ME CERTIFICATION LTD.

MSC Public Certification Report

Walker Seafoods Australian albacore, yellowfin tuna and swordfish longline fishery

AUGUST 2015

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Glossary

Term / Acronym	Definition
ABARES	Australia Bureau of Agriculture and Resource Economics and Sciences
ACAP	Agreement on the Conservation of Albatrosses and Petrels
AFMA	Australia Fisheries Management Authority
AFZ	Australian Fishery Zone
AMMC	Australian Marine Mammal Centre
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCM	Commission Members, Cooperating non-Members and participating Territories
CHSP	Commonwealth Harvest Strategy Policy
CMM	Conversation Management Measure
CMS	Convention on the Conservation of Migratory Species of Wild Animals
ComFRAB	Commonwealth Fisheries Research Advisory Board
CS	Coral Sea
CPUE	Catch Per Unit Effort
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry
DSEWPAC	Department of Sustainability, Environment, Water, Population and Communities
EAC	Eastern Australia Current
EAFM	Ecosystem Approach to Fisheries Management
EBFM	Ecosystem-Based Fisheries Management
EEZ	Exclusive Economic Zone
ENSO	El Niño Southern Oscillation
EPBC	Environmental Protection and Biodiversity Conservation Act
EPO	Eastern Pacific Ocean
ERA	Ecological Risk Assessment
ERAEF	Ecological Risk Assessment For the Effects of Fishing
ERM	Ecological Risk Management
ESD	Ecologically Sustainable Development
ETBF	Eastern Tuna and Billfish Fishery
ETP	Endangered, Threatened and Protected Species
FAA	Fisheries Administration Act
FAD	Fish Aggregating Device
FAME	Fisheries, Aquaculture and Marine Ecosystems
FAO	Food and Agriculture Organisation of the United Nations
FFA	Forum Fisheries Agency
FMA	Fisheries Management Act
FRDC	Fisheries Research and Development Corporation
HS	Harvest Strategy
HSP	Commonwealth Harvest Strategy Policy
IATTC	Inter-American Tropical Tuna Commission

IPOA	International Plan of Action
ISC	International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean
ITQ	Individual Transferrable Quota
IUCN	International Union for Conservation of Nature and Natural Resources
IWC	International Whaling Commission
JPLL	Japanese Longline
LOSC	Law of the Sea Convention
MAC	Management Advisory Committee
MEY	Maximum Economic Yield
MSE	Management Strategy Evaluation
NMFS	US National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPOA	National Plan of Action
NSW	New South Wales
NTADS	Non-Target or Associated and Dependent Species
OCS	Offshore constitutional settlement
OFP	Ocean Fisheries Programme
PCSWG	Population and Conservation Status Working Group
PNA	Parties to the Nauru Arrangement
PSA	Productivity-Susceptibility Analysis
PTTP	Pacific Tuna Tagging Project
RAG	Research Assessment Group
RBCC	Recommended biological commercial catch
RRR	Research Review and Recommendation
RTTP	Regional Tuna Tagging Project
SAFE	Sustainable Assessment for Fishing Effects
SAG	DAFF Shark Advisory Group
SBTF	Southern Bluefin Tuna Fishery
SBWG	Seabird Bycatch Working Group
SFR	Statutory Fishing Right
SICA	Scale Intensity Consequence Analysis
SIDS	Small Island Developing States
SIRC	Shark Plan Implementation and Review Committee
SPC	Secretariat to the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
SRP	Shark Research Plan
STAGIS	Shark TAGging Information System
TACC	Total Allowable Commercial Catch
TMP	Turtle Mitigation Plan
TTMAC	Tropical Tuna Management Advisory Committee
TTRAG	Tropical Tuna Research Assessment Group
UNLCOS	United Nations Convention on the Law of the Sea
UoC	Unit of Certification
VDS	Vessel Day Scheme
VMS	Vessel Monitoring System
WCPFC	Western Central Pacific Fisheries Commission
WCPO	Western Central Pacific Ocean

WSA	Walker Seafoods Australia
WTBF	Western Tuna and Billfish Fishery
WTO	Wildlife Trade Operation

1. Executive Summary

This report is the Public Certification Report (PCR) for the full MSC assessment of the Walker Seafoods Australian albacore, yellowfin tuna and swordfish longline fishery by the Conformity Assessment Body (CAB) ME Certification Ltd. (MEC). Walker Seafoods Australia Pty Ltd., the client for this assessment, are based in Mooloolaba, Queensland, and operate a longline fishery which is part of the Australian Eastern Tuna and Billfish Fishery (ETBF).

The target (Principle 1) species for the assessment are: albacore tuna, yellowfin tuna and broadbilled swordfish. Main retained species were identified as bigeye tuna, striped marlin and mahi mahi. No main bycatch species were identified. Under ETP species, interactions with seabirds, turtles, marine mammals and various species of shark were considered. Under management, the team considered both the regional management framework (WCPFC) and the national management framework (the Australian Fisheries Management Authority – AFMA). The Risk-Based Framework (RBF) approach was used to assess retained and bycatch species outcome performance indicators.

The assessment team was made up of Dr Jo Gascoigne (team leader, P1), Robert O'Boyle (P1), Kat Collinson (P2) and Dr Tim Emery (P3). The site visit and Scale Intensity Consequence Analysis (SICA) took place in Mooloolaba, Queensland in August 2014, with participation from the client, de Bretts (processor), AFMA and WWF Australia, who also provided a written submission.

In general, the key strengths of the Walker Seafoods operation derive from the strong and precautionary Australian fisheries management framework, as well as the good relationship and level of consultation between AFMA and the industry. Key weaknesses derive mainly from the regional management framework for the tuna species under Principle 1. Concerns are also raised about relatively high bycatch rates of shortfin mako, although regulations are in place, which aim to keep these to a minimum.

The MEC assessment team have provisionally concluded that the fishery should be certified MSC, because no performance indicator (PI) scored <60 and all the Principles have an average weighted score of 80 or above. Nine PIs scored 60-80 and therefore the certification is subject to nine conditions: seven for Principle 1 and two for Principle 2, as summarised below. Principle 1 averaged 81.9 (albacore), 85 (yellowfin) and 80.6 (swordfish); Principle 2 averaged a score of 86 and Principle 3 averaged a score of 86.8. No recommendations are proposed. This determination has been subject to client and peer review, and now requires stakeholder review.

The conditions are as follows:

Condition number	Condition	Performance Indicator
1	The management system should formally adopt a target reference point for the South Pacific albacore stock, which is consistent with maintaining the stock at B_{MSY} or some other measure with similar intent or outcome. This target reference point should be used for management purposes.	**1.1.2 (albacore)**
2	The fishery management system should put in place a regional harvest strategy, incorporating limit and target reference points (management objectives), a harvest control rule and management actions, such that the strategy is responsive to the status of the stock and the elements of the strategy work together to maintain the stock at or around the target level.	**1.2.1 (albacore)**

Condition number	Condition	Performance Indicator
	The key missing elements of the harvest strategy at present are 1. a target reference point formally adopted by the regional management system, and 2. a well-defined harvest control rule with associated management actions. These issues are also addressed specifically in conditions 1 and 3.	
3	A well-defined regional-level harvest control rule should be put in place, with associated management actions (in the form of a WCPFC CMM or another form as appropriate) which together act effectively to reduce exploitation rates as the limit reference point is approached. The selection of the harvest control rule should take into account the main uncertainties regarding the status of the stock or the impact of the fishery (or other uncertainties if considered important). This condition can be addressed together with conditions 1 and 2.	**1.2.2 (albacore)**
4	The fishery management system should put in place a regional harvest strategy, incorporating limit and target reference points (management objectives), a harvest control rule and management actions, such that the strategy is responsive to the status of the stock and the elements of the strategy work together to maintain the stock at or around the target level. The key missing element of the harvest strategy at present is a well-defined harvest control rule with associated management actions. This issue is also addressed specifically in condition 5.	**1.2.1 (yellowfin)**
5	A well-defined regional-level harvest control rule should be put in place, with associated management actions (in the form of a WCPFC CMM or another form as appropriate) which together act effectively to reduce exploitation rates as the limit reference point is approached. The selection of the harvest control rule should take into account the main uncertainties regarding the status of the stock or the impact of the fishery (or other uncertainties if considered important). This condition can be addressed together with condition 4.	**1.2.2 (yellowfin)**
6	Turtles: • Continue to collect data, which allows turtle interactions per 1000 hooks to be estimated. • If data show that interactions have reduced to below the trigger level, no further action is required. • If data show that there remains a significant risk of interactions above the trigger level, further management measures should be implemented, either by Walker Seafoods Australia or by the ETBF as a whole. Shortfin mako: The fishery may show that it is not having an unacceptable impact on this species by various means: i) further reducing the mortality of this species from the fishery such that impacts are highly unlikely; and/or ii) providing an estimate of the total population size of shortfin mako against which the existing catch rate can be compared and shown to be acceptable; and/or iii) providing evidence on trends in shortfin mako population in the area of the fishery, to show that there is no evidence of any reduction in the population in the area associated with the fishery; and/or iv) any other appropriate method.	**2.3.1**
7	Collect and analyse data to provide an estimate of the total population size of against which the existing catch rate can be compared, and/or provide evidence on trends in shortfin mako population in the area of the fishery, in relation to the activity of the	**2.3.3**

Condition number	Condition	Performance Indicator
	fishery.	

2. Authorship and Peer Reviewers

The authors of this report (MEC assessment team) are:

Dr Jo Gascoigne (Team Leader): Dr Gascoigne is a former research lecturer in marine biology at Bangor University, Wales. She is a fully qualified MSC Team Leader with particular expertise in the assessment of Principle 1 (target species stock status and management) and the Risk Based Framework (RBF). She has been involved as expert and lead auditor in all of MEC's previous MSC assessments and numerous pre-assessments. For this assessment, Dr. Gascoigne was the team leader and responsible for Principle 1.

Robert O'Boyle: Robert O'Boyle has a Master's degree from University of Guelph. He has undertaken numerous technical reviews of ocean and resource management issues. Regarding stock assessment, recent reviews include Scotian Shelf cusk, US spiny dogfish, Atlantic cod, Atlantic and Gulf menhaden and east coast summer flounder. He has been involved in a number of MSC pre- and full assessments including Russian Pollock, Atlantic swordfish, British Columbia spiny dogfish, Chilean hake, Lake Erie walleye and yellow perch, US west coast groundfish, and Cornish sardine. He is a current member of the New England Fisheries Management Council's Scientific and Statistical Committee and as such is required to provide on-going peer review of issues related to the management of New England resources. He has also under taken reviews of EBM issues, including most recently the fishery benefits of Marine Protected Areas, networks of sensitive habitat in the Gulf of Maine and decision support tools for EBM. Robert was also a member of the Canadian scientific team for the Canada – US Georges Bank trans-boundary dispute responsible for data management and analysis of trans-boundary distribution of resources and fishing fleets. He has been involved in numerous reviews, most recently that of SMAST's Marine Fisheries Institute's research program and the US national stock assessment program. During this full assessment, he shared responsibility with Jo Gascoigne for Principle 1.

Kat Collinson: Kat has a Master's Degree in Aquatic Resource Management from King's College University and has worked on a number of MSC fisheries assessments including the Menai Strait mussel fishery. She has also been responsible for the completion of pre-assessments for tuna fisheries in the Pacific and Indian Ocean against the MSC principle and criteria. Kat is a fully qualified MSC Team Member and specialises in Principle 2 requirements and has received training in RBF. She regularly participates in MSC CAB training sessions and workshops and has also completed over 200 separate MSC CoC audits and acts as the team's expert on traceability for the fishery.

Dr Tim Emery: Tim is currently a junior research fellow at the University of Tasmania, Australia, where he is responsible for modelling the status of local fisheries stocks. Current research interests include examining fisher behaviour and ways to increase the use of economic analyses within fisheries management frameworks. Prior to commencing his PhD, Tim worked for three years at AFMA as a management officer in various fisheries where he gained a detailed understanding of Australian fisheries governance and management frameworks. For this assessment Tim was responsible for Principle 3.

The peer reviewers for this report are:

Jo Akroyd: Jo is Director and Principal Consultant of Jo Akroyd Ltd, an International consultancy company specialising in marine fisheries policy and marine ecosystem and community based management. She has over 30 years of experience in the field of fisheries management and has also provided services in quality system implementation and training in project management and negotiation skills. Prior to a career in consultancy, she was manager of International Projects at the Auckland University of Technology and Director of Quality and Strategic Management and Assistant Director of Marine Research at the Ministry of Agriculture & Fisheries, Wellington, New Zealand (NZ). Her specific experience includes team leader and Principle 3 expert for NZ Hoki, hake, southern blue whiting, troll albacore, and southern scallop fisheries, the Japanese Pole and Line Fishery for Skipjack Tuna, Fiji Albacore longline fishery and team member as P3 specialist for Ross Sea Tooth fishery and Hokkaido scallops. Jo was trained on the use of Risk Based Assessment in June 2009 by Intertek Moody Marine and in September 2011 attended an MSC workshop in Sydney, which included RBF.

Dr Joseph Powers: Dr Powers is currently working for the University of Louisiana as an associate professor in marine resource assessment. He has had extensive experience in conducting population dynamics studies, scientific stock assessments, in communicating results to constituents and managers, and serving as a fisheries manager. He has been the lead US scientist conducting stock assessments for Atlantic tuna and billfish species for the International Commission for the Conservation of Atlantic Tunas (ICCAT). Additionally, Dr. Powers served as the Chairman of the Scientific Committee of ICCAT. He also has various research interests including modelling of recruitment variability, ecosystem criteria in fisheries management and development of robust statistical methods to characterize the variability of fishery populations and ecosystems subjected to environmental and anthropogenic stress. Dr Powers has worked on a number of MSC assessments including Tosakatsuo Suisan pole and line skipjack fishery, Icelandic gillnet lumpfish fishery and initial certification of the South Africa hake trawl.

3. Description of the Fishery

3.1. Scope

MEC confirms that fishery under assessment is in conformity with Principle 3, Criterion A1 and Principle 3, Criterion B14 of the MSC Certification Requirements v1.3:

- Criterion A1: A fishery shall not be conducted under a controversial unilateral exemption to an international agreement.

- Criterion B14: Fishing operations shall not use destructive fishing practices such as fishing with poisons or explosives.

The client has also not been successfully prosecuted for a forced labour violation in the last 2 years.

Therefore, MEC concludes that the fishery is within the scope of the MSC certification process.

3.2. Unit of Certification

There are three Units of Certification (UoC) considered in this report:

<table>
<tr><td>Species</td><td>Albacore tuna (Thunnus alalunga) (UoC1), yellowfin tuna (Thunnus albacares) (UoC2) and broadbill swordfish (Xiphias gladius) (UoC3)</td></tr>
<tr><td>Geographical range</td><td>Central east coast of Australia, inside the Australian Fishery Zone (AFZ) between 3 and 200 nautical miles (Figure 1). Port of landing: Mooloolaba, Queensland.</td></tr>
<tr><td>Method of capture</td><td>Pelagic mid-set longline</td></tr>
<tr><td>Stocks</td><td>South Pacific albacore (UoC1), Western and Central Pacific yellowfin (UoC2), Southwest Pacific swordfish (UoC3)</td></tr>
<tr><td>Management System/s</td><td>Australia: managed by the Australian Fisheries Management Authority (AFMA) as part of the Eastern Tuna and Billfish Fishery (ETBF)
Regional: managed by the Western and Central Pacific Fisheries Commission (WCPFC)</td></tr>
<tr><td>Client group</td><td>Walker Seafoods Australia. See http://www.walkerseafoods.com.au/
<table>
<tr><th>Vessel Name</th><th>Registration Number</th><th>Flag State</th><th>FFA VID</th></tr>
<tr><td>Assassin</td><td>LFB12904</td><td>Australia</td><td>9805</td></tr>
<tr><td>Sharp Shooter</td><td>900769</td><td>Australia</td><td>11079</td></tr>
<tr><td>Santa Lucia</td><td>RFB13129</td><td>Australia</td><td>5084</td></tr>
</table></td></tr>
<tr><td>Other eligible fishers</td><td>There is no certificate sharing in place and therefore no other eligible fishers. An announcement was made at the beginning of the assessment process regarding the option of certificate sharing with the client group; however no other fishers came forward Other participants in the ETBF may be eligible for certificate sharing, subject to some conditions, but no interested parties have come forward.</td></tr>
</table>

3.3. Overview of the fishery

3.3.1. Fishing area

The Australian Fisheries Management Authority (AFMA) defines the Eastern Tuna and Billfish Fishery (ETBF) as the tuna and billfish fishery operating in the Australian Fishery Zone (AFZ) from Cape York, Queensland, to the South Australian/Victorian border, as well as the AFZ around Lord Howe and Norfolk Islands and the adjacent high seas area, which comes under the jurisdiction of the Western and Central Pacific Fisheries Commission (WCPFC) (Figure 1). The AFZ is established under the *Australian Fisheries Act 1991* (FMA), the inner limit of which is three nautical miles seaward of the territorial sea baselines, while the outer limit of 200 nautical miles is shared with the Exclusive Economic Zone (EEZ). AFMA has jurisdictional responsibility for managing all fisheries in the AFZ. Walker Seafoods

Australia operates out of the port of Mooloolaba in southern Queensland (shown in Figure 1) and their fishery covers the AFZ.

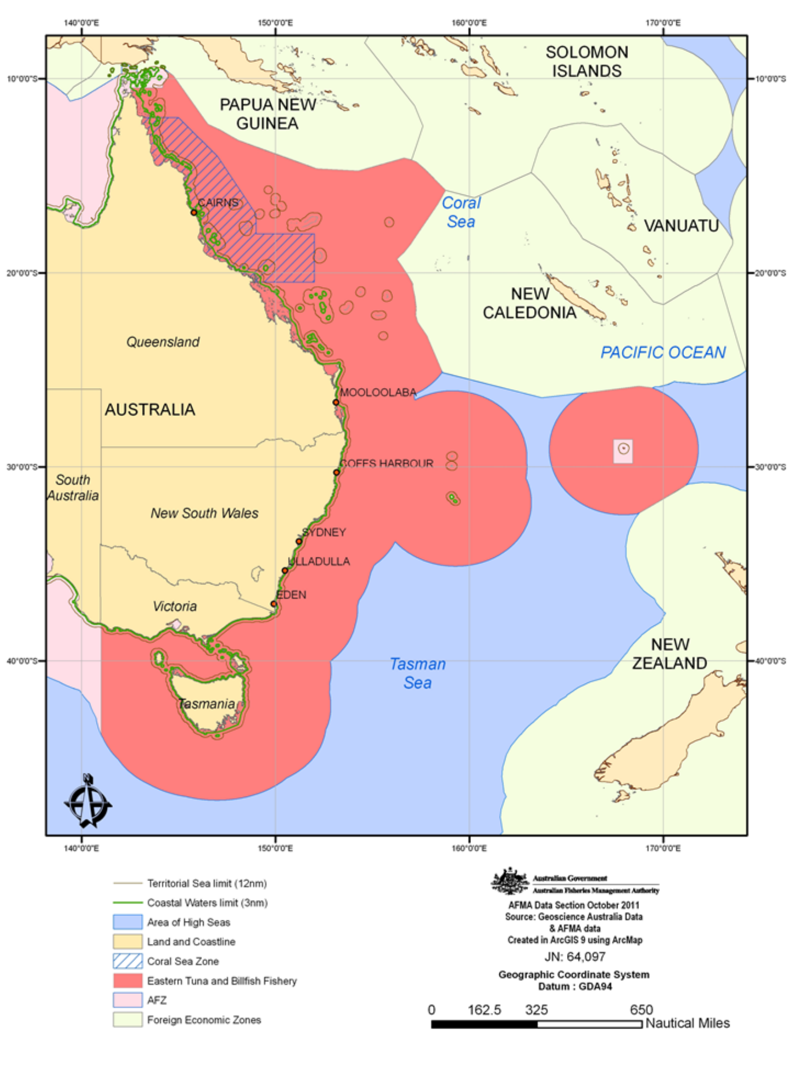


Figure 1. Area of the Eastern Tuna and Billfish Fishery; red=Australian EEZ, yellow=other EEZs, blue=high seas. Mooloolaba (S. Queensland) is one of the main ports of operation for the ETBF and home of Walker Seafoods Australia. (Source: AFMA website[1])

3.3.2. History of the fishery

The history of the development of the ETBF and its management framework is summarised in Table 1.

Table 1. Summary history of the development of the ETBF fishery and management.

Year	Description
1930s	Domestic commercial fishing (handline and trolling) begins along the east coast of Australia.
1950s	Japanese and domestic tuna fishing begins in waters that are now part of the Australian Fishing Zone (AFZ).

[1] AFMA (2014) ETBF page. Available at: http://www.afma.gov.au/fisheries/eastern-tuna-and-billfish-fishery-page/

1970s	Introduction of purse-seining and development of the skipjack fishery (purse-seine as well as pole and line) with catches increasing.
1979	Declaration of the AFZ and access of Japanese longliners restricted through bilateral arrangements to those with licences.
1980s	Markets in Japan for fresh tuna become available to domestic Australian fishers air freight costs fall, leading to a marked increase in domestic longlining fishing effort.
1985	Granting of new Commonwealth fishing licences suspended.
1986	Logbook requirements introduced for domestic fishers and the first meeting of the ETBF Management Advisory Committee (MAC) is held.
1987	Nominal catch per unit effort (CPUE) peaked for yellowfin tuna at 27 fish per 1000 hooks with two million hooks set.
Early 1990s	Significant expansion of fishing effort directed at yellowfin and bigeye tuna, particularly off northern Queensland.
1991	The *Fisheries Management Act 1991* (*FMA*) comes into force.
1995	AFMA enforces logbook requirements as a condition of fishing permits
1997	Bilateral agreement lapses with Japan. Japanese longliners are excluded from the AFZ. Nominal CPUE peaked for bigeye tuna and broadbill swordfish at four fish per 1000 hooks with six million hooks set.
1998	The *FMA* amended to prohibit commercial fishers taking black and blue marlin in recognition of their importance to the recreational sector.
Late 1990s	Expansion of the broadbill swordfish fishery off southern Queensland.
2000	AFMA introduces quota-holding requirements for ETBF fishers who land southern bluefin tuna.
2003	At-sea observer program implemented in the ETBF. Longline fishing effort peaked at 12.4 million hooks. Purse-seine entitlements for skipjack tuna separated out of the ETBF.
2004	The Western Central and Pacific Fisheries Commission (WCPFC) is established.
2005	*Eastern Tuna and Billfish Management Plan 2005* (ETBF Plan 2005) comes into force but the fishery is managed under transitional arrangements with the granting of statutory fishing rights (SFRs) delayed due to the announcement of the Australian Government's structural adjustment package.
2006	Surrender of 45% of longline and 49% of minorline fishing permits through Commonwealth buyout as part of the Australian Government's structural adjustment package. AFMA introduced catch disposal records (CDRs) for the ETBF, which collected verified number and total weights of target species landed.
2007	AFMA closes the main albacore tuna fishing ground in Queensland to new entrants and introduces a TAC of 3,200 tonnes for this area.
2009	The ETBF Plan 2005 introduced under transitional arrangements – a total allowable effort of 12 million hooks between 1 November 2009 and 28 February 2011 and allocation of hook day SFRs. Tropical Tuna MAC (TTMAC) is formed from a merger of ETBF MAC, Western Tuna and Billfish MAC and Skipjack MAC as the main consultation committee for the ETBF.
2010	The ETBF Plan 2005 is revoked and the ETBF Plan 2010 determined in its place to change effort to catch quota management for major species as required under the 2005 Ministerial Direction to move all Commonwealth fisheries to output controls.
2011	In March, the *ETBF Plan 2010* was introduced shifting management of the ETBF from an allowable effort of 12 million hooks to output controls in the form of individual transferable quotas (ITQs) and total allowable commercial catches (TACCs).
2014	About 35 vessels remain in the ETBF, compared with a peak in 2003 of 165 vessels. All except one are <24m.

3.3.3. Management framework

Australia is a federal state, with government responsibilities divided between the Commonwealth of Australia and the individual states. State-managed coastal waters extend out to three nautical miles, and Commonwealth-managed waters from three to 200 nautical miles. The Commonwealth therefore has jurisdiction over tuna and billfish resources from three to 200 miles, but also has jurisdiction from zero to three nautical miles through offshore constitutional settlements (OCS) with adjacent States (except New South Wales). The Australian Fisheries Management Authority (AFMA) is the Commonwealth government department responsible for fisheries management. Management measures and policies are all developed in accordance with AFMA's legislative objectives as detailed in the *Fisheries Management Act 1991* (*FMA*) which include: implementing efficient and cost-effective fisheries management, pursuing ecologically sustainable development, maximising the net economic returns to the Australian community, ensuring accountability and achieving cost recovery in relation to Australian government targets.

Historically, the ETBF has been managed through annual fishing permits under transitional arrangements set out in the *Eastern Tuna and Billfish Fishery Management Plan 2005*. In 2011, the fishery shifted from effort- to catch-based controls under the *Eastern Tuna and Billfish Management Plan 2010* (ETBF Plan 2010) as mandated by the 2005 Ministerial Direction that required AFMA to implement output controls in the form of individual transferable quotas (ITQs) in all Commonwealth fisheries. In determining the ETBF Plan 2010, AFMA allocated statutory fishing rights to eligible fishers for the five main target species of the ETBF - yellowfin tuna (*Thunnus albacares*), bigeye tuna (*Thunnus obesus*), albacore tuna (*Thunnus alalunga*), broadbill swordfish (*Xiphias gladius*) and striped marlin (*Kajikia auda*) and determines their respective total allowable commercial catches (TACCs) before the commencement of each fishing season running from 1 March to 28 February. At the commencement of each fishing season, individual operators are allocated a share of the TACC for each target species in the shape of ITQs, which together forms their quota holdings for the season. Under this arrangement, each fisher is limited to catching any amount of quota they hold (plus or minus any they lease in or out during the season) and the whole fishery is limited to the TACC set each season for each target species[2] (Note: bigeye and striped marlin are not included as UoCs for this assessment).

In the absence of an agreed harvest strategy at the WCPFC and allocation of tuna resources in the western and central Pacific Ocean (WCPO), AFMA manages the ETBF (in principle) via a harvest strategy model; a detailed decision rule based on recent CPUE and catch size data (described under Principle 1 below) (Larcombe and New, 2012). The harvest strategy model is used to determine recommended biological commercial catches (RBCC) for the target species through the tropical tuna resources assessment group (TTRAG), – the scientific advisory group for the ETBF (Borthwick, 2012). TTRAG's RBCCs are provided to the tropical tuna management advisory committee (TTMAC), which takes into consideration AFMA's legislative objectives and other stakeholder input before providing a recommendation on a TACC to the AFMA Commission, who are the ultimate decision-makers (Borthwick, 2012).

All five target species of the ETBF are highly migratory and are part of larger stocks whose spatial range extends across the WCPO to various extents. Regional management of highly migratory stocks is the responsibility of the WCPFC. Australia is a member of WCPFC and therefore has obligations to implement WCPFC management measures in the WCPO.[3]

[2] AFMA (2014) Eastern Tuna and Billfish Fishery. Available at: http://www.afma.gov.au/fisheries/eastern-tuna-and-billfish-fishery-page/

[3] Ibid.

Stock assessments are undertaken regionally through the auspices of the WCPFC, by the Ocean Fisheries Programme of the Secretariat to the Pacific Community (OFP-SPC). For the tuna species (yellowfin, albacore and bigeye), AFMA does not apply the harvest strategy, because the proportion of the Australian catch (and hence fishing mortality) was not high enough to allow the harvest strategy to function effectively at the level of the stock (see Table 3) – hence WCPFC is the only (or main) source of management for these stocks. For these stocks, the TACC is fixed at a level, which is compatible with WCPFC management and sustainable objectives. Conversely, for broadbill swordfish and striped marlin, where Australia has a higher proportional catch on the stock, the harvest strategy is applied to the ETBF to set the TACC. This is in the context of overall management by the WCPFC.

Vessels must leave the wharf with some quota for their target species. If they exceed their quota allocation, they are given 28 days to rectify the situation (by buying or leasing additional quota) after which time action will be taken (a tie-up notice).

Aside from the TACCs and quotas, the following regulations also apply in the fishery:

- Requirement to fill out logbooks reporting all catch (landed and discarded) by species, including a daily sheet and an end of trip rectification
- Requirement to accept observers on board if requested by AFMA
- Requirement to have VMS on board and operational
- Areas may be closed by AFMA (e.g. in response to high seabird bycatch – but in this case only south of 30ºS)
- 20 per trip retained bycatch limit of sharks – shark landed bycatch may not exceed retained quota species in any given trip
- No retention of shortfin mako sharks if alive (may be retained if dead)
- No retention of great white sharks, silky sharks, oceanic whitetip sharks and longfin mako, live or dead
- No retention of blue or black marlin
- No use of wire tracers
- No shark finning – must land whole sharks
- Special Area E permit required for the Great Barrier Reef Marine Park area, with a limit of 500 hooks per vessels
- Must have ID cards on board for turtles, seabirds and sharks, and must carried de-hookers and be trained to use them

3.3.4. Catch and effort data

The five ETBF target species comprise the majority of the catch of the ETBF. Commercially important bycatch species include mahi mahi, escolar (black oilfish), moonfish, ray's bream, rudderfish, skipjack tuna and rudderfish. Southern Bluefin tuna (SBT) is also caught as a bycatch species during the winter months of the year along the New South Wales coast. All SBT not released alive and in a vigorous state, however, must be covered by quota under the *Southern Bluefin Tuna Management Plan 1995*. Note that Walker Seafoods' fishing area (offshore from Queensland rather the New South Wales) does not overlap with the distribution of southern bluefin, they do not hold any quota and do not catch it.

Total longline catch (target species) and effort for the ETBF was 3,915 tonnes and 6.51 million hooks respectively in 2013. The total value of the fishery (target species catch only) was AUD $23.9 million in 2013 (See Table 2). The majority of the catch is sold fresh to the domestic market and internationally to Japan and the United States while some is exported frozen to Europe. Some albacore is sold to Thailand, American Samoa and Indonesia for canning (AFMA 2014a).

Table 3 shows the total catches as reported by WCPFC for the WCPO (yellowfin) and South Pacific (albacore, swordfish), compared to the size of the ETBF and Walker fishery, for 2010-2013. The ETBF is a small fishery relative to the total catches on the stocks. Note, however, that for swordfish stock structure is unclear and the WCPFC figures may cover at least two stocks – this issue is discussed in detail below.

Table 2. Total catch and economic value statistics for the ETBF (Larcombe and Stephan, 2014)

Species	ETBF TACC (t) 2013-14 season	ETBF catch (t) 2013-14 season	ETBF catch value (AUD $) 2013-14 season
Albacore Tuna	2,500t	773t	$1.8 million
Broadbill Swordfish	1,396t	1,062t	$4.6 million
Bigeye Tuna	1,056t	489t	$5 million
Striped Marlin	370t	250t	$1 million
Yellowfin Tuna	2,200t	1,341t	$11.4 million
Total		*3,915t*	*$23.9 million*

Table 3. Total catches by species in the WCPFC area, by the ETBF and by Walker, with a comparison of their relative sizes. Units: tonnes. Source: WCPFC 2013a (Tuna Fishery Yearbook), AFMA logbook data

Year	WCPFC	ETBF	Walker Seafoods Australia	WSA as % of WCPFC catch	WSA as % of ETBF	ETBF as % of WCPFC catch
WCPO Yellowfin						
2010	542,851	1,315	46.9	0.009	3.57	0.24
2011	502,373	1878	102	0.02	5.43	0.37
2012	587,192	1130	47.5	0.007	4.20	0.19
2013	524,022	1129	144	0.03	12.8	0.22
S. Pacific Albacore						
2010	88,942	725	44.7	0.05	6.2	0.82
2011	66,476	652	83.4	0.13	12.8	0.98
2012	87,895	564	74.9	0.09	13.3	0.64
2013	84,835	643	122	0.14	19.0	0.76
S. Pacific Swordfish						
2010	19,679	922	119	0.60	12.9	4.69
2011	21,188	910	177	0.96	19.5	4.29
2012	23,358	1014	176	0.84	17.4	4.34
2013	21,517	896	198	0.93	22.1	4.22

3.3.5. Vessels, ports and fishing gear

ETBF

The methods used to target tuna and billfish in the ETBF are pelagic longline, trolling, handlining and rod and reel fishing – the client fleet uses longlining only. Pelagic longline fishing involves the use of branch lines attached to a mainline, with each branch line (snood) fitted with one or more hooks. The branchline and hooks are suspended in the water column by floats at the sea surface. By setting a different number of hooks between floats and longer float lines, fishers can set gear at different depths in the water column, allowing them to target different species (Figure 2; AFMA, 2014b). Most of the catch in the ETBF is taken using pelagic longlines; however, a small quantity is taken using minor-line methods. Domestic longline vessels are around 15 -25 m long and use monofilament gear with most fishing trips lasting between three to 15 days, but occasionally extend up to 24 days (Larcombe and New, 2012).

The number of active longline vessels in the fishery has declined through time (from 150 in 2002 to 44 in 2012) due to the Government-funded structural readjustment programme in 2006-07 and declining economic conditions in the fishery (Larcombe and New, 2012). In 2012, there were a total of 44 active longline vessels and 7 minorline vessels with most of these based out of the ports of Mooloolaba in Queensland or Ulladulla in New South Wales, with other minor ports including Cairns and Coffs Harbour (AFMA, 2014a).

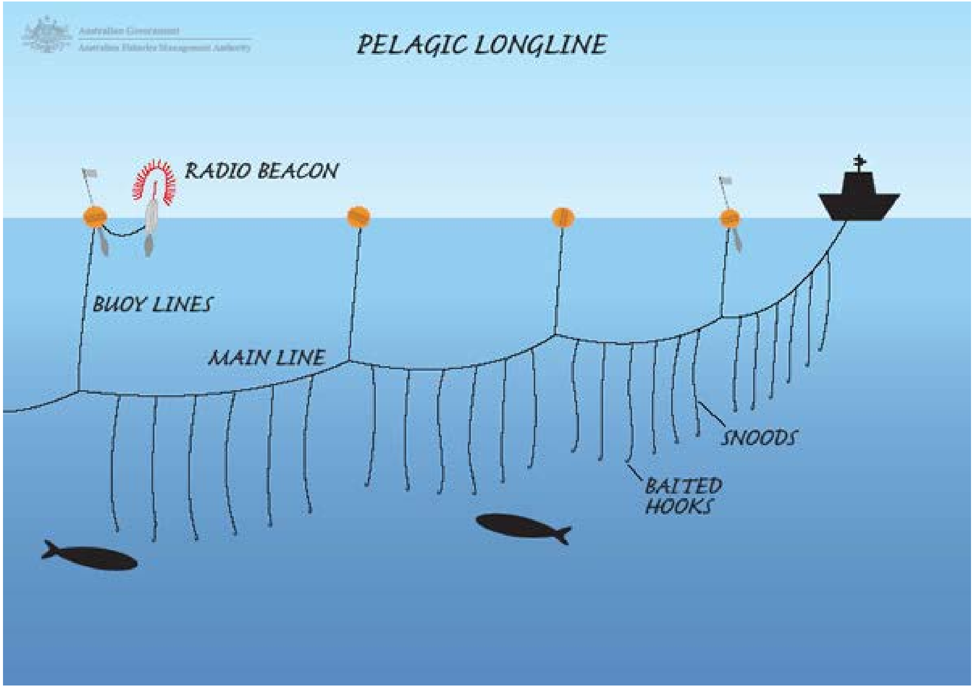


Figure 2. Illustration of a pelagic longline (AFMA, 2014b)

Walker Seafoods Australia

Walker Seafoods Australia currently has three vessels which all operate 100% of their time in the ETBF. These are the Assassin (purchased 2004) (Figure 3), the St. Lucia (purchased 2012) and the Sharp Shooter (purchased 2013). The client reports that the vessels' fishing strategy focuses on efficiency of operation – i.e. obtaining the maximum catch for the minimum outlay in inputs (fuel, crew wages etc.). This means that fish are targeted as close to Mooloolaba as possible, and the vessels only operate for about 20 days per month, either side of the full moon. They make extensive use of SST imagery to evaluate the structure of the pelagic habitat. They fish one line at a time - it is set at dusk and hauled at dawn (soak time ~six hours), with the catch being processed through the day. An alternative strategy (fishing on the dark of the moon with a daytime set) can be used to target albacore specifically, but the albacore price is currently too low to make this pay.

Figure 3. One of Walker Seafoods longline vessels and longline gear set-up

The line will have 2-3000 circle hooks (size 14/0) (Figure 3), each on a six fathom (12m) branchline, with 30m between branchlines and 12 branchlines between floats on a 10m float line – this is termed ‘mid-setting’ and gives a maximum hook depth (between two floats) of ~100m. Mid-setting targets primarily swordfish, yellowfin, marlin, mahi mahi and other species that spend most of their time at these latitudes close to the surface – conversely, targeting albacore requires deep-setting with a maximum depth of ~300m (but, as noted above, this is not a worthwhile activity at present). Hooks are baited with squid – usually *Ilex* spp. from Argentinian waters, but occasionally New Zealand arrow squid.

Although CPUE is a valuable method of tracking abundance in this and many other fisheries, it is clear from the above information that raw CPUE data have to be treated with care in this fishery, because fishing behaviour is highly variable depending on quota availability and price. If quota is limiting (e.g. for striped marlin), vessels will not be able to target it at certain times, and likewise if prices are low (e.g. for albacore) vessels will change their behaviour to focus on higher value species. It is thus important for stock assessments that CPUE is standardised (which is done – see below).

3.4. Principle One: Target Species Background

3.4.1. Definition of target stocks

3.4.1.1. Yellowfin

For assessment and management purposes, Pacific Ocean yellowfin is divided into two stocks – the WCPO stock (under consideration here) west of 150ºW and the Eastern Pacific stock east of 150ºW. To support this, there is reportedly some indication that mixing between the western and eastern Pacific may be restricted, based on analysis of genetic samples, otolith microchemistry, morphological variation and tagging data (Davies et al., 2014; Campbell, 2011). The distribution of larvae likewise is reported to be consistent with at least two stocks (eastern vs. western and central; Campbell, 2011).

A recent analysis of tagging data (1989-2012; Davies et al., 2014), however, suggests that there can be extensive latitudinal movements in equatorial regions, as well as longitudinal movements between the tropics and sub-tropics (Figure 4). Nevertheless, Campbell (2011) points out that a large proportion of recaptures are recorded close to release sites, suggesting some regional site fidelity.

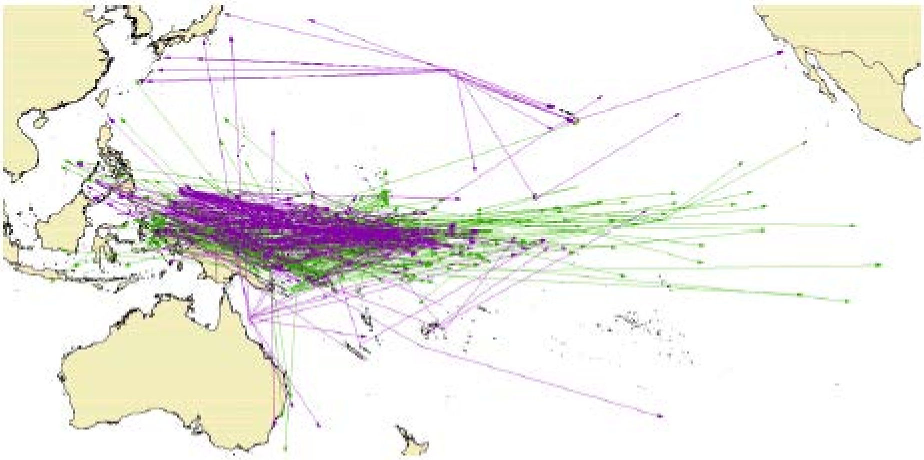


Figure 4. Long-distance movements (>1000 nm) of tagged yellowfin, from the Pacific Tuna Tagging Programme (2008-current; green) and the SPC western Pacific tagging project (1989-1992), as well as tagging by IATTC in the eastern Pacific and the University of Hawaii in the northern Pacific (purple) (Davies et al., 2014 – data from OFP-SPC).

Potential regional differences in growth rate have also been recognised. Juvenile yellowfin may grow more slowly in the far western Pacific (Indonesian and Philippines waters) than in the wider western Pacific. Growth rates in equatorial regions may also be slower than in sub-tropical areas; however, the implications of this for stock structure and the stock assessment are unclear and have not been examined (Davies et al., 2014).

The evidence for yellowfin population structure within the WCPO remains uncertain (Campbell, 2011). Yellowfin tagged near Cairns have been recaptured in nearby areas of the wider western Pacific (e.g. Papua New Guinea, Solomon Islands), with two fish reportedly recaptured in the North Pacific. On that basis, there are clear linkages between yellowfin in Australian waters and the wider WCPO. However, yellowfin released further south on the Australian coast have mainly been recaptured in the same area, and conversely only 3 of 40,000 yellowfin tagged in the broader western Pacific since 1977 have been recaptured by the ETBF. This could reflect some stock differentiation, but it could also reflect relatively low fishing pressure, poor tag return rates or other factors. Overall, Campbell (2011) concludes that it is ‘unlikely’ that yellowfin in the ETBF are a separate stock from the WCPO stock.

3.4.1.2. Albacore

Separate North and South Pacific albacore stocks are recognized in the Pacific Ocean based on location and seasons of spawning, low longline catch rates in equatorial waters and tag recovery information (Murray, 1994, cited in Hoyle et al., 2012, see Figure 5). The South Pacific stock considered in this assessment is distributed from the east coast of Australia and archipelagic waters of Papua New Guinea eastward to the coast of South America, and south of the equator to at least 49ºS. Although there is some suggestion of gene flow between the North and South Pacific stocks based on an analysis of genetic population structure, migration between stocks is not thought significant enough to affect management. For assessment and management purposes, the north-south boundary between albacore stocks is considered to be the equator, with 140º E taken to be the boundary with the Indian Ocean stock (Akroyd et al., 2012). There is no direct evidence of population structure within the South Pacific Ocean; however; the data are limited. Hoyle et al. (2012) note spatial heterogeneity in some fishery or population characteristics (e.g. most notably growth rates), which suggest that mixing rates across the South Pacific might not be very rapid, irrespective of whether there is effectively a single panmictic spawning population. There is increasing evidence that tropical tuna populations may have more structure than generally assumed (Dale Kolody, CSIRO, pers.comm), and it would not be surprising if this was the case for albacore as well.

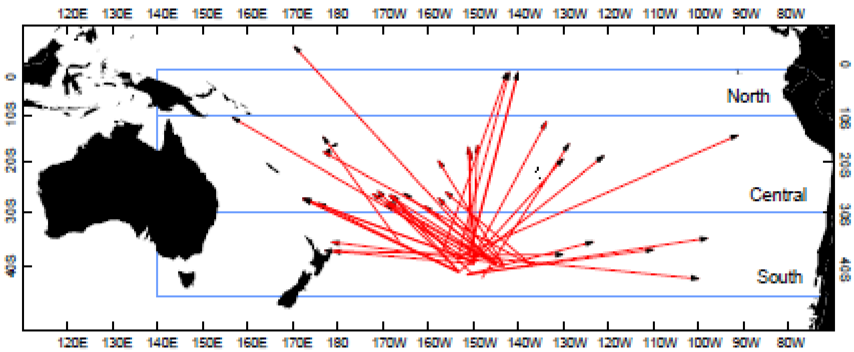


Figure 5. Movements of tagged South Pacific albacore (Labelle and Hampton 2003).

3.4.1.3. Swordfish

The structure of swordfish populations in the Pacific Ocean is not very well understood. Information from the Japanese longline fishery on the distribution of catch suggests three core areas of high swordfish density: the northwest, southwest and eastern Pacific. Larval surveys, however, suggest that spawning takes place in tropical and sub-tropical regions, with the exception of the western Pacific equatorial region. Genetic studies suggest imperfect gene flow between (sub) populations, with southwest and northwest Pacific populations most genetically distinct, and central and eastern Pacific populations intermediate. In terms of the South Pacific, the available evidence suggests three populations – southwest Pacific (140ºE-175ºW), south central (175ºW-130ºW) and southeast (east of 130ºW), with the central population genetically intermediate - this assessment is not, however, conclusive (see references in Davies et al., 2013). It is known that swordfish make seasonal migrations between temperate foraging grounds and tropical spawning grounds (Campbell, 2011), but it is not clear how much site fidelity individuals show for these areas. It may be that there is different mixing between foraging areas and spawning areas – i.e.

individuals may spawn in the same area but forage in different areas, or vice versa (Campbell, 2011).

The question of whether there is a separate stock in the SW Pacific (Australian east coast EEZ and Tasman Sea) is a crucial one for our analysis, so we consider below the information that exists on patterns of movement in this area, based on the analysis in Campbell (2011).

For a study by CSIRO (Evans, 2010, cited in Campbell, 2011), pop-up satellite archival tags were deployed on 57 large swordfish on the Australian east coast during 2006-2009; data were received from 54 tags with an attachment duration of two-364 days, distance travelled 43-1905km. All the swordfish remained within the Coral/Tasman Sea region, with the longest displacements north-south rather than east-west (Figure 6; Figure 7). There was no evidence of synchrony of movement (as would be expected for directed migrations), even for those moving the longest distances. 65% of position estimates were within the Australian zone (ETBF region), while the remainder were adjacent, except for two individuals who entered the EEZs of New Caledonia and New Zealand respectively.

