



Australian Government

Department of the Environment and Heritage

**Strategic Assessment of the
Eastern Tuna
and
Billfish Fishery**

March 2005

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Assistant Secretary
Wildlife Trade and Sustainable Fisheries Branch
Department of the Environment and Heritage
GPO Box 787
Canberra ACT 2601

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This document is an assessment carried out by the Department of the Environment and Heritage of a commercial fishery against the Australian Government Guidelines for the Ecologically Sustainable Management of Fisheries. It forms part of the advice provided to the Minister for the Environment and Heritage on the fishery in relation to decisions under Parts 3, 10, 13 and 13A of the Environment Protection and Biodiversity Conservation Act 1999. The views expressed do not necessarily reflect those of the Minister for the Environment and Heritage or the Australian Government.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1.1 BACKGROUND	1
1.2 OVERALL ASSESSMENT	6
1.3 RECOMMENDATIONS	9
PART I MANAGEMENT ARRANGEMENTS	12
2.1 MANAGEMENT OF EASTERN TUNA AND BILLFISH FISHERY	12
2.1.1 <i>Recreational Fishing</i>	18
2.1.2 <i>Protected Areas</i>	18
2.1.3 <i>Bait Fishing</i>	19
2.1.4 <i>International Context</i>	19
2.2 CONCLUSION	21
PART II GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES	23
3.1 STOCK STATUS AND STOCK RECOVERY	23
3.1.1 <i>Information requirements</i>	23
3.1.2 <i>Assessment</i>	25
3.1.3 <i>Management responses</i>	28
3.1.4 <i>Conclusion</i>	31
3.2 PROMOTE RECOVERY TO ECOLOGICALLY VIABLE STOCK LEVELS	31
3.2.1 <i>Management responses</i>	31
3.2.2 <i>Conclusion</i>	32
4.1 ECOSYSTEM IMPACTS	33
4.1.1 <i>Information requirements</i>	33
4.1.2 <i>Assessment</i>	34
4.1.3 <i>Management response</i>	34
4.1.4 <i>Conclusion</i>	37
4.2 PROTECTED SPECIES AND THREATENED ECOLOGICAL COMMUNITIES	38
4.2.1 <i>Information requirements</i>	38
4.2.2 <i>Assessment</i>	38
4.2.3 <i>Management response</i>	42
4.2.4 <i>Conclusion</i>	45
4.3 MINIMISING ECOLOGICAL IMPACTS OF FISHING OPERATIONS	46
4.3.1 <i>Information requirements</i>	46
4.3.2 <i>Assessment</i>	46
4.3.3 <i>Management response</i>	47
4.3.4 <i>Conclusion</i>	47
BACKGROUND INFORMATION ON IMPORTANT SPECIES TAKEN IN THE ETBF	1
KEY PROTECTED SPECIES ENCOUNTERED IN THE ETBF	3
ACRONYMS IN USE IN THE ETBF	5

Executive Summary

1.1 Background

The Australian Fisheries Management Authority (AFMA) has submitted documents for the assessment of the Eastern Tuna and Billfish Fishery (ETBF) under Parts 10, 13 and 13A of the *Environment Protection and Biodiversity Conservation Act, 1999* (the EPBC Act).

On 5 February 2002 the Minister for the Environment and Heritage (the Minister) signed an Agreement with AFMA to initiate the strategic assessment of the fishery. Following public consultation, closing on 15 March 2002, *Terms of Reference - Environmental Assessment of the Eastern Tuna and Billfish Fishery* were adopted and are available through the Department of the Environment and Heritage's (DEH) website (<http://www.deh.gov.au/coasts/fisheries>). The *Draft Assessment Report - Eastern Tuna and Billfish Fishery* (the Submission) and a draft of the proposed *Eastern Tuna and Billfish Fishery Management Plan* (the ETBF MP) were received by DEH and released for public comment, with the public comment period closing on 22 November 2002. 29 public comments were received. AFMA prepared a response to these, making corrections to the report and/ or the ETBF MP as considered appropriate.

Subsequently, the ETBF MP and Submission were amended and on 19 September 2003 AFMA released the amended ETBF MP and Submission for a second round of public comment, closing on 14 November 2003. 30 public comments were received. AFMA prepared a response to these comments and further amended the ETBF MP. 5 of the public comments made comment on the Submission and AFMA prepared a response to these. The Submission was not amended as a result of these comments.

The Submission, although available on AFMA's website, was not released for public consultation when the ETBF MP was released for a third and final round of public comment, closing on 21 September 2004. 12 public comments were received with none referring to the Submission.

A final Submission for assessment was forwarded to DEH on 31 August 2004.

The Submission reports on the ETBF against the Terms of Reference, including the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries* (the Guidelines). The DEH assessment considers the Submission and associated documents, public comments and AFMA's responses to the public comments.

The ETBF is summarised in Table 1.

Table 1: Summary of Eastern Tuna and Billfish Fishery

Target Species (primary species)	Broadbill swordfish (<i>Xiphias gladius</i>), bigeye tuna (<i>Thunnus obsesus</i>), yellowfin tuna (<i>T. albacares</i>) and striped marlin (<i>Tetrapturus audax</i>). Albacore tuna (<i>T. alalunga</i>) is a minor component of the catch.												
Area of Fishery	Eastwards from the tip of Cape York covering part of Qld, NSW, Vic and Tas to the SA/Vic border out to and beyond the 200 nm Australian Fishing Zone (AFZ) boundary. In the absence of agreement under the Offshore Constitutional Settlement (OCS), in waters off NSW, between the shoreline and 3 nm, tuna take is managed under NSW Fisheries regulations. The fishery includes waters off Norfolk Island (outside the area known as the 'box') and off Lord Howe Island (outside the 12 nm boundary) and the ETBF is considered part of the Western and Central Pacific Ocean fishery												
Fishery status or development stage:	The 'Australian' fishery is considered fully developed, and any further development is constrained by the total fishing pressure throughout the Pacific Ocean, the status of key target species and the economic environment that drives markets and fishing costs.												
Stock assessment reliability and status:	Broadbill swordfish : The Bureau of Rural Sciences (BRS) rates the species as uncertain in the ETBF, but with strong indications of localised depletion in inshore areas. Knowledge on stock structures is limited but possibly several semi-independent stocks (a northern stock, a southwestern stock and two or three eastern Pacific stocks) exist. No quantitative stock assessment has been undertaken for the southwestern Pacific stock. The Standing Committee on Tuna and Billfish ¹ (SCTB) has commenced work on stock assessment. Bigeye tuna: BRS rates the species as fully fished or fully exploited in the Pacific Ocean. This rating is consistent with that reported at the SCTB where the current levels of fishing mortality are identified with high risks of overfishing. Limited knowledge is available on stock structures, but SCTB has investigated possibility of two stocks (a western and central stock and an eastern stock) with some residency possible. Yellowfin tuna: BRS rates the species as uncertain in the ETBF and nearing full exploitation in the western and central Pacific Ocean (WCPO). BRS tentatively reports that the exploitation rates in the ETBF are lower than in the WCPO. Limited knowledge is available on stock structures and the stock is assessed under the assumption it is a single stock. Tagging studies suggest some degree of residency, although migrations are also recognized. Significant inter-annual variability is noted but without any clear trends. The Coral Sea is identified as the spawning grounds. Albacore tuna : BRS rates the species as uncertain in the ETBF and underfished in the WCPO. A single stock is reported for the South Pacific. Marlins : BRS rates the species (blue, black and striped) as uncertain in the ETBF and in the WCPO. There are no reliable stock assessments for any marlin species in the WCPO. Striped marlin is the only marlin target species in the ETBF. Limited knowledge on stock structures, but possibly a semi-independent southwestern Pacific stock.												
Fishery value (2003-04)	<table border="0"> <tr> <td>Yellowfin tuna</td> <td>A\$20.4 m</td> <td>(2,422 tonnes)</td> </tr> <tr> <td>Bigeye tuna</td> <td>A\$8.4 m</td> <td>(795 tonnes)</td> </tr> <tr> <td>Billfish</td> <td>A\$14.6 m</td> <td>(2,267 tonnes)</td> </tr> <tr> <td>Albacore</td> <td>A\$1.0 m</td> <td>(556 tonnes)</td> </tr> </table> <p>Majority of catch is exported either to Japan or to the USA</p>	Yellowfin tuna	A\$20.4 m	(2,422 tonnes)	Bigeye tuna	A\$8.4 m	(795 tonnes)	Billfish	A\$14.6 m	(2,267 tonnes)	Albacore	A\$1.0 m	(556 tonnes)
Yellowfin tuna	A\$20.4 m	(2,422 tonnes)											
Bigeye tuna	A\$8.4 m	(795 tonnes)											
Billfish	A\$14.6 m	(2,267 tonnes)											
Albacore	A\$1.0 m	(556 tonnes)											
Management arrangements : Recreational	Bag and boat limits for all species under State fisheries legislation. Gamefishing clubs have also introduced voluntary or mandatory size limits and tag and release.												
Recreational harvest	Recreational take is unknown. Several species are important to the recreational sector, particularly marlins as targets in the capture and release fishery sector.												
Management arrangements : Commercial	Primarily permitted gear units (hooks carried) set under a Total Allowable Effort (TAE). Also limited entry, gear controls and area restrictions.												
Fleet characteristics	BRS ² reports that the number of full-time longliners doubled from 66 in 1997 to 112 in 1999, with a slow overall increase since then. 131 vessels were active in 2003-04, 9 fewer than in 2002-03. Over 300 permit packages have been issued for access to the fishery. In 2001 this was applied as approximately 395 operator/ area combinations with entitlements in the longline sector, 650 in the minor line sector and 258 in the pole and line sector. These permits will be converted to Statutory Fishing Rights (SFR) under the ETBF MP and will be a right to a prescribed number of hooks (effort units).												

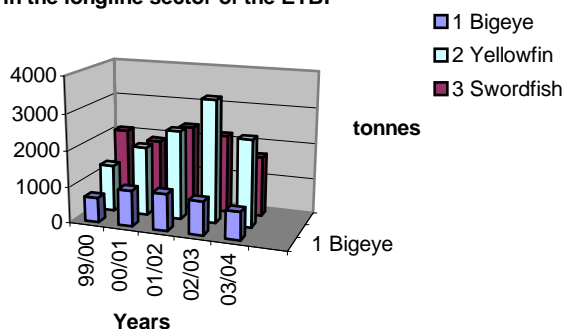
¹ The Standing Committee on Tuna and Billfish (SCTB) is the forum established to discuss scientific issues related to data, research and stock assessments for tuna and billfish stocks in the WCPO. Membership includes representatives from the Forum Fisheries Agency (FFA), the Inter-American Tropical Tuna Commission (IATTC), the Secretariat of the Pacific Community (SPC) and the Food and Agricultural Organisation of the United Nations (FAO).

² National Tuna Fishery Report: *Tuna and Billfish Fisheries of the Eastern Australian Fishing Zone and Adjacent High Seas* by Peter Ward and Don Bromhead, a working paper presented at the 17th meeting of the SCTB (August 2004)

Table 1: Summary of Eastern Tuna and Billfish Fishery cont.

Commercial catch history and catch trend

History of Catches for key target species in the longline sector of the ETBF

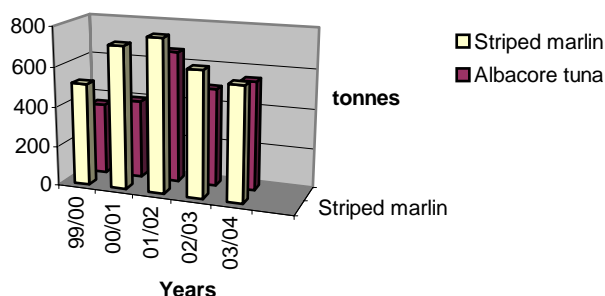


Bigeye tuna 2003-04 catch was 769 tonnes. Peak catch was 1,018 tonnes in 2001-02. Trend since peak shows some decline. WCPO catch is around 95,000 tonnes annually. ETBF takes approximately 0.8% of WCPO catch.

Yellowfin tuna 2003-04 catch was 2,408 tonnes. Peak catch was 3,390 tonnes in 2002-03. Trend until 2002-03 was increasing catches. WCPO catch is around 450,000 tonnes annually. ETBF takes approximately 0.5% of WCPO catch.

Broadbill swordfish 2003-04 catch was 1,670 tonnes. Peak catch was 2,336 tonnes in 2001-02. Trend since peak shows some decline. WCPO catch is around 20,000 tonnes annually. ETBF takes approximately 8% of WCPO catch

History of catches of marlin and albacore in the longline sector of the ETBF



Striped marlin 2003-04 catch was 574 tonnes. Peak catch was 768 tonnes in 2001-02. Trend since peak shows some decline. WCPO catch is around 4,500 tonnes annually. ETBF takes approximately 13% of WCPO catch.

Albacore tuna 2003-04 catch was 547 tonnes. Peak catch was 663 tonnes in 2001-02. Overall trend shows some incline in catches with a peak in 2001-02. WCPO catch is around 135,000 tonnes annually. ETBF takes approximately 0.4% of WCPO catch.

Catch rate variation over time is not necessarily indicative of the stock status as the fishery is considered developmental and targeting has changed significantly over time as the swordfish fishery increased in importance.

The fishery is currently experiencing a downturn with fewer vessels operating (and fewer hooks being set) than in previous years. This is believed to be attributable to a number of reasons, mainly economic, but also because of lack of fish accessible to the fishery, which may be associated with inter-annual variability arising from oceanographic conditions.

Between 1999 – 01 and 2002 – 03 there was a trend of increasing numbers of hooks set with a 12% drop in 2003 – 04.

Year	Hooks set
1999 - 00	9,864,763
2000 - 01	10,092,322
2001 - 02	11,796,528
2002 - 03	12,691,921
2003 - 04	11,113,333

Table 1: Summary of Eastern Tuna and Billfish Fishery cont.

Gear	<p>Three fishing methods are permitted: pelagic longlining, purse seine and pelagic hook and line. Other methods can be permitted but require evaluation through scientific permits.</p> <p>Pelagic longline accounts for 90% of total catch (2003). Australian longlines typically consist of a monofilament mainline (averaging 50 km in length with an average of 900 hooks) that is set horizontally at a predetermined depth (determined by the length of line between floatation buoys). Branch lines are clipped to the mainline at regular intervals, each with a single baited hook.³</p> <p>All longlines are set and retrieved once (sometimes twice) a day, with the timing of the setting and hauling usually determined by the fish being targeted and prevailing conditions including water temperature. Restrictions are in place under the Threat Abatement Plan to prohibit day time setting south of 30°S to protect seabirds.</p> <p>Swordfish and yellowfin tuna sets are typically shallow (20 – 120 m) night sets with squid bait and light sticks. Bigeye tuna sets are typically set in daylight hours and the set is deeper.</p> <p>Disposal of used light sticks and their attractant value for bycatch species is a management issue.</p> <p>Pelagic Hook and Line (minor line) uses trolling, rod and reel and handlining. During minor line fishing operations a fishing line, or number of lines, remains attached to the vessel throughout the fishing operation and only one hook, or one set of ganged hooks, or one lure is attached to each line at any one time.</p> <p>Poling is sometimes carried out in conjunction with purse seine operations. A fish is enticed to strike at an artificial or natural lure or bait at the end of a line attached to a pole, and is then brought on board the boat.</p> <p>Purse Seine uses long nets to encircle the tuna. Drawstrings much like a drawstring purse close off these nets, trapping the school of tuna. The trapped fish are then scooped on board and processed. Purse seining is not employed to take target species in this fishery. Although not used in the Australian fishery, the use of fish aggregating devices (FADs) is leading to increasing pressure on juvenile yellowfin tuna stocks by purse seine fishers.</p>
Bait	<p>Bait is required for each hook, sometimes used in association with light sticks. The use of live bait is uncommon.</p> <p>Main bait species are squid, blue mackerel and pilchards. Under OCS agreements, ETBF operators are permitted to catch bait for their own use in this fishery. Most bait (estimated at 98% or 686 tonnes) is purchased commercially.</p>
By-product (secondary species)	<p>Over 100 marine species (70 fish and 30 other) recorded.</p> <p>In 2003-04, main by-product/ secondary species are:</p> <ul style="list-style-type: none"> • dolphinfish (<i>Coryphaena hippurus</i>); 275 tonnes • rudderfish (<i>Centrolophus niger</i>); 223 tonnes • escolar/ oilfish (<i>Ruvettus pretiosus</i>/ <i>Lepidocybium flavobrunneum</i>); 88 tonnes • shortfin mako shark (<i>Isurus oxyrinchus</i>); 81 tonnes • bronze whaler shark (<i>Carcharhinus brachyurus</i>); 30 tonnes • wahoo (<i>Acanthocybium solandri</i>); and 17 tonnes • blue shark (<i>Prionace glauca</i>) 16 tonnes <p>plus 14 tonnes of shortbilled spearfish (<i>Tetrapturus angustirostris</i>), 13 tonnes of northern bluefin tuna (<i>Thunnus orientalis</i>), 12 tonnes of hammerhead sharks (<i>Sphyrna</i> spp.), 11 tonnes of oceanic whitetip shark (<i>Carcharhinus longimanus</i>) and 10 tonnes of moonfish/ opah (<i>Lampris</i> spp.).</p> <p>Catch limits in place for most species.</p>
Bycatch	<p>In 2003-04, lancet fish (<i>Alepisaurus</i> sp.), blue shark, bronze whaler shark, sunfish (<i>Mola mola</i>) and blue marlin (<i>Makaira mazara</i>) were discarded in the highest numbers. Also some discarding of all key target/ primary species occurs. Sharks appear as both by-product and bycatch as their retention as by-product is limited through bag or catch limits imposed under State legislation.</p>
Interaction with Protected Species⁴	<p>Interactions with turtles, seabirds and marine mammals. 2003-04 logbook data indicated 38 wildlife interactions, with the flesh-footed shearwater (16) showing most interactions.</p>

³ branchline clips reflect the number of hooks recorded for a particular Statutory Fishing Rights (SFR) holder during a fishing operation.

