Australian Government
Department of Agriculture, Fisheries and Forestry
ABARES

Australian Country Report

Ecologically Related Species in the Australian Southern Bluefin Tuna Fishery 2009–10

Heather M. Patterson, Patricia I. Hobsbawn, Ilona Stobutzki

Research by the Australian Bureau of Agricultural And Resource Economics and Sciences

February 2012

Patterson HM, Hobsbawn PI, Stobutzki I 2011, Australian Country Report: Ecologically related species in the Australian Southern Bluefin Tuna Fishery 2009–10, ABARES report to client prepared for the Commission for the Conservation of Southern Bluefin Tuna, Canberra, February.

Department of Agriculture, Fisheries and Forestry
Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)
Postal address GPO Box 1563 Canberra ACT 2601
Switchboard +61 2 6272 2010
Facsimile +61 2 6272 2001
Email info.abares@daff.gov.au
Web www.daff.gov.au/abares

Acknowledgements

The authors thank Rupert Summerson for creating the maps. In addition, Matt Daniel, Trent Timmiss, Jonathon Barrington, Graham Robertson, Kathryn Read and Johnathon Davey are thanked for their useful comments and input.

Contents

Summary 1
1 Introduction 2
2 Review of SBT Fisheries 3
Fleet size and distribution 3
Distribution of catch and effort 6
3 Fisheries monitoring for each fleet 8
Catch documentation 8
Observer programs 8
Vessel Monitoring System 9
Port monitoring 9
4 Seabirds 10
Observed seabird interactions 10
Non-observed seabird interactions 12
5 Non-target fish 13
Scalefish 13
Sharks 14
6 Marine mammals and marine reptiles 17
7 Mitigation measures to minimise seabird and other species bycatch 18
Current measures 19
Measures under development/testing 22
8 Public relations and education activities 26
Public relations activities 26
Education 26
9 Information on other ERS (non-bycatch) such as prey and predator species 28
10 Other 29
11 Implementation of the IPOA-Seabirds and IPOA-Sharks 30
References 31
Appendix I 32
Mandatory Seabird Mitigation Measures in the ETBF 2012 32
Appendix II 33
Mandatory Seabird Mitigation Measures in the WTBF 2012 33
Appendix III 34
Summary of Working Papers Submitted by Australia 34

Summary

Purpose

This report includes information and data on ecologically related species (ERS) from Australia's southern bluefin tuna (SBT) fisheries for the 2008–09 and 2009–10 SBT fishing seasons and some preliminary results for the 2010–11 fishing season.

Catch and effort

Australian SBT catches for the 2009 and 2010 calendar years were 5108 t and 4199 t, respectively. The 2008–09 quota year catch was 5242 t, and the 2009–10 quota year catch was 4091 t. Note that Australia's SBT quota for the 2009–10 and 2010–11 fishing seasons was set at 8030 t total over the two seasons, and fishers were permitted to take up to 5265 t (the quota from the 2008–09 season) in the first of these fishing seasons.

In 2008–09, 30 vessels landed SBT in Australian waters: 95.7 per cent of the catch was taken by 7 purse seiners off South Australia, with the remaining 4.3 per cent taken by 1 pole-and-line vessel in the Western Tuna and Billfish Fishery (WTBF); 21 longliners in the Eastern Tuna and Billfish Fishery (ETBF), and 1 purse seiner in the ETBF.

In 2009–10, 23 vessels landed SBT: 96.0 per cent of the catch was taken by 7 purse seiners off South Australia with the remaining 4.0 per cent taken by 16 longliners in the ETBF. No SBT were caught in the WTBF singe 2006–07.

Observer coverage

In 2008–09, observers monitored 7.9 per cent of purse seine sets. In 2008, observers monitored 47.9 per cent of hooks in the ETBF during the months and areas of the SBT migration, and 16.7 per cent of operations in the WTBF.

In 2009–10, purse-seine coverage was 9.0 per cent of sets. In 2009, a coverage level of 17.2 per cent of hook effort was achieved in the ETBF during the months and in the areas of the SBT migration. Observers were present on three purse seine trips in the ETBF. Observers monitored 8.5 per cent of operations in the WTBF in 2009.

In 2010–11, purse-seine coverage was 20.2 per cent of sets. In 2010, a coverage level of 7.7 per cent of hook effort was achieved in the ETBF during the months and in the areas of the SBT migration. Observers monitored 2.5 per cent of operations in the WTBF in 2010.

Interactions with ERS

Details of ERS interactions in the SBT fishery and ETBF are provided in the report. Interactions are limited in the SBT purse seine fishery given the very targeted nature of the fishery. No interactions are reported for the WTBF as no SBT have been taken in this fishery since 2006–07.

Mitigation measures

Australia has implemented mitigation measures to address seabird and turtle bycatch in the longline fisheries and continues to test and develop further measures including line-weighting regimes.

1 Introduction

Three domestic fisheries managed by the Australian Government catch southern bluefin tuna (SBT; *Thunnus maccoyii*) in varying quantities: the Southern Bluefin Tuna Fishery (SBTF), Eastern Tuna and Billfish Fishery (ETBF) and the Western Tuna and Billfish Fishery (WTBF). The SBTF targets SBT in the Great Australian Bight using purse seine, with the fishing season from 1 December to 30 November[1]. After capture, the SBT are transferred to grow-out cages and fattened for up to approximately 6 months before being harvested. The ETBF and WTBF are longline fisheries primarily targeting yellowfin tuna (*Thunnus albacares*), bigeye tuna (*Thunnus obesus*), albacore (*Thunnus alalunga*), swordfish (*Xiphias gladius*) and striped marlin (*Tetrapturus audax*). Longlining for SBT occurs primarily in the Australian winter months between May and October. The fishing season in the WTBF begins on 1 February each year, while in the ETBF the fishing season begins on 1 March. Because the three fisheries have distinct characteristics and management plans, they are separated within this report.

Australia separates its ecologically related species (ERS), or non-target catch, into byproduct and bycatch (including threatened, endangered and protected [TEP] species). The longline fisheries are multi-species fisheries that, while being relatively selective, catch a range of fish and shark species and have reported interactions with seabirds and, to a lesser extent, marine turtles. Much of the non-target catch in the SBTF, ETBF and WTBF is considered byproduct and is sold commercially. A reduction in discarding of species with little commercial value has been a focus of recent management initiatives. In contrast to the ETBF and WTBF longline fisheries, the SBTF has very little interaction with ERS as the purse seine is highly selective.

Australia as a whole has made considerable investments to mitigate the rate of seabird, turtle and shark interactions and capture during longline fishing operations. Through government and industry initiatives, the incidence of seabird bycatch during longline operations has declined in recent years. Australia has also completed research on mitigation measures to reduce the capture of sharks and marine turtles in longline fisheries (Ward et al. 2008, 2009).

This report includes information and data on ERS interactions in Australia's SBT fisheries for the 2008–09 and 2009–10 SBT fishing seasons, with some preliminary results for 2010–11.

[1] Various time periods, such as 'calendar years', 'fishing seasons' and Australian 'quota years', can be used when describing Australia's SBTF. Unless otherwise indicated, we have used fishing seasons in this report, but note that fishing seasons of the various fishery components often span quota years.

2 Review of SBT Fisheries

Fleet size and distribution

Historical fleet size and distribution

Fishing for SBT began in the early 1950s off New South Wales and South Australia and then later, in 1970, off Western Australia. The catch, then used primarily for canning, peaked at 21 500 t in 1982.

Progressively over the mid to late 1980s, the Australian catch focused on supplying the Japanese sashimi market. The introduction of an individual transferable quota-based management plan in 1984, based on an Australian total allowable catch (TAC) of 14 500 t, resulted in the redistribution of quota ownership. In the late 1980s, the Australian quota was reduced to 5265 t, which led to further restructuring of quota distribution. Since 1992 there has been a progressive increase in the proportion of SBT taken under farming operations. Currently, 96 per cent of the Australian SBT quota is captured using the purse-seine method.

From 1990 to 1994, approximately half the Australian quota was taken by Australia-Japan joint venture longliners. With the termination of the joint venture arrangement in 1995, Australian catches again focused on the surface fishery with poling operations supplying the fresh chilled sashimi market and purse seiners providing SBT to farms for mariculture.

In the past there has been longlining for SBT off New South Wales, Tasmania and Western Australia, with occasional catches in South Australian waters. There were also some purse seine, trolling and poling operations in the offshore waters of the Australian Fishing Zone (AFZ). Currently, longlining in which SBT is taken occurs primarily off south eastern New South Wales during the winter months (May to October).