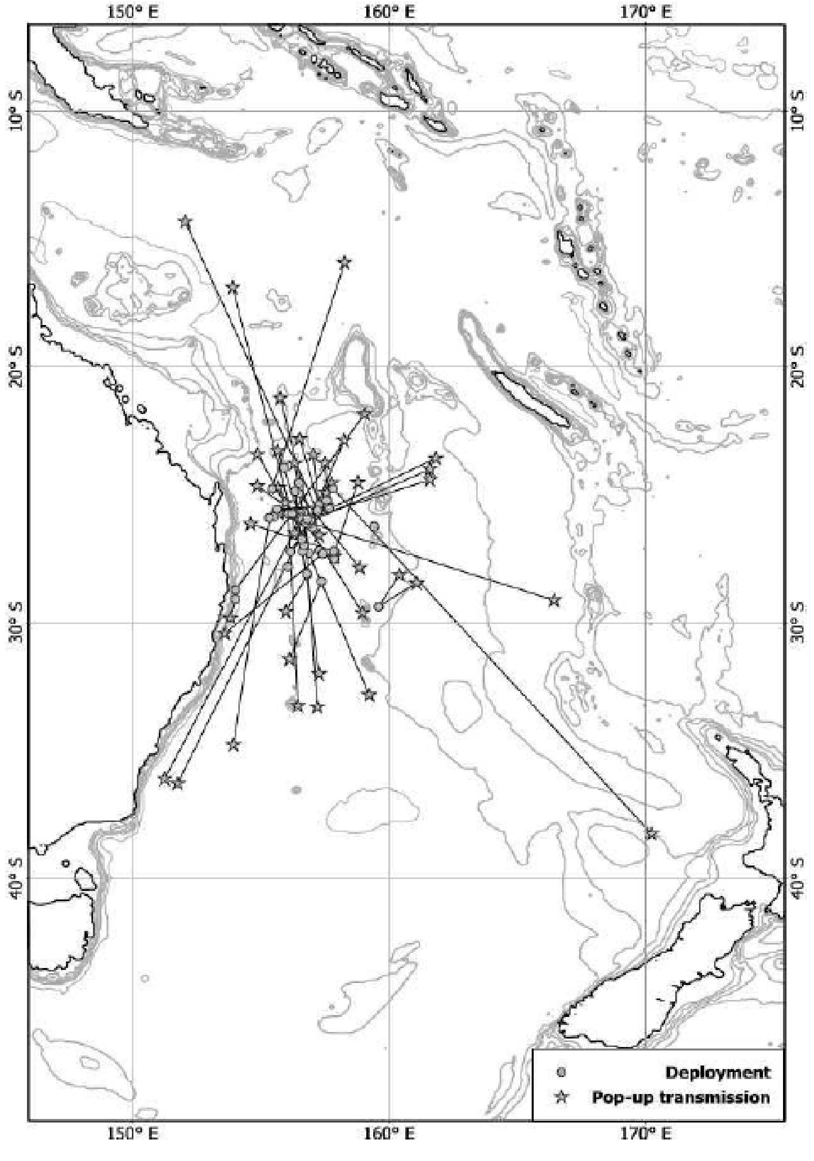


Figure 6. Release (circle) and pop-up (star) locations for satellite-tagged swordfish, 2006-2009 (from Evans, 2010, reproduced in Campbell, 2011).

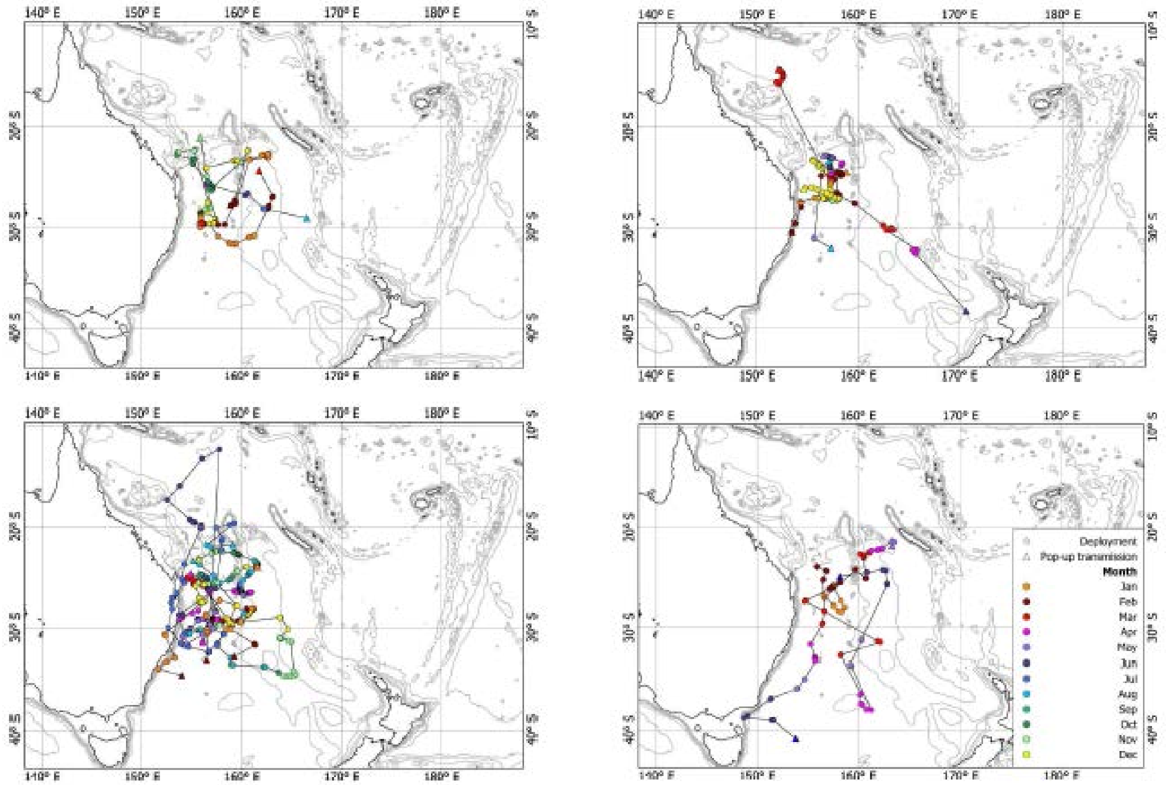


Figure 7. Some examples of tracks for pop-up archival satellite tags from swordfish off the east coast of Australia, 2006-2009, colours=months (from Evans, 2010, reproduced in Campbell, 2011).

Overall, the data point to the swordfish population exploited by the ETBF being separate to some extent from other WCPO populations, but with some (unquantified) level of connectivity between populations. Given the relatively plastic and opportunistic behaviour of swordfish (see below), connectivity is most likely variable and uncertain.

The most recent WCPFC stock assessment for swordfish (Davies et al., 2013) covers the southwest and south central stocks via a two-region spatial structure, while noting that the connectivity between these two populations is not well understood (see further details below).

3.4.2. Biology and ecology of the target species

3.4.2.1. <u>Yellowfin</u>

Yellowfin tuna are a fast-growing species with a tropical/sub-tropical distribution. Juvenile yellowfin are first recruited to commercial fisheries (mainly surface fisheries in Philippines and eastern Indonesia) at a few months of age. They grow quickly to a maximum length of ~180 cm FL, probably in only a few years – however, growth rates are uncertain and may vary significantly by area in the western Pacific (this is not taken into account in the stock assessment), although we could find no evidence of changes in growth rates over time. Tagging data suggest that many adults reach at least four years of age, with the longest period at liberty for a recaptured tagged yellowfin in the western Pacific currently six years

(Davies et al., 2014). They associate with other tropical species of tuna (skipjack, bigeye), particularly as juveniles.

Yellowfin spawn across the Pacific in equatorial regions (bounded by the 26º isotherm). Spawning occurs year round, but there may be peaks at different times in different areas (November-April for the western Pacific and March-September for the eastern Pacific). Size at maturity is variable in individuals and may be linked to food supply. On average, size at 50% maturity is estimated at ~95cm corresponding to an age of about two years. After maturity, males grow faster than females, and in size classes larger than ~140cm, the proportion of females decline. It is not known whether this is connected to slower growth rates, higher natural mortality, or both (Lehodey and Leroy, 1999).

Small yellowfin tuna are found in surface waters for the most part (often associated with skipjack), but as they grow, they may change their behaviour to live somewhat deeper (although still usually above the thermocline and shallower than albacore in a given area). This change in behaviour may be associated with the development of the gas bladder, which greatly reduces the metabolic costs of swimming starting from ~50cm, but it will depend on, for instance, relative food availability in surface vs. deeper waters (Lehodey and Leroy, 1999).

Yellowfin are often called a 'highly migratory' species, but yellowfin movements do not necessarily conform to a strict seasonal pattern; movements are variable and most likely opportunistic. Tagging data suggest that tuna can follow the movement of convergence zones and other areas of higher productivity, and respond to events such as the El Nino Southern Oscillation (ENSO), which change geographical patterns of productivity in the equatorial Pacific (Lehodey and Leroy, 1999). In the stock assessment, movement between regions is modelled empirically based on analysis of tagging data (Davies et al., 2014).

Natural mortality is considered to be variable by size, declining initially with size, then increasing at the onset of maturity (Figure 16 in Davies et al., 2014). The lowest rate is estimated at ~0.6-0.8 per year for pre-adult yellowfin of ~50-80cm FL (Hampton, 2000, cited in Davies et al., 2014). Natural mortality is a key uncertainty in the stock assessment, as it is for many stocks (see further details below).

3.4.2.2. Albacore

Albacore tuna is highly migratory, exploiting widely-spaced feeding and spawning grounds, and stocks are thought to be strongly influenced by large oceanic phenomena such as ENSO (Akroyd et al., 2012). The fish start to mature at ~80cm fork length (FL) (length at 50% maturity ~85cm; Farley et al., 2012), and spawn between 10º and 25ºS during the austral summer. Juveniles appear to migrate southwards, presumably in search of food in more productive temperate waters, and are recruited to the surface fishery in the central South Pacific (around the sub-tropical convergence frontal zone at around 40ºS) and in New Zealand waters at about 1 year old or ~50cm FL (Farley et al., 2012, Figure 8).

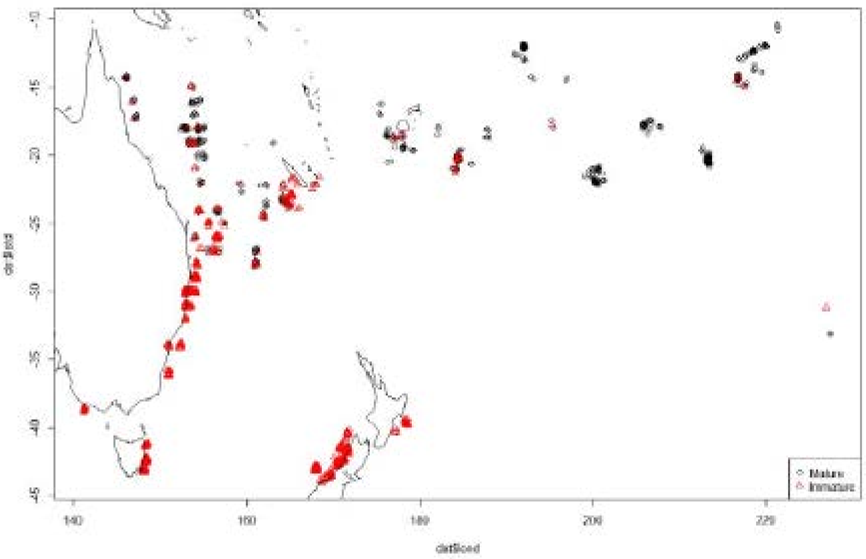


Figure 8. Sample locations of mature (black) and immature (red) female albacore (Farley et al., 2012)

After this initial migration, the movement of albacore is more uncertain – they may gradually move back north, or may migrate seasonally between tropical and sub-tropical areas, perhaps following the 23-28º isotherm (Langley, 2004, cited in Hoyle et al., 2012). Apparent differences in maturity ogives between northern and southern latitudes suggest that newly mature females migrate north to the spawning grounds, while immature females of the same size remain in more southern latitudes (Farley et al., 2012). Smaller mature females seem to have a shorter spawning period than larger females (starting later and finishing earlier) (Farley et al., 2012).

After the first year, growth rates slow to FL increments of ~10cm per year up to age 4, and slower still thereafter, suggesting that spawning starts at around ages 3-4. Males grow larger than females overall, with the growth curve starting to diverge at approximately the age at maturity (Figure 9). Large sizes classes show a male-dominated sex ratio, which had been thought to be driven by differences in male and female natural mortality rates due to higher costs associated with spawning for females. Sex-specific growth rates, however, may be a significant factor, since smaller size classes show a female bias – i.e. since females growth more slowly (post-maturity), there is an accumulation of females in the smaller size classes relative to males (Farley et al., 2012).

Albacore also appear to grow faster in the eastern South Pacific than in the west (Figure 10). The reasons for this are unclear; size-specific migration could be a factor. Another hypothesis relates to the difference in thermocline depth, which is shallower in the eastern Pacific where growth rates appear to be higher. It may be that this 'compresses' prey into a smaller area, reducing foraging costs (Farley et al., 2012). These differences in growth by sex and by region are of more than academic interest, since the stock assessment is sensitive to assumptions about growth and maturity (Hoyle et al., 2012).

As with yellowfin, no information could be found suggesting changes in growth curves over time.

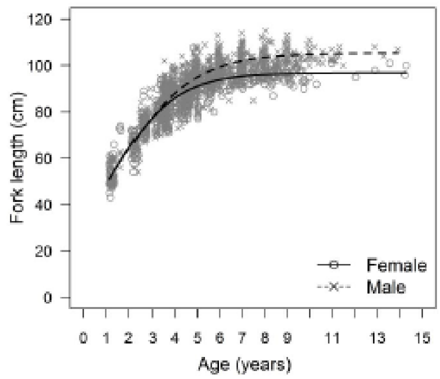


Figure 9. Length at age from otolith and fin spine aging, samples from across the S Pacific for males (L∞ = 105cm) and females (L∞=97cm). From Farley et al. (2012).

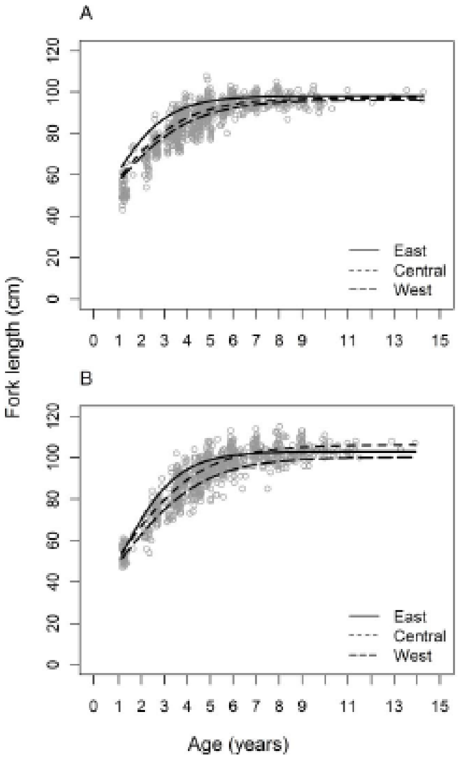


Figure 10. Predicted growth curves from the west, central and east South Pacific, based on longitudinal trends for females (A) and males (B). From Farley et al. (2012)

The longest period at liberty for a recaptured tagged albacore in the South Pacific to date is 11 years (Hoyle et al., 2012). The maximum age estimated by Farley et al. (2012) from readings of 1969 otoliths was 14.3 years.

The instantaneous natural mortality rate for South Pacific albacore is believed to be ~0.2-0.5 per year, with significant numbers of fish reaching at least 10 years (Hoyle et al., 2012). Unlike yellowfin, no information is available on changes in natural mortality with size and for the purposes of the stock assessment, natural mortality is assumed to be constant throughout life (Hoyle et al., 2012).

3.4.2.3. Swordfish

Swordfish are widely distributed globally between ~50ºN and S – i.e. in all longitudes in the Pacific Ocean. They are sexually dimorphic – females growth larger and faster than males, and may live in different areas, although overall, sexual differences in life-history characteristics (e.g. movement patterns, natural mortality etc.) are not well known. The most recent stock assessment notes that '*there remains a large degree of uncertainty about some of the basic biological characteristics of this species*' (Davies et al., 2013 and references therein). Further details on swordfish growth and natural mortality schedules (which are a key issue for stock assessment) are given below. No information is available on changes over time in life history traits, if any.

As would be expected from their wide latitudinal distribution, swordfish appear to be very adaptable, with the ability to exploit a wide variety of habitats. In the Tasman Sea, they have been shown to move seasonally between different areas and depths, and seem to track the thermal structure of the ocean environment, which most likely serves as a proxy for prey distribution (e.g. accumulation of prey in areas by physical advection or higher productivity associated with thermoclines or fronts). From tagging studies, fish may divide into 'resident' vs 'migratory' but it is not known if this represents different foraging strategies, differences between genders or age classes, movements between spawning and foraging grounds or simply opportunistic changes in behaviour.

In the Tasman Sea and Australian zone, at least a proportion of the swordfish population are thought to follow an annual migratory pattern from spawning grounds in the Coral Sea south through the fishing grounds off southeast Queensland, then southeast towards New Zealand and back to the Coral Sea (map provided in Figure 1 previously). Higher densities of swordfish may also be found in the vicinity of seamounts, although it is not clear whether this represents directed migration to these areas or just a retention when they are encountered (Campbell, 2011).

3.4.3. Other fisheries on the stock

3.4.3.1. Yellowfin

Yellowfin are targeted by both longline and purse seine fisheries, with 61% of the total catch in 2012 estimated to come from purse seine fisheries (Figure 11), 16-20% from longlining and the remainder mainly from artisanal fisheries in the Philippines and Indonesia (Davies et al., 2014). The ETBF takes a small percentage of the total WPC yellowfin catch (see Table 3 previously), given that the ETBF fishing area is outside the main area of yellowfin distribution (Figure 12).

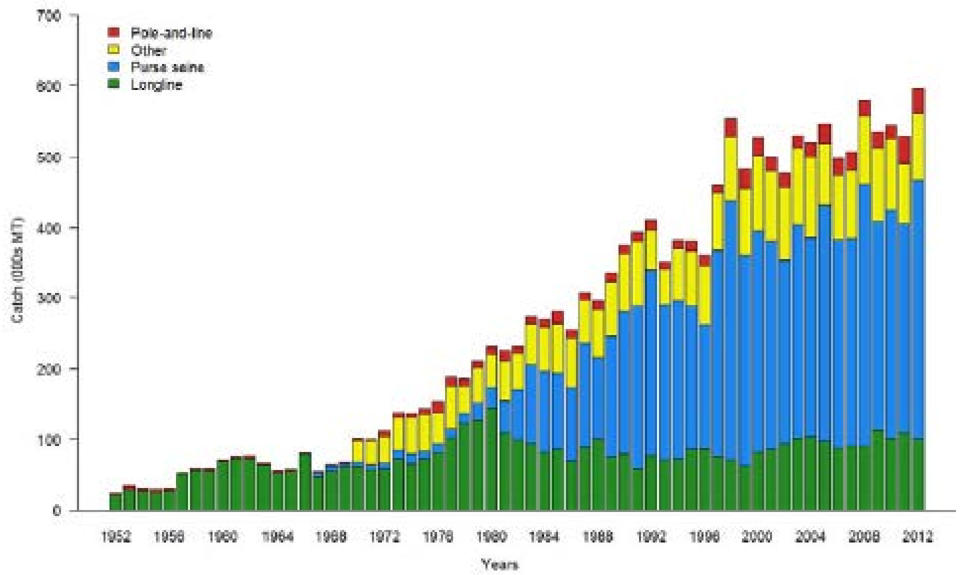


Figure 11. Total annual catch of yellowfin ('000 t) by fishing gear, 1952-2012 (Davies et al., 2014).

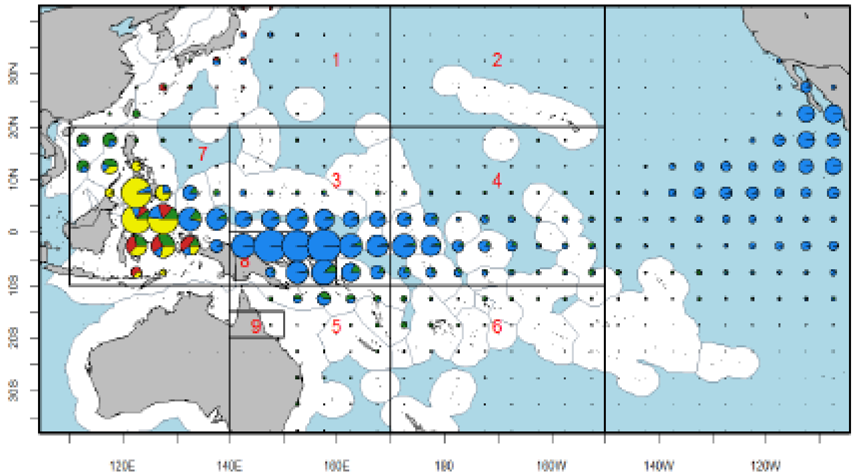


Figure 12. Catch distribution of yellowfin by 5º squares latitude and longitude, and fishing methods: longline (green), purse seine (blue), pole-and-line (red) and other (yellow), with the regions for the stock assessment model overlaid (Davies et al., 2014)

Approximately 55% of the total yellowfin catch is taken in the purse seine fishery in the waters of countries which are Party to the Nauru Arrangement (PNA countries) (Sandy Morison, SCS - PNA yellowfin assessment team P1 expert, pers. comm.). PNA countries represent the main tropical coastal states, and have a joint management system for the fishery – the vessel-day scheme (VDS). The main focus of the VDS is skipjack, but given the proportion of the total yellowfin fishery under their control, it is significant for yellowfin as well. The PNA VDS as it relates to yellowfin is considered in Section 3.4.6.

3.4.3.2. Albacore

Albacore are mainly targeted by longline fisheries, including both distant-water fleets and locally-based fleets, both large and small scale. There is also a troll fishery for juvenile albacore operating in New Zealand waters and in the central Pacific. There was formally a significant driftnet fishery for albacore, but this fishery has ceased following a UN moratorium on industrial-scale drift-netting. The majority of the catch is taken by the longline fishery, which increased rapidly from 25-30,000 t per year prior to 1998, peaking at >90,000 t in 2009, before apparently declining. Catches from the troll fishery are much smaller – a few thousand tonnes per year at most. Driftnet catches peaked at 22,000 t in 1989, but have not existed since 1991-2 (Hoyle et al., 2012; Figure 13).

Hoyle et al. (2012) provide a list of all the fisheries on the stock, which are included in the stock assessment (Table 1 in Hoyle et al., 2012). They include longline fisheries from Japan, Korea, Taiwan, Australia, New Caledonia, Fiji, American Samoa, Samoa, Tonga, French Polynesia and New Zealand, and troll fisheries from New Zealand and the US, as well as (now defunct) driftnet fisheries from Japan and Taiwan.

The ETBF is closer to the centre of distribution of the South Pacific albacore fishery, but nevertheless represents a small proportion of the total catch (Figure 14).

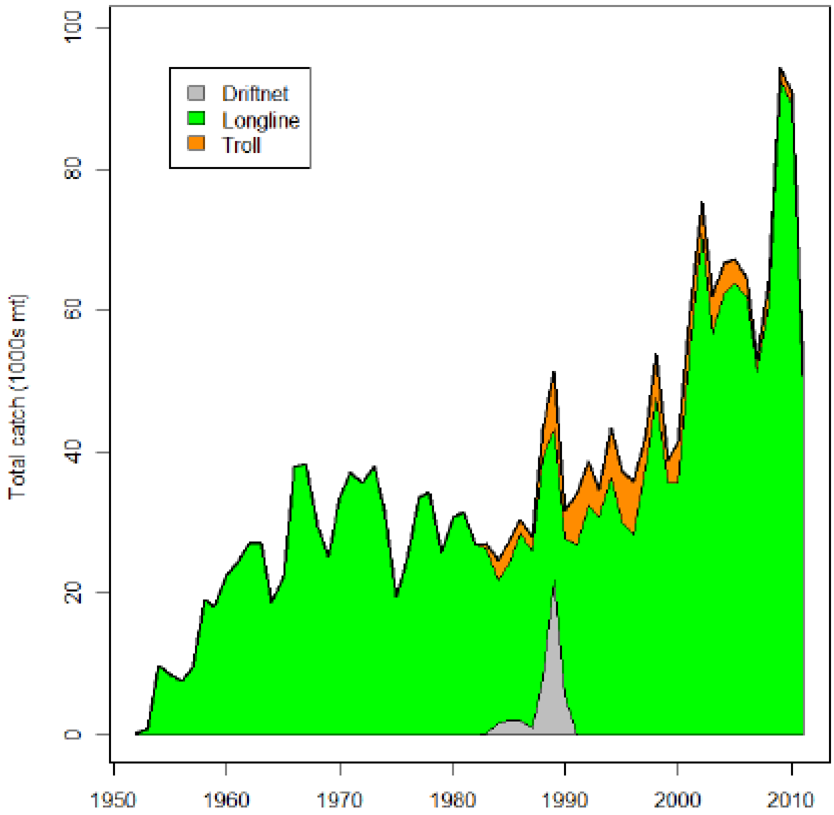


Figure 13. Annual catch of South Pacific albacore, 1952-2011, by fishing method (Hoyle et al. 2012).

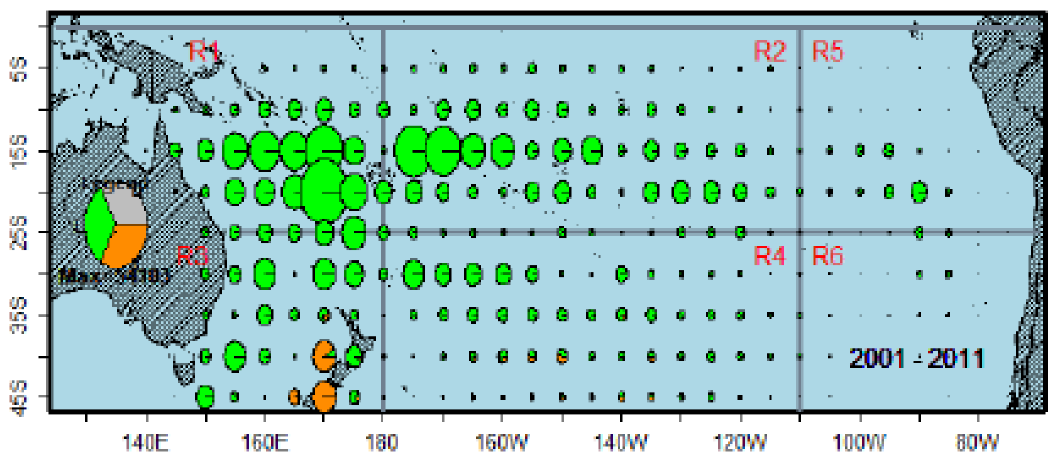


Figure 14. Total catch by 5º squares of lat. and long., by fishing gear (longline=green, troll=orange), for South Pacific albacore, 2000-2011 (Hoyle et al. 2012).

3.4.3.3. <u>Swordfish</u>

In the past, swordfish catch was dominated by distant water longline fleets, notably Japanese but also from China, Taiwan and Korea, which took swordfish mainly as a bycatch in the directed tuna fishery. The longline fishery in Australia developed starting in the early 1990s, and is now the most significant fisheries on the southwest population (Region 1 in the stock assessment, Davies et al., 2013, see discussion further on). For the south-central region (Region 2 in Davies et al., 2013), a significant distant-water longline fishery continues

– mainly Asian but also in recent years from the EU (Spain), and there is also a small New Zealand fishery (Figure 15). The issue of the proportion of the catch taken by different fisheries in relation to different parts of the stock(s) is considered in detail below in the discussion as to which level of management (Australian vs. WCPFC) is most significant for this stock – see Section 3.4.6.

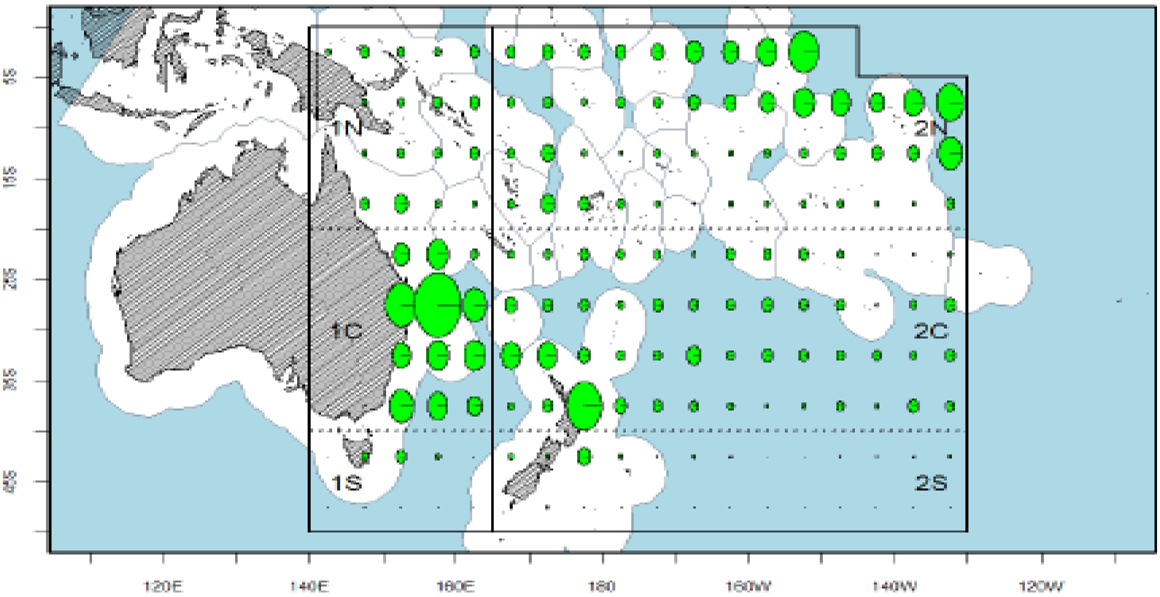


Figure 15. Total catch by 5º squares of lat. and long., by fishing gear (longline=green), for South Pacific swordfish, 1952-2011. The regions (region 1 vs. region 2) cover the two putative stocks (southwest in region 1, south central in region 2), divided into north (N), central (C) and southern (S) sub-regions to represent different fisheries. The ETBF is clearly visible in sub-region 1C. From Davies et al. 2013.

3.4.3.4. <u>Recreational fisheries</u>

The ETBF commercial fishery is somewhat concerned about the impact of recreational fisheries on their target stocks, because it is possible that they may take quite large catches, although total mortality from recreational fisheries (take plus release mortality) is very difficult to quantify and is largely unknown (TTRAG, 2013a). The TACC for striped marlin in particular has declined in recent years, partly as a response to concerns about the impacts of recreational fisheries. In relation to marlin, there has been an informal ‘agreement’ that striped marlin is a commercially fished species, while blue and black marlin are ‘set aside’ for recreational fisheries, with ETBF fishermen required to discard them.

The ETBF has a code of conduct for interactions with recreational fisheries, requiring them, among other things to stay outside a certain radius of recreational fishing tournaments.

3.4.4. Stock status

3.4.4.1. Yellowfin

The most recent stock assessment for western Pacific yellowfin was conducted in 2014 (Davies et al., 2014; draft version used for this report, but substantive changes considered unlikely). In summary, the conclusions of the stock assessment are as follows:

- Latest catch estimates (2012) marginally exceed MSY;
- Recent levels of fishing mortality are likely to be below F_{MSY};
- Recent levels of spawner potential (SB) estimated to be above SB_{MSY}, both for estimates of the average value 2008-2011 ('current') and for the 2012 estimate ('latest');
- Spawner potential estimated to be above the agreed limit reference point (20% of the unfished level $SB_{F=0}$);
- Spawner potential is estimated to be ~around the range of candidate target reference points currently under consideration;
- Although there were various sensitivities and uncertainties in the model, the main conclusions appear to be robust to the uncertainties evaluated.

The estimated stock status relative to various kinds of reference points is given in figures in Table 4. Taking the variability and uncertainty incorporated into the stock assessment as a measure of probability (the only one available, although it does not incorporate all uncertainties), fishing mortality is estimated to be below the MSY level with >95% probability, and spawner potential above MSY level with ~95% probability. This suggests that the stock is not in equilibrium – if catches of ~MSY are maintained, fishing mortality would be expected to increase to ~F_{MSY} and spawner potential to decline to ~SB_{MSY}. In relation to reference points, the spawner potential is above the agreed limit and more or less at the lower range of the possible targets; i.e. ~40% of the unfished level.

Table 4. Estimated stock status relative to various reference points, for i) the reference case stock assessment model (parameterisation considered most plausible), ii) median value for all parameterisations tested; iii) 5% percentile of values; iv) 95% percentile of values. C=catch, F=fishing mortality, SB=spawner potential. Colour coding: red – parameter on wrong side of reference point with 95% probability or greater; orange – within range of reference point; green – parameter on right side of reference point with 95% probability or greater. Source: Davies et al. 2014 or data given therein.

Type of comparison	Ratio	Reference case model	Grid median	Grid 5%ile	Grid 95%ile
Stock status vs. MSY reference points	C_{2012}/MSY	1.02	1.04	0.80	1.24
	F_{curr}/F_{MSY}	0.72	0.76	0.51	1.09
	SB_{curr}/SB_{MSY}	1.37	1.37	0.97	1.82
	SB_{2012}/SB_{MSY}	1.24	1.29	1.00	1.69
vs. situation in absence of fishing	$SB_{curr}/SB_{curr,F=0}$	0.42	0.41	0.29	0.55
	$SB_{2012}/SB_{2012,F=0}$	0.38	0.38	0.29	0.52
vs. agreed limit ref. point	$SB_{curr}/20\%SB_{curr,F=0}$	2.1	2.05	1.45	2.75
vs. possible target ref. points	$SB_{curr}/40\%SB_{curr,F=0}$	1.05	1.03	0.73	1.38
	$SB_{curr}/60\%SB_{curr,F=0}$	0.70	0.68	0.48	0.92

The conclusion of the most recent stock assessment is that overall recruitment is estimated to decline in the early assessment period, although these estimates of recruitment are very uncertain, but that no trend is evident in recruitment after 1965.

Trends in catch and fishing mortality and spawner potential and recruitment are given in Figure 16 and Figure 17, from 1990 to 2012. The Kobe plot (SB and F relative to MSY reference points) is given in Figure 18.

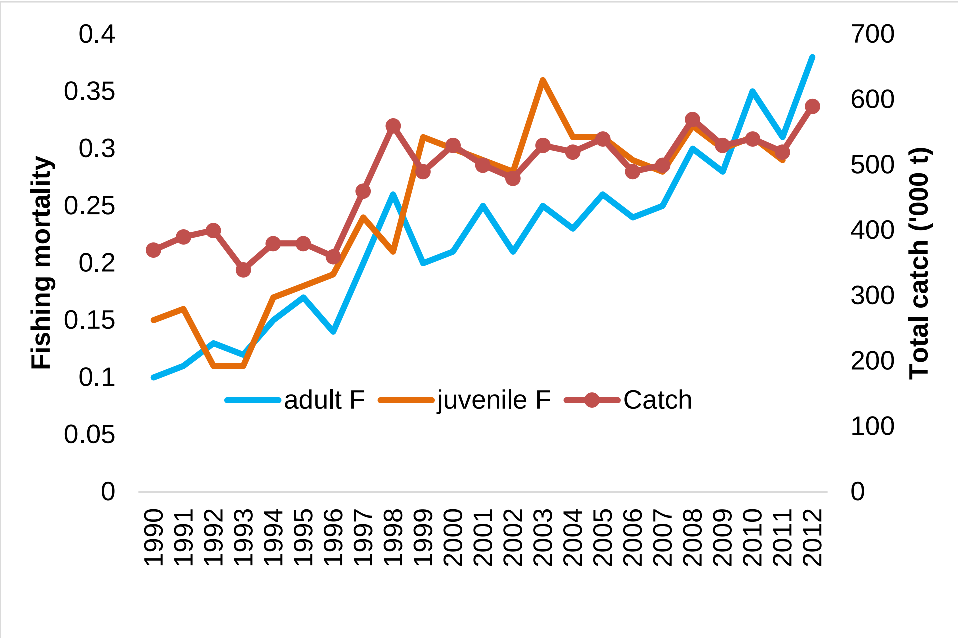


Figure 16. Trends for WCP yellowfin in fishing mortality (adult = blue, juvenile = green) and catch (orange, secondary axis) from 1990 to 2012. Data from Davies et al., 2014.

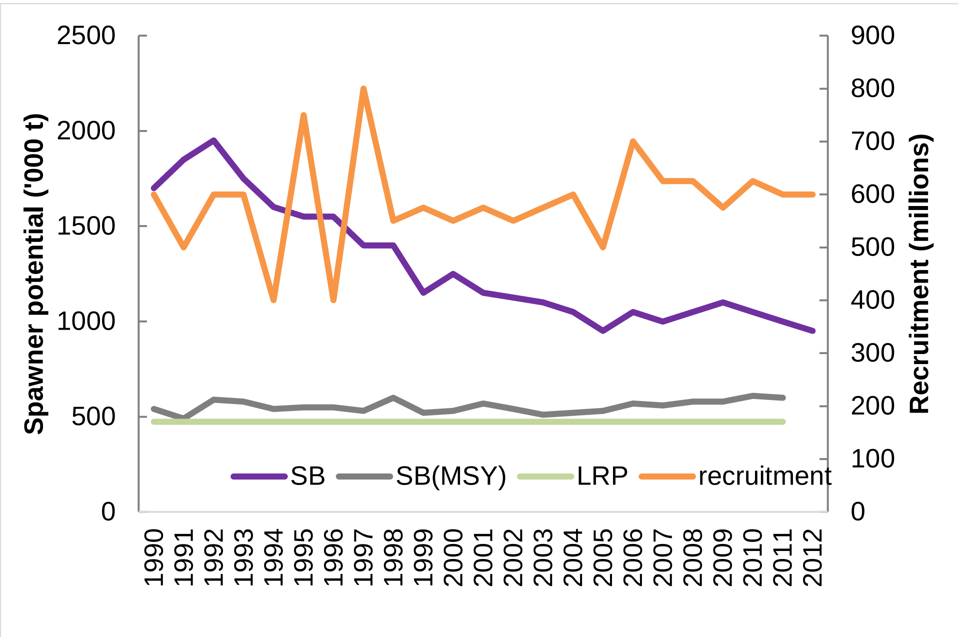


Figure 17. Trends in WCP yellowfin spawner potential (expressed as spawner biomass) (purple), SBMSY as estimated by the stock assessment model (dark grey) and recruitment (green – on secondary axis) from 1990 to 2012 (data from Davies et al. 2014). The limit reference point (20%$B_{current,F=0}$), as estimated by Davies et al., 2014 for the current period has also been added for reference (LRP, light grey).

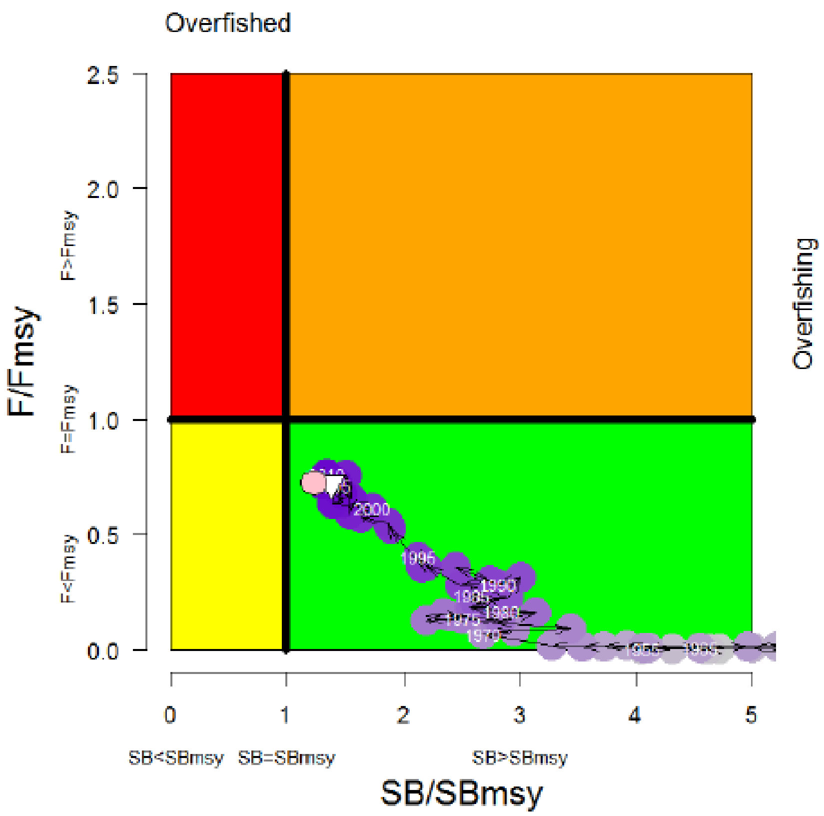


Figure 18. Kobe plot for WCP yellowfin: spawner biomass relative to SB_{MSY} on x-axis and fishing mortality relative to F_{MSY} on y-axis, plot shows stock trajectory over time, with darker purple more recent. The white triangle is the 'current' situation and the pink circle the 'latest' situation as defined above. From Davies et al., 2014.

3.4.4.2. Albacore

The most recent stock assessment for south Pacific albacore was conducted in 2012 (Hoyle et al., 2012). In summary, the conclusions of the stock assessment are as follows:

- Recent catches are around the MSY level;
- Recent levels of fishing mortality are likely to be below F_{MSY};
- Recent levels of spawner potential (SB) are estimated to be well above SB_{MSY};
- Spawner potential is estimated to be above the agreed limit reference point;
- Spawner potential is estimated to be ~around the range of candidate target reference points currently under consideration – most likely towards the upper end of the range;
- If the fishery continues at current catch rates, then biomass will decline to ~MSY level, and hence catch rates and economic returns will also decline, although not to a point that is biologically unacceptable (although it may be economically unacceptable to some fleets);
- The main conclusions of the assessment were robust to the sources of uncertainty investigated by the stock assessment team.

The estimated stock status relative to various kinds of reference points is given in Table 5. Taking the variability and uncertainty incorporated into the stock assessment as a measure of probability (the only one available), catch is at or below the MSY level, while fishing mortality is estimated to be below the MSY level with ~95% probability, and spawner potential below MSY level with >95% probability. As for yellowfin, this suggests that the stock is not in equilibrium. In relation to reference points, the spawner potential is well above the agreed limit and more or less at the upper range of the possible targets; i.e. ~60% of the unfished level.

Table 5. Estimated stock status relative to various reference points, for i) the reference case stock assessment model (parameterisation considered most plausible), ii) median value for all parameterisations tested; iii) 5% percentile of values; iv) 95% percentile of values. C=catch, F=fishing mortality, SB=spawner potential, curr=current=June 2008-June 2010 average. Colour coding: red – parameter on wrong side of reference point with 95% probability or greater; orange – within range of reference point; green – parameter on right side of reference point with 95% probability or greater. Source: Hoyle et al. 2012 or data given therein.

Type of comparison	Ratio	Reference case model	Grid median	Grid 5%ile	Grid 95%ile
Stock status vs. MSY reference points	C_{2011}/MSY	0.66	0.90	0.41	1.94
	F_{curr}/F_{MSY}	0.14	0.21	0.044	1.08
	SB_{curr}/SB_{MSY}	2.58	2.56	1.46	5.20
	SB_{2011}/SB_{MSY}	2.56	2.38	1.33	5.18
vs. situation in absence of fishing	$SB_{curr}/SB_{curr,F=0}$	0.71	0.63	0.35	0.80
	$SB_{2011}/SB_{2011,F=0}$	0.67	0.58	0.31	0.77
vs. agreed limit ref. point	$SB_{curr}/20\%SB_{curr,F=0}$	3.55	3.15	1.75	4.00
vs. possible target ref. points	$SB_{curr}/40\%SB_{curr,F=0}$	1.78	1.58	0.88	2.00
	$SB_{curr}/60\%SB_{curr,F=0}$	1.18	1.05	0.58	1.33

Trends in catch and fishing mortality and spawner potential and recruitment are given in Figure 19 and Figure 20, from 1990 to 2012. The Kobe plot (SB and F relative to MSY reference points) is given in Figure 21. Although estimates of recruitment for the last few years show an increasing trend, it is important to note that these estimates, and the role of recruitment variability in the stock dynamics, are very uncertain (uncertainties in the stock assessment are considered in detail in Section 3.4.8.). Nevertheless, Hoyle et al. (2012) conclude that there is no indication that current levels of catch are causing recruitment overfishing. The longline fishery selectivities (as determined in part by the area of operation) are estimated to catch very few immature albacore (i.e. most fish at least reach the spawning ground and have the opportunity to spawn before they are vulnerable to the fishery).