⁴ Protected species in this report refers species listed in Part 13 of the EPBC Act which includes those identified in Sections 178 (listed threatened species), 209 (listed migratory species), 248 (listed marine species) and in Division 3 (whales and other cetaceans) as well as to species identified in the *Fisheries Management Act 1991* (FM Act).

The ETBF is a multi-species and a multi-method fishery targeting tuna and tuna like species in the western Pacific Ocean as shown in Figure 1.

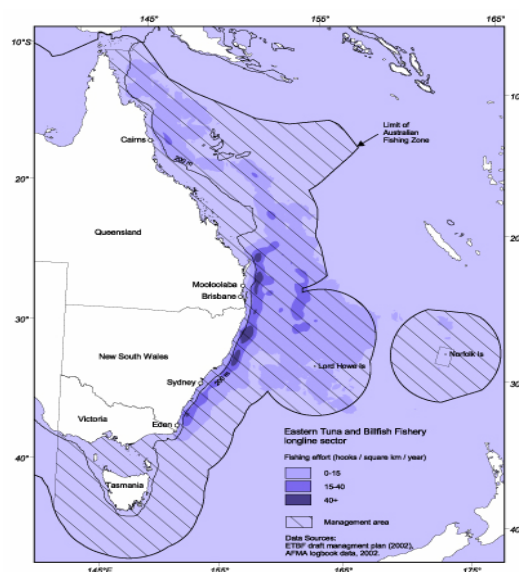


Figure 1: Distribution of Commercial Fishing Effort⁵

Japanese longliners have operated off eastern Australia since the early 1950s. With the introduction of the AFZ in 1979, Japanese longliners operated in the AFZ under bilateral agreements. In the 1980s Japanese longlining was prohibited within 50 nm of the Australian coast. These longliners have been excluded from Australian waters since November 1997.

The domestic longline fishery began off Qld in 1986 and interest increased significantly from the early 1990s. Many other nations fish for tuna and billfish throughout the Pacific Ocean, and there is significant fishery pressure adjacent to Australia’s AFZ, particularly in waters outside the AFZ adjacent to NSW.

The main Australian method of fishing for these species is pelagic longlining and the majority of the catch is exported, usually fresh-chilled, to Japan or the United States of America. Yellowfin tuna (*Thunnus albacares*), bigeye tuna (*T. obesus*) and broadbill swordfish (*Xiphias gladius*) are the most valuable commercial species. Striped marlin (*Tetrapterus audax*) and albacore (*T. alalunga*) are also taken as part of the fishery.

Longliners also take marlin, notably black marlin (*Makaira indica*) and blue marlin (*M. mazara*) but these are not retained. Several other species, such as rudderfish (*Centrolophus niger*), moonfish (*Lampris* sp.), dolphinfish (*Coryphaena hippurus*), blue shark (*Prionace glauca*), escolar/ oilfish (*Ruvettus pretiosus/ Lepidocybium flavobrunneum*), and species from the family Bramidae have become a significant component of the retained catch in recent years. Appendix 1 provides a summary of the biological characteristics of the main species taken as target and by-product species. In summary, the ETBF has a large spatial range and targets highly migratory and some localised (broadbill swordfish and perhaps some stocks of yellowfin tuna) pelagic species.

A recreational game, charter and private boat fishery operates in the same general area as the ETBF targeting tunas (yellowfin, southern bluefin, albacore, skipjack and to a lesser extent bigeye tunas), billfish (black marlin, blue marlin, striped marlin, sailfish (*Istiophorus platypterus*) and to a lesser extent broadbill swordfish) and sharks in near-shore State and

⁵ Bureau Rural Sciences Fishery Status Reports 2002 - 2003

Commonwealth waters (generally within 50 nm of the coast and near major population centres).

The day-to-day management of the recreational fishery is the responsibility of the State and Northern Territory governments. There is no consolidated record of recreational fishery catches but a large proportion of billfish are caught during gamefishing competitions and the majority of these are tagged and released.

AFMA is responsible for the management of commercial tuna fisheries under agreements set within the Offshore Constitutional Settlement (OCS). AFMA manages the ETBF under the *Fisheries Management Act 1991*. Currently the fishery is managed under permits but it is proposed to be managed under the ETBF MP to be introduced in 2004-05. The overall objectives of the FM Act form the basis for the management of all Commonwealth fisheries. The ETBF MP provides for access to the species identified in the plan (viz. tuna and tuna like species, except those specifically excluded) in all waters of the AFZ west from Cape York, Queensland around the western coastline of Australia to the South Australian/Victorian Border and extending to the high seas in the area generally recognised as the Central and Western Pacific Ocean. The ETBF MP includes a number of management measures to control the effort applied in the fishery (through the number of hooks deployed) and to limit the take of the permitted species. The ETBF MP also includes performance criteria to assess the performance of the fishery's management.

The ETBF MP will manage the fishery based on input controls. The controls will primarily be gear based SFRs in the form of longline SFRs and minor line SFRs. These relate to hook allocations given to individuals set under a Total Allowable Effort (TAE). The SFRs will be the primary tool to be used to maintain sustainable harvest levels in the fishery through sustainable effort levels.

The TAE will be set to meet Australia's international obligations and this will reflect the relevant decisions of the Western and Central Pacific Fisheries Commission (WCPFC). The WCPFC has been established under the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean, which came into force on 19 June 2004. The WCPFC is still in its establishment phase and will seek to manage all highly migratory fish stocks within the Convention area including tuna, billfish (such as swordfish, marlins and sailfish), mackerel and sharks.

The management of the fishery must also be consistent with any relevant international or regional management regimes to which Australia is a party. Those particularly relevant are:

- the United Nations Fish Stocks Agreement (UNFSA)⁶ (established to ensure the long-term conservation and sustainable use of straddling stocks of highly migratory fish stocks); and
- the United Nations Convention on the Law of the Sea (UNCLOS) (the international agreement that gives Australia the right to define an Exclusive Economic Zone (EEZ) and to manage and conserve resources within this zone).

1.2 Overall Assessment

The material submitted by AFMA indicates that the ETBF, under the ETBF MP, will operate in accordance with the Guidelines.

⁶ UNFSA is also known as the United Nations Agreement on Straddling and Highly Migratory Fish Stocks

While the Australian commercial fishery is relatively well managed by AFMA, DEH has identified a number of risks that must be managed to ensure that their impacts are minimised. The risks can be categorised into those within the international fishery management framework of the WCPFC (which are outside the capacity or responsibility of AFMA to manage) and those within the domestic fishery.

Within the international fishery, DEH's concerns are as follows:

- Bigeye tuna is fully fished in the WCPO and while knowledge on stock structures is limited, there are possibly two stocks. There is no Total Allowable Catch (TAC) or reference point (s) for these stocks.
- Yellowfin tuna is nearing full exploitation in the WCPO but there is tentative indication that the stocks in the western Pacific Ocean are capable of further limited exploitation. The stock status is uncertain and stock structure is unknown. There is no TAC or reference point (s) for these stocks.
- Broadbill swordfish status is unknown. No formal stock assessment has been conducted and the stock structure is unknown. There is concern over the prospect of localised depletion. There is no TAC or reference point (s) for these stocks.

Other more general concerns with the international fishery relate to bycatch, unsustainable fishing methods (such as purse seining for juvenile bigeye and yellowfin tuna around FADs) and poor recording of catch data.

Australian fishers have expressed a desire for future expansion of the Australian fishery into the wider Pacific Ocean, but this prospect is limited. While the pressure on the stocks from high seas fishing activities and from Pacific Island States is a major limitation to expansion, there are other constraints, some of which are economic in nature.

Failure by the WCPFC to address high fishing pressures and potentially unsustainable fishing practices on key stocks will ultimately impact on Australia's harvest of any (or all) bigeye tuna, yellowfin tuna or broadbill swordfish. If the WCPFC is unable to engender commitment and capacity to effectively manage the species under its responsibility, and in particular, to maintain or, if needed, rebuild the bigeye and/or yellowfin tuna stocks to ecologically sustainable levels, Australia may need to consider other measures to provide some protection to these species within the Australian jurisdiction.

Within the Australian domestic fishery, DEH's concerns are as follows:

- bigeye tuna - the total Australian catch is showing some decline, noting that Australian fishers only take a very small amount (~ 0.8 %) of the total Pacific Ocean catch.
- yellowfin tuna – the total Australian catch has shown a steady increase until the last year when it declined. Australian fishers only take a very small amount (~ 0.5 %) of the total Pacific Ocean catch.
- broadbill swordfish - total Australian catch has shown a decreasing trend, with the Pacific Ocean fishery status basically uncertain. Australians only take a small amount (~ 8.0%) of the total Pacific Ocean catch. Localised depletion is a possibility.

The fishery has significant issues relating to protected species interactions. It is known to interact with seabirds, marine turtles and cetaceans. More observer data is urgently needed to quantify the risk across the full extent of the fishery. The fishery will be managed in accordance with relevant recovery plans and threat abatement plans. Appropriate mitigation measures need to be developed and introduced as necessary.

The nature and amount of bycatch also need to be validated, using independent means where possible. Also an increasing range of by-product species are being taken and this raises

significant complementary (State and Commonwealth) management issues, particularly for pelagic sharks such as blue sharks, but also for a range of other species such as inshore demersal shark species, rudderfish, dolphinfish and escolar/ oilfish. (Noting that sharks are considered both as by-product and then as bycatch once catch limits are reached.)

Ongoing improvements in fishing technologies are leading to increasing pressure on target and non-target species.

Recommendations to address these issues have been developed to ensure that the risk of impact is minimized in the longer term. Through the implementation of the recommendations and the continuation of a responsible attitude to the management of the fishery, management arrangements are considered to be sufficiently precautionary and capable of controlling, monitoring and enforcing the level of effort in the fishery while ensuring that stocks are fished sustainably.

- The ETBF MP includes an extensive range of measures by which the objectives of the plan are to be attained, and performance criteria that complement these measures.

DEH is satisfied that a decremented hook system⁷ (as a measure of effort expended) is an effective management approach. The issue that will need to be carefully monitored and managed will be to set the TAE at a level that takes into account the ecological requirements of the most vulnerable species in the fishery.

DEH considers that the operation of the fishery is consistent with the objects of Part 13A of the EPBC Act. Given the management arrangements specified in the ETBF MP, the observer program in place, the progress of the Environmental Risk Assessment for Commonwealth Fisheries (ERA) and AFMA's commitment to mitigate risks identified through the ERA, together with implementation of the recommendations in this report, DEH considers that the fishery will not be detrimental to the survival or conservation status of the taxa to which it relates in the short term. Similarly, it is not likely to threaten any relevant ecosystem in the short term. DEH therefore recommends that the fishery be declared an approved Wildlife Trade Operation (WTO) with the actions specified in the recommendations to be undertaken by AFMA or, where relevant, by the Department of Agriculture Fisheries and Forestry (DAFF) to manage the environmental risks in the longer term. DEH considers that the fishery, as managed in accordance with the ETBF MP is not likely to cause serious or irreversible ecological damage over the period of the export decision. The WTO declaration will allow the export of product from the fishery for a period of 3 years. The WTO declaration will require annual reporting on the progress of implementing the recommendations of this report and other managerial commitments. The implementation of the recommendations will be monitored and reviewed as part of the next DEH review of the fishery in 3 years time.

As the official fishery area encompasses Commonwealth as well as State/ Territory waters, consideration under Part 13 of the EPBC Act is required regarding the impact of the fishery on listed threatened species, listed migratory species, cetaceans and listed marine species (collectively referred to as protected species). Protected species that could occur in the fishery are listed in Appendix 2. The majority of reports of interactions with protected species relate to seabirds, marine turtles and cetaceans. There are reports of leatherback and loggerhead turtles being hooked but the majority are recorded as being released alive and vigorous.

A Threat Abatement Plan (TAP) (*Incidental catch (or bycatch) of seabirds during oceanic longline fishing operations*) (the Longline Fishing TAP) became effective on 2 August 1998

⁷ decrementation is the process whereby an agreed amount of effort (measured as hooks) is deducted from the allocation of a fisher each time a longline is set.

and requires fishers to operate in accordance with a number of prescriptions relating to permitted gear, areas and times.

The mandatory requirements of the Longline Fishing TAP are reducing the level of take of seabirds but have not yet been totally effective in achieving the longline fishery requisite criterion of reducing seabird captures to 0.05 birds per 1,000 hooks set in all areas and seasons of the fishery. The TAP is currently under review.

The level of interaction between cetaceans and fishing operations is uncertain, but only a very few such interactions have been recorded.

Given the measures in the ETBF MP, AFMA's agreement to implement the recommendations in this report and the requirement for fishers to continue to comply with existing (or future) threat abatement plans, recovery plans and national plans of action, DEH recommends that the ETBF MP be declared an accredited Management Plan under Sections 208A, 222A, 245 and 265 of the EPBC Act. In making this judgement, DEH considers that the fishery to which the ETBF MP relates does not, or is not likely to, adversely affect the survival in nature of listed threatened species or populations of those species, or the conservation status of a listed migratory species, cetacean species or listed marine species or population of any of these species. DEH also considers that the ETBF MP requires that all reasonable steps are taken by fishers to avoid the killing or injuring of protected species, and the level of interaction under the proposed fishing operations is within acceptable limits. On this basis, DEH considers that an action taken by an individual fisher, acting in accordance with the ETBF MP would not be expected to have a significant impact on a listed threatened species, or listed migratory species protected by the EPBC Act.

Part 10 of the EPBC Act requires that Commonwealth managed fisheries undergo strategic assessment to determine whether actions taken in the fishery have a significant impact on the environment in Commonwealth Marine Areas. Under this Part, the Minister may accredit a Management Plan to exempt actions taken in accordance with the Management Plan from further impact assessment approval. DEH considers, *inter alia*, that there has been adequate assessment of the impacts that actions approved in accordance with the ETBF MP have, will have or are likely to have on the marine environment. DEH also considers that actions approved or taken in accordance with the ETBF MP will not have unacceptable or unsustainable impacts on the marine environment in a Commonwealth area. DEH therefore recommends that, in accordance with Part 10, the ETBF MP be accredited under section 33 of the EPBC Act for the matter of national environmental significance "the marine environment".

1.3 Recommendations

1. Operation of the fishery is to be carried out in accordance with the Eastern Tuna and Billfish Fishery Management Plan (as determined) including conducting the reviews identified in the Management Plan against an overarching objective of ensuring that the fishery achieves ecological sustainability. AFMA to inform DEH of any proposed amendment to the management regime for the Eastern Tuna and Billfish Fishery, including any significant shift in fishing away from the longline method of fishing, to enable DEH to evaluate any impact on the ecological sustainability of the fishery.
2. AFMA to develop a process and timelines for responding to triggering of performance criteria and reference points.
3. AFMA to establish formal consultative mechanisms and subsequently implement research, management, monitoring and compliance approaches to ensure that there is

complementary and appropriate management of species (that could include harvest limits, reference points, triggers and management responses to breaches) taken in the Eastern Tuna and Billfish Fishery and overlapping State managed fisheries (as either target/ primary, by-product/ secondary or bycatch species).