To minimise the risk of non-quota take of SBT by longline vessels off New South Wales and Western Australia, access to the waters through which SBT migrate has been restricted to vessels holding SBT quota since 2000 off New South Wales and 2001 off Western Australia. This arrangement has resulted in a significant reduction in longline effort in southern areas, and corresponding reductions in seabird and other species bycatch interactions.

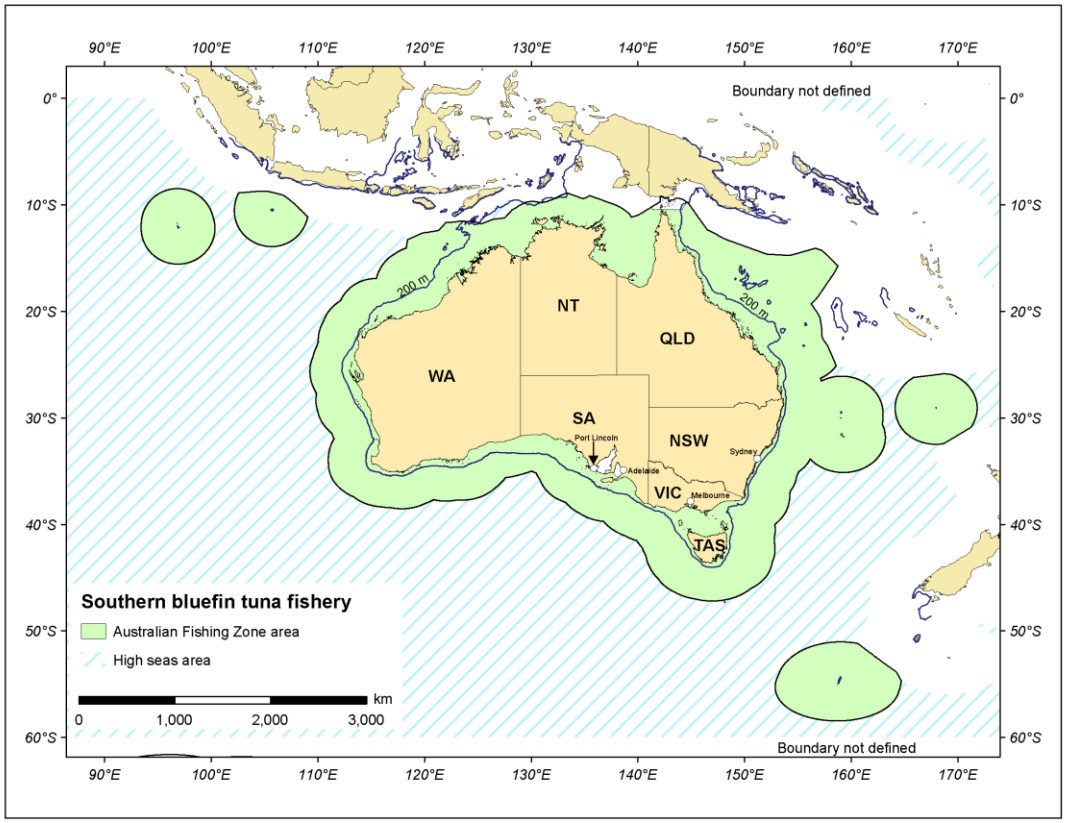
Current fleet size and distribution

Southern Bluefin Tuna Fishery

All SBT caught commercially in Australia is taken under the Southern Bluefin Tuna Fishery Management Plan 1995 and is required to be covered by quota. The area of the SBTF encompasses the entire AFZ and extends onto the high seas (Figure 1). The AFZ is defined consistently with Australia's Exclusive Economic Zone (EEZ) and extends out to 200 nautical miles from the coast. There are two main components for the fishery: the purse seine fleet operating out of Port Lincoln, South Australia, and longline fleets operating off eastern and western Australia, which take SBT as a byproduct of fishing for other tuna or billfish species. To longline in these areas, operators are required to have a Boat Statutory Fishing Right in either the ETBF or WTBF and at least some uncaught quota for target species. Management measures in terms of gear restrictions and bycatch are managed separately in these fisheries.

The purse seine fleet operating out of Port Lincoln currently takes 96 per cent of the total SBT commercial catch, fishing in the Great Australian Bight. The SBT are towed back to Port Lincoln, transferred into grow-out pontoons and farmed for up to 6 months before harvest. In 2008–09 to 2009–10, SBT were also landed by the ETBF from waters off New South Wales. No SBT were have been caught in the WTBF since 2006–07.

Figure 1 Area of Australia's Southern Bluefin Tuna Fishery



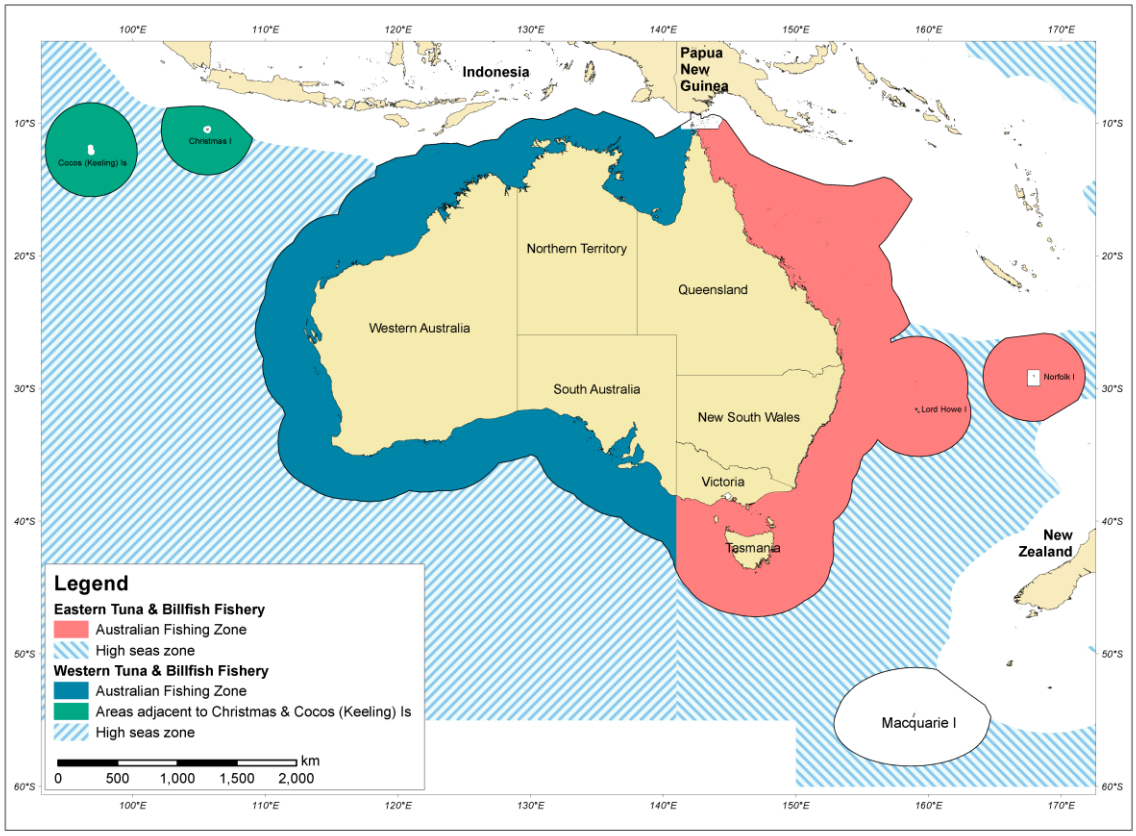
Eastern Tuna and Billfish Fishery

The ETBF extends from Cape York to the Victoria–South Australia border, including waters around Tasmania (Figure 2). Domestic longline vessels are mostly 15–25 m long and use monofilament gear. Fishing practices vary with target species, location and season. Vessels usually conduct one longline operation per day or night, depending on the target species. A typical longline set will comprise about 1200 hooks. Fishers commonly operate around 107 days per year. Most trips are between 2 and 15 days, but occasionally trips extend up to 30 days. Typical fishing trips range from 40–300 nautical miles from port, though in the past some vessels journeyed out to 1000 nautical miles or further to fish.