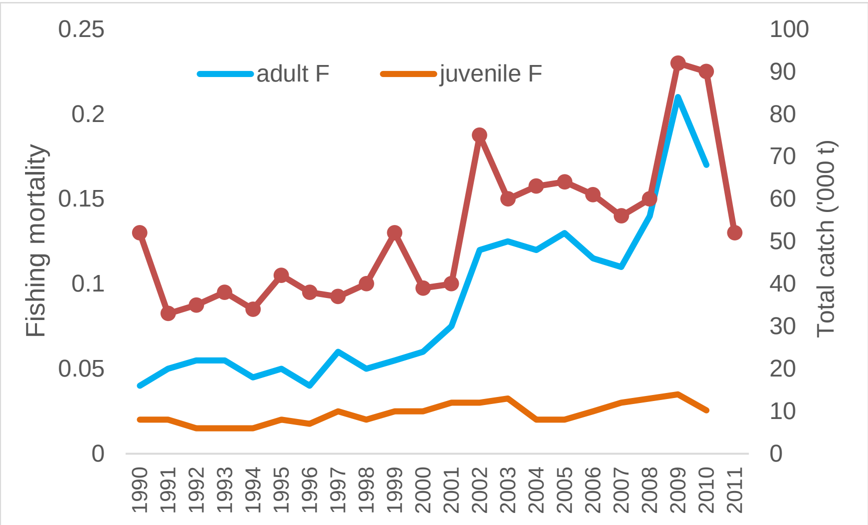


Figure 19. Trends for S. Pacific albacore in fishing mortality (adult = blue, juvenile = green) and catch (orange, secondary axis) from 1990 to 2011. Data from Hoyle et al., 2012.

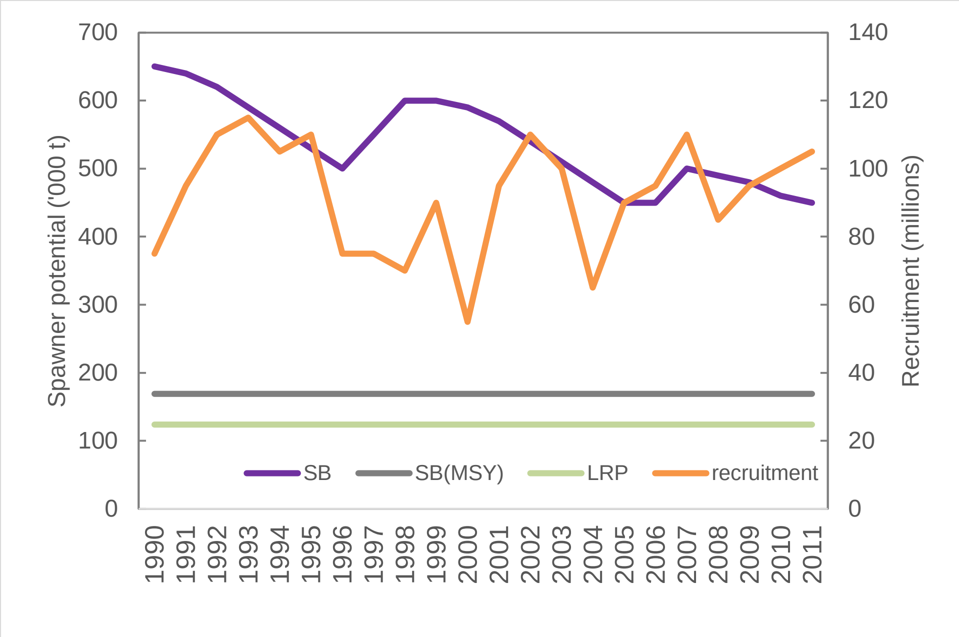


Figure 20. Trends in S. Pacific albacore spawner potential (expressed as spawner biomass) (purple) and recruitment (green – on secondary axis) from 1990 to 2011 (data from Hoyle et al., 2012). The SB_{MSY} and the limit reference point ($20\%B_{current,F=0}$), as estimated by Hoyle et al. 2012 for the current period has also been added for reference (LRP = light grey, SB_{MSY} = dark grey).

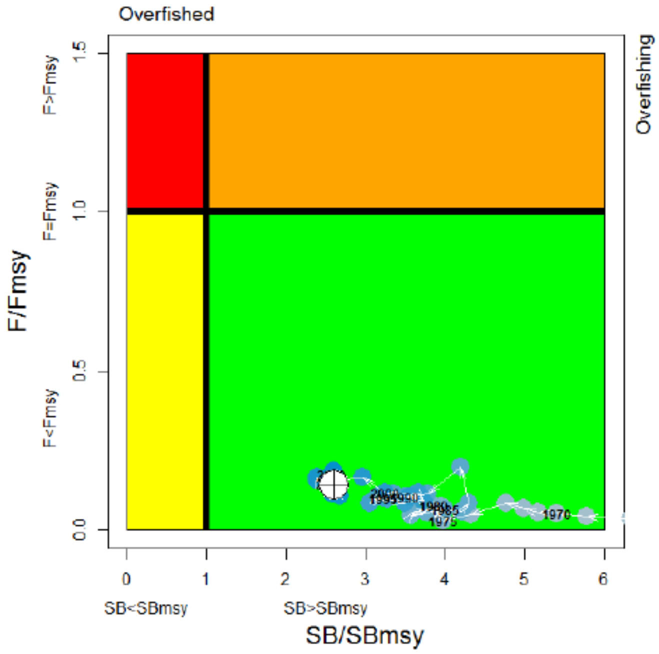


Figure 21. Kobe plot for S. Pacific albacore: spawner biomass relative to SB_{MSY} on x-axis and fishing mortality relative to F_{MSY} on y-axis, plot shows stock trajectory over time, with darker blue more recent. The white circle is the 'current' situation – the 'latest' situation (2011) is excluded because it is highly uncertain. From Hoyle et al., 2012.

3.4.4.3. <u>Swordfish</u>

The most recent stock assessment for SW Pacific swordfish was conducted by SPC on behalf of WCPFC in 2013 (Davies et al., 2013). The assessment covers two 'regions' – Region 1, in which the ETBF is the most significant fishery, and Region 2, which covers the rest of the SW Pacific up to the boundary of the WCPFC Convention Area (Figure 15). The reason for this regional structure is that, as noted above, the stock structure of swordfish in the WCPO is not clear.

The stock assessment has various sources of uncertainty, which are discussed in detail below. A large issue arises from the set of assumptions for growth-, maturity- and mortality-at-age schedules. Two data sets are available to provide this information: one set from estimates made by the US National Marine Fisheries Service (NMFS) in Hawai'i and one set by CSIRO in Australia, which result in rather different outcomes. The Australian schedule estimates age at 50% maturity to be ~10 years, while the Hawai'ian schedule estimates age at 50% maturity to be ~four years (reportedly at the extreme lower end of the range of estimates used worldwide), and as a result, the Australian schedule results in lower productivity estimates for the stock and therefore a somewhat more pessimistic assessment of the stock status (Davies et al., 2013).

The main conclusions of the stock assessment are therefore uncertain, depending on the schedule assumed to be correct:

- There has been a decline in biomass since the late 1990s, but no evidence of a concurrent change in recruitment. This may be associated with a large increase in catches, notably in Region 2 (see Figure 15 for map giving regions).
- Recent catches are ~MSY (Hawai'ian schedule), or above MSY (Australian schedule).
- F is below F_{MSY} (Hawai'ian schedule), or above F_{MSY} (Australian schedule) – i.e.it is unclear whether overfishing is occurring.
- Estimated total biomass (B) is 44-68% of B_0, and spawner biomass (SB) is estimated at 27-55% of SB_0 or 26-60% of $SB_{current,F=0}$.
- Both schedules produce estimates of B and SB which are above MSY levels (B_{MSY} and SB_{MSY}) – i.e. the stock is not in an overfished state.

In terms of the growth/maturity/mortality assumptions in the model, Davies et al. (2013) tested the two growth and maturity schedules, each with four mortality possibilities, as set out in Table 6. GHMHS was taken as the 'reference case' model, because it showed the best overall fit to the data, but note that this does not mean that it is the 'right answer' – rather it provides a starting point for the analysis of uncertainty (sensitivities). The range of model output according to the choice of growth-maturity-mortality assumptions is set out in Table 7, and a summary of the whole model grid in Table 8.

Table 6. Summary of the various growth, maturity and mortality options tested in the stock assessment. A 'spawner effect' on mortality means a high rate of mortality for individuals above the age at maturity. The reference case model (best fit to the data) was taken as GHMHS (shaded)

Growth/maturity schedule	Growth rate	Age at 50% maturity	Mortality rate	Mortality 'spawner effect'	Model name
Hawai'ian	Fast	4 years	High	Yes	GHMHS
	Fast	4 years	High	No	GHMH
	Fast	4 years	Low	Yes	GHMLS
	Fast	4 years	Low	No	GHML
Australian	Slow	10 years	High	Yes	GAMHS
	Slow	10 years	High	No	GAMH
	Slow	10 years	Low	Yes	GAMLS
	Slow	10 years	Low	No	GAML

Table 7. Estimated stock status relative to various reference points, for the eight growth-maturity-mortality options set out in Table 6. C=catch, F=fishing mortality, SB=spawner biomass, curr=current=2006-09 average, CHSP=Commonwealth Harvest Strategy Policy (details given below). Colour coding: red – parameter on wrong side of reference point; green – parameter on right side of reference point. Source: Davies et al. (2013) or data given therein.

Type of comparison	Ratio	Hawai'ian GHMHS	Hawai'ian GHMH	Hawai'ian GHMLS	Hawai'ian GHML	Australian GAMHS	Australian GAMH	Australian GAMLS	Australian GAML
Stock status vs. MSY reference points	C_{curr}/MSY	0.98	0.82	1.24	1.14	1.53	1.70	1.89	2.02
	C_{2010}/MSY	0.96	0.81	1.20	1.10	1.41	1.60	1.71	1.86
	F_{curr}/F_{MSY}	0.51	0.40	0.70	0.62	1.06	1.21	1.46	1.77
	B_{curr}/B_{MSY}	1.58	1.58	1.51	1.52	1.37	1.33	1.27	1.15
	SB_{curr}/SB_{MSY}	2.17	2.54	1.86	2.05	1.80	1.58	1.47	1.15
	SB_{2010}/SB_{MSY}	1.88	2.22	1.55	1.72	1.34	1.20	1.04	0.81
vs. situation in absence of fishing	$B_{curr}/B_{curr,F=0}$	0.68	0.75	0.59	0.63	0.55	0.53	0.46	0.42
	$SB_{curr}/SB_{curr,F=0}$	0.55	0.60	0.47	0.49	0.41	0.34	0.35	0.26
	$SB_{2010}/SB_{2010,F=0}$	0.50	0.55	0.40	0.43	0.31	0.26	0.24	0.18
vs. start of time series	B_{curr}/B_0	0.63	0.68	0.57	0.60	0.54	0.54	0.48	0.44
	B_{2010}/B_0	0.62	0.67	0.54	0.58	0.51	0.52	0.42	0.40
	SB_{curr}/SB_0	0.51	0.55	0.45	0.47	0.41	0.34	0.35	0.27
	SB_{2010}/SB_0	0.44	0.48	0.38	0.39	0.30	0.26	0.25	0.19
vs. CHSP limit ref. point	$B_{curr}/20\%B_0$	3.15	3.4	2.85	3.0	2.7	2.7	2.4	2.2
	$B_{2010}/20\%B_0$	3.1	3.35	2.7	2.9	2.55	2.6	2.1	2.0
vs. CHSP target ref. point	$B_{curr}/120\%B_{MSY}$	1.32	1.32	1.26	1.27	1.14	1.11	1.06	0.96

Table 8. Estimated stock status relative to various reference points, for the reference case model (model GHMHS) and the median, 5%ile and 95%ile of the model grid. Abbreviations as above. Colour coding: orange – reference point within range of uncertainty; green – parameter on right side of reference point with >95% probability. Source: Davies et al. (2013) or data given therein.

Type of comparison	Ratio	Reference case model	Grid median	Grid 5%ile	Grid 95%ile
Stock status vs. MSY reference points	C_{curr}/MSY	0.98	1.24	0.63	2.13
	C_{2010}/MSY	0.96	1.2	0.62	2.0
	F_{curr}/F_{MSY}	0.51	0.70	0.23	1.81
	B_{curr}/B_{MSY}	1.58	1.59	1.17	2.24
	SB_{curr}/SB_{MSY}	2.17	2.17	1.14	4.72
	SB_{2010}/SB_{MSY}	1.88	1.88	0.86	4.3
vs. situation in absence of fishing	$B_{curr}/B_{curr,F=0}$	0.68	0.63	0.45	0.80
	$SB_{curr}/SB_{curr,F=0}$	0.55	0.50	0.30	0.72
	$SB_{2010}/SB_{2010,F=0}$	0.50	0.45	0.22	0.69
vs. start of time series	B_{curr}/B_0	0.63	0.61	0.46	0.81
	B_{2010}/B_0	0.62	0.59	0.41	0.90
	SB_{curr}/SB_0	0.51	0.48	0.30	0.71
	SB_{2010}/SB_0	0.44	0.42	0.21	0.71

vs. CHSP limit ref. point	$B_{curr}/20\%B_0$	3.15	3.05	2.3	2.43
	$B_{2010}/20\%B_0$	3.1	2.95	2.05	4.5
vs. CHSP target ref. point	$B_{curr}/120\%B_{MSY}$	1.32	1.33	0.98	1.87

Overall, it is relatively certain that the stock is well above the agreed limit reference point set by the Australian Commonwealth Harvest Strategy Policy (CHSP), and that stock biomass is above the MSY level. Estimates of fishing mortality are very dependent on the growth schedule assumed, so that overall they are uncertain. Catches are estimated to be at or above the MSY level, suggesting that the stock (or stocks) is not at equilibrium, and that current rates of fishing may lead the stock to decline.

In relation to recruitment, the difference between B_{curr}/B_0 and $B_{curr}/B_{curr,F=0}$ (or SB equivalents) can be used as an indication of the impact of recruitment variability on the stock biomass, since the difference between B_{curr} and B_0 includes the effects of both fishing and recruitment variability, while the use of $B_{curr}/B_{curr,F=0}$ is an attempt to evaluate the impact of fishing only, since recruitment variability is included in both the numerator and the denominator. As can be seen from Table 7 and Table 8, they are extremely similar across the entire model grid, suggesting that recruitment variability is not a major driver of stock dynamics (Davies et al., 2013).

Trends in catch and fishing mortality (Figure 22) and spawner potential and recruitment (Figure 23) are given below, from 1990 to 2011. The Kobe plot (SB and F relative to MSY reference points) is given in Figure 24.

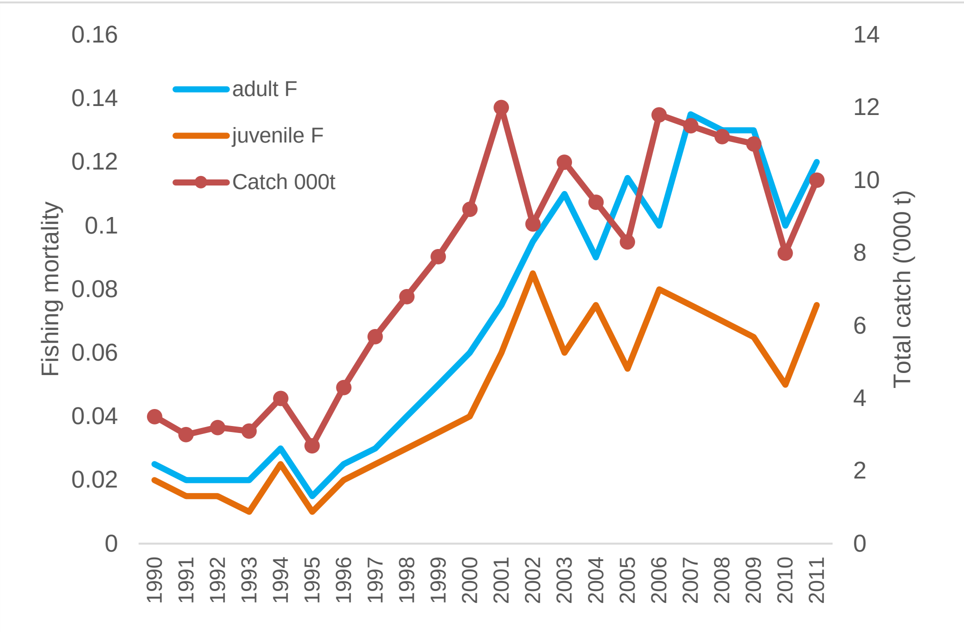


Figure 22. Trends for SW Pacific swordfish in fishing mortality (adult = blue, juvenile = green) and catch (orange, secondary axis) from 1990 to 2011. Data from Davies et al., 2013.

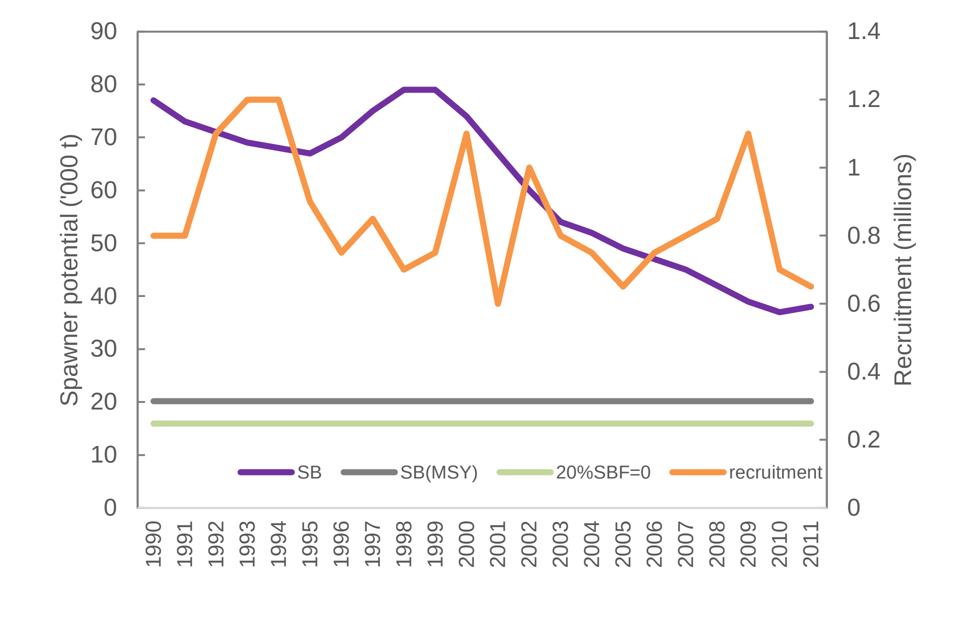


Figure 23. Trends in SW Pacific swordfish spawner biomass (purple) and recruitment (green – on secondary axis) from 1990 to 2011 (data from Davies et al. 2013). The SB_{MSY} and $20\%B_{current,F=0}$, as estimated by Davies et al., 2013 for the current period has also been added for reference.

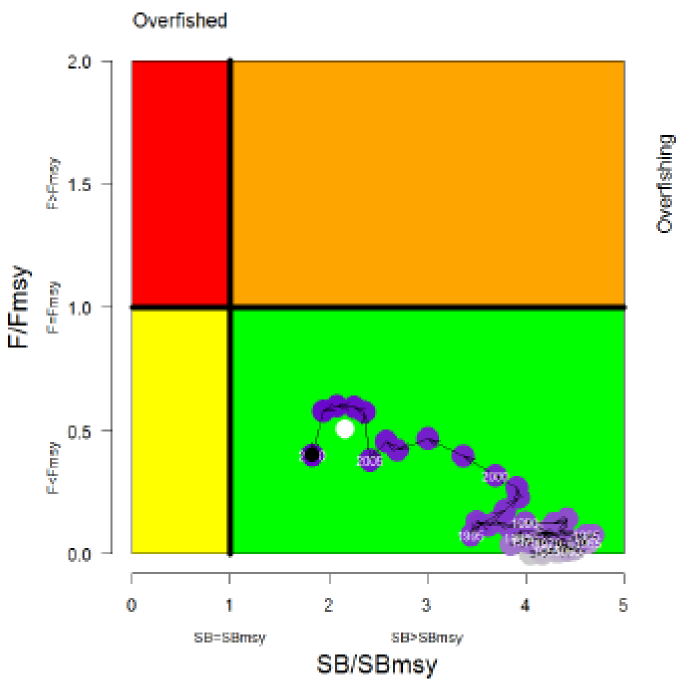


Figure 24. Kobe plot for SW Pacific swordfish: spawner biomass relative to SB_{MSY} on x-axis and fishing mortality relative to F_{MSY} on y-axis, plot shows stock trajectory over time, with darker purple more recent. The white circle is the average value for the 'current' situation, while the 'latest' situation (2011) is in black. From Davies et al., 2013.

Given that the stocks in Region 1 and Region 2 are considered to be separate, although linked, it is also relevant to consider stock status for each region separately. The stock assessment report (Davies et al., 2013) does not provide this information, but figures for total and adult biomass in each region were kindly provided by Graham Pilling of SPC, and are plotted in Figure 25 below. These should not be taken as a definitive estimate of the total biomass of swordfish within each region at any given moment, but give an indication of any differences in trends between the two regions. Trends are broadly similar for both regions, with both showing a similar proportional decline starting in the late 1990s, although the biomass in Region 1 may now be recovering, while biomass in Region 2 appears shows no evidence of a recent increase.

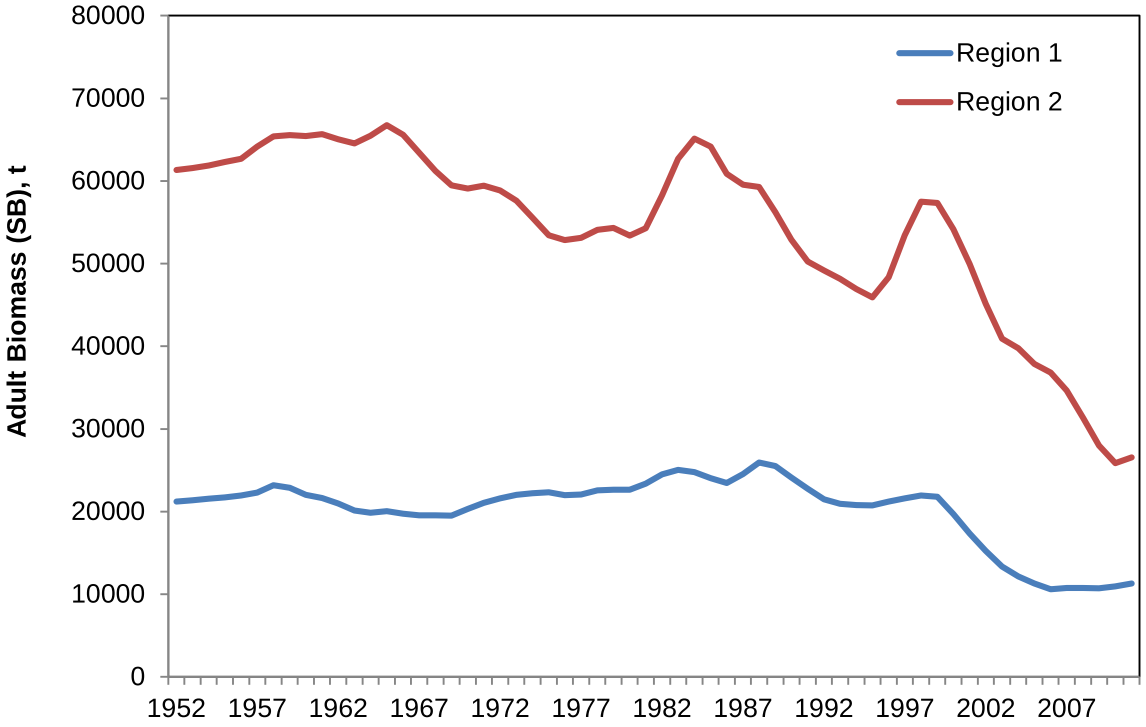


Figure 25. Indicative trends in spawner biomass for Region 1 and Region 2 (data provided by Graham Pilling, SPC).

Although the CHSP defines a limit reference point as shown in Table 8, the CHSP harvest control rule is based on targets defined in terms of standardised CPUE of 'prime-sized' fish for the ETBF. Trends in swordfish standardised CPUE up to 2012 are given in Figure 26, relative to defined target and limit levels – standardised CPUE has been fluctuating around the target level since 2008 (full details are given on the CHSP harvest control rule below).

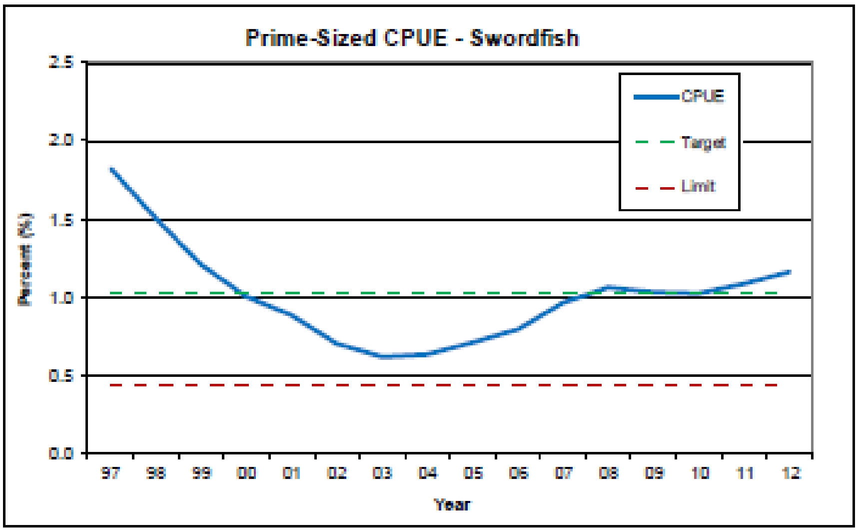


Figure 26. Standardised CPUE for prime-sized swordfish for the ETBF, relative to defined limit and target reference points, from 1997-2012. Taken from the minutes of the TTRAG 8. Attachment A (TTRAG, 2013a).

3.4.5. Reference points

Some reference points are shown in the previous section– as estimated by the stock assessment in order to evaluate the stock status. In this section, we consider the reference points used in the management of the fishery.

3.4.5.1. Tunas - WCPFC

Work has been on-going on target and limit reference points by the Scientific Committee (SC) of WCPFC for several years, with limit reference points for the main tuna species initially taken as the main priority. The report of the 7th Scientific Committee meeting (SC7 2011) proposed a definition for limit reference points as follows:

- Defining a state of the stock or fishery which is undesirable and which management action should avoid;
- Low probability of breaching the limit reference point;
- Management actions should be taken before the fishery is at risk of falling below the limit reference point.

SC7 also recommended that the Commission take a hierarchical approach to identifying limit reference points for the main species, based on the information available on stock dynamics – notably, whether there was good information to estimate the steepness of the stock-recruit relationship (Table 9). This is a significant source of uncertainty in many stock assessments, including in the most recent assessment for this species, which is discussed in more detail further on in this section. This approach was endorsed by the Commission at its plenary meeting WCPFC8 (2011). South Pacific albacore and WCP yellowfin and bigeye are considered to be a level 2 species (skipjack is considered level 3).

Table 9. The hierarchical approach to defining limit reference points (LRPs), based on information available about stock dynamics, notably stock-recruit steepness (from SC7 2011).

Level	Condition	LRPs
Level 1	A reliable estimate of steepness is available	F_{MSY} and B_{MSY}
Level 2	Steepness is not known well, if at all, but the key biological (natural mortality, maturity) and fishery (selectivity) variables are reasonably well estimated.	$F_{X\%SPRo}$ and either $X\%SB_o$ or $X\%SB_{current,F=0}$
Level 3	The key biological and fishery variables are not well estimated or understood.	$X\%SB_o$ or $X\%SB_{current,F=0}$

SC8 (2012) recommended a biomass limit reference point for South Pacific albacore, yellowfin and bigeye to be set at $20\%SB_{current,F=0}$, which was endorsed by WCPFC9 in 2012. $SB_{current,F=0}$ is defined as the '*estimated average spawning biomass over a recent period in the absence of fishing*' (SC8 report, paragraph 298). Discussion of the associated fishing mortality reference point ($F_{X\%SPR}$) was deferred until SC9 (2013).

At SC9, further discussion of the biomass limit reference points related to the definition of a 'recent period' (as per the definition of the reference point given above). SC9's recommendation was to use a 10-year time window (subject to review), up to and including the most recent year used in the stock assessment – the Commission endorsed this recommendation during WCPFC10. Another issue was how to deal with recruitment in the estimation of the reference point value – either by estimating it directly in the model, or by scaling it according to the stock-recruit relationship (i.e. the latter case assumes that recruitment would have been higher than the model estimates if there had been no fishery, because the fishery would not have reduced the spawning biomass). Analyses suggested that using the direct estimation approach was consistently less precautionary than the stock-recruit approach, so SC9 recommended the latter method. In relation to the associated fishing mortality reference point, SC9 deferred a decision back to the Commission as to what would be an acceptable level of risk of breaching the biomass reference point (although they considered 5% and 10% in a preliminary analysis). Once this management decision has been taken, analyses can 'match' an appropriate level of fishing mortality to the biomass reference point. WCPFC10, however, referred this decision back to the Scientific Committee, requesting them to provide more advice on the implications of different options in relation to risk levels. Currently, therefore, only biomass limit reference points are formally agreed by WCPFC, in the form 20%$SB_{current,F=0}$, where 'current' is defined as the most recent 10-year period for which data are available for the stock assessment. The reported intention, however, is to set target reference points on the same basis, and the range of options currently under consideration is reportedly 40-60%$SB_{current,F=0}$. Note, however, that the stated objective of management for yellowfin is to maintain F below F_{MSY}, meaning that F_{MSY} is also an implied reference point for yellowfin. This also suggests that B_{MSY} is an implicit reference point. The stated objective for albacore is more vague – to limit any increase in effort for reasons of uncertainty.

For yellowfin, the PNA vessel day scheme sets a reference point of 2010 effort levels for the PNA purse seine fishery, which reportedly corresponds to ~50%SB_0 for skipjack, and is compliant with scientific advice for yellowfin, although no explicit reference point is set for yellowfin (PNA, 2014).

For albacore, the Tokelau Arrangement (see below) sets an interim target reference point of total catch limit not to exceed MSY (Tokelau Arrangement 2014).

3.4.5.2. Swordfish

WCPFC has not explicitly defined any reference points for swordfish, although CMM 2009-03 refers to an objective of 'keeping the stock above its associated reference points' (it does not, however, say which reference points). Notwithstanding this, the WCPFC Convention states the objective of ensuring long-term conservation and sustainable use of highly migratory stocks and is consistent with Article 5 of the Fish Stock Agreement which incorporates the guidelines for application of precautionary reference points (see Section 3.6.1). Thus, reference points are implied rather than stated. The Australian management system has agreed on reference points for swordfish, which are set out in the Eastern Tuna and Billfish (ETBF) Harvest Strategy, approved by AFMA in December 2007, and revised in 2011 (AFMA, 2011c), and are incorporated into the ETBF Management Plan (AFMA, 2010).

Target reference point: The agreed target reference point for all the key species in the ETBF, including swordfish, is maximum economic yield (MEY). MEY is the sustainable yield which provides the maximum ratio of income to input costs, and is, in a theoretical fishery, obtained at a lower rate of fishing mortality than MSY, because input costs are assumed to increase approximately linearly with fishing mortality. In other words, it is considered to be a precautionary reference point.

The disadvantage of MEY is that it is difficult to estimate, and varies with changes to input costs (e.g. the price of fuel etc.). This means that it normally has to be estimated via some proxy measure. According to the CHSP (see further on), the default proxy for B_{MEY} is $1.2B_{MSY}$. In this fishery, however, the agreed proxy for MEY (for all the key species) is the average standardised catch rate from 1997-2001, during which period the fishery is considered to have been exploited at ~MEY.

Limit reference point: The CHSP default limit reference point is 20%B_0. This reference point is not incorporated formally into the ETBF harvest strategy, but the strategy notes that the MSE (Kolody et al., 2010) suggests that the ETBF harvest strategy is consistent with maintaining the stock biomass above this reference point.

3.4.6. Harvest strategy and control rules

3.4.6.1. WCPFC vs. ETBF – what is the appropriate level of management to consider?

MSC defines a harvest strategy as '*the combination of monitoring, stock assessment, harvest control rules and management actions, which may include an MP or an MP (implicit) and be tested by MSE*' (MSC CR v1.3). The monitoring and stock assessment elements are considered in Section 1.1.1 and 3.4.8.

There are two strands to the harvest strategy for this fishery: the international component managed under the WCPFC, and the domestic Australian component, managed under ETBF harvest strategy and management plan. The first task of the assessment was to decide which component of management (Australian vs. WCPFC) was most significant in driving the exploitation of the stock – or whether both should be considered.

Table 3 (in Section 3.3.4 on 'catch' previously) estimates the size of the total ETBF fishery as a proportion of the total WCPFC fishery for each of the three target species. For WCP yellowfin, S. Pacific albacore and SW Pacific swordfish, the figures are 0.22%, 0.76% and 4.22%, respectively for 2013. On the face of it, therefore, it seems most logical to argue that the WCPFC is the most significant source of management, since the ETBF covers only a small proportion of the total catch. This is certainly true for yellowfin and albacore, where there is only one stock in the area concerned. However, the situation for swordfish, while uncertain, is more complex, with most likely separate stocks in southwest vs. south central Pacific (Davies et al., 2013 – see Figure 15). If indeed the stocks in region 1 vs. region 2 are distinct, then the ETBF represents a much more significant proportion of the catch for the region 1 stock (Figure 27, Table 10).

Table 10. Approximate catch of swordfish (number) in the ETBF and in the stock assessment regions / sub-regions, as estimated from Figure 27 (Davies et al. 2013). Note that better and more recent data were provided by AFMA as to the total ETBF catch, but by weight and therefore not comparable with the other figures taken from Figure 27.

	2009	2010	2011
ETBF catch (1C)	19,000	18,000	17,000
Total catch 1N	6,000	5,000	10,000
Total catch 1C	20,000	20,000	20,000
Total catch 1S	0	0	0
ETBF as % catch in region 1	**73.1 %**	**72.0 %**	**56.7 %**
Total catch region 2	117,000	105,000	95,000
ETBF as % catch in regions 1 + 2	**13.3 %**	**13.8 %**	**13.6 %**

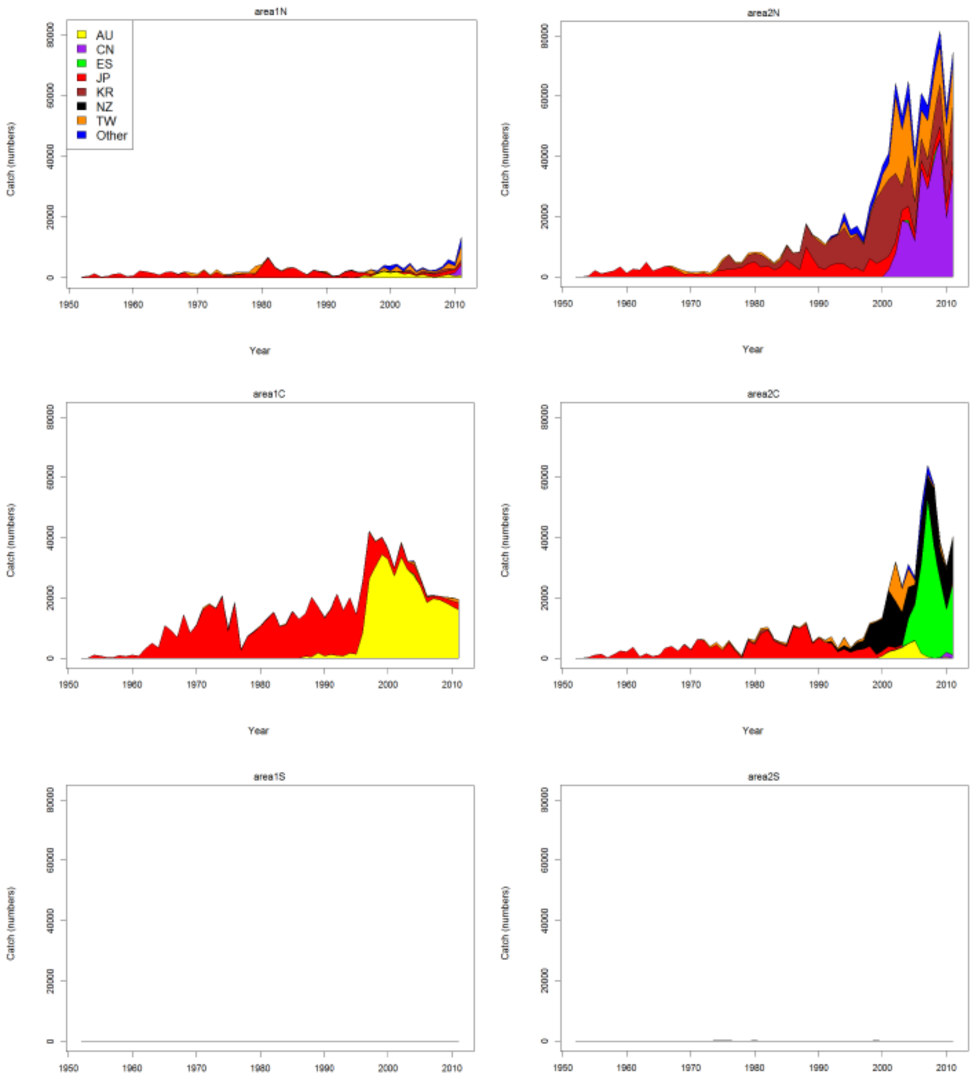


Figure 27. Total estimated catch of swordfish (number) by flag and subarea, 1952-2011. Left: region 1 (SW Pacific), right: region 2 (S. central Pacific). Top – north, centre – central, bottom – south. The ETBF is the yellow fishery in Region 1C – middle left. From Davies et al., 2013.

It is clear that Australian domestic management is more significant at the scale of the stock for swordfish than for the two tuna species, but whether or not it is the main driver of management for the stock depends on whether the stock in question is considered to be the southwest Pacific stock (region 1 only) or the southwest and south central stock (regions 1 and 2).

This issue is considered in the evaluation of the Commonwealth Harvest Strategy for the ETBF (Kolody et al., 2010). They note: '*It is estimated that the ETBF potentially has a considerable impact on the SW Pacific swordfish population relative to the other fleets'* (p.7). Likewise, the analysis by Campbell (2011) of likely stock structure (summarised in the section 'stock structure' above) concludes that the data suggest that '*the east coast of Australia largely comprises localised populations of swordfish. The demonstration of high levels of retention of swordfish in the Tasman/Coral Sea region supports fishery data for the region and serialised depletion in localised stocks not only in the ETBF, but also in other areas of the western/central Pacific Ocean*.' (p.23).

In conclusion, the assessment team decided that the WCPFC provides the most important management regime for yellowfin and albacore stocks (although the Australian harvest strategy is also considered for completeness), and that for swordfish the Australian management regime is more important, but that the WCPFC regime should also be taken into account.

3.4.6.2. WCPFC yellowfin

Harvest strategy: As for all the main tuna stocks, WCPFC (in 2012) adopted a limit reference point for yellowfin of 20%$B_{current,F=0}$, as described and defined in Section 3.4.5. No target reference points have been agreed, although references points in the range 40-60%$B_{current,F=0}$ are reportedly the most likely candidates and are currently under discussion. The WCPFC harvest strategy for yellowfin tuna is set out in CMM 2014-01 (Conservation and Management Measure for bigeye, yellowfin and skipjack tuna in the West and Central Pacific Ocean; replacing CMM 2012-01 and CMM 2013-01). The stated objective of CMM 2014-01 for yellowfin is keep the fishing mortality rate at a level no greater than F_{MSY}.

Harvest control rule and tools: The main elements of CMM 2014-01 relating to yellowfin are not changed in any substantive way from CMM 2013-01, and can be summarised as follows:

1. Control on FAD sets

For 2014 and onwards:
- prohibition on setting on FADs for July, August and September, in EEZs and on the high seas
- for each CCM either a) fourth month of closure (October), b) limit on the total number of FADs set by its vessels

For 2015-16 (subject to agreement on measures to avoid 'disproportionate burden' on SIDS):
- prohibition on setting on FADs for an additional two months (January, February, July, August, September), ensuring that total FAD sets in 2015-16 do not exceed those in 2010-12 (for non-SIDS); or
- three month FAD ban as for 2014, plus limit on total number of FADs set by vessels of that CCM

For 2017 (subject to agreement as above):
- Ban on FAD sets in the high seas, except for Kiribati-flagged vessels in adjacent high seas areas, unless the Commission decides on alternative measures in the meantime

2. Purse seine effort

- PNA coastal states to restrict effort in their EEZ to 2010 levels through the vessel day scheme [NB: this represents most of the tropical tuna purse seine effort]
- Other coastal states with >1500 days of effort per year over the period 2006-2010 to limit effort in their EEZs to 2001-04 average or 2010 levels
- Other coastal states to establish effort or catch limits consistent with the objectives for each species
- Non-SIDS CCMs to restrict high seas purse seine effort to agreed levels to be reviewed in 2015
- CCMs other than SIDS and Indonesia not to increase number of freezer purse seiners >24m fishing between 20ºN and 20ºS over current levels

3. Specific measures for yellowfin

- CCMs should take measures not to increase their yellowfin catch
- appropriate limits for the yellowfin fishery to be formulated and adopted at WCPFC12 (December 2015)

4. Other

- All skipjack, yellowfin and bigeye to be retained on board purse seiners except in exceptional circumstances
- All purse seiners fishing between 20ºN and 20ºS to have an observer on board
- CCMs fishing on the high seas shall submit a FAD management plan
- CCMs to 'explore' spatial management
- SIDS permitted to continue to expand their own domestic fleets
- Commission to develop a scheme for reduction of overcapacity

The tools used to implement CMM 2013-01 vary by country and fishery; the ETBF system is described in Section 3.6.7.

PNA yellowfin

As noted previously (Section 3.4.3), somewhat over half of the total yellowfin catch takes place in the waters of PNA countries, and is therefore subject to their vessel-day scheme (VDS). The VDS is actually incorporated into the WCPFC harvest strategy, in that CMM 2014-01 requires CCMs to comply with the requirements of the VDS. The VDS includes a reference point for skipjack (2010 levels of effort as a proxy for 50%B_0) but does not include a quantitative reference point for yellowfin, although PNA (2014) suggests that this level of effort is compatible with maintaining yellowfin at or above MSY reference points. The VDS works by agreeing a total amount of effort for the fishery, in vessel-days, which is then divided up among the participants according to a (rather complicated) formula. The participant countries may then manage their fisheries at this level of effort as they see fit: some allocate a given amount of effort to each licence-holder at the start of the year, while others allow free fishing, but close their EEZ to purse seining when the effort limit is reached. Details are provided in Banks et al. (2012a).

3.4.6.3. WCPFC albacore

Harvest strategy: At the level of the South Pacific albacore stock, management is the responsibility of WCPFC, as noted above. As for all the main tuna stocks, WCPFC (in 2012) adopted a limit reference point for albacore of 20%$B_{current,F=0}$, as described and defined in Section 3.4.5. No target reference points have been agreed, although references points in the range 40-60%$B_{current,F=0}$ are reportedly the most likely candidates and are currently under discussion. The WCPFC CMM which provides for a harvest control rule for South Pacific albacore (CMM-2010-05) set as an objective that the increase in fishing mortality on the stock should be limited for precautionary reasons, due to uncertainties in the stock assessment, despite the fact that the stock has been evaluated to be within MSY reference points.

Harvest control rules and tools: The management actions currently in place under WCPFC for South Pacific albacore are set out in CMM 2010-05. Note that this was put in place prior to agreement of the limit reference point, so does not make reference to it. The key element of CMM 2010-05 is that there should be no increase in the number of fishing vessels actively fishing for South Pacific albacore above either 2000-2004 or 2005 levels. However, the CMM specifically allows Pacific Islands to pursue a responsible level of development of their domestic albacore fisheries over and above these levels. It also requires cooperation on research, as well as annual reporting of catch levels. CMM 2010-05 is set out below:

1. Commission Members, Cooperating Non-Members, and participating Territories (CCMs) shall not increase the number of their fishing vessels actively fishing for South Pacific albacore in the Convention Area south of 20°S above current (2005) levels or recent historical (2000-2004) levels.
2. The provisions of paragraph 1 shall not prejudice the legitimate rights and obligations under international law of small island developing State and Territory CCMs in the Convention Area for whom South Pacific albacore is an important component of the domestic tuna fishery in waters under their national jurisdiction, and who may wish to pursue a responsible level of development of their fisheries for South Pacific albacore.
3. CCMs that actively fish for South Pacific albacore in the Convention Area south of the equator shall cooperate to ensure the long-term sustainability and economic viability of the fishery for South Pacific albacore, including cooperation and collaboration on research to reduce uncertainty with regard to the status of this stock.
4. CCMs shall report annually to the Commission the catch levels of their fishing vessels that have taken South Pacific Albacore as a bycatch as well as the number and catch levels of vessels actively fishing for South Pacific albacore in the Convention area south of 20°S. Initially this information will be provided for the period 2006-2010 and then updated annually.
5. This measure will be reviewed annually on the basis of advice from the Scientific Committee on South Pacific albacore.

Overall, given that i) catch rates have reportedly declined (according to stakeholders – see Section 4.4.2), at least in some areas and for some fleets (see discussion above) and ii) that total reported catches were ~35% greater in 2012 than in 2005, it seems plausible to argue that fishing mortality on albacore has increased significantly over the last decade or so, and that CMM 2010-05 has not so far been effective in reversing this trend. The stock status for the moment appears to be healthy, but it is worth noting that the data since June 2011 are not included in the stock assessment.