4. DAFF in consultation with AFMA, DEH and other relevant government agencies, must take a proactive role in the early work of the Western and Central Pacific Fisheries Commission (WCPFC) to ensure its effectiveness as the regional fishery management forum for managing and conserving the species on which the Eastern Tuna and Billfish Fishery relies. This should include the following priorities:
 - developing management options that address concerns of the Working Groups formed under the WCPFC or the South Pacific Commission on key target species;
 - endeavouring that the membership of the WCPFC includes all nations taking tuna species in the area of the convention;
 - verifying the catch of all nations, both target and bycatch species;
 - strengthening stock assessments of key species (with a priority for big eye tuna and yellowfin tuna which are reportedly ‘fully fished’ in the Pacific and uncertain in the Australian fishery and which may require stock rebuilding objectives to be established);
 - developing national allocations including a position for establishing Australia’s claim for catch of key species, noting the status of two of the key target species, bigeye tuna and yellowfin;
 - establishing a regime in the Commission to protect ecologically related species; and
 - ensuring unsustainable fishing practices and technologies, such as fish aggregating devices, are thoroughly evaluated and if necessary phased out.
5. AFMA to ensure that the observer program continues to meet domestic and international data and management needs and provide the required information at a statistically robust level.
6. Within 3 years AFMA will identify and implement management responses to fishing impacts identified from the ecological risk assessment process, taking into account known fishing impacts on:
 - species in the fishery listed as protected under the EPBC Act;
 - species with low productivity;
 - areas of localised depletion; and
 - species with increasing levels, or significant potential for increased levels, of catch landings.
7. AFMA to ensure an effective effort monitoring system is in place to monitor and manage the effort expended in the fishery from the time of introduction of the Total Allowable Effort.
8. AFMA to monitor the impact of technological advancements in the fishery on the ecological sustainability of target, by-product and bycatch species, and incorporate any mitigation measures into management as necessary taking account of the impacts of technological advancements in stock assessment and setting the Total Allowable Effort.
9. AFMA to analyse the risks and the extent of the localised depletion of swordfish and to develop appropriate management measures to mitigate against any localised depletion as needed.
10. AFMA to introduce management measures to reduce the incidence of capture, injury and mortality to shark species that are identified in the ERA as being susceptible to fishing pressure.
11. AFMA to implement the Tuna and Billfish Longline and Minor Line Bycatch Action Plan (BAP) as required under the Eastern Tuna and Billfish Management Plan (as determined) as a matter of priority and through the actions set in the BAP or through

other approaches (eg Directions set under the *Fisheries Management Act 1991*, regulation or conditions on permits) ensure that the impacts of the fishery on bycatch are minimized and consistent with achieving the objectives of other legislative requirements including:

- all relevant Recovery Plans (such as the *Recovery Plan for Grey Nurse Sharks, Carcharias taurus in Australia*, the *White Shark (Carcharodon carcharias) Recovery Plan*, the *Recovery Plan for Albatrosses and Giant Petrels* and the *Recovery Plan for Marine Turtles in Australia*)
 - all relevant Threat Abatement Plans (such as *Incidental Catch (or By-catch) of Seabirds during Oceanic Longline Fishing Operations*)
 - all relevant National Plans of Action (such as the *National Plan of Action for the Conservation and Management of Sharks*)
12. AFMA to monitor the compliance of industry with their code of practice and, where necessary and appropriate, introduce regulatory measures to ensure bycatch is minimised.
13. Within 3 months of acceptance of the ETBF Management Plan by the Minister for Fisheries, Forestry and Conservation, AFMA to apply measures commensurate with the prescriptions of the Longline Fishing TAP to the area of the ETBF between 25 and 30°S. These measures to remain in place until the new Longline Fishing TAP or interim measures, endorsed by the Department in consultation with key stakeholders, come into effect.
14. AFMA to introduce measures to reduce the incidental capture of marine turtles and to improve the survivability of those that are caught.
15. AFMA to ensure that:
- morphological measurements are taken from turtles caught;
 - tagging programs are established to collect data on post release survival;
 - genetic samples are taken where possible so that stocks of turtles being caught may be determined; and
 - feedback is provided on modifications to fishing operations or fishing gear to reduce the likelihood of interactions and/or increase the survival rates

PART I MANAGEMENT ARRANGEMENTS

2.1 Management of Eastern Tuna and Billfish Fishery

The ETBF is managed by AFMA.

The management regime is described in the following documents:

- The ETBF MP
- The Tuna and Billfish Longline and Minor Line Fisheries Bycatch Action Plan (the Longline Fishery BAP)
- The Tuna Purse Seine Fisheries BAP (the Tuna Purse Seine BAP)
- The Fisheries Management Act 1991 (the FM Act)
- The Fisheries Administration Act 1991
- The Fisheries Management (Eastern Tuna and Billfish Fishery) Regulations 1995
- The Eastern Tuna and Billfish Fishery Five Year Strategic Research Plan 2003 – 2008
- The Eastern Tuna and Billfish Data Plan
- Ecological Risk Assessments for Commonwealth Fisheries
- A risk based compliance program for the ETBF
- A catch monitoring program for the ETBF
- A communication plan for the ETBF
- Directions and permit conditions made under the ETBF MP.

A number of other documents, including research reports, scientific literature and discussion papers, are integral to the management of the fishery.

AFMA's governing legislation, the FM Act, provides AFMA with clear accountability to the Australian Fisheries Minister and the Parliament and, through them, the wider community. AFMA must submit an Annual Report to the Fisheries Minister and the Parliament and provide a copy of that report to the peak industry body - the Australian Seafood Industry Council (ASIC). The AFMA Chair and Managing Director are required to report on AFMA's performance to the ASIC Executive and AFMA holds an annual public meeting to consult with industry, other stakeholders and the general public.

Management of the ETBF incorporates a sound range of consultative mechanisms and a clear commitment to effective consultation with a variety of stakeholders. DEH considers the level of consultation to be adequate and is confident that AFMA will continue to ensure interested parties are consulted appropriately.

The primary consultative mechanism is the Eastern Tuna Management Advisory Committee (Eastern Tuna MAC), which has been in operation since the 1990s. Eastern Tuna MAC meets regularly to discuss issues relating to the management of the fishery. The Committee provides advice to AFMA on a range of issues and played a fundamental role in the development of the ETBF MP, the Longline BAP, the data plan and Five-Year Strategic Research Plan.

Membership on Eastern Tuna MAC includes an independent chair, an independent Executive Officer, 5 industry members, an environment/conservation member, a scientific member, a recreational/game fishing representative, a State government representative and the AFMA manager of the fishery. DEH and the Great Barrier Reef Marine Park Authority (GBRMPA) have permanent observer status on the MAC.

Annual public meetings, workshops, discussion papers and information circulars are also used to promote discussion and understanding of ETBF management. Eastern Tuna MAC has held workshops on effort monitoring, bycatch and strategic planning.

Consultation on the management of the fishery is also conducted outside of Eastern Tuna MAC. The FM Act requires that AFMA consult adequately when developing management plans and in the development of other fisheries policies. This consultation includes the establishment and maintenance of an interested persons register and the advertisement of material in newspapers and on the AFMA website.

The ETBF MP is publicly available and has been developed through extensive public consultation that provided sufficient opportunity for input from all interested and affected parties. The draft ETBF MP and the Submission were both subject to public consultation.

The ETBF MP contains objectives for the management of the fishery and a series of performance measures, performance criteria against which these measures will be assessed, and environmental obligations for individuals operating in the fishery. The management objectives provide for the protection of target, byproduct and bycatch species and the broader marine environment, and reflect the objectives of the Guidelines. These objectives are crucial to the overall environmental performance of the fishery and strongly influence the ecologically sustainable management of the fishery.

The management of the ETBF will primarily be based on input controls. Gear-based SFRs in the form of longline SFRs and minor line SFRs form the basis of the draft plan. Each type of right is an input control. Longline SFRs are rights to a certain number of effort units (and hence hooks) in the longline sector. The ETBF MP includes provisions for other fishing methods to be employed, including purse seining, in exchange for longline SFRs. These methods require fishing permits which may only be issued to the holder of a longline SFR who has unexpended effort units. Minor line rights are rights to use minor line equipment. The ETBF MP also includes a conversion formula with which to determine the number of effort units expended while using another fishing method, by converting effort units into a weight of fish.

The longline SFRs will be the primary tool used to maintain sustainable effort levels in the fishery, and therefore sustainable harvest levels. Fisheries managed under input controls require analysis of effective fishing effort and its relationship to catch, in order to regulate fishing effort in the fishery over time. In effect, this is a determination of the TAE that will produce what is estimated to be sustainable for the fishery, including impact on bycatch including protected species and ecosystem impacts. Under the ETBF MP both a longline TAE and minor line TAE will be established for each fishing season.

The longline TAE for a fishing season has been defined in the ETBF MP as the total effort that may be expended in pelagic longline fishing in the fishery in the season. Similarly, the minor line TAE for a fishing season has been defined as the total effort that may be expended in minor line fishing in the fishery in the season. A system for monitoring effort and, if necessary, catch will be developed under the ETBF MP.

The Western Tuna and Billfish Fishery (WTBF) will be managed under the WTBF Management Plan based on a Total Allowable Commercial Catch (TACC). This approach will be the major difference in management approach to be taken in the management of the ETBF, where a TAE is the basis of management.

Although the ETBF will be managed primarily through the input control of a TAE, other input controls are also to be employed. The main controls which can be employed include:

- limitations on gear (pelagic longline, pelagic hook and line fishing equipment or purse seine, unless otherwise allowed under permit);
- a limit on the number of fishers involved in the fishery (to fishers currently holding permits for access to the current ETBF);
- temporal/ area restrictions⁸;
- shark catch controls, particularly finning controls⁹;
- catch limits applied to those species managed under State fishery legislation.

Other input controls will arise from:

- the Longline Fishery BAP and the Tuna Purse Seine BAP;
- TAPs (such as the Longline Fishing TAP);
- Recovery plans (such as the *Recovery Plan for Grey Nurse Sharks, Carcharias taurus in Australia* and the *White Shark (Carcharodon carcharias) Recovery Plan*, the *Recovery Plan for Albatrosses and Giant Petrels* and the *Recovery Plan for Marine Turtles in Australia*)
- National Plans of Action (NPOAs) (such as the *National Plan of Action for the Conservation and Management of Sharks*)

DEH considers that the ETBF MP is comprehensive and, when the complete suite of management arrangements (particularly the measures and performance criteria) are introduced and compliance levels are satisfactory, it will be able to effectively manage the fishery.

While it is important that management arrangements remain flexible, any significant amendment to the ETBF MP could change the outcomes of the assessment and decisions stemming from it. DEH needs to be advised of any changes that are made to the management regime and make an assessment that the new arrangements are equivalent or better, in terms of ecological sustainability, than those in place at the time of the original decision.

DEH's assessment of the ETBF MP takes particular account of longlining as the dominant fishing method and its impacts on target, by-product and bycatch species and on the environment more generally. DEH acknowledges that the ETBF MP allows for fishers to use other methods, however the nature of the SFRs to be granted under the ETBF MP is highly specific and applies directly to longline operations and minor line fishing. Any significant change to these methods would require a change in the plan which would then require a review of DEH's assessment of the fishery and of the EPBC Act decisions.

DEH welcomes the development of a management plan (the ETBF MP) for this fishery and recognizes the considerable progress in the ETBF MP from previous management arrangements, particularly the inclusion of clear management objectives, performance measures and performance criteria.

Recommendation 1: *Operation of the fishery is to be carried out in accordance with the Eastern Tuna and Billfish Fishery Management Plan (as determined) including conducting the reviews identified in the Management Plan against an overarching objective of ensuring that*

⁸ Temporal and area restrictions currently imposed relate to measures imposed under the longline TAP to mitigate the bycatch of seabirds. ETBF fishers are also subject to controls under the Southern Bluefin Tuna Management Plan (SBT MP) administered by AFMA to manage the SBT fishery to manage the take of Southern Bluefin Tuna.

⁹ Finning refers to the removal of the fins from the shark and disposal of the carcass at sea prior to it being landed in port. Finning bans were introduced in the Eastern, and Southern and Western, Tuna Fisheries in October 2000 and then in all Australian Government fisheries where shark is taken. Similar bans on shark finning exist in the States of Western Australia, New South Wales, Queensland, Tasmania and Victoria.

the fishery achieves ecological sustainability. AFMA to inform DEH of any proposed amendment to the management regime for the Eastern Tuna and Billfish Fishery, including any significant shift in fishing away from the longline method of fishing, to enable DEH to evaluate any impact on the ecological sustainability of the fishery.

DEH welcomes AFMA's commitment to develop, in line with the United Nations Fish Stocks Agreement (UNSFSA), reference points and recovery strategies for stocks that fall below these reference points, for all species taken in the fishery.

The process and timeframes for developing a recovery strategy or for responding to a breach of a performance criterion are not defined in the ETBF MP. While DEH understands the need for flexibility to recover individual stocks and respond to breaches of performance criteria, there is a need to have an established process to be followed in the event that a trigger is activated. For example, within 3 months of a stock falling below its reference point, the cause of the fall is identified and if appropriate, a stock rebuilding strategy is developed that includes objectives, future management actions with timelines, monitoring arrangements and arrangements for reporting on the effectiveness of the actions taken.

Recommendation 2: *AFMA to develop a process and timelines for responding to triggering of performance criteria and reference points.*

Effective management of all species taken in the fishery is complicated by the distribution of jurisdictional responsibilities for these species. While AFMA has responsibility for the tuna and tuna like species, under the OCS (as per the list in the ETBF MP Schedule and under Regulation) other species taken are the responsibility of State management by Queensland, NSW or Tasmanian Fisheries (eg Rays bream, sharks). Jurisdictional arrangements need to be addressed to ensure that responsibility lies with the agency best placed to collect and analyse data and to manage a particular species.

The take of blue shark is an example of this issue. Sharks are generally a responsibility of State fishery management agencies. AFMA has imposed (under a Fishery Management Regulation) a 20 sharks per trip catch limit on the take of all shark. The blue shark is an oceanic species taken in significant numbers by the ETBF fishery but is not commonly taken in the state managed inshore commercial or recreational fisheries. The blue shark, and other pelagic shark species, are considered to be at risk and, while AFMA fishers need to comply with State imposed management approaches to protect them (including any spatial and or temporal closures), the States are not actively managing them in the area of the ETBF.

In addition, OCS arrangements with NSW need to be finalised to harmonise the management of fish taken in NSW waters with those arrangements applying in the wider fishery.

DEH welcomes AFMA's commitment to ensure that effective management arrangements are in place for all species taken and retained in the fishery.

Recommendation 3: *AFMA to establish formal consultative mechanisms and subsequently implement research, management, monitoring and compliance approaches to ensure that there is complementary and appropriate management of species (that could include harvest limits, reference points, triggers and management responses to breaches) taken in the Eastern Tuna and Billfish Fishery and overlapping State managed fisheries (as either target/ primary, by-product/ secondary or bycatch species).*

Operators in the fishery will be required to complete a range of documentation (logbooks and associated catch records) designed to record all catches and the transfer of catch throughout the

processing and export chain. Fishery dependent data relating to the target species is to be collected on a regular basis. This will include:

- fishing logs (AL05);
- port sampling programs; and
- catch disposal records.

Under the ETBF MP the documentation trail is to be underpinned by:

- an observer program (conducted by independent personnel);
- an integrated computerised vessel monitoring system (ICVMS) that records in real time the vessel's location, course and speed and enables AFMA to gain information on the operations of the fishers in the fishery; and
- random audit of fish receivers.

AFMA has a responsibility to enforce the provisions of the FM Act through the detection and investigation of illegal activities by both domestic and foreign fishing boats in the AFZ and Commonwealth managed fisheries. AFMA coordinates compliance arrangements for Commonwealth fisheries and utilizes State and Territory fisheries officers to undertake compliance and enforcement operations.

Compliance and enforcement is generally a mix of extension and enforcement activity designed to encourage and ensure operators comply with management requirements, including catch, and by-product limits and to the extent possible allow for monitoring of bycatch levels and protected species interactions. Measures to address compliance and enforcement of management arrangements are set within the ETBF MP. These will be contained in risk based compliance and catch monitoring programs.

The ETBF MP requires AFMA to review the ETBF MP whenever it considers it necessary and at least every 5 years after its commencement. Administrative flexibility will be incorporated into the ETBF MP through the ability to call up supporting instruments such as regulations, directions and conditions and place additional obligations on holders of SFRs.

The ETBF MP includes requirements to review performance against measures on an annual basis or to other set timeframes. It is important that the performance criteria in the ETBF MP have appropriate quality criteria against which each measure in the plan can be assessed to ensure that it is achieving the outcome(s) required. Specific areas relating to ecological sustainability to be reviewed (and the plan or arrangements amended if necessary) are summarised in Table 2.

Table 2: Summary¹⁰ of Performance Measures and Review Criteria in the Eastern Tuna and Billfish Fishery Management Plan

Performance Measures	Review Criteria	Timelines
management plan	assessed against the performance criteria identified in management plan and advice from MAC	at least every 5 yrs
services (data collection, research and consultation) to manage the fishery	assessed against cost effectiveness	annually
data plan to collect, verify, analyse and manage data that is related to the management of the fishery	method used to collect data is published in accordance with the data plan data is reviewed and if necessary improved data is collected, analysed and used in accordance with the data plan	developed within 12 months biennial review
ecological risk assessment of marine communities, primary species and secondary species		undertaken within 12 months
setting catch limits for species managed by State/ Territory		established within 12 months
stock assessments and/ or risk assessments for stocks	stock assessments and/ or risk assessments are carried out and reviewed	
reference points for stocks of primary and secondary species	reference points are reviewed and if necessary improved method for revision of reference point published	set within 12 months for key primary species or 24 months for all
decision rules for setting the TAE and any other related management decision	rules are published, reviewed and evaluated and if necessary improved	
BAP	BAP is published, reviewed and evaluated and if necessary improved	
other action plans	other action plans are implemented, reviewed and updated	
TAE to manage the fishery in an ecologically sustainable manner	TAE set	annual review
research program to support the management of the fishery	program is operating and information about the program published program improved if necessary	established within 12 months annual review
risk based compliance program	program is developed and is effective methods used to monitor compliance program improved if necessary	upon commencement
catch monitoring program	methods for monitoring fishing effort and catch are developed and used, reviewed and if necessary improved	upon commencement
number of vessels operating in fishery	.	within 3 years
communication program		within 18 months

The National Bycatch Policy¹¹ administered by DAFF requires the development of bycatch action strategies. In September 2001 AFMA launched the Tuna and Billfish BAP and in April 2003 AFMA initiated a review of all BAPs. As part of this review a BAP specific for longline fisheries, the Longline Fishery BAP, was drafted and introduced in 2004. To complement the Longline Fishery BAP, a Purse Seine BAP was also developed and introduced in 2004.