The *Eastern Tuna and Billfish Fishery Management Plan* 2010 came into effect on 1 March 2011. The Plan outlines specific ecosystem requirements, the process for setting total allowable commercial catch (TACC) limits and the provisions for granting of statutory fishing rights (SFRs) in the ETBF. This is the first time that TACCs have been permanently implemented in the ETBF and marks a significant change in management as the fishery moves from input controls based on total allowable effort to output controls with individually transferable quotas operating

under a TACC. The species managed under the ETBF Plan include albacore tuna, bigeye tuna, billfish, longtail tuna, northern bluefin tuna, Ray's bream, skipjack tuna and yellowfin tuna.

Figure 2 Area of Australia's Eastern and Western Tuna and Billfish Fisheries



Western Tuna and Billfish Fishery

The WTBF encompasses the area of the AFZ off the northern, western and southern coastline westward from Cape York Peninsula (142°30'E) off Queensland to 141°E at the Victoria–South Australia boarder (Figure 2). The fishery includes waters seaward of territorial waters (outside 12 nautical miles from the coast) adjacent to Christmas and Cocos (Keeling) Islands and high seas areas throughout the Indian Ocean, consistent with the area of competency of the Indian Ocean Tuna Commission. Most longline vessels in the fishery are 15–25 m long and set 1000–1500 hooks on monofilament lines, with an average of one set per day. Vessels fish throughout the year with an average trip of 4 to 10 days.

The *Western Tuna and Billfish Management Plan* 2005 came into effect on 12 November 2006. The WTBF Plan removes the internal barrier at 34°S, which had previously separated the Southern and the Western Tuna and Billfish Fisheries, and renamed the entire area the 'Western Tuna and Billfish Fishery'. The WTBF Plan provides for a system of individual transferable quota SFRs, with the quota species including bigeye tuna, yellowfin tuna, striped marlin and broadbill swordfish. For one fishing season, each SFR entitles an equal share to the TAC for the relevant species.

Distribution of catch and effort

The Australian domestic SBT catches for the 2009 and 2010 calendar years were 5108 t and 4199 t, respectively. The 2008–09 quota year catch was 5242 t, and the 2009–10 quota year catch was 4091 t. Note that Australia's SBT total allowable catch (TAC) for the 2009–10 and 2010–11 fishing seasons was set at 8030 t total over the two seasons, and fishers were permitted to take up to 5265 t (the quota from the 2008–09 season) in the 2009–10 fishing season.

In 2008–09, 30 vessels landed SBT in Australian waters: 95.7 per cent of the catch was taken by 7 purse seiners off South Australia (with a total of 139 sets), and the remainder by 1 pole-and-line vessel in the WTBF; 21 longliners in the ETBF, deploying a total of 1 048 000 hooks; and 1 purse seiner in the ETBF (Figures 3a and 3b[2]).

In 2009–10, 23 vessels landed SBT: 96.0 per cent of the catch was taken by seven purse seiners off South Australia (with a total of 78 sets) and the remainder by 16 longliners in the ETBF, deploying a total of 1 032 087 hooks (Figures 3a and 3b).

No SBT were caught by longline in the WTBF in 2008–09 or 2009–10.

Australian longliners generally target more than one species in the fishing season and the targeted effort (number of hooks targeting SBT) is not distinguishable from logbooks.

[2] SBT catch has been filtered so that only operations from a total of five or more vessels over the time period from 2008–09 to 2010–11 are shown. The catch was first aggregated using a kernel density algorithm at a spatial resolution of 25 km square. A neighbourhood analysis was then carried out on the same data and at the same spatial resolution; only the cells where five boats or more operated were then used to make the final map of catch per units of area. The footprint shows grid cells at a spatial resolution of one degree (111 km square) where vessels have reported catch during the time period.

Figure 3a Location of SBT catch by purse seine in 2008–09, 2009–10 and 2010–11.

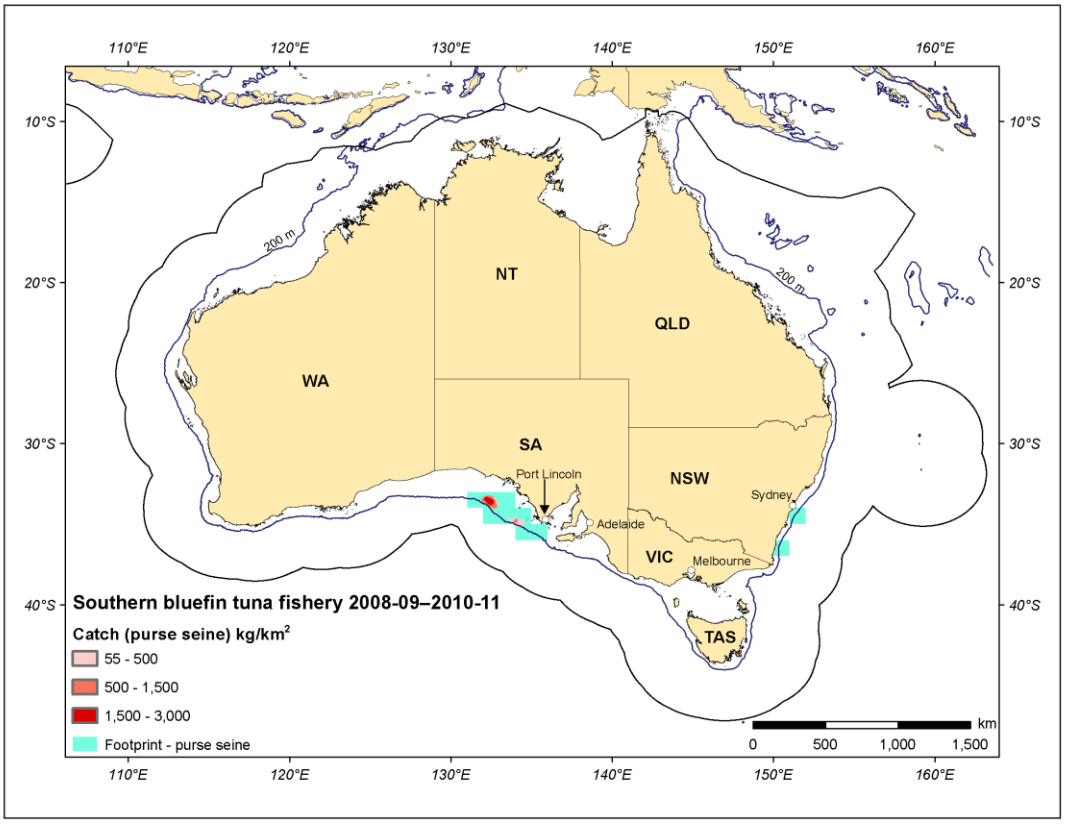
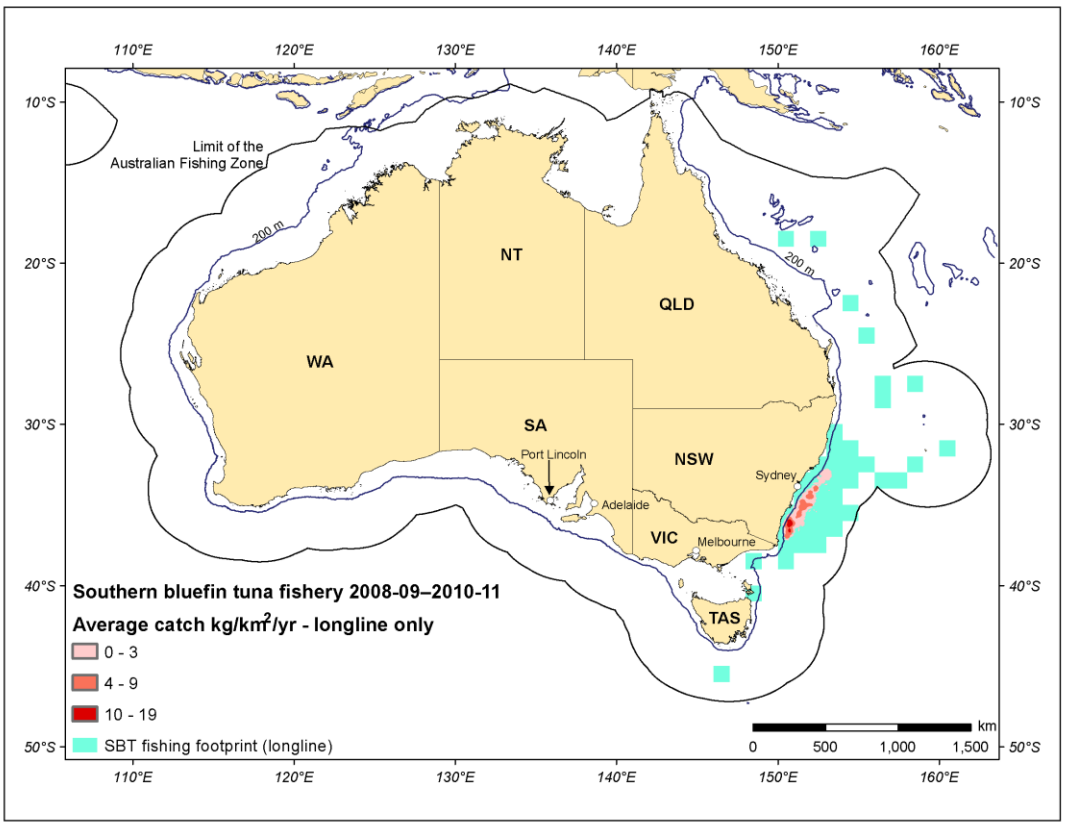


Figure 3b Location of SBT catch by longline in 2008–09, 2009–10 and 2010–11.



