



Australian Government

Department of the Environment and Heritage

Assessment of the
Skipjack Tuna Fishery

November 2005

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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 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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Assessment of the ecological sustainability of management arrangements for the Skipjack Tuna Fishery

TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
Background	4
Overall assessment.....	9
Recommendations.....	13
Part I - Management Arrangements	12
International Context	16
Conclusion	19
Part II – Guidelines for the ecologically sustainable management of fisheries	20
STOCK STATUS AND RECOVERY	20
<i>Maintain ecologically viable stocks.....</i>	20
Information requirements.....	20
Assessment.....	23
Management response.....	26
Conclusion	27
<i>Promote recovery to ecologically viable stock levels</i>	27
Conclusion	27
ECOSYSTEM IMPACTS	28
<i>Bycatch protection.....</i>	28
Information requirements.....	28
Assessment.....	29
Management response.....	30
Conclusion	31
<i>Protected species and threatened ecological community protection.....</i>	31
Information requirements.....	31
Assessment.....	32
Management response.....	33
Conclusion	33
<i>Minimising ecological impacts of fishing operations</i>	34
Information requirements.....	34
Assessment.....	34
Management response.....	35
Conclusion	35
References	36
List of acronyms	38

EXECUTIVE SUMMARY

Background

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

On 12 November 2004 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 23 December 2002, *Terms of Reference for the Environmental Assessment of the Skipjack Tuna 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 document: *Draft Assessment Report – Skipjack Tuna Fishery* (the submission) was received by DEH in September 2004. The document was released for a public comment period that expired on 28 January 2005. No public comments were received. A final submission for assessment was received by DEH in April 2005.

The submission reports on the SJTF against the Terms of Reference, including the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. The DEH assessment considers the submission and associated documents.

Table 1: Summary of the SJTF

Area	Commonwealth and State waters of the Australian Fishing Zone (except the Great Barrier Reef Marine Park, Heard and Macdonald Islands and Macquarie Island), and adjoining high seas, which includes the waters under the mandate of the Indian Ocean Tuna Commission (IOTC) and the Western and Central Pacific Fisheries Commission (WCPFC).
Fishery status	Uncertain in Australian waters. Stocks in both the Pacific Ocean and Indian Ocean are considered to be under-exploited.
Target Species	Skipjack tuna (SJT), <i>Katsuwonus pelamis</i> .
By-product Species	Small numbers of yellowfin tuna, bigeye tuna, eastern little tuna, southern bluefin tuna, Australian bonito, frigate mackerel, albacore, dolphin fish (mahi mahi) and other scalefish and shark species.
Gear	Mainly purse seine (currently >95% of total catch) and pole-and-line operations.
Season	The main fishing season extends from around December through to March.
Commercial harvest 2003/04	809 tonnes (total): 779 tonnes (Eastern SJTF) and 30 tonnes (Western SJTF).
Value of commercial harvest 2003/04	Approximately AUD\$1.4 million (total). Harvest is canned and marketed in Australia and overseas. Marketing companies include: John West, Seakist and Greenseas. It is estimated that Australia's production supplies around 50% of the Australian canned tuna market. There is no available data on overseas export.
Recreational harvest	The Bureau of Rural Sciences (BRS) estimates suggest that the annual catch of skipjack by recreational fishers is probably less than 150 tonnes.
Recreational Management arrangements	Daily catch limits apply for recreational anglers in New South Wales (NSW), Tasmania, Northern Territory and

	Victoria. Recreational anglers in Queensland, Western Australia and South Australia have unlimited access to SJT.
Commercial licences issued	32 transferable purse seine fishing permits, issued annually (owned by 18 permit holders): 19 for the Eastern SJTF 13 for the Western SJTF.
Commercial Management arrangements	Input and output controls including: <ul style="list-style-type: none"> • limited entry licensing; • permits limit operations to purse seine fishing in the eastern or western fishery sectors; • permits specify target species and incidental catch restrictions; • annual yellowfin and bigeye tuna byproduct is restricted; • blue and black marlin must be returned to the sea; • a maximum trip limit of 20 sharks (with fins intact); • purse seine dimensions are restricted; • transshipment of catch at sea to authorised vessels is permitted; and • all purse seine operators must complete the PS01 Australian daily fishing logbook.
Fleet characteristics	There are currently a total of 32 transferable fishing permits. Logbook records held by AFMA indicate that only 4 purse seine vessels have fished for SJT in each year since 1990. Additional take of SJT includes permit holders from the Eastern Tuna and Billfish Fishery (ETBF) and the Western Tuna and Billfish Fishery (WTBF).
Bycatch	Blue and black marlin and several other scalefish and shark species. Anecdotal information also indicates that purse seine nets can (rarely) catch seals and manta rays (both of which are easily released before the net is retrieved).
Interaction with Threatened Species	Considered low.

The area of the fishery includes the Australian Fishing Zone (AFZ), including state/territory Territorial waters (excluding the Great Barrier Reef, Heard and Macdonald Islands and Macquarie Island), and adjacent high seas, which includes the waters under the mandate of the IOTC and the WCPFC. With the exception of fishing in NSW Territorial waters, the entire fishery is managed by the Commonwealth under a series of Offshore Constitutional Settlement (OCS) agreements between the Commonwealth Government and the State and Northern Territory governments. The fishery is managed as two separately-zoned entities – the Eastern SJTF and the Western SJTF (Figure 1). In the Australian eastern sector fishery, SJT occur in open waters from Far North Queensland to Storm Bay, Tasmania, but are mainly harvested off southern NSW to north-eastern Tasmania (Figure 2). In the western sector, SJT occur from Kangaroo Island to Broome, but are mainly harvested in the eastern Great Australian Bight (GAB), (Figure 2).

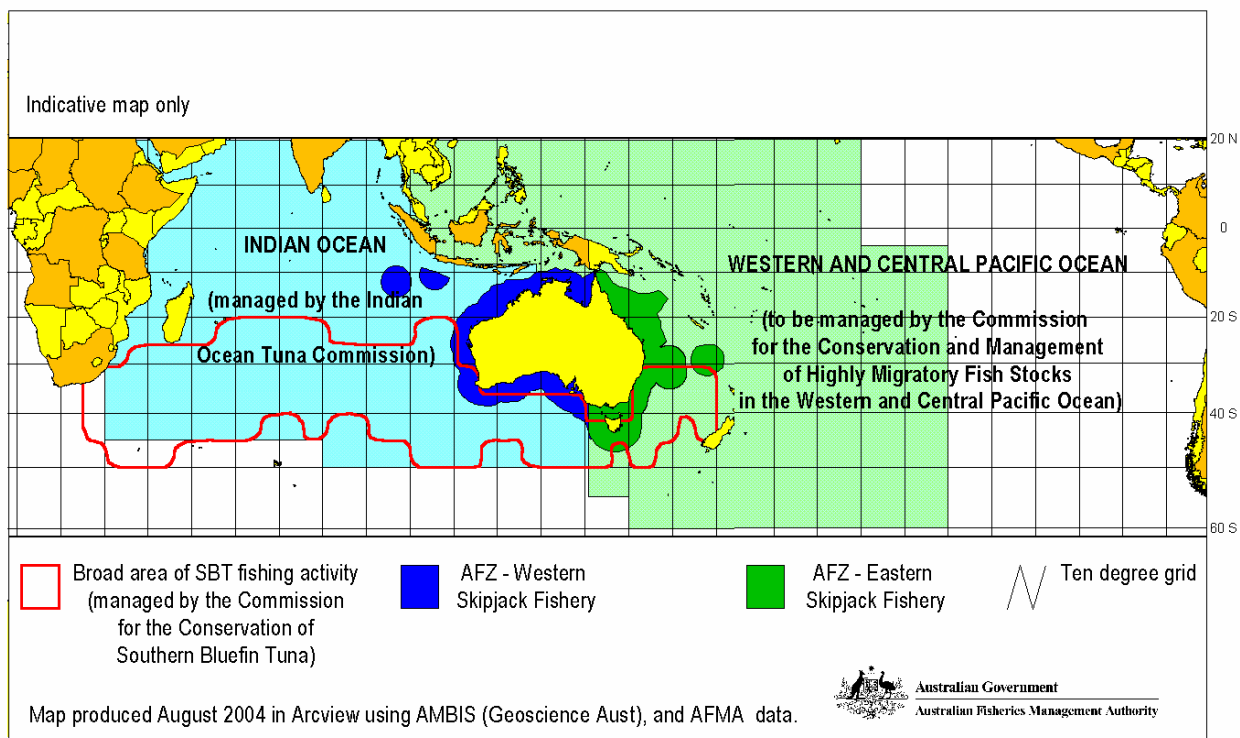
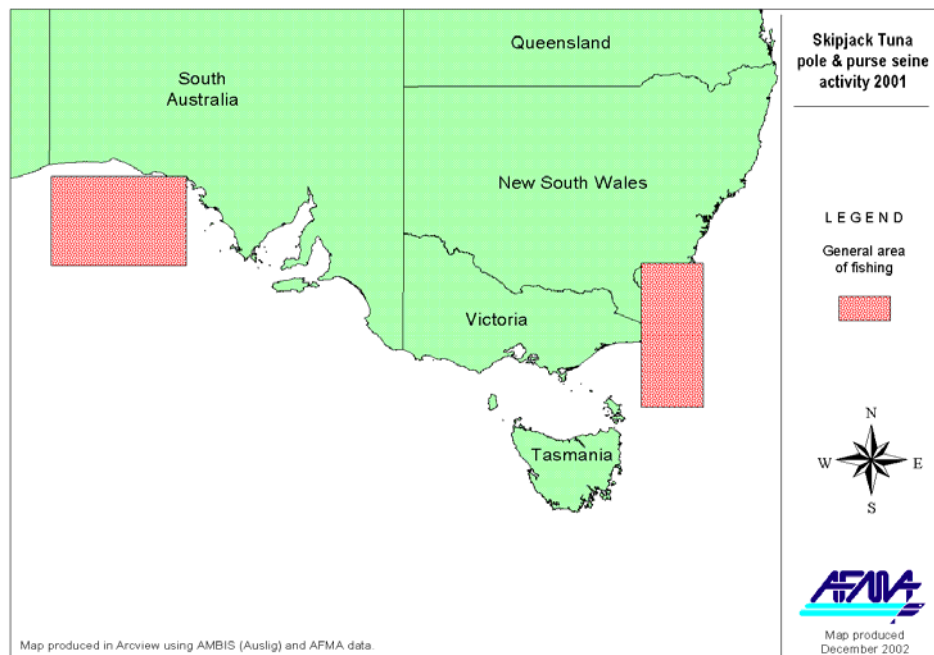


Figure 1: Indicative map of the proposed area of the SJTF
Figure 2: Generalised fishing areas in SJTF



As the SJTF is based on fishing grounds that sit on the extreme range for the species, the fishery is not considered to impact on the main stocks of SJT and catches are low compared to traditional Pacific and Indian Ocean fisheries. While catches fluctuate significantly, the Australian fishery, although unverified, is regarded as underfished and as such, the probability of a localised depletion with the ability to negatively impact on the main stocks in the Pacific and Indian Oceans is low. However, the 2002 meeting of the Standing Committee on Tuna and Billfish (SCTB 15) noted that

it does not appear that skipjack tuna move over great distances rapidly and hence, do not thoroughly mix over the entire region. Concentrated and sustained fishing effort in local areas, consequently, could result in localised depletion. AFMA will need to continue to explore and monitor the situation of localised SJT stocks to sustain Australia's market and ensure ecosystem impacts are minimised.

The fishery targets SJT *Katsuwonus pelamis*. The fishery also take small byproduct quantities of yellowfin tuna *Thunnus albacares*, bigeye tuna *Thunnus obesus*, southern bluefin tuna *Thunnus maccoyii*, albacore tuna *Thunnus alalunga*, Australian bonito *Sarda australis*, mahi mahi *Coryphaena hippurus*, yellowtail kingfish *Seriolla grandis* and shark species. Precautionary byproduct limits for yellowfin and bigeye tuna are currently in force under fishery permits. The retained combined catch of yellowfin and bigeye tuna by each purse seine operator is restricted to 2% of the total live weight of SJT taken annually and to a trip limit of 50% of the live weight of SJT taken. Southern bluefin tuna (SBT) may only be retained by operators also holding quota for that species. A trip limit of 20 sharks (with fins attached) applies to purse seine operators, while blue and black marlins must be returned to the sea.