¹⁰ extracted from the proposed *Western Tuna and Billfish Fishing Management Plan 2004*

¹¹ The National Bycatch Policy can be found at DAFF website (www.daff.gov.au) through the following web path: DAFF Home > Industry Development HOME > Fisheries > Environment and Fishing > Bycatch (National policy)

DEH considers that the management arrangements set out in the ETBF MP comply with all relevant threat abatement plans, recovery plans and the National Policy on Fisheries Bycatch and bycatch action strategies developed under that policy. DEH expects that AFMA will also ensure compliance with any future plans or policies as they are developed.

2.1.1 Recreational Fishing

Some of the species taken in the ETBF are also taken in the recreational fishery, predominately the game fishing sector, and there is significant overlap in fishing areas. The recreational fishery is managed by the fisheries management agencies in each of the States. Recreational catch is generally managed through a range of legal length and bag/boat limits.

Game fishers target the following species, which are also caught in the commercial sector:

- **Billfish:** striped marlin, black marlin, blue marlin, sailfish and to a lesser extent broadbill swordfish;
- **Tunas:** yellowfin is the main species, but also southern bluefin, albacore, mackerel (*Euthynnus affinis*), skipjack and to a lesser extent bigeye tuna;
- **Sharks:** shortfin mako, blue whalers and dusky whalers; and
- **Others:** dolphinfish, wahoo (*Acanthocybium solandri*) and bonito (*Euthynnus alletteratus*)

The level of take in the recreational sector is unknown.

The interaction between recreational and commercial fleets taking striped marlin and direct conflict on inshore live bait collection grounds has resulted in considerable animosity between the recreational and commercial fishers. There have been calls for striped marlin to be classed as a species that may not be retained by commercial fishers and calls for closure of inshore bait grounds to longliners.

In October 2002 a workshop¹², involving Federal, State and Northern Territory fisheries agencies as well as representatives from the commercial fishing, traditional fishers, aquaculture, game fishing, tourism, charter and recreational fishing sectors drafted principles for rights based management of the recreational fishing sector. These were proposed to provide guidance to the Federal government in establishing the rights and responsibilities for recreational fishers when accessing Commonwealth managed fisheries. Further work led by DAFF in the preparation of a draft framework for resource allocation between fisheries sectors and options for management was undertaken in 2003 and is being further progressed in 2004 and 2005.

2.1.2 Protected Areas

There are four notable marine protected areas in the area of the ETBF. These are the:

- **Great Barrier Reef Marine Park (GBRMP).** This is a World Heritage Area and is managed under the *Great Barrier Reef Marine Park Act, 1975* by the GBRMP Authority. In zones where fishing is allowed, line fishing using more than 6 hooks per line is prohibited, effectively prohibiting longlining in the GBRMP.
- **Solitary Islands Marine Park.** This park is zoned and the Sanctuary and Habitat Protection Zones restrict access by ETBF fishers.

¹² *Workshop on Recreational Fishing Rights and Resource Allocation in Commonwealth Managed Fisheries*, Coolangatta, October 2002.

- Tasmanian Seamounts Marine Reserve. This reserve is located south of Hobart. The upper 500 m of the reserve is a managed Resource Zone and access by ETBF fishers is not constrained.
- Lord Howe Island Marine Park. Operators within the ETBF are not permitted within 12 nm of Lord Howe Island and Ball's Pyramid. The only exemption applies to two vessels owned by one company and the exemption was made on AFMA's assessment that this operator poses no threat to the sustainability of stocks and had a fishing history in the area prior to 1993.

Effective consultative mechanisms with the governments of Norfolk Island (for example through the Norfolk Island Fisheries Consultative Committee) and NSW (responsible for the management of Lord Howe Island), are needed to ensure that the fishing within the ETBF is compatible with the management of species of conservation importance, reliant on the waters around these islands.

2.1.3 Bait Fishing

Pelagic longliners in the ETBF use squid and pelagic fish species to fish for tuna and billfish. Swordfish and bigeye tuna are targeted using imported squid. Other target species are caught using pilchard, jack mackerel, yellowtail scad, blue mackerel, other mackerel, anchovy, redbait, tooth whiptails and redfish. Purse seines and lift nets are used off south-eastern Australia to target pilchards, anchovy, small yellowtail and small blue mackerel for longline bait. Approximately 10% of all bait fish used is caught by ETBF fishers prior to a fishing trip.

Bait fish are also used to aggregate and retain feeding surface schools of tuna by chumming¹³. These surface schools are then poled or purse seined.

Under OCS agreements with Queensland, Victoria and Tasmania, the Commonwealth has jurisdiction for bait species taken in waters of these States¹⁴. ETBF operators are permitted to catch bait in these waters for their own use as a part of their rights to access the ETBF. An OCS for bait fish has not been developed with NSW and operators bait fishing in NSW waters are required to have authorisation from NSW. Alternatively, an operator may be entitled to use a lift net to take bait fish as a licence condition on a NSW Fishing Permit. ETBF operators are required to record quantities of bait used in their ETBF logbooks and AFMA is developing a bait fish logbook to collect detailed data on bait fishing.

2.1.4 International Context

Management of the fishery must be consistent with any relevant international or regional management regimes to which Australia is a party. The *United Nations Convention on the Law of the Sea* (UNCLOS) is the international agreement that gives Australia the right to define an EEZ and to manage and conserve resources within this zone. As the species taken in the fishery are highly migratory and straddle national and international waters, the *United Nations Fish Stocks Agreement* (UNFSA), established to ensure the long-term conservation and sustainable use of straddling stocks of highly migratory fish stocks, is also applicable.

Australia signed UNFSA on 4 December 1995 and ratified it on 23 December 1999. This agreement came into effect on 11 December 2001 after ratification by 30 signatories. The objective of the UNFSA is to ensure the long-term conservation and sustainable use of straddling fish stocks and highly migratory fish stock through effective implementation of relevant provision of UNCLOS. UNFSA was developed to address issues related to

¹³ Chumming or burleying is the use of attractants (including blood, offal, skin or other parts of animals or chemicals) to lure fish to a fishing operation

¹⁴ The bait species identified are generally described as small pelagics and AFMA manages the take of these under separate management arrangements.

unregulated fishing on the high seas for highly migratory and straddling stocks and to promote cooperative management of shared resources. The agreement applies on the high seas and has certain provisions that apply within the EEZ of coastal states.

Relevant provisions of the UNFSA have been incorporated into the FM Act.

Western and Central Pacific Fisheries Commission.

The Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (the Convention) has established the WCPFC to conserve and manage migratory fishery resources in the WCPO. After consultation with states, territories and industry groups, Australia ratified the Convention on 23 September 2002. On 19 June 2004, the Convention entered into force and the first meeting of the new Commission was in December 2004. The Convention was negotiated at a series of Multilateral High-Level Conferences (MHLC), which included participants from Pacific Island Countries and distant water fishing nations. Australia was an active participant in the MHLC process, recognising the importance of the Convention to the long-term future of Australian and Pacific fisheries.

The objective of the Convention is to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the WCPO in accordance with UNCLOS and UNFSA. The Convention draws upon the principles of sustainable use, long-term conservation, effective monitoring, control and surveillance and the precautionary approach. The WCPFC seeks to manage all highly migratory fish stocks within the Convention area, including tuna, billfish (such as swordfish, marlin and sailfish), mackerel and sharks. Broadbill swordfish, bigeye tuna, yellowfin tuna, skipjack tuna, albacore tuna and longtail tuna are particularly relevant to the ETBF.

The DAFF is the lead agency for Australia's participation in the WCPFC. Australia is playing a lead role, through its Chairing role (Mr Glen Hurry from DAFF), in the development of arrangements for the Commission which was created to manage a resource of significant benefit to the region. Australia is working with other members of the Commission to ensure satisfactory management arrangements are implemented (through adoption of a resolution committing the Commission to the implementation of management measures at its second meeting in December 2005), and progress on issues such as the provision of scientific advice and data, and the development of an operationally effective Monitoring, Control and Surveillance Scheme.

The reported status of the key target species, increasing pressure from fishing nations (both coastal state and distant water fishing nations entering into bi-lateral agreements with Pacific Island States) and the use of reportedly unsustainable practices such as fishing for juveniles around FADs, are priorities that DEH considers must be addressed by the WCPFC. Effective engagement in the WCPFC is seen by DEH as critical in the management of the migratory species on which the ETBF relies. Priorities for Australia in the WCPFC include ensuring that all relevant nations become members of the WCPFC, that stock assessments are robust and scientifically defensible, that stock rebuilding measures with a high probability of succeeding are implemented and that effective decision rules to set national allocations are in place.

Given the initial stages of the work of this Commission, Australia can provide input into its management framework, particularly in areas such as stock assessments, bycatch monitoring and mitigation, national allocations, research priorities and ecologically related species interactions.

Recommendation 4: *DAFF in consultation with AFMA, DEH and other relevant government agencies, must take a proactive role in the early work of the Western and Central Pacific*

Fisheries Commission (WCPFC) to ensure its effectiveness as the regional fishery management forum for managing and conserving the species on which the Eastern Tuna and Billfish Fishery relies. This should include the following priorities:

- *developing management options that address concerns of the Working Groups formed under the WCPFC or the South Pacific Commission on key target species;*
- *endeavouring that the membership of the WCPFC includes all nations taking tuna species in the area of the convention;*
- *verifying the catch of all nations, both target and bycatch species;*
- *strengthening stock assessments of key species (with a priority for big eye tuna and yellowfin tuna which are reportedly 'fully fished' in the Pacific and uncertain in the Australian fishery and which may require stock rebuilding objectives to be established);*
- *developing national allocations including a position for establishing Australia's claim for catch of key species, noting the status of two of the key target species, bigeye tuna and yellowfin;*
- *establishing a regime in the Commission to protect ecologically related species; and*
- *ensuring unsustainable fishing practices and technologies, such as fish aggregating devices, are thoroughly evaluated and if necessary phased out.*

A major constraint in the management of the ETBF is the lack of complete stock assessments for all key species taken in the Pacific-wide fishery. Scientists from the Marine Research Division in the Commonwealth Scientific and Industrial Research Organisation (CSIRO), from the Bureau of Rural Sciences (BRS) in DAFF and from AFMA provide input to the stock assessments conducted under the auspices of the SCTB. The SCTB provides a forum for scientists and others to discuss scientific issues related to data, research and stock assessments for tuna and billfish stocks in the WCPO and reflects the likely membership of the WCPFC.

Of the six working groups convened by the SCTB, the Highly Migratory Species (HMS) Stock Assessment Working Group undertakes stock assessments for the key species of the fishery. The HMS Stock Assessment Working Group reports that the annual total catches of the four main tuna species (skipjack, yellowfin, bigeye and albacore) have continued to increase in the WCPO with the 2003 catches in the order of 1.9 M metric tonnes. The purse seine sector accounted for 60% of this catch and the longline catch approximately 11% (~210,000 tonnes).

While the science underpinning the stock assessments is as robust as the methodologies allow there are still concerns over the data used in the modelling, particularly the availability/provision of comprehensive catch and effort information from many of the fishing fleets.

Other international regimes are applicable to fisheries management but do not explicitly involve this fishery, for example the 1992 Convention on Biological Diversity and in particular the 1995 Jakarta Mandate requiring that, in relation to the sustainable use of marine and coastal biological diversity, the precautionary principle should apply in efforts to address threats to biodiversity. While these agreements are not specifically addressed in the Submission, the fishery's compliance with their requirements can be assessed by examination of Part Two of this report. The application of the International Convention for the Prevention of Pollution from Ships (MARPOL) to vessels operating in the fishery is explicitly discussed under Principle 2, Objective 3.

2.2 Conclusion

The ETBF management regime is documented, publicly available and transparent, and developed through a consultative process. The management arrangements are adaptable and underpinned by appropriate objectives and performance criteria by which effectiveness of

management arrangements can be measured, enforced and reviewed and if necessary amended in a timely manner.

The management arrangements are capable of controlling the harvest through a combination of input and output controls appropriate to the size of the fishery. Periodic review of the fishery is provided for, as are the means of enforcing critical aspects of the management arrangements.

The management regime adheres to arrangements established under Australian laws and international arrangements. The cross-jurisdictional arrangements for species that occur in both State and AFMA managed fisheries require further development and closer collaboration between State fisheries management agencies and AFMA. Particular emphasis is required during the establishment phase of the WCPFC to ensure it is a fully effective regional fishery management organisation, focussing in the first instance on the fully fished status of yellowfin and bigeye tuna stocks.

DEH considers that there is scope to further refine the management arrangements and has provided a number of recommendations for improvements in the longer term.

PART II GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES

3.1 Stock Status and Stock Recovery

Principle 1: *“A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover”*

Maintaining ecologically viable stocks

Objective 1: *“The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability”*

3.1.1 Information requirements

Under the ETBF MP, AFMA has a comprehensive program of data collection incorporating an appropriate mix of fishery dependent and fishery independent methods. This includes:

- a data plan to collect, verify, analyse and manage data related to the management of the fishery;
- a catch monitoring program;
- a research program to support management of the fishery;
- ecological risk assessments of marine communities, primary species and secondary species; and
- a risk based compliance program.

AFMA uses independent observers in the majority of fisheries it manages, including the ETBF, to collect data on fishing operations, catch, effort and interactions with the environment by the vessel and its fishing gear.

The primary means of collecting ‘fishery dependent’ data will be through the logbooks and associated catch records required by law and used by AFMA for monitoring, compliance and research. The information is to be maintained in the Australian Fishing Zone Information System housed in AFMA. The primary logbook is the Pelagic Longline Daily Fishing Log – AL05, which provides for recording:

- vessel details, including vessel dimensions, vessel name and distinguishing symbol, engine power, fuel capacity, cruise speed, technological equipment carried;
- owner and master’s details
- details of fishing gear and seabird mitigation gear carried.

The logbook also provides for the daily recording of:

- shot by shot catch and effort (number of hooks, depth targeted, number of lightsticks¹⁵, bait type and weight);
- latitude and longitude;
- shot by shot information on environmental conditions (sea surface temperature, wind speed and direction);
- seabird mitigation measures used on each shot;
- number of species caught and retained and estimated total weights;
- number of species discarded (28 species listed plus provision for 2 additional species)
- port of landing and name of fish receiver; and

¹⁵ Lightsticks are plastic tubes filled with chemicals that when combined emit a light. The lightsticks are attached to the branchlines near the bait and acts as an added attractant.

- comments.

Other logbooks record equivalent information in the minor line sector, the OT 03, and in the purse seine and pole sector, the PS01.

Systems are in place to enter this information onto AFMA's GENLOG database and AFMA reports that there are very high levels of completion compliance, with 99.9% submission of logbooks in 2003-04. To crosscheck with these compulsory logbooks, AFMA requires vessel operators to complete Catch Disposal Records (CR4). Fish receiver documentation will be required in the near future as a further cross check system.

Logbook officers periodically visit fishing ports as part of the Logbook Education Program to talk to fishers about the logbook program and its importance to the management of the fishery. The ETBF Size Monitoring Program, initiated in 1997-98, collects information from fish processors on ETBF landed catch and its composition.

DEH considers the target species data collected by AFMA to be accurate and sufficiently reliable and that compliance and enforcement activities have the capacity to ensure that this data continues to be reliable.

The ETBF MP requires all vessels in the fishery to carry an operational ICVMS. This computer-based system automatically relays information to AFMA on vessel location, course and speed, enabling AFMA to analyse fishery operations on a real time basis. The system is independent of the operations of the vessel. An added benefit to this system is the ability for AFMA to contact a vessel to advise of any changes to management arrangements that need immediate action and to investigate any suspected breach of conditions.

A scientific monitoring program was initiated in the ETBF in July 2003. This program was designed to characterise the immediate and future requirements of routine monitoring of the fishery, to be undertaken by observers. In accordance with the Longline Fishery BAP, AFMA has introduced an observer program with a target level of 5.1% coverage per year for five years. For the 2003-04 fishing season the reported level of coverage of hooks set in the fishery was 3.5%. DEH expects that this level will increase in subsequent years and the target coverage will be achieved.

The ETBF observer program was designed by CSIRO, according to AFMA specifications, to provide statistically robust data across all areas of the fishery and seasons, sufficient to detect rare but potentially significant interactions. The observer program will monitor compliance with management measures, record details of catch and effort, collect scientific samples and data on target, bycatch and protected species interactions.