3 Fisheries monitoring for each fleet

Catch documentation

There are a series of compulsory fishery-specific logbooks and associated catch disposal records that are required by law to be completed by Australian fishers. Current fishery-specific logbooks and catch disposal records can be downloaded from http://www.afma.gov.au/services-for-industry/logbooks-and-catch-disposal/current-logbooks-and-catch-disposal-records/. All of the data provided in logbooks and catch disposal records must be supplied to the Australian Fisheries Management Authority (AFMA) within specified time periods. Verification of these data is undertaken through observer programs and, as a minimum, through an annual audit process undertaken by AFMA. In addition, specific reporting forms for threatened, endangered or protected (TEP) species are included with the fishery-specific logbooks in all Australian Commonwealth fisheries.

Observer programs

Observer programs for the purse seine and longline fisheries have been in place for a number of years. The observer program began in 2001 in the ETBF and 2003 in the WTBF and SBTF. Approximately 20 observers are currently employed in the AFMA observer program. They are sourced from universities and the maritime industries 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 must complete an AFMA observer training course.

Observer reports include details of daily fishing operations, the mitigation measures employed and any non-target species interactions. In terms of ERS species interactions, the number (and weight where appropriate) of each species caught is recorded for each shot observed as well as the life status (alive, dead, injured) and whether it was retained or discarded. Australia's observer program aims to monitor 10 per cent of SBT fishing activities and employs international and domestic observers in compliance with CCSBT observer standards.

In the 2008–09 quota year, observers monitored 7.9 per cent of purse seine sets where fish were retained, and 15.3 per cent of the estimated SBT catch. In the 2008 calendar year, observers monitored 47.9 per cent of hooks in the ETBF during the months and in the areas of the SBT migration through that fishery. Observers monitored 16.7 per cent of operations in the WTBF in 2008, though only one vessel operated in the fishery during this period (Hobsbawn et al. 2009).

In the 2009–10 quota year, observers monitored 9.0 per cent of purse seine sets and 13.5 per cent of the estimated SBT catch. In 2009, observers also monitored 17.2 per cent of longline hook effort in the ETBF during the months and in the areas of the SBT migration through that fishery. Observers were present on three purse seine trips in the ETBF. Observers monitored 8.5 per cent of longline hook effort in the WTBF, but only three vessels operated in the fishery (Hobsbawn et al. 2010).

In the 2010–11 fishing season, the purse-seine coverage was 20.2 per cent of sets and 12.4 per cent of the estimated SBT catch. In 2010, a coverage level of 7.7 per cent of hook effort was achieved in the longline ETBF south of 30°S from May to September (the months in which SBT are generally caught). A coverage rate of 2.5 per cent of operations was achieved in the WTBF in the 2010 calendar year, when only three vessels operated in the fishery (Hobsbawn et al. 2011).

Vessel Monitoring System

All Australian longline vessels, including those that catch SBT, as well as purse seine vessels in the ETBF or WTBF, are required to operate Integrated Computer Vessel Monitoring Systems (ICVMS) while fishing and transiting to and from fishing grounds. This allows real-time vessel position and activity reporting to a central Vessel Monitoring Systems (VMS) operations area at AFMA.

Australian SBT purse seine and tow vessels off Port Lincoln are required to report their locations and catch details on a daily basis. This may be done by ICVMS, or at sea by satellite phone, mobile phone or fax.

Port monitoring

Australian fisheries officers conduct random inspections of landings at key SBT ports, as well as at-sea boardings and inspection of vessels taking SBT in the longline and purse seine fisheries.

Compliance risk assessments for all sectors taking SBT are completed annually. Likewise, a specific compliance operational plan is developed and implemented on an annual basis for each fishery.

4 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. Bait is not used when purse seining, the therefore rate of seabird interactions in this sector is very low.

Oceanic longline fishing is listed as a key threatening process for seabirds under the *Environmental Protection and Biodiversity Conservation Act* 1999 (EPBC Act 1999), requiring the development of a Threat Abatement Plan (TAP) for the Incidental Catch (or bycatch) of Seabirds during Oceanic Longline Fishing Operations (Anon 2006). The current TAP (2006) requires the ETBF and WTBF 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 season (1 September–30 April; 1 May–31 August). The TAP is currently under review, which will be completed in 2013.

Australia has implemented fishing permit conditions that are designed to prevent the capture of seabirds. For example, Australian vessel fishing south of 25°S must use of seabird streamers or 'tori' lines to prevent seabirds from diving on the line, and line weighting to quickly sink the line out of reach of seabirds.

Vessel/crew responses to interactions with seabirds are mandated in the TAP. 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.

Observed seabird interactions

Southern Bluefin Tuna Fishery

There are very few recorded incidences of seabirds interacting with fishing vessels or gear in the SBTF. There have been no observed seabird interactions in the purse-seine sector since 2007–08.

Eastern Tuna and Billfish Fishery

Of the Commonwealth fisheries that interact with SBT, the only one with a substantive seabird interaction rate is the ETBF. With the implementation of the TAP, a large proportion of the longline fleet on the east coast began to set their lines during the night to avoid interactions with albatross species. In doing so, they dramatically reduced the probability of catching albatross but increased the probability of catching of shearwaters. Through a number of at-sea trials with a variety of mitigation measures, the catch of all seabirds has been reduced to a level under the 0.05 seabirds per 1000 hooks set as the performance indicator under the TAP (Lawrence et al. 2009).

Table 1a gives the observed interactions (where contact has been made with fishing gear) of seabirds for the Australian ETBF from 2006 to 2010, as reported to the Western and Central Pacific Fisheries Commission (WCPFC) (Patterson and Sahlqvist 2011). Note that interactions have been reported for all observed shots in the ETBF, not only those shots in which SBT were caught. Table 1b provides catch per unit effort (CPUE) estimates for observed interactions. Note that these estimates are not standardised and are for the entire WCPFC Area of Competence and also include non-SBT shots. The estimates are therefore not robust.

Table 1a Observed interactions (gear contact) between seabird species and ETBF vessels in the WCPFC Area of Competence, 2006 to 2010. Note: data are from all observed shots in the ETBF, not only those in which SBT were captured (Patterson and Sahlqvist 2011).

Common name	Scientific name	2006	2007	2008	2009	2010
Black-browed albatross	*Thalassarche melanophrys*	1	2	2	3	0
Buller's albatross	*Thalassarche bulleri*	1	0	1	0	0
Shy albatross	*Thalassarche cauta*	2	0	1	1	0
Wandering albatross	*Diomedea exulans*	1	3	1	0	0
Yellow-nosed albatross	*Thalassarche chlororhynchos*	0	0	0	0	1
Albatrosses (other)	-	0	0	2	1	0
Flesh-footed shearwater	*Puffinus carneipes*	1	0	0	0	0
Cape petrel	*Daption capense*	0	3	0	0	0
Great skua	*Catharctica skua*	0	3	0	0	0
TOTAL		6	11	7	5	1

Table 1b CPUE for observed interactions (gear contact) between seabird species and ETBF vessels in the WCPFC Area of Competence, 2008 to 2010. Hook numbers are presented as thousands of observed hooks. CPUE is given as number of observed interactions per thousand observed hooks. Note: data are from all observed shots in the ETBF, not only those in which SBT were captured (Patterson and Sahlqvist 2011).