Interactions between SJT present in Australian waters and in the wider oceanic regions are presently unknown. SJT are a global oceanic species, occurring in schools in surface waters and preferring tropical and sub-tropical conditions at temperatures of 20-30°C, hence their variable seasonal abundance and limited seasonal fisheries in temperate waters off southern Australia. The stock structure and the extent of mixing between stocks of SJT is not known. Unlike other tunas, SJT grow quickly, mature at 1-2 years, spawn year-round (in tropical waters >25 degrees Celsius), produce 100,000 to 2 million eggs at each spawning, live for only 4 years and depend on only a few age classes for fishery survival. Most of those caught in Australian waters weigh 1.5 – 3.0 kg and may reach 80cm in fork length (FL). By day SJT occur down to 260 metres, but occupy much shallower waters at night and, based on tagging information, movement is highly variable, influenced by large-scale oceanographic phenomena, such as El Nino. SJT feed on pelagic fishes, crustaceans and molluscs. Adult SJT are cannibalistic towards juveniles which may increase the potential risk of localised depletion. The main predators of SJT are larger tunas, billfish and sharks (Kailola *et al.* 1993).

The reported harvest of SJT for 2003/04 was 809 tonnes, with an estimated landed value of approximately AUD\$1.4 million. In 2001/02, the reported SJT harvest was 1,358 tonnes, with an estimated landed value of approximately AUD\$2.2 million. Most of the SJT harvest is now canned at Port Lincoln, supplying the domestic market. Small quantities taken off NSW are being sold as bait, tuna fillets or pet food (BRS 2000).

Beginning in the 1950s, SJT were harvested regularly as byproduct of the purse seine and pole-and-line fisheries for SBT off southern NSW. During the 1980s when the fishery for the latter species declined, the focus shifted to SJT most of which were processed at the cannery in Eden, NSW. While previously the annual catch in most years was less than 200 tonnes, it rose to more than 800 tonnes in the late 1980s to 6,000 tonnes in the early 1990s (Kailola *et al.* 1993). Concern about unregulated purse seine fishing led to limited licensing in the ETBF (19 purse seine permits) and the WTBF (13 permits) in the early 1990s. In 2000, AFMA decided to manage the fishery for SJT separately from those tuna and billfish fisheries resulting in the AFMA board forming the Skipjack Tuna Consultative Committee (SJTCC) in December 2002. In July 2003, the SJTF was formally removed from the ETBF and WTBF. The 1999 closure of the Eden cannery resulted in processing shifting to Port Lincoln. It has also influenced the recent downturn in the pole-and-line catch off southern NSW and a shift in the focus of the fishery to the GAB.

Purse seines (currently >95% of total catch) are used to encircle surface-schooling SJT, concentrating them alongside the boat where they can be brailled into refrigerated storage. These nets may be 80-350m deep. Drawstrings close off these nets, trapping the school of tuna. The way in which they are deployed enables fishing to be highly selective in terms of species and the sizes of both the school and the individual fish. Pole and line fishing involves the manual or automated use of short poles fitted with lines and baited barbless hooks or lures to target surface-schooling SJT.

Purse seine and pole and line fishers often use satellite thermal imagery and spotters in aircraft to locate SJT schools. Most Australian poling vessels are 15-20 metres long, while most purse seine vessels are 20-25 metres long. This is small by international standards, but there are several at around 40-45 metres long (BRS, 2004).

All operators must record and report daily fishing catch and effort details on prescribed log sheets. In addition, all vessels operating in the fishery on high seas must carry integrated computerised vessel monitoring systems (VMS) to provide AFMA with 24 hr position monitoring data. They may also be required to make pre-departure and landing reports to facilitate AFMA's surveillance and monitoring capabilities. In 2003/04, three purse seine and one pole operator in the eastern sector and one purse seine operator in the western sector recorded SJT landings.

The amount of verified information on bycatch in the SJTF is limited. The submission refers to fishery logbook records of incidental catches of yellowfin tuna, bigeye tuna, albacore, yellowtail kingfish, Australian bonito, SBT, jack mackerel *Trachurus declivis*, frigate mackerel *Auxis thazard*, blue mackerel *Scomber australasicus*, and blue *Makaira mazara* and striped marlin *Tetrapturus audax* (Table 2). Apart from those fish retained as byproduct, these make up the bulk of the recorded bycatch. There are anecdotal reports of purse seine bycatch of seals, sharks and manta rays, all of which can readily be released unharmed (Harris and Ward 1999).

Table 2: Reported bycatch (kilograms) by skipjack pole and purse seine fishers in the AFZ (where SJT was 75% or more of the total catch).

Year	Jack Mackerel	Yellowtail Kingfish	Blue Mackerel	Yellowfin Tuna	Albacore Tuna	Frigate Mackerel	Eastern Little Tuna	Aust Bonito	Striped Marlin	Other
1994				9,366			1,870	636		
1995		200								
1996		10		9,142	33					
1997	2,000	59		7,832			5,130			65
1998	500			100			950			
1999						440			70	
2000			530	2,350						
2002				100						
2003										
2004 to date									100	

A bycatch action plan (BAP) for tuna purse seine fisheries (AFMA 2004) is intended to ensure that fishery impacts on marine ecosystems - including bycatch species - are identified and managed appropriately. Its starting point is to address the shortage of verified information on species involved and their interactions (frequency, nature and vulnerability) with tuna purse seines. The plan's emphasis is on protected species currently listed under the EPBC Act. Interactions with protected species in the SJTF is considered low. Bycatch and protected species interactions are further assessed under Principle Two of this report.

Very small and variable numbers of SJT are taken as byproduct by longline, dropline, gillnet and trawl fisheries managed by State, Northern Territory and Australian governments. While the submission refers to the SJT catch by NSW commercial fishers operating in that state's Territorial waters, it gives no indication of the magnitude of the annual SJT harvest. The submission refers to several current or recent approaches that are intended to address the lack of information on the SJT take by recreational and indigenous fishers. These include purpose-designed surveys, gamefish tournament and tagging records, and charter fishing records.

Sport and recreational fishing in south-east Western Australian waters commonly catch SJT. Most fish are caught by trolling or casting lures from a boat and are often used as live/dead bait for larger fish species. Currently, there are no management controls on recreational fishing for SJT, except in NSW, Northern Territory, Tasmania and Victoria, where daily catch limits apply. For example, a recreational possession limit of 30 non-managed fish (including SJT) applies in the Northern Territory, while a maximum daily bag limit of 20 fish applies to any fish or invertebrate not included on the NSW bag and size limit tables (which includes SJT).

Recreational anglers in the other States have unlimited access to SJT. BRS estimates that the annual catch of SJT by anglers and recreational fishers is probably less than 150 tonnes (BRS 2000), although no current data is available. It is also not known where the majority of recreational fishing for SJT occurs. Therefore, to further strengthen the effectiveness of the management arrangements for the fishery, the management measures for recreational fishers should compliment the management regime of the commercial fishery.

There is currently no data available on the levels of illegal fishing for SJT in the AFZ.

The SJTF is managed under the regime described in the submission under the authority of the Australian Government *Fisheries Management Act 1991* (FM Act). The groundwork for this regime was laid in 2002 when AFMA released a discussion paper on the development of a SJTF management plan (AFMA 2002a). The discussion paper was part of AFMA's preparation for the formal separation of the SJTF from the ETBF and WTBF in 2003. There is no management plan for the SJTF, however it is currently managed to comply with the SJTF Statement of Management Arrangements 2005.

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)¹ (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).

Overall assessment

The material submitted by AFMA demonstrates that the management arrangements for the SJTF operate in accordance with most of the requirements of the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*.

While the fishery is considered relatively well managed, DEH has identified a number of risks that must be managed to ensure that their impacts are minimised:

- no management plan or formal management regime (lack of comprehensive fishery management objectives, performance indicators, performance measures and management responses);
- uncertain status of eastern and western SJT stocks in Australia and on the relationship between eastern and western Australian SJT and those in the Indian Ocean and Western and Central Pacific Ocean;
- potential for intensive fishing to result in localised stock depletion (as the Australian SJT stock sits on the extreme distribution range of the SJT population);

¹ UNFSA is also known as the United Nations Agreement on Straddling and Highly Migratory Fish Stocks

- dependence of stock and risk assessments on regional (Pacific and Indian oceans) assessments that are based on incomplete catch, effort and other data;
- unvalidated data (lack of a data validation program);
- potential for substantial increase in fishing effort and catch by permit holders (latent effort) and the lack of performance indicators and measures to address this; and
- the lack of a mechanism to take into account the take of SJT by other sectors.

Conditions and recommendations to address these issues have been developed to ensure that the risk of impact is minimised in the longer term. Through the implementation of the conditions and recommendations and the continuation of a responsible attitude to the management of the fishery, management arrangements are likely to be sufficiently precautionary and capable of controlling, monitoring and enforcing the level of take from the fishery while ensuring the stocks are fished sustainably. Overall, the SJTF management arrangements suggest that the fishery is being managed in an ecologically sustainable way.

While Australia's fishery for SJT has been developing over a period of 30 years, its management as an entity separate to other tuna and billfish fisheries only began formally in July 2003. Management arrangements for the SJTF have been under consideration since 2002 when AFMA released a discussion paper on the subject (AFMA 2002a). At the time, the AFMA board considered the development of a statutory management plan for the fishery as a "matter of priority" (AFMA 2002b). This was based jointly on AFMA's goal of managing all fisheries under its control under management plans and on industry's enthusiasm to obtain Marine Stewardship Council certification for the fishery (AFMA 2000b). In the absence of consensus among the SJTCC, this urgency and progress towards a management plan appears to have weakened. Consequently, recognising that the Australian fishery poses no immediate threat to the SJT stocks – the fishery continues to operate under an informal management regime. There is, however, an indication from AFMA that this is likely to change in the foreseeable future with the development of a SJT management plan. There are also indications from industry of an interest in expanding the fishery to a take of up to 10,000 tonnes.

The SJTF management arrangements aim to ensure that, in the short term, fishing is 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. However, it does so in the absence of a management plan, which incorporates a framework of management objectives, performance indicators, performance measures and review processes that enable the regime's effectiveness to be measured.

The operation of the fishery is consistent with the objects of Part 13A of the EPBC Act and demonstrates that the management arrangements for the SJTF operate in accordance with most of the requirements of the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. Given the management arrangements specified in the submission and supporting documents and the fact that the Australian Fishery currently operates at a relatively low level at the fringe of the stock, DEH considers that the fishery will not be detrimental to the survival or conservation status of the taxon to which it relates, in the short term. Similarly, it is not likely to threaten any relevant ecosystem in the short term. However, due to certain risks within the SJTF, as identified by DEH, there are some concerns with retaining the current management regime. DEH therefore recommends that the fishery be declared an approved Wildlife Trade Operation (WTO), with the actions specified in the conditions and recommendations to be undertaken by AFMA to contain the environmental risks in the long term. DEH considers that the fishery, as managed in accordance with the management regime is not likely to cause serious or irreversible ecological damage over the period of the export decision. Specifically, the WTO declaration would 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 conditions and recommendations directed towards AFMA, along with the other commitments made by AFMA in the submission and the SJTF

management regime, 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 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.

Protected species occurring in the fishery area include marine turtles, marine mammals, sharks and seabirds. The fishery has reportedly recorded very low indirect interactions with these species groups (as indicated by Phase I of the *Ecological Risk Assessment for Commonwealth Fisheries*) and anecdotal reports indicate that past interactions in other fisheries caused no harm to protected species. The actual and potential impact on Part 13 species under the management arrangements, which involves the highly selective method of purse seining and the associated BAP, is considered low and adequate protection is provided. There are no listed threatened ecological communities in the fishery area.