DEH considers the observer program critical for the collection of validated data for use in stock assessments and for informing management decision making. Wherever possible, observers should collect information on the life status of all discards, particularly species vulnerable to the fishery. Information should also be collected on the impact of emerging technologies (for example, lightsticks, circle hooks, types of bait) on fishing sustainability.

The effective implementation of the observer program has been a significant consideration in DEH's assessment of this fishery.

Recommendation 5: *AFMA to ensure that the observer program continues to meet domestic and international data and management needs and provide the required information at a statistically robust level.*

Eighteen years of logbook, radio report and observer data from the Japanese longline fishing vessels that used to operate in the AFZ is a valuable source of information for the ETBF. The extent of observer coverage was approximately 5.5% of hooks set in the area of the ETBF between 1991 and 1997.

In recent years, observer data has been collected on seabird interactions below 30 °S, through the Longline Fishing TAP mitigation trials. Apart from the data acquired under the Longline Fishing TAP, the fishery currently has little verified data on target, by-product or bycatch species or protected species interactions and hence high levels of uncertainty about the impacts of the take, or interactions with this wide range of species. The observer program has started to provide data to address this uncertainty, but given the extended (5 year) timetable for the program, AFMA will need to continuously review priorities for the roll out of the program across the fishery.

DEH welcomes AFMA's commitment to establish data plans and to review these every two years to ensure that the data collected is appropriate to the management of the fishery.

Several tagging programs are under way including key programs for tagging bigeye and yellowfin tunas and broadbill swordfish.

Information from *The National Recreational and Indigenous Fishing Survey*¹⁶ (released in July 2003) did not differentiate between tuna species and did not provide any quantitative breakdown of the recreational catch in Australia. There are no consolidated records of catches in the eastern Australia recreational fishing sectors¹⁷ and therefore no accurate record of the total catch of species taken in the area of the ETBF. Given that Queensland has extensive datasets on recreational catch in their jurisdiction DEH suggests that AFMA seek access to this and similarly with NSW game fishing data.

Most of the species taken in the recreational sector that are common to the commercial sector are primarily taken during game fishing activities and most of these are tagged and released. While there are some concerns over the post release mortality, it is claimed that the level of post release mortality is quite low, but this has not been verified.

One group of particular importance to the recreational fishers is the marlins. Black marlin, blue marlin and striped marlin are all key target species for the game fishing sector. Black and blue marlin have been protected under the FM Act since 1998 by commercial operators being prohibited from taking or landing these species. Striped marlin constitute a small but important component of the ETBF.

3.1.2 Assessment

The stock assessment process is conducted by working groups established under the SCTB. Scientists from the CSIRO, BRS and AFMA provide input to the stock assessments. The key working group is the HMS Stock Assessment Working Group. Other relevant working groups are:

- Statistics Working Group;
- HMS Biology Working Group;
- Ecosystem & Bycatch Working Group;
- Fishing Technology Working Group; and

¹⁶ *The National Recreational and Indigenous Fishing Survey*, edited by GW Henry, New South Wales Fisheries and JM Lyle, Tasmanian Aquaculture and Fisheries Institute (FRDC Project 99/158).

¹⁷ Recreational fishing includes the game fishers who predominately tag and release fish and other recreational fishers (including clients on charter operations) who take fish for retention/ consumption.

- Methods Working Group

These 'thematic' based working groups will most likely reflect the scientific support arrangements adopted by the WCPFC.

Issues to be addressed in the stock analyses for key species, include:

- the very wide geographical area of the WCPO fishery, covering over half the Pacific Ocean and significant areas in both the northern and southern hemispheres;
- poor knowledge of the catches, effort and size-frequency from all commercial fishers operating in the area of the WCPO; and
- a poor knowledge of the catches, effort and size-frequency data for gillnet and other artisanal fisheries in the many Pacific Island States.

These concerns were highlighted in the recent report of the 17th meeting of the SCTB¹⁸ where the HMS Stock Assessment Working Group reported that:

- the current fishing mortality for bigeye tuna is estimated to be close to the Maximum Sustainable Yield (MSY);
- the yellowfin stock in the WCPO is probably not being overfished and is not in an overfished state, but any future increases in fishing mortality may move the stock into an overfished state;
- the broadbill swordfish stock status is unknown and work has only commenced on a stock assessment for the species;
- the albacore stock status is unknown but it is considered unlikely that the stock is being overfished or that it is in an overfished state; and
- the skipjack stock is not overfished and the level of exploitation is modest relative to the stock's biological potential.

According to the BRS 2002–03 Status Report, there are no quantitative management reference points for the ETBF. The development of long-term management objectives, incorporating assessment-based reference points, will be hampered until the interactions of the ETBF and the wider-Pacific stocks are clarified. Similarly, the nature and extent of localised depletion, and of the interactions of ETBF with the overlapping recreational fishery, require investigation.

AFMA has included a number of specific actions in the ETBF MP to address such uncertainties, including:

- developing and implementing reference points for primary and secondary species, and if reference point are not developed, then establishing precautionary limits;
- determining the status of stocks in relation to the reference points by conducting stock assessments and risk assessments;
- reviewing and if necessary, improving the reference points;
- developing, publicizing and applying decision rules for the setting of the TAE and other related management measures and reviewing, evaluating and if necessary improving the decision rules.

The primary management tool for the fishery will be a TAE (ie the total number of hooks permitted to be set during the year). The TAE will be set annually and before it is set, the AFMA Board must consider:

- the reference point for each primary species and secondary species;
- information given by the advisory committee and other interested bodies;
- the total estimated catch by commercial, recreational, charter, indigenous and any other users of the fishery;

¹⁸ Seventeenth Meeting of the Standing Committee on Tuna and Billfish, Majuro, Republic of the Marshall Islands, 9 – 18 August 2004.

- information about the sustainability of marine species in the area of the fishery;
- any decision made by the Minister or an intergovernmental Ministerial Council about resource sharing in the fishery;
- any decision rule used for the setting of the longline TAE and minor line TAE; and
- the likely effect, for the fishing season, of any over-expenditure of effort units permitted.

DEH is satisfied that using a decremented hook system (as a measure of effort expended) is an effective management approach, provided an appropriate number of hooks is set. AFMA has established the above criterion that must be considered before the TAE is set annually and this includes taking into account the ecological requirements of the most vulnerable species in the fishery. The initial TAE is expected to be 13.5 million hooks.

The ETBF pelagic species have a wide distribution and are generally highly migratory. Appendix 1 provides general information on the distribution and spatial structure of the key target species.

A major concern in this fishery is the status of the key target species in the Pacific Ocean, particularly bigeye tuna which is considered to be fully exploited and possibly subject to overfishing. Most of the effort and take is well outside the area of the ETBF and Australian fishers take only a very low proportion of the total Pacific Ocean catch.

The setting of a low TAE by AFMA to provide protection to species such as bigeye tuna, would send a strong message about Australia's commitment to sustainable fishing for Pacific Ocean tuna stocks, but would not necessarily be effective in allowing for the rebuilding of the stocks. A collaborative approach, through the WCPFC, by all countries that fish in the western Pacific Ocean is essential if the ocean-wide fishery is to be ecologically sustainable. Recommendation 4 refers to this.

In October 2001 CSIRO initiated, at the behest of AFMA, BRS and the Victorian Marine and Freshwater Research Institute, a project, titled "*Ecological risk assessment for Australian Commonwealth fisheries*" (ERA), for all Commonwealth managed fisheries to help prioritise research, data collection, monitoring and management needs. This project is a key aspect of AFMA's implementation of ecosystem based fisheries management and will be used to develop a general and flexible approach to assessing the ecological risks attributable to each Commonwealth managed fishery. The project aims to:

- assist AFMA to achieve ecologically sustainable development objectives; and
- underpin the progression towards ecosystem based fisheries management.

Considerable emphasis has been placed by AFMA on the ERA to identify the ecological risks attributable to fishing (and thus enable identification of mitigation measures). The ERA is being undertaken in relation to target, by-product, bycatch, protected species interactions and broader ecological impacts.

The ERA assesses the risk a particular fishery may pose to all ecosystem components – target species; by-product and bycatch species; threatened, endangered and protected species; habitats; and communities. The ERA will categorise various species into high, medium or low risk on the basis of their susceptibility to capture by the permitted fishing methods and the ability for impacted species' populations to recover. Identified high-risk categories will require AFMA to initiate precautionary management responses and/or assessment to a next more quantitative level. As part of the project, CSIRO undertook to conduct case studies for several fisheries, including the ETBF Fishery. The Case Study is still being finalised.

The ERA for the ETBF is drafted to Level 2 risk assessment¹⁹. The report is to be finalised by 30 June 2005. AFMA advises that implementation of the report will commence immediately.

DEH strongly endorses the ERA project as a significant tool to assist AFMA in achieving ecosystem based fisheries management, tailoring management measures to ensure those species identified as being at risk are given appropriate protection. DEH considers that the implementation of measures to mitigate high risks identified through the ERA must be a priority for management of the fishery.

Recommendation 6: *Within 3 years AFMA will identify and implement management responses to fishing impacts identified from the ecological risk assessment process, taking into account known fishing impacts on:*

- *species in the fishery listed as protected under the EPBC Act;*
- *species with low productivity;*
- *areas of localised depletion; and*
- *species with increasing levels, or significant potential for increased levels, of catch landings.*

DEH welcomes AFMA's ongoing commitment to regular ecological risk assessments in the ETBF MP.

3.1.3 Management responses

The ETBF MP requires the development of reference points and precautionary limits for both primary and secondary species. The reference points to be developed will be provisional in the first instance and subject to change, depending on any reference points set by the WCPFC or additional information collected and incorporated into the stock assessments. AFMA advises that, given the paucity of information on which to set reference points, it will set provisional reference points in the first instance, based on precautionary limits or target reference points. DEH also notes that the setting of TAE in the future will include consideration of the reference points once established.

Bigeye tuna and yellowfin are classified as fully fished in the Pacific Ocean and management approaches designed to ensure the species are not overfished are required. The WCPFC needs to establish total allowable catches, national allocations and reference points for all mandated species, particularly for bigeye and yellowfin tunas.

New management strategies are being established in the ETBF MP to control the level of take in the commercial fishery and this differs quite considerably from the controls (output based and permits) employed previously. The key strategy is based on controlling the effort applied in the fishery (input based) and this will be through gear based SFRs in the form of longline SFRs and minor line SFRs. The rights confer rights to fishers to use a certain number of effort units (hooks) in each sector in which they have access. SFR holders will be allocated their effort units in accordance with either their longline or minor line SFR.

The number of effort units allowed in the fishery in any year will be set by AFMA as the TAE. The TAE will be the primary tool to maintain sustainable effort levels in the fishery and therefore sustainable harvest levels. Fisheries managed under input controls require analysis of effective fishing effort and its relationship to catch.

¹⁹ The ERA Project uses a hierarchical risk assessment approach consisting of three distinct levels:
Level 1 – a qualitative risk assessment, including a scoping report of the fishery;
Level 2 – a semi-quantitative risk assessment; and
Level 3 – a fully quantitative risk assessment (ie a stock assessment).

DEH notes that a risk based compliance program and catch monitoring program are to be implemented at the commencement of the ETBF MP. The effective management of an effort managed fishery requires measures in place to provide a high level of confidence in compliance with allocated effort. With the introduction of the TAE, a compliance system must be in place to monitor the effort expended by each vessel in the fishery.

Regular reviews and reporting of the effectiveness of these programs will be essential for evaluating the new management arrangements under the ETBF MP.

Recommendation 7: *AFMA to ensure an effective effort monitoring system is in place to monitor and manage the effort expended in the fishery from the time of introduction of the Total Allowable Effort.*

The accurate setting of an ecologically sustainable TAE (among other things) is critical to the effectiveness of the ETBF MP and this requires an understanding of the species most at risk and the status of all targeted stocks and the introduction of biologically based reference points. DEH notes that AFMA has the management tools available to protect the species most at risk from the fishery, but it is critical to clarify how these will be used to set the TAE to protect not only the primary target species considered most at risk but also the other species taken in the fishery.

While DEH accepts the need for AFMA (and the fishers) to allow for the management of under-expenditure, any under-expenditure carried over into following fishing seasons must not impact on the ecological sustainability of the species most at risk from the fishery. DEH notes that the determined percentage will be set at zero initially.

The ETBF MP requires AFMA to consider ecological sustainability, both when setting the TAE and when making decisions about possible carry over of effort.

To support the necessary monitoring of effort AFMA has a range of monitoring and compliance systems, ranging from logbooks, catch records, ICVMS, education and extension programs through to dedicated compliance activities.

The ETBF MP provides for a differential clip decrementation system. This is potentially an effective tool in the management of effort in this fishery and a means to provide an incentive for fishers to investigate other target species permitted under the ETBF MP. Effectively differential clip decrementation would become a spatial management tool. This approach warrants further evaluation and DEH notes that AFMA will not introduce this measure initially. Before any introduction of a differential clip decrementation scheme, its utility in achieving the desired outcome (for example, to protect swordfish from localised depletion) and the decision rules to be applied needs to be evaluated, along with potential impacts on all other components of the ecosystem.

The ETBF MP lists the primary species (Schedule 1) and defines secondary species (Schedule 2) as all species of fish, other than a primary species, that may lawfully be taken in the fishery and retained. Effectively these are the by-product species. Primary species are those species managed by the Commonwealth (ie the Commonwealth has primary jurisdiction under the OCS or as in international agreements).

Secondary species are those species where the Commonwealth doesn't have exclusive jurisdiction. Catch of these species is usually limited by trip limits agreed in Memoranda of Understanding (MOU) under the relevant OCS between the Commonwealth and the States.

These trip limits are generally constrained and act to remove any incentive for targeting secondary species.

DEH notes that the ETBF MP (section 11) requires the development of reference points for key target species within 12 months and for any outstanding primary and secondary species within 24 months. If reference points are not set AFMA under the ETBF MP must set precautionary limits on the catch of primary and secondary species. DEH considers the setting of reference points to be a priority for the management of the fishery.

DEH recognises that there may be insufficient data on which to determine biologically based reference points for some of these species, in which case precautionary limits should be applied while information to develop more meaningful reference points is obtained.

DEH welcomes the improvements in cooperative arrangements being discussed at forums, such as the Southern and Northern Fisheries Management Workshops. Section 2.1 and Recommendation 3 also address cross-jurisdictional issues.

The ETBF is categorised as an input-managed fishery relying on a TAE to manage the impact of the fishing operations on the stocks. The capacity of fishers to employ fishing techniques that significantly increase fishing power (such as the use of electronics, eg radar, water column temperature monitoring, sonar, depth sounders, radio buoys, the use of particular fishing equipment eg FADs, light sticks, circle hooks, pingers), and hence possibly threaten ecological sustainability, needs to be monitored and overtly incorporated into management arrangements, such as in the setting of the TAE. If warranted, a policy for managing technological advances should be developed.

Lightsticks, as well as improving catch rates may have adverse impacts on bycatch levels and therefore warrant close evaluation and possible direct management. The disposal of used light sticks also needs management as they are reported to have potentially deleterious effects on species that ingest discards.

DEH maintains that the use of FADs in the Pacific Ocean wide fishery is a major threat to the long-term sustainability of several species, particularly bigeye and yellowfin tunas. As FADs effectively retain migratory species of fish temporarily, aggregate scattered schools and tends to attract juvenile fish, the effective fishing power of the fisher is significantly increased. There has been limited acknowledgement of the unsustainability of the fishing method by the international fishers. A comprehensive review and analysis of impacts of this fishing method in the Pacific Ocean is required as a matter of some urgency and effective management directions need to be developed and applied. Given the significant adverse impacts that this method of fishing is recognized as causing, its use in the ETBF cannot be supported without such a review and the imposition of any stringent controls considered necessary.

Recommendation 8: *AFMA to monitor the impact of technological advancements in the fishery on the ecological sustainability of target, by-product and bycatch species, and incorporate any mitigation measures into management as necessary taking account of the impacts of technological advancements in stock assessment and setting the Total Allowable Effort.*

DEH's emphasis in the assessment of the ETBF MP is based on the dominant method of fishing, longlining, and takes into account the impacts attributable to this method of fishing on target, by-product (non-target) and bycatch species and on the environment generally.

The nature of the SFRs to be granted under the ETBF MP is highly specific and applies directly to longline operations and minor line fishing. Any significant change to these methods would require a change in the plan and hence a review of DEH's assessment of the fishery and its associated EPBC Act decisions.

Preliminary reports by BRS indicate that there is a risk of localised serial depletion of swordfish in the ETBF, particularly in inshore areas. This risk needs to be properly evaluated and, if necessary, managed through spatial and/ or temporal controls.

Recommendation 9: *AFMA to analyse the risks and the extent of the localised depletion of swordfish and to develop appropriate management measures to mitigate against any localised depletion as needed.*

3.1.4 Conclusion

The ETBF is a multi-species, multi-method (primarily longline) fishery that is comparatively small when compared to the wider Pacific Ocean fisheries for the species taken. There are stock assessment signals that some key primary species are fully fished, particularly bigeye and yellowfin tunas, and if not addressed this may impact on the overall long term sustainability of the fishery.