CMM 2010-05 is implemented by the members of WCPFC as they see fit, so it is not possible to set out in detail all the various tools used by different fisheries to implement the harvest control rule. As far as the ETBF is concerned, the system of setting a TAC, a TACC and individual quotas is described in below in this Section.

Management of albacore under the Tokelau Arrangement

FFA has provided a forum by which member countries and territories with significant albacore fisheries and their EEZs have come together to develop an alternative harvest strategy for S. Pacific albacore, with the ultimate aim of replacing CMM 2010-05 with a more robust management system involving quota allocations. The objective of the Tokelau Arrangement is to develop and implement a South Pacific Albacore Harvest Strategy. As an interim measure, the arrangement allows for catch limits by EEZ, as well as an interim target reference point of total catch limit not to exceed MSY[4].

[4] See Tokelau Arrangement explanatory note from FFA: https://www.ffa.int/system/files/WCPFC11-2014-DP05b%20Tokelau%20Arrangement%20Explanatory_Note.pdf

The Tokelau Arrangement foresees an integrated management system for the stock based around a TAC. As an interim measure, the arrangement sets out catch limits for the EEZ of each signatory country or territory, based on the following rules:

- All participants get a baseline limit of 2500 t;
- Participants who exceeded 2500 t in 2001-12 can use their highest catch during that period;
- Participants may propose a lower limit than their entitlement under the above.

The Tokelau Arrangement has (or had as of 1 December 2014) been signed by Australia, the Cook Islands, New Zealand, Niue, Samoa, Tokelau, Tonga, Tuvalu and Vanuatu, accounting for ~50% of the potential maximum total catch from EEZs. Other FFA members (Fiji, the Solomon Islands, PNG, Kiribati) are reportedly 'working towards' signing up, while the overseas territories (New Caledonia, French Polynesia, American Samoa, Wallis and Futuna) are also eligible. The arrangement comes into force after 5 signatories – hence it is already in force for those countries which have signed up.

If all the countries proposed (and caught) the maximum limit under this arrangement in their EEZ, the total catch in EEZs would be ~78,000 t – compared to an estimated MSY of 133,000 t (2012 reference case model) or 99,000 t (2012 median stock assessment output) (Hoyle et al., 2012). This would leave 20-40% to be caught on the high seas.

3.4.6.4. WCPFC swordfish

The WCPFC harvest strategy for swordfish is set out in CMM 2009-03 (conservation and management for swordfish), which is set out below:

1. Commission Members, Cooperating Non-Members and participating Territories (CCMs) shall exercise restraint through limiting the number of their fishing vessels for swordfish in the Convention Area south of 20°S, to the number in any one year between the period 2000-2005 (listed in Annex 1).

2. In addition to vessel limits established under paragraph 1, CCMs shall exercise restraint through limiting the amount of swordfish caught by fishing vessels flagged to them in the Convention Area south of 20°S to the amount caught in any one year during the period 2000 – 2006.

3. CCMs shall not shift their fishing effort for swordfish to the area north of 20°S, as a result of this measure.

4. No later than 30 April 2010 CCMs shall nominate the maximum total catch of swordfish that it shall continue to be permitted to fish in the area south of 20°S. This amount shall be no more than their maximum verified catch declared to the Commission for any one year in the period 2000-2006.

5. Paragraphs 1 to 4 and paragraph 9 shall not prejudice the legitimate rights and obligations under international law of Small Island Developing State (SIDS) and participating Territory CCMs, in the Convention Area who may wish to pursue a responsible level of development of their own fisheries in the Convention Area.

6. For the purposes of these measures, vessels operated under charter, lease or other similar mechanisms as an integral part of the domestic fleet of a coastal State, shall be considered to be vessels of the host State or Territory. Such charter, lease or other similar mechanism shall be conducted in a manner so as not to charter known IUU vessels.

7. CCMs shall cooperate to protect the long-term sustainability and economic viability of the fisheries for swordfish in the Southwest Pacific, and in particular shall cooperate on research to reduce uncertainty with regard to the status of swordfish stocks.

8. CCMs shall report to the Commission the total number of vessels that fished for swordfish and the total catch of swordfish for the following:

> a. Vessels flying their flag anywhere in the Convention Area south of 20°S other than vessels operating under charter, lease or other similar mechanism as part of the domestic fishery of another CCM
>
> b. Vessels operating under charter, lease or other similar mechanism as part of their domestic fishery south of 20ºS
>
> c. Any other vessels fishing within their waters south of 20°S

This information shall be provided in Part 1 of each CCM's annual report. Initially, this information will be provided in the template provided at Annex 2 for the period 2000-2009 and then updated annually.

9. As an interim measure, and without prejudice to future decisions of the Commission relating to monitoring and responding to compliance with conservation and management measures, until the Commission adopts a scheme relating to compliance with CMMs which includes responses when a flag State exceeds any limits assigned to it, if it is determined by the Commission that the catch of vessels flying the flag of a CCM exceeds the total catch specified for them under paragraphs 2 and 4 above, that CCM will be subject to a reduction in their catch limit equal to the exceeded amount. The reduction will apply in the year immediately after it has been determined that the catch limit has been exceeded.

According to WCPFC-TCC10-2014-IP06 (see its Table 3), all the flag states fishing for swordfish in the South Pacific WCPFC Convention Area are complying with the requirements of CMM 2009-03 in relation to both catch and number of vessels.

WCPFC bigeye harvest strategy as an example

A key requirement in the MSC assessment of the harvest strategy and control rule is that it is 'responsive to the state of the stock'. Given that the stock status of the target species, as evaluated in SPC stock assessments, is good and has always been good, it is hard to assess for these species how WCPFC would react if the stock status were to decline – because this has never yet happened.

By way of illustrating WCPFC's approach in these circumstances, we can, however, consider the harvest strategy for bigeye tuna, where stock status was evaluated in the 2011 stock assessment (Davies et al., 2011) as 'overfishing occurring' and in the most recent 2014 stock assessment (Harley et al., 2014) as 'overfished' and 'overfishing occurring'. The agreed limit reference point for central and west Pacific bigeye is the same as for albacore and yellowfin, and Harley et al. (2014) evaluated the stock biomass to be approximately at this limit.

The WCPFC harvest strategy for bigeye tuna is covered by the same CMMs as yellowfin. It was first established in 2012 with CMM 2012-01, which was in force only for one year before being replaced by CMMs 2013-01 and 2014-01. The stated objective of these CMMs for bigeye is the gradual reduction in fishing mortality, to reach $F<=F_{MSY}$ by 2017. On this basis, it is at least clear that some action has been taken in recognition of the issue of bigeye overfishing in response to the 2011 stock assessment. There was no change in the harvest strategy in response to the 2014 stock assessment (Harley et al., 2014), which is on the face of it a serious lapse, given that the conclusions of the stock assessment was that the stock situation has deteriorated. However, it is worth noting that the assessment includes data up to the end of 2012 ('latest') or 2011 ('current') and therefore does not include the time period after which management was introduced (starting in 2013, since CMM 2012-01 was introduced in December 2012). The impact of WCPFC management on the stock cannot, therefore, as yet be evaluated. A Pacific-wide stock assessment (a joint project of SPC and IATTC) will take place during 2015.

The main elements of CMM 2014-01 relating to bigeye are the same as those for yellowfin, but it also includes some measures specific to bigeye, specifically to deal with longline effort:

5. <u>Longline effort</u>

- Catch limits for bigeye by longline for CCMs catching >2000 tonnes per year; CCMs with smaller catches limited to 2000 tonnes per year for 2014-17

- CCMs other than SIDS and Indonesia not to increase number of freezer longliners targeting bigeye over current levels

Overall, these measures, first introduced in CMM 2013-01, are not likely to result in a major reduction in fishing effort on bigeye, and they were not greeted by stakeholders in 2013 with wholehearted enthusiasm: FFA 'reluctantly supported' the draft CMM; PNA, Japan and the Philippines considered that their own proposal would have been more effective, particularly in limiting high seas effort; Papua New Guinea expressed its 'disappointment'; and environmental NGOs summarised it as 'inadequate' (WCPFC10, 2013).

ETBF harvest strategy

As noted at the top of this section, the ETBF harvest strategy is relevant for the swordfish fishery, but not particularly relevant for the tunas.

The ETBF harvest strategy is described in Section 3.3.3 (management framework). An annual total allowable commercial catch (TACC) is set before the start of each fishing season (Table 11), and this TACC is divided up among the operators based on their holding of ITQs. This system applies to the three target species of this assessment, plus bigeye tuna and striped marlin.

Table 11. TACCs for the last three seasons and for next season in the ETBF (Larcombe and Stephan, 2014).

	2011-12	2012-13	2013-14	2014-15
Albacore	2500	2500	2500	2500
Yellowfin	2200	2200	2200	2200
Swordfish	1550	1396	1396	1378
Bigeye	1056	1056	1056	1056
Striped marlin	390	370	370	356

The stated objective of the ETBF harvest strategy is to achieve catch rates of the target species similar to the 1997-2001 level, over a long period of time, on the basis that the catch over this period is considered to be a good estimate of maximum economic yield. The target catch rate is in the range 600-650 kg per 1000 hooks for the five species combined.

The harvest strategy is implemented by monitoring key indicators of stock status for the five species. These indicators are evaluated by a harvest strategy model, which includes reference points and a set of decision rules (Figure 28).

On the basis of the output of the harvest strategy model, the TTRAG make a recommendation as to the ‘Recommended Biological Commercial Catch’ (RBCC), which then goes to the Tropical Tuna MAC for consultation, on the basis of which a decision is taken by AFMA Commissioners on the TACCs for that year.

The key data sets used to evaluate the stocks are:

- Trends in the catch rate of prime or optimal-sized fish (CPUE-prime)
- Trends in the catch rate of large fish (CPUE-old)
- The proportion of large fish in the catch (proportion-old)
- Trends in the availability of small-sized fish in the fishery (CPUE-recruits)

These are monitored via catch rates by species and size class, standardised to account for differences in fishing strategies and gear deployment, as well as changes in oceanographic conditions, as well as via the overall size structure of the catch.

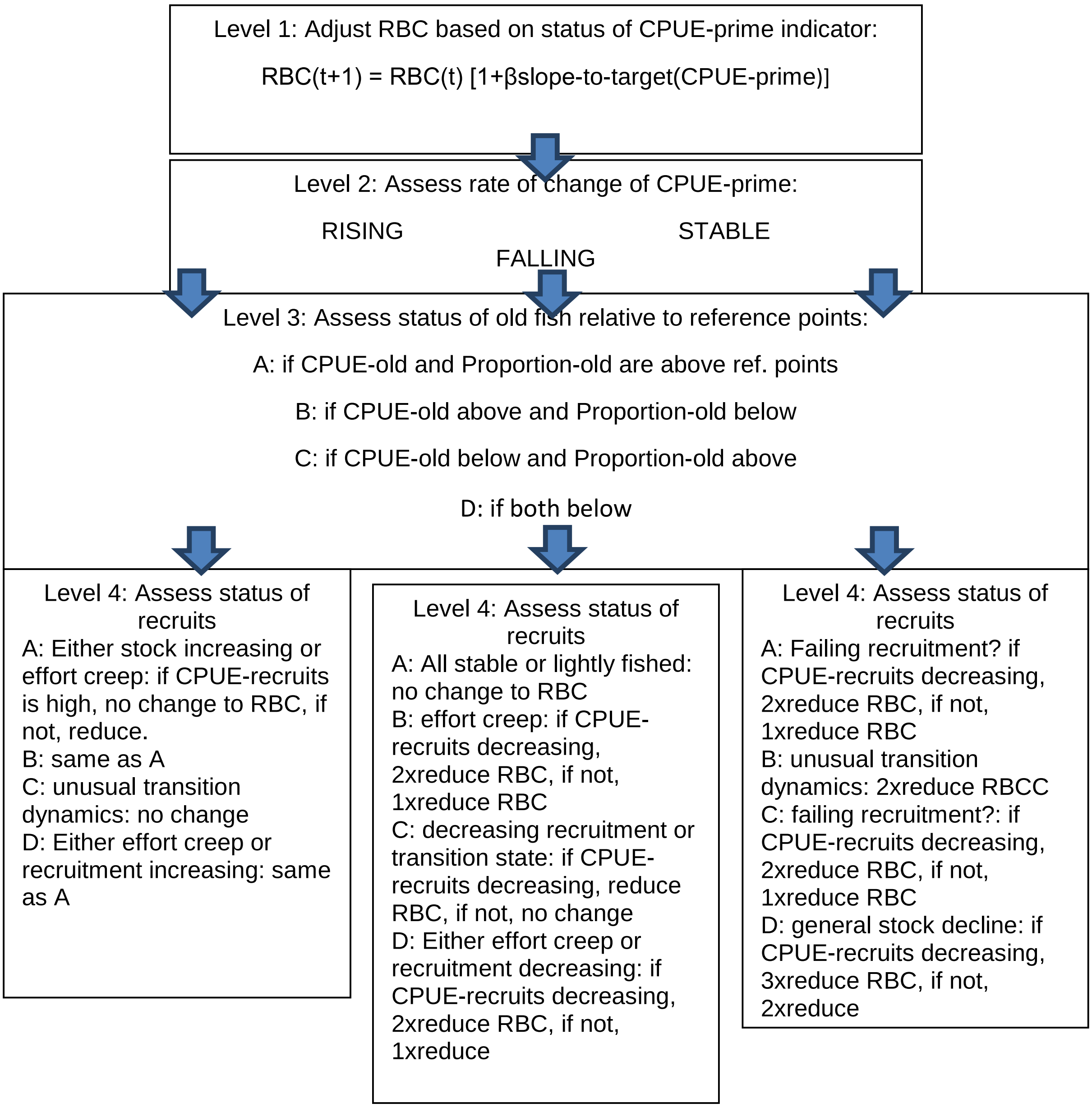


Figure 28. Empirical decision-rules for the ETBF Harvest Strategy, taken from Kolody et al. (2010). RBC=recommended biological catch – RBCC is derived from RBC by taking account of estimates of mortality from recreational sources.

On a yearly basis, the harvest strategy proceeds following the pre-agreed decision rules (Figure 28), but the development of the rules involved a Management Strategy Evaluation, which considers the performance of the decision rules under different circumstances via simulation testing. This was done for the ETBF Harvest Strategy in 2010 (Kolody et al., 2010).

Kolody et al. (2010) set out a detailed critique of the structure of the harvest strategy and how it has been implemented; notably the following:

- They note that although the decision-making framework is on the face of it relatively simple, the procedure for analysing the data, and in particular for standardising CPUE time series, is complex. Ideally, the procedure by which the data are standardised should also be included in the harvest strategy (i.e. agreed in advance) because it may turn out that the outcome is sensitive to assumptions made in the development of the statistical model for standardisation. By way of example, they note that in the swordfish fishery, recent changes in fishing strategy include a switch from disposable light sticks towards LEDs, and from J-hooks to circle hooks (now standard in the fishery) which anecdotally do not retain large fish as well. Because these changes are not recorded in logbook data, they are difficult to include in the standardisation.

- They note that the framework is depending on longline CPUE data, which is not necessarily a faithful proxy of stock biomass, for the reasons including those set out above (but also note that this is a problem with harvest strategies based on most formalised stock assessment models as well, including WCPFC stock assessments).
- They note that it is target-driven rather than limit (risk)-driven and query how the targets were set and whether they are always attainable.
- They note that it relies on data from the ETBF, and does not include information on the stock more widely (e.g. WCPFC stock assessments) – which may be useful in some circumstances. It is not clear, at least for the tuna species, that the harvest strategy is robust to changes in the wider stock status.

Overall, Kolody et al. (2010) are sceptical about the harvest strategy as applied to yellowfin, bigeye and notably albacore, because it is unclear that unilateral action by Australia will have an impact on the overall stock status, and in the case of albacore because the WCPFC stock assessment was at that time uncertain and in conflict with ETBF data (the situation has since improved somewhat). For swordfish and striped marlin, they state '*it is reasonable to expect that management would not go badly wrong in the short term if the harvest strategy is used to recommend the RBC [RBCC] for swordfish and striped marlin*.' For the tuna species, however, it is noted that the application of this harvest strategy provides a means by which Australia can lobby in WCPFC for a stock-wide harvest strategy that meets the same type of objectives.

For each species, the conclusions of the MSE can be summarised as follows:

- Swordfish: The highest confidence in the harvest strategy for swordfish, because the WCPFC stock assessment framework has been developed with the harvest strategy in mind – i.e. the stock is essentially partitioned into ETBF and non-ETBF components (see above and description of stock assessment below). They note: '*it is estimated that the ETBF potentially has a considerable impact on the SW Pacific swordfish population relative to the other fleets, and the HS* [harvest strategy] *seems to have a reasonable capacity to manage the uncertainty in the stock dynamics and achieve the objectives of the HSP* [Commonwealth harvest strategy policy]

- Yellowfin (and bigeye): The main question is connectivity between the ETBF and the wider WCP stocks – if connectivity is high, then reducing RBC in the ETBF will result in economic pain for the ETBF for little wider benefit (except perhaps in political terms in relation to the WCPFC)

- Albacore: Kolody et al. (2010) had least confidence in the harvest strategy for this species, mainly based on the fact that the SPC stock assessment at the time was uncertain and preliminary. The same issue also applies as for yellowfin (and bigeye)

3.4.7. Information and monitoring

Information used in the stock assessment

Fisheries-dependent data: The stock assessments are based mainly on fisheries-dependent data: catch, effort and length-frequency in the catch. The data come from nominal 5º-month aggregated data provided by distant-water fishing nations and from logsheet data from domestic longline fisheries. Pacific island countries have frequently complained that the distant-water fishing nations should provide more spatially- and temporally-detailed catch and effort data, but they have consistently declined to do so – and in fact this does have implications for the stock assessments.

Catch and effort data for purse seine fisheries are problematic, because catch data are potentially biased according to the species composition of the catch, which has to be estimated, while quantification of purse seine effort is difficult. Total catches are generally taken from logsheet declared totals, apportioned by species on the basis of grab samples, which are corrected for bias based on the results of paired trials with other sampling methods, although this procedure is not required where there is detailed port sampling (e.g. Japan). Effort units for purse seine fisheries are defined as days fishing and/or searching, and allocated to set type (FAD vs. free school) based on logbook reports. The reporting of searching days is a problem – reportedly some fleets report these days as searching specifically, while others report them as non-fishing (i.e. transit) days – this issue remains to be further investigated in the purse seine data set, and its impact on the stock assessment is unclear. Hence, although purse seine fisheries catch the majority of yellowfin in the Pacific, longline CPUE remains the key input into the stock assessment.

The data are aggregated temporally and spatially within the assessment. Temporal stratification is general by quarter, but can be by month, depending on the nature of the data set. Fisheries may also be divided into discrete time periods, in order to account for changes in selectivity over time (e.g. via technological changes). Spatially, data are stratified into geographic regions for each assessment.

Length-frequency data are available generally as follows:

- For distant water fleets (Japan, Korea and Taiwan, and more recently China) most data for tunas come from the NMFS port sampling programme at Pago Pago, American Samoa. There are also port sampling data from Taiwanese longliners landing in Fiji. Japan and Taiwan have also provided some length-frequency data from their longliners landing at other ports (Taiwan only from 2003).
- For domestic fleets, including the ETBF fleet, data come from domestic port sampling programmes, and/or SPC or domestic observers from Australia, New Zealand, New Caledonia, Fiji, American/Western Samoa, Tonga and French Polynesia (from AFMA in the case of Australia).
- For the (former) driftnet fishery, port sampling data have been provided by Japan and New Caledonia.
- For the time period prior to 1970, the only size data available are from the Japanese longline fishery.

Particular care has to be taken with swordfish length-frequency data, which has to be standardised according to the particular measurement used.

Fisheries-independent data: The only fishery-independent dataset used in the stock assessments is tagging data. For albacore, this dataset dates from the 1980s and 1990s. A total of 9,691 fish were tagged, all from the southern region (Regions 3 and 4) and mainly juveniles (<80cm, ages 1-4). For the stock assessment, releases were stratified by quarter and size class. There were a total of 138 returns, mainly (57%) from southern longline fisheries, as well as (20%) from the Taiwanese longline fishery in Region 2, and from the troll fisheries. SPC have recently (2009) started a new tagging programme, but the number of returns was not yet sufficient to include it in the 2012 stock assessment.

For yellowfin, the stock assessment includes data sets from three tagging projects:

- SPC's Regional Tuna Tagging Project (RTTP; 1989-1992)
- The Australian Coral Sea tagging programme (CS; 1991-1995)
- SPC's Pacific Tuna Tagging Programme (PTTP; on-going over the last decade, covers the whole tropical western Pacific)

The complete data set includes 82,581 releases and 17,121 returns, which could be assigned to fisheries included in the stock assessment model.

For swordfish, the tagging data have been extensively described above (Section 3.4.1).

Information provided by the ETBF fishery

Logbooks: Vessels fishing in the ETBF are required to fill out a daily logsheet with details of effort (hooks set, hauls, times set and retrieved etc.) and catch. At the end of each trip, the logsheet data is rectified against accurate weight data received from processors, to ensure that the use of quota allocations can be accurately tracked in real time. AFMA considered that the logbook data catch, as corrected against weight data from the processors, to be accurate and reliable, and also consider the effort data to be reliable, since there is no incentive on the fishermen not to report effort accurately (since the fishery is limited by landings).

Port sampling: AFMA operate a port sampling programme in order to provide length-frequency data for the purposes of stock assessment, as described above. For swordfish, the fish are graded by the processors into the three size categories required by the CHS harvest control rule (as shown in Figure 28) – 'recruits', 'prime' and 'old'.

Observers: AFMA operate an observer programme which evaluates catch (landings and discards) of all species. This is scaled up by AFMA to provide an estimate of total discards by species, which forms a key input into the Ecological Risk Assessment (ERA) for bycatch species for this fishery (see details under Principle 2, Section 1.1). CCTV on board the vessels is under consideration, and is generally supported by the vessel owners, because of the costs of funding the observer programme.

3.4.8. Stock assessment

Stock assessment process and model

The Oceanic Fisheries Programme of the Secretariat of the Pacific Community (SPC) carries out stock assessments for Western Pacific stocks, which is the science advisory body to WCPFC. A draft assessment report is submitted for discussion to the meeting of the WCPFC Science Committee, which is usually held in August. Members of the Science Committee will review and comment on the report, after which it is revised, and a final report presented to the WCPFC plenary, usually held in December.

The assessment uses the integrated stock assessment model known as MULTIFAN-CL. MULTIFAN-CL allows the user to develop a statistical model for fisheries stock assessment, which is age-structured but length-based – i.e. the population dynamics are disaggregated by age, but the model objective function includes a term for the quality of fit between predicted and observed length-frequency data (or weight frequency data). This is more realistic than attempting to estimate age from length outside of the model (i.e. because it admits that the age of large fish is highly uncertain). Two other features of interest in MULTIFAN-CL are that it allows variability in catchability over time, as well as spatial structuring as described in the previous sections.

Multifan-CL is an integrated statistical modelling framework that estimates parameters and derived population states by optimizing an objective function consisting of likelihood components (fitting model predictions and observations), prior probability distributions (expert judgement) and constraining penalties. There is a large degree of flexibility as to which model components are fixed or estimated (including biological parameters, fishery characteristics and variances).

3.4.8.1. Albacore

Standardisation of the CPUE data: Standardisation of the CPUE data for this stock assessment model is described in detail in Bigelow and Hoyle (2009). The distant-water fleets show different long-term trends in nominal CPUE estimated from the 5º-month aggregated data, which is presumed to be due to differences in fishing strategy between fleets and/or over time. In order to get around this, Bigelow and Hoyle (2009) used cluster analysis to separate out the operational datasets targeting bigeye from datasets targeting albacore, based on species composition of the catch. They then standardised this dataset using a GLM with independent variables of vessel identity, time (year, quarter, month) and space (latitude and longitude). Vessel effects were the key driver of differences between nominal and standardised CPUE, with differences most apparent in regions 1 and 2 (lower latitudes). The standardised dataset is more coherent with nominal CPUE from the domestic fleets than the unstandardised dataset, showing a decline in CPUE since 2002 in regions 1 and 2.

Biological parameters: How biological parameters for albacore are incorporated into the stock assessment is set out in Table 12.

Table 12. How biological parameters are dealt with in the albacore stock assessment (Hoyle et al. 2012).

Parameter	How incorporated into assessment
Reproductive potential of each age class	Assumed to be a multiple of the proportion of females in that age class (sex ratio), the proportion of females mature at that age, spawning frequency at age for matures females, and fecundity per spawn at age. These are based on empirical data as outlined previously (Farley et al., 2012), and are fixed assumptions in the stock assessment model.
Natural mortality	Previous assessments assumed that the proportion of females declined with age as they do with length, and therefore that females above the age of maturity have increased natural mortality. Recent analysis, however, demonstrates that females grow to a significantly smaller maximum size than males (see above), and that may by itself explain the change in sex ratio with age. The 2012 stock assessment, therefore, assumed constant natural mortality at age and by sex, and assumed that the sex ratio does not vary with age (as it does with size). Natural mortality was assumed for the purposes of stock assessment to be 0.4;

	values of 0.3 and 0.5 were also evaluated (see below).
Growth	The von Bertananffy growth parameters were estimated within the model, although starting values were provided based on data from the New Zealand troll fishery, which provide the best information on growth rates, albeit within a limited geographic range of 165-175ºE; growth rates outside this area may be somewhat faster. Fixed, faster growth rates were also used as part of the sensitivity analysis of the stock assessment model (see following section).

Assumptions of the stock assessment: Key assumptions in the stock assessment model are given by Hoyle et al. (2012) as in Table 13.

Table 13. Main structural assumptions used in the base case model for South Pacific albacore (expanded from Table 3 in Hoyle et al., 2012).

Category	Assumption
Catch data	Observation errors are small
Length-frequency data	Normally-distributed; variance determined by sample size and observed frequency; assumptions made about effective sample size[5] for each data set, in order that variance can be estimated
Tagging data	Tag numbers in a given stratum (region/quarter/size category) have a Poisson distribution
Tag reporting	Reporting rates are constrained to be equal for all longline fisheries and constant over time, but were allowed to vary by region (reflecting the probability of high reporting closer to the release site); maximum reporting rate constrained at 0.9. (N.B.: this parameter is actually a composite of tag reporting, tag shedding and tagging mortality.)
Tag mixing	Tagged fish assumed to be randomly mixed with untagged fish after the first year following release
Recruitment	Occurs as a discrete event once each year. Related to spawning potential with a one-year time lag via a Beverton-Holt stock-recruit relationship with steepness=0.8[6]; but with a weak penalty for deviation from this relationship. Variance set such that recruitment of ~three times normal would occur on average every ~20 years. (N.B.: steepness changed from 0.75 to 0.8 for consistency with other tuna stock assessments; 0.65 and 0.95 tested as part of sensitivity analyses.)
Initial population	Has equilibrium age structure in each region based on (assumed) natural mortality and the first three years of fishing mortality
Age and growth	20 annual age classes, with the last representing a plus group ('19 and over'). Mean length for each age class constrained by von Bertalanffy growth curve; mean weight for each age class computed from length-at-age following weight-length relationship derived from available data. Within an age class, length normally distributed with standard deviation proportional to mean length. Mean lengths for ages two to five are allowed to deviate from a von Bertalanffy curve.
Selectivity	Constant over time within each fishery, but some fisheries are split into several time periods, to account for apparent differences in selectivity between these time periods. Selectivity coefficients for the last two age classes are constrained to be equal. Selectivity for longline fisheries was allowed to vary by quarter, to account for strong seasonal variation in the length of fish caught. Hoyle et al. (2012) note that selectivity functions are an influential component of the model, because of its importance as a driver of expected length-frequency distributions, which are an important component of the overall log-likelihood function.
Catchability	Seasonal variation in catchability for troll and driftnet fisheries. For the Taiwan longline fishery, where effort is based on standardised CPUE, catchability is

[5] The issue of effective sample size arises because the samples used to derive length-frequency estimates are generally neither random nor independent.

[6] The definition of steepness is the ratio of equilibrium recruitment at 20% of unexploited spawning biomass to equilibrium recruitment at unexploited biomass – i.e. for a steepness of 0.8, recruitment at 20%B_0 would be equal to 80% of recruitment at B_0.

	estimated separately for each season. Non-standardised fisheries have random deviations in catchability applied every 12 months, constrained by a log-normal distribution. Sensitivity analysis for effort creep of the Taiwanese fishery (0.5% per year) was incorporated via changes in catchability (note: changes in vessels is already accounted for under the standardisation of the CPUE).
Effort	Effort deviations are constrained by a prior distribution (for non-standardised fisheries). For the time period 1965-1975, the rapid decline in CPUE cannot be fully explained by a decline in biomass, according to the model estimates of biomass. Steep declines in CPUE at the start of a fishery can also be explained by a decline in catchability: e.g. by removal of the more catchable individuals, learned avoidance behaviour and genetic selection towards lower catchability. To deal with this reduction in CPUE, constraints on effort deviates in the model before 1975 were reduced, to allow estimated biomass to decline more slowly than CPUE. An alternative scenario with a constant constraint throughout was run as a sensitivity analysis.
Natural mortality	Fixed and constant over time and ages, with mean = 0.4. Previous stock assessments attempted to allow the model to estimate M, but this was not found to be particularly successful. Higher natural mortality for younger age groups was also tried in previous assessments but not found to make a significant difference to management parameters in the model output. M=0.3 and 0.5 were run as sensitivity analyses.
Movement	Not included in this model – fish are assumed to mix fully across all the regions

Interpretation of the stock assessment: Various ancillary analyses were run to provide the advice required for management. These were as follows:

- Evaluation of fishery impact via estimates of $B_{\text{current,F=0}}$ and $SB_{\text{current,F=0}}$ and related parameters (as described above); this was done by re-running the model with the estimated model parameters fixed and F=0

- Yield analysis: calculation of equilibrium catch and biomass for a given vector of relative age-specific fishing mortalities – the F-vector at which equilibrium yield is maximised gives *MSY* (maximum equilibrium yield) and B_{MSY} (equilibrium biomass giving *MSY*) for the specified selectivity assumptions

Fit diagnostics: As noted above, the performance of the model is evaluated by comparing predicted (output) to observed data – this was done with catch, effort, length-frequency and tagging data. Results are summarised by Hoyle et al. (2012) as follows:

- *Catch estimates in the model are constrained not to deviate far from the observed catch; the main case in which deviates were observed was in the standardised fisheries (Taiwan, Japan and Korea longline) in cases where standardised CPUE estimates are also constrained*
- *Tagging data are relatively uninformative in the model, because the number of tag returns is low, and because the model can vary fishery-specific tag reporting rates to fit the data. In general, the model estimates of tag return rates over time fit the data reasonably well*
- *Comparisons of observed and predicted proportions of fish in each length class in the catch (by fishery and quarter) show some patterning in the residuals for some of the distant water fisheries, apparently driven by the increasing size in the length-frequency data, which is difficult to explain. Likewise, residual trends are apparent in some domestic fisheries, which may coincide with changes in fishing strategy (e.g. in the main target species) (note that this is dealt with in the model via changes in the selectivity parameter, allowing these data to be down-weighed). Non-random sampling of either the catch or the population may also be a factor in some cases.*

Hoyle et al. (2012) note that further analysis of the length-frequency data is required to make sense of these patterns

- *The consistency of the model with observed effort data can be evaluated via plots of effort deviations (expected as compared to observed) over time. There is generally no temporal trend in effort deviates with time (although there is often a seasonal trend), suggesting that the model is a reasonably good fit to the effort data, with the exception of Taiwanese, Japanese and Korean longline fisheries prior to 1975, which were given a low weighting in the model and therefore allowed to deviate without much penalty*

Alternative scenarios and changes to the model: Sensitivity analyses were run to consider the impact of different assumptions on model output and uncertainty. All possible combinations of each set of factors were considered. The various scenarios and the outcome of these analyses are summarised in Table 14. It is clear that model assumptions and choices made during model design and analysis can have significant impacts on model output and conclusions about stock status – these different scenarios must therefore be taken seriously in the analysis of stock status (see above).

Table 14. Scenarios considered in the sensitivity analysis and their outcome (Hoyle et al., 2012).

Feature	Reference case scenario	Other scenarios considered	Outcome
Steepness	0.8	0.65, 0.95	Little impact on dynamics or model fit but big impact on MSY-related parameters ($F_{current}/F_{MSY}$ varied by a factor of three). Higher steepness → more optimistic assessment of stock status.
Growth curve	Estimated in the model	Fixed, incorporating variation based on longitude and/or sex	Significant changes to recruitment, biomass and management parameters. Changes that resulted in larger size of adult fish (e.g. higher Lmax) resulted in more pessimistic estimates of F/FMSY and SB/SBMSY.
Effort creep	None	0.5% per year	Introduction of effort creep increased the rate of biomass decline, as would be expected, and made estimates of B/BMSY slightly more pessimistic.
Natural mortality (M)	0.4	0.3, 0.5	Higher M resulted in higher estimates of recruitment and biomass, but similar estimates of spawning potential. Lower M resulted in slightly more pessimistic outcomes, because it implies a less productive stock.
CPUE data	All regions	Western regions (1 and 3) only; Eastern regions (2 and 4) only	Moderate impact on biomass estimates but little impact on management parameters.
CPUE data before 1975	Down-weighted	Weighting estimated from the CPUE standardisation	Negligible effect on estimates of management parameters.

Problems and uncertainties: The authors of the stock assessment (Hoyle et al., 2012) note that considerable improvements have been made to the model structure and inputs over the last few years, as set out above. In particular, the standardisation of the CPUE data (the most informative input to the model, aside from total catches) has likely made this dataset a better reflection of underlying trends in biomass. However, early steep declines in CPUE are likely to reflect changes in catchability as well as biomass, as noted previously, and there are concerns about how well one can standardise any commercial CPUE series. The incorporation of recent biological work on growth is also a significant step forward.

A key remaining problem is that despite restratification of the length-frequency data, it continues to conflict with the CPUE data. The authors note that some of the length-frequency data are poor quality, with spatial sampling bias and likely variability in selectivity due to spatial and temporal variability in fleet activities (and possibly albacore distributions). The weighting of the length-frequency data in the model had to be reduced in order to get a model fit to CPUE trends without predicting long-term trends in recruitment (for which there is no evidence). This resulted in lower estimates of biomass and higher estimates of fishing pressure, so could be considered a precautionary approach – but nonetheless remains a key source of uncertainty in the stock assessment.

The sensitivity analyses suggested that all management parameters were sensitive to assumptions about growth, steepness and natural mortality, with biomass-related management parameters also sensitive to assumptions about effort creep and the choice of CPUE time series. Median values for the key MSY-related reference indices are given in

Table 15 under the different assumptions tested in the sensitivity analysis, and biomass trends under these assumptions are shown in Figure 29. It is important to note, however, that these analyses change just one parameter at a time, keeping the other assumptions fixed at the reference model values. The structured uncertainty grid component of the sensitivity analyses evaluated the changes in model output resulting from every possible combination of these parameter values – the full result set is, however, not presented, since it would be much too large. In their discussion of this issue, Hoyle et al. (2012) identify key sources of uncertainty as follows:

- Steepness, as so often, is an intractable source of uncertainty in this assessment. Over the range 0.65-0.95, $F_{current}/F_{MSY}$ varied by a factor of three, while the median value of SB_{MSY}/SB_0 ranged from 8% to 34%.
- Model output was highly sensitive to the assumed growth curve, and Hoyle et al. (2012) recommend additional work in this area – particularly in relation to modelling approaching incorporating spatial and sex-specific growth rates. Alternatively, a model that is directly age-based (rather than calculating age from size data within the model) may be more robust to assumptions about growth curves.
- Effort creep relating to new vessels is accounted for in the CPUE standardisation, but additional effort creep is also likely (e.g. via technology to detect fronts with aggregations of fish, or to target larger fish). Incorporating effort creep had some impact on biomass ratios although less on fishing mortality ratios.
- The model was sensitive to assumptions about average natural mortality – because this partially controls the productivity of the stock. Like steepness, natural mortality is difficult or perhaps impossible to estimate accurately.
- Overall, the sensitivity analysis, taking all possible combinations of the various parameters included (see Table 14) showed a very broad range of variation in estimates of biomass, fishing mortality and management parameters – showing that the model still has a significant amount of structural uncertainty. This does not include parameter uncertainty, nor does it include a variety of other assumptions (e.g. in relation to catchability, selectivity, variation of natural mortality with age etc.).

While the model dynamics showed considerable sensitivity to many assumptions, the key conclusions about the stock status relative to management reference points were very robust.

A potentially important source of uncertainty that has not been explicitly addressed relates to albacore population connectivity in the South Pacific Ocean. The assumed unit stock is spread over an area of more than 50 million km^2, with spawning observed across a vast area. At least two observations are consistent with a population that is not rapidly mixing: i) CPUE trends appear to differ somewhat by region, and ii) different regions appear to have different growth rates (not just different size composition). Whether or not the aggregate population mixes at a rate that ensures genetic homogeneity, there may be structure at a level that is relevant for management. This uncertainty has not been explicitly examined. However, there is enough spatial coherence in the data and fishery distribution to at least qualitatively suggest that if sub-populations exist, they are probably being exploited in a reasonably similar way.

Table 15. Median values of some of the reference indices used in management under different assumptions. G2-7 = different growth models, S1 steepness = 0.65, S3 = 0.95, Cr2=0.5% effort creep per year, EC2=estimated weighting for early CPUE, M1 M=0.3, M3=0.5, CPUE2=CPUE from regions 1 and 3 only, CPUE3 = CPUE from regions 2 and 4 only

Model	$F_{current}/F_{MSY}$	$B_{current}/B_{MSY}$	$SB_{current}/SB_{MSY}$
2012 reference case model	**0.14**	**1.51**	**2.56**
G2	0.69	1.68	1.95
G3	0.35	1.66	2.49
G4	0.43	1.70	2.35
G5	0.26	1.62	2.62
G6	0.10	1.61	2.93
G7	0.10	1.55	2.87
S1	0.36	1.50	1.95
S3	0.11	1.74	3.95
Cr2	0.21	1.59	2.48
EC2	0.21	1.62	2.54
M1	0.38	1.56	2.09
M3	0.11	1.65	2.95
CPUE2	0.21	1.71	2.78
CPUE3	0.21	1.55	2.37

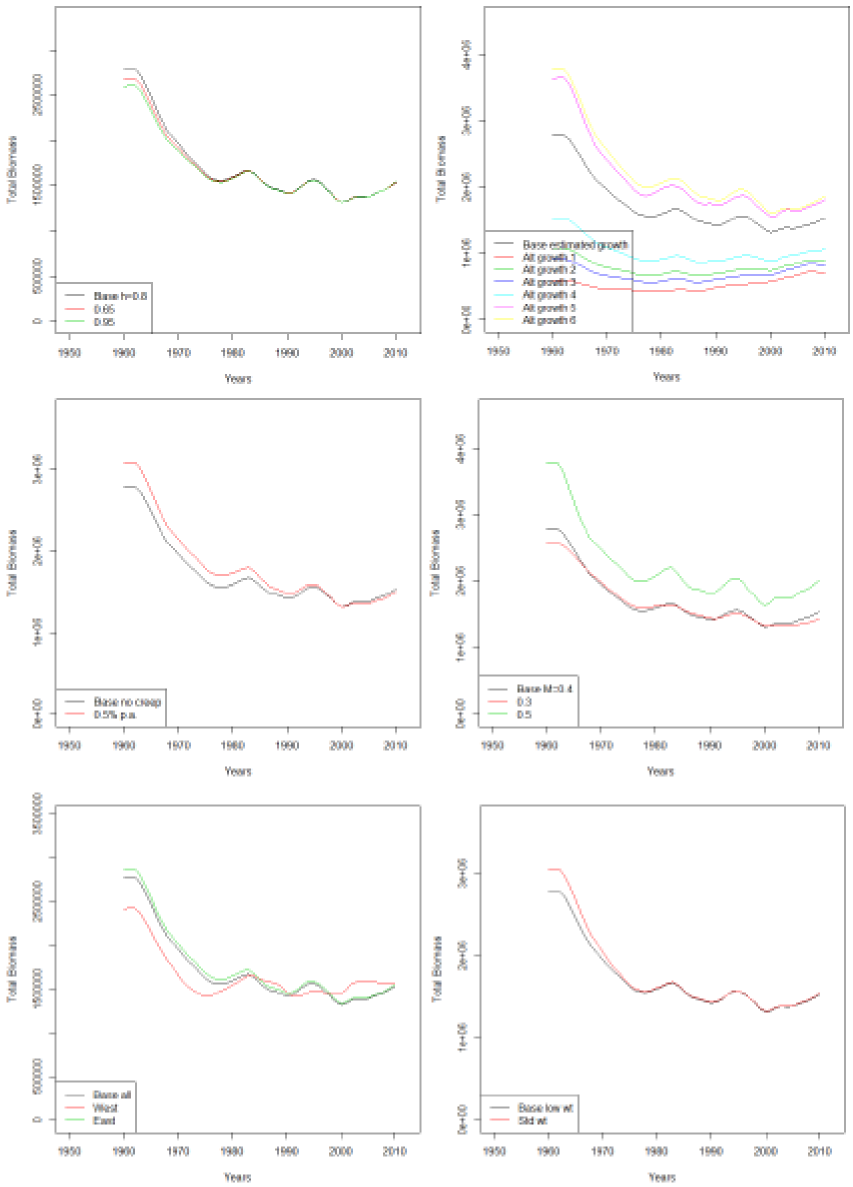


Figure 29. Trends in total biomass through time estimated by the model under alternative structural assumptions: 1. steepness, 2. growth, 3. effort creep, 4. natural mortality, 5. CPUE by region and 6. early CPUE. Base case (reference model) in black throughout.

3.4.8.2. <u>Yellowfin</u>

<u>Standardisation of CPUE data</u>: For longline CPUE, a similar approach was taken for yellowfin as for albacore (McKechnie et al., 2014). For yellowfin longline CPUE, previous assessments have relied on a standardised CPUE index from the Japanese longline fleet (JPLL), as well as indices from other distant-water Asian fleets – the latter mainly based on aggregated rather than operational data. The spatial range of operation of the Japanese fleet has, however, contracted over time, while the range of the other fleets has generally expanded – this is presumed to have caused changes in catchability which will bias the indices when standardisation is done by fleet. In addition, from the JPLL fishery only aggregate rather than operational data were available to update the data set. To get around this, the following methods were used:

- A matching up ('splicing') of the operational JPLL data available until mid-2010 with the aggregate data available since then;
- A more detailed analysis of all the operational data available, from SPC and from a collaboration with Taiwan;
- Analysis of the other longline data sets together, with the use of a variable 'vessel' rather than 'fleet' within the GLMM standardisation model, on the basis that catchability is more likely to be influenced by the vessel (design, power, fishing strategy of the skipper, expertise of the crew etc.) than by the fleet to which that vessel is assigned.

Purse seine CPUE is generally accepted to be uninformative as an index of stock biomass for two main reasons: i) effort cannot easily be measured (see discussion above); and ii) because purse seine fisheries target schools, their CPUE (catch per set or catch per day) is insensitive to changes in stock biomass – or 'hyperstable', particularly when FADs are used (Hoyle et al., 2014). The approach that has been taken in WCPFC tropical tuna stock assessments has been to incorporate purse seine CPUE indices, but weighted such that it is not informative as to the outcome of the stock assessment. The logic for this is that it allows changes in purse seine efficiency to be 'back-calculated' in the model, potentially providing some information on changes in the operation of the fisheries (Hoyle et al., 2014).

<u>Biological parameters</u>: How biological parameters for albacore are incorporated into the stock assessment is set out in Table 16.

Table 16. How biological parameters are dealt with in the yellowfin stock assessment (Davies et al., 2014).

Parameter	How incorporated into assessment
Reproductive potential of each age class	Same approach as albacore
Natural mortality	The increasing proportion of males in the catch with increasing size was assumed to be due to an increase in the natural mortality of females associated with sexual maturity (although the issue is raised in the albacore assessment as to whether they may be associated as well or instead with slower female growth rates after maturity).
Growth	A von Bertalanffy growth curve was assumed, but following empirical observation, deviation was allowed within the model for small fish (up to 80cm). It was assumed that growth did not vary by region

<u>Assumptions of the stock assessment</u>: Key assumptions in the stock assessment model are given by Davies al. (2014) as in Table 17.

Table 17. Main structural assumptions used in the reference case model for yellowfin (from Davies et al., 2014)

Category	Assumption
Tag reporting	Reporting rates externally fixed, based on the data available for that fishery and the confidence of the modellers in that data.
Tag mixing	Dynamics of tagged fish assumed to the same as non-tagged fish
Recruitment	Occurs as a discrete event once each year. Related to spawning potential with a

	one-year time lag via a Beverton-Holt stock-recruit relationship with steepness=0.8[7]; but with a weak penalty for deviation from this relationship. Last four recruitment deviates (from stock-recruit relationship) not estimated, and these and first 14 years not used in the estimation of the relationship.
Initial population	Equilibrium age structure in each region based on average total mortality (natural + fishing) in the first 20 quarters
Age and growth	Quarterly age classes, including a final plus group. Mean length for each age class constrained by von Bertalanffy growth curve; mean weight for each age class computed from length-at-age following weight-length relationship derived from available data. Within an age class, length normally distributed with standard deviation proportional to mean length. Mean lengths for the first 8 quarterly age-classes are allowed to deviate from a von Bertalanffy curve.
Selectivity	Constant over time within each fishery, but some fisheries are split into several time periods, to account for apparent differences in selectivity between these time periods. Selectivity functions can be shared between fisheries if appropriate – e.g. to allow inclusion of fisheries for which there are no length data.
Catchability	Allowed to vary seasonally. Non-standardised fisheries have random deviations in catchability applied every 2 years, with a variance set by the modellers according to the information available from that fishery.
Effort	Effort deviations are used to model random variation in the relationship between effort and fishing mortality. Penalties on deviation from the measured value of effort were inversely related to the variance in the data set, such that data sets having high variance had a lower penalty for deviation and hence a lower influence on the model fit.
Natural mortality	Externally estimated and fixed for each age class.
Movement	Occurs instantaneously at the beginning of each quarter via movement coefficients across common boundaries between regions. Seasonal but not interannual changes in movement coefficients, for which priors are set to assume relatively high rates of mixing.
Sexual maturity / reproductive potential	Externally estimated and fixed for each age class. The reproductive potential of each age class estimated as proportion of females x proportion of females mature x spawning frequency of mature females x fecundity

<u>Interpretation of the stock assessment</u>: Various ancillary analyses were run to provide the advice required for management. These were as follows:

- Evaluation of fishery impact via estimate of $SB_{F=0}$ at each time step; this was done by re-running the model with the estimated model parameters fixed and F=0.