In contrast to the situation in many other fisheries, the decision to implement a formal management regime for SJT is not a response to either overexploitation or overcapitalisation in the fishery. The intent of the management regime is to preclude such a situation arising, while at the same time provide an environment in which the full potential for sustainable development of the fishery can be realised while taking into account the inherent variability in the availability of skipjack in the AFZ.

DEH recommends that the SJTF, which is managed under the arrangements described in the SJTF Statement of Management Arrangements 2005, under the authority of the FM Act, be declared an accredited management regime under Sections 208A, 222A, 245 and 265 of the EPBC Act. In making this judgement, DEH considers that the fishery to which the management regime relates does not, or is not likely to, adversely affect the survival in nature of listed threatened species or populations of that species, or the conservation status of a listed migratory species, cetacean species or listed marine species or a population of any of those species. DEH also considers that the management regime requires that all reasonable steps are taken to avoid the killing or injuring of protected species, and the level of interaction under current fishing operations is low. On this basis, DEH considers that an action taken by an individual fisher, acting in accordance with the management regime, 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 (or policies) 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 SJTF management regime have, will have or are likely to have on the marine environment. DEH is also satisfied that actions approved or taken in accordance with the SJTF management regime 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 SJTF Statement of Management Arrangements be accredited under section 33 of the EPBC Act for the matter of national environmental significance “the marine environment”.

Recommendations

Recommendation 1: *AFMA to establish a more formal consultative mechanism for the skipjack tuna fishery that is consistent with the consulting and reporting provisions of an AFMA Management Advisory Committee.*

Recommendation 2: *By the end of 2006, AFMA to develop a management regime for the skipjack tuna fishery, which includes fishery specific management objectives, performance indicators and performance measures for target, byproduct and bycatch species. AFMA will ensure that adequate information collection systems are put in place to monitor performance against measures and ensure that the fishery is ecologically sustainable.*

Recommendation 3: *AFMA, by the end of 2006, to develop and implement an ongoing robust system to validate effort and catch data on target species, byproduct and bycatch species.*

Recommendation 4: *The Department of Agriculture, Fisheries and Forestry (DAFF) in consultation with AFMA, DEH and other relevant government agencies, to take a proactive role in the Western and Central Pacific Fisheries Commission (WCPFC) and seek to improve the effectiveness of the Indian Ocean Tuna Commission (IOTC) as the regional fishery management forum for managing and conserving the species on which the skipjack tuna fishery relies. DAFF to pursue through these forums the achievement of the following priorities:*

- *promote the development of management options that address potential concerns of the IOTC Scientific Committee as they emerge;*
- *develop a process to gain a better understanding of the relationship between the populations of skipjack in Australian waters and other regional populations of skipjack in either the Indian or Pacific Oceans;*
- *endeavour to take measures to improve controls over illegal, unregulated and unreported fishing;*
- *ensure all fishing entities taking skipjack tuna in the Western and Central Pacific and Indian Oceans are members of the WCPFC and/or the IOTC, as applicable;*
- *take measures to verify the catch (target, by-product and bycatch species) of all fishing entities;*
- *endeavour to strengthen stock assessments for SJT; and*
- *pursue a regime to protect ecologically related species, including byproduct and bycatch, from unsustainable fishing pressures.*

Recommendation 5: *Within 18 months of completion of the ecological risk assessment, AFMA will identify and implement appropriate management strategies to address fishing impacts identified as high risk from the ecological risk assessment process.*

Recommendation 6: *Within 18 months, AFMA to take account of the harvest of skipjack tuna by all sectors and factor this into the stock assessment process and management of the fishery to ensure sustainable management of the resource.*

PART I - MANAGEMENT ARRANGEMENTS

The SJTF is managed by AFMA under the FM Act and the current SJTF Statement of Management Arrangements 2005. The overall objectives of the FM Act form the basis for the management of all Commonwealth Fisheries. AFMA has submitted documents for assessment of the SJTF under Parts 10, 13 and 13A of the EPBC Act.

Management of the SJTF incorporates a sound range of consultative mechanisms and a commitment to effective consultation with a variety of stakeholders. DEH is confident that AFMA will continue to ensure stakeholders and other interested parties are consulted appropriately.

The primary consultative mechanism is the SJTCC, which has been in operation since December 2002. The SJTCC meets when necessary (on a needs basis) 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 current SJTF management arrangements and Australia's Tuna Purse Seine Fisheries BAP 2005.

The management regime is described in the following documents, all of which are, or will be publicly available:

- the Australian Government *Fisheries Management Act 1991*;
 - *The Fisheries Administration Act 1991*;
 - The SJTF Statement of Management Arrangements 2005;
 - AFMA Corporate Plan; and
 - Australia's Tuna Purse Seine Fisheries BAP 2005;
- as well as relevant licence conditions and gazetted notices.

A number of other documents, including research reports, scientific literature and discussion papers (eg AFMA 2002a & b) are integral to the management of the fishery.

The SJTF is a relatively new fishery. Its management as an entity separate to other tuna and billfish fisheries only formally began in July 2003. The fishery is currently experiencing a downturn with fewer vessels operating than in previous years. This is believed to be attributable to a number of reasons including economic viability, the closure of Eden cannery and year-to-year variation in the availability of SJT in the AFZ. The availability of fish may be attributable to fishing pressures in the wider Indian Ocean, the fact that the Australian fishing grounds sit on the extreme range for the species, inter-annual variability due to prevailing oceanographic or climatic conditions (such as El Nino), or other reasons yet to be identified.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Because of the reliance on information on the current management regime and documents referred to above to DEH's assessment of the fishery, a change in fishing operations and / or management arrangements could affect the outcomes of the assessment and decisions stemming from it. Decisions arising from this assessment relate to the arrangements in force at the time of the decision.

In order to ensure that the decisions made in DEH's assessment of the fishery remain valid, 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. A condition to address this issue has been established to ensure that the risk of impact is minimised.

Since its formal separation from the ETBF and the WTBF in 2003, the SJTF management arrangements began evolving generally in the direction indicated in AFMA's 2002 discussion paper. That paper was advertised nationally and made publicly available as well as being sent to interested individuals and organisations registered with AFMA. Since 2002, in the absence of a statutory fisheries management plan, AFMA's main avenue for consulting directly with industry and other stakeholders on the management of the fishery has been the SJTCC. This committee comprises representatives of AFMA, the purse seine industry, scientific bodies, DEH, conservation interests and recreational fishers. The submission indicates that the committee is playing a prominent role in assisting the AFMA Board to consider management arrangements for the fishery. However, it gives no indication of how decisions or advice by the committee are developed or how their deliberations are made known to all stakeholders. Unlike the statutory Management Advisory Committees (MACs) operating for several other fisheries, summaries of the SJTCC meetings are not published on the AFMA website. DEH encourages AFMA to address this matter.

The lack of consensus between committee members on a preferred option for future management of the fishery appears to have resulted in the cessation of wider public consultation on this matter. This appears contrary to the previous priority accorded by both AFMA and the industry to resolve future management arrangements of the fishery. DEH recommends AFMA establish an open

consultative process to assist in the development and implementation of a formal management regime.

Recommendation 1: *AFMA to establish a more formal consultative mechanism for the skipjack tuna fishery that is consistent with the consulting and reporting provisions of an AFMA MAC.*

The submission sets out the legislative objectives under which AFMA operates. It also describes AFMA's commitment to examine the advantages and disadvantages of a range of alternative management arrangements for the fishery, such as output controls in the form of Individual Transferable Quota's (ITQ). However, it provides no formal management objectives specific to the SJTF management regime, or accompanying performance measures, reference points or indicators. AFMA's decision to manage the SJTF separately to other tuna and billfish fisheries led to the release of the *Skipjack Fishery Management Plan, AFMA Discussion Paper September 2002*. That paper outlined the issues related to the development of a management plan and provided a range of management options for consideration in its development and set out the requirements (statutory and otherwise) for such a plan. The paper canvassed objectives, management strategies and reference points. AFMA's intent to develop a formal management plan is considered by DEH to be a positive step for the management of the SJTF. However, three years later there is no clear indication that AFMA proposes to manage the fishery under a statutory management plan or alternatively, formalise a management regime. There is also no clear indication by AFMA that there has been a decision not to develop formal management arrangements. In fact, it makes it quite clear that this remains a moot point. Irrespective of how AFMA proceeds on this matter, DEH considers that a formal statement of management arrangements including objectives, performance measures and performance indicators relating to the fishery impacts on target and byproduct species, bycatch species, protected species and communities and the marine ecosystem is an essential and fundamental requirement of effective fishery management.

Recommendation 2: *By the end of 2006, AFMA to develop a management regime for the skipjack tuna fishery, which includes fishery specific management objectives, performance indicators and performance measures for target, byproduct and bycatch species. AFMA will ensure that adequate information collection systems are put in place to monitor performance against measures and ensure that the fishery is ecologically sustainable.*

Management of the fishery is based on a combination of input and output controls. These include:

- limited entry with 32 transferable Commonwealth 12-month purse seine fishing permits;
- permits specifying
 - whether operators may fish in the eastern or western sector of the fishery;
 - purse seine dimensions;
 - target species and incidental harvest restrictions (eg sharks, yellowfin tuna and bigeye tuna) and prohibitions (eg blue marlin and black marlin);
- at-sea transshipment of catch to authorised vessels is permitted;
- permit holders may only take bait from NSW waters if they hold an appropriate NSW fishing entitlement;
- PS01 Australian Purse Seine Daily Fishing Logbooks must be completed by all purse seine operators; and
- daily catch limits apply to recreational fishers in NSW, Tasmania, Victoria and the Northern Territory.

While operating under the input and output controls currently in place (also discussed in Table 1), harvest in the fishery has not reached levels that would cause any concern. However, should permit holders decide to increase their levels of participation and fishing effort, these measures would offer little opportunity to control the harvest effectively. This shortcoming was recognised by AFMA when it considered the relative merits of Statutory Fishing Right types under consideration by the Consultative Committee (AFMA 2002b). In fact, AFMA Management considered limiting boat numbers to be a "blunt and unresponsive tool" and that continued reliance on this measure would prevent AFMA from pursuing its "legislative objectives in relation to the long-term management of

the skipjack fishery” (AFMA 2002b). DEH acknowledges that, until now, while operating under current arrangements the harvest level has not posed any concerns. Nevertheless, we share AFMA’s concerns regarding the continued reliance on input measures to control the level of harvest in the future.

While there are no identified sustainability concerns with the current level of active fishing effort, an increase in active fleets and effective fishing effort may place the SJT populations at risk, place pressure on stocks currently considered sustainable and affect the resource shared amongst user groups. An increase in fishing effort is possible due to the activation of latent effort (non-active fishing effort). A significant amount of latent and low level of effort still exists in the fishery due to:

- the low value of the product globally;
- high fishing costs compared to other fisheries in Australia;
- the closure of the Eden fish cannery in 1999; and
- the SJTF being confined to two main fishing areas in southern Australian waters.

There are currently a total of 32 Commonwealth tuna purse seine permits in the fishery, with limited new entries. The permits are owned by 18 permit holders, of whom seven hold permits for both the Eastern and Western Skipjack Fisheries. However, logbook records held by AFMA indicate that only four purse seine vessels have fished for SJT in each year since 1994. Of the 138 ETBF/WTBF permits authorizing pole fishing the average annual number of vessels taking skipjack by this method has been 12, while the number of state operators and recreational anglers are unknown. There are therefore concerns that if all 32 permit holders start active fishing of SJT in the AFZ, that there may be a significant impact on the local population.

This concern is further increased by the lack of fishery performance measures, indicators and processes (see **Recommendation 2**) and the possible decline of the southern bluefin tuna fishery (SBTF), which may result in the SJT being the most valuable tuna to the domestic canning industry and the tuna industry in general. However, the SBTF has remained relatively stable but has shifted from the East Coast to the Port Lincoln purse seine sector for farming.

The main concern was that a large and relatively sudden increase in effort could lead to:

- localised stock depletion;
- reduced economic performance via market flooding; and/or
- increased gear conflict.

The activation of latent effort needs to be considered when determining the long-term management of the fishery and when developing and implementing **Recommendation 2**. The mechanisms for reducing latent effort are varied, however it is considered imperative that an optimum number of units be determined as part of the long-term management strategy based clearly on ensuring the sustainability of key stocks. This matter including performance indicators to address latent effort is further discussed under Principle One of this report.