As a mixed species and mixed gear fishery operating within an international fishery, AFMA faces considerable challenges to maintain, at ecologically sustainable levels, the range of stocks under its responsibility.

The WCPFC has recently been established to manage the international fishery. Australia must play an active role in this Commission to ensure that it effectively manages the migratory stocks across their entire range.

DEH considers that the management regime in the ETBF MP is appropriately precautionary and provides for the Australian fishery to be conducted in a manner that does not lead to over-fishing and for fishing operations to be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem.

Recognizing the limitations associated with operating within an international fishery targeting highly migratory species, DEH considers the information collection systems, stock assessment and management arrangements generally are adequate to ensure that the fishery can be conducted at effort levels that maintain ecologically viable stock levels with acceptable levels of probability. DEH also considers that there is scope to further refine some of the existing information collection, assessment and management responses and has provided a number of recommendations for improvements in the longer term.

3.2 Promote recovery to ecologically viable stock levels

Objective 2: *“Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes”*

3.2.1 Management responses

Currently as there are no reference points established for either the Australian domestic fishery or the wider Pacific Ocean fishery and no specific recovery strategies are in place.

Internationally there is an increasing need to develop specific objectives to manage the fully fished status of bigeye and yellowfin tuna, including the establishment of appropriate reference points, and to ensure that these are accepted by all nations taking the species in the Pacific Ocean.

In the domestic fishery, AFMA's ETBF MP includes provision for the development of reference points (that may be trigger or limit) within a prescribed time for both primary and secondary species. Should any of these stocks fall below these reference points, AFMA with assistance from the Eastern Tuna MAC and the ETBF Fisheries Advisory Group (FAG) will develop a precautionary recovery strategy for that stock. The recovery strategy will be based on scientific advice, will specify management actions and establish timelines appropriate to the biology of the species.

3.2.2 Conclusion

There are no reference points for the primary species, but bigeye and yellowfin tuna and broadbill swordfish have been identified as being under significant fishing pressure internationally. AFMA has committed to developing reference points and should future stock assessments indicate that species are below these reference points, AFMA will develop and implement recovery strategies.

Hence DEH considers that AFMA will, to the extent possible within an international fishery, manage the ETBF to promote recovery to ecologically sustainable levels, as needed.

4.1 Ecosystem impacts

Principle 2: *“Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem”*

Bycatch protection

Objective 1: *“The fishery is conducted in a manner that does not threaten bycatch species”*

4.1.1 Information requirements

Longlining is not a particularly selective fishing method. While fishing techniques to target particular species are improving, a considerable number of species are still taken as bycatch (either species that have no commercial value, are protected under legislation or interact in some way with the fishing operations). Bycatch protected under legislation is discussed in Section 4.2.

More than 45 species of bycatch were reported in the Japanese longline fishery that operated in the AFZ. Information available on the composition and relative abundance of bycatch species taken in the fishery is limited. Observer data suggest that around 15% (by number) of fish caught are discarded as bycatch. Some bycatch species are usually brought in dead (particularly fish species) while others, such as some sharks, are usually brought in alive. Bycatch can be rare, large, long-lived, low fecundity species or species that are valuable to other fisheries. Of particular concern is the bycatch of sharks.

The fishery dependent data collection program (primarily the logbooks) is robust. The AFMA logbooks provide for the collection of information on bycatch and AFMA regularly conducts logbook education programs, including the distribution of species identification guides, to improve the quality of the information collected. Such approaches are important for minimising the non-reporting or under-reporting of bycatch.

An observer based monitoring program is being undertaken in the fishery. In 2003-04, 51 different species were identified in the longline fishery. This is comparable with logbook records and the observer reports from Japanese longlining in the AFZ. The observer program initially established to monitor the level of interaction with protected species, notably seabirds, in southern waters of the fishery (below 30°S) has been expanded to cover the entire fishery at a level to provide statistically robust information on the take of species of concern.

The ETBF data plan includes the collection of data on bycatch, including verified data through an observer program. Should the ERA project identify specific areas of data deficiency, the data plan and other monitoring programs will be amended as required. AFMA advises that, in relation to bycatch, the data plan will:

- increase the quality and accuracy of data;
- collect data to identify spatial, temporal, structural and abundance trends; and
- collect data to identify reliable estimates of bycatch interaction and mortality rates.

This data will be used to:

- identify and assess mechanisms to reduce bycatch; and
- collect data to identify species associations and relationships.

4.1.2 Assessment

Currently the level of bycatch in the fishery is only estimated from logbook data with limited verification by observer coverage. A formal risk analysis of bycatch and its vulnerability to fishing has recently been initiated.

The ecological risk assessments (the ERA and later similar analyses) will categorise various species, including bycatch species, into high, medium or low risk on the basis of their susceptibility to capture by the various fishing methods and the ability for impacted species populations to recover. AFMA has committed to initiate precautionary management responses for those species identified as high risk. The outcomes of the ERA may also include the identification of an indicator group or species, such as black marlin, blue marlin, dolphinfish, blue shark and/ or turtles, that may prove useful as indicator species to establish management responses (mitigation, avoidance, control) for the range of bycatch species taken.

DEH has concerns about the post release mortality²⁰ of bycatch. Little is known about the fate of any species released from the longlines. Information on this issue needs to be collected as an integral part of all data collection programs undertaken in the fishery, including as much as is possible, as a important function of observers. The lack of information on species such as sunfish and thin tailed thresher sharks that may be particularly vulnerable to fishing impacts is of increasing concern. If the observer program does not provide reliable information AFMA must consider other approaches to determine post release mortalities and develop management approaches as needed to address the issue. Post release mortality is an issue across a number of fisheries that would benefit from cooperative research. The current project being conducted through Fisheries Research and Development Corporation (FRDC) to investigate the post release mortality of marine turtles may be of use in ascertaining if a broader range of bycatch species, considered at risk, can be effectively investigated.

4.1.3 Management response

AFMA has developed a range of management responses to avoid and/ or reduce the capture and mortality of bycatch species. Longline Fishery BAP is the major management response, (discussed later in this Section). Other measures include:

- a catch limit of 20 sharks per trip for operators in the ETBF;
- a ban on shark finning at sea; and
- a ban on landing of black or blue marlin. This prohibition originally was introduced because of concerns over the status of the stocks of these species and the interaction between the Japanese longlining fleet operating under bilateral agreements in the AFZ and the developing recreational fishery targeting these species as game fish.

Off the East coast of Australia, the area of the ETBF overlaps with the distribution of southern bluefin tuna (SBT) for around 5 months of the year. For this period, AFMA has developed specific management actions to ensure that all mortalities of SBT are accounted for under the SBT Management Plan. Given the risk of discarding of SBT and the status of the SBT stock, AFMA is introducing in 2005, 100% observer coverage for boats targeting SBT within the critical part of the ETBF area of waters. To enter core and buffer zones, fishers have to hold SBT quota. All SBT caught in these zones are decremented against quota, except those that are released in an alive and vigorous state.

DEH concurs with AFMA that the trip limits imposed for sharks are a precautionary measure to protect shark species that are recognised as being susceptible to overfishing. AFMA intends to review this limit once more information is available on particular species. Recommendation 3 aims to strengthen collaborative management arrangements between AFMA and the State

²⁰ post release mortality of bycatch refers to the survivability of bycatch species once they are released.

Fishery agencies to specifically manage species that cross jurisdictional boundaries, particularly shark species.

Recognition of the biological vulnerability of pelagic sharks to over-exploitation, the large numbers caught as bycatch in “open access” high seas fisheries, escalating fin prices and a lack of international management has led to the Food and Agricultural Organisation’s International Plan of Action and Australia’s *National Plan of Action for the Conservation and Management of Sharks* (NPOA - Shark). These plans stress the urgent need for quantitative assessment of the sustainability of pelagic shark catches.

DEH welcomes the finalisation of the NPOA-Sharks in May 2004 noting that the intention of the Plan is not to over-ride or supplant existing management measures. The NPOA-Sharks does not require the introduction of any specific management measures, but does make a commitment to introduce any measure should they become necessary. DEH considers that the high-risk status accorded to sharks in the first stage of the ERA requires AFMA to consider the introduction of measures to mitigate the risks posed to sharks. A number of sharks are categorised by the International Union for the Conservation of Nature’s (IUCN) Red List as ‘near threatened’ reflecting concerns that they are approaching threatened status and that efforts to reduce or prevent bycatch of sharks should be a priority.

Some species, such as oceanic white tip shark and thresher sharks, may be particularly vulnerable due to their low productivity. Other species, such as the pelagic sharks, may be fecund and fast growing and able to withstand higher fishing pressures but some of these, the blue sharks for example, are among the most heavily fished shark group in the world. The ERA identified that pelagic shark species caught by domestic longline fisheries are at high risk of over-exploitation. Other research indicates that blue shark catch rates have significantly declined in the ETBF, raising serious concerns about the sustainability of their take.

The result is a pressing need to investigate:

- stock structure of pelagic sharks in the WCPO;
- changes in catch rates for sharks to determine if this is due to changes in:
 - fishing strategies and thus effective longline effort directed at pelagic sharks;
 - spatial distribution; or
 - the actual abundance of these species;
- migratory routes, residency areas and oceanic ‘hot spots’ that aggregate these sharks; and
- sustainability of pelagic shark catches in the Australian region.

Recommendation 10: *AFMA to introduce management measures to reduce the incidence of capture, injury and mortality to shark species that are identified in the ERA as being susceptible to fishing pressure.*

BAPs are the major means through which AFMA addresses bycatch issues in its fisheries. The original Tuna BAP has been split into two - the Tuna Purse Seine BAP and the Longline Fishery BAP. Both will be applicable in the ETBF, but with most fishing activity covered under the Longline Fishery BAP.

The Longline Fishery BAP requires:

1. identification of fishery specific issues and risks particularly those for:
 - protected species and threatened ecological communities, (marine turtles, seabirds, sharks, cetaceans and other marine mammals);
 - high risk and other bycatch species (sharks, blue and black marlin);
 - habitat removal attributable to the fishery operations; and

- the impact of total bycatch on the broader ecosystem;
- 2. strategies/ actions addressing risks associated with:
 - protected species;
 - high risk and other bycatch species; and
 - the broader marine ecosystem;
- 3. a communication strategy:
 - protected species;
 - high risk and other bycatch species; and
 - the broader marine ecosystem.
- 4. a prioritised workplan.

The BAP includes:

- outcome as well as process orientated performance indicators, (eg levels of compliance with regulations, levels of bycatch reduction and uptake of bycatch reduction measures);
- regular (6 monthly) progress reporting; and
- an implementation timeline for specific actions to be taken over the 1st year of the BAP.

DEH commends AFMA for its commitment to developing, implementing and regular review of its BAPs.

In the event that a significant impact on the environment, bycatch or protected species occurs, the management regime includes measures, such as the 'Directions',²¹ power, that can be introduced quickly to ensure that no further impact is made.

Recommendation 11: *AFMA to implement the Tuna and Billfish Longline and Minor Line Bycatch Action Plan (BAP) as required under the Eastern Tuna and Billfish Management Plan (as determined) as a matter of priority and through the actions set in the BAP or through other approaches (eg Directions set under the Fisheries Management Act 1991, regulation or conditions on permits) ensure that the impacts of the fishery on bycatch are minimized and consistent with achieving the objectives of other legislative requirements including:*

- *all relevant Recovery Plans (such as the Recovery Plan for Grey Nurse Sharks, Carcharias taurus in Australia, the White Shark (Carcharodon carcharias) Recovery Plan, the Recovery Plan for Albatrosses and Giant Petrels and the Recovery Plan for Marine Turtles in Australia)*
- *all relevant Threat Abatement Plans (such as Incidental Catch (or By-catch) of Seabirds during Oceanic Longline Fishing Operations)*
- *all relevant National Plans of Action (such as the National Plan of Action for the Conservation and Management of Sharks)*

DEH welcomes the development of a Code of Practice by the ETBF operators and commends industry's commitment to this Code. The efficacy of the Code in achieving the objectives of the Longline Fishery BAP is to be reviewed within 18 months of the BAP's introduction and AFMA has committed to a bi-annual review of its objectives and actions.

DEH strongly supports industry codes of practice that include proven mitigation methods and considers that when compliance is high, they are significant contributors to ecologically sustainable fisheries management.

²¹ A direction under this power in relation to the ETBF fishery may identify areas, species, equipment, method or any combination of these in which fishing is prohibited or limited.

The BAPs and the voluntary Code provide the basis for bycatch management that should be underpinned as necessary by specific regulatory approaches. Regulatory or mandatory measures are required if non-compliance is unacceptably high or if voluntary measures are found to be inadequate. DEH believes such regulatory approaches could include:

- gear restrictions (such as longline configurations and depth of setting) based on bycatch rate triggers;
- prohibition of the use of light sticks;
- ‘move-on’ provisions based on bycatch rate triggers;
- area closures;
- time based closures based, for example, on knowledge of the biology of the species at risk;
- compulsory training in species identification and handling to minimise stress and post release mortality;
- equipment use (dip nets, line cutters) proven to release hooked animals with minimal damage; and
- compliance programs designed to ensure that mitigation measures are effectively implemented and there are higher levels of understanding of bycatch issues in the fishery.

Recommendation 12: *AFMA to monitor the compliance of industry with their code of practice and, where necessary and appropriate, introduce regulatory measures to ensure bycatch is minimised.*

4.1.4 Conclusion

Over 50 species are recorded as being taken in the ETBF, with limited information on the nature and level of bycatch and limited understanding of the abundance and dynamics of bycatch populations.

The ERA is well progressed for the ETBF and its outcomes will be used by AFMA to identify particular bycatch species at risk and as a basis for the development of mitigation measures to minimise the risks to these species.

DEH is satisfied that the ETBF MP includes measures to collect the necessary information to quantify the nature and scale of bycatch in the fishery and to minimise capture and mortality of bycatch species. AFMA has demonstrated a commitment to use such measures as needed. Hence DEH is satisfied that through the implementation of the measures in the ETBF MP and the recommendations in this report, the fishery will be conducted in a manner that does not threaten bycatch.

4.2 Protected species and threatened ecological communities

Objective 2: *“The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities”*

4.2.1 Information requirements

Appendix 2 lists species, protected under the EPBC Act, that are reported to be in the area of the fishery (or inhabit habitat of the type found in the fishery) and lists the main groups identified as of concern in the ETBF. These include seabirds, marine turtles, grey nurse and great white sharks and marine mammals.

As with bycatch in the ETBF, information on interactions with the range of endangered, threatened or protected species encountered in the fishery is limited, but improving. Observer data collected on Japanese longliners in the 1990s provides historical data on protected species interactions.

Under the EPBC Act fishers are obliged to report interactions with protected species and, since 1997, Australian pelagic longline skippers have been required to report all sea turtle interactions in logbooks.

AFMA amended the daily longline logbook (the AL05) in October 2000 to better provide for recording of interactions with protected species and mitigation measures used in the fishery. Through the logbook program, operators are required to record all interactions with protected species.

Oceanic longline fishing is recognized internationally as a threat to seabirds and has been listed as a key threatening process under the EPBC Act. A *Threat Abatement Plan for the (Incidental catch (or bycatch) of seabirds during oceanic longline fishing operations)* (the Longline Fishing TAP) became effective on 2 August 1998. Data collection is one of the actions in the Longline Fishing TAP. Data have been obtained from observers of the mitigation trials conducted south of 30°S under the TAP. Some data are also now available north of 30°S. The Longline Fishing TAP is currently under review, with public consultation on this review expected to start in March 2005.

The implementation of the ETBF observer program has begun to provide useful data from other areas of the fishery. CSIRO designed the observer program, under AFMA specifications, to provide statistically robust data about rare events.

4.2.2 Assessment

Assessment of the historical data indicates that interactions occur with a range of species. The ERA being conducted for the ETBF will provide a quantitative analysis of the risks to the protected species that interact with the fishery operations. The observer program is providing a data set that will enable assessment of the impacts of the fishery on protected species by area of the fishery and by season.

Seabirds

The most common interaction with protected species identified in the fishery is the capture of seabirds that are hooked and/ or entangled during setting or hauling of the longlines.

Seabirds have been identified as at risk from longline fishing operations as a result of the nature of longline baiting and setting gear. In 1998, when the Longline Fishing TAP was drafted, this problem was believed to be confined to below south of 30°S in the ETBF. However, as more

data have been collected, it has become apparent that seabird bycatch is also an issue north of 30°S. Birds in the vicinity of the vessels have been habituated to taking the bait before the hook has time to sink. The birds are then hooked and subsequently drown. There are also reports of birds taking the bait during the hauling process.

Verified information about the level of capture and death of seabirds in this fishery is largely confined to the area between 30 and 34 °S. Observed bycatch rates for flesh-footed shearwaters were 0.378 birds per 1000 hooks for night sets, and 0.945 birds per 1000 hooks for day sets. The mean number of birds killed from 1998 to 2002 was estimated to be 1,794 - 4,486 birds per year, with the total killed over this period ranging from 8,972 to 18,490 birds²². Since 2002, about 350 birds have been killed in the ETBF.