Year	Hooks ('000)	Number	CPUE
2008	738.971	7	0.009
2009	564.008	5	0.009
2010	284.731	1	0.004

Western Tuna and Billfish Fishery

No SBT were caught in the longlining operations of the WTBF in 2008–09 or 2009–10 . The prevalence of seabirds on the west coast of Australia is considerably less than that of the east coast. In addition to the lower abundance of seabirds, the majority of the fleet in the WTBF targets broadbill swordfish and therefore sets 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 on WTBF vessels in 2010 recorded no interactions with seabirds.

Non-observed seabird interactions

Southern Bluefin Tuna Fishery

No seabird interactions have been recorded in logbooks for the purse seine fishery.

Eastern Tuna and Billfish Fishery

Fishers in the ETBF encounter SBT during a limited time of the year when SBT migrate into the ETBF area, typically May to September. In addition, fishing for SBT is permitted only in designated areas. To minimise the risk of non-quota take of SBT by longliners off New South Wales, access to the waters through which SBT migrate has been restricted to only vessels holding SBT quota. This arrangement has resulted in a significant reduction in longline effort in southern areas, and corresponding reductions in seabird and bycatch species interactions. Table 2 provides the number of seabirds released alive, and mortalities, for 2006 to 2010 during May to September south of 30°S (i.e. when SBT fishing was occurring) recorded in logbooks.

Table 2 Seabird numbers from logbooks in the ETBF (south of 30°S from May to September) for 2006 to 2010. Both numbers released alive and mortalities (in parentheses) are provided.

Common name	Scientific name	2006	2007	2008	2009	2010
Albatross	unknown	-	-	3(2)	-	-
Black-browed albatross	*Thalassarche melanophrys*	-	0(1)	0(1)	1(0)	-
Mollymawk	unknown	2(4)	-	-	-	1(0)
Seabird	unknown	1(1)	0(1)	-	-	-
Shy albatross	*Thalassarche cauta*	-	-	0(1)	-	-
Yellow-nosed albatross	*Diomedea chlororhynchos*	-	-	-	-	0(1)

Western Tuna and Billfish Fishery

No SBT were caught inlongline operations in the WTBF during the recent fishing seasons (2008–09 and 2009–10). Seabird interactions occurring in the WTBF are reported annually to the Indian Ocean Tuna Commission (IOTC) (e.g. Hobsbawn et al. 2011).

5 Non-target fish

Scalefish

Southern Bluefin Tuna Fishery

The purse seine fishery is highly selective and takes few non-target scalefish. Because purse seine trips often exceed 20 days and there are limited freezer facilities on board, any non-target fish catch is generally discarded. There is no non-target catch recorded in logbooks for the 2008–09 and 2009–10 fishing seasons.

Eastern Tuna and Billfish Fishery

Table 3 provides commercial logbook records of non-target fish catch for the ETBF from 2006 to 2010. Again, only fish captured when fishing for SBT was taking place are provided.

Table 3 Non-target fish numbers from logbooks in the ETBF (south of 30°S from May to September) for 2006 to 2010. Both numbers retained and discarded (in parentheses) are provided. Only non-target species with numbers greater than 20 for any given year are provided.

Common name	Scientific name	2006	2007	2008	2009	2010
Escolar	*Lepidocybium flavobrunneum*	227(1)	1291(21)	345(7)	739(2)	87(6)
Lancet fish	*Alepisaurus spp.*	1(130)	20(1022)	0(145)	32(509)	6(294)
Mahi mahi	*Coryphaena hippurus*	60(0)	149(0)	99(0)	291(0)	1182(1)
Moonfish	*Lampris guttatus*	-	61(0)	294(0)	96(1)	-
Ocean sunfish	*Mola mola*	0(24)	1(21)	0(26)	3(58)	0(56)
Oilfish	*Ruvettus pretiosus*	-	65(3)	-	-	-
Ray's bream	*Brama brama*	479(0)	3092(1)	7162(0)	3258(8)	1926(2)
Rudderfish	*Centrolophus niger*	490(1)	733(1)	1420(0)	1151(2)	1407(3)
Short-billed spearfish	*Tetrapturus angustirostris*	-	-	-	-	25(2)
Skipjack tuna	*Katsuwanus pelamis*	263(15)	88(0)	719(0)	1518(0)	116(3)
Striped trumpeter	*Latris lineata*	32(0)	-	281(0)	161(0)	-

Western Tuna and Billfish Fishery

No SBT were caught in the longline operations of the WTBF during the recent fishing seasons (2008–09 and 2009–10). The catch of non-target fish species in the WTBF is reported annually to the IOTC (e.g. Hobsbawn et al. 2011).

Sharks

Southern Bluefin Tuna Fishery

Bycatch of sharks during pole-and-line and purse seine fishing (including farm operations) for SBT is minimal. Sharks taken incidentally during purse seining are able to be released before the net is retrieved and fish are transferred to tow cages. Sharks are known to interact with tow cages containing SBT being towed back to farms, and divers work to release these sharks alive. No interactions between purse-seiners and sharks were recorded in the SBT Fishery in 2008–09 or 2009–10. In 2010–11, two white sharks (*Carcharodon carcharias*) were caught in a purse seine. The net was dropped and both sharks were released alive.

Eastern and Western Tuna and Billfish Fishery

If more than 20 sharks are caught in the ETBF and WTBF per trip they are classified as bycatch and must be discarded whether alive or dead. To reduce the capture of sharks in these fisheries, the use of wire tracers was banned in the WTBF and ETBF in 2001 and 2005, respectively (see Ward et al. 2008 for further details). No SBT have been caught in the longline operations of the WTBF since 2006–07 and shark catches in the WTBF are reported annually to the IOTC (e.g. Hobsbawn et al. 2011). Shark catch details from the ETBF are provided in Table 4a. Table 4b provides basic estimates of CPUE using observed shark data from the entire WCPFC Area of Competence. These estimates are not standardised and are therefore not considered robust.

Table 4a Shark numbers from logbooks in the ETBF (south of 30°S from May to September) for 2006 to 2010. Both numbers retained and discarded (in parentheses) are provided.

Common name	Scientific name	2006	2007	2008	2009	2010
Blacktip shark	*Carcharhinus* spp.	4(0)	1(5)	2(1)	1(0)	10(0)
Blue shark	*Prionace glauca*	55(29)	37(191)	19(96)	104(728)	65(1990)
Bronze whaler	*Carcharhinus brachyurus*	24(11)	23(32)	10(4)	14(3)	34(3)
Crocodile shark	*Pseudocarcharias kamoharai*	-	0(1)	-	-	-
Dusky whaler	*Carcharhinus obscurus*	0(1)	-	4(0)	2(2)	1(44)
Gummy shark	*Mustelus antarcticus*	-	-	2(0)	-	-
Hammerhead	*Sphyrna* spp.	90(0)	5(0)	53(0)	7(0)	22(0)
Longfin mako	*Isurus paucus*	-	-	-	-	0(1)
Manta ray	*Manta birostris*	0(2)	-	0(1)	0(2)	0(2)
Oceanic whitetip	*Carcharhinus longimanus*	1(0)	1(6)	-	5(0)	-
Porbeagle	*Lamna nasus*	1(1)	-	-	-	1(0)
Shortfin mako	*Isurus oxyrinchus*	235(3)	150(9)	419(1)	687(135)	619(87)
Stingray	*Dasyatidae*	-	-	-	-	0(7)
Thresher	*Alopias vulpinus*	0(1)	0(14)	0(6)	1(9)	2(5)
Tiger shark	*Galeocerdo cuvier*	21(3)	24(22)	19(1)	40(1)	48(19)
White shark	*Carcharodon carcharias*	-	0(1)	-	-	-

Table 4b CPUE estimates for observed interactions (gear contact) between shark species (in total) and ETBF vessels in the WCPFC Area of Competence, 2008 to 2010. Hook numbers are presented as thousands of observed hooks. CPUE is given as number of observed interactions per thousand observed hooks. Note: data are from all observed shots in the ETBF, not only those in which SBT were captured (Patterson and Sahlqvist 2011).

Year	Hooks ('000)	Number	CPUE
2008	738.971	1296	1.75
2009	564.008	1087	1.93
2010	284.731	1072	3.76

Note that 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 for protection under Australia's *Environment Protection and Biodiversity Conservation Act* (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.

6 Marine mammals and marine reptiles

The ETBF and WTBF longline fisheries and the SBTF all have a very low incidence of marine mammal and reptile interactions.