As for all Commonwealth-managed fisheries, AFMA has developed a risk-based compliance plan. As part of its implementation of this plan, AFMA coordinates supporting compliance activities undertaken according to detailed agreements with each state and the Northern Territory. A key feature of the compliance program is the requirement of every operator in the fishery to carry an integrated computerised VMS. This enables AFMA to monitor fishing locations and unloading sites and to focus compliance resources where they are most needed. AFMA also has provision to require prior reporting of departure from port and of catch landing. Another key feature is the information component of the compliance program. This includes educating operators on the importance of correct logbook recording, species identification, catch limits and prohibitions, and area restrictions. The monitoring, reporting, education and inspection components of the compliance program are backed by a range of penalties, including suspension or cancellation of

permits. DEH considers that these compliance measures contain the means of enforcing critical aspects of the management arrangements for the fishery.

In the absence of a SJTF management plan with clearly stated objectives linked to management strategies, performance measures, limits and targets, the submission refers to the SJTCC as providing “an avenue to review management arrangements in the fishery”. While this is a logical and essential approach to the development of the SJTF as a separately-managed entity, the fishery has been in operation at its current production level for a number of years. AFMA’s obligation to report on the extent to which performance criteria have been met, as part of each annual report, is of limited value if these criteria are not embedded in a management objective and performance review framework. In addition, the submission offers no indication of whether the Consultative Committee has, indeed reviewed the management arrangements and if so through what process and with what outcomes (see **Recommendation 1**). DEH considers that the absence of a formal commitment to, and process for, reviewing the performance of the fishery management arrangements is a major deficiency for the fishery.

Detailed fishery-dependent data relating to the target, byproduct and discarded species is collected through logbooks on a regular basis in the fishery. Mandatory reporting requirements also include interactions with protected marine wildlife and observations of tagged fish and wildlife. Some fishery independent information is also collected. Discussion of the information collection system can be found in Part Two of this report.

An analysis of the fishery’s capacity for assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species lives and the fishery operates is contained under Principle 2 of this report.

AFMA is responsible for the management of the species in all jurisdictions except NSW and takes into account the fishery in NSW territorial waters. Externally, Australia is actively engaged as a member of several institutional arrangements, which relate to the management of SJT stocks in the WCPO and the Indian Ocean. The distribution and spatial structure of these stocks and how they are factored into management arrangements are discussed under Principle 1 of this report.

AFMA coordinates compliance arrangements for Commonwealth fisheries and utilizes State and Territory fisheries officers to implement these compliance arrangements. AFMA has developed a Memorandum of Understanding with each of the States and the Northern Territory, which commits the Australian Government and State and Territory governments to cooperate in compliance activities. For each Commonwealth fishery, AFMA develops a Compliance Plan. This plan involves the assessment of the potential risks of non-compliance with management arrangements and then a further assessment of the impact or consequence of a particular act of non-compliance. A risk reduction strategy developed through this process is incorporated into a Compliance Program for the fishery. DEH considers that the current management arrangements comply with all relevant threat abatement plans, recovery plans, 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.

INTERNATIONAL CONTEXT

SJT is listed as a highly migratory species under the UNFSA, which came into effect on 11 December 2001 after ratification by 30 signatories. Management of the fishery must therefore be consistent with any relevant international or regional management regimes to which Australia is a party.

Australia is a signatory to the Agreement for the Implementation of the provisions of the UNCLOS. This agreement provides for the conservation and management of straddling fish stocks and highly migratory fish stocks on the high seas; and in limited circumstances, it also applies to fisheries management in the AFZ. As one of the Commonwealth managed fisheries that impact on

straddling fish stocks or highly migratory fish stocks, the management of the SJTF should comply with Australia's obligations under this agreement.

Australia's obligations are being addressed primarily through two regional agreements. Since 1996, Australia has been a signatory to the IOTC, which aims to promote cooperation among its members in relation to the conservation and optimum utilisation of stocks of tunas and tuna-like species and encourage sustainable development of fisheries based on these stocks. Australia is also a signatory to the WCPFC. Under this convention, a commission is to be formed to manage migratory species, including SJT, in its area of competence, including the high seas off eastern Australia.

Worldwide, catches of SJT have been increasing steadily since 1950, reaching a peak in 1999 at nearly 2 million tonnes. In 2000, more than 70% of the reported catch was taken in the Pacific Ocean and a further 17% in the Indian Ocean (AFMA 2002a). The major catching countries in the Pacific Ocean are Japan and Indonesia, while the Maldives and Spain are the major catching nations in the Indian Ocean.

Indian Ocean Tuna Commission

The IOTC is the peak international fishery management body for the region and it is an intergovernmental organization established under the *Agreement for the Establishment of the Indian Ocean Tuna Commission*, which was adopted by the Food and Agricultural Organisation (FAO) Council on 25 November 1993. The Agreement entered into force on 27 March 1996. Membership of IOTC is open to Indian Ocean coastal countries and to countries or regional organisations that are members of the United Nations or one of its specialised agencies and are fishing for tunas in the Indian Ocean. The area of competence of the IOTC is the Indian Ocean and adjacent seas, north of the Antarctic Convergence, insofar as it is necessary to cover such seas for the purpose of conserving and managing stocks that migrate into or out of the Indian Ocean.

The objective of the IOTC is to promote cooperation among its Members with a view to ensuring, through appropriate management, the conservation and optimum utilisation of stocks covered by the Agreement. In order to achieve this, the IOTC has the following functions and responsibilities:

- to keep under review the conditions and trends of the stocks and to gather, analyse and disseminate scientific information, catch and effort statistics and other data relevant to the conservation and management of the stocks and to fisheries based on the stocks covered by the IOTC Agreement;
- to encourage, recommend, and coordinate research and development activities in respect of the stocks and fisheries covered by the IOTC Agreement;
- to adopt, on the basis of scientific evidence, conservation and management measures to ensure the conservation of the stocks covered by the IOTC Agreement and to promote the objective of their optimum utilisation throughout the Area; and
- to keep under review the economic and social aspects of the fisheries based on the stocks covered by the IOTC Agreement bearing in mind, in particular, the interests of developing coastal states.

The initial overview of the IOTC noted that the estimated total catch of SJT was over 480,000t in 2002, one of the highest annual catches attained. This increase in 2002 was mainly due to the increased use of fish aggregating devices (FADs) in the purse seine fishery. However, the Working Party on Tropical Tuna (WPTT) considered that there are large uncertainties in the information needed to conduct a complete assessment of the Indian Ocean SJT. In the absence of any stock structure estimate, a single Indian Ocean stock is assumed. As an alternative, the group decided to analyse different fishery indicators that provide a general understanding of the state of the stock.

The IOTC plan to conduct a large scale Indian Ocean Tuna Tagging Program to address the uncertainties in key parameters for the stock assessment of SJT. No timeframe or completion date was mentioned in the IOTC Scientific Committee (IOTC SC) report, however, the tagging program

should allow the IOTC to estimate the stock structure, variability of growth in time and space, natural mortality at age and the stock size of SJT (IOTC SC 6).

The IOTC has not introduced any management measures for SJT or management recommendations for the skipjack stock. However, the IOTC SC suggests that there is no need for immediate concern about the status of SJT. Two reasons not to be concerned are:

- declining catches with increasing effort are good indicators that a stock is close to or above its maximum sustainable yield, however in the case of SJT, catches have continued to increase as effort increases; and
- the majority of the catch comes from fish that are already sexually mature (>40cm).

Although there maybe no reason for concern, the IOTC SC stated that it was clear the catches cannot be increased at the current catch rate indefinitely and the situation be monitored closely. The priority for SJT in the Indian Ocean is to gain a better understanding of stock structure and status. The IOTC made no management recommendations other than to continue to monitor fishing of SJT in the Indian Ocean.

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 Western and Central Pacific Ocean (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 main objectives of the Commission established by 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. It is believed that species such as SJT will benefit from mechanisms implemented under the Convention to control regional levels of fishing activities and from a regional approach to monitoring, data collection, research and assessment (BRS 2002).

SJT are the most important tuna resource in the WCPO, in terms of its contribution by weight to the total catch. In the past decade, SJT catches have contributed about 63% of the total tuna catch from the region. The 2002 catch of SJT was more than 1.3 million, the highest catch on record, which makes the Australian SJTF tiny in comparison. The purse seine fishery accounted for 73% of the catch, with 21% from the pole and line fishery (SCTB 16). Currently, stock assessments for the WCPO is largely undertaken with the MULTIFAN-CL Model, which indicates that current levels of SJT being taken is sustainable (SCTB 15).

The SCTB 15 reported “the skipjack tuna stock (in the WCPO) appears to be healthy and capable of sustaining the current catch without adverse affects on stock conditions” (SCTB 15, Final draft, Executive Summary, July 2002). Nevertheless, the Group noted that it does not appear that SJT thoroughly mix over the entire region. Concentrated and sustained fishing effort in local areas, consequently, could result in local depletion. In such areas, further increase in fishing effort may not result in proportionate increase in catches, but instead result in decline in Catch per Unit Effort and even in average size of SJT taken. The experience in the Atlantic SJT fisheries where this has occurred was noted.

Overall, it is considered unlikely that concerns for the SJT resource will result in any action to restrict catches of SJT in either the WCPO or the Indian Ocean in the near future. However, there are concerns for the status of both bigeye and yellowfin tuna stocks in the WCPO. The Standing Committee on Tuna and Billfish (SCTB) noted that the stock assessments for these two species indicated that both are likely to be nearing full exploitation. The catches and fishing mortality of juveniles have increased greatly over the last decade, due mainly to increased catches in Indonesia,

the Philippines, and the international purse seine fishery where the increased use of drifting FADs has increased juvenile mortality of both species. It is possible, therefore, that restrictions on the purse seine fleet in response to concerns about bigeye and yellowfin may have an impact on the SJTF.

Other International Bodies

Australia is currently party to a treaty with the United States of America (US) that gives United States purse seiners access to an area in the far northeast of the AFZ, however both have recently signed an agreement under which US vessels have agreed not to access the AFZ. It is understood that the US purse seine fleet does not regard the area as a viable fishing ground, mainly due to the possibility that fishing would be subject to domestic regulations, such as restrictions on yellowfin and bigeye incidental catch (BRS 2000). The US fleet also regards the long period of steaming to reach Cairns, and the inadequate port facilities in Cairns, as a disincentive to fishing in the AFZ.

No other regional or international management regimes, to which Australia is a party, are of direct relevance to the fishery. The prime international regime affecting the fishery is the UNCLOS. The management regime essentially complies with this. 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.

DEH considers it is incumbent on all authorities to develop a thorough understanding of the framework of national, regional and international agreements and their applicability to export-based fisheries for which they are responsible.

Conclusion

DEH considers that the SJTF management arrangements are documented, publicly available, and are developed through a consultative process. The current management arrangements are adaptable and underpinned by appropriate monitoring, assessment and compliance arrangements. However, it lacks a strategic framework of objectives, performance indicators and performance measures by which the effectiveness of the management arrangements can be measured, enforced and reviewed.

The management arrangements are adequate to control the fishery through a combination of input and output controls appropriate to the size of the fishery in the short term. However, these arrangements rely largely on input controls, which, alone, may not be sufficiently adequate and flexible to control the harvest in the longer term. There is no apparent commitment to a periodic review of the performance of the fishery management regime or its strategic direction. The management regime provides appropriate measures for enforcing critical aspects of the management arrangements.

The SJTF Statement of Management Arrangements take into account management measures in other jurisdictions and adheres to arrangements established under Australian laws and international agreements.

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

Stock Status and 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’*

Maintain 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’*

Information requirements

Fishery dependent data are obtained through detailed compulsory daily logbooks. Fishing details are recorded on a shot-by-shot basis and include:

- data and time, including search time;
- latitude and longitude (backed by mandatory VMS);
- catch of each target, byproduct and bycatch species;
- condition and estimated weight of non-retained catch;
- gear and boat details;
- catch of each bait species;
- support by spotter planes, pole boats;
- interactions with, and captures of threatened and protected species (including completing the *Wildlife and Other Protected Species Form – PSP01*); and
- captures of tagged fish or wildlife and protected species interactions (including completing *Recapture Sheets for all Tagged Fish, Tagged Animals and Banded Seabird Recaptures*).