AFMA advises that observers reported a total of 32 seabirds as being taken by longliners operating in the ETBF in 2003-04. None were released alive. The species breakdown is provided in Table 3.

Species common name	Species scientific name	No
Flesh-footed shearwater	<i>Puffinus pacificus</i>	16
Short tailed Shearwater	<i>Puffinus tenuirostris</i>	5
Black-browed Albatross	<i>Thalassarche melanophris</i>	2
Westland petrel		3
Buller's albatross		1
Great Winged Petrel	<i>Pterodroma macroptera</i>	1
Southern Royal Albatross or	<i>Diomedea epomophora</i> or	1
Northern Royal Albatross	<i>Diomedea sanfordi</i>	
Shy Albatross	<i>Thalassarche cauta</i>	1
Sooty Shearwater	<i>Puffinus griseus</i>	1
Yellow-nosed Albatross	<i>Thalassarche chlororhynchos</i>	1

Table 3: Observed bycatch of seabirds in the longline sector of the ETBF in 2003 – 04.

Analysis of historical Japanese data from between 1991–1997 is provided in the following Table. This indicates that approximately 153 birds were taken each year on observed fishing vessels, which could be extrapolated to over 2,500 birds (based on a reported 11% observer coverage of the Japanese fleet) caught annually. The species breakdown is provided in Table 4.

Species	South of 30°S	North of 30°S
Albatross	220	0
Black-browed Albatross	51	
Buller's albatross	18	
Grey Headed Albatross	4	
Royal Albatross	10	
Shy Albatross	31	
Wandering Albatross	44	2
Yellow-nosed Albatross	4	
Petrel	76	
Giant-Petrel	10	
White chinned-Petrel	37	
Shearwater	32	2
Short tailed Shearwater	14	
Wedge tailed Shearwater	1	
Mutton bird	15	13
Other	327	12
Total	894	29

Table 4: Observed bycatch of seabirds in the Japanese longline fishery operating in the AFZ between 1991 - 97.

In the southern areas of the fishery the main species of concern are wedge tailed and flesh-footed shearwater, great winged and other various petrels, prions and shearwaters, including,

²² Unpublished data. Personal Communication from Barry Baker

providence, and Hall's giant petrels, short tailed shearwater and numerous albatrosses, including the black browed, royal, yellow-nosed, wandering and shy albatrosses. The species considered most at risk are the albatrosses and petrels.

An analysis of observer data on Australian vessels indicates that most seabirds captured using longline techniques are killed.

The level of interaction with seabirds in the ETBF is still uncertain, but across the fishery, is believed to be higher than the current TAP criterion of less than 0.05 seabirds per 1000 hooks set.

Marine Reptiles

The bycatch of sea turtles by commercial fisheries is a worldwide concern.

AFMA maintains that the ETBF turtle catch rates is low compared to the reports in other longline fisheries around the world. Robins et al²³, report that Australian pelagic longline fisheries, the ETBF and the WTBF, may incidentally catch around 400 sea turtles per year. The variation around this estimate is wide, due to a lack of accurate data. Interview data from this report indicate an average catch rate of 0.024 turtles per 1000 hooks with a standard deviation of 0.027. Robins et al estimate that each fisher takes a maximum of up to 20 turtles per year (but this ranges between 0 and 20 with an average annual sea turtle catch rate from fisher interviews of 2.4 turtles per year ETBF). A large proportion of the turtles captured are reported as released alive and vigorous. However it is not known whether turtles captured and released survive. Further research to determine the survival of turtles, post release, is required.

Insufficient verified information is currently available to determine catch levels or species composition.

The observer program operating in the ETBF reported 4 turtle captures during 2003 – 04, and all were reported as being released alive. DEH notes that the observer coverage during this period was largely concentrated in southern waters where the likelihood of turtle interactions would be expected to be lower than northern waters. The potential for interaction with turtles is also increased with the expansion of shallow setting techniques to target swordfish. Collection of data from areas where turtle interactions are more likely will need to be a priority for the observer program.

The main species caught incidentally are leatherback turtles (*Dermochelys coriacea*) followed by the loggerhead turtles (*Caretta caretta*) and hawksbill turtles (*Eretmochelys imbricata*).

The mortality rate of sea turtles caught by Australian longliners is unknown but expected to be relatively low for leatherbacks and also possibly low for the other species. A high proportion of leatherbacks caught were reported as externally hooked or entangled, presumably while trying to take the bait. It is expected that post release mortality of turtles is quite low (although there is no verified information to support this assumption), and dependent on a wide range of factors including the severity of the hooking (and whether it is external or internal); entanglement with line; whether the caught animal can reach the surface to breathe; time on the hook; size and species of the sea turtle; and environmental conditions.

Even though there is anecdotal evidence that turtles are not often caught in high numbers in the ETBF, the impact of any deaths attributable to fishing activities is important, given the

²³ as reported by Carolyn M. Robins, Sali J. Bache and Stephanie R. Kalish in the publication titled *Bycatch of Sea Turtles in Pelagic Longline Fisheries – Australia* published by the Fisheries Resources Research Fund of AFFA, 2002

endangered status of loggerhead turtles, the vulnerable status of the leatherback and hawksbill turtles and the prospect of local and even global extinction.

Marine Mammals

The main cetacean species identified as interacting with longline fishing operations are from the family *Delphinidae*, false killer whales (*Pseudorca crassidens*), pilot whales (*Globicephala* spp) and killer whales (*Orcinus orca*). AFMA reports an extremely low level of capture of cetaceans, with only one recorded by observers in 2003 - 04. This animal was released alive.

The main biological issues relating to cetaceans in longline fisheries is capture by hooks or entanglement in the longlines, boat strike, competition for food, depredation and possibly acoustic pollution (underwater noise). These threats generally relate to both baleen and toothed whales, with the toothed whales primarily impacted through capture on longline hooks and depredation. In the ETBF the level of take of toothed whale species is extremely low and is not considered an issue.

Depredation is a growing concern in the fishery with reports of increasing frequency of events and the number of cetacean species involved. Species implicated include the smaller toothed whale species, including false killer whales. In addition to the economic losses, depredation has environmental consequences. In particular, losses due to depredation are not usually accounted for in the fish stock assessment and therefore cannot be considered in quota allocation processes (although depredation may overlap with natural predation and therefore not affect fish stock assessment). Depredation also may represent a modification of cetacean foraging behaviour and involve atypical prey for some cetaceans.

All marine mammals are afforded particular protection under the EPBC Act. Recent suggestions that cetaceans and other marine mammals (probably seals) have been shot to reduce the level of depredation are a very serious concern. Such actions are illegal under the EPBC Act are also a breach of the ETBF MP. DEH and AFMA are obliged to investigate any such offences that occur in Commonwealth waters and initiate prosecution against any fisher suspected of killing or injuring protected species.

All seals and sea lions are protected in Australia as listed marine species under the EPBC Act. AFMA reports a very low level of interaction with seals in the longline fishery (most probably the New Zealand fur seal (*Arctophalus forsteri*), the Australian fur seal (*A pusillus*) or sea lions (*Neohpoca cinera*) and it is not considered a concern.

Protected Sharks

Two protected species of shark, the white shark and the eastern population of the grey nurse shark are reported by AFMA as being taken in the ETBF. Although the total number reported is low DEH is concerned that any incidental catch of the critically endangered grey nurse shark may present a significant threat to the population of the species. The reported catch of protected sharks is provided in the Table 5.

Billfish

AFMA reports that the billfish species protected under the FM Act, black marlin and blue marlin, are taken at the following levels

The reported take of these species does not present any significant threat to the populations of these species. The species breakdown is provided in Table 5.

Species	1999 - 00	2000 - 01	2001 - 02	2002 - 03	2003 - 04

white shark	1				
grey nurse shark		5			
black marlin	427	842	988	1209	855
blue marlin	455	1211	1227	1449	1310

Table 5: Reported bycatch of protected marlins and sharks in the ETBF between 1999 - 2000 and 2003 - 04.

Threatened Ecological Communities

There are no threatened ecological communities identified within the geographical boundaries of the fishery.

4.2.3 Management response

AFMA has instituted a number of measures to increase the information available on the level and nature of interactions with protected species in the fishery, including an observer program, the ERA and the BAPs. Initially the emphasis will be on the collection of data followed by introduction of specific measures to reduce impacts of the fishery on the protected species as necessary.

The Longline Fishery BAP includes specific management measures to avoid capture and/ or mortality of protected species, including:

- the development or modification of fishing gear to reduce the likelihood of interactions and/ or increase the survival rates for released protected species;
- assessing the utility of tagging programs to quantify the level of post release mortality of protected species; and
- the development of a Code of Practice to promote the use of mitigation measures.

Seabirds

The Longline Fishing TAP is the primary mechanism for mitigating the impacts of longline operations on seabirds. Compliance with the measures set in the Longline Fishing TAP is mandatory for all fishers employing the pelagic longlining fishing method. The Longline Fishing TAP is administered by DEH, with advice from a Threat Abatement Team comprising representatives of AFMA, industry and conservation interests.

The ultimate aim of the threat abatement process is to achieve zero bycatch of seabirds, especially threatened albatross and petrel species, in longline fisheries. However, using currently available mitigation methods, it is not possible to achieve this goal in the short term. The objective of the current Longline Fishing TAP is to reduce seabird bycatch in all fishing areas and seasons to below 0.05 seabirds per thousand hooks, based on current fishing levels. This objective is considered to represent a reduction of up to 90% of seabird bycatch within the AFZ. To achieve this objective, action was identified for three key areas:

- mitigation of the threat;
- education of fishers and relevant organisations to improve their knowledge of the seabird bycatch problem and to improve threat mitigation application; and
- the collection of information to measure progress of the TAP and provide information necessary for decision making.

Specific objectives, criteria and actions in each of these areas have been established. The Longline Fishing TAP is available on-line from the DEH website²⁴.

Under the Longline Fishing TAP, all longline fishers operating south of 30°S in the AFZ are required to adopt one of three options:

²⁴ www.deh.gov.au/coasts/species

- All baits will be set between 60 minutes after sunset and 60 minutes before dawn, or
- All vessels fishing during the day will:
 - use lines which are sufficiently weighted to cause the baits to sink out of reach of diving seabirds immediately after they are set;
 - demonstrate an ability to thaw baits before lines are set; and
 - use thawed baits on their hooks, or
- Vessels which can demonstrate a technique of setting and hauling longlines which does not make the hooks/baits available to seabirds can be issued with a permit to operate without any of the restrictions in Options 1 and 2 above.

These measures were based on the belief that seabird interactions were only a problem below 30°S.

With the expansion of the observer program, it became apparent that seabird bycatch was also an issue in waters between 25 and 30°S. In response, AFMA introduced interim measures in December 2004 requiring fishers operating between 28°S and 30°S to carry and deploy tori poles to reduce the risk of further captures. In January 2005, AFMA convened a meeting of stakeholders to discuss an appropriate response to these incidents.

The preferred approach of this stakeholder meeting was for AFMA to extend the TAP measures and framework to 25°S, to introduce night setting for the entire area south of 25°S and to conduct sink rate trials to determine an appropriate sink rate and line-weighting regime. In addition AFMA was to review the current tori line specifications to ensure they are effective in deterring seabirds. DEH supports this approach.

Recommendation 13: *Within 3 months of acceptance of the ETBF Management Plan by the Minister for Fisheries, Forestry and Conservation, AFMA to apply measures commensurate with the prescriptions of the Longline Fishing TAP to the area of the ETBF between 25 and 30°S. These measures to remain in place until the new Longline Fishing TAP or interim measures, endorsed by the Department in consultation with key stakeholders, come into effect.*

The Longline Fishing TAP is currently under review. Finalisation of the revised TAP is a high priority for DEH. The revised TAP needs to apply to all AFMA managed longline fishing operations and have the flexibility to respond to new and emerging issues. The new TAP should set clearly defined performance standards and responses, including timelines, to breaches of those standards. Recent limited sink rate trials appear promising and should be more widely tested under rigorous conditions.

If the use of mitigation measures consistently fails to achieve the performance standards, AFMA must consider implementing spatial and/ or temporal closures.

AFMA will also need to ensure that measures are adequate to ensure that the fishery does not, or is not likely to, adversely affect the survival or recovery of threatened seabird species.

Marine Reptiles

Anecdotal reports from the fishery are that the level of take of turtles (specifically loggerhead and leatherback turtles) is comparatively low, when compared with other areas in the Pacific Ocean. As yet there is no or very little observer data to validate this anecdotal information.

The *Recovery Plan for Marine Turtles in Australia* (the Recovery Plan) was made by the Minister for the Environment and Heritage in 2003. One of the objectives of the Recovery Plan is to reduce mortality of marine turtles, including by reducing fishing bycatch. Preparing and implementing a BAP for this fishery was an action identified in the Recovery Plan. A BAP for the fishery was developed and, in 2004, a revised BAP was introduced.

There exists considerable concern over the level of mortality of turtles worldwide from any cause and this warrants the consideration of introduction of proven mitigation measures wherever possible. The recent decisions in the Hawaiian swordfish fishery to reopen the fishery on a restricted basis are based upon the proviso that a number of mitigation measures are introduced in a timely and pertinent manner. The Hawaiian fishery will be required to comply with the following:

- a) only No 18 circle hooks can be used;
- b) only mackerel type baits can be used;
- c) restricted fishing days;
- d) observers on board at all times; and
- e) a strict limit on the number of turtles that can be hooked.

Until it is demonstrated that interactions with turtles are not an issue in this fishery, precautionary measures to minimise the incidental capture and mortality of marine turtles in the fishery are needed. In particular the introduction of circle hooks, the use of de-hooking devices and restrictions on the types of bait used needs evaluation as a matter of priority and an implementation schedule developed, if warranted. DEH considers that AFMA should, by the end of 2005, have conducted the evaluation and any plan for implementation (by 2008) of circle hooks in longline fisheries, and/ or require adoption of de-hooking devices on all boats operating in the fishery.

Recommendation 14: *AFMA to introduce measures to reduce the incidental capture of marine turtles and to improve the survivability of those that are caught.*

DEH commends the recent investigations by SeaNet²⁵ on dehooking devices and the Eastern Tuna MAC discussions on introduction of these devices across the fishery. DEH believes that the collection of data (and biological samples) from the Australian pelagic longline fleets is very important and a necessary management response in recognition of the conservation status of marine turtles. Information, beyond what is normally collected (including species identification, status of animal and location) should include morphological measurements, tagging data including data from satellite and archival tagging, genetic samples, and feedback from modifications to fishing operations or fishing gear to reduce the likelihood of interactions and/ or increase the survival rates.

Recommendation 15: *AFMA to ensure that:*

- *morphological measurements are taken from turtles caught;*
- *tagging programs are established to collect data on post release survival;*
- *genetic samples are taken where possible so that stocks of turtles being caught may be determined; and*

feedback is provided on modifications to fishing operations or fishing gear to reduce the likelihood of interactions and/ or increase the survival rates.

Marine Mammals and Protected Sharks

The impact of the ETBF on both these groups is reported to be low. DEH agrees with AFMA that no other specific management responses are warranted other than those set in the *Recovery Plan for Grey Nurse Sharks, Carcharias taurus in Australia* or the *White Shark (Carcharodon*

²⁵ SeaNet is a fisheries environmental extension service providing 'hands-on' technical assistance to fishermen to help them reduce or eliminate the environmental impacts of fishing. SeaNet was established with funding from the Natural Heritage Trust, and with in-kind support from the fishing industry and conservation groups. SeaNet has a national coordinator and State based extension officers.

carcharias) *Recovery Plan*. DEH notes AFMA's commitment to continue to collect information on both the incidental capture and depredation by marine mammals and notes that collection of relevant information is part of the observer program.

4.2.4 Conclusion

There are no declared threatened ecological communities in the ETBF area and therefore these provisions in the Guidelines are not applicable.

The ETBF poses a risk to a number of protected species. DEH concludes that the ETBF MP provides AFMA with the measures it needs to quantify and mitigate these risks. AFMA has demonstrated a willingness to use these measures, which together with the implementation of the recommendations in this report should ensure that the fishery is conducted in a manner that avoids mortality of or injury to endangered, threatened or protected species.

4.3 Minimising ecological impacts of fishing operations

Objective 3: *“The fishery is conducted in a manner that minimises the impact of fishing operations on the ecosystem generally”*

4.3.1 Information requirements

Little information has been collected on the ecosystem in which the ETBF operates, particularly in a manner that could be used to verify any impact the fishery may have on that ecosystem.

AFMA is involved in the development of data collection programs both within the ETBF and the WCPO. While these programs should provide the information necessary for evaluating the impact of the fishery operations on the environment, DEH is concerned at the lack of information collection and research covering fisheries impacts on the ecosystem and the environment generally.

The ETBF MP includes a commitment to develop and implement a data plan for the fishery within the first year of the plan. The data plan will be developed to collect, verify, analyse and manage data that is related to, among other things, the biological and ecological state of the fishery.