- Evaluation of fishery impact via estimate of B_{0t} at each time step; this is done as above but also includes an adjustment to recruitment to remove any fishery impact via the stock-recruit relationship.

- Yield analysis: calculation of equilibrium catch and biomass for a given vector of relative age-specific fishing mortalities – the F-vector at which equilibrium yield is maximised gives MSY (maximum equilibrium yield) and B_{MSY} (equilibrium biomass giving MSY) for the specified selectivity assumptions.

[7] The definition of steepness is the ratio of equilibrium recruitment at 20% of unexploited spawning biomass to equilibrium recruitment at unexploited biomass – i.e. for a steepness of 0.8, recruitment at 20%B_0 would be equal to 80% of recruitment at B_0.

Fit diagnostics: As noted above, the performance of the model is evaluated by comparing predicted (output) to observed data – this was done with catch, effort, length-frequency and tagging data. Results are summarised by Davies et al. (2014) as follows:

- CPUE fits: The model estimates of longline exploitable biomass trends were generally consistent with the observed longline CPUE indices, in that predicted CPUE for these fisheries closely reflected the observed trends (Figure 30). Despite the shorter time series, the model predicted CPUE was also consistent with the observed indices for the purse seine fisheries. The model was, however, unable to predict the increase in nominal catch rates in Region 8, and there is also a poor fit to the decreased longline CPUE in Region 1.

- Length and weight data: For most longline fisheries, there is a reasonable fit to the length data. Close consistency between the model and observed length frequencies was obtained for the relatively large samples from the purse seine fisheries in regions 3, 7, and 8. Generally the model adequately describes the variability in catch length frequencies observed among the regions. The model predicted weight frequencies were likewise highly consistent with those observed for the longline fisheries, with some exceptions. The model also shows a generally good fit to observed median lengths and weight over time.

- Tag recaptures: The model predictions were broadly consistent with the observations, including the high numbers obtained from the PTTP in 2008-12, although predicted recaptures exceeded observed in some years. Time at liberty also closely matching the observations (Figure 31), indicating that model estimates of tag attrition due to fishing and natural mortality adequately describe that observations over all tag release programmes. The model predictions of the movement of tagged fish among the regions reflected the observed recaptures of tagged fish. Region 8 has the majority of observed tag recaptures, and the recaptures of tagged fish remaining in this region were well described by the model predictions. Reasonable estimates of the movement of tagged fish out of the release regions were obtained, although the model overestimated the movement from region 7 to region 3.

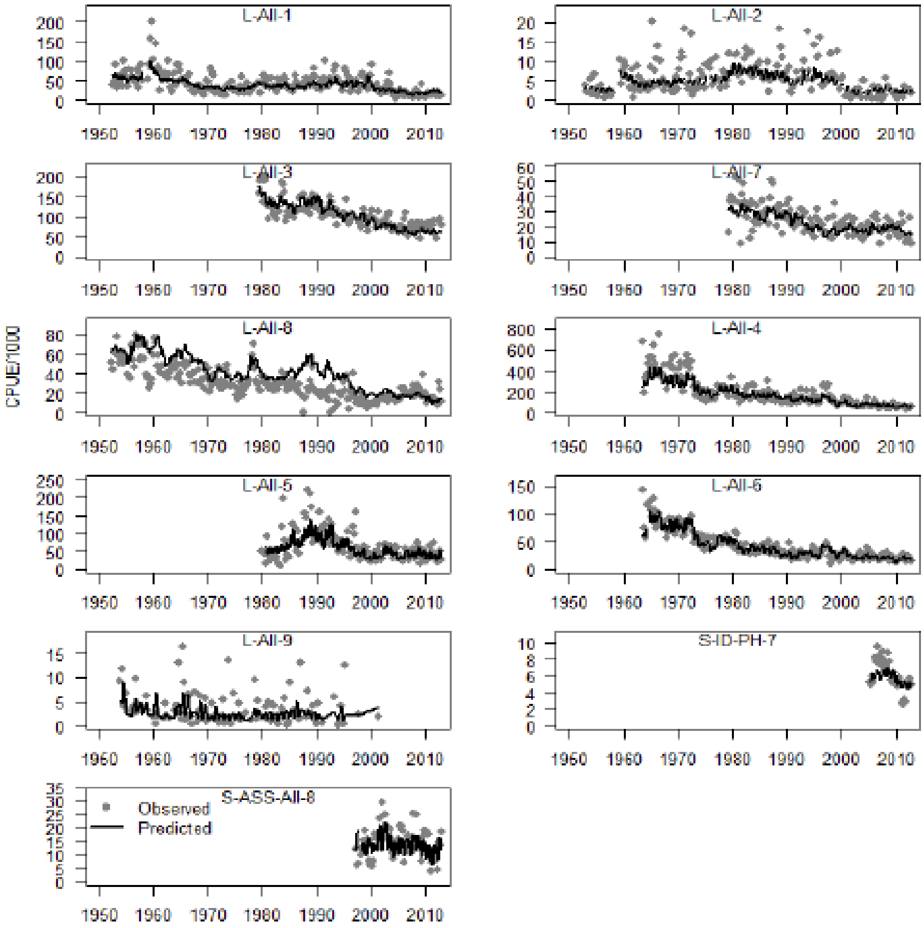


Figure 30. Observed (dots) and predicted (lines) CPUE for the reference case model, for each of the major longline fisheries (Davies et al., 2014, Figure 11).

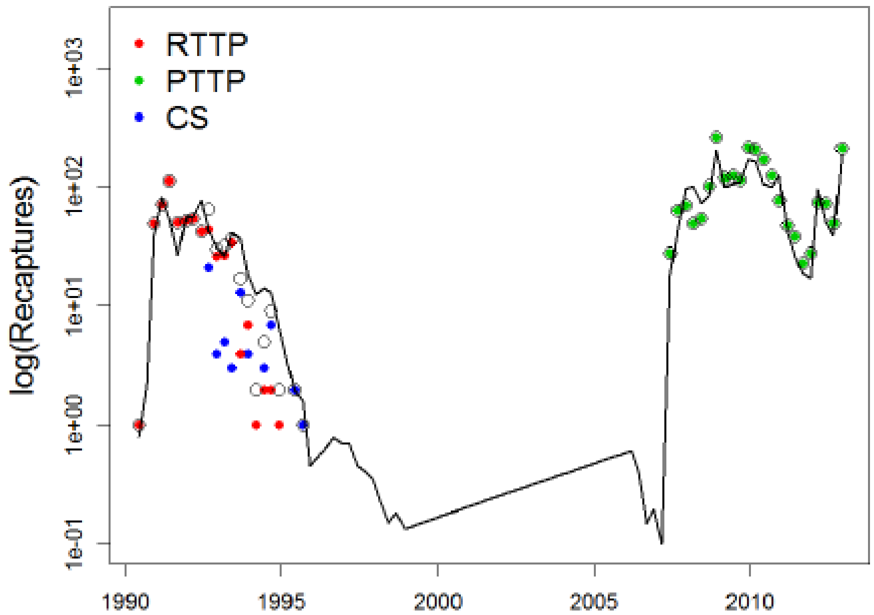


Figure 31. Observed (dots) vs predicted (line) tag recaptures for each of the tagging programmes: PTTP (green), CS (blue) and RTTP (red). Open circles = total number of recaptures in a given time period – dots and circles coincide when recaptures are all from one programme (Davies et al., 2014, Figure 17).

Alternative scenarios: Sensitivity analyses were run to consider the impact of different assumptions on model output and uncertainty. All possible combinations of each set of factors were considered. The various scenarios and the outcome of these analyses are summarised in Table 18. Estimated natural mortality and higher steepness resulted in estimates of stock status relative to MSY reference points which were somewhat more optimistic than the reference case model, while the other sensitivity analyses resulted in slightly more pessimistic estimates – but none of them were dramatically different.

Table 18. Scenarios considered in the sensitivity analysis and their outcome, ranged in order, more or less, from the most optimistic to the most pessimistic (Davies et al. 2014).

Feature	Sensitivity analysis	MSY reference points		
		C_{2012}/MSY	F_{curr}/F_{MSY}	SB_{curr}/SB_{MSY}
Natural mortality	Estimated by the model rather that fixed	0.8	0.51	1.55
Steepness	Steepness = 0.95	0.93	0.58	1.68
Ref. case model		1.02	0.72	1.37
Standardised CPUE indices	Include Philippines handline fishery index, which apparently conflicts with others in Region 7	1.02	0.72	1.37
Tag mixing	Reduce the tag mixing period to one quarter	1.12	0.72	1.37
Relative weighting of size data	Down-weighted relative to ref. case	1.03	0.73	1.34
Steepness	Steepness = 0.65	1.13	0.9	1.16

Uncertainties in the stock assessment: Overall, compared to the other two stock assessments, the yellowfin stock assessment team were relatively confident about the robustness of the assessment. They note: *Clear contrast was evident in the likelihood profile in respect of the total population scaling parameter values associated with a plausible range in absolute abundance (Annex 10.1). The maximum likelihood estimate for this parameter occurred at the nadir of the profile as could be expected, with a clear increase in the negative log-likelihood (i.e. a reduction in model fit) when larger or smaller fixed values were assumed. This result indicates there to be sufficient and coherent information in the observations from which absolute abundance can be inferred.* (Davies et al., 2014, p.35)

Nonetheless, there are, as always, sources of uncertainty in the assessment, notably:

- Conflicts between CPUE indices and PTTP tagging data in Region 8: with standardised longline CPUE suggesting an increasing trend in biomass in 2009-10, while tag returns suggest a decreasing trend. The effect of this conflict on the overall outcome of the assessment is reported, however to be 'minimal'

- Confounding of estimates of regional recruitment with movement patterns between regions: this results, reportedly, in a 'counter-intuitive' distribution of recruitment among regions 3,4 and 7, with nevertheless, a good overall fit to the data

- Recruitment estimates for the first 14 years are highly uncertain, and they have been excluded from the fitting of the stock-recruit model

- Steepness, as always, is unknown, and the same assumptions have been made here as for albacore, and indeed most other tuna stock assessments
- The sensitivity analysis where natural mortality was estimated provided a better fit to the data than the reference case model (where it was fixed), the authors recommend

that this model be treated with caution until there is a better exploration of the associated uncertainties

3.4.8.3. Swordfish

The following information is from Davies et al. (2013), unless otherwise indicated.

Model structure: The spatial structure of the model has been discussed above. In summary, the model assumes two biologically-connected populations, in Regions 1 and 2 (Figure 15).

Standardised CPUE: The key standardised CPUE indices for the stock assessment were:

- Japanese longline fishery, IC, 1952-2011
- Taiwanese longline fishery, 2C, 1967-2003
- ETBF fishery, Region 1, 1997-2011
- New Zealand longline, Region 2, 1993-2011
- Spanish longline, Region 2, 2004-2011

These were standardised as follows (SPC, 2014):

- Japanese longline aggregated data: Standardised using a GLM with variables year/quarter, 5º lat./long. cell and gear configuration (hooks between floats; HBF[8])
- Taiwanese longline aggregated data: The data were initially stratified by target species, and this analysis suggested a change in targeting behaviour ~2001. The data set was therefore split in two, with two standardised time series developed for the periods pre- and post-2001, with catchabilities allowed to vary. Data were standardised as for Japanese longliners
- ETBF data: Discards are included in CPUE as well as landings (from observer data). A standardised CPUE index is calculated for three different size classes (small, prime and large), based on individual weights per landing from processors, as well as an overall index. CPUE is standardised by fitting statistical models to i) the probability of attaining a catch and ii) the size of the positive catch, and then combining the two outputs
- New Zealand longline: The New Zealand longline data were standardised based on variables in the operational data records (similar to the Australian data). The trends in this standardised index (an increase over time) is generally in conflict with trends in the other data sets
- Spanish longline: CPUE for this fishery was difficult to standardise below of missing elements in the operational data on effort, including number of hooks, and because catch is reported by weight rather than number, as for the other fisheries. It was standardised based on latitude and longitude

Assumptions: Key assumptions in the stock assessment model are given by Davies al. (2013) as in Table 19.

[8] This determines the maximum depth of the line, and is adjusted depending on the target species – e.g. more hooks between floats for targeting albacore, and fewer for targeting swordfish. Since this fishery is mainly a bycatch fishery, the gear configuration cannot be assumed to be optimised for swordfish.

Table 19. Main structural assumptions used in the reference case model for swordfish (from Davies et al. 2013).

Category	Assumption
Catch data	Observation errors small
Size-frequency data	Frequencies normally distributed with variance determined by sample size and observed frequency
Recruitment	Occurs as a discrete event once each year. Annual variation in proportion of recruitment for each region estimated. Weakly related to spawning potential with no time lag via a Beverton-Holt stock-recruit relationship with steepness=0.8.
Initial population	Equilibrium age structure in the region as a function of the estimated natural mortality
Age and growth	20 year classes, including a final plus group, and fixed von Bertalanffy growth curve.
Selectivity	Constant over time within each fishery
Catchability	Allowed to vary seasonally. Non-standardised fisheries have random deviations in catchability applied every two years, with mean=0 and standard deviation=0.1.
Effort	For fisheries with a fitted CPUE index, effort deviations are constrained by a temporally-variable penalty weight based upon the index coefficient of variation (constrained to have a mean of 0.2). For other fisheries, variability of effort deviations was constrained by a penalty weight scaled by the square root of the effort.
Natural mortality	Externally estimated and fixed for each age class.
Movement	Occurs instantaneously at the beginning of each quarter via a constant diffusion rate (0.11) across region boundaries.

Interpretation: Various ancillary analyses were run to provide the advice required for management. These were as for albacore.

Fit diagnostics: As noted above, the performance of the model is evaluated by comparing predicted (output) to observed data – results summarised by Davies et al. (2013) as follows:

- Catch data: Overall, there is a very good fit to the observed catch from all fisheries by the model. Fisheries with less good fit were mainly those fisheries to which the CPUE was fitted, and even for those, there were no consistent temporal trends

- Effort data: For the key fisheries, effort deviations are relatively small and there is no evidence of a strong temporal trend

- CPUE indices: A generally good fit to the observed CPUE was obtained for the key fisheries time series used in the model fit. Model predictions are consistent with the increasing and declining trend in the distant-water time series in Region 1C, as well as the declining and increasing trend in the ETBF index. Some extreme values are not predicted by the model, however these observations have high uncertainty

- Weight-frequency: Overall, there is generally a good fit to the observed weight frequency data for the fisheries where data were considered to be most reliable (ETBF, New Zealand) with good correspondence between observed and predicted median weights. A poorer quality fit was obtained for the other fisheries but overall, the general trends in median weight are described by the model

- Length-frequency: Out of the two fisheries with high weighting (ETBF and New Zealand), a good fit was obtained for the NZ fishery over most of the time series, but the fit to the Australian data was relatively poor, with the model consistently over-estimating the median sizes caught

Alternative scenarios and key uncertainties: Sensitivity analyses were run to consider the impact of different assumptions on model output and uncertainty. The key sensitivity considered was the different growth/maturity/mortality schedules, as described above. The stock assessment output for these eight possible model variants is given in Table 7 above, and is not repeated here. The stock assessment report provides the outcome of the other sensitivity analyses against the reference case model only (i.e. growth model GHMHS). The various scenarios and the outcome of these analyses are summarised in Table 20.

Clearly, the New Zealand CPUE series adds a large element of uncertainty to the model, because it conflicts with the other CPUE data sets. Assumptions about steepness also make a significant difference compared, for example, with the yellowfin assessment. Assumptions about movement also have an impact, although a slightly less significant one. The selection of the appropriate growth schedule is, however, the most crucial uncertainty in the model, particularly given that several of the alternatives considered give a considerably more pessimistic outcome than the reference case model and the uncertainties considered below (see Table 7).

Table 20. Scenarios considered in the sensitivity analysis and their outcome, ranged in order, more or less, from the most optimistic to the most pessimistic (Davies et al., 2013).

Feature	Sensitivity analysis	MSY reference points		
		C_{curr}/MSY	F_{curr}/F_{MSY}	SB_{curr}/SB_{MSY}
CPUE series	Region 2 exclude Spanish and include New Zealand	0.53	0.19	3.39
Steepness	Steepness = 0.95	0.80	0.33	3.53
Movement	diffusion rate = 0.25	0.84	0.45	2.18
Relative weighting of size data	Down-weighted relative to ref. case	0.92	0.46	2.26
Ref. case model		0.98	0.51	2.17
Movement	diffusion rate = 0.05	1.00	0.48	2.34
CPUE series	Region 2 exclude Spanish series	1.05	0.57	2.03
Movement	diffusion rate = 0	1.13	0.65	1.96
Steepness	Steepness = 0.65	1.2	0.70	1.69

Overall, the stock assessment authors note the key uncertainties in the assessment as follows:

- Growth-maturity-mortality schedule is the key source of uncertainty, as already discussed

- Conflict between the New Zealand CPUE data series and the other CPUE indices, as noted above. The NZ indices reportedly derive from a relatively small spatial range of region 2, and the increasing trend in the indices is in contrast to the declining trend in median fish size caught within the same fishery. On this basis, the authors consider that the NZ indices most likely are not representative of trends in relative abundance, and have removed this data set from the key model runs used to derive the assessment of stock status

- The fishery in Region 2N showed an increasing trend in catchability over the last 20 years of the model, the cause of which is uncertain. The authors suggest that it is most likely a reflection of changes in fleet composition and targeting behaviour

- Conflicts were evident in the model fit to the size composition data. Most obvious was the poor fit to the ETBF length-frequency data, even though a relatively good fit was obtained to the more extensive weight frequency data set from the same fishery. The reasons for this conflict are unclear, but may derive from the sampling protocols used in the ETBF. Likewise, there was poor fit to the length-frequency data for the Taiwanese fleet post-2001

3.4.9. Key LTL species

All three species under assessment are predators, and therefore not key low tropic level species.

3.5. Principle Two: Ecosystem Background

This section of the report outlines the fishery's potential impacts on the wider ecosystem. Five key components are considered to cover the range of potential ecosystem elements that may be impacted by the fishery. These are:

(i) Retained, non-target species: species that are retained by the fishery (usually because they are commercially valuable or because they are required to be retained by management rules)

(ii) Bycatch (discarded) species: organisms that have been taken incidentally and are not retained (usually because they have no commercial value).

(iii) ETP species: Endangered Threatened or Protected species

(iv) Habitats: the habitats within which the fishery operates

(v) Ecosystem: broader ecosystem elements such as trophic structure and function, community composition, and biodiversity

Under each of those five components, particular attention was paid to:

(i) Outcome: the status of the impact or the risk that the fishery poses to that component

(ii) Management: the management strategy for the component

(iii) Information: the monitoring and information available to inform the outcome and management of the component

3.5.1. Definition of 'main' retained, bycatch (discarded) and ETP species

Definitions

Main retained and bycatch species: In the MSC context, "main" retained and bycatch species are those species which constitute over 5% of the total catch, or which can be considered as vulnerable, or of particularly high value to the fishery.

ETP: ETP (endangered, threatened and protected) species are defined by MSC as 'species recognised by national legislation or binding international agreements to which the jurisdiction of the fishery is party' (including listing on CITES Appendix I).

List of species of concern

Table 21 gives a summary of the 'main' retained and bycatch species and the ETP species used to score these sections of Principle 2. The rationale for how these were defined is presented in the relevant sections below, as well as the rationale for why other species were excluded, where applicable.

Table 21. Summary of 'main' retained and bycatch species and ETP species of interest to the assessment and the basis for the decision to include them.

Main retained species	Bigeye tuna (proportion of catch), striped marlin (proportion of catch, value), mahi mahi (value)
Non-main retained species	All other retained species (see Table 24)
Main bycatch species	None
Non-main bycatch species	Lancetfish (SICA), snake mackerel (SICA)
ETP species	Seabirds, turtles and marine mammals (EPBC Act, CITES

	Appendix I); short- and long-fin mako sharks (EPBC Act), oceanic whitetip shark (WCPFC), silky shark (WCPFC), porbeagle (EPBC Act), manta ray (EPBC Act)

3.5.2. Ecological Risk Assessment Process

AFMA assesses the impacts of fishing on all parts of Australia's marine environment as part of their strategy to pursue "Ecologically Sustainable Development" (AFMA, 2014a). This is achieved through hierarchical ecological risk assessments (ERAs), which encompass an ecosystem-based approach (discussed further in Section 3.5.7) to the potential impacts from fishing. The assessment comprises five components: target species; byproduct and discard species; ETP species; habitats; and communities. The ERAs are then used to prioritise research and data collection needs and subsequent necessary management actions for the fisheries.

The ERA process has three stages, each with increasing detail of analysis (AFMA, 2014a). The Level 1 scale, intensity, consequence analysis (SICA) screens the "low risk" elements, taking only the most vulnerable sub-components on for further analysis (e.g. the most vulnerable species, habitat type or community) (Hobday et al., 2011). The Level 2 productivity susceptibility analysis (PSA) provides a semi-quantitative analysis of the risk posed by fishing to all individual species, habitats and communities identified in the scoping stage. Above level 2 is a quantitative Sustainability Assessment for Fishing Effects (SAFE). This process estimates fishing impact and compares the impact to sustainable biologically based references points (Zhou et al, 2009). The SAFE methodology uses simple life history traits as reference points for data-deficient species in the fishery and uses them to estimate the effect of the fishing mortality rate to provide an ecosystem-based approach to management (Zhou et al., 2007).

AFMA included 390 species in the Level 2 analysis of the ETBF, of which 30 were classified as high risk. AFMA later reclassified this list, to take into account the management measures in place in the fishery, the absence of which was said to have resulted in a "potential over-estimate of the actual risk of some species" (AFMA, 2014a). A residual risk (risk remaining after the implementation of mitigation measures) assessment reduced the original 34 species to five.[9] This was followed by a Level 3 SAFE analyse of 207 teleost and chondrichthyan species (Zhou et al., 2007). Following the Level 3 SAFE assessment a total of nine species were classified to be at high risk from the effects of fishing in the ETBF. Table 22 lists all species assessed and their current ERA risk rating as designated by AFMA.

Table 22. Species of the Walker Seafoods assessment and their current AFMA ERA risk rating

Species common name	Species scientific name	Role in the fishery	Role in MSC assessment	Highest level of assessment	Risk rating from ERA process	Reason for rating
Bigeye tuna	*Thunnus obesus*	Primary quota species	Main retained	Level 2 PSA	Low	No comment
Striped marlin	*Tetraturus audax*	Primary quota species	Main retained	Level 2 PSA	Medium	Spatial uncertainty of range
Mahi mahi	*Coryphaena hippurus*	Byproduct	Main retained	Level 2 PSA	Low	No comment
Ocean sunfish	*Mola mola*	Bycatch	N/A	Level 3	Precautionary extreme high	Low retention

[9] Crocodile shark (*Pseudocarcharias kamoharai* was not considered in the residual risk assessment but was assessed to Level 3.

Species common name	Species scientific name	Role in the fishery	Role in MSC assessment	Highest level of assessment	Risk rating from ERA process	Reason for rating
					risk	rate in fishery
Ocean sunfish	*Mola*	Bycatch	N/A	Level 3	Precautionary extreme high risk	Low retention rate in fishery
Long-nosed lancet fish	*Alepisaurus ferox*	Bycatch	Bycatch	Level 2 PSA	Medium	Low PSA attribute score
Short-nosed lancet fish	*Alepisaurus brevirostris*	Bycatch	Bycatch	Level 2 PSA	Low	No comment
Snake mackerel	*Gempylus serpens*	Bycatch	Bycatch	Level 2 PSA	Low	No comment
Wandering albatross	*Diomedea exulans*	Bycatch	ETP	Residual risk assessment	Medium – management measures in place reduced rating from high risk.	Spatial uncertainty of range
Black-browed albatross	*Thalassarche melanophris*	Bycatch	ETP	Residual risk assessment	Medium – management measures in place reduced rating from high risk.	Spatial uncertainty of range
Shy albatross	*Thalassarche cauta*	Bycatch	ETP	Residual risk assessment	Medium – management measures in place reduced rating from high risk.	Spatial uncertainty of range
Grey-headed albatross	*Thalassarche chrysostoma*	Bycatch	ETP	Residual risk assessment	Medium – management measures in place reduced rating from high risk.	Spatial uncertainty of range
Tristan albatross	*Diomedea dabbenena*	Bycatch	ETP	Residual risk assessment	Medium – management measures in place reduced rating from high risk.	Spatial uncertainty of range
Antipodean albatross	*Diomedea antipodensis*	Bycatch	ETP	Residual risk assessment	Medium – management measures in place reduced rating from high risk.	Low PSA attribute score
Northern Giant Petrel	*Macronectes halli*	Bycatch	ETP	Residual risk assessment	Medium – management measures in place reduced rating from high risk.	Spatial uncertainty of range
Southern Giant Petrel	*Macronectes giganteus*	Bycatch	ETP	Residual risk assessment	Medium – management measures in place reduced rating from high risk.	Spatial uncertainty of range
Silky shark	*Carcharhinus falciformis*	Bycatch (no take)	ETP	Level 2 PSA	Medium	Low core range

Species common name	Species scientific name	Role in the fishery	Role in MSC assessment	Highest level of assessment	Risk rating from ERA process	Reason for rating
						overlap with fishery
Oceanic whitetip	*C.longimanus*	Bycatch (no take)	ETP	Level 2 PSA	Medium	Low core range overlap with fishery
Dusky shark	*C.obscurus*	Byproduct	N/A	Level 3	Precautionary high risk	Shark trip limit in place since 2000 that allows take of 20 sharks per trip. No limit on number of trips undertaken and restriction not developed through a scientific assessment: **no change in risk score**
Shortfin mako	*Isurus oxyrinchus*	Byproduct	ETP	Level 2 PSA	Medium	Low core range overlap with fishery
Longfin mako	*Isurus paucus*	Byproduct	ETP	Level 3	Precautionary high risk	High susceptibility & shark trip limit in place since 2000 that allows take of 20 sharks per trip. No limit on number of trips undertaken and restriction not developed through a scientific assessment: **no change in risk score**
Porbeagle	*Lamna nasus*	Byproduct	ETP	Residual risk assessment	Medium	Low core range overlap with fishery
Hammerheads (undifferentiated)	*Sphryna* spp.	Byproduct	Bycatch	Level 2 PSA	Medium	Low core range overlap with fishery
Pelagic thresher shark	*Alopias pelagicus*	Byproduct	N/A	Level 3	Precautionary high risk	High susceptibility

Species common name	Species scientific name	Role in the fishery	Role in MSC assessment	Highest level of assessment	Risk rating from ERA process	Reason for rating
Crocodile shark	*Pseudocarcharias kamoharai*	Byproduct	N/A	Level 3	Precautionary high risk	Low attribute score
Green turtle	*Chelonia mydas*	Bycatch	ETP	Level 2 PSA	Medium	Spatial range uncertainty
Leatherback turtle	*Dermochelys coriacea*	Bycatch	ETP	Residual risk assessment	Medium – management measures in place reduced rating from high risk.	Spatial range uncertainty
Loggerhead turtle	*Caretta caretta*	Bycatch	ETP	Level 2 PSA	Medium	Low PSA attribute score
Short-finned pilot whale	*Globicephala macrorhynchos*	Bycatch	ETP	Residual risk assessment	High	Low PSA attribute score
False killer whale	*Pseudorca crassidens*	Bycatch	N/A	Residual risk assessment	High	Spatial uncertainty
Dolphin (unidentified)	Various species	Bycatch	ETP	Residual risk assessment	Low/Medium risk for all dolphins	Low PSA attribute score
Australian Fur Seal	*Arctocephalus pusillus*	Bycatch	ETP	Level 2 PSA	Medium	Low PSA attribute score
New Zealand Fur Seal	*Arctocephalus forsteri*	Bycatch	ETP	Level 2 PSA	Medium	Low PSA attribute score

CSIRO have improved the ERA methodology and AFMA are currently in the process of assessing how to renew all the ERAs.

3.5.3. Retained Species

Table 24 shows the retained species for the ETBF, 2009-2013. Over this five-year period, the only species that consistently averaged over 5% of the catch in the ETBF, other than the target species of this assessment (yellowfin, albacore tuna and swordfish) was bigeye tuna (11.2%). Striped marlin is borderline (4.56%) and is an ETBF quota species. The assessment team therefore included this species as a 'main' retained species. Mahi mahi (dolphinfish) (3.44%) has also been included as 'main' in this assessment because it is a key species for Walker Seafoods Australia.

Southern bluefin tuna (SBT) could be defined as a 'main' retained for the ETBF as a whole (3.67%, vulnerable) but the species range does not overlap with areas fished by Walker Seafoods vessels and is not caught by client vessels. The species is managed under a separate management plan (SBTF management plan, 1995). Zones of likely SBT catch (core and buffer zones) are put in place during the winter months when SBT are present in waters off the east coast of Australia, to ensure that no SBT is taken in the ETBF without being covered with quota. This species has therefore not been considered further in this assessment.

The assessment team also considered whether opah, escolar, Ray's bream and ocean sunfish should be considered as 'main' retained species, based on their reported high vulnerability to fishing pressure (Cheung et al., 2005). The conclusion (based on the analysis summarised in Table 23) was that they should not be considered 'main'.

Table 23. Consideration of some minor retained species

Species	Landings ETBF 2013 (t)	Outcome of SICA on impact of fishing	Outcome of AFMA ERA process	Conclusion – main?
Opah / moonfish	0.009	>80	Medium	No
Escolar / black oilfish	0.063	>80	Low	No
Ray's bream	0.016	>80	Low	No
Ocean sunfish	499 individuals (2012), of which 498 discarded (AFMA 2014a)		Precautionary extreme high risk	No

In addition to the main retained species listed above, bait species were considered as retained species. The bait species used by the client group under assessment is mainly Argentinian squid (*Illex argetinus*), but they may also use New Zealand arrow squid (*Nototodarus sloanii* and *N.gouldi*) on occasion. The UoC uses around 10-12 tonnes of *Illex* squid a year, this translates to approximately 0.27-0.33% of the total catch weight of retained species in the ETBF (rate determined using retained catch weights for the last three years). Based on these estimates and the fact that these species are not vulnerable in their life history, neither bait species are considered "main".

The main source of data for this section of the report was taken from ETBF logbook data. Each licensed vessel fishing in the ETBF must carry and complete an AFMA logbook (logbook version AL06). Information must be submitted for all target and primary discarded catch as well as those species listed on the Protected Species List (discussed under section 3.5.5). Details recorded include number of fish kept, estimated weight of fish retained from hauls and whether an AFMA observer was onboard the vessel for that trip. For retained species, the logbook data are cross-checked against landings records obtained from processors.

Table 24: Logbook recorded retained species for ETBF (green highlighted rows denote MSC assessment target species, gold denotes main retained, non-target species and blue denotes ETP species – further details given below)

Species		Retained catch (kg)					% Catch composition				
		2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
Yellowfin tuna	*Thunnus albacares*	1,094.15	1,195.85	1,645.16	1,001.11	986.79	23.57	31.69	40.43	30.23	28.93
Albacore Tuna	*Thunnus alalunga*	1,339.76	722.17	648.51	561.48	640.89	**28.86**	**19.14**	**15.94**	**16.96**	**18.79**
Broad Billed Swordfish	*Xiphias gladius*	744.57	697.45	726.7	811.24	719.43	**16.04**	**18.48**	**17.86**	**24.5**	**21.09**
Bigeye Tuna	*Thunnus obesus*	563.16	398.36	353.18	439.13	383.54	**12.13**	**10.56**	**8.68**	**13.26**	**11.24**
Striped Marlin	*Tetrapturus audax*	217.52	165.82	192.57	156.18	145.26	**4.69**	**4.39**	**4.73**	**4.72**	**4.26**
Southern Bluefin Tuna	*T. maccoyii*	177.62	129.77	72.98	48.36	267.01	**3.83**	**3.44**	**1.79**	**1.46**	**7.83**
Mahi Mahi	*Coryphaena hippurus*	120.22	232.86	188.39	55.67	72.53	**2.59**	**6.17**	**4.63**	**1.68**	**2.13**
Shortfin Mako	*Isurus oxyrinchus*	64.7	45.12	46.06	58.92	38.59	1.39	1.2	1.13	1.78	1.13
Rudderfish	*Centrolophus niger*	99.14	59.92	28.07	40.32	25.92	2.14	1.59	0.69	1.22	0.76
Yellowfin tuna - small	*Thunnus albacares*	0	0	60.86	25.56	41.26	0	0	1.5	0.77	1.21
Moonfish / opah	*Lampris guttatus*	54.89	27.16	18.01	16.64	9.07	1.18	0.72	0.44	0.5	0.27
Ray's Bream	*Brama brama*	34.8	12.95	4.19	20.18	16.76	0.75	0.34	0.1	0.61	0.49
Escolar / Black Oilfish	*Lepidocybium flavobrunneum*	29.49	18.23	16.61	15.55	63.11	0.63	0.48	0.41	0.47	0.19
Blue Shark	*Prionace glauca*	23.09	13.2	8.62	11.71	13.4	0.5	0.35	0.21	0.35	0.39
Wahoo	*Acanthocybium solandri*	19.34	13.45	14.22	9.34	12.18	0.42	0.36	0.35	0.28	0.36
Bronze Whaler	*C.brachyurus*	14.81	9.47	9.59	7.15	4.3	0.32	0.25	0.24	0.22	0.13
Shortbilled Spearfish	*Tetrapturus angustirostris*	9.39	11.36	9.36	4.58	6.82	0.2	0.3	0.23	0.14	0.2
Skipjack Tuna	*Katsuwonus pelamis*	12.23	3.42	3.14	3.65	2.65	0.26	0.09	0.08	0.11	0.08
Tiger Shark	*Galeocerdo cuvier*	4.35	3.71	3.51	5.01	3.07	0.09	0.1	0.09	0.15	0.09
Hammerhead Shark	*Sphyrna* spp.	3.3	3.18	4.93	3.89	3.17	0.07	0.08	0.12	0.12	0.09
Dusky Shark	*Carcharhinus*	3.86	2.84	1.79	5.06	2.76	0.08	0.08	0.04	0.15	0.08

	obscurus										
Oceanic Whitetip Shark	*C.longimanus*	3.72	2.9	1.89	2.71	3.48	0.08	0.08	0.05	0.08	0.1
Blacktip shark	*Carcharhinus tilstoni*	0.28	0.75	7.27	3.6	1.49	0.01	0.02	0.18	0.11	0.04
Northern Bluefin Tuna	*T. orientalis*	3.16	0.39	0.72	0.93	0.22	0.07	0.01	0.02	0.03	0.01
Indo-Pacific Sailfish	*Istiophorus platypterus*	0.54	0.69	0.48	0.56	0.73	0.01	0.02	0.01	0.02	0.02
Thresher Shark	*Alopias* spp.	0.57	0.22	0.46	1.11	0.42	0.01	0.01	0.01	0.03	0.01
Porbeagle	*Lamna nasus*	0.11	0.34	0.29	0.24	0.61	0	0.01	0.01	0.01	0.02
Longtail tuna	*Thunnus tonggol*	0.57	0.34	0.23	0.37	0.1	0.01	0.01	0.01	0.01	0
Silky Shark	*C. falciformis*	0.1	0	0	0.15	1.39	0	0	0	0	0.04
Longfin Mako	*Isurus paucus*	0.37	0.31	0.08	0.1	0.06	0.01	0.01	0	0	0
Grey Reef Shark	*C. amblyrhynchos*	0.28	0	0	0	0	0.01	0	0	0	0
Lancet fish	*Alepisaurus* spp.	0.3	0.08	0.03	0	0	0.01	0	0	0	0
Ocean Sunfish	*Mola mola*	0.32	0	0	0.02	0.05	0.01	0	0	0	0
Shark other	N/A	0.03	0	0.03	0.04	0.3	0	0	0	0	0.01
Striped Trumpeter	*Latris lineata*	0.4	0	0	0	0	0.01	0	0	0	0
Whaler Shark	*Carcharhinus* spp.	0.05	0.47	0	0	0.04	0	0.01	0	0	0
Yellowtail Kingfish	*Seriola lalandi*	0.11	0.05	0.03	0.31	0.02	0	0	0	0.01	0
Australian Bonito	*Sarda australis*	0.05	0.03	0	0.07	0	0	0	0	0	0
Australian Tusk	*Dannevigia tusca*	0.01	0	0	0	0	0	0	0	0	0
Barracouta	*Thyrsites atun*	0.02	0.05	0.03	0.02	0	0	0	0	0	0
Black Kingfish	*Rachycentron canadum*	0.08	0.04	0.02	0.02	0	0	0	0	0	0
Blue Eye Trevalla	*Hyperoglyphe antarctica*	0.16	0	0	0	0	0	0	0	0	0
Blue Mackerel	*Scomber australasicus*	0	0	0	0.02	0	0	0	0	0	0
Bull Shark	*C.leucas*	0	0.09	0	0	0	0	0	0	0	0
Cardinal Fish	*Epigonus telescopus*	0	0	0.01	0	0	0	0	0	0	0

Cod - unspecified	N/A	0.03	0.01	0.02	0	0	0	0	0	0	0
Crocodile Shark	*Pseudocarcharias kamoharai*	0	0.01	0	0	0	0	0	0	0	0
Dogtooth Tuna	*Gymnosarda unicolor*	0	0	0.02	0	0	0	0	0	0	0
Dories	Oreosomatidae family	0	0.02	0	0	0	0	0	0	0	0
Eastern Little Tuna	*Euthynnus affinis*	0.05	0	0.01	0	0	0	0	0	0	0
Gemfish	*Rexea solandri*	0	0	0	0	0	0	0	0	0	0
Grouper and Cod	*Ephinephelus* spp.	0	0	0	0	0	0	0	0	0	0
Jackass Morwong	*Nemadactylus macropterus*	0.01	0	0	0	0	0	0	0	0	0
Jewfish	*Sciaenidae* family	0	0	0	0	0	0	0	0	0	0
Luvaru	*Luvarus imperialis*	0	0	0.06	0	0	0	0	0	0	0
Mackerel	Scombridae family	0.04	0.01	0.05	0.15	0.01	0	0	0	0	0
Mixed fish	N/A	0	0.01	0.19	0	0	0	0	0	0	0
Narrow barred spanish mackerel - Spanish	*Scomberomorus commerson*	0.11	0.18	0.2	0.04	0.02	0	0	0	0	0
Oarfish	*Regalecus glesne*	0	0.03	0.03	0	0	0	0	0	0	0
Pink snapper	*Pagrus auratus*	0	0	0.07	0.08	0.02	0	0	0	0	0
Queenfish	*Scomberoides* spp.	0.03	0	0	0	0	0	0	0	0	0
Rainbow Runner	*Elagatis bipinnulata*	0	0.01	0.03	0	0	0	0	0	0	0
Red Gurnard	*Chelidonichthys kumu*	0.02	0	0	0	0	0	0	0	0	0
Rosy Jobfish / King Snapper	*Pristipomoides filamentosus*	0.02	0	0	0	0	0	0	0	0	0
Roughskin Shark	*Centroscymnus & Deania spp*	0	0	0	0.01	0	0	0	0	0	0
Sandbar Shark	*C.plumbeus*	0	0	0	0.06	0.1	0	0	0	0	0
School Shark	*Galeorhinus galeus*	0	0	0	0	0.01	0	0	0	0	0
Shark fins	N/A	0	0	0.01	0	0.03	0	0	0	0	0
Sharkfin guitarfishes	Rhinobatidae &	0	0	0	0	0.04	0	0	0	0	0

- Sand sharks	Rhinidae spp										
Snake Mackerel	*Gempylus serpens*	0	0.02	0	0	0	0	0	0	0	0
Southern Frostfish	*Lepidopus caudatus*	0	0	0.03	0	0	0	0	0	0	0
Southern rock cod	*Lotella* & *Pseudophycis* spp.	0	0	0	0.03	0	0	0	0	0	0
Sweep	Scorpididae	0	0	0	0	0	0	0	0	0	0
Sweetlips	*Plectorhinchus* spp.	0.02	0	0	0	0	0	0	0	0	0
Trevally	*Caranginae* spp	0.01	0	0	0	0	0	0	0	0	0
Whiskery Shark	*Furgaleus macki*	0	0	0.05	0	0	0	0	0	0	0
Total		4,642	3,773	4,069	3,311	3,468					

3.5.3.1. Bigeye Tuna

Bigeye tuna (*Thunnus obesus*) are a tropical and sub-tropical species with a circumglobal distribution. The biology of the species is similar to that of yellowfin, in that they are relatively fast growing, and reach a maximum size of ~200 cm. Their behaviour is also similar to that of yellowfin, with juvenile and small adult bigeye schooling at the surface, sometimes mixed with other tunas, and often associating with floating objects, while adult bigeye tend to stay in deeper waters. The diet of bigeye tuna comprises a wide variety of fishes, cephalopods and crustaceans.

There is some uncertainty about the stock structure of this species, with little information available on the extent of mixing across the central Pacific Ocean. Genetic analysis has failed to reveal significant evidence of widespread population subdivision and tagging data are ambiguous about spatial stock structure in that some individual migrations of over 4,000 nautical miles have been detected over periods of one to several years. Most tags, however, are recovered much closer to the tagging point. Currently, stock assessments of bigeye tuna are routinely undertaken for the WCPO and EPO separately (Harley et al., 2014). The species is an important component of tuna fisheries throughout the Pacific Ocean, being the most valuable species of tropical tuna, weight for weight. Bigeye are taken by both surface gears (mostly as juveniles) and longline gear (as adults). They are a principal target species of both the large, distant-water longline fleets, as well as the smaller, fresh sashimi longline fleets based in several Pacific Island countries and Hawaii.

According to WCPFC Tuna Fishery Year Book (2013a) the total bigeye catch for the WCPO in 2013 was 150,281 tonnes, which is ~average for the last decade or so. 2013 was, interestingly, the year in which WCPFC estimates of purse seine catches in their area were greater than longline catches for the first time (Figure 32). Note, however, that there remains considerable uncertainty regarding the accuracy of purse-seine catch estimates, with logsheet data considered to be an underestimate of the true catch (Davies et al., 2011). Some other smaller fisheries also take bigeye, including small, coastal purse seine and pole-and-line fisheries in Japan and artisanal mixed-gear fisheries in the Philippines and Indonesia (Davies et al., 2011).

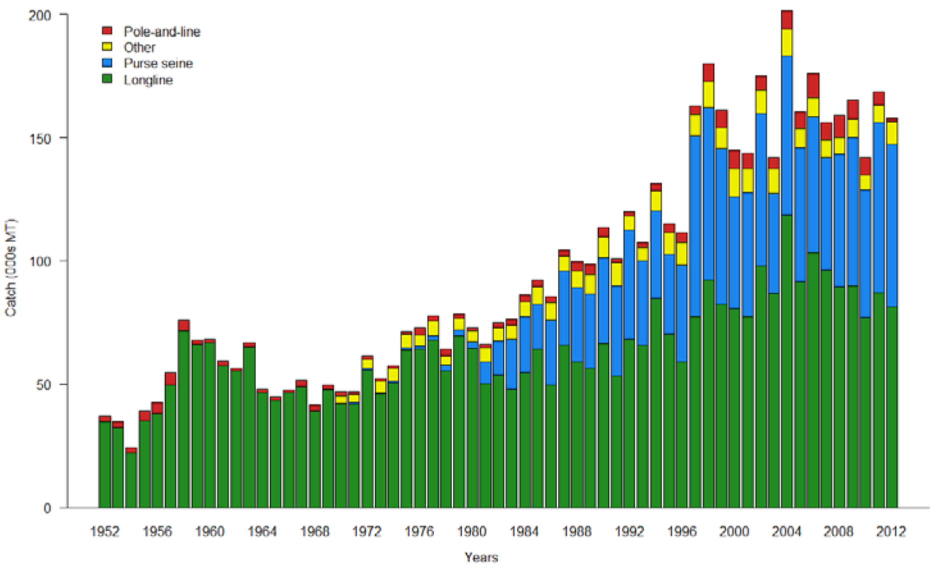


Figure 32. Bigeye tuna catch by gear and year for the WCPFC - Convention Area (source: Harley et al., 2014)

Outcome: As for the target species for this assessment, stock assessments for bigeye are carried out by SPC, most recently in 2014 (Harley et al*.,* 2014). The stock assessment methodology and data sources are largely the same as for yellowfin (see Section 3.4.8). In 2012, WCPFC formally adopted a biomass limit reference point for bigeye (and for yellowfin), set at 20% of the average annual total biomass over a recent period in the absence of fishing ($SB_{current,F=0}$) (the same as for yellowfin and albacore – see Section 3.4.5).