All data must be entered before completion of a trip and log sheets must be sent monthly to AFMA where it is entered on a database and then used for monitoring, compliance and research. Details of the vessel and the dimensions and mesh sizes of purse seines are included in the mandatory information required of all SJT operators.

Current information collection, the prepared data plan and the upcoming data collection program are primarily fisheries dependent, as the extensive area of waters of the fishery and the migratory nature of SJT is more conducive to fishery dependent research and monitoring. However, some fishery independent studies have been undertaken or others are underway (Table 3).

Table 3: Summary of data collection research and monitoring for the SJTF

Description	Fishery dependent or independent	Information collected	Collection frequency	Provided to
Logbooks: PSO1 (to replace the TPB03) – purse seine & pole sector	Fishery dependent	Shot by shot data on: - fishing effort - catch estimates of Schedule 4 & bycatch species	Ongoing - every shot	AFMA & the Commonwealth Scientific and Industrial Research Organisation (CSIRO) for stock monitoring purposes.
Secretariat of the Pacific Community (SPC) information collection from coastal states	Fishery dependent	Catch data from SPC coastal states and Forum Fisheries Agency observer programs	Ongoing	SPC, AFMA & CSIRO for stock monitoring
IOTC Mandatory statistical requirements from member countries	Fishery dependent	A range of scientific fisheries data	Ongoing reporting requirements	IOTC
IOTC Resolution 01/01 Concerning the National Observer Programmes for Tuna Fishing in the Indian Ocean	Fishery dependent	Verified catch data	To be ongoing	AFMA, CSIRO, BRS, IOTC
Tagging programs	Fishery dependent	Indian Ocean Tuna Tagging program including skipjack. SJT were tagged in the western tropical Pacific, in 1991 and 1992, as part of the SPC Regional Tuna Tagging Program The IOTC Scientific Committee has approved an Indian Ocean Tuna Tagging Program (IOTTP) for bigeye tuna, yellowfin tuna and SJT in 2001	IOTC Pilot program under way	IOTC Results incorporated into the SPC assessment model for skipjack Results from program considered in IOTC assessments of stock status for these species
BRS review of the impact of FADs on tuna and billfish fisheries		Review of scientific literature and current research relevant to FADs	Completed	BRS, National Research Institute of Far Sea Fisheries
Vessel monitoring system	Fishery dependent	Vessel position & electronic notification when vessel is nearby/ entering port	Continuous	AFMA

Description	Fishery dependent or independent	Information collected	Collection frequency	Provided to
Flight logs from industry spotter planes	Fishery dependent	Species composition and location. Weather conditions	Ad hoc –line with operational needs	Industry info. Available to AFMA on request
Gamefish Tagging Program	Fishery dependent	The main species tagged include black, blue and striped marlin, swordfish, tunas, sharks and other pelagic species	Commenced in 1974 and ongoing. Several thousand tags have been released Australia wide	CSIRO, AFMA, WCPO Commission IOTC
Improved data collection for Indonesian industrial and artisanal tuna fisheries	Fishery dependent	Catch and effort data by species including skipjack tuna	Commence 2002	IOTC
The application of Sea-Viewing Wide Field-of-view Sensor (SeaWiFS) high resolution Ocean Colour data in pelagic fisheries such as skipjack and yellowfin tuna.	Fishery independent	Collaborating fishing vessels are supplying logbook information and, data on fluorescence, temperature and salinity.	Completed	CSIRO
IOTC WPTT application of various indices of environmental variability	Fishery independent	Environmental factors to explain large-scale events and associated environmental fluctuations that affect catchability, local abundance, spatial-temporal distribution and recruitment.	Underway	IOTC
Tuna diet studies	Fishery independent	To determine the horizontal and vertical distribution of tuna species, digestion rates of tuna, and spatial distribution of prey items.	Underway; preliminary results	IOTC

AFMA is developing a data plan for the fishery as required by the BAP 2005 for tuna purse seine fisheries. This plan will be published and reviewed biennially, however the timeframe for developing the plan was not mentioned in the Submission. It will address requirements for the collection, verification, analysis and management of catch and effort, biological, ecological, technical and economic data appropriate to the scale and management needs of the fishery. This move to improve data quality and completeness is supported by an education program in which AFMA officers meet regularly with vessel skippers in port. These measures will bring the data collection in line with international standards set under the UNFSA, enabling Australia to meet ongoing regional reporting requirements.

As well as providing higher quality data for stock assessment, risk assessment and related purposes linked with target and byproduct species, these improvements should provide more useful data for monitoring discard trends (discarding is discussed in greater detail under Principle 2 of this report). DEH believes that data reliability for target species is sound and that compliance activities have the capacity to ensure the ongoing reliability of data in the fishery, dependent on reviews and conditions.

The collection of fishery-independent information on the SJTF is limited. The submission refers to previous work by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and

two current projects that are providing the IOTC with large-scale information on factors affecting the distribution of tuna species. Within the AFZ, AFMA points out that the extensive area over which fishing may occur, the migratory nature of the species and the variable annual and seasonal nature of fishing all point to the advantages of higher quality fishery-dependent monitoring and research. Accordingly, this is the principal direction being taken under the data plan for the SJTF. The implementation of a data validation program or equivalent will provide the opportunity to validate and improve the overall quality of logbook data and to provide biological and other information.

Recommendation 3: *AFMA, by the end of 2006, to develop and implement an ongoing robust system to validate effort and catch data on target species, byproduct and bycatch species.*

Apart from the use of VMS's on all vessels to validate position details, the submission makes no reference to current measures to validate fishery-dependent information in this fishery. Reference material listed in the submission includes reports on previous work undertaken to validate logbook data from the tuna fishery off eastern Australia, but no mention is made of the nature or findings of this work. The submission does refer to verification of fisheries data on target and non-target species as an integral part of AFMA's proposed data plan for the fishery. For example, as stated above, the implementation of a data validation program will provide the opportunity to validate logbook records (**Recommendation 3**). DEH considers this to be an appropriate approach given the nature of the fishery and stocks. DEH considers that independent scientific surveys and studies could also be useful for validating fishery information.

The bulk of past and present research on the SJT stocks targeted by Australian fishers has been focussed on the main tropical and sub-tropical oceanic waters of the eastern Indian Ocean and the WCPO. Among previous studies are major regional tagging programs that have provided information essential to the development and application of SJT models and stock assessments. The submission refers to ongoing regional programs providing scientific fisheries data. Current studies are examining environmental and ecological factors affecting the biology, population dynamics and accessibility of SJT to commercial fisheries in the Indian Ocean.

Overall, given the range of fishery dependent data gathered by AFMA, the process outlined for developing and implementing the data plan and the commitment to ongoing review of data quality and needs, DEH considers that there is a reliable information collection system in place appropriate to the scale of the fishery. Implementation of a fishery data validation program is the most pressing need, so that trends can be verified. Continuation of, and continuous improvements to, existing data collection, will be important for the future management of the fishery.

Assessment

The combined Australian landings of 809 tonnes in 2003/04 is small in comparison to the 1.2 million tonnes of SJT taken from the WCPO and around 0.4 million tonnes of skipjack tuna taken from the expanding Indian Ocean fishery in recent years (DAFF 2005). While the links between eastern and western SJT taken in the Australian fishery and those regional stocks are poorly understood, skipjack are known to be highly migratory and at the edge of their geographic range where they are targeted by the Australian fishery. Due to SJT being highly migratory, DEH recommends that SJT stocks be cooperatively managed to incorporate global trends, which should include spatial and temporal management measures.

AFMA's response, as indicated in the submission, has been to support the Indian Ocean Tuna Commission's Scientific Committee and working parties (including the Working Party on Tropical Tunas) and an advisory body to the Secretariat to the Pacific Community's Oceanic Fisheries Program, the Standing Committee on Tuna and Billfish, in their work towards SJT stock assessments for their respective regions. Australia's overall support takes several forms, including funding, membership and participation, and collection of fisheries data that comply with international principles applying to highly migratory stocks.

Recommendation 4: *DAFF in consultation with AFMA, DEH and other relevant government agencies, to take a proactive role in the WCPFC and seek to improve the effectiveness of the IOTC as the regional fishery management forum for managing and conserving the species on which the skipjack tuna fishery relies. DAFF to pursue through these forums the achievement of the following priorities:*

- *promote the development of management options that address potential concerns of the IOTC Scientific Committee as they emerge;*
- *develop a process to gain a better understanding of the relationship between the populations of skipjack in Australian waters and other regional populations of skipjack in either the Indian or Pacific Oceans;*
- *endeavour to take measures to improve controls over illegal, unregulated and unreported fishing;*
- *ensure all fishing entities taking skipjack tuna in the Western and Central Pacific and Indian Oceans are members of the WCPFC and/or the IOTC, as applicable;*
- *take measures to verify the catch (target, by-product and bycatch species) of all fishing entities;*
- *endeavour to strengthen stock assessments for SJT; and*
- *pursue a regime to protect ecologically related species, including byproduct and bycatch, from unsustainable fishing pressures.*

For the Australian Eastern Sector fishery, AFMA relies on the SPC's annual assessment using the MULTIFAN-CL model. This length-based, age-structured and spatially-explicit model incorporates catch, length frequency and tag-recapture date and is used for assessments of the skipjack tuna stock in the WCPO. The submission points out that, while these assessments do not include Australia's minor Eastern Sector catches, they seem to adequately reflect the status of the stock and the fishery. Although the assessments do not address changes in biological diversity in relation to the fishery, they do monitor changes in the reproductive capacity of the stock. The assessments are reviewed by the Secretariat's Oceanic Fisheries Program independently of AFMA.

The submission states that the SPC's stock assessment "provides a sound estimate of the potential productivity of skipjack tuna in the [Western and Central Pacific Ocean]" but does not give details of the estimate. A report by the Secretariat's research group refers to recruitment variability as the main influence on both the stock and the fishery, observing that at the current level of sustainable fishing the stock appears to be healthy. It adds some cautionary notes, in particular the possibility of localised depletions in the face of sustained intensive fishing, which relates to SJT found in Australian waters that are sourced from what are considered to be separate stocks in the Pacific and Indian Oceans. As mentioned before, the extent to which these regional populations mix with populations of SJT found in Australia is not known. The greater the isolation of Australia's SJT population, the higher the risk of localised depletion occurring as a result of fishing. The report also points to the need for further work in areas of SJT biology, stock assessment and fishery data collection. BRS considers that, while the current Australian harvest from this stock is sustainable, the stock status is uncertain. In light of this, DEH recommends that AFMA investigate and if needed, develop a mechanism to mitigate the potential for localised depletion.

The submission points out that stock assessment in relation to the Australian Western Sector fishery has not been possible because of the small size of that fishery and the recent origin of the IOTC. Australian scientists participate in annual meetings of the Commission's Working Party on Tropical Tunas which provides advice on research and stock assessments of tuna species in the region, including SJT. In the absence of a stock assessment, the Working Party has examined "stock status indicators" and pointed to the need for tagging work to investigate stock structure, movements and other aspects of population biology including possible interactions with stocks exploited in the western Indian Ocean. The BRS considers that, while the status of the eastern Indian Ocean stock is uncertain, there is no evidence that it is over-exploited.

The *Ecological Risk Assessment for Commonwealth Fisheries* (ERA) project being undertaken jointly by AFMA and CSIRO for the SJTF (and other Commonwealth-managed fisheries) involves qualitative assessment of the risks to the sustainability of the fishery, biodiversity and the

environment. This project will move towards a full quantitative risk assessment that includes modelling of risk management strategies based on levels of risk and uncertainty. 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, as well as reviewing and continuing with the tuna purse seine BAP.