4.3.2 Assessment

The ETBF targets pelagic species that normally occur in waters of considerable depth and in Australia is usually associated with the continental shelf. The potential for the fishery to impact unacceptably and unsustainably on the physical environment generally is considered to be low. As a consequence, AFMA has not conducted a risk assessment of the impact of the fishery on benthic communities in the area.

The ERA being conducted will provide a risk analysis of the range of ecologically related species that interact with the fishery. The data plan will include the collection of data on the impact of the fishery on ecologically related species, including:

- information on environmental characteristics and observed impacts of the fishery on ecological communities, food chains and the physical environment;
- data on impacts on ecological communities, food chains and the physical environment; and
- and data for various research purposes such as oceanographic and ecosystem studies.

The little information that is available suggests that longlining poses no significant risk to the physical habitat or water quality. Fishers operating in the ETBF are required to comply with a range of measures (eg MARPOL²⁶ regulations) designed to minimize any discharges from the fishing vessel, particularly unused bait and any offal from the processing the catch.

There are some areas that warrant investigation including the use and disposal of lightsticks which are linked to harm to seabird chicks and attraction of marine turtles.

AFMA indicates that there is a basic understanding of the structure of the food chain in which the fishery operates, including:

- the impact/ reliance of the ETBF on ecologically related species;
- structure and productivity flows of the food chain; and

²⁶ International Convention for the Prevention of Pollution from Ship is known as MARPOL

- predator – prey relationships;

More information is required on the structure of the food chain in which the fishery operates and AFMA acknowledges that this is to be collected as part of the data plan in the ETBF MP.

4.3.3 Management response

DEH acknowledges that the ERA being conducted will indicate the level of risk the fishery imposes on the broader ecosystem and provide the appropriate level of information required to determine if specific ecosystem indicators are necessary. DEH agrees with AFMA that the management measures drafted in the ETBF MP including the observer program, the data plan and the research plan will underpin the ERA assessments. The legislative powers (particularly the 'Directions' power) available to AFMA to implement directions will be able to prevent/mitigate or avoid fishery operations that are identified as causing significant damage to the environment and if applied in a timely and effective manner will be effective in ensuring that there is no significant damage to the ecosystem attributable to the operations of the fishery.

4.3.4 Conclusion

The ERA project is expected to highlight any risks to the environment attributable to the fishery and this is underpinned by the collection of relevant information through the observer program, the research plan and the data plan.

The ETBF MP provides AFMA with measures to minimise ecosystem impacts that are identified. Recommendation 6 ensures that measures will be implemented to mitigate any high risks identified through the ERA.

The fishery has minimal impacts on the physical environment in which it operates.

DEH is therefore satisfied that the ETBF MP provides for the fishery to be conducted in a manner that minimises the impact of fishing on the ecosystem generally to the greatest extent practicable in the short to mid-term. DEH is satisfied that AFMA has measures underway to identify and manage significant risks in the longer term.

Background Information on Important Species Taken in the ETBF.

Broadbill swordfish (*Xiphias gladius*),

Swordfish are found in both the Indian and Pacific Oceans and are found in tropical to temperate waters (45°N and 45°S). In the Pacific Ocean they have ocean-wide distribution and a wide temperature range tolerance (5° – 27°C) but usually inhabit waters with a surface temperature >13°C.

Swordfish may grow to 550 kg or more. Females generally reach much larger sizes than males and most swordfish larger than about 200 kg are female. Females are sexually mature at around four years of age or 50–60 kg whole weight, whereas males mature by about two years or 20 kg. Larger fish tend to be solitary. Swordfish are described as having a high reproductive capacity. Fish are thought to live until around 15 years old.

Swordfish have a high reproductive capacity, and they spawn throughout the tropical waters of the Pacific Ocean where the temperature is >24°C. There is some indication that there are three or more separate stocks but the data on this is inconclusive.

At night the species move to surface waters to feed and night sets are shown to be the best time to catch this species. During the day swordfish live in deep waters (down to 600 m, although they may dive to 1000 m) surfacing at night to feed. In general the longlines are set at night, use light sticks as attractants and squid as bait.

Most swordfish taken by ETBF longliners are 20–100 kg, averaging about 50 kg. Swordfish abundance is related to oceanic cycles, and cycles are influenced by climatic conditions. Water temperature, availability of food, and fish migration patterns all play a role, influencing fishing success. There is some risk of localised depletion of stock through fishing pressures.

Swordfish are reported to be one of the hardier species of billfish surviving post capture release. They are reportedly have medium resiliency to fishing pressures.

Tuna

Yellowfin Tuna (*Thunnus albacares*)

Yellowfin tuna are found in both the Indian and Pacific Oceans and are found in tropical to subtropical waters. In the Pacific Ocean they have ocean-wide distribution and but usually inhabit waters with a surface temperature >15°C. There is some indication that there are two stocks (east and west) but the data on this is preliminary.

Yellowfin tuna usually inhabit the water column above 250 m. They tend to school in size classes.

Yellowfin tuna may grow to 180 cm in length and weigh over 100 kg (up to 170 kg) when they are six years or older; the average dressed weight of those caught by Australian longliners is about 30 kg (dressed weight). Fish are thought to live until around 8+ years old. They mature at around 2 yrs old.

Yellowfin tuna have a high reproductive capacity, and they spawn throughout the tropical waters of the Pacific Ocean normally where the water temperature is >26°C.

In general the longlines are set shallow, using smaller bait.

Bigeye Tuna (*Thunnus obesus*)

Bigeye tuna are found in Pacific and Pacific Oceans between 45°N and 45°S and have a wide distribution both latitudinally and vertically because of their tolerance to low oxygen levels and low temperatures. In the Pacific Ocean they have an ocean-wide distribution. There is some indication that there is a single Pacific Ocean stock, although in the Pacific they have been shown to be capable of long-range movements and some instances of longer-term residency in an area. This needs to be tested in the Pacific Ocean, before any conclusion can be made.

Bigeye tuna are considered slow growing, maturing at about 3 yrs old and around 100 cm, reaching 200 cm and over 180 kg when eight years or older. Bigeye tuna caught by Australian longliners average 35 kg.

Bigeye tuna appear to be associated with the temperature range of 10 – 15°C, particularly the 15°C isotherm and they demonstrate a tolerance to low oxygen levels and low temperatures. They tend to occupy waters deeper than other tunas (300 m). Smaller animals are found in schools sometimes with skip jack, whereas older animals tend to be solitary. Fish are thought to live until around 11 years old.

Bigeye tuna reportedly have medium resiliency to fishing pressures but are considered less resilient to fishing than species such as skipjack or yellowfin tuna.

In general the longlines are deep set.

Albacore (*Thunnus alalunga*)

Albacore are found in the tropical and temperate waters of all oceans extending north to 45° to 50° N and south to 30° to 40° S, but not at the surface between 10° N and 10° S.

Albacore are considered to be relatively slow growing (compared to Yellowfin tuna and skipjack) maturing at around 85cm when 5 – 6 yrs old, and attaining 120 cm when 10 yrs old.

Albacore tend to concentrate along thermal discontinuities with the juveniles living in the cooler, temperate waters of the subtropical convergence zone, and the adults living to its north.

Albacore migrate within water masses rather than across temperature and oxygen boundaries. Throughout its range, the albacore migrates over great distances and appears to form separate groups at different stages of its life cycle. Albacore sometimes form mixed schools with skipjack tuna, Yellowfin tuna and bluefin tuna. Schools may be associated with floating objects.

Billfish

Black marlin tend to be most abundant near land masses, whereas the other marlin species have broader, oceanic distributions, with blue marlin most abundant in equatorial and tropical waters, and striped marlin in subtropical waters.

Striped marlin (*Tetrapturus audax*)

Striped marlin occurs mainly in the tropical, subtropical and temperate waters of the Pacific and Atlantic oceans, occurring as far South as 45° S in the southwestern Pacific Ocean and 35° S in the southeastern Pacific Ocean. They are normally associated with shallower waters during pre-spawning and spawning aggregations which also coincide with a temperature between the 20°C and 25°C isotherms. They are considered an epipelagic and oceanic species, usually found above the thermocline.

Striped marlin are a significant byproduct of commercial longliners fishing for tuna and swordfish. As well as those in Australia and New Zealand, longliners in nearby areas (such as Fiji) and distant-water longliners catch striped marlin.

The maximum size attained by this species exceeds 350 cm in total length and 200 kg in weight.

Striped marlin are reported to be one of the hardier species of billfish surviving post capture release.

Black marlin (*Makaira indica*)

Black marlin are distributed throughout the Pacific Ocean although high catches have been associated with coastal areas.

Since 1998 all black marlin caught in the Australian fishery are released (or discarded), dead or alive. This measure was introduced in the early 1990s and was designed to restrict black marlin catch and provide for the then developing recreational sport fishery, particularly off eastern Australia.

Blue marlin (*Makaira mazara*)

Blue marlin are found in the tropical and subtropical waters of the Pacific ocean, extending to 40 to 45° S in the southwestern Pacific Ocean and 35° S in the southeastern Pacific Ocean. It is the most tropical billfish species and is frequently found in equatorial waters.

Blue marlin are an epipelagic and oceanic species mostly confined to the waters on the warmer-side of the 24° C surface isotherm and known to effect seasonal north-south migrations. Blue marlins are not usually seen close to land masses or islands, unless there is a deep drop-off of the shelf. The species is reported as being capable of long-distance movements.

Since 1987 all blue marlin caught in the Australian fishery are released (or discarded), dead or alive.

Key Protected Species encountered in the ETBF

Seabirds

The species considered most at risk from ETBF fishing operations are the albatrosses and petrels. In the southern areas of the fishery the main species of concern are Wandering, Black-browed, Shy, Grey-headed, Light-mantled, Northern Giant-Petrel Southern Giant-Petrel Amsterdam, Antipodean, Atlantic Yellow-nosed, Buller's, Campbell, Chatham, Gibson's, Pacific Yellow-nosed, Laysan, Northern Royal, Salvin's, Sooty, Southern Royal, Tristan and White-capped Albatrosses

Due to the nature of baiting and setting longline gear, seabirds have been identified at risk through longline fishing operation in some areas (particularly south of 30°S and recently identified in areas north of 30°S). Through the process of attaching baited hooks to the longline during setting, birds in the vicinity of the vessels have been habituated to taking the bait before the hook has time to sink. The birds are then hooked and subsequently drown. There are also reports of birds taking the bait during the hauling process.

Marine Reptiles

There are only seven species of sea turtle, six living in Australian waters: the loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), olive ridley sea turtle (*Lepidochelys olivacea*), flatback sea turtle (*Natator depressus*) and leatherback sea turtle (*Dermochelys coriacea*). In Australia, all species of marine turtles are protected under various State and Territory legislation and the EPBC Act. Under the EPBC Act the olive ridley and loggerhead turtles are listed as endangered, while the leatherback, green, hawksbill and flatback turtle are listed as vulnerable. The IUCN Redbook lists all marine turtles as endangered except the hawksbill turtle which is listed as critically endangered.

In Australian pelagic longline fishing operations²⁷, the Eastern Tuna and Billfish Fishery and the Western Tuna and Billfish Fishery, may incidentally catch around 400 sea turtles per year. The variation around this estimate, however, is wide due to lack of accurate data. Interview data indicates an average catch rate of 0.024 turtles per 1000 hooks with a standard deviation of 0.027. A high proportion of turtles taken in these fisheries, possibly more than 60%, are believed to be leatherbacks. The species identifications of the hard-shelled sea turtles are unknown. The mortality rate of sea turtles caught by Australian longliners is unknown but expected to be relatively low for leatherbacks. The estimated sea turtle catch by Australian pelagic longliners is considerably less than some other longline fisheries around the world, including those in the Mediterranean, and U.S. longliners in the Atlantic and the Pacific.

Marine Mammals

All seals and sea lions are protected in Australia under the EPBC Act. The Australian sea lion (*Neophoca cinera*) is listed as 'rare' in the IUCN Redbook and 'vulnerable' under South Australian legislation.

All cetaceans are protected in Australian waters under the EPBC Act. Over forty species of cetaceans have been recorded in Australian waters. Of these only 12 species are 'possibly' secure in status and only one, the killer whale, is 'probably' secure: The Blue whale (*Balaenoptera musculus*) is listed as 'endangered' and the Southern right (*Eubalaena australis*), humpback (*Megaptera novaeangliae*), Sei (*Balaenoptera borealis*) and Fin (*Balaenoptera physalus*) whales are all listed as 'vulnerable'.

The main threats to cetaceans are illegal killing, entanglement and incidental take in fishing nets, aquaculture sea cages and shark control nets, boat and ship strike, competition for food with commercial fisheries, habitat disturbance and possibly acoustic pollution (underwater noise). These threats relate to both baleen and toothed whales. The main types of whales that are likely to be interacting with fishers in the longline fisheries are the toothed whales and this interaction is through both depredation (the removal of hooked fish or bait from longlines) and capture on the longlines. Baleen whales may also interact with longlines through entanglement with the set lines, although this is considered unlikely. Toothed whales (sub-order Odontoceti) include sperm whales, beaked whales, killer whales and dolphins.

Depredation is a growing concern in the fishery with reports of increasing frequency of events and the number of cetacean species involved. Species implicated include the smaller toothed whale species, including false killer whales, which may be a major pest taking fish from longlines. There are alleged incidences of intentional mortality of this species by fishers using guns. Possible explanations for increasing reporting of depredation include:

- increased fishing effort and/ or increased rates of reporting;
- increases in abundance or changes in distribution of some cetacean populations;
- increased ecological competition and spatial overlap with commercial fisheries;

²⁷ as reported by Carolyn M. Robins, Sali J. Bache and Stephanie R. Kalish in the publication titled *Bycatch of Sea Turtles in Pelagic Longline Fisheries – Australia* published by the Fisheries Resources Research Fund of AFFA, 2002

- incorrect attribution of shark damage to whale damage;
- that as opportunistic predators, toothed cetaceans are quick to take advantage of 'new' food sources in their environment, or alternatively that depredation is a learned behaviour and has been rapidly transmitted; or
- a combination of the above.

In addition to the economic losses, depredation has environmental consequences. For example, losses due to depredation are not usually accounted for in the fish stock assessment and quota allocation processes (although in some instances depredation may overlap with natural predation and therefore not affect fish stock assessment). The loss of catch due to depredation may also lead to increased fishing effort, with associated environmental effects. Depredation also may represent a modification of cetacean foraging behaviour and involve atypical prey for some cetaceans. It can at least occasionally lead directly to incidental catch (bycatch) of cetaceans

Sharks

There are two shark species currently protected in Commonwealth waters under the EPBC Act, the grey nurse shark (*Carcharias taurus*) and the great white shark (*Carcharodon carcharias*) that occur within the area of the ETBF.

Acronyms

ASIC	Australian Seafood Industry Council
AFFA	Agriculture, Fisheries and Forestry Australia
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
BAP	Bycatch Action Plan
BRS	Bureau of Rural Sciences
CPUE	Catch per Unit Effort
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry (formerly AFFA)
DEH	Department of Environment and Heritage (previously EA)
Eastern Tuna FAG	Fishery Advisory Group of the Eastern Tuna MAC
Eastern Tuna MAC	Management Advisory Committee to the ETBF
EEZ	Exclusive Economic Zone
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ERA	Ecological Risk Assessment for Commonwealth Fisheries project being conducted by the CSIRO
ETBF	Eastern Tuna and Billfish Fishery
ETBF MP	Eastern Tuna and Billfish Fishery Management Plan
FAD	Fish Aggregating Device
FAG	Fishery Assessment Group of the Eastern Tuna MAC
FAO	Food and Agricultural Organisation
FFA	Forum Fisheries Agency
FM Act	Fisheries Management Act 1991
FRDC	Fisheries Research and Development Corporation
GBRMP	Great Barrier Reef Marine Park
GBRMPA	Great Barrier Reef Marine Park Authority
HMS	Highly Migratory Species
IATTC	Inter-American Tropical Tuna Commission
ICVMS	Integrated Computerised Vessel Monitoring System
IUCN	International Union for the Conservation of Nature
MAC	Management Advisory Committee
MARPOL	International Convention for the Prevention of Pollution from Ships
MHLC	Multi High Level Conferences
MOU	Memorandum of Understanding
MSY	Maximum Sustainable Yield
NPOA	National Plan of Action
OCS	Offshore Constitutional Settlement
OCS	Offshore Constitutional Settlement
SBT	Southern Bluefin Tuna
SCTB	Standing Committee on Tuna and Billfish
SFR	Statutory Fishing Rights
SPC	Secretariat of the Pacific Community

TAC	Total Allowable Catch
TACC	Total Allowable Commercial Catch
TAE	Total Allowable Effort
TAP	Threat Abatement Plan for the Incidental catch (or bycatch) of seabirds during oceanic longline fishing operations
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stocks Agreement
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	Western and Central Pacific Ocean
WTBF	Western Tuna and Billfish Fishery
WTO	Wildlife Trade Operation approved under 303FN of the EPBC Act