Based on the results from the reference case model and with consideration of results from sensitivity model runs the main conclusions of the assessment were as follows (Figure 33, Table 25):

- Current catches exceed maximum sustainable yield (MSY)
- Recent levels of fishing mortality exceed F_{MSY}
- Recent levels of spawning biomass are most likely at (based on 2008-11 average) or below (based on 2012) SB_{MSY}
- Recent levels of spawning biomass are most likely at (based on 2008-11 average) or below (based on 2012) the agreed limit reference point of 20% SBF=0, and therefore also below candidate biomass-related target reference points currently under consideration for skipjack tuna, i.e., 40-60% SB_F=0

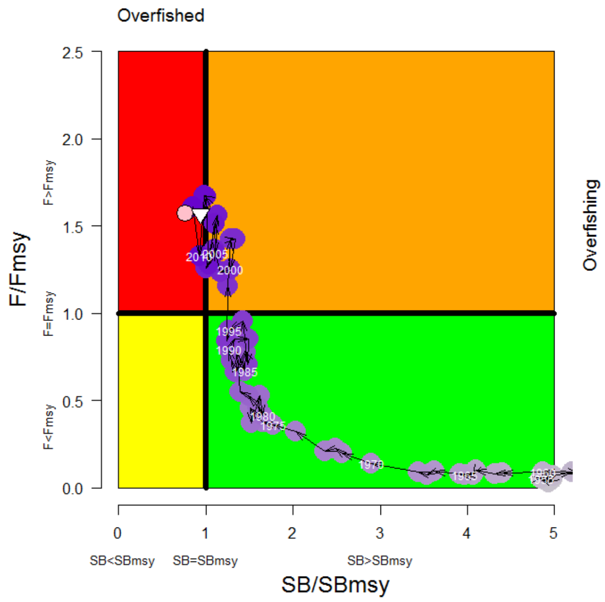


Figure 33. Temporal trend in annual stock status, relative to SBMSY (x-axis) and FMSY (y-axis) reference points, for the period 1952–2011 from the reference case. The colour of the points is graduated from mauve to dark purple through time and the points are labelled at 5-year intervals. The white triangle represents the average for the current period and the pink circle the latest period (source: Harley et al., 2014)

Table 25. Estimated stock status of bigeye relative to various reference points, for i) the reference case stock assessment model (parameterisation considered most plausible), ii) median value for all parameterisations tested; iii) 5% percentile of values; iv) 95% percentile of values. C=catch, F=fishing mortality, SB=spawner potential, curr=average 2009-2011. Colour coding: red – parameter on wrong side of reference point with 95% probability or greater, orange – within range of reference point. Source: Harley et al. (2014) or data given therein.

Type of comparison	Ratio	Reference case model	Grid median	Grid 5%ile	Grid 95%ile
Stock status vs. MSY reference points	C_{2012}/MSY	1.45	1.47	1.35	1.57
	F_{curr}/F_{MSY}	1.57	1.57	1.22	2.14
	SB_{curr}/SB_{MSY}	0.94	0.94	0.64	1.25
	SB_{2012}/SB_{MSY}	0.77	0.78	0.53	1.01
vs. situation in absence of fishing	$SB_{curr}/SB_{curr,F=0}$	0.20	0.20	0.14	0.23
	$SB_{2012}/SB_{2012,F=0}$	0.16	0.17	0.12	0.19
vs. agreed limit ref. point	$SB_{curr}/20\%SB_{curr,F=0}$	1	1	0.7	1.15
vs. possible target ref. points	$SB_{curr}/40\%SB_{curr,F=0}$	0.5	0.5	0.35	0.58
	$SB_{curr}/60\%SB_{curr,F=0}$	0.33	0.33	0.23	0.38

In other words, the spawner biomass is estimated to be ~at the limit reference point and most likely below the MSY reference point (with less than 95% probability), while catch and fishing mortality are above MSY reference points (with greater than 95% probability); stock biomass is depleted by ~77-88% by fishing.

Management: Management of WCPO bigeye is the responsibility of the WCPFC at the regional level through CMMs 2012-01, 2013-01 and 2014-01 (already described previously in Section 3.4.6 in relation to yellowfin – the same provisions apply for bigeye). For bigeye tuna, the target reference point for CMM 2014-01 is set at F_{MSY} (as for yellowfin). The emphasis of the CMM is purse seine fisheries (specifically, reduction of effort on FADs). The main measure for bigeye taken in longline fisheries is that CCMs with catch limits shall report monthly the amount of bigeye catch by its flagged vessels to the Secretariat by the end of the following month. Reports shall include catch of the month and catch for the year to date. When 90% of the catch limit for a CCM is reached, the Secretariat shall notify that to all CCMs.

The PNA vessel-day scheme, although focusing on skipjack, also has a management effect on bigeye as it does on yellowfin. Reportedly, PNA, unhappy at the outcome of WCPFC11 in relation to bigeye, are aiming to take additional measures to control bigeye effort in their EEZs, including charging a premium access fee for bigeye fishing days, but it is not clear as yet whether this will be done and how it will work.

At the Australian national level, this species is managed under the ETBF Management Plan (2010) and has a Total Allowable Commercial Catch (TACC), but as for the other tuna species, the CHSP is not applied to bigeye in the ETBF, because of their low share of the total catch on the stock.

Information: Information on bigeye is provided by each CCM to SPC, who manage and process the data for use in stock assessments and associated analyses with the output scientific advice used by the WCPFC, other regional or sub-regional organisations (e.g., FFA, PNA) and individual SPC members to manage the fishery. The data include fisheries-dependent data structured by flag state, region of operation and gear type obtained through vessels, observers, port samplers and agents (e.g. catch and effort data, unloadings data, port sampling data, transhipment data, size composition data and observer data based on

5% coverage of the longline fleet and 100% coverage of the purse seine fleet in the WCPFC convention area), as well as tagging data, oceanographic data and data from biological research undertaken by CCMs and SPC. In the ETBF, landings data are gathered from logbooks and processors records (including weights of individual fish), and discards are recorded by observers, although discarding of bigeye is not likely.

3.5.3.2. Striped Marlin

This species is the only type of marlin allowed to be landed in the ETBF; the take of blue (*Makaira nigricans*) and black marlin (*Makaira indica*) by commercial fisheries has been prohibited since 1998. Striped marlin (*Kajikia (Tetrapturus*) *audax*) is a widespread tropical and subtropical, pelagic species, which rarely enters coastal waters (Collette et al., 2011a). Within the pelagic zone, most catches have been reported from surface waters (less than 100 m deep) (Brill et al., 1993, Domeier et al., 2003 – both cited in Davies et al., 2012). The species is listed as a Highly Migratory Species under Annex I of the 1982 Convention on the Law of the Sea (FAO, 1994). Striped marlin biology and ecology is poorly understood due to a number of factors, including their highly migratory behaviour and relative low abundance. They are thought to spawn in the southwest Pacific between November and December and display very high initial growth rates in their first year (up to 45% of their maximum size in the first year of life (Melo-Barrera et al., 2003 cited in Davies et al., 2012)). At least three stocks are thought to be present in the Pacific: north-west, east and south-west stocks.

Outcome: The most recent stock assessment for striped marlin was undertaken by SPC in 2012 (Davies et al. 2012). The main conclusions were as follows:

- Total and spawning biomass are estimated to have declined to ~50% of their initial levels by 1970, with more gradual declines since then, to ~one third of the pre-fishing level ($B_{current}$ /B_0 = 36%; $SB_{current}$ /SB_0 =29%);
- Except under some assumptions, $F_{current}$/F_{MSY} was estimated to be lower than 1, with a median value of 0.58, therefore, based on these results, overfishing is not occurring in the striped marlin stock;
- There is estimated to be a ~50% probability that $SB_{current}$ is less than SB_{MSY}; given the recent declining trend in spawning biomass, it was concluded that striped marlin is approaching an overfished state.

The Kobe plot for striped marlin is given in Figure 34, and the estimated stock status in relation to various reference points is given in Table 26. There is no agreed limit reference point for striped marlin – taking the tuna limit reference point (just for purposes of comparison), current spawner biomass is estimated to be above it with <95% probability.

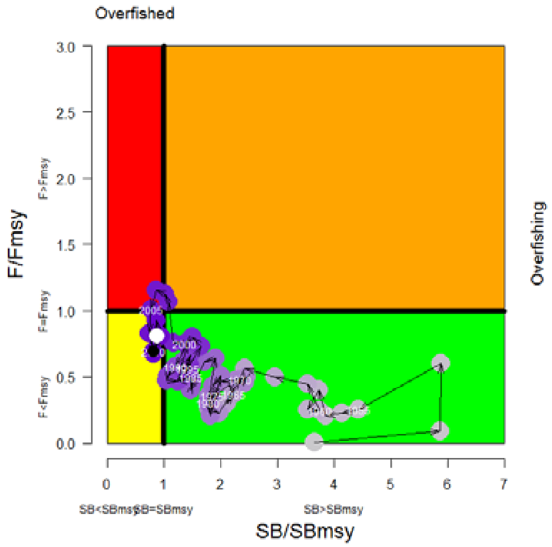


Figure 34. Temporal trend in annual stock status, relative to SBMSY (x-axis) and FMSY (y-axis) reference points for the Reference case for the period 1952–2010. The colour of the points is graduated from mauve (1952) to dark purple (2010) and the points are labelled at five-year intervals. The white circle represents the average for the period 2007-10 and the black circle the 2010 values (source: Davies et al., 2012)

Table 26. Estimated stock status of striped marlin relative to various reference points, for i) the reference case stock assessment model (parameterisation considered most plausible), ii) median value for all parameterisations tested; iii) 5% percentile of values; iv) 95% percentile of values. C=catch, F=fishing mortality, SB=spawner potential, curr=average 2007-2010. Colour coding: green – parameter on right side of reference point with 95% probability or greater, orange – within range of reference point. Source: Davies et al. (2012) or data given therein.

Type of comparison	Ratio	Reference case model	Grid median	Grid 5%ile	Grid 95%ile
Stock status vs. MSY reference points	C_{2011}/MSY	0.85	0.81	0.24	0.99
	F_{curr}/F_{MSY}	0.81	0.58	0.08	2.53
	SB_{curr}/SB_{MSY}	0.87	1.09	0.32	2.89
	SB_{2011}/SB_{MSY}	0.90	1.14	0.33	2.78
	B_{curr}/B_{MSY}	0.83	0.96	0.37	1.96
vs. situation in absence of fishing	$SB_{curr}/SB_{curr,F=0}$	0.34	0.43	0.14	0.85
	$B_{curr}/B_{curr,F=0}$	0.46	0.52	0.20	0.89
	$SB_{2011}/SB_{2012,F=0}$	0.37	0.46	0.14	0.86
vs. tuna limit ref. point	$SB_{curr}/20\%SB_{curr,F=0}$	1.7	2.15	0.7	4.25

<u>Management by WCPFC</u>: There is no specific WCPFC CMM relating to striped marlin. The species is covered by the 2005 Resolution on Non-Target Fish Species (Resolution-2005-03) which encourages CCMs to "*avoid to the extent practicable, the capture of all non-target fish species that are not to be retained. Any such non-target fish species that are not to be retained, shall, to the extent practicable, be promptly released to the water unharmed*". This does not apply in this fishery, however, since striped marlin is a target species which is covered by ETBF quota allocations.

<u>Management by the ETBF</u>: Striped marlin is one of the five quota species in the ETBF – i.e. it is covered by a TACC and associated ITQ allocations. For the tuna species, the TACC has been fixed for several years and the CHSP harvest strategy model (see

Figure 28) is not run, because Australia has too low a proportion of the total catch on the stock to be able to influence stock status via management at ETBF level. Conversely, for swordfish, Australia has >50% of the total catch on the (sub)stock in question (see analysis in Section 3.4.6), and therefore uses the harvest strategy to set the TACC annually at an appropriate level for the stock status. Striped marlin is in an intermediate position between these two situations: TTRAG (2013a) notes that the Australian share of the commercial catch is unknown but <50%, while the recreational catch is potentially large but uncertain. For the minute, AFMA continue to use the harvest strategy as input in setting the TACC for striped marlin, but report that their confidence in it is 'low'. AFMA have commissioned an MSE analysis to consider what is the appropriate proportion of the total catch above which the harvest strategy model should be used to set the TACC; this has yet to be reported on. The TACC for the 2014-15 fishing season for striped marlin in the ETBF was 351 tonnes.

Information: As with bigeye tuna, the SPC gathers data from CCMs. Data are then used, for example for the revision of stock assessments and associated investigations. At the national level, data are collected on the catch of this species under the conditions of the ETBF Harvest Strategy (see section 3.4.6 on bigeye for more details). A significant problem for striped marlin specifically is that the recreational catch may be quite high proportional to the commercial catch – both from retention by recreational fishers from release mortality.

3.5.3.3. Mahi mahi

Mahi mahi (*Coryphaena hippurus*, also known as dolphinfish) is a fast-growing, coastal and pelagic fish (Collette et al., 2011b). This species is found throughout the world's tropical and subtropical oceans to depths of ~85 metres, (according to Bennetti et al. (1995), mahi mahi have high metabolic rates and can only survive in waters with high dissolved oxygen). It is one of two *Coryphaena* species found in Australian waters (Kingsford and Defries, 1999). Larval stages of mahi mahi have been caught along the east coast of Australia from Queensland to the end of the East Australian Current (EAC) in New South Wales (NSW). There is some evidence that limited spawning occurs in NSW but the majority is thought to occur off the coast of Queensland at multiple times in the year (Kingsford and Defries, 1999). A highly fecund species, an exponential increase in egg numbers with increasing fish length has been reported and females can produce up to 1.5 million eggs per female (DPI, 2009). Mahi mahi can grow to a maximum of two metres, although most caught are around one metres in length. The maximum lifespan is thought to be four years but more commonly two (Lessa et al., 2008 in Collette et al., 2011b). Independent tagging studies in NSW indicate the species is strongly site-associated (Kingsford and Defries, 1999). It is a popular recreational target species and has high commercial value, but is of 'least concern' on the IUCN Red List (Collette et al., 2011b), mainly due to its high growth rates and fecundity and high natural mortality.

Outcome: There is no stock assessment available for this species. A scale intensity consequence analysis (SICA) was therefore conducted by the assessment team with the stakeholders on the 12th August 2014. The MSC equivalent score for this PI came to a score of 80 (see Appendix 2. SICA tables with scores and justifications). As the score was 80 or above, a productivity-susceptibility analysis (PSA) did not need to be conducted. Ecosystem models for the ETBF predicted biomass reductions (9%) of this species in relation to a 50% reduction in fishing effort, presumably due to predation by other target or bycatch species such as marlins and hammerhead sharks (Griffiths et al., 2010).

Management: At the regional level, there is no specific CMM relating to mahi mahi. Like striped marlin, the species is covered by the 2005 Resolution on Non-Target Fish Species (Resolution 2005-03), where it is not a target species (which does not include the ETBF). At the national level, mahi mahi are not subject to any specific catch restrictions or quotas in the commercial sector under the ETBF Management Plan (2010), and is also permitted to be retained by recreational fisheries, although subject to a bag limit of three per trip or per day (DoF, 2013). Similar limits are in place in the eastern states recreational fisheries. Effort limitation is the only means of management for this species at present. This is provided through the provision of SFRs. The number of SFRs is set by AFMA for quota species in the ETBF Management Plan (2010), and this sets a limit on effort on all the target species of the ETBF.

Information: Fisheries-dependent data are provided through the mandatory reporting in ETBF logbooks, through the carriage of observers and independently verified catch disposal records (CDRs). In June 2007, a PSA was conducted by AFMA for the ETBF. Mahi mahi scored as "low risk" to the impact of longline gear for this fishery (AFMA submission to the assessment team; available on request to MEC). The TTRAG (2013b) has reviewed catch data of mahi mahi in recent years in the ETBF but CPUE has never been standardised and no trends in the data were identified. It was also noted that due to large amounts of recreational catch of this species, data and tagging studies need to be included with logbook and observer data when formalising management actions. At the time of writing, the TTRAG scientific members were in the process of comparing all relevant indices relating to the nominal CPUE for this species.

3.5.4. Bycatch

Walker Seafoods give five reasons why discarding might take place:

- Regulatory – discarding obligatory (e.g. various shark species, blue and black marlin)
- Size – if <15kg has no value
- Quality e.g. if too damaged, if just head remains from shark or cetacean depredation (although fish with small or medium amounts of damage are landed – pers. obs.)
- Alive – shortfin mako must be released if alive
- Species of no value – e.g. lancetfish

Note that 'over-quota' is not a reason for discarding. Vessels must leave port with some quota, and over-quota catch may be landed, with 28 days available to buy or lease enough quota to cover the catch. In practice, fishing strategies are very responsive to quota availability, so this, reportedly, rarely happens.

The information on bycatch in the fishery was provided through ETBF observer catch composition data for the last five years and through the SICA stakeholder meeting, conducted by the team on the 12th August 2014. Stakeholders agreed that the main risks of discarding were to longnose lancetfish (*Alepisaurus ferox*) and snake mackerel (*Gempylus serpens*). The results are discussed below and the rationales for these species can be found in Appendix 2. SICA tables with scores and justifications.

Information on discarded bycatch comes mainly from observers, although it is also reported in logbooks (but perhaps not fully – see below). AFMA sets observer coverage in the ETBF at a minimum of 5% of all hooks set and hauled in each fishing area (Commonwealth of Australia, 2014), and coverage has averaged 6.2% of the total number of hooks deployed in recent years (WCPFC, 2013b).

3.5.4.1. Lancetfish

Alepisaurus spp. are circumglobal, mainly nocturnal species of fish. Usually inhabiting tropical and subtropical waters, lancetfish feed on teleost fish, cephalopods and crustaceans in surface waters to depths of below 1,591 metres (Post, 1984 and 1990). There are two species of lancetfish; the IUCN Red List assessed *A.ferox* as “Least Concern” and has yet to evaluate *A.brevirostris*. The conclusion was attributed to its widespread distribution and the depth to which it is found, which offers a degree of protection from the impacts of fishing gear (Paxton, 2010). The biology and ecology of this species is largely unknown but studies have shown that juveniles of the species are synchronous hermaphrodites (Smith and Atz, 1973).

Outcome: As there is little information surrounding the stock status of these species, a SICA was conducted by the assessment team and stakeholders on the 12th August. The MSC equivalent score for this PI was determined as 100 (see Appendix 2. SICA tables with scores and justifications). As the score was above 80, a productivity-susceptibility analysis (PSA) did not need to be conducted. A PSA conducted by AFMA in 2007 ranked lancetfish (one species) as “medium risk”, due to a number of missing productivity attributes.

Management: As with mahi mahi and striped marlin, there is no specific management measure for this species at regional level except for the WCPFC 2005 Resolution on Non-Target Fish Species (Resolution-2005-03). In Australian waters, bycatch species are covered by the bycatch and discarding workplan (AFMA, 2014c) but this measure focuses on high-risk species such as turtles and seabirds. As for mahi mahi, effort is limited by the overall effort limitations in the fishery.

Information: Fisheries-dependent data are provided through the mandatory reporting in logbooks, carriage of observers, who provide quantitative data on the sets observed. Lancetfish are also specifically referred to in Catch Disposal Records (CDRs), which are independently verified. TTRAG (2013b) reviewed available data for lancetfish and agreed that as the CPUE had not been standardised, any trends in the data presented for lancetfish could not yet be identified.

3.5.4.2. Snake mackerel

A worldwide, tropical and subtropical species, *Gempylus serpens* is usually solitary (Nakamura and Parin, 1993). Adults exhibit diel migrations, coming to the surface at night, whilst juveniles behave in a reverse pattern (Nakamura and Parin, 1993). Snake mackerel are found from surface waters to approximately 600 metres and reach a maximum length of 500 millimetres (Bianchi et al., 1999). This species has not yet been assessed on the IUCN Red List.

Outcome: Like lancetfish, the stakeholders identified this species as being one of the higher risk in the fishery. As little information is available for this species, a SICA was conducted by the assessment team and stakeholders on the 12th August. The MSC equivalent score for this PI was determined as 100 (see Appendix 2. SICA tables with scores and justifications). As the score was above 80, a productivity-susceptibility analysis (PSA) did not need to be conducted. The AFMA PSA (2007) considered fisheries impacts on this species to be ‘low risk’.

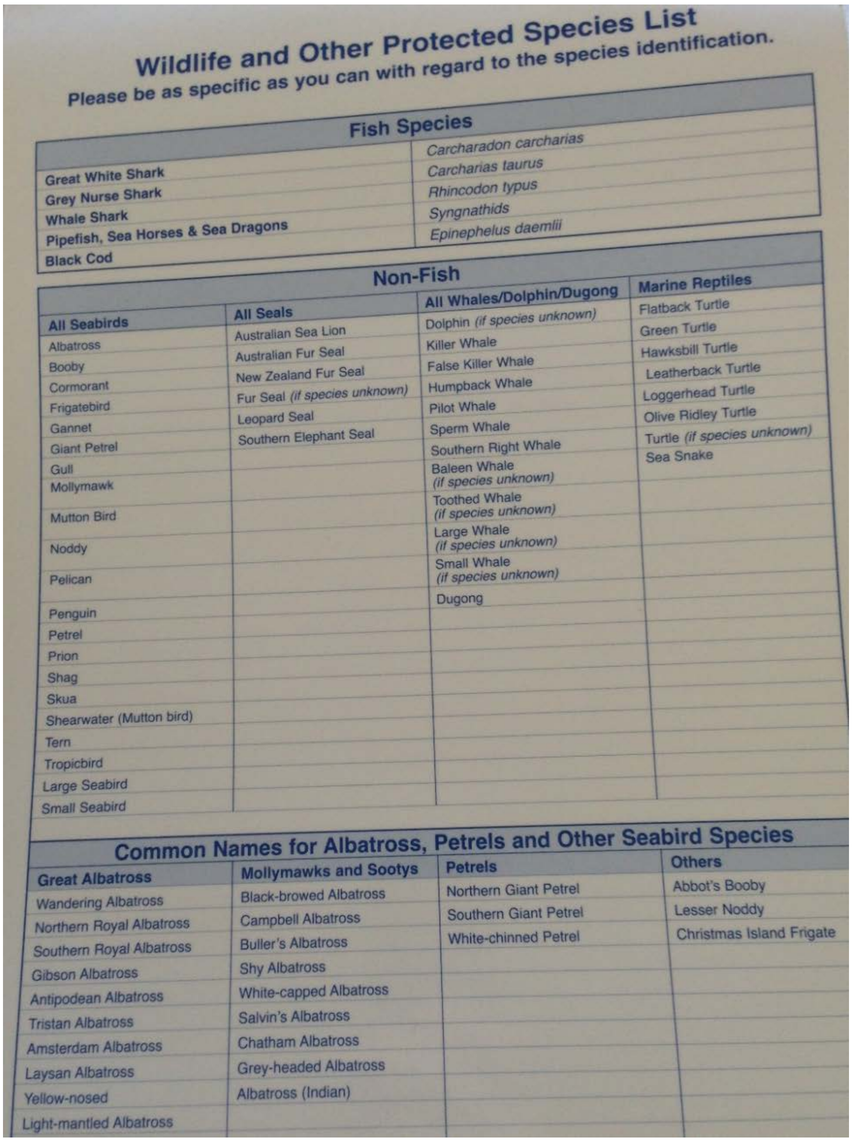
Management and information: Same situation as for lancetfish.

3.5.5. ETP species

The available information for this fishery on Endangered, Threatened and Protected (ETP) species comes from AFMA observer and ETBF logbook records. Within the Australian Commonwealth, all fishers are subject to mandatory reporting requirements to record all fishery interactions with ETP species in their logbooks and submit these to AFMA (Figure

35). This list is generated through the national legislation protecting ETP species. The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and is aimed to provide environmental protection and biodiversity conservation in the Australian Commonwealth (Australian Government[10]). A full list of EPBC Act species can be found at: http://www.environment.gov.au/epbc/about/epbc-act-lists.

This, in conjunction with those species which have international (such as CITES) or regional (CMMs) protective legislation have been included in this assessment as ETP species. In this section, ETP falls under four categories: seabirds, sea turtles, elasmobranchs and marine mammals. These are discussed separately.



Wildlife and Other Protected Species List

Please be as specific as you can with regard to the species identification.

Fish Species	
Great White Shark	*Carcharadon carcharias*
Grey Nurse Shark	*Carcharias taurus*
Whale Shark	*Rhincodon typus*
Pipefish, Sea Horses & Sea Dragons	*Syngnathids*
Black Cod	*Epinephelus daemlii*

Non-Fish

All Seabirds	All Seals	All Whales/Dolphin/Dugong	Marine Reptiles
Albatross	Australian Sea Lion	Dolphin *(if species unknown)*	Flatback Turtle
Booby	Australian Fur Seal	Killer Whale	Green Turtle
Cormorant	New Zealand Fur Seal	False Killer Whale	Hawksbill Turtle
Frigatebird	Fur Seal *(if species unknown)*	Humpback Whale	Leatherback Turtle
Gannet	Leopard Seal	Pilot Whale	Loggerhead Turtle
Giant Petrel	Southern Elephant Seal	Sperm Whale	Olive Ridley Turtle
Gull		Southern Right Whale	Turtle *(if species unknown)*
Mollymawk		Baleen Whale *(if species unknown)*	Sea Snake
Mutton Bird		Toothed Whale *(if species unknown)*	
Noddy		Large Whale *(if species unknown)*	
Pelican		Small Whale *(if species unknown)*	
Penguin		Dugong	
Petrel			
Prion			
Shag			
Skua			
Shearwater (Mutton bird)			
Tern			
Tropicbird			
Large Seabird			
Small Seabird			

Common Names for Albatross, Petrels and Other Seabird Species

Great Albatross	Mollymawks and Sootys	Petrels	Others
Wandering Albatross	Black-browed Albatross	Northern Giant Petrel	Abbot's Booby
Northern Royal Albatross	Campbell Albatross	Southern Giant Petrel	Lesser Noddy
Southern Royal Albatross	Buller's Albatross	White-chinned Petrel	Christmas Island Frigate
Gibson Albatross	Shy Albatross		
Antipodean Albatross	White-capped Albatross		
Tristan Albatross	Salvin's Albatross		
Amsterdam Albatross	Chatham Albatross		
Laysan Albatross	Grey-headed Albatross		
Yellow-nosed	Albatross (Indian)		
Light-mantled Albatross			

Figure 35. Photograph of Australian ETP species list from ETBF logbook (AL06), taken by team on site visit

Logbook interactions are forwarded to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPAC) on a quarterly basis (WCPFC, 2013b). Information is now also collected on fishing gear, as well as size and species composition on

[10] Australian Government, Department of Environment. Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) http://www.environment.gov.au/epbc

catch hauls. In addition, AFMA launched an observer programme on domestic longliners in 2001 in order to collect additional fisheries data. In 2012, observers monitored 406,827 hooks; this grew to 416,868 hooks in 2013. In both years this translates to 6.2% of the total number of hooks deployed (WCPFC, 2013b, 2014b). Table 27 presents the observed interactions in the ETBF for the years 2008 – 2013.

Table 27. ETP species observed interactions in the ETBF for 2008 – 2013 (fate of individuals unavailable) (WCPFC, 2014b)

Group	Common name	2008	2009	2010	2011	2012	2013
Seabirds	Black-browed albatross	2	3	0	0	1	0
	Shy albatross	1	1	0	0	2	0
	Wandering albatross	1	0	0	0	0	0
	Yellow-nosed albatross	0	0	1	0	0	0
	Albatrosses (other)	2	1	0	0	0	0
	Cape Petrel	0	0	0	1	0	0
Sea turtles	Green turtle	1	1	1	10	5	6
	Hawksbill turtle	0	1	1	0	0	0
	Leatherback turtle	3	5	2	2	3	7
	Loggerhead turtle	2	4	1	0	0	3
	Pacific (olive) Ridley	2	0	0	1	0	0
	Turtles (unspecified)	0	0	0	0	1	0
Mammals	Short-finned pilot whale	0	0	3	0	0	0
	Australian fur seal	4	0	0	0	0	0

3.5.5.1. Sea Birds

In 1995, the incidental catch of seabirds in pelagic longline fisheries was listed as a "key threatening process" by the Australian Commonwealth (Commonwealth of Australia, 2003). Several species have been identified interacting in the ETBF fishery, either foraging or as part of breeding populations (Table 28), and all are protected under the EPBC Act.

Table 28. Species listed in the Seabird Threat Abatement Plan, 2014

Species	IUCN status	EPBC Act listing	Likely incidence in longline bycatch	Primary reason for presence
Wandering albatross *Diomedea exulans*	Vulnerable	Vulnerable	Moderate	Breeding
Black-browed albatross *Thalassarche melanophris*	*Near Threatened*	Vulnerable	High	Breeding
Shy albatross *Thalassarche cauta*	*Near Threatened*	*Vulnerable*	Moderate	Breeding
Grey-headed albatross *Thalassarche chrysostoma*	Endangered	Endangered	High	Breeding
Northern Giant Petrel *Macronectes halli*	*Least concern*	Vulnerable	Low	Breeding
Southern Giant Petrel *Macronectes giganteus*	*Least concern*	Endangered	Low	Breeding

Tristan albatross *Diomedea dabbenena*	Critically endangered	Endangered	Low	Foraging
Antipodean albatross *Diomedea antipodensis*	Vulnerable	Vulnerable	Low	Foraging
Northern royal albatross *Diomedea sanfordi*	Endangered	Endangered	Low	Foraging
Southern royal albatross *Diomedea epomophora*	Vulnerable	Vulnerable	Low	Foraging
Amsterdam albatross *Diomedea amsterdamensis*	Critically endangered	Endangered	Low	Foraging
Yellow-nosed albatross *Thalassarche chlororhynchos*	Endangered	Not listed	Low	Foraging

In accordance with the International Plan of Action on Seabirds (IPOA-Seabirds), Australia prepared a National Plan of Action for Reducing Incidental Catch of Seabirds (NPOA-Seabirds) in 1996 under Commonwealth legislation. This subsequently was subsumed by the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and evolved into the Threat Abatement Plan or TAP (Commonwealth of Australia, 2014) for the incidental catch, or bycatch of seabirds during oceanic longline fishing operations (see seabird management section below for further detail), which meets the requirements of an NPOA.

<u>Outcome</u>: No interactions with seabirds in the ETBF have been recorded in logbooks for the last two and a half years, but the interactions were reported to AFMA from the ETBF between 2008 and 2013 by observers (Table 27). The 2014 Seabird Threat Abatement Plan (TAP) under the Commonwealth jurisdiction sets the bycatch rate for all fisheries, in all seasons and areas. For the ETBF the bycatch rate of seabirds must remain below 0.05 seabirds per 1000 hooks.

Table 29 and Table 30 show the interaction rates from the ETBF fishery above and below the 30ºS latitude line. In both areas, seabird encounters with longline gear in the fishery have been well within interaction limits for the last six years.

Table 29. Interaction rates with seabirds in the ETBF south of 30ºS in years 2008 – 2013 (WCPFC, 2013b, 2014b)

Year	Fishing effort (000's hooks)				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Capture number	Capture rate
2008	35	1742	353	20.2	6	0.017
2009	38	2019	217	10.8	4	0.018
2010	35	2441	109	4.5	1	0.009
2011	39	2228	143	6.4	1	0.007
2012	35	2069	158	7.6	3	0.02
2013	35	1905	103	5.4	0	0.00

Table 30. Interaction rates with seabirds in the ETBF between 23ºN and 30ºS in years 2008 – 2013 (WCPFC, 2013b, 2014b) (Note: Walker Seafood Australia operates in this area)

Year	Fishing effort (000's hooks)				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Capture number	Capture rate
2008	49	6317	392	6.4	1	0.002
2009	49	6820	346	5.2	1	0.003

2010	45	5434	176	3.2	0	0.0
2011	45	4369	272	6.4	0	0.0
2012	39	4537	249	5.8	0	0.0
2013	33	4850	314	5.3	0	0.0

The 2008 ERA Level 2 analysis originally listed 23 species of seabird as ‘high-risk’ of being impacted by fishing operations in the ETBF. Through further analysis (as discussed previously in 3.5.5), the risk classifications of these taxa was downgraded to ‘medium risk’, due to the management measures in place which were considered to reduce the risk of incidental bycatch (AFMA, 2014b).

Management: At the regional level, there is a CMM in place to mitigate the impacts of fishing on seabirds in the WCPFC Convention Area (CMM 2012-07 which came into effect on the 1st July 2014, succeeding CMM 2007-04). The CMM is, however, particularly concerned with the area south of 30ºS, which is not relevant to this fishery. In areas between 23ºN and 30ºS, CCMs are encouraged to implement one or more of the mitigation measures listed in the CMM (which include bird curtain, weighted branch lines, tori lines, night-setting with minimum deck lighting, blue-dyed bait, a deep-setting line shooter and management of offal discharge).

For Australia, the Threat Abatement Plan (TAP) states that 5% of all hooks set and hauled in the ETBF must be observed by an AFMA Observer (Commonwealth of Australia, 2014). Additionally, AFMA has increased the required level of observer coverage (of up to 100%) for vessels operating in the identified Sothern Bluefin Tuna (SBT) zones of the ETBF (AFMA, 2014b), where bird bycatch is more of a risk.

In compliance with the WCPFC CMM for seabirds, the ETBF set the following management measures as mandatory in 2013 (WCPFC, 2013b):

- Carry an assembled tori line on board
- Carry either: 1000 weighted swivels each weighing at least 60 g or 1000 weights each weighting at least 40 g
- Not discharge offal while setting or whilst hauling (an exemption for small boats may be given by AFMA

In addition to the TAP, a recovery plan for albatross and giant petrels was implemented in 2001, as recognition of the need to develop a conservation strategy for 19 species of albatross and two species of giant petrel, most of which are listed under the EPBC Act, 1999 (DSEWPAC, 2011). The strategy is reviewed at intervals, no longer than five years and the current plan is *in situ* until 2016. The strategy has two categories:

- ‘Breeding species’: species that breed on islands in areas under Australian jurisdiction (seven species)
- ‘Foraging species’: species that forage (or potentially forage), but do not breed, within areas under Australian jurisdiction (14 species)

Within this document, the threats affecting these populations are evaluated; the primary source being that of interactions with fishing activities. Other threats identified include, but are not limited to climate change, dependence on discards, marine pollution, nest space competition, pest species and parasites and disease. The overall objective of the 2011-2016 recovery plan is: “to *ensure the long term survival and recovery of albatross and giant petrel populations breeding and foraging in Australian jurisdiction by reducing or eliminating human related threats at sea and on land*.” Specific objectives for 2011-2016 are as follows:

- Research and monitoring of the biology, ecology and population dynamics of albatrosses and giant petrels breeding within Australian jurisdiction is sufficient to understand conservation status and to implement effective and efficient conservation measures
- Land-based threats to the survival and breeding success of albatrosses and giant petrels breeding within areas under Australian jurisdiction are quantified and reduced
- Marine-based threats to the survival and breeding success of albatrosses and giant petrels foraging in waters under Australian jurisdiction are quantified and reduced
- Fishers are educated and public awareness is raised on the threats to albatrosses and giant petrels
- Substantial involvement in the promotion and development of improved and, ultimately, favourable conservation status of albatrosses and giant petrels globally in international conservation and fishing fora is maintained

The first albatross and giant petrel recovery plan (DSEWPAC, 2011) nominated four recovery criteria against which to judge the success of the albatross and giant petrel recovery plan. None of those four criteria were be judged to have been fully met during the plan's review. The poor outcome of these recovery criteria was attributed to a combination of several factors including many human-induced threats outside Australian control with longline fishing no longer being the sole threat for albatrosses and giant petrels (DSEWPAC, 2011).

At the fishery level, seabird identification guides are onboard all three longlining vessels. Under the ETBF longline SFR conditions (clause 11), vessels must carry onboard at least one assembled tori line with other requirements (depending if you are fishing south of 25ºS). Specific measures can be found in AFMA (2014b).

<u>Information</u>: Extensive information has been collected and is ongoing for seabird species. Research needs of the fishery are reviewed annually by the Tropical Tuna Management Advisory Committee (TTMAC) Research Review and Recommendation (RRR) Group and has been facilitated through the ETBF fishers, the Australian Antarctic Division of AFMA, BirdLife International, Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) and the Agreement on the Conservation of Albatrosses and Petrels (ACAP), which Australia ratified in 2001. The Seabird Bycatch Working Group (SBWG) was established to advise ACAP on actions that will assist in the assessment, mitigation and reduction of negative interactions between fishing operations and albatrosses and petrels. Within ACAP, working groups such as the Population and Conservation Status Working Group consider ACAP species assessments, which summarise current knowledge of biology and conservation information including population trends, distribution and threats (PCSWG, 2013).

Research continues to aid improvement of the TAP, which is currently under review (TTMAC, 2014), as well as studies into bycatch mitigation measures. ETBF vessels and crew are currently participating in trials of gear and method modifications (underwater setting chutes and bait pod trials) to mitigate seabird interactions. The development of this measure began in 2007 (Sullivan, 2011), and has the potential to reduce seabird bycatch to near zero levels by "*by enclosing the point and barb of the hook as it enters the water, making it impossible for birds to become hooked. The pod has an air pressure mechanism which* *opens on reaching fishing depth and the baited hook is released to begin fishing*" (Hookpod, 2014[11]).

Recently completed research projects for seabirds in the ETBF, including (AFMA, 2014a):

- A stepped approach to evaluating a possible heavier line-weighting regime in the ETBF, south of the 30° line to reduce seabird interactions
- New deep setting technique for bycatch mitigation

3.5.5.2. Sea Turtles

There are currently six species of marine turtle in Australia, three of which were identified in ETBF logbook reports as interacting with the fishery (2012-2014): leatherback turtle (*Dermochelys coriacea*), green turtle (*Chelonia mydas*) and loggerhead turtle (*Caretta caretta*). All are protected under the EPBC Act and under Appendix I of CITES. Their status upon release is shown below in Table 31 for those years. In 2012, an unspecified individual was found dead upon retrieval of fishing gear.

Table 31. Sea turtle status upon release based on ETBF logbook records for the period 2012 - 2014

Species	Alive	Dead	Unknown	TOTAL
Green turtle	7	3	0	**10**
Leatherback turtle	11	0	2	**13**
Loggerhead turtle	3	0	0	**3**

Wallace et al. (2010) defined 58 sea turtle Regional Management Units (RMUs) globally, comprising multiple nesting sites, nesting populations and breeding populations, and defining core distribution areas that are considered optimal for assessing the conservation status of marine turtles and for management applications (Gilman et al., 2013). The fishery under assessment overlaps with the three RMUs listed in Table 32.

Outcome: A review of turtle bycatch in the Western and Central Pacific Ocean was undertaken by SPC for the South Pacific Regional Environment Programme in 2001 (Anon, 2001). Within the tropical Pacific longline fishery, the depth of the line set is the most influential factor in high rates of turtle interactions/capture rates. On shallow sets, the number of encounters can be an order of magnitude higher than deep sets. Pelagic longline bycatch has been implicated as one of the reasons for the regional declines for both loggerhead and leatherback sea turtle populations in the Pacific (Spotila et al., 2000).

Table 32. Sea turtle Regional Management Units that overlap with the fishery under assessment (from Wallace et al., 2010). RMU risk and threat level (from Wallace et al., 2011), longline bycatch impact (from Wallace et al., 2013), IUCN and conservation instruments are also shown.

Species	RMU	RMU risk and threat level	Longline bycatch impact	IUCN status
Loggerhead *Caretta caretta*	South Pacific	High/High	High	Endangered

[11] Hookpod website. 2014. Saving the albatross from extinction. Available at: https://www.kickstarter.com/projects/hookpod/hookpod-saving-the-albatross-from-extinction?ref=nav_search

Green turtle *Chelonia mydas*	West Pacific	Low/Low	Low	Endangered
Leatherback *Dermochelys coriacea*	West Pacific	High/Low	Low	Critically endangered

For the ETBF specifically, the interaction rates shown in Table 33 below exceeded the minimal levels of interactions with the ETBF for green turtles in 2011 and leatherback turtles in 2010 – 2012, as set in 2009 in the ETBF Sea Turtle Mitigation Plan (discussed under management further on). In response, the mitigation plan was revoked by AFMA and further management measures were enacted. These included large circle hooks to be used on shallow sets (if less than 8 hooks per float are used) to reduce catches and improve survival rates. It also became compulsory to keep line-cutters and de-hookers onboard to aid the safe release of live turtles, with a minimal amount of stress to the animal (AFMA, 2014b).

Table 33. Observed number of interactions and interaction rates of sea turtles per 1000 hooks in ETBF in years 2010-2012 (green=below interaction threshold, pink=above) (WCPFC, 2013)

Species	WCPFC & AFMA minimum levels	Number (Rate) 2010	Number (Rate) 2011	Number (Rate) 2012
Green turtle	0.0048	1 (0.0025)	10 (0.0239)	5 (0.0123)
Leatherback turtle	0.0040	2 (0.0070)	2 (0.0048)	3 (0.0074)
Loggerhead turtle	0.0040	1 (0.0035)	0 (0.0000)	0 (0.000)
Other[12]	0.0040	1 (0.0035)	1 (0.0024)	1 (0.0025)
Total	**0.0168**	**5 (0.0176)**	**13 (0.0311)**	**9 (0.0221)**

In the ERA (AFMA Management, 2008), only the leatherback turtle remained as a 'high risk' species due to low productivity and uncertain extent of its full geographical range. It has been noted (AFMA Management, 2008) that the use of circle hooks in the fishery has aided the reduction in sea turtle mortality. The other species are designated as at 'medium risk'.

<u>Management</u>: At regional level, WCPFC CMM 2008-03 on the conservation and management of sea turtles requires the implementation of the FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations. The CMM also details reporting requirements for CCMs, for example the obligation to specifically report in CCM annual reports the progress of the implementation of the FAO Guidelines; including information collected on interactions with sea turtles in fisheries managed under the Convention. Best practice guidelines to ensure the survival of captured sea turtles is also outlined and are a requirements. CCM longline vessels must carry and use line cutters and de-hookers to handle and promptly release sea turtles caught or entangled. In some cases, the vessel operators are also required to carry and use dip-nets in accordance with the WCPFC guidelines.

At national level, the Commonwealth acts in a number of ways to protect turtles, for example by managing reserves, such as those in the Great Barrier Reef, through direct fisheries management, as well as through conservation programmes. Commonwealth legislation prohibits the export of marine turtles or their products. A large number of islands and their adjacent waters are also closed to visitation seasonally under management plans or permit conditions restricting access for the purposes of seabird and turtle protection. The Commonwealth also monitors nesting marine turtles and hatching success in the Coral Sea National Nature Reserves, on Field Island in Kakadu National Park and in the Ashmore Reef National Nature Reserve (Environment Australia, 2003). Various pieces of national legislation are relevant to the protection of marine turtles or at least identifies their status as needing particular conservation action: the Wildlife Protection (Regulation of Exports and Imports) Act (1982) and the Environmental Protection and Biodiversity Conservation Act

[12] Other refers to a combination of hawksbill, flatback and Pacific (olive) Ridley turtles

(1992) at the Commonwealth level, while legislation at the Queensland state level (State Nature Conservation Act 1992) adds further protection.

In the absence of detailed information about populations of marine turtles in Australia, a turtle recovery plan (2003) was created, adopting a “threat-based approach” to reduce impacts and improve survival rates of turtles residing in Australian waters (Environment Australia, 2003). The recovery plan for turtles (Environment Australia, 2003) identifies the main threats to Australian turtle populations as:

- Incidental bycatch in fisheries
- Unknown levels of harvest by indigenous Australians and unsustainable levels of harvest by people in neighbouring countries of the Asia/Pacific region
- Predation of turtle eggs by native and introduced animals
- Coastal development
- Deteriorating water quality
- Marine debris
- Loss of habitat

These led to the development of the following objectives:

- To reduce the mortality of marine turtles and, where appropriate, increase natural survivorship, including through developing management strategies with Aboriginal and Torres Strait Islander communities for the sustainable use of marine turtles
- To develop programs and protocols to monitor marine turtle populations in Australia, assess the size and status of those populations, the causes of their mortality and address information gaps
- To manage factors that affect marine turtle nesting
- To identify and protect habitats that are critical for the survival of marine turtles
- To communicate the results of recovery actions and involve and educate stakeholders
- To support and maintain existing agreements and develop new collaborative programs with neighbouring countries for the conservation of shared turtle populations

In line with the WCPFC CMM, the ETBF also had a sea turtle mitigation plan (TMP) (Australia Government, 2009) in place, designed to reduce the interaction rates of turtles in the pelagic longlines which target swordfish. As discussed in the outcome section above, the interaction limits were exceeded for two species. This resulted in the “trigger system” being initiated. Large circle hooks, line-cutters and de-hookers are now mandatory and their correct use of this equipment was included in the ETBF 2012 Skipper Education Programme (AFMA, 2012a). Evidence from other similar fisheries (US Atlantic swordfish and US Hawaii longline fisheries) shows that the introduction of management measures such as circle hooks reduce turtle bycatch rates significantly (Gilman et al., 2006).

Information: Extensive information is available on the various life history characteristics. The majority has been through localised projects such as the Queensland Turtle Research Project, which was implemented through the Queensland Environment Protection Agency.