Recommendation 5: *Within 18 months of completion of the ecological risk assessment, AFMA will identify and implement appropriate management strategies to address fishing impacts identified as high risk from the ecological risk assessment process.*

While recognising the steps being made within AFMA's direct influence to accelerate progress towards achieving robust stocks assessments, particularly for the Indian Ocean stock, and accepting AFMA's limited capacity in this regard, DEH encourages AFMA to continue its efforts, working together with the DAFF and CSIRO.

SJT is an oceanic species that inhabits the uppermost layer of the ocean. It is concentrated in tropical waters but extends seasonally into subtropical waters to the north and south. Tagging information indicates that SJT movement is highly variable and thought to be influenced by large-scale oceanographic variability. For example, oceanographic studies suggest El Nino impacts positively on recruitment, particularly when rapidly followed by La Nina conditions (as in 1998).

Factoring the spatial structure of stocks into Australian management arrangements is particularly difficult for a species which is exploited at the overlap in the distributional extremities of two large regional stocks. In the medium to long term, the management regime must be sufficiently responsive to adapt to the high level of inter-annual variability experienced in the Australian fishing areas, in contrast to the relative stability of the stocks at the centre of their distributions. Previous tagging studies in 1991/92 have shed some light on the distribution and spatial structure of the SJT stock in the WCPO. However, the links between SJT occurring off eastern Australia and the wider regional stock remain unclear. The submission indicates AFMA's expectation that the IOTC proposed tagging program will help to remove similar doubts regarding SJT in the AFZ and the regional stock in the eastern Indian Ocean. DEH urges AFMA to take all possible steps to address these uncertain relationships between SJT exploited in the AFZ and the adjacent regional stocks (see **Recommendation 4**).

The submission describes the detailed fishery catch and effort logbook system, which provides comprehensive, yet unverified, data on the harvest by the commercial SJTF. It also refers to existing sources of data on the harvest by recreational, charter and indigenous sectors. Recreational and Indigenous take of SJT in the Australian fishery is not as well known, however, there are several processes in place to improve these estimates, including: *A National Review of the Recreational Fishing Sector*, *Gamefish tournament catch and effort monitoring*, *Gamefish Tagging Program*, recreational sector representation on the SJTCC and a *National recreational and Indigenous fishing survey*. Currently, there are limited management controls on recreational fishing for SJT in the main commercial catch areas (NSW and particularly South Australia), (see **Recommendation 6**). BRS estimates that the annual catch of SJT by recreational fishers is probably less than 150 tones (BRS 1998). It should also be noted that there are currently no restrictions on the catch of SJT as byproduct by longline in the ETBF and WTBF. DEH recommends that AFMA take this into consideration when conducting stock assessments for SJT and when implementing **Recommendation 6**.

While DEH encourages AFMA to work with all sectors to improve the reliability and completeness of harvest data by all sectors of the Australian fishery, we accept the proposition put in the submission that the critical data deficiencies occur elsewhere. The main deficiencies are identified as estimates only of the unreported and unregulated take by some operators in the WCPO fishery and the lack of data or estimates of catch, effort and species composition of the catch by several

Indian Ocean states. However, estimates of all removals are factored into the SPC stock assessments. The SPC identifies that there is some unreported and unregulated take from these stocks and, where possible, obtains representative estimates of these removals from the vessels and their flag states. These estimates are also factored into the stock assessment process.

Management response

The current SJTF management regime aims to maintain ecologically viable stock levels through a range of input and output controls. These measures are outlined in Table 1 and Part I of this report.

The principal management controls on catch from the AFZ are licensing measures limiting entry to zones within the fishery and specifying purse seine dimensions. These measures are supported by the requirement for all vessels to carry integrated computerised VMS, enabling their positions and movements to be monitored at all times when fishing within the AFZ and on the high seas. The fishery management measures are also backed by controls on the take by vessels operating in state (except NSW) and Northern Territory fisheries. Control of the take from the AFZ is not an issue at present, with only four of the 32 purse seine permit holders reporting SJT landings in 2004. DEH acknowledges that AFMA has adequate catch reporting and vessel monitoring arrangements in place to enable rapid detection of an upsurge in effort. However, we consider that the reliance on input controls offers limited capacity to control the take in the event that more operators decide to target this species in future. The only explanation offered for the lack of progress towards management and performance measures capable of effectively controlling take in the fishery is the lack of consensus within the SJTCC. DEH is concerned with this and agrees with AFMA Management's previously-expressed view that continued reliance primarily on input measures constrains its ability to control catches and to manage the fishery in terms of its legislative objectives. Related to this, DEH notes that the submission's reference to the current construction of several Australian vessels, which will be capable of fishing for SJT on the adjacent high seas – fishing for which Australia has responsibility.

One key consequence of the absence of a formal SJTF management regime is the absence of target or limit reference points and related triggers with defined management processes to respond to breaches. While the submission refers to moves towards development of reference points by regional management bodies in relation to the Indian Ocean (by the Indian Ocean Tuna Commission) and the Western and Central Pacific Ocean (by the Western and Central Pacific Fisheries Commission) stocks, AFMA is non-committal on whether the management of Australia's SJTF will incorporate or rely on any reference points developed.

Performance measures established should ensure that any significant change in trends in effort and/or catch is detected, allowing for effective management. For example, DEH considers a potential performance measure could relate to an increase in the relative percentage over consecutive years in the level of active fishing effort or catch, which would reflect an activation of latent effort in the commercial SJTF. This possible activation of latent effort could be attributable to a number of causes, including the possible change from reliance on SBT and the possible decline of the SBTf. DEH also considers the implementation of performance indicators and performance measures will assist in developing mechanisms to mitigate against any potential for localised depletion, which may result from increased fishing effort or catch.

DEH is concerned that there is a lack of clear commitment to developing and introducing a formal SJTF management regime, under which reference points are defined and performance measures (with a process to identify appropriate responses) established, designed to protect stocks from any unsustainable impacts attributable to fishing.

Recommendation 2: *By the end of 2006, AFMA to develop a management regime for the skipjack tuna fishery, which includes fishery specific management objectives, performance indicators and performance measures for target, byproduct and bycatch species. AFMA will ensure that adequate information collection systems are put in place to monitor performance against measures and ensure that the fishery is ecologically sustainable.*

The submission indicates that the fishery is extremely effective in its ability to select and harvest fish by species and size. In addition, certain byproduct limits are set, and catch and effort reporting requirements include detailed byproduct records on a shot-by-shot basis. Purse seine operators are limited to a maximum seasonal catch of a combined live weight of 2% yellowfin and bigeye and a trip limit of 50% of the live weight of these species. A maximum trip limit of 20 sharks also applies, with fins still attached. The target fisheries for yellowfin tuna and bigeye tuna are managed under regimes that have been subject to assessment by DEH.

Although the byproduct levels in the SJTF are low, DEH recommends that incidental catch restrictions on the purse seine take of bigeye and yellowfin tuna be retained under a SJTF management regime. The data available, although not verified, indicates that the incidental catch of these two species is well below the existing incidental catch limits in the SJTF. However, the nature of the limits means that if there was a significant increase in purse seine effort for SJT there could be a correspondingly significant increase in the quantity of bigeye and yellowfin caught. DEH suggests AFMA take this into account when developing performance indicators and measures as part of the management regime, as addressed through **Recommendation 2**.

Conclusion

The SJTF is a multi-species, multi-method (primarily purse seine) fishery that is comparatively small when compared to the wider Indian and Pacific Ocean fisheries for the species taken. There are stock assessment signals that some key primary species are fully fished, particularly bigeye and yellowfin tuna species, and if not further addressed 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.

DEH considers that, in the short term, the management regime in the SJTF is appropriately precautionary and provides for the fishery to be conducted in a manner that does not lead to over-fishing. DEH considers that the information collection system and stock assessment and management arrangements generally are sufficient to ensure that the fishery is conducted at catch levels that maintain ecologically viable stock levels with acceptable levels of probability.

DEH 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.

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’*

This objective is not applicable to the fishery at present. Although the submission indicates that reference points linked to specific management responses have not been defined for the SJTF, the information presented makes it clear that the stocks have not been exploited to levels requiring management intervention at either a local or regional level. The status and management responses for major byproduct species are addressed under management plans for their respective fisheries. However, 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 Indian and Pacific Ocean.

Conclusion

DEH considers that the SJT stocks are not being fished at a level requiring management intervention but should that occur in the future, the fishery is conducted such that there is a high

degree of probability the stock would recover to ecologically viable stock levels within nominated timeframes.

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'*

Information requirements

The majority of the catch in the SJTF is taken using the purse seine method (up to 95% of the total catch). While anecdotal reports indicate that there is no significant bycatch using this method, AFMA recognises that there is little verified data on bycatch in the SJTF although the introduction of a data validation program should improve this.

Australian SJT purse seiners only target free-swimming schools dominated by SJT. Cannery reports show that the landings of species other than SJT are much less than 2% of the total landings. Anecdotal reports suggest that incidental catch levels of other species are extremely low (BRS 2002). 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 yellowfin and bigeye tuna and sharks. Refer to Table 2 for further information.

The fishery dependent data collection program is currently the principal source of information on bycatch in this fishery. All operators must report the fish component of the bycatch on their "Purse Seine Daily Fishing Log" sheets. These log sheets require shot-by-shot records of the estimated weight of the non-retained fish catch – for all species combined – with qualifying entries to be made in a comments box indicating the species involved and their condition on release. As the comments may apply to the bycatch recorded from up to 10 shots or days, there is scope for confusing or inaccurate reporting under this arrangement. Although the submission states that the amount of verified data is limited, it points out that the data plan for the fishery and other initiatives should lead to improvements that ensure bycatch reporting that is appropriate to the scale of the fishery.

Noting the lack of data validation programs and the need for verification and improvements to reporting of catch, byproduct, bycatch and protected species interactions, DEH recommends AFMA to proceed to develop a data validation program, or equivalent, as soon as possible. DEH notes the skipper education and awareness program and AFMA's proposed on-board observer program (as discussed in the *Skipjack Fishery Management Plan, AFMA Discussion Paper September 2002*) and considers that the implementation of these programs would assist in addressing these concerns.

Recommendation 3: *AFMA, by the end of 2006, to develop and implement an ongoing robust system to validate effort and catch data on target species, byproduct and bycatch species.*

It should also be noted that the take of SJT by recreational fishers is uncertain. BRS estimates that that the annual catch of SJT by recreational fishers is probably less than 150 tonnes, which equates to approximately 10% of the total 2001/02 commercial catch (BRS 1998). DEH is concerned with the limited management arrangements in place for recreational fishing of SJT in the main commercial catch areas (NSW and SA). To reduce uncertainty in stock assessments, DEH suggests AFMA liaise closely with state agencies to improve data collection on all SJT removals including that from the recreational sector.

Recommendation 6: *Within 18 months, AFMA to take account of the harvest of skipjack tuna by all sectors and factor this into the stock assessment process and management of the fishery to ensure sustainable management of the resource.*

Linked with daily fishing log sheets, operators are also required to complete “Wildlife and Other Protected Species Forms” provided in their logbooks. The details required include date and time, species name, precise position, nature of interaction and condition on release. Also linked to daily log sheets are separate forms where operators are required to report details of recaptures of tagged fish, seabirds and other animals. Tag returns contribute to the availability and reliability of bycatch data for the fishery.

AFMA has developed a BAP for Australia’s Tuna Purse Seine Fisheries for 2005. The Tuna Purse Seine BAP requires and identifies:

- fishery specific issues and risks, including protected species and threatened ecological communities, high risk and other bycatch species, removal of habitat as well as the impact of total bycatch on the broader ecosystem;
- Strategies and actions addressing risks associated with protected species, high risk and other bycatch species and the broader marine ecosystem;
- communication strategy (communicating the tuna purse seine BAP to industry, which includes education and awareness programs, port visits and training); and
- a prioritised workplan, which includes:
 - i. where there are known impacts, identify management actions that reduce the fishery impacts on bycatch or protected and high-risk species;
 - ii. develop and implement bycatch data collection plans;
 - iii. continue collection and analysis of verified data; and
 - iv. identify management priorities that include the development of management regimes to reduce bycatch to acceptable levels as determined by Threat Abatement or Recovery plans and reduce bycatch of high-risk species as identified in the ERA project being conducted by the CSIRO.