Southern Bluefin Tuna Fishery

No sea turtle interactions were recorded in the SBT Fishery in 2008–09 or 2009–10. In 2009–10, a single interaction with an unidentified seal was reported. The seal was released alive.

Eastern Tuna and Billfish Fishery

Interactions with marine mammals and reptiles in the ETBF while fishing for SBT (i.e. between May and September south of 30°S) were very low between 2006 and 2010. In 2008, two unidentified seals were recorded in ETBF logbooks. Both were released alive. In 2010, logbooks record that one leatherback turtle was released alive.

Western Tuna and Billfish Fishery

No SBT have been caught in the longline operations of the WTBF in the past several fishing seasons (since 2006–07)

7 Mitigation measures to minimise seabird and other species bycatch

In Australia, the EPBC Act (1999) is the primary legislation that 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/Northern Territory wild capture marine fisheries with an export component be assessed to determine the extent to which management arrangements will ensure each fishery is 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 should 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. Initial and subsequent assessments have been completed for the SBT Fishery, ETBF and WTBF (see http://environment.gov.au/coasts/fisheries/commonwealth/index.html), and continue to guide the development of improved management arrangements to reduce the ecological impacts of Australian fisheries catching SBT.

Measures to reduce the ecological impacts of fisheries catching SBT rely initially on the analysis of fishery-dependent and -independent data collected through observer programs, logbooks and targeted research activities. As more data are collected and the impacts of SBT fishing operations on 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 SBT surface fishery (2003), and its longline fisheries targeting SBT (2001 and 2003 for the ETBF and WTBF, respectively), which include specific reporting requirements for 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 hook sink rates, see Table 5)
- Introduced detailed strategies to reduce bycatch and impacts on ecologically related species, 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 completed ecological risk assessments for each fishery managed by the Commonwealth to quantify impacts on ecologically related species and the broader marine environment (http://www.afma.gov.au/managing-our-fisheries/environment-and-sustainability/Ecological-Risk-Management/). Ecological risk management reports for the SBTF, ETBF and WTBF are also available and detail management priorities in those fisheries, based on the results of the assessments. 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 inter alia susceptibility to capture by the various fishing methods, their distribution, and the ability for species populations to recover.

Current measures

Mandatory measures for each fleet

Mitigation measures to minimise seabird bycatch

As previously noted, under Commonwealth legislation (now the EPBC Act), a TAP was prepared and approved by the Minister for the Environment on 2 August 1998. A review of the TAP was carried out under subsection 279(2) of the EPBC Act and a new TAP was approved in 2006 (Anon 2006). The TAP is currently under review. The provisions of the TAP apply to all longline fisheries managed by the Australian Government. The TAP (2006) is now under review.

In the TAP (2006) 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

    c. 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 the performance criteria for each fishery (Anon 2006).

Following experiments showing that 40g weights placed directly at the hook exhibit greater sink rates than the weighting regime of 60g at 3.5m from the hook and sea trials showing that there

was no significant impact on catch rates of commercial species, AFMA has implemented permit conditions to allow 40g weights to be used with dead bait. The new conditions are implemented from 1 February (WTBF) and 1 March (ETBF) 2012. Operators are still permitted to use 60g, 3.5m from the hook. In addition, 40g weights at the hook are coated with luminescent plastic which reduces the need to use light sticks. Further trials to investigate the sink rates and commercial impact of using 40g weights at the hook with live weight are being conducted. See Table 5 for more information on the testing of the 40g weights. See Appendix I and II for specific measures required for the ETBF and WTBF in 2012.

Mitigation measures to minimise shark bycatch

Australia has developed a National Plan of Action for the Conservation and Management of Sharks (Shark-plan 2004) in line with the FAO International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks). This plan is currently under review with a draft provided for public comment in 2011. Accordingly, regulations have been put in place in the longline sector to minimise shark bycatch and prevent indiscriminate finning.

The regulations applying to the ETBF and WTBF are:

- A ban on the use of wire leaders
- A limit of 20 sharks per trip, excluding school shark, gummy shark, elephantfish (Callorhinchidae), chimaerids (Chimaeridae and Rhinochimaeridae) and sawshark. This limit does not apply to great white sharks and grey nurse sharks, which are no-take TEP 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

Mitigation measures to minimise sea turtle bycatch

Interactions between sea turtles and pelagic longline fisheries in the AFZ are rare. Guidelines for mitigating the impact of longline fisheries on marine turtles are described under 'Voluntary measures for each fleet', although there is compulsory carriage of line cutters and dehookers. Interactions with the purse seine fishery are negligible and there has been no need to develop mitigation measures for this sector.

In 2009, Australia formally submitted a mitigation plan, *Eastern Tuna and Billfish Fishery Sea Turtle Mitigation Plan*, for review by the Western and Central Pacific Fisheries Commission Scientific Committee and Technical Compliance Committee, and approval by the Commission. The mitigation plan was submitted under CMM 2008-03 (Conservation and Management of Sea Turtles) and was designed to reduce the interaction rate of turtles in pelagic longline fisheries which target swordfish. In an Australian context, the fishery to which this measure has the most relevance is the ETBF. It took effect 1 January 2010.

Mitigation measures to minimise fish bycatch

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

Compliance monitoring system

AFMA's observer program currently places observers on domestic and, if required, foreign vessels fishing within the AFZ and some adjacent areas under international arrangements. Observers are trained in specialised sampling techniques including environmental observations, and are briefed to educate fishers on their responsibilities to complete logbooks and other data sources, and to use mitigation strategies to reduce impacts on ERS.

AFMA has a responsibility to enforce the provisions of the Fisheries Management Act 1991 and the Torres Strait Fisheries Act 1984 through the detection and investigation of illegal activities by both domestic and foreign fishing boats in the AFZ and Commonwealth-managed fisheries. The Australian Customs and Border Protection Services also patrol waters in the AFZ as part of the Australian Government's anti-illegal fishing strategy.

Voluntary measures for each fleet

'Industry codes of practice' are in place for a number of fisheries, including the ETBF. These generally include voluntary bycatch mitigation measures together with handling and release guidelines for seabirds, including:

- Puncturing of swim bladders of thawed baits to increase sinking rates
- Gear selection that minimises the probability of seabird bycatch
- Promoting safe handling and release of seabirds caught alive on longlines.

AFMA has run a 'seabird bycatch education program' in the ETBF to teach fishers about fishing practices designed to minimise seabird bycatch, effective line weighting, and correctly assembling/deploying tori lines.

A recovery plan for sea turtles in Australia has been developed by the Australian Government Department of the Sustainability, Environment, Water, Populations and Communities (DSEWPaC). 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 recovery plan can be obtained from http://www.environment.gov.au/coasts/publications/turtle-recovery/index.html.

A video 'Crossing the line: sea turtle handling guidelines for the longline fishing industry' has been produced by the Fisheries Research and Development Corporation to help the Australian longline fishing industry minimise its impact on sea turtle populations. It shows how to use de-hooking devices on deck and on turtles still in the water, how to safely bring turtles aboard and handle them on deck, how to help comatose turtles recover and how to release them back into the water. Similarly, AFMA conducted port visits in 2011 in the ETBF to provide de-hookers to all boats with instructions on how to use them and on safe handling of marine turtles.

Measures under development/testing

Australia has conducted a number of scientific trials to reduce seabird bycatch, including a variety of line-weighting trials, methods to increase line sink rates and an underwater bait setting machine (Table 5). Scientific studies have been conducted to investigate the most appropriate minimum sink rate of line, differences in the sink rates of live and dead baits, the sink rates of different stages of thawed bait and a variety of weighted branchline arrangements.

Results indicate that weighted lines are among the most effective mitigation measures for all seabirds and can be complemented by other measures, such as offal management and use of tori lines. Night setting is also very effective at reducing albatross bycatch. Recent research has focused on the effects of differing line-weighting regimes.

Operators are also encouraged to develop and experiment with mitigation measures to suit their own situations and vessels, while ensuring they are meeting their domestic and international mitigation requirements.

Previous research on wire versus nylon leaders indicates that catch rates of sharks are significantly reduced when nylon leaders are used (Table 5; Ward et al. 2008); conversely, catch rates of sharks increase when circle hooks rather than tuna hooks are used (Table 5; Ward et al. 2009).