Biological reviews of leatherback (Limpus, 2009), green (Limpus, 2008a) and loggerhead turtles (Limpus, 2008b) was undertaken in Australian waters by the Environmental Protection Agency; discussing genetic population size characteristics, nesting sites and anthropogenic impacts such as fishery bycatch and capture by indigenous people for food. Genetic studies on species such as loggerhead and green turtles have indicated unique breeding populations in Australia, signifying habitats of international importance (Bowen et al., 1993; Bowen, 2003). Population modelling research has been improving for the eastern Australian stocks in recent years (Chaloupka, 2003).

Other ongoing research on the regional scale, includes the Marine Turtle Satellite Tracking programme, which is a collaborative undertaking by SPREP, the Marine Turtle Research Programme (NOAA, National Marine Fisheries Service, Pacific Islands Fisheries Science Centre, Hawaii), and member countries. Nationally, AFMA is currently completing research (Tennison et al., ongoing) on estimating turtle bycatch rates in the ETBF (WCPFC, 2013b).

Only in the last decade or so, has the impact of commercial fishing on Australian populations of sea turtles begun to be measured. The observer programme in the ETBF did not start until 2001 and exact mortality figures on turtles in the commercial sector were difficult to determine. Mandatory recording of these species in logbooks has aided impact quantification and observer coverage is now at 6.2%. A CSIRO study in 2002 (Bravington et al., 2002) investigated possible designs for the observer programme and estimated each design’s likely precision for five representative species or species groups (turtles - identified to family, not to species, black marlin (*Makaira indica*), blue marlin (*Makaira mazara*), dolphinfish (*Coryphaena hippurus*), and blue shark (*Prionace glauca*). Even for low-level interaction species such as turtles, this 5.1% coverage provided annual estimates of turtle bycatch precise to ±70% (a 95% confidence interval). This infers that even coverage as low as 5.1% can provide a good representation of what is occurring in the fishery.

3.5.5.3. Elasmobranchs

Some elasmobranch species are considered here as ETP species due to international, regional and national legislation in place (Table 34) – see summary in Table 21 previously. Most of the elasmobranchs are recorded in logbook data (see Table 24 above) but manta ray are always released and are therefore recorded only in observer reports.

Manta ray, porbeagle and shortfin and longfin mako are all listed under the CMS (Convention on the Conservation of Migratory Species of Wild Animals), and are therefore listed under the EPBC Act (1999) by legislative requirement (effective from January 1st, 2010), prohibiting their retention. Despite this listing, in July 2010, an amendment was made to the legislation. Targeting of these species is now allowed in recreational fisheries in Commonwealth waters, and although still an offence to commercially target these species, makos caught incidentally in the ETBF may be retained if dead on line retrieval (as long as the total retained catch is below the bycatch limit for sharks in the ETBF – see below). Live animals must be released. Those species which have regional CMMs prohibiting their retention have also been included as ETP species, i.e. oceanic white-tip sharks (CMM 2011-04) and silky sharks (CMM 2013-08).

Table 34. ETP elasmobranch species, IUCN status and conservation listings

Species	IUCN Status	Conservation Listings
Silky shark – *Carcharhinus falciformis*	Near threatened	International - Annex I, Highly Migratory Species UNCLOS; Regional - CMM-2013-08
Oceanic whitetip shark –	Vulnerable	International – CITES Appendix II,

Carcharhinus longimanus		International - Annex I, Highly Migratory Species UNCLOS; Regional – CMM-2011-04
Short-finned mako – *Isurus oxyrinchus*	Vulnerable	International - Highly Migratory Species UNCLOS Annex I, CMS Appendix II; National - EPBC Act 1999
Long-finned mako – *Isurus paucus*	Vulnerable	International - Highly Migratory Species UNCLOS Annex I, CMS Appendix II; National - EPBC Act 1999
Porbeagle shark – *Lamna nasus*	Vulnerable	International – CMS Appendix II; National - EPBC Act 1999
Manta ray - *Manta birostris*	Vulnerable	International – CITES Appendix II, Annex I, Highly Migratory Species UNCLOS, National - EPBC Act 1999

Shark catches by the ETBF: Landings of ETP sharks in the ETBF are given in Table 35, from AFMA logbook data. The vast majority (86% in 2013) of sharks landed by the ETBF are shortfin mako. The species is probably caught in higher numbers in the ETBF than other sharks because as they exhibit foraging specialisation where upwellings make areas of spatially concentrated production, such as in the vicinity of the Tasman seamounts where the ETBF commonly operates (Rogers et al., 2012) – in other words, their foraging behaviour is similar to swordfish which are a key target species of the fishery.

Table 35. ETBF logbook landing records for ETP elasmobranch species in ETBF (number of fish retained) (Note: these data apply to the whole ETBF, not just Walker Seafoods)

Species	2008	2009	2010	2011	2012	2013
Silky shark	30	12	0	0	5	49
Oceanic whitetip	87	129	85	66	82	106
Shortfin mako	1614	2815	1907	1643	2056	1514
Longfin mako	1	4	6	2	2	2
Porbeagle	2	2	4	5	4	12

Condition of sharks on hauling: According to logbooks records 2,460 shortfin mako sharks (*Isurus oxyrinchus*) were hooked in the ETBF in 2012. Of these, 2,056 were dead, 400 were released in unknown condition and four were alive – in other words, nearly all shortfin mako come up dead, or at least are reported to come up dead. Five longfin mako sharks (*I. paucus*) were also hooked; two were dead and three were in unknown condition. Six porbeagle sharks (*Lamna nasus*) were hooked, with four dead and two released in unknown condition (ETBF, 2012b).

Outcome: The information on population trends and relative ETBF impacts for each of the ETP shark species is summarised in Table 36.

Table 36. Summary of information on ETP shark populations potentially impacted by the fishery

Population	Information available on stock status	Outcome	Estimated total catch WCPO 2009 (% from ETBF)	Ref
S. Pac. shortfin mako	ERA, catch fishery trends	No trend in commercial catch rate, 1998-2011, reported to be abundant by recreational fishers	Unknown but ETBF may be significant	TTRAG 2013b
WCPO silky shark	Stock assessment	Overfished and overfishing: $F_{current}/F_{MSY}$=6.4, $SB_{current}/SB_{MSY}$=0.66	488,600 (0.002%)	Rice & Harley, 2012a

WCPO oceanic whitetip	Stock assessment	Overfished and overfishing: $F_{current}/F_{MSY}$=6.5, $SB_{current}/SB_{MSY}$=0.153	102,900 (0.13%)	Rice & Harley, 2012b
Longfin mako	ERA	ERA 'high risk' mainly because of lack of data	Unknown (ETBF ~2-3 individuals /yr)	
Porbeagle	ERA	ERA 'high risk'; however, ETBF not the main interacting fishery since this is a colder-water species	Unknown (ETBF ~5 individuals /yr)	
Manta ray	Not assessed in ERA	N/A	Observer report in 2013 – reported released unharmed	

In summary, the impact of the ETBF is not likely to be significant for any of these species except perhaps the shortfin mako, for which further information is given below.

The seventh Tropical Tuna Resource Assessment Group (TTRAG, 2013b) meeting noted "*good numbers of mako sharks off Sydney and it has been common for recreational fishers to catch 4-6 each tournament*". The TTRAG (2013b) also remarked that there has been no apparent trend in nominal or standardised catch rate estimates for shortfin makos since 1998. They noted, however, that the total catch is generally underreported in logbooks (23-28%; Bruce et al., 2013). Observer data (beginning in 2001) can be used to get a better estimate of total catches (see Figure 36 below). The observed nominal catch rate over that period was ~4.08 makos per 10,000 hooks, compared to 3.49 makos per 10,000 hooks recorded in logbooks (Campbell, 2013).

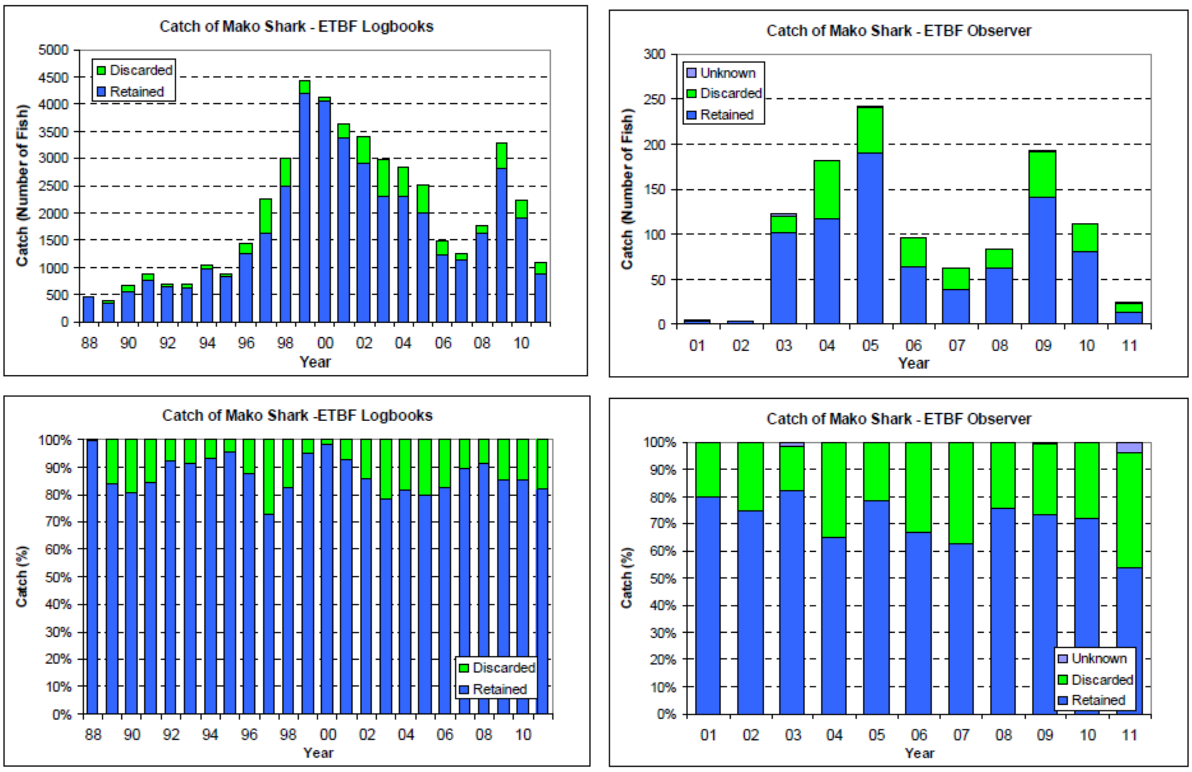


Figure 36. Left - Annual catch of mako sharks recorded in logbooks and Right - Annual catch of mako sharks observed in the ETBF (source: Campbell, 2013)

Despite significant catch and tagging data (fishery-dependent and independent), it has not been possible to quantitatively evaluate the species' current status in Australian waters

(Bruce et al., 2013). This has been partly through data inconsistencies, changes to fishing practices (mainly influenced by management changes) and the insufficient knowledge of post-release survival in both commercial and recreational fisheries. Based on Canadian Atlantic fisheries data in 2010, Campana et al. (2011) estimated that 29% of discarded mako sharks do not survive. There is also evidence to suggest delayed mortality as a result of capture on longlines. Abascal et al. (2011) reported death of tagged individuals up to 133 days after release. SPC were due to release a stock assessment on this species in 2013; however this had not yet been released when this report was drafted.

Management WCPFC: At the regional level, management of sharks is implemented through the WCPFC CMM for Sharks (CMM 2010-07). The CMM requires CCMs to implement the IPOA for the conservation and management for sharks via NPOAs for sharks. Measures taken should aim to minimise waste and discards from shark catches and encourage the live release of incidental shark catches, as well as providing data on shark catch by gear and species. The CMM further requires that any retained catches of sharks are fully utilised and that the fin to body weight ratio should be no more than 5%. For oceanic white-tip sharks and silky sharks specifically, CMM-2011-04 and CMM-2013-08 also apply.

CMM 2011-04 for oceanic whitetip sharks came into force on January 1st, 2013. Specific measures include:

- Ban on retention, storage on-board, transshipment and landing, in part or whole, any oceanic whitetip in the fisheries covered by the Commission
- Their release from fishing gear, in a manner that causes the least amount of practicable harm
- Recording the number of releases and status (dead or alive) through an observer programme or other means

Table 35 above shows that in 2013, 106 oceanic whitetip sharks were landed by the ETBF, after the CMM came into force on January 1st, 2013. This catch is attributed by AFMA to the catch of this species in January and February 2013, which was still part of the 2012-2013 fishing season for the ETBF. The Tropical Tuna Fisheries Manager at AFMA reports that the WCPFC CMM wasn't decided until early December and then did not come into effect for another 90 days (Steve Auld, pers. comm.). The Statutory Fishing Rights (SFRs) conditions were amended at the end of February for the start of the 2013-2014 in March (Steve Auld, AFMA; pers. comm. 8th October, 2014) enabling compliance with the regional CMM.

For silky sharks, CMM 2013-08 became effective on the 1st July 2014. The objectives of this measure are similar to CMM 2011-04 for oceanic whitetip. In addition, CCMs are further encouraged to continue work on bycatch mitigation methods to avoid incidental catch wherever possible and maximise the number of individuals released alive, with the aid of live release guidelines for vessels.

Management AFMA: At national level, shark management is overseen by AFMA. The main shark management measure for the ETBF is that operators are not permitted to take more sharks than the number of fish of the quota species retained, up to a maximum of 20 sharks per trip. There is not, however a limit to how many trips can be made, other than the operators' quota limit (although trips are more likely to be planned based on maximum overall fishing efficiency rather than specifically to circumvent the rules for sharks, which are not the highest value species in the catch). In addition, all AFMA-managed fisheries prohibit the removal of shark fins from its body whilst onboard, and wire traces are banned (see below).

The first Australian NPOA for sharks was developed by the Shark Advisory Group (SAG), within DAFF in 2004. In line with the IPOA (FAO, 1999) for assessing implementation at least once every four years, a performance review was undertaken in 2008 by DAFF, in collaboration with the Shark-Plan Implementation and Review Committee (SIRC). The review identified strategies for increasing the effectiveness of the NPOA and seeks to co-ordinate action on shark conservation and management in Australia through existing fisheries and conservation processes.

The main objectives of the NPOA (2004 & 2008) are:

- To ensure that shark catches from target and non-target fisheries are sustainable
- To assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use
- To identify and provide special attention, in particular, to vulnerable or threatened sharks
- To improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States
- To minimise unutilised incidental catches of sharks
- To contribute to the protection of biodiversity and ecosystem structure and function
- To minimise waste and discards from shark catches in accordance with article 7.2.2.(g) 3 of the Code of Conduct for Responsible Fishing (FAO 1995) (for example, requiring the retention of sharks from which fins are removed)
- To encourage full use of dead sharks
- To facilitate improved species-specific catch and landings data and monitoring of shark catches
- To facilitate the identification and reporting of species-specific biological and trade data.

Under the NPOA (2012), the following management strategies are adopted for sharks in non-targeted fisheries:

- Minimum size limits for some species
- Trip limits for shark byproducts
- Ban on finning (that is, the removal of the fins from a shark and the torso discarded to the sea)
- Bans on the retention of shark products
- Bans on the use of wire traces and long shanked hooks

Wire traces were banned across the entire ETBF in July 2005 and prior to this, wires were preferred by most operators over monofilament. There is a high degree of confidence in the compliance with this regulation (AFMA, 2008). The ban on wire traces have reduced the selectivity of longline gear for shark catch, as the sharks are able to remove the hooks by biting through the snoods attaching the hook to the longline (FAO, 2005, Ward et al., 2008). Research conducted off north-eastern Australia comparing the catch rates of nylon monofilament traces to wire traces found that the catch rates of sharks using monofilament were 30% less than when using wire (AFMA, 2008).

Other mitigation measures for reducing bycatch are somewhat relevant for the safe release of sharks, such as the mandatory requirement for line cutters and de-hookers onboard vessels. A comparison of mako shark catch reported in ETBF logbooks between 2009 and 2011 shows positive results with a decrease 37% and between 2010 and 2011 a further 13% decrease in mako and porbeagle sharks (from logbook data) after operators were encouraged to release live sharks (AFMA, 2012b).

In 2009, Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) and AFMA developed the chondrichtyan guide for fisheries managers: A practical guide to mitigating chondrichtyan bycatch (Patterson and Tudman, 2009). This guide aims to provide fisheries managers with practical options to mitigate chondrichthyan ETP and high-risk species bycatch. AFMA Shark identification guides are onboard the three Walker Seafoods vessels to ensure correct identification.

<u>Information</u>: Information on shark bycatch in the WCPO longline fisheries generally suffers from under-reporting of commercial landings with minimal information regarding the targeting and fate of sharks encountered in the fisheries, as well as identification of the species concerned. Prior to 1990, there was very little information on shark catches and what is available is not species-specific but just generic ‘shark’. Since then there has been an increase in the reporting of sharks, both generic and species-specific, but when longline effort over the past ten years is considered, less than a third of it is associated with species-specific estimates of catch – and for these it is not clear whether discards are included or not (Harley et al., 2013). Data on shark catch and effort at regional level are therefore mostly based on observer data held by the SPC.

At the regional level, there is a Shark Research Plan (SRP) in place under the WCPFC. One of its principal objectives is to provide sufficient information to complete stock assessments on main shark species. At present resources have not been assigned for the following species (Harley et al., 2013):

- Porbeagle – *Lamna nasus*
- Great hammerhead – *Sphyrna mokarran*
- Scalloped hammerhead – *S.lewini*
- Smooth hammerhead – *S.zygaena*
- Winghead hammerhead – *Eusphyrna blochii*

Stock assessments for blue (*Prionace glauca*) and shortfin mako (*Isurus oxyrinchus*) are currently underway but have been delayed (Bruce et al., 2013). Longfin makos are still data-deficient but it is intended that the species be included in the shortfin mako assessment. In addition, it is currently unclear as to whether there is sufficient species-specific information on the three thresher shark species; common (*Alopias vulpinus*), pelagic (*A.pelagicus*) and bigeye (*A.superciliosus*) (Harley et al., 2013).

Under the SRP, there have been several important areas of progress since SC8 including, for the species of concern to this assessment:

- Analysis of potential mitigation options for silky and oceanic whitetip sharks for WCPFC9 and SC9

- Distribution of 400 shark identification guides to longline vessels operating from the ports of 8 small island developing states, although further work to enhance the identification of sharks and therefore improvement in shark data is recommended (Harley et al., 2013)

As a result of the SRP, a coordinated review of all Pacific shark tagging data was recommended to understand the extent and usefulness of existing information and the need for further work in WCPO shark research. The Shark TAGging Information System (STAGIS) was subsequently launched in 2011 and is hosted on the SPC-OFP website for free public access. The database contains meta-data (i.e. data about data) for approximately 200 shark tagging studies, i.e. more than 80,700 tags deployed on over 60 shark species in the Pacific Ocean providing information on shark movement, habitat use, growth and natural mortality. The project was set up with the aim to support the SPC in its stock assessments of the WCPFC key shark species and highlight issues for further research, facilitate research collaboration, and identify critical habitats[13].

An important part of the SRP is collaboration with other agencies to maximise the efficiency of the resources available for shark science and stock assessment. Three main collaborations have occurred during 2011-13 with the ISC, the IATTC, CSIRO in Australia, and NMFS in the United States (Harley et al., 2013). Clarke et al. (2011c, cited in Harley et al., 2013) provided a comprehensive summary of shark data holdings by SPC and WCPFC and data submissions to WCPFC with respect to the new requirements to submit shark catches and updated information is now available annually through the online accessible WCPFC Data Catalogue[14] (Harley et al., 2013).

In conjunction with the Data Collection Committee Report (a joint SPC/FFA initiative) an expanded logsheet form was recently developed which allows the collection of data for all key shark species (note that thresher sharks are not separated by species). These forms are being increasingly used by coastal states in the region and have been translated into English, Japanese, Korean, Spanish, and Mandarin (Harley et al., 2013).

AFMA and the recreational fishing members have also been working to develop a paper, listing any recreational research projects. For example TTRAG (2013b) noted the series of current studies on post-release survival of mako sharks in the recreational fishing industry in Victoria and South Australia. Satellite tags are being used to collect these data. This work is being completed through the fisheries programme at the Institute for Marine and Antarctic Studies, University of Tasmania (IMAS, 2012[15]) and aims to provide information to further aid stock information.

3.5.5.4. Marine Mammals

Depredation by cetaceans on pelagic longline sets is well documented. In general, it is possible to distinguish catch that has been taken by sharks and cetaceans. Sharks tend to take multiple, smaller bites. Cetaceans, in particular “blackfish” such orcas (*Orcinus orca*), take larger portions, sometimes taking the whole fish and leaving the hook; or else leaving only the head up to the gills, or lips and upper jaw of the fish (Secchi and Vaske, 1998; AFMA, 2005). The most common whale species that has been reported interacting with longlines in the ETBF is the short-finned pilot whale (*Globicephala macrorhychos*). This toothed whale species is found in all oceans, but mostly concentrated in tropical and warm-temperate waters (NOAA, 2009). It is thought to be adapted to feed primarily on squid, although fish does constitute part of its diet. Short-finned pilot whales are known to exhibit

[13] http://www.spc.int/ofp/shark/index.php
[14] http://www.wcpfc.int/wcpfc-data-catalogue
[15] IMAS website. 2012. Post release survival in mako sharks. Institute of Marine and Antarctic Studies. University of Tasmania. Available at: http://www.imas.utas.edu.au/videos

deep-diving behaviour, following prey species on their diurnal migrations at dawn and dusk (Baird et al., 2003 in Taylor et al., 2011).

Australian (*Arctocephalus pusillus*) and New Zealand fur seals (*A.forsteri*) are also known to interact with the ETBF. Both of which are listed as 'Least Concern' on the IUCN Red List (Hofmeyr and Gales, 2008 and Goldsworthy et al., 2008) due to large populations over extensive geographical ranges. They do not occur in the area of operation of Walker Seafoods.

Outcome: Recent data summaries for the ETBF show few interactions occurring with both cetaceans and pinnipeds. In the majority of cases, these are observed as "light contact with gear or are easily cut free from tangles" (AFMA, 2012b). The ETBF Ecological Risk Assessment (AFMA, 2008) also notes that it is a rare occurrence for animals to experience "immediate mortality due to these interactions".

Between 2007 and 2010 there were only three interactions observed with cetaceans and four with seals (Table 37). In 2012, no interactions with marine mammals were observed in the fishery.

Table 37. Marine mammals reported in logbooks and observed interactions in ETBF in the years 2008 - 2013

Species	2008	2009	2010	2011	2012	2013
Short-finned pilot whale -*Globicephala macrorhynchos*	0	0	3	0	0	0
Dolphin (unidentified)	0	0	0	0	0	1
Australian Fur Seal – *Arctocephalus pusillus*	4	0	0	0	0	0
New Zealand Fur Seal – *Arctocephalus forsteri*	0	0	0	0	0	1

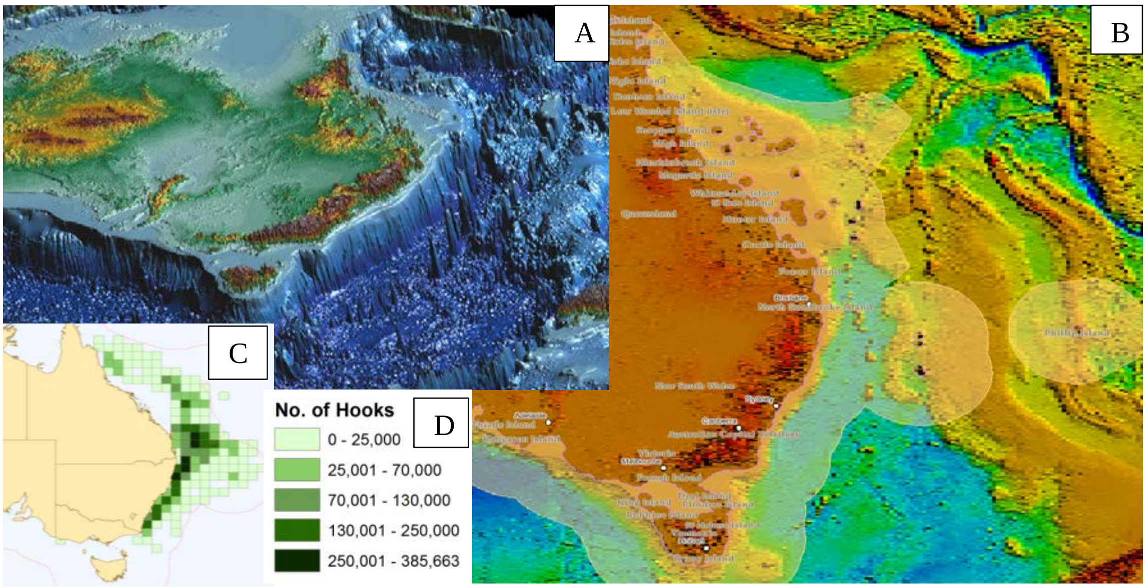
Management: At the regional level, there is no CMM for cetaceans interacting with longline operations. Management is therefore provided by national legislation. All whale species and 11 species of seals (six from the Family Otariidae and five from the Family Phocidae) are protected under the EPBC Act (1999). As with all Australian ETP species, interactions must be recorded in vessel logbooks, those records are submitted to AFMA, and then subsequently to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPAC) at three-month intervals (AFMA, 2012a). Consistent with the mitigation measures for sea turtles, it is compulsory to carry line cutters and de-hookers onboard to help safely release hooked or entangled cetaceans.

The Australian Whale Sanctuary includes all Commonwealth waters from the three nautical mile state waters limit out to the boundary of the AFZ. It is an offence to injure, take, trade, keep, move, harass, chase, herd, tag, mark or brand a cetacean in the Australian Whale Sanctuary without a permit.

Information: Australia currently has the largest whale research programme in the world (Australia Antarctic Division, 2013). The Fisheries Research and Development Corporation (FRDC), the research arm of AFMA, undertook a project to assess and develop depredation mitigation devices in the Australian longline fisheries (McPherson et al., 2003). In 2008, it was announced that $32 million AUS dollars were to be assigned to a non-lethal research programme, called the International Whaling and the Marine Mammal Conservation Initiatives Programme. In 2013, an extra $6 million AUS dollars in federal funding were allocated for the continuation of the programme (Department of Environment, 2010[16]). Through the Department of Environment, the Australian Marine Mammal Centre (AMMC) was established, and it is the base for the Secretariat of the Southern Ocean Research Partnership. Activities also include research into acoustics, population structure and distribution, aging and diet, abundance surveys, and movement and migration patterns. The AMMC also works closely with the International Whaling Commission (IWC) to support whale conservation and national legislation. Recently completed research in the ETBF into marine mammals includes reduction of interactions by toothed whales with fishing gear through the development and assessment of predation mitigation devices around longlines; the testing of acoustic tracking systems for marine mammals around longline and gillnet fishing gear; and preliminary trials of predation mitigation devices for longline fisheries.

3.5.6. Habitats

The ETBF extends from Cape York to the Victoria – South Australia border, including waters around Tasmania, approximately five million square kilometres (Griffiths et al., 2010). As seen in Figure 37, there are numerous seamounts dominated by a centrally-located sub-marine plateau, with the Great Barrier Reef to the north of the fishery boundary. Recent longline effort has taken place mid-way between the northern and southern boundaries of the AFZ. Depths on the continental shelf range from approximately 2,000 to 5,000 metres (Brewer et al., 2007). Based on the gear descriptions provided in Section 3.3.5, the pelagic longline fishery is highly unlikely to interact with benthic features at those depths. This fishery is therefore not expected to directly impact benthic habitats and no habitats were identified to be at risk to the effects of pelagic longline fishing in the SICA performed in the ERA process (AFMA, 2014a). A data collaboration effort between Geoscience Australia, other Australian government agencies and industrial sources have been used to create AMSIS, a web-based interactive mapping system that provides access to integrated government and non-government information in the Australian Marine Jurisdiction. AMSIS contains many layers of information displayed in themes of Maritime Boundaries, Petroleum, Fisheries, Regulatory, Environment and Offshore Minerals (AMSIS, 2014[17]).



[16] Department of Environment website. 2010. The Australian Government Marine Mammal Conservation Initiative. Available at: http://www.environment.gov.au/resource/australian-government-marine-mammal-conservation-initiative

[17] AMSIS. 2014. Australian Marine Spatial Information System. Available at: http://www.ga.gov.au/imf-amsis2/?accept_agreement=on

Figure 37. A) 3-D view of 2009 bathymetric grid of Australia (source: Whiteway, 2009). B) Screenshot from Australian Marine Spatial Information (AMSIS) (source AMSIS, 2014). C) ETBF longline effort in 2012 (source AFMA, 2014a). D) Key to number of hooks set for diagram C (source: AFMA, 2014a)

Another issue which needs to be considered is unobserved impacts due to ghost fishing by discarded or lost fishing gear. Lost gear may consist of monofilament and/or hooks and is only likely to continue to fish as long as bait remains on the hooks. Impacts associated with lost longlines is usually low (Macfadyen et al., 2009) but the team could not obtain estimates of gear loss in the ETBF.

3.5.7. Ecosystem

The ocean structure surrounding Australia is complex, as the country is bordered by three oceans, the Indian, Pacific and Southern Oceans. The East Australian Current (EAC) (Figure 38) is the main influencing current in the ETBF. Originating in the Coral Sea in the north of the country, the current is a product of the westerly flowing South Equatorial Current approaching the Australian land mass between 14-20ºS. As it flows toward the south, it diverges to a further three currents; the Subtropical Counter Current, which travels in a north-easterly direction; the Tasman Front, which flows directly eastward; and the EAC Extension, which is the residual flow of the original current's direction south along the country's coastline (Marine Climate Change website, 2012[18]). The CSIRO website[19] (2012) reports the current transports up to 30 million cubic metres per second, with a strong influence covering several kilometres and up to 1,000 metres depth. The EAC is strongest in the summer months, peaking in February, generating ocean eddies and causing nutrient-rich upwellings where it moves away from the coast (Figure 38).

Figure 38. Major currents and circulation patterns around Australia (source: Marine Climate Change website, 2012[18])

Off the eastern Australian coast, the euphotic surface layers, which are warmer but nutrient-poor, sit over the top of the cooler, denser, nutrient-rich waters of the Southern Ocean. Wind- or topographically-induced upwellings (e.g. around seamounts) facilitate mixing to a large extent drive the productivity of the open ocean in this region. These areas are well-known and exploited commercially by the ETBF longliners (Figure 39). These conditions are

[18] Marine Climate Change Website. 2012. Impacts and adaptation report card, Australia 2012. Available at: http://www.oceanclimatechange.org.au/content/index.php/2012/background/category/australias_oceans

[19] CSIRO website. 2012. East Australian Current on science watch. Available at: http://www.csiro.au/Portals/Media/2012/East-Australian-Current-on-science-watch.aspx

further modified by large-scale effects, such as ENSO. In El Niño years, the EAC does not flow as far south, which results in the surface layer of the ocean being cooler and more productive.

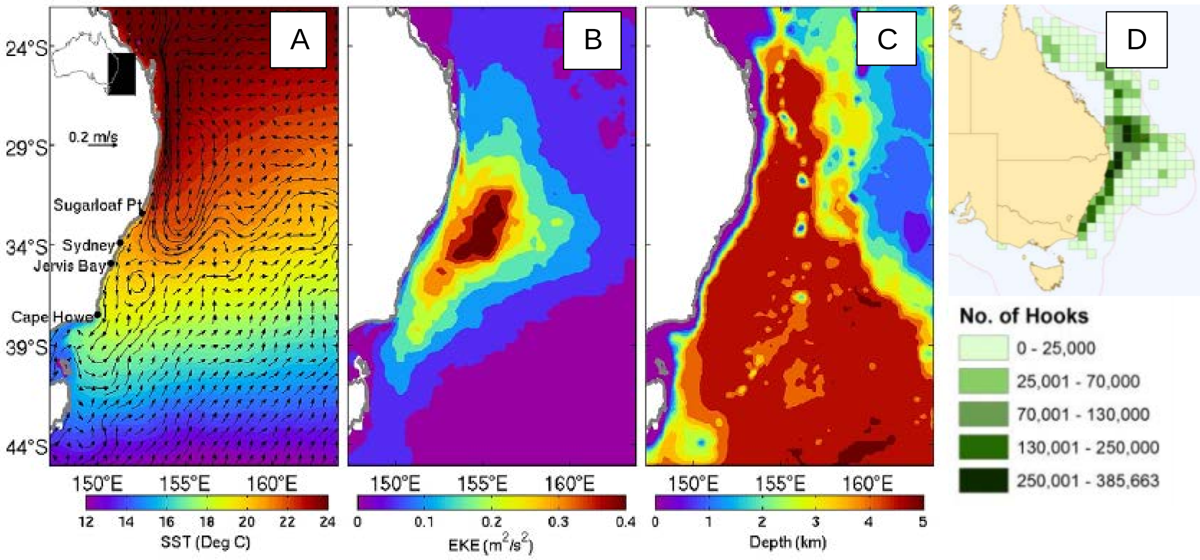


Figure 39. Sea-surface temperature and surface velocities (A), eddy-kinetic energy (EKE, B) and model topography (C) from 1993-2006. Note the dots of blue in C identifying Tasman seamounts (source: O'Kane et al., 2011) and ETBF fishing effort in 2012 (D) (source: AFMA, 2014a)

In addition to the dynamic water movements, Brewer et al. (2007) report the topographic intricacies of the Tasman seamount chain (visible in Figure 37) and the difficulties they pose in generalising trophodynamics of the region and the fishery on a broad scale. Species abundance and distribution fluctuates seasonally and spatially due to these oceanographic factors. Brewer et al. (2007) further note that yellowfin tuna tend to be more abundant in years where water temperatures are higher overall (Young et al., 2001). Species interactions differ depending on whether species are feeding in the EAC or further offshore. Those species associated with the EAC tend to feed in the surface layers (Figure 40), conversely those feeding outside the current's influence tend to feed at greater depths (Brewer et al., 2007).

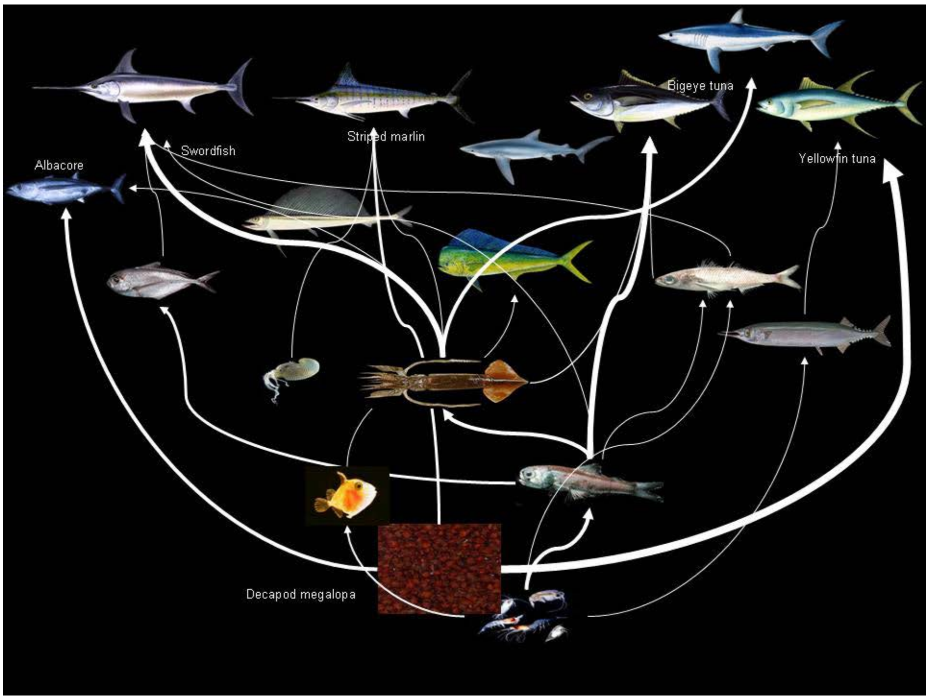
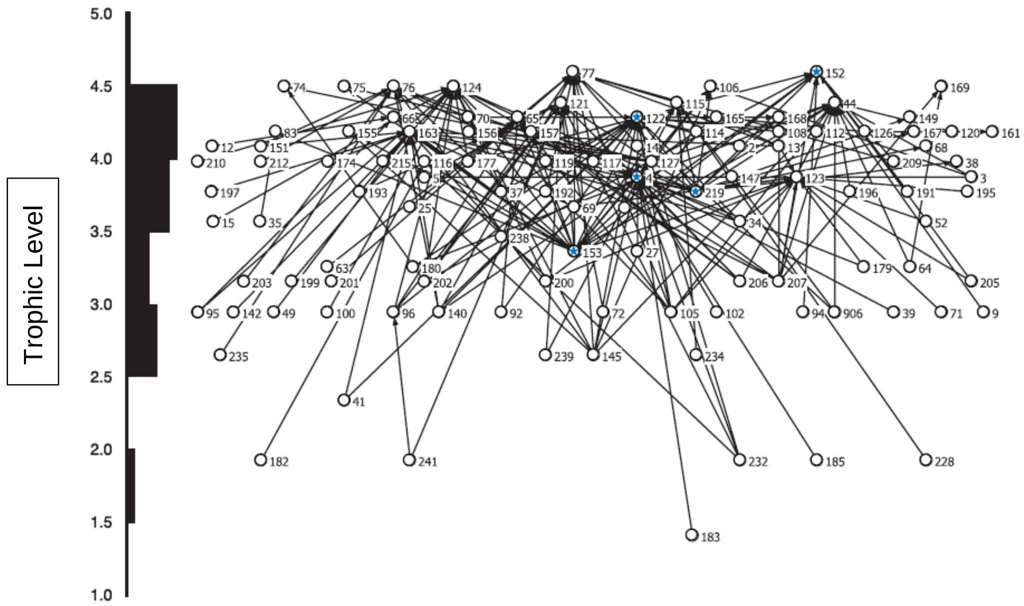


Figure 40. Schematic food web of the waters in the east Australian EEZ, which characterises the ETBF (source: Brewer et al., 2007)

In the last 60 years, climate change is thought to have increased the EAC's flow towards the pole (Ridgeway, 2007 & Hill et al., 2008 cited in Armbrecht et al., 2014). Recent studies of potential ocean-warming indicate a long-term southward extension of tropical-origin water (Brewer et al., 2007). The data show that the region has "become both warmer and saltier with mean increases of 2.28ºC/century and 0.34 psu/century over the 1944-2002 period. This corresponds to a poleward advance of the EAC of ~350-km. The summertime trends in temperature and salinity are greater than in winter – there is an augmented summer pulse of warm, high salinity subtropical water associated with the EAC (Ridgeway, 2007). In addition, Armbrecht et al. (2014) suggest that these changes have already rapidly modified phytoplankton composition along the east Australian coast. Reductions in upwelling of nutrients and extension of warm water along the east Australian coast are likely to reduce krill and jack mackerel abundance, upon which many other species are reliant, including tuna, seals and seabirds (CSIRO, 2002).

Outcome: The effects of fishing pressure for tuna and tuna-like species on a pelagic marine ecosystem will occur from the removal of such predators from the food-chain. The species



targeted in the ETBF are high trophic-level species and are considered apex predators (Dambacher et al., 2010). In the south-west Pacific Ocean, the maximum tropic level recorded was 4.5 (for swordfish), with the mean estimated at 3.6 (Figure 41). Removal of key predators is well documented, with varying opinions or predictions as to overall effects.

Figure 41. Pelagic food web of the south-west Pacific Ocean. Histograms denote relative frequency and position of trophic levels in food web. Numbers refer to sequence number of taxa listed in Dambacher et al., 2010. Stars are taxa identified as 'key players' (source: Dambacher et al., 2010)

Schindler et al. (2002) found that ecosystem impacts of fishing in the central Pacific Ocean are likely to be significant; whereas Kitchell et al. (1999) reported a lower effect due to the "*sharing of a diverse prey base and lack of 'key-stone' predators that may trigger a trophic cascade if removed*". AFMA (2014a) concludes that the impacts of the ETBF on the ecosystem occur mainly through the take of target, by-product and bycatch species. No habitats or communities were identified as being at high risk from the effects of pelagic longline fishing in the SICA performed in the ERA process (AFMA, 2014a).

Climate change has also been a major concern for the ETBF. Tunas and other pelagic fish like swordfish modify their distribution in order to remain within optimal temperature ranges (Andrade et al., 1999; Schick et al., 2004). Hobday (2010) investigated the impacts of climate change on 14 large pelagic species captured in Australia's longline fisheries, the ETBF and WTBF (Western Tuna Billfish Fishery). A model based exclusively on temperature was applied and investigated changes in distributions of large pelagic fish with varying sea temperatures. For the ETBF, over 95% of the model predictions suggested that the core range of distribution would move south and shrink. The overall rate of predicted habitat movement for the suite of pelagic species averaged about 40 km/decade (Hobday, 2010). This was later echoed by Hartog et al. (2011), in the following year, who predicted the shift of favourable habitats of yellowfin and southern bluefin tuna southward, increasing the overlap of the species' distributions and therefore increasing existing management complexities and difficulties.

An Ecopath with Ecosim model run by Griffiths et al. (2010) was used to investigate the potential effects of longline fishing and climate change on the eastern Australia pelagic ecosystem. Using biomass data and fishery catch data from 1952 – 2006, the model simulated changes in fishing effort and mortality rates on individual target species for 2008-2018. The study specifically explored the results of a 50% fishing effort reduction and the effects of altering targeting regimes by the ETBF by increasing the fishing mortality on the main target and bycatch species.

Reduction in fishing effort saw biomass increases of high value species such as bigeye tuna, southern bluefin tuna, swordfish and lamnid sharks by up to 32%. Doubling of effort conversely resulted in biomass decreases of up to 57% for similar species. The specific targeting of sharks in the fishery indicated increases of target and ETP species (tunas and turtles respectively) of up to 149% but decreases of marlins and mahi mahi of up to 35%. The study resonated similar conclusions made by Kitchell et al. (1999 & 2002) and Okey et al. (2007) where 'top predators' were concerned. The removal of individual apex predator species, such as billfishes, tunas and sharks, has little effect on the structure of pelagic ecosystems; but when the apex predator trophic group is pressurised collectively, the most dramatic ecosystem structure occurs. From these results Griffiths et al. suggested an amount of ecological redundancy among high trophic level predators since they share a diverse suite of prey and collectively only represent less than 1% of the total system biomass.

Overall, it is likely that the tuna longline fishery is having some degree of impact on ecosystem structure and functioning, as do most fisheries. Work is ongoing to determine how much predator abundance can be altered before cascading effects occur, and whether there are clear thresholds for large-scale ecosystem transformation (Baum and Worm, 2009).

<u>Management</u>: The 1995 FAO Code of Conduct for Responsible Fisheries is used as the framework for sustainable fisheries for an "Ecosystem Approach to Fisheries Management (EAFM), otherwise known as "Ecosystem-Based Fisheries Management (EBFM)". For the western and central Pacific region, the WCPFC's application of the FAO code extends to the highly migratory fish species including tuna through CMM-2013-01 on the management of bigeye, yellowfin and skipjack, as well as to the management of non-target species, in particular through Resolution 2005-03 on Non-Target Fish Species.

For the Commonwealth, Australia's Oceans Policy (1998) sets in place the framework for Ecologically Sustainable Development (ESD) for all of Australia's marine jurisdictions through integrated and ecosystem-based planning and management. Ecosystems in Australia are managed at three levels of government: local, state and federal. Fisheries exporting product are required to submit applications under the Australian government's guidelines for sustainable fisheries, as ESD is an underlying principle. The Fisheries Administration Act (1991) also sets out the principles for sustainable development, including the conservation of biological diversity and ecological integrity and decision making for both long and short-term economic, environmental, social and equity considerations.

AFMA's main areas of work relating to the preservation of marine ecosystems are through Ecological Risk Management (ERM) and strategic assessment to develop management plans for Commonwealth fisheries. Minimising bycatch and discarding, declaring protected species and managing shark species, assessing climate change, Marine Protected Areas and Marine Bioregional Planning are also key issues in their integrated approach to mitigate the effects of fishing on the ecosystem. The various management systems in place form a hierarchy to integrate the ESD approach (Figure 42) (Fletcher et al., 2006).

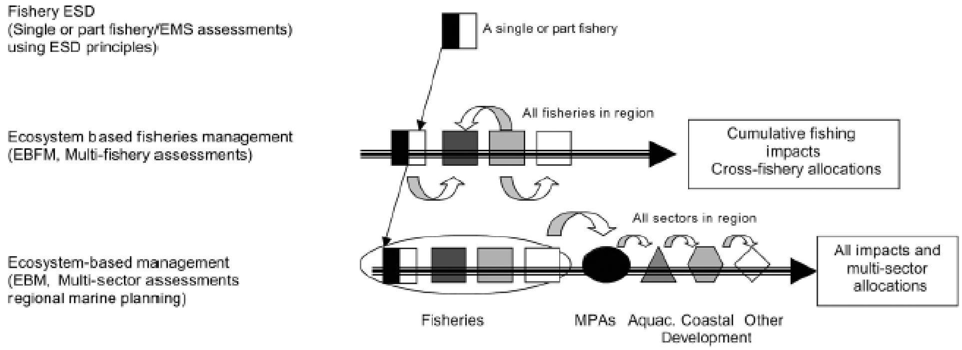


Figure 42. Diagram of ESD-related frameworks which implement the main areas of AFMA outlined above. The split box in the first and lower levels representing Environmental Management Systems covering some elements of the fishery. The encircling of all the fisheries boxes within the Ecosystem-Based-Management level indicates that they represent only one sector at this level. The curved arrows indicate the allocation interactions are likely, not the direction of any impact (source: Fletcher et al., 2006)

The ETBF area is included in several marine bioregional plans, which are prepared under section 176 of the EPBC Act 1999 (DSEWPAC, 2012). The relevant regions for the ETBF are the Coral Sea, temperate east and south-east marine regions. The plans provide a basis for the recognition and valuation of the many essential and largely irreplaceable ecosystem services provided by the Australian marine environment, including food production, waste management, climate stabilisation and recreation. The main objectives of the marine bioregional plans are to:

- Support efficient administration of the EPBC Act to promote the conservation and ecologically sustainable use of the marine environment and its resources
- Provide a framework for strategic intervention and investment by government to meet its policy objectives and statutory responsibilities
- Support strategic, consistent and informed decision-making under Commonwealth environmental legislation in relation to Commonwealth marine areas.