DEH considers the further development of an ongoing monitoring program a high priority for the future management of the fishery. Advancement of the 2004 draft BAP for Australian purse seine fisheries and of the specific data plan for the SJTF must address issues including compliance, verification of bycatch reporting and improvements to the reliability of non-retained fish catch reporting. It is also important that monitoring data be used to develop reference points for key species that are known to be susceptible to purse seining for SJT and other pelagic species.

Bycatch reporting arrangements in the wider regional fisheries are not rigorous. Generally, reporting of bycatch and discards available from log sheet data in the WCPO and the Indian Ocean for the SJTF is poor, with an extremely low incidence of self-reported bycatch. While there is little verified data available, observer-reported bycatch rates in the WCPO suggest that the bycatch level is between 0.35 and 0.77% of the total catch with sets on floating objects accounting for higher incidences than school sets. The main types of bycatch in these two areas are: yellowfin and bigeye tuna, certain shark species, dolphinfish and triggerfish, however the nature of bycatch interactions and the species involved in these larger tropical fisheries appear to be of limited direct relevance to bycatch considerations and DEH’s interests in the Australian fishery.

Assessment

Currently the level of bycatch in the fishery is only estimated from logbook data with no verification by data validation programs at present. A formal risk analysis of bycatch and its vulnerability to fishing has recently been initiated through the Tuna Purse Seine BAP 2005.

The submission states that there has been very little research in the way of risk assessment of bycatch species and their vulnerability to the fishery. It refers to a previous study of non-target species in Commonwealth fisheries (Harris & Ward 1999), which drew on available information, looking mainly at the nature and impacts of fishing-induced mortality and the ecological effects of bycatch. AFMA and CSIRO are working to improve the assessment of bycatch species and impacts of fisheries for SJT (and other species) through the ERA. This study will identify the species most

at risk from gear interactions and discarding. The submission states that the study's objectives include:

- “consolidating/developing ecological risk assessment methods that will meet the requirements of strategic assessments for Commonwealth fisheries; and
- determining the relative sustainability risks in Commonwealth managed fisheries, considering target, byproduct, bycatch and broader ecological impacts where possible.”

Three-stage quantitative risk assessments outlined in the submission include the evaluation of risk management strategies for bycatch and other species. In addition, AFMA expects that this study will point to areas where improvements should be made to the collection of bycatch data and to mechanisms to reduce bycatch. The timely completion and implementation of the results of this risk assessment clearly has important implications for several crucial aspects of the SJTF, particularly those being considered under Principle 2 in this report. In addition, when necessary the Standing Committee on Tuna and Billfish's research group makes recommendations on bycatch data and assessment needs, based on its own assessments of bycatch in the WCPO fishery.

DEH has concerns about the post-release mortality² of bycatch. Little is known about the fate of any species released from purse seines. Information on this issue must be collected as an integral part of all data collection programs undertaken in the fishery and must be a primary function of the data validation program. If the validation 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. **Recommendation 3** stresses the importance of developing a data validation program and would assist the collection of post-release mortality information. The collection of this data may identify a need to research the survival of bycatch species.

Management response

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

- a catch limit of 20 sharks per trip for operators in the SJTF;
- a ban on shark finning at sea;
- catch of yellowfin and bigeye tuna (total combined live weight) is limited to a seasonal catch of 2% of the total live weight of SJT taken and a trip limit of 50% of the SJT live weight;
- operations limited to target species as specified on permits and incidental catch restrictions as specified on permits.
- operations limited to the purse seine fishing method and dimensions of purse seine nets are fixed, unless approval is gained from AFMA; and
- a ban on landing of black or blue marlin.

BAPs are the major means through which AFMA addresses bycatch issues in its fisheries. The original Tuna BAP has been split into two – the Longline Fishery BAP and the Tuna Purse Seine BAP. The latter is applicable in the SJTF and is consistent with other tuna purse seine operations, such as the SBTF. The aims and requirements for the Tuna Purse Seine BAP have been previously mentioned in this report. DEH commends AFMA for its commitment to developing, implementing and regular review of its BAPs.

Based on information contained in the submission and supporting documents, DEH understands that the incidence of fish bycatch is considered low because of the highly species and size specific nature of purse seining. SJT logbook records indicate small catches of jack mackerel, blue mackerel, yellowfin tuna, bigeye tuna, frigate mackerel, eastern little tuna and striped marlin. The impacts of these catches on sustainability are addressed as part of the management arrangements for the respective species (AFMA 2004).

² post release mortality of bycatch refers to the survivability of bycatch species once they are released.

While bycatch is considered to be low in the SJTF, the potential for a significant increase in effort in the fishery may result in an increase in bycatch. DEH believes that a formal management regime for the fishery should include provisions to ensure that data collection and verification on bycatch is adequate and reliable in the event of a significant increase of take or a change in fishing gear.

DEH supports AFMA in continuing with and reviewing the Tuna Purse Seine BAP 2005 for the fishery to ensure adequate bycatch data collection and sustainable bycatch levels. DEH is satisfied that the combination of current programs and initiatives (especially the data validation program) will be sufficient to ensure that risks to bycatch species are adequately monitored and assessed.

No specific group of indicator species is being monitored in this fishery. If the ERA identifies any species as being at risk from the impacts of purse seining, management action will be taken. However, DEH's concerns regarding the absence of specific management objectives, strategies, performance indicators, performance measures and management responses (**Recommendation 2**) are applicable here.

Conclusion

DEH is satisfied that the current SJTF management arrangements 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. However, there is limited information or verification on the nature and level of bycatch and limited understanding of the abundance and dynamics of bycatch populations or the recreational take of target and bycatch species.

To redress the lack of verified information on bycatch AFMA has instituted a number of programs, to support routine fishery dependent data collection, eg logbooks, including a Tuna Purse Seine Fishery BAP that will include, along with data collection requirements, the development and implementation of specific mitigation measures. However, this data needs to be substantiated through the data validation program and any other data collection programs and DEH has provided recommendations to address these concerns.

Overall, DEH considers that there is a high likelihood the fishery is conducted in a manner that does not threaten bycatch species and has a good chance of achieving the fishery objectives. Should this situation change, or a risk assessment process indicate otherwise, DEH expects that AFMA would undertake appropriate actions to ensure that bycatch species are not threatened by this fishery.

Protected species and threatened ecological community protection

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'*

Information requirements

Very little information is available on the interaction of the purse seine sector with protected species. Protected species known to occur in the area where some of the fishing for SJT occurs include marine mammals (cetacean species and seals), the white shark (*Carcharodon carcharias*), turtles and some species in the Class Aves (birds) that occur naturally in Commonwealth marine areas.

Under the EPBC Act fishers are obliged to report interactions with protected species. The fishery dependent data collection program is currently the principal source of information on interactions of this fishery with endangered, threatened or protected species. All operators must indicate the occurrence of such interactions on their "Purse Seine Daily Fishing Log" sheets and record complete details on "Wildlife and Other Protected Species Forms" provided in their logbooks. The

details required include date and time, species name, location, nature of interaction and condition on release. The data is completed by the fishers and then forwarded to AFMA. The data summaries for the ETBF and WTBF (AFMA 2000) indicate that no wildlife interactions were recorded for the pole and line and purse seine sectors of these fisheries for the period 1996/97 to 1999/2000 in the ETBF and 1994-2000 in the WTBF. While the provision and requirement for detailed reporting of all protected species interactions are excellent, DEH has concerns about the lack of data verification and uncertainty regarding compliance with reporting requirements.

The submission refers to a number of areas in which AFMA is working to improve information collection and assessment in relation to protected species interactions. These include the AFMA/CSIRO ERA and BAP initiatives to independently verify fishery dependent data and assist operators in accurate species identification and incident reporting of threatened species.

Assessment

Phase I of the AFMA/CSIRO ERA for the tuna component of the Commonwealth was completed in mid-2004 and the results passed to the SJTCC to consider appropriate management responses and additional data needs. Phase I consisted of two levels of assessment aimed to assess the risk that fisheries pose to the sustainability of species it interacts with. Phase II of the ERA will run for two years from August 2004 and will finalise the risk assessment using a refined methodology (AFMA 2004). The ERA project will enable better targeting of management actions, research and monitoring needs to high risk areas.

Preliminary results from the ERA process indicates that there is low level risk to species interacting with the SJTF. Appendix A lists the threatened, endangered or protected species that were considered to interact directly or indirectly with the SJTF, including the great white shark *Carcharodon carcharias*, bottlenose dolphin *Tursiops truncatus*, leatherback turtle *Dermochelys coriacea* and killer whale *Orcinus orca*.

The BAP for tuna purse seine fisheries examined available recorded and anecdotal information on interactions between SJT fishing and protected species. Single anecdotal reports of the incidental captures of a seal and a shark in Australian bluefin tuna purse seining operations indicate that these animals were readily released unharmed (AFMA 2004). DEH is also concerned that any incidental catch of the critically endangered grey nurse shark may present a significant threat to the population of the species, although this is unlikely in the SJTF due to its method of collection.

The available data provides no evidence of seabirds taken in purse seines in either the WCPO or the Indian Ocean and there is little evidence that dolphins are taken as bycatch. However, purse seiners occasionally set on sharks (especially bronze whaler sharks, but possibly white sharks) and reportedly injure these animals when attempting certain release techniques. There are also concerns with regional reports that marine turtles are sometimes caught in the purse seine nets, more noticeably when fishing on FADs. DEH are nonetheless confident that Australian agencies will continue to use their influence to bring about improvements in the collection of bycatch data in these regional fisheries, particularly with regards to the mitigation of impacts on threatened and/or protected species. However, there is possibly a concern with the maximum depth that a seine net can reach. It was noted in the submission that the net can go down to 350 metres, but SJT's only occur down to 260 metres by day. Therefore, it should be noted that there is an extra 90 metres of net where the SJT's are not expected to occur, while other fish or marine mammals may occur, which in turn, may increase the level of bycatch, byproduct and interactions with threatened species. This, however, could be covered by the fixed dimensions of the purse seine nets, which is part of the SJTF management arrangements.

Future reviews of risks to protected species will examine data from the ongoing fishery dependent reporting and the data validation program. DEH encourages AFMA to formalise future arrangements as part of a regular fishery assessment process.

No threatened ecological communities have been identified in the area of the SJTF.

Management response

The submission and supporting documents indicate that the current level of purse seining for SJT is low and the recorded incidence of interactions with protected species is extremely low. However, AFMA has instituted a number of measures to redress the lack of information of the level and nature of interactions with protected species in the fishery, including the ERA and the BAP. Initially the emphasis will be on the collection of data and, where necessary, introduction of specific measures to reduce impacts of the fishery on the protected species.

The Australian fishery in temperate waters is not exposed to the number and variety of interactions with marine turtles, cetaceans, dolphins, pelagic sharks and rays that regional SJT fisheries face in tropical waters. The draft BAP for tuna fisheries (AFMA 2004) includes several measures designed to further avoid and minimise the impacts of interactions with protected species. These actions include fostering of research and development on fishing gear and practices, assessment of tagging to quantify post-release mortality, development of an appropriate industry code of practice and the use of spatial and temporal closures as risk mitigation tools. Draft recovery plans for protected white sharks and grey nurse sharks, both of which occur in the areas covered by the SJTF, do not identify this fishery as affecting these species. DEH encourages AFMA to work with industry on the implementation of a code of practice and other measures proposed under the draft BAP.

While interactions with threatened or protected species is considered to be low in the SJTF, the potential for a significant increase in effort in the fishery may result in an increase in interactions. DEH believes that a formal management regime for the fishery will ensure that data collection and verification on these interactions are adequate and reliable in the event of a significant increase of take or a change in fishing gear.

The SJTF does not interact with any known threatened ecological community and accordingly there are no management measures in place or that are considered necessary.

The SJTF management arrangements include requirements for fishers to take all reasonable steps to minimise interactions with seabirds, marine reptiles, marine mammals which effectively cover most of the key species of concern under the EPBC Act, and fish identified in sections 15 (referring to black cod, *Epinephelus daemeli*) and 15A (blue marlin, *Makaira mazara* or black marlin, *Makaira indica*) of the FM Act.