Despite the comparatively rare occurrence of interactions between pelagic longliners and sea turtles within the AFZ, the Australian Government has recognised the potential for these interactions to threaten the survivability of the species. Research quantified the relative effects of circle and tuna hooks on catches of target and common non-target species (Table 5). Although not designed to compare capture rates of marine turtles on circle and tuna hooks (owing to the rarity of sea turtle interactions in Australian longline fisheries), results demonstrated that higher catch rates of target species were attained when circle hooks were used (Table 5; Ward et al. 2009).

Table 5a Mitigation measures to reduce the incidental catch of seabirds developed or under development in Australia

Mitigation measure	Lead agency and collaborators	Results to date	Planned development/testing	Status
Underwater bait setting machine	Australian Antarctic Division (AAD), Amerro Engineering (AE) and ETBF Operators	Not yet available	Stage 1: R&D; initial operational testing of prototype unit (Mk1)	Completed
			Stage 2: Aug 2009: Testing Mk1 unit in ETBF under normal operational fishing	Completed
			Stage 3: At-sea testing and refinement of the performance of Mk1 prototype.	Ongoing
			Stage 4: Controlled experiment to compare and evaluate the Mk1 prototype underwater setting machine with the conventional method of setting branch lines by hand at the surface.	Completed
			Stage 5: Extensive modification of Mk1 prototype, based on experience from the experiment. Improvements to design and performance, especially with regard to maximum depth and cycle time. Extensive operational testing. Construction of new prototype unit (Mk2).	Completed
			Stage 6: Proof-of-concept experiment with Mk2 prototype.	Mid-2012
			Stage 7: Complete scientific paper on effectiveness of underwater setting method in minimising mortality of albatrosses and petrels in pelagic longline fisheries.	Late-2012

Table 5a Cont. Mitigation measures to reduce the incidental catch of seabirds developed or under development in Australia

Mitigation measure	Lead agency and collaborators	Results to date	Planned development/testing	Status
Weighting regimes	AFMA, ETBF operators	Not yet available	Trialling different weighting regimes, (38 g, 60 g swivel) for use with double tori lines	Completed
Methods to increase link sink rates	AAD	Key results to date: 1. Provided bait is thawed sufficiently to be placed on a hook, further thawing of baits does not significantly alter branch line sink rates, contrary to the results of earlier research. 2. Use of a line shooter is not necessarily beneficial to achieving faster line sink rates for pelagic longlines; it cannot be regarded as a mitigation measure in all circumstances. 3. Mainlines set by a line shooter that produces more than a minimal amount of slack line, such as during 'deep setting', sink more slowly than tauter set lines, due to the slack line being buoyed by propeller turbulence. 4. It is important to avoid setting mainline into propeller turbulence and to avoid slack in the mainline.	A range of research is being undertaken to evaluate the factors, including gear, that affect line sink rates. Research includes: 1. Examining the effects of line shooters and propeller turbulence on mainline tension and line sink rates. 2. Testing the sink rates of frozen versus different stages of thawed baits. 3. Following tank testing and initial field work, conducting operational fishing trials in the ETBF to examine the effects on catch rates of target and non-target species by adding more weight to branch lines and moving the weight closer to the hook. The trials tested a faster sinking gear (120 g weight within 2.0 m of the hook and a newly designed 40 g weight at the hook) against the current standard (60 g within 3.5 m of the hook).	Ongoing Completed Completed Completed

Table 5b Mitigation measures to reduce the incidental catch of sharks developed in Australia

Mitigation measure	Lead agency and collaborators	Results to date	Planned development/testing	Status
The effects of wire-leaders on longline catch rates	BRS and AFMA	Large numbers of animals are lost when they bite through nylon leaders. There is uncertainty over the species composition of that component of the catch and their fate (Ward et al. 2008)	Observers monitored 177 longline fishing operations in 2005–06, involving equal numbers of wire and nylon monofilament leaders. Results indicated reduced shark catch rates and elevated bigeye tuna catch rates on the nylon compared with wire leaders	Completed
Sea turtles				
The effects of circle hooks on longline catch rates	BRS, Belldi Consultancy and AFMA	Not designed to investigate the efficacy of circle hooks in reducing sea turtle bycatch: turtle interactions quite rare in Australian longline fisheries. Four turtles were caught: 3 on circle hooks and 1 on a tuna hook. Scalefish and shark catches were considerably higher on circle compared with tuna hooks (Ward et al. 2009)	Observers monitored 16 trips on longliners from 2005–08, testing the effects of circle hooks on longline catches	Completed

8 Public relations and education activities

Public relations activities

All mitigation strategies in place or being trialled by Australia to reduce impacts of SBT fishing on ERS include a level of education and extension to increase their effectiveness. Specific activities to educate fishers on ERS issues are included in the TAP, National Plan of Action for Sharks, and Bycatch Action Plans for both the tuna purse seine and longline fisheries. AFMA's Resource Assessment Groups and Management Advisory Committees are valuable forums in which government, non-government, industry and other stakeholders can discuss current and emerging mitigation strategies.

AFMA staff regularly visit key SBT fishing ports and engage in education and extension activities during these visits. AFMA also provides education materials in the form of brochures, fact sheets, communication post cards, media releases and other written material for extension to fishers and the general public. A large amount of material is made available through the websites of AFMA and the Fisheries Research and Development Corporation (FRDC). Industry representatives are continuing to refine existing codes of practice to reduce the environmental impacts of Australian tuna fisheries.

Communication (media releases, published material, video, public presentations)

AFMA provides education materials in the form of booklets, posters, media releases, educational videos and other written material for further education of vessel skippers and crews. Industry and the general public are able to subscribe to AFMA for electronic media releases and be informed of upcoming extension activities in their local area. A large amount of material is made available through the websites of AFMA and the FRDC: see http://www.afma.gov.au/managing-our-fisheries/environment-and-sustainability/ and http://www.frdc.com.au/resources/resources for further information. Media releases and other publications can be found at http://www.afma.gov.au/resource-centre/media-centre/.

Education

Training of fishers

Specific activities to educate fishers on ERS issues are included in the TAP, National Plans of Action for Sharks and Bycatch Action Plans for both the tuna purse seine and longline fisheries, and in the Ecological Risk Assessment project.

In addition, Australian observers are briefed to educate fishers on their responsibilities to complete logbooks and other data submission obligations, and in the requirements for, and use of, mitigation strategies to manage impacts on ERS. This information is passed onto vessel skippers and crews during observer trips and while in port.

A series of voluntary training workshops for ETBF operators about bycatch handling, reporting and mitigation was completed. The program was a key initiative under the Australian Tuna and Billfish Longline Fisheries Bycatch and Discarding Workplan, which came into effect on 1 November 2008. Through the program, on-shore workshop sessions and on-board

demonstrations provided training to vessel owners, skippers, crew and shore managers on their obligations in relation to bycatch.

This included:

- Logbook reporting requirements
- Handling practices
- Mitigation measures—in particular, the importance of using tori lines and other deterrent methods to reduce seabird interactions.

Managers

The Australian Government is committed to the ecologically sustainable development of Australian fisheries and all associated international obligations. On-the-job and specific training is provided to meet this commitment.

Observers

AFMA has recruited and trained scientific observers since its establishment in 1992. Observers are sourced from universities and maritime industries 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.

Information exchange

Australia is committed to its data exchange obligations, and information exchange in general, and actively encourages open and transparent regional approaches in line with the revised requirements for CCSBT member's annual report to ERSWG, and the Recommendation to Mitigate the Impact on Ecologically Related Species of Fishing for Southern Bluefin Tuna, adopted at the 15th meeting of the Commission in October 2008.

Australia's commitment is also evident in the priority given to meeting data exchange obligations to the WCPFC, IOTC and the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR).

9 Information on other ERS (non-bycatch) such as prey and predator species

In 2001, AFMA initiated the project Ecological Risk Assessment for Commonwealth Fisheries (ERACF). This project undertook ecological risk assessments (ERAs) that looked at the impact, both direct and indirect, of fisheries activities on all aspects of the marine ecosystem, which includes prey and predator species. This work forms part of a transition to ecosystem-based fisheries management by AFMA.

The ERA framework details a process for assessing and progressively addressing the impacts that fisheries' activities have on five aspects of the marine ecosystem, including:

- Target species
- Bycatch and byproduct species
- Threatened, endangered and protected (TEP) species
- Habitats
- Communities

All ERAs for Australian Government-managed fisheries are now publicly available, as are the management reports detailing the response planned to the results of the ERAs (http://www.afma.gov.au/managing-our-fisheries/environment-and-sustainability/Ecological-Risk-Management/).

10 Other

Not applicable.