On balance DEH agrees with the view that the purse seine sector poses minimal risk to protected species and that AFMA has actions in progress to validate this. Should this assumption be shown to be incorrect, DEH expects AFMA will use their capabilities to mitigate any threats to protected species.

Conclusion

As with bycatch more generally, the pressing issue in the management of the interaction with protected species in the SJTF is the lack of information on the nature of and level of any interactions. DEH considers it essential that AFMA collects verified data on interactions with protected species. Without such reliable data there is no way of determining the significance of the interactions in terms of protected species survival or recovery to sustainable population levels.

DEH notes that interactions with protected or threatened species in the purse seine sector of the fishery are minimal and considers that the fishery is conducted in a manner that attempts to avoid mortality of, or injuries to, endangered, threatened or protected species and has no impact on threatened ecological communities. Should this situation change, or a risk assessment process indicate otherwise, DEH expects that appropriate actions will be undertaken to ensure the fishery avoids mortality or injury to these species and avoids or minimises impacts on threatened ecological communities.

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'*

Information requirements

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

DEH is concerned at the lack of information collection and research covering the fisheries impact on the ecosystem and environment generally. However, DEH understands that this lack of information is the case across a range of Australian and International fisheries and until appropriate research techniques and programs are developed and implemented this will continue to be the case. DEH strongly supports research in this area.

The primary source of information collected on the impact of the fishery on pelagic ecosystems is the – as yet – unverified fishery dependent data reporting system. This system provides for detailed reporting of target and byproduct harvest, bycatch, protected species interactions and recaptures of tagged animals. The low level of intensity of the fishery over relatively large areas and its focus on a migratory pelagic species mean that fishery independent data collection is not considered practical. The alternative adopted by AFMA is the ERA approach conducted with CSIRO, based on fishery dependent data (verified in the future) and other available information (from other regional bodies) on SJT, associated species and ecosystems. These programs should help to provide the information necessary for evaluating the impact of the fishery operations on the broader marine environment.

Assessment

SJT is a pelagic species that normally occurs in waters of considerable depth and in Australia is usually associated with the continental shelf. Purse seine fishing is selective both by use and design and, if the nets are set properly, has no direct contact with the substrate and therefore no significant potential to impact on the benthic communities that occur below the fishery. DEH concludes that the risk of interaction with benthic communities is considered to be very low and not commensurate with the costs of investigating possible impacts at this stage.

Apart from impact on the harvested stocks themselves, the most likely environmental impacts relate to ecologically related species and communities and food-chain effects. As indicated previously in this report, all indications are that interactions between the fishery and ecologically related species are minimal. The AFMA/CSIRO ERA has examined a range of potential impacts and is expected to provide risk assessments for each of these species. At the wider regional level, the SPC has initiated a food web study that will use data gathered from examination of tuna diets to model environmental and fishing impacts on pelagic ecosystems in the WCPO. Results are likely to be applicable to the Indian Ocean where tuna diet studies are also being conducted. The Secretariat's SJT stock assessments include estimates of natural mortality which incorporate predation components based on an understanding of the food chain of which SJT are a part.

The submission also refers to a CSIRO study of seawater composition and productivity, which included the area of the SJTF and provides fundamental knowledge of the food chain.

As in most pelagic fisheries conducted well within the limits of sustainability, the potential of the SJTF to impact unacceptably and unsustainably on the environment generally is considered to be low. Operators must comply with MARPOL regulations preventing garbage disposal at sea. Unlike other fisheries, purse seining does not pose risks associated with discarding of bait and packaging, loss of gear, ghost fishing or risk of unobserved entrapment or entanglement in fishing and related equipment.

Management response

The submission identifies a number of existing management measures are in place to contain potentially damaging impacts of the fishery on the ecosystem. These include:

- the limit on the number of permits issued for the fishery,
- systematic collection of comprehensive data on catch of target and non-target species and interactions with protected species;
- the AFMA/CSIRO ERA providing the SJTCC information as a basis for further management responses;
- several large marine protected areas – closed to purse seining – within the SJT range in the AFZ; and
- separate management regimes that provide mechanisms to ensure the productivity and sustainability of major byproduct and bycatch species.

It also refers to future measures that will further assist in this area, such as ongoing review of the assessment of ecological risk by the SJTCC (committee subject to change through

Recommendation 1) and the potential to use spatial and temporal fishery closures if necessary.

The submission notes the consideration being given by the IOTC and other tuna commissions to the use of marine protected areas to help manage the impacts of fishing on tuna and bycatch species.

Impacts on water quality through polluting discharges and discarding of waste materials from vessels are controlled under MARPOL legislation. Operators are required to comply with the legislation and must retain any plastic waste and dispose of it only when vessels return to port.

There are no ecosystem indicators linked to decision rules to be activated when monitoring indicates the need for management intervention based on a precautionary approach to minimising harmful impacts on the ecosystem. The submission refers to the AFMA/CSIRO ERA and a CSIRO project “Ecological indicators for fisheries management: non-target species, habitats and food chains”, however no details were presented. The submission also proposes that stock assessment processes in “the draft Plan” will help to identify ecosystem concerns. While it is not clear to which plan this refers, DEH considers that the combination of the assessments now available should provide AFMA and the SJTCC with sufficient information to develop ecosystem indicators linked to formalised decision rules and management responses.

The National Oceans Office is currently leading a regional marine planning process, developed under Australia’s Oceans Policy, in a large part of the area of the fishery, off southern NSW and eastern Bass Strait. The planning process aims to ensure the ecologically sustainable use of the resources in the planning area and will help to integrate management across jurisdictions and sectors. It will also identify potential candidate areas for the National Representative System of Marine Protected Areas (NRSMPA). The regional marine planning process is a potential vehicle for pursuing sustainable fisheries objectives, particularly where cross sectoral or cross jurisdictional approaches are required. AFMA should continue to engage in the process as far as practical. More information is available at <http://www.oceans.gov.au/index.jsp>.

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 data validation program, the research plan and the data plan. **Recommendation 5** ensures that measures will be implemented to mitigate high risks identified through the ERA.

The fishery has minimal impacts on the physical environment in which it operates. Therefore, DEH is satisfied that the fishery is conducted in a sufficiently precautionary manner to minimise the impact of fishing operations 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.

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LIST OF ACRONYMS

AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
BAP	Bycatch Action Plan
BRS	Bureau of Rural Sciences
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry
DEH	Department of Environment and Heritage (formerly Environment Australia)
EEZ	Exclusive Economic Zone
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERA	Ecological Risk Assessment
ETBF	Eastern Tuna and Billfish Fishery
FAD	Fish Aggregating Device
FAO	Food and Agricultural Organisation
FL	Fork Length
FM Act	<i>Fisheries Management Act 1991</i>
GAB	Great Australian Bight
IOTC	Indian Ocean Tuna Commission
IOTC SC	Indian Ocean Tuna Commission Scientific Committee
ITQ	Individual Transferable Quota
MAC	Management Advisory Committee
MARPOL	International Convention on Marine Pollution
NSW	New South Wales
NRSMPA	National Representative System of Marine Protected Areas
OCS	Offshore Constitutional Settlement
SBT	Southern Bluefin Tuna
SBTF	Southern Bluefin Tuna Fishery
SCTB 15	Standing Committee on Tuna and Billfish
SJT	Skipjack Tuna
SJTF	Skipjack Tuna Fishery
SJTCC	Skipjack Tuna Consultative Committee
SJTF MP	Skipjack Tuna Fishery Management Plan
SPC	Secretariat of the Pacific Community
WPTT	Working Party on Tropical Tuna
WTBF	Western Tuna and Billfish Fishery
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stocks Agreement
US	United States of America
VMS	Vessel Monitoring System
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	Western and Central Pacific Ocean
WTO	Wildlife Trade Operation

Attachment A. Species list and risk values for the species components of the SJTF.*

A total of 8 target (including bait species), 15 bycatch/byproduct, and 27 Threatened Endangered or Protected species were considered to interact directly or indirectly with the SJTF. The table below depicts the preliminary results from the AFMA/CSIRO ERA process and indicates the level of risk to species interacting with the SJTF. TEP = Threatened Endangered or Protected species, DI = Discard species (bycatch), BP = Byproduct species, TA = Target species.

<i>Scientific name</i>	Common name		Preliminary individual risk value
<i>Orcinus orca</i>	Killer whale	TEP	High
<i>Tursiops truncatus</i>	Bottlenose dolphin	TEP	High
<i>Diomedea exulans</i>	Wandering albatross	TEP	High
<i>Morus serrator</i>	Australian gannet	TEP	High
<i>Neophoca cinerea</i>	Australian Sea- Lion	TEP	High
<i>Puffinus tenuirostris</i>	Short- tailed shearwater	TEP	High
<i>Eubalaena australis</i>	Southern right whale	TEP	High
<i>Feresa attenuata</i>	Pygmy killer whale	TEP	High
<i>Globicephala macrorhynchus</i>	Short- finned pilot whale	TEP	High
<i>Globicephala melas</i>	Long- finned pilot whale	TEP	High
<i>Carcharodon carcharias</i>	Great White Shark	TEP	High
<i>Isurus oxyrinchus</i>	Shortfin Mako shark	DI	High
<i>Arctocephalus pusillus</i>	Australian Fur Seal	TEP	High
<i>Thalassarche chlororhynchus</i>	Yellow nosed albatross	TEP	High
<i>Dermochelys coriacea</i>	Leatherback turtle	TEP	High
<i>Arctocephalus forsteri</i>	New Zealand Fur Seal	TEP	Med
<i>Sterna bergii</i>	Crested tern	TEP	Med
<i>Carcharhinus obscurus</i>	Dusky shark	DI	Med
<i>Manta birostris</i>	Manta ray	DI	Med
<i>Megaptera novaeangliae</i>	Humpback whale	TEP	Med
<i>Delphinus delphis</i>	Common dolphin	TEP	Med
<i>Pelagodroma marina</i>	White faced storm petrel	TEP	Med
<i>Eudyptula minor</i>	Little penguin	TEP	Med
<i>Arripis georgianus</i>	Tommy rough	TA	Med
<i>Prionace glauca</i>	Blue shark	DI	Med
<i>Emmelichthys nitidus</i>	Red bait	TA	Med
<i>Thunnus maccoyii</i>	Southern Bluefin Tuna	BP	Med
<i>Katsuwonis pelamis</i>	Skipjack tuna	TA	Med
<i>Sarda australis</i>	Australian bonito	BP	Med
<i>Trachurus declivis</i>	Jack mackerel	TA	Med
<i>Trachurus murphyi</i>	Peruvian jack mackerel	TA	Med
<i>Trachurus novaezelandiae</i>	Yellowtail scad	TA	Med
<i>Makaira mazara</i>	Blue marlin	DI	Med
<i>Coryphaena hippurus</i>	Mahi mahi	BP	Med
<i>Hippocampus breviceps</i>	Short- head seahorse	TEP	Low
<i>Phycodurus eques</i>	Leafy seadragon	TEP	Low
<i>Phyllopteryx taeniolatus</i>	Weedy seadragon	TEP	Low
<i>Stigmatopora argus</i>	Spotted pipefish	TEP	Low
<i>Makaira indica</i>	Black marlin	DI	Low
<i>Tetrapturus audax</i>	Striped marlin	DI	Low
<i>Sardinops neopilchardus</i>	Pilchard	TA	Low
<i>Scomber australasicus</i>	Blue mackerel	TA	Low
<i>Xiphias gladius</i>	Broadbill swordfish	DI	Low
<i>Hippocampus abdominalis</i>	Big- bellied seahorse	TEP	Low
<i>Hippocampus whitei</i>	White's seahorse	TEP	Low
<i>Thunnus alalunga</i>	Albacore tuna	BP	Low
<i>Auxis thazard</i>	Frigate mackerel	DI	Low
<i>Thunnus albacares</i>	Yellowfin Tuna	BP	Low
<i>Thunnus obesus</i>	Bigeye tuna	BP	Low
<i>Solegnathus spinosissimus</i>	Spiny pipehorse	TEP	Low

* Source: Ecological Risk Assessment for Effects of Fishing: Skipjack Tuna Fishery