11 Implementation of the IPOA-Seabirds and IPOA-Sharks

Australia endorsed the IPOA-Seabirds, and has undertaken a national assessment of longline fisheries to determine seabird bycatch rates. The Australian longline fisheries that principally interact with seabirds operate in Commonwealth waters, which generally refers to waters from three nautical miles offshore to the extent of Australia's EEZ. To manage these interactions, Australia has put in place the TAP. The TAP is a legislative instrument that directs mandatory seabird bycatch management measures. It was first introduced in 1998 and was revised in 2006, and applies to all longline fisheries managed by the Australian Government. The TAP (2006) is Australia's key national measure for mitigating the impact of longline fisheries on seabird populations, and is consistent with the IPOA-Seabirds. The TAP (2006) is currently under review.

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 has finalised the 2009 Shark Assessment Report (SAR) which is the scientific basis for the adoption of the NPOA. The 2009 SAR (Bensley et al. 2010) builds upon the information provided in the 2001 SAR and identifies any 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 released in early 2012 and will be provided to the Ninth meeting of the ERSWG.

References

Anon 2006, Threat Abatement Plan 2006: for the incidental catch (or bycatch) of seabirds during oceanic longline operations. Australian Antarctic Division, Hobart, http://www.antarctica.gov.au/__data/assets/pdf_file/0017/21509/ml_399394109837963_final20threatabatement2007-4-combined6c.pdf

Bensley N, Woodhams J, Patterson HM, Rodgers M, McLoughlin K, Stobutzki I & Begg GA 2009, Shark Assessment Report for the Australian National Plan of Action for the Conservation and Management of Sharks, final report to the Department of Agriculture, Fisheries and Forestry, Bureau of Rural Sciences, Canberra

Hobsbawn P, Phillips K, Begg G 2009, Australia's 2007–08 southern bluefin tuna fishing season. CCSBT-ESC/0909/SBT Fisheries—Australia, Commission for the Conservation of Southern Bluefin Tuna, Fourteenth Meeting of the Scientific Committee, 5–11 September, Busan, Korea

Hobsbawn P, Patterson H, Begg G 2010, Australia's 2008–09 southern bluefin tuna fishing season. CCSBT-ESC/1009/SBT Fisheries—Australia, Commission for the Conservation of Southern Bluefin Tuna, Fifteenth Meeting of the Scientific Committee, 4–10 September, Taipei, Taiwan

Hobsbawn P, Patterson H, Begg G 2011, Australia's 2009–10 southern bluefin tuna fishing season. CCSBT-ESC/1109/SBT Fisheries—Australia, Commission for the Conservation of Southern Bluefin Tuna, Sixteenth Meeting of the Scientific Committee, 19–28 July, Bali, Indonesia

Hobsbawn PI, Patterson HM, Kirby DS 2011, Australian national report to the Scientific Committee of the Indian Ocean Tuna Commission for the2011, Indian Ocean Tuna Commission, IOTC-2011-SC14-NR-01, Fourteenth Session of the Scientific Committee, 12–17 December 2011, Victoria, Seychelles.

Lawrence E, Giannini F, Bensley N, Crombie J (2009) Estimation of seabird bycatch rates in the Eastern Tuna and Billfish Fishery. Bureau of Rural Sciences, Canberra

Patterson H, Sahlqvist P (2011) Annual report to the Western and Central Pacific Fisheries Commission, Part 1: information on fisheries, research and statistics 2010, Australia. WCPFC-SC7-AR/CCM-01, Western and Central Pacific Fisheries Commission, Seventh Regular Session of the Scientific Committee, 9–11 August 2011, Pohnpei, Federated States of Micronesia

Ward P, Lawrence E, Darbyshire R, Hindmarsh S (2008) Large-scale experiment shows that nylon leaders reduce shark bycatch and benefit pelagic longline fishers. Fisheries Research 90:100–108, doi: 10.1016/j.fishres.2007.09.034

Ward P, Epe S, Kreutz D, Lawrence E, Robins C, Sands A (2009) The effects of circle hooks on bycatch and target catches in Australia's pelagic longline fishery. Fisheries Research 97:253–262, doi: 10.1016/j.fishres.2009.02.009

Appendix I

Mandatory Seabird Mitigation Measures in the ETBF 2012

When you are fishing south of 25°S you must:

• Deploy a tori line before commencing a shot

• Use only thawed bait

• Weight longlines with either a minimum of:

1.) 60g swivels at a distance of no more than 3.5m from each hook ; or

2.) 98g swivels at a distance of no more than 4m from each hook.

3) 40g weight directly adjacent to the hook for dead bait only.

• At all times carry 1,000 weighted snoods each weighing at least 60 grams

• Not discharge offal while setting

• Not discharge offal while hauling. An exemption for small boats may be given.

When you are fishing north of 25°S you must:

• Carry an assembled tori line on board

• At all times carry 1,000 weighted snoods each weighing at least 60 grams

• Not discharge offal while setting

• Not discharge offal while hauling. An exemption for small boats may be given.

Your tori line must be:

• At least 100m long;

• Set up from a position on the boat that allows it to stay above the water for at least 90m;

• Have streamers attached at least every 3.5m;

o Streamers should be maintained ensuring that their lengths are as close to the water as possible; and

• Have a drogue at the end of the line to give sufficient drag to meet the 90m aerial coverage criteria.

Appendix II

Mandatory Seabird Mitigation Measures in the WTBF 2012

At all times you must:

• Carry an assembled tori line on board

• Carry either:

  o 1,000 weighted swivels each weighing at least 60 grams; or

  o 1,000 weights each weighting at least 40 grams

• Not discharge offal while setting

• Not discharge offal while hauling. An exemption for small boats may be given by AFMA.

When you are longline fishing south of 25°S you must:

• Deploy a tori line before commencing a shot

• Use only thawed bait

• Weight longlines with either a minimum of:

  1.) 60g swivels at a distance of no more than 3.5m from each hook ; or

  2.) 98g swivels at a distance of no more than 4m from each hook; or

  3.) 40g weights at each hook.

• At all times carry 1,000 weighted swivels each weighing at least 60g

• Not discharge offal while setting

• Not discharge offal while hauling. An exemption for small boats may be given by AFMA.

Your tori line must be:

• At least 100m long;

• Set up from a position on the boat that allows it to stay above the water for at least 90m;

• Have streamers attached at least every 3.5m;

  o Streamers should be maintained ensuring that their lengths are as close to the water as possible; and

• Have a drogue at the end of the line to give sufficient drag to meet the 90m aerial coverage criteria.

Appendix III

Summary of Working Papers Submitted by Australia

New branch line weighting regimes to reduce seabird mortality in the Australian pelagic longline fishery

Concern by Australia's pelagic longline fishing industry about the effect on target fish catch rates of the amount of weight in branch lines and the proximity of weight to the hook, has restricted adoption of gear with faster sink rates that reduces the incidental capture of seabirds. Trials of two new branch line weighting regimes involving custom-made lead weights were conducted to determine effects on catch rates of target and non-target fish species. There were no statistically detectible difference in the catch rates of the main target and non-target fish species between branch lines with 60 g lead weights 3.5 m from hooks (the fishing industry standard) and those with either a 120 g lead weight ≤ 2 m from the hook or a 40 g lead weight placed at the hook. Branch lines with 40 g weights at the hook – which have the greatest potential to be adopted in the fishery - commenced sinking immediately upon deployment and took, on average, 4.5 seconds (0.43 m/s) to reach 2 m depth, 33 % less time than industry standard gear. The 40 g leads placed at the hook also improved crew safety, reduced the amount of time spent in gear construction and facilitated gear inspection for compliance purposes. The findings provide the fishing industry with new line weighting options that have the potential to reduce seabird bycatch without affecting target fish catch.

Revised proposal for verifying catch and effort data through a CCSBT scientific observer program

The Extended Commission for the Conservation of Southern Bluefin Tuna (CCSBT) implemented a management procedure (MP) in October 2011. The development and implementation of a regional observer program is important in order to improve confidence in the data inputs to the MP and would also improve the information available on interactions with ecologically related species. Australia presented a scoping study and draft proposal for a regional observer program to CCSBT at the Extended Commission meetings in 2010 and 2011, and additionally to the special meeting of the Commission in August 2011. The revised proposal includes a workplan for implementing priority measures to improve the verification of catch and effort data through the CCSBT observer program in the most effective and practical manner. In addition, a draft resolution provides a schedule of implementation for these elements and addresses the issues previously raised by Members.