Australia also has an extensive network of marine reserves, although not all are no-take (there is however, a large no-take area in the Coral Sea). It is not clear to what extent they impact exploitation rates of large pelagics and hence the impacts of this fishery on the ecosystem – probably not a great deal compared to other fisheries measures (Figure 43).

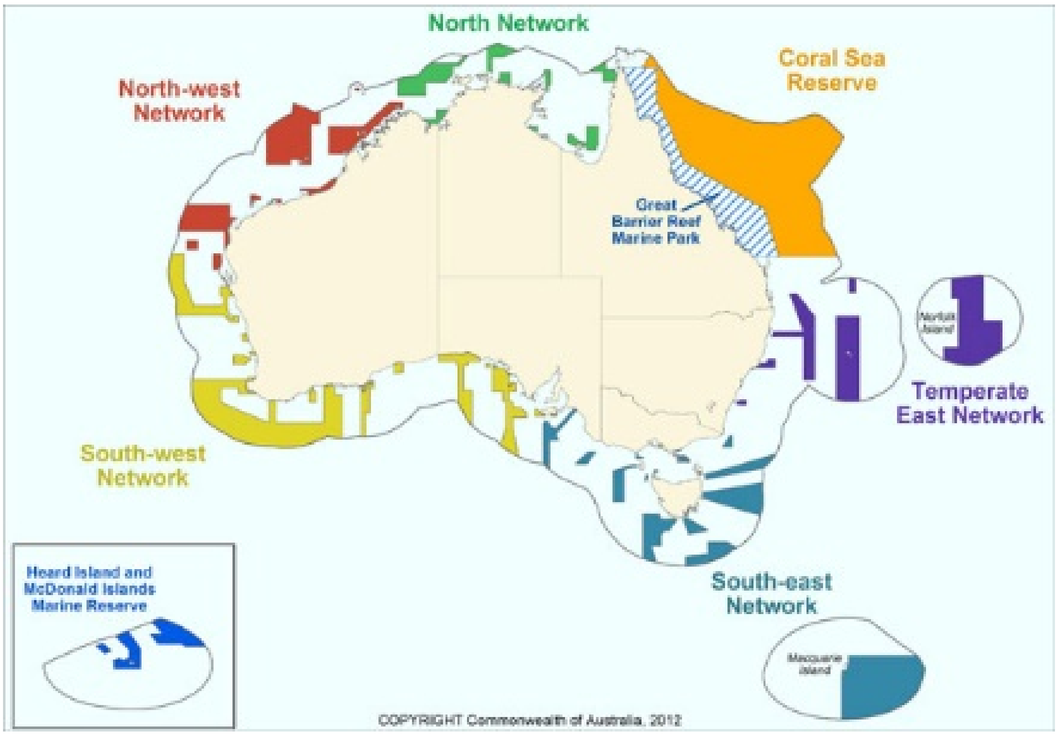


Figure 43. Marine reserves in Australia (Source: http://www.marinereservescoalition.org/files/2013/09/Australia-network-map.jpg)

Information: Information collection and monitoring on the ecosystem supporting the fishery is collected in numerous ways, including logbooks and observer reports. Challenges of implementing an EBFM system led to the development of the Ecological Risk Assessment for the Effects of Fishing (ERAEF). This system is used to filter the higher-risk elements of the fisheries, prioritising research, data collection monitoring needs and management actions for all fisheries in the Commonwealth. Information incorporated into the Ecological Risk Assessments (ERAs) include parameters such as life history, biological productivity and susceptibility to fishing gear. As a result of the ETBF ERAs (most recent ERAs were conducted in 2008) on non-target species and those listed under the EPBC Act (1999), fisheries management have been able to respond to data collected and formed several management plans such as the Bycatch and Discarding Work Plan (AFMA 2011b & 2014c), the ETBF Sea Turtle Mitigation Plan (Australia Government, 2009) and the Seabird Threat Abatement Plan (Commonwealth of Australia, 2014).

With specific reference to climate change, the Australian Government has several avenues for providing information. For example the Climate Change Authority, established under the Climate Change Authority Act (2011), provides independent advice for the Australian Government's climate change initiatives. The National Climate Change Adaptation Research Facility includes the establishment of a Climate Change Adaptation Research Network for Marine Biodiversity and Resources and the development of the Marine Biodiversity and Resources: National Adaptation Research Plan (Marine NARP) (Mapstone et al., 2009). The National Climate Change Action Plan for Fisheries and Aquaculture (2010) states "*The most effective role for government in assisting the fisheries sectors to adapt to climate change is to continue supporting targeted research and development. This will provide information to make sound decisions on climate change and its impacts, and allow fishers to adapt their operations as they deem necessary*."

In order to quantitatively address how fisheries and aquaculture will adapt to climate change, a collaboration between State and Commonwealth agencies, CSIRO, the University of Tasmania and the Fisheries Research and Development Corporation (FRDC) have created a model, Atlantis, to simulate the potential futures of the Australian marine and coastal waters in the south-east. The simulations used to explore the alternative futures were designed in the context of the management strategy evaluation (MSE) framework and used end-to-end ecosystem models to help understand both the form of potential changes, but also potentially resilient adaptation and management options (Fulton and Gorton, 2014). The model is inclusive of a plethora of components to represent the ecosystem as a whole, these include recreational and commercial fisheries, trophic interactions, habitats, biodiversity, economic and market components and main management types in the region (including closures, incentive-based structures and gear controls). The model helps to demonstrate the merits of integrated management for the most balanced and consistent approach relative to conservation, industry and economic objectives (Fulton and Gorton, 2014).

In addition, data is collected on the diets of a wide range of organisms, including target species, living within the ETBF has led to the ETBF ecosystem model (Griffiths et al., 2010). This was developed with Ecopath with Ecosim and is discussed in the outcome section in more detail. The model predicts the direction and magnitude of biomass change in response to ecosystem changes and provides "what if" scenarios triggered by the effects of fishing and climate change. Currently there is also a 'whole-of-system' model of Australia's East Marine Region in its developmental stages (Hutton et al., 2012) which has not yet undergone peer-review. Based on Atlantis, it is named "Northern Atlantis" and it is intended that the ETBF fishing fleet will shortly be included (Hutton, T.; personal communication, 23rd October, 2014). "Northern Atlantis" is largely focussed on pelagic fish, and considered them explicitly as individual Functional Groups for each target pelagic species in the ETBF (e.g. yellowfin tuna, bigeye tuna, albacore). This allows a general comparison with Griffiths' et al. (2010) model of the ETBF. "Northern Atlantis" is not inaugurated to fit model biomass trends to stock assessment estimated biomass trends unlike Griffiths' et al. (2010). "*There is the future potential option for running the model to obtain multi-species model estimates of biomass for some of the target and bycatch species in the ETBF (and then compare and correct CPUE trends) (….) Analysis would only occur if there was reasonable confidence that the "Northern Atlantis model" is representing the interactions between the species in a way that is plausible; and only in conjunction with ETBF scientists and TTRAG approval*" (Hutton, T.; personal communication, 23rd October, 2014).

3.6. Principle Three: Management System Background

3.6.1. Jurisdictions in the area of operation and legal framework

The ETBF fishery targets tuna and billfish species, which are highly migratory fish stocks, located within both the Australian Fishing Zone (AFZ) and the WCPO, under the jurisdiction of the WCPFC. The target species are therefore subject to both national and regional fisheries management measures and policy.

At the national level the Commonwealth Minister for Agriculture has executive responsibility for fisheries, with support provided by the Department of Agriculture. The AFMA Commission, which was originally established under the *Fisheries Administration Act 1991* (*FAA, 1991*)[20] reports to the Minister and is responsible for performing and exercising domestic fisheries management function and powers of Authority (Borthwick, 2012). Under the Federal constitutional arrangements, AFMA generally manages commercial fisheries from three nautical miles offshore to the boundary of the EEZ at 200 nautical miles. State and territory governments generally manage fisheries within their border and inside three nautical miles from shore, except where arrangements have been established between AFMA and State governments to simplify management responsibility through for example, offshore constitutional settlements (OCS), which specify which jurisdiction will be responsible for management of certain fish species (AFMA, 2012c) The Commonwealth has jurisdiction over tuna and billfish resources from the baseline out to 200 nautical miles through OCS with adjacent States (except New South Wales).

Australian Commonwealth fisheries are managed by AFMA in accordance with the *FMA 1991*[21] and the *FAA 1991*. The *FAA 1991 inter alia*, makes provisions to establish AFMA, appoint commissioners, engage staff and consultants, form management advisory committees and for AFMA to develop and have approved corporate and annual operational plans. The *FMA 1991* sets out legislative parts of the fisheries management framework, including *inter alia* the regulation of fisheries, preparation of management plans, allocation and management of statutory fishing rights and other concessions, determination of allowable catches, compliance and foreign fishing controls, cooperation with the States and the Northern Territory, and satisfying international obligations. More specifically the *FMA 1991* requires AFMA to prepare and determine a management plan for each Commonwealth fishery and allocate statutory fishing rights for access to resources, while facilitating cooperation between different legislative jurisdictions in the management of fish stocks (e.g. through OCS agreements).

In managing the fishery in accordance with the *FMA 1991*, AFMA also must also take into account the requirements of other pieces of domestic legislation, in particular the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act 1999*). The *EPBC Act 1999* requires that each fishery requiring export approval undergo a strategic assessment in order to ensure current management is ecologically sustainable and in accordance with the principles of ecological sustainable development and the precautionary approach, both of which are legislative objectives under the *FMA 1991*.

Key aspects of the policy framework for Commonwealth fisheries are articulated in:

- New Directions for Commonwealth Fisheries Management in the 1990s (1989)
- Looking to the Future: A review of Commonwealth Fisheries Policy (2003)

[20] *Fisheries Administration Act 1991*. Available at: http://www.comlaw.gov.au/Details/C2014C00521
[21] *Fisheries Management Act 1991*. Available at: http://www.comlaw.gov.au/Details/C2014C00258

- Securing our Fishing Future Initiative and associated Ministerial Direction to AFMA (2005)[22]
- Future Operating Environment for Commonwealth Fisheries (AFMA, 2006)
- Commonwealth Fisheries Harvest Strategy Policy and Guidelines (2007)
- Review of Commonwealth Fisheries: Legislation, Policy and Management (Borthwick, 2012).

Sections 161 and 165 of the *FMA 1991* provide rights for parties to appeal AFMA decision-making through judicial means in the Federal Court (Section 161) or administrative means through internal AFMA review or the Administrative Appeals Tribunal (AAT) (Section 165). This system has been well-tested with AFMA decisions to apply the precautionary principle upheld in a number of cases following referral to the Administrative Appeals Tribunal (AAT) (Weire and Lok, 2007). Similarly, there were a number of judicial cases in the Federal Court in 2009, challenging the validity of delegated legislation under the *FMA 1991*, both of which were upheld (Federal Court of Australia, 2009; AFMA, 2010b). Fishers are advised of their appeal rights and the processes involved during communications with AFMA. AFMA tries to minimize and avoid disputes by consulting extensively with industry through the TTMAC and TTRAG process, organizing port visits and written communication. This allows parties to raise grievances and discuss alternative points of view prior to AFMA making amendments to management measures and/or policy (S. Auld, AFMA, pers. comm.).

The *FMA 1991* does not explicitly refer to customary fishing beyond mention at Article 24, Schedule 2 (Fish Stocks Agreement). There are no objectives relating to the rights or importance of recognising traditional fishing and any individuals who wish to access the ETBF must purchase a boat statutory fishing right and have attached quota SFRs for the target species. Other Commonwealth legislation such as the *Native Title Act 1993* however, does provide an avenue for indigenous persons to claim native (i.e. customary) title over areas of land and water and provides a formal system for assessing, recognising and protecting those claims (e.g. native title claims over Torres Strait waters). There are no such claims that impinge on this fishery, however.

Australia has agreed to abide by a range of international, legally binding and non-binding treaties and instruments concerning fisheries, which influence the domestic management framework. These include the binding *United Nations Convention on the Law of the Sea, 1982* (UNCLOS), *Food and Agricultural Organisation (FAO) Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas 1993* (FAO Compliance Agreement), the *United Nations Agreement on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks 1995* (Fish Stocks Agreement) and the signed but not ratified *FAO Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing 2009*. Other non-legally binding treaties include the FAO Code of Conduct for Responsible Fisheries and International Plans of Action (IPOA) to: (i) prevent, deter and eliminated illegal, unreported and unregulated fishing; (ii) reduce fishing (over) capacity; (iii) reduce the incidental catch of seabirds; and (iv) conserve and manage sharks.

Consistent with its obligations under Article 118 of the UNCLOS and Part III of the Fish Stocks Agreement, Australia cooperates in the management of highly migratory species through regional fisheries management organisations (RFMOs), which have allowed the development and implementation of sustainable management arrangements for some species as required under the obligations of UNCLOS Articles 63(2), 64, 118, 119 and the Fish Stocks Agreement Article 8.

The Western and Central Pacific Fisheries Commission (WCPFC) is the relevant RFMO for the management of tuna and billfish species as well as the impacts of fishing on the wider ecosystem in the WCPO. The WCPFC Convention (WCPFC, 2000) is consistent with the principles of the UNCLOS and Fish Stock Agreement, specifically:

- The objective of ensuring the long-term conservation and sustainable use of highly migratory stocks (Article 2)
- The general principles in Article 5 of the Fish Stocks Agreement, including the application of the precautionary approach, incorporating the UNFSA Annex II Guidelines for the Application of Precautionary Reference Points (Article 5)
- The application of these principles by Parties in their cooperation under the Convention, including the application of these principles in areas under national jurisdiction (Article 7)
- Compatibility of measures established for the high seas and those adopted for areas under national jurisdiction (Article 8)
- Application of the dispute settlement provisions of the Fish Stocks Agreement to disputes between WCPFC members (Article 31)
- Recognition of the interests of small scale and artisanal fishers, and of communities and small island states dependent for their food and livelihoods on tuna resources (Article 30)

The Commission takes input and advice from a number of subsidiary bodies (e.g. Scientific Committee) before making decisions, including the adoption of conservation and management measures (CMMs). The Commission also seeks input from recognised international law experts to ensure that decision-making is informed in relation to compliance with international law and protocols. All WCPFC members (including Australia) are legally bound to apply the precautionary approach and relevant CMMs as parties to the WCPFC Convention.

Decision-making at the WCPFC is open and by consensus, with a provision for a two-chambered voting process requiring a 75% majority in both chambers if all efforts to reach a decision by consensus have been exhausted. There are also provisions under Article 31 and Annex II of the Convention for a decision by the Commission to be reconsidered by a review panel at the request of a member. The WCPFC Convention also recognises the interests of small-scale and artisanal fishers under Article 5 (h), which specifies that the Commission shall “take into account the interests of artisanal and subsistence fishers” and furthermore under Article 30, which states that “the Commission shall give full recognition to the special requirements of developing States parties to this Convention, in particular small island developing States, and of territories and possessions, in particular (b) the need to avoid adverse impacts on and ensure access to fisheries by, subsistence, small-scale and artisanal fishers and fish workers as well as indigenous people.”

3.6.2. Stakeholders (fishery and non-fishery) roles and responsibilities

The Australian Fisheries Management Authority (AFMA)

The *FAA 1991* established AFMA in 1992 to manage Australia’s Commonwealth fisheries on behalf of the Australian community by applying the provisions of the *FMA 1991*. Section 7 of the *FAA 1991* sets outs AFMA's functions and Section 3 of the *FMA 1991* sets out AFMA's objectives. AFMA has translated its functions under Section 7 of the *FFA 1991* into management practices including:

- Processing licensing and entitlement transactions (excluding Torres Strait) to give effect to fisheries management arrangements
- Collecting licence fees and management levies from foreign and domestic fishers to allow for cost recovery of licensing and management services
- Ensuring each fishery is assessed on a continuing basis, and filling significant gaps in knowledge through research projects
- Managing catch, effort and other data collected through its logbook program
- Providing professional observer services to domestic and foreign fishing vessels
- Detecting and investigating illegal fishing activity by both domestic and foreign fishing boats
- Advising Australian delegations in international fisheries forums such as the Commission for the Conservation of Southern Bluefin Tuna (Borthwick, 2012)

AFMA's head office is in Canberra, employing 144 people and manages most of AFMA's functions, including fisheries management, environment and research, national compliance operations, foreign compliance policy and corporate services (AFMA, 2013a). The Darwin office employs 32 staff with a focus on foreign compliance and international engagement, while the Thursday Island office employs 5 staff and focuses on Torres Strait fisheries management, compliance and bilateral management with Papua New Guinea (AFMA, 2013a).

AFMA's responsibilities are shared between a Commission and the Chief Executive Officer (CEO):

- The Commission is responsible for domestic fisheries management
- The CEO is responsible for foreign compliance and for assisting the Commission and giving effect to its decisions
- The CEO is responsible for the agency that supports these functions

The Commission contains six part-time members, and the AFMA CEO who is appointed on a full-time basis. Appointments are made by the relevant Australian Minister and based on "expertise in one or more of the fields of fisheries management, fishing industry operations, science, natural resource management, economics, business or financial management, law, public sector administration or governance."[23]

Commercial Fishing Industry

The commercial fishing sector comprises a total of 105 boat statutory fishing rights and 131 minor line statutory fishing rights in the fishery with 44 active longline vessels and seven minorline vessels in 2012.[24] Most operators are based out of the ports of Mooloolaba in Queensland or Ulladulla in New South Wales. The client has a total of three fishing vessels

[23] AFMA (2014) The Commission. Available at: http://www.afma.gov.au/about-us/who-we-are/the-commission/
[24] AFMA (2014) ETBF at a glance. Available at: http://www.afma.gov.au/managing-our-fisheries/fisheries-a-to-z-index/eastern-tuna-and-billfish-fishery/at-a-glance/

based out of Mooloolaba, employs six skippers, 33 deckhands and a shore based manager.[25]

[25] Walker, P. verbal communication 11 August 2014.

Non-Governmental Organisations (NGOs)

There is an active environmental NGO community within Australia and the regional tuna fisheries of the WCPO and include *inter alia*: World Wildlife Fund for Nature (WWF), Greenpeace Australia Pacific, Birdlife International, TRAFFIC, Humane Society International and Australian Marine Conservation Society. A WWF representative attended the site visit for the fishery and is also the relevant conservation and environment member on TTMAC.

The Western and Central Pacific Fisheries Commission (WCPFC)

The WCPFC was established under the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the WCPO, which is a multilateral agreement with the primary objective of ensuring the long term conservation and management of highly migratory fish stocks in the WCPO. The WCPFC is the largest of the tuna RFMOs, with over half the world's tuna catch taken within the Convention area.

The WCPFC Convention Articles 9-16 and 23-24 provide information on the functions, roles and responsibilities of member states and the committees formed under Commission control (e.g. Scientific Committee and Technical Compliance Committee). The Commission and its associated committees have clear operating procedures and terms of reference and the roles and responsibilities of members and non-members are clearly defined in the Convention, in the Rules of Procedure and in relevant CMMs.

The Commission has 26 members, most of which are small island developing states (SIDS). All major coastal and fishing states in the WCPO are members, except for Vietnam. Current members include: Australia, China, Canada, Cook Islands, European Union, Federated States of Micronesia, Fiji, France, Indonesia, Japan, Kiribati, Republic of Korea, Republic of Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Chinese Taipei, Tonga, Tuvalu, United States of America and Vanuatu. Participating territories include: American Samoa, Commonwealth of the Northern Mariana Islands, French Polynesia, Guam, New Caledonia, Tokelau, Wallis and Futuna. Eight other countries including: Belize, Democratic People's Republic of Korea, Ecuador, El Salvador, Mexico, Panama, Thailand and Vietnam are granted cooperating non-member (CNM) status on an annual basis. This allows them to participate in meetings of the Commission and its subsidiary bodies (e.g. Scientific Committee and Technical Compliance Committee) and licence their vessels to fish in the WCPO on the condition they agree to comply with WCPFC measures (See, WCPFC CMM 2009-11).

The Forum Fisheries Agency (FFA)

The FFA is an advisory body, based in Honiara, Solomon Islands, comprised of 17 Pacific Island countries that provide expertise, technical assistance and support to its members about their tuna resources. FFA's members include: Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu and Vanuatu.

Approximately 50 staff are employed at the regional headquarters in Honiara to support the following work:

- Fisheries management – providing policy and legal frameworks for the sustainable management of tuna
- Fisheries development – developing the capacity of members to sustainably harvest, process and market tuna to create livelihoods

- Fisheries operations – supporting monitoring, control and surveillance of fisheries as well as treaty administration, information technology and vessel registration and monitoring

In addition to providing services to FFA members, FFA support the WCPFC vessel monitoring system (VMS) through shared facilities with the FFA, providing establishment, maintenance, diagnostic and support infrastructure and services, mobile transmission unit or automatic location communicator management services and communication gateways for the Commission VMS, along with training for Commission staff (WCPFC, 2008).

Secretariat of the Pacific Community (SPC)

SPC is an intergovernmental organisation, based in Noumea, New Caledonia that provides technical and policy advice and assistance to Pacific Island members. Established in 1947 there are 26 member countries including: American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji Islands, France, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn Islands, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, United States of America, Vanuatu and Wallis and Futuna.

SPC has six divisions including the relevant Fisheries, Aquaculture and Marine Ecosystems (FAME) division, which aims to provide "*member countries with the scientific information and advice necessary to rationally manage fisheries exploiting the region's resources of tuna, billfish and related species"*. Key services include:

- Provision of advice on the regional status of stocks and national implications thereof
- Scientific support for the development and implementation of national fisheries management plans
- Capacity building in stock assessment interpretation
- Provision of data processing and data management services and capacity building
- Capacity building in fishery monitoring, particularly in observer training, debriefer training and the development of in-country observer training capabilities
- Provision of analyses of management options being considered by FFA at the sub-regional level

In addition to serving SPC Members, the FAME provides data and scientific services to the WCPFC, such as evaluation of management options and measures, and data management.

3.6.3. Consultation processes in the fishery

At the national level, the *FAA 1991* under Section 9 outlines a non-exhaustive list of individuals and entities AFMA may consult with "for the purpose of considering any matter, or obtaining information or advice, relating to the performance of its functions…including:

- Persons or bodies representative of the whole or a part of the industry or recreational fishing
- The Commonwealth Government or State or Territory Governments or Commonwealth, State or Territory authorities having functions relating to fisheries
- Persons (including members of the scientific community) having a particular interest in matters associated with the industry."

The *FAA 1991* and *FMA 1991* also set out several specific consultation requirements for AFMA, including:

- Under Section 90 of the *FAA 1991*, holding public meetings at intervals of no greater than one year for the "purpose of consulting with industry and the public generally". AFMA must also "bring the holding of a proposed meeting to the notice of persons engaged in the industry and members of the public"

- Under Section 17A of the *FMA 1991*, "maintain a register…of persons and organisation who are to be notified of, or of determinations affecting the preparation of, draft plans of management" and under Section 20 of the *FMA 1991* "give written notification of that fact to each person who is the holder of a statutory fishing right."

- Under Sections 17(2) – (4) of the *FMA 1991* before determining a management plan for the fishery AFMA must "invite interested persons to make representations in connection with the draft plan" through publication of an invitation in the Gazette, newspapers or other appropriate publications."

Beyond these legislative requirements, the main consultation processes are undertaken by AFMA through the MACs and RAGs with around two meetings of each held annually. The minutes of both meetings are publically available on the AFMA website. TTMAC is AFMA's main point of contact with stakeholder groups for the ETBF and plays an important role in helping AFMA fulfil its legislative objectives through providing advice on a variety of issues including fisheries management arrangements, research, compliance and management costs.[26] The roles and responsibilities of MACs and RAGs are outlined in Fishery Management Paper 1 (FMP 1) (AFMA, 2009) and Fisheries Administration Paper 12 (FAP 12) (AFMA, 2014d) respectively. In determining who sits on TTMAC, AFMA is guided by FMP 1, with the AFMA Commission having final responsibility for determining the actual membership and ensuring the composition balances the interests of all relevant stakeholder groups. Typically this comprises an AFMA staff member and seven other members including a research member, up to four industry members and an environment and conservation member (AFMA< 2014h). TTRAG, which operates independently from TTMAC provides advice on the status of fish stocks, sub-stocks, species (target and non-target) and the impact of fishing on the marine environment and comprises fishery scientists, industry members, fishery economists, AFMA management and other interest groups.[27]

AFMA also conducts two port visits a year in the ETBF, sometimes more, if there are significant management changes to communicate to stakeholders in the fishery (Auld, S. verbal communication 12 August 2014). These port visits are open to the public and advertised to stakeholders with meeting outcomes used internally to guide management decision-making (Auld, S. verbal communication 12 August 2014). AFMA also readily communicates to stakeholders through newsletters such as AFMA update and direct mail to concession holders. Additionally, AFMA has the ability to use an integrated computer VMS to communicate with fishing vessels via text message/email remotely (AFMA, 2013a). Any formal management changes are advertised in Australian newspapers. Decisions of the AFMA Commission (which may or may not accept MAC and RAG advice) are summarised and published regularly through the newsletter AFMA Update but the deliberations and decision-making (i.e. minutes) of Commissioners and the reasoning for their decisions is not made public (Timmiss, T. email communication 26 September 2014).

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[26] AFMA (2014) Management Advisory Committees (MACs). Available at: http://www.afma.gov.au/managing-our-fisheries/consultation/management-advisory-committees/
[27] AFMA (2014) Resource Assessment Groups (RAGs). Available at: http://www.afma.gov.au/managing-our-fisheries/consultation/resource-assessment-groups/

At the regional level, the WCPFC Secretariat facilitates effective engagement with stakeholders and there are extensive formal and informal consultation processes that regularly seek and accept information from members and cooperating non-members. Attendance at Commission and related meetings are comprehensive and logistic and financial support is provided to cooperating non-members to ensure attendance and meaningful involvement and interaction in the cooperative management of fisheries in the WCPO. Attendance at these meetings has facilitated a greater understanding of the functions, roles and responsibilities of member States and the WCPFC. Additional opportunities for consultation between Australia and other Pacific Island countries in the management of tuna and billfish stocks occurs regularly through the FFA and associated committees.

The Commission is active in assisting and facilitating the regular and timely provision of fisheries data and information in order to be assessed by the Commission secretariat and scientific providers such as SPC. The Commission actively uses information from the fishery and its member states in order to inform fisheries management decisions and the formulation of CMMs. This is demonstrated through reports and outcomes of WCPFC meetings, which detail the decision-making process and are readily accessible online.

3.6.4. Decision-making processes

At the national level, there are established decision-making processes with judgements on the implementation of management measures or policy made by the AFMA Commission, following advice from MACs, RAGs, industry and AFMA Management. MACs and RAGs are central to the decision-making processes and the advice delivered by them is vital to the on-going performance of Commonwealth fisheries management (AFMA, 2012c). MACs provide expert advice on fisheries management arrangements; research, compliance and management costs, while ensuring decisions are in line with AFMA's legislative objectives. RAGs provide scientific and economic advice to the AFMA Commission on the harvest level of key commercial species. Both TTMAC and TTRAG also have to ensure that advice is formed taking into account the decisions of the WCPFC on issues such as TACC setting and other relevant CMMs, for example on mitigating impacts on sea turtles or sharks.

In recommending biological commercial catches (RBCCs), the RAGs reference the formal harvest strategies in place for all Commonwealth fisheries. The ETBF harvest strategy, for example requires the collection of catch and effort data in order to determine RBCCs for the target species using a series of decision rules (see Figure 28 in Section 3.4.6 above). The harvest strategy uses the latest and best available scientific information to support decision-making. There is evidence that decision-making processes use the precautionary approach and respond to serious issues through the AFMA Commission setting TACCs for target species such as bigeye tuna (1,056 tonnes) lower than the recommended WCPFC limit of 2,000 tonnes as defined in CMM 2013-01 (Borthwick 2012). There is also evidence that AFMA responds to serious issues on the status of endangered, threatened and protected (ETP) species through the development of the bycatch and discarding workplan and ecological risk management (ERM) process for the fishery.

The expert-based AFMA Commission applies a high level of critical review to the advice it receives from MACs, RAGs, industry and AFMA Management. For example, over the last two years, one-quarter of all the Commission's decisions were not in-line with MAC recommendations and it is also not unusual for the Commission's decisions to deviate from the recommendations it receives from AFMA Management (AFMA, 2012c). Nevertheless, the AFMA Commission places a great deal of weight on the scientific advice underpinning fisheries management decisions and there is a very high degree of alignment between the scientific advice of RAGs and final decisions taken by the AFMA Commission (AFMA, 2012c).

Decision-making processes are transparent, with TTMAC and TTRAG minutes publically available on the AFMA website, which describes how the management system responds to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity. Formal reports such as the bycatch and discarding workplan, ABARES fishery status report, the ERM strategy and the TACC determinations for the ETBF are all publically available on the website and stakeholders are notified of their availability through newsletters such as AFMA update and direct mail to concession holders. Any formal management changes are advertised in Australian newspapers. AFMA also has to submit an annual formal report on its operations to the relevant Minister for Parliament (which also goes to the peak industry body), that includes an evaluation of AFMA's functioning against performance indicators set out in its corporate and operational plan. Decisions of the AFMA Commission (which may or may not accept MAC and RAG advice) are summarised and published regularly through the newsletter AFMA Update but the deliberations and decision-making (i.e. minutes) of Commissioners and the reasoning for their decisions is not made public (Timmiss, T. email communication 26 September 2014).

At the regional level, the WCPFC decision-making processes are open, seek to apply the precautionary principle as required under Article 5(c) of the Convention, use the best available information and are well documented. The WCPFC has a consensus-based decision-making process with provision for a two-chambered voting process requiring a 75% majority in both chambers if all efforts to reach a decision by consensus have been exhausted. Voting grounds for appealing decisions, conciliation and review are all part of the established decision-making process, as described in Article 20 of the WCPFC Convention. Extensive consultation processes occur prior to and during decision-making to ensure transparency and feedback mechanisms for stakeholders.

The WCPFC website contains comprehensive minutes from meetings as well as technical and scientific reports from both the Commission and its subsidiary bodies (e.g. Scientific Committee), which are freely available for download. These provide a high degree of transparency in decision-making indicating how information is used by the Commission to inform management actions. It is clear that decision-making processes are based heavily on Scientific Committee reports on the status of target and non-target species.

3.6.5. Objectives for the fishery

Section 3 of *FMA 1991* sets out AFMA's overarching objectives which include:

- Implement efficient and cost-effective fisheries management on behalf of the Commonwealth
- Ensure that the exploitation of fisheries resources is conducted in a manner consistent with the principles of ecologically sustainable development (which includes the exercise of the precautionary principle), in particular the need to have regard to the impact of fishing activities on non-target species and the long term sustainability of the marine environment
- Maximise the net economic returns to the Australian community from the management of fisheries
- Ensure the accountability to the fishing industry and to the Australian community in AFMA's management of fisheries resources
- Achieve government targets in relation to the recovery of the costs of AFMA.

These objectives are summarised into a single outcome by AFMA: to pursue ecologically sustainable and economically efficient Commonwealth fisheries, through understanding and monitoring Australia's marine living resources and regulating and monitoring commercial fishing, including domestic licensing and deterrence of illegal foreign fishing (AFMA, 2013a).

These long-term objectives also aligned with the specific objectives of the *EPBC Act 1999*, which under Parts 10, 13 and 13A require all Commonwealth fisheries to undertake assessment against the *Guidelines for the Ecologically Sustainable Management of Fisheries* (Guidelines). These Guidelines require a fishery to operate under a management regime that meets two overarching principles for ecological sustainability, taking into account arrangements in other jurisdictions, as well as those established under Australian laws and international agreements. The two principles include:

- 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
- Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem (DEWR, 2007)

Associated with each principle are a number of objectives, information requirements, assessments and management responses.

The long-term objectives outlined in the *FMA 1991* are reiterated in Part 1.5 of the ETBF Plan 2010. Part 1.6 of the ETBF Plan 2010 outlines a list of measures by which these objectives are attained, including *inter alia* through: "(c) reviewing ecological risk assessments…to determine the risk to maintenance of an ecologically sustainable fishery; (d) developing in cooperation with stakeholders, a plan to strategically address any high risks identified during an ecological risk assessment; and (f) setting catch limits and managing quota species in accordance with the Commonwealth Harvest Strategy Policy" (HSP) (AFMA, 2010). Fishery short-term objectives are therefore available in documents such as the Commonwealth HSP or the ETBF Harvest Strategy, bycatch and discarding workplan or ERM strategy.

The Commonwealth HSP in particular is used by AFMA to meet fishery-specific objectives through the "sustainable and profitable utilisation of Australia's Commonwealth fisheries in perpetuity through the implementation of harvest strategies that maintain key commercial stocks at ecologically sustainable levels and within this context maximise the economic returns to the Australian community" (DAFF, 2007). The Commonwealth HSP explicitly requires that fisheries develop harvest strategies to:

- Maintain fish stocks, on average, at a target biomass point (B_{TARG}) equal to the stock size required to produce maximum economic yield (B_{MEY})
- Ensure fish stocks will remain above a biomass level where risk to the stock is regarded as too high (B_{LIM}) (or proxy)
- Ensure that the stock stays above the limit biomass level at least 90% of the time (DAFF, 2007)

The ETBF through TTRAG has developed its own harvest strategy with measurable short-term objectives of achieving "catch rates of the five key target species similar to 1997-2001 levels over a long period of time….catch over this period is thought to provide a good estimate for Maximum Economic Yield (MEY)" (AFMA, 2011a). This is being achieved through the use of a harvest strategy (with associated reference points) based on CPUE and catch size data to provide RBCCs for the five target species.

While the ETBF harvest strategy is focused primarily on target tuna and billfish species, other documents such as the ETBF bycatch and discarding workplan also have clear objectives, particularly for ETP species, which for 2014-2016 include:

- Develop bycatch mitigation devices for seabirds
- Reduce interactions with protected seabird species
- Improve post capture survival of chondrichthyan species
- Improve understanding of catch composition for chondrichthyan species (AFMA, 2014c).

Further measurable fishery-specific objectives for ETP species are also available through documents such as the threat abatement plan (TAP) for seabirds. The TAP requires the fishery to maintain a bycatch rate of less than 0.05 birds per 1000 hooks set in all fishing areas (by five degree latitudinal bands) and all seasons (1 September – 30 April; 1 May – 31 August)" (Commonwealth of Australia, 2006). Likewise in the sea turtle mitigation plan for the ETBF, which requires the fishery to "maintain an observed marine turtle interaction rate at or below [certain values]…and specifies management measures AFMA must implement if the interaction rates are exceeded" (Australia Government, 2009).

At the regional level, long-term objectives are explicit within the WCPFC Convention as detailed in Section 3.6.1. For example, Article 2 specifies that the Commission has the objective to "ensure through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the WCPO in accordance with the 1982 Convention and Agreement [UNCLOS and FSA respectively]". Article 5 of the Convention then provides principles and measures for achieving this conservation and management objective. More specifically, Article 5(c) requires the Commission to apply the precautionary approach in decision-making and Article 6 outlines the means by which this will be given effect, including through the application of the guidelines set out in Annex II of the FSA. Article 10 of the Convention is consistent with MSC principles and objectives in specifying long term objectives of "maintaining or restoring populations…above levels at which their preproduction may become seriously threatened". Similarly, short-term objectives for specific target, non-target and ETP species are outlined in various CMMs and default reference points for target stocks. Examples include: CMM 2013-01 (bigeye, yellowfin and skipjack), CMM 2010-07 (sharks), CMM 2012-07 (seabirds) and CMM 2008-03 (sea turtles).

3.6.6. Rights of access to the fishery

There are two commercial sectors in the ETBF: the longline and minorline sector. To fish in the longline sector, an operator must have a longline boat statutory fishing rights (SFR) nominated to the boat they are operating, and the respective holder must hold a number of uncaught quota SFRs or individual transferable quota (ITQs) for each species (AFMA, 2014a). To fish in the minorline sector, an operator must have a minorline boat SFR nominated to the boat that they are operating and the respective holder must hold a number of uncaught quota SFRs. Within the longline sector, there is also a sub-sector called the Coral Sea Zone (CSZ) where in order to fish in this area, an operator must hold a CSZ SFR, uncaught quota SFRs and either a longline or minorline boat SFR (AFMA, 2014a).

A boat SFR allows the operator to fish in the area of the ETBF as well as the WCPFC Convention area. In order to ensure the impact of the fishery on the broader ecosystem is minimised and that operators comply with international regulations conditions are also placed on the boat SFRs (e.g. gear restrictions or prior reporting of unloading in foreign port) by AFMA. Also, those operators with CSZ SFRs have additional conditions, such as a limit on using only 500 hooks per shot. Further information is available in each operator's specific boat SFR conditions.

The number of quota SFRs an operator receives each fishing season is proportional to the number of shares they own for each target species and the respective TACC determined by the AFMA Commission. Quota SFRs provide security of access to fishers, reduce over-capitalisation of the fishing fleet and improve economic efficiency and theoretically promote stewardship of the resource (Grafton, 1996; Grafton et al., 2006). ITQs are the Australian Government's preferred fisheries management mechanism for attaining its long-term objectives as evidenced through Section 4(a) of the 2005 Ministerial Direction to AFMA.

3.6.7. Management regulations and measures

The ETBF is managed through output controls with a TACC limit set for each of the five tuna and billfish target species under the ETBF Plan 2010. All operators in the ETBF have been granted SFRs rights that allow them to fish in the fishery and catch a portion of the TACC for each quota species. These fishing rights are fully transferable and are also known as ITQs. Under these arrangements, each fisher is limited to catching up to the amount of quota that they hold and the whole fishery is limited to the TACC that is set each season by the AFMA Commission.

Additional management measures in the fishery that meet Australia's national fisheries objectives and international commitments under the WCPFC are detailed in the ETBF Management Arrangements booklet 2014 (AFMA, 2014b) and conditions on boat SFRs and include *inter alia*:

- Bycatch and byproduct trip limits and prohibited species in waters adjacent to various States
- Requirements to fill out fishery logbooks and catch disposal record (verified weights)
- Requirements to have a VMS operating at all times
- Arrangements (management zones) to prevent the incidental capture without quota of Southern Bluefin Tuna (SBT)
- Requirements to carry of observers as required by AFMA
- Reporting arrangements for fishing on the high seas and unloading in foreign ports
- Mandatory mitigation measures for seabirds, sea turtles and sharks
- Restrictions on processing at-sea
- Requirements to report wildlife (ETP) interactions

3.6.8. Monitoring, control and surveillance (MCS)

The national management system takes a risk-based approach to MCS in accordance with its National Compliance Operations and Enforcement Policy 2013 (the Policy) which aims to target compliance and enforcement in the areas where it is most needed, "thereby using AFMA's resources most effectively" (AFMA, 2013b). The risk assessment process involves stakeholders (e.g. AFMA managers and industry) and AFMA intelligence ranking the risks of non-compliance with management arrangements to provide an overall picture of where non-compliance may occur across Commonwealth fisheries. These risks ratings are then used by AFMA to determine the priority risks for the fishing season. In 2013-14 priority risks included: 1) failure to have a VMS operating at all times and 2) quota evasion.[28] Primary compliance tools used by AFMA to monitor fishing activity and more generally deter non-compliant activity include: VMS on all vessels, catch disposal records and fish receiver records, at-sea and in-port inspections of vessels and in-port fish receiver inspections. AFMA also uses an observer program to monitor fishing activity. In the ETBF there is a target of observing 8.5% (although 5.7% in 2012 (AFMA, 2014a) of all fishing effort, however a 5% level was considered representative for the fishery (Bravington et al., 2002). While observers have no legal authority to act in an enforcement role, AFMA asks them to report on illegal fishing activity so they contribute to the overall MCS program.

Penalties for infringements are set out in the *FMA 1991* and are based on two tiers: low-level 'on the spot' fines (i.e. infringement notices) and larger fines, which require successful criminal prosecution. Under Section 106 and following a conviction of certain offences (Section 13 or Section 95(5)), a court may order forfeitures – including boats, gear, catches or the proceeds of the sale of catches. AFMA or a court may, in certain circumstances, also cancel fishing concessions; however, forfeiture or cancellation has been used very rarely for domestic offences in Commonwealth fisheries (Borthwick, 2012).

There is evidence the Commonwealth MCS program is working effectively with VMS compliance rates averaging 97.7% in 2013-14 compared to 96.7% in 2012-13 (AFMA, 2014e). During 2013-14, 38 Commonwealth fishing concession holders faced compliance action for failing to reconcile their over-catches with one balancing their quota prior to suspension and the remaining 37 subsequently reconciling their quota after suspensions were issued by AFMA to remain in port. Non-compliance in the ETBF more specifically seems low, with only minor infringements evident for failure to complete logbooks and unauthorised processing at sea, usually resulting in warnings or cautions being issued (Bravington et al., 2002). On the evidence presented, it seems most ETBF fishers comply with management arrangements and are involved in the active management of the fishery through participation at compliance workshops and the risk assessment process, timely return of logbook and catch disposal records, assisting in the collection of research data, complying with the carriage of observers and participating in the management decision-making through TTMAC and TTRAG.

The Australian MCS program is inherently linked to the regional (FFA and WCPFC) MCS system for the wider WCPO. WCPFC MCS tools include: VMS, illegal, unreported and unregulated (IUU) vessel listing, port state controls, observers, logbooks and transhipment monitoring. AFMA contributes to the effectiveness of these MCS tools through, for example, providing inspection vessels to the WCPFC high seas boarding and inspection program under CMM 2006-08 and ensuring that its vessels are compliant with the regional Pacific (WCPFC and FFA) VMS reporting requirements on the high seas under CMM 2011-02. The IUU vessel list is the main deterrent for non-compliance in use by the WCPFC and it seems to be effective, with no new vessels added to the list since 2010.[29]

3.6.9. Review of the management system

At the national level, there is a regular system of internal and external review of key parts of the management system. These include:

[28] AFMA (2013) National compliance and enforcement program 2013-14. Available at: http://www.afma.gov.au/managing-our-fisheries/compliance-activities/

[29] WCPFC (2014) IUU vessel list for 2014. Available at: http://www.wcpfc.int/wcpfc-iuu-vessel-list

Internal review

- The AFMA annual report, which requires AFMA to review its overall performance against its legislative objectives, statutory requirements and financial reporting, the effectiveness of internal controls and adequacy of systems; and the Authority's risk management processes
- Review of the effectiveness of the ETBF Plan by AFMA and TTMAC, including measures taken to achieve its objectives, against certain performance criteria, at least once every five years
- An AFMA Commission review of the performance of TTMAC under FMP 1 at intervals of no longer than every two years

External review

- ABARES annual fisheries status reports, which is an independent evaluation of the biological condition of fish stocks and economic status of fisheries. Therefore, it assesses the performance of AFMA in managing the ETBF through the harvest strategy
- Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) strategic assessment of the fisheries ecological sustainability for ongoing export approval under the EPBC Act 1999
- Australian Audit Office's periodic review of AFMA's performance
- Questioning of AFMA decision-making by the Senate Standing Committee on Rural and Regional Affairs in Senate Estimate hearings three times a year
- Independent periodic review of Commonwealth legislation and policy, (which was last undertaken in 2012) to improve the legislative framework governing Commonwealth fisheries
- CSIRO fishery stock assessments and research results, which are usually published in peer-reviewed journals

At the regional level, WCPFC undertook an independent review of its performance in 2008, which was completed in 2011 (WCPFC, 2011a). A schedule of responses and actions were developed in response to the recommendation of the review, which were considered by WCPFC in 2012. There is however, no regular program of external review. A recent Independent Review of the Commission's Transitional Science Structure and Functions recommended periodic external review of the stock assessments, which has been adopted by the WCPFC (MRAG, 2009). The WCPFC Secretariat provides an annual report to the Commission, which reviews the compliance of members with the reporting provisions of the Commission. Progress with implementation of CMMs is monitoring through the reporting provisions within the CMMs themselves or the annual reports of member countries to the Commission. Stock assessments undertaken by SPC are subject to peer-review and occasional external review.

4. Evaluation Procedure

4.1. Harmonised Fishery Assessment

For this assessment, harmonisation is required as follows:

- Principle 1 yellowfin – expedited assessment of PNA purse seine yellowfin (in assessment)
- Principle 1 albacore – Fiji longline albacore (certified), Cook Islands longline albacore (in assessment)
- Principle 3.1 (general features of Australian Commonwealth fisheries management) – Australia northern prawn fishery

Comparative scores for these fisheries are given in Table 38, with an explanation of differences where they occur. None of the differences had any substantive impact on the outcome of the assessment. For fisheries where assessment is underway, provisional scores are given where they are known. For the PNA yellowfin assessment, where scoring has not yet been completed, a harmonisation meeting for P1 was held on 6 January 2015, and the results of this meeting have been incorporated into scoring for this fishery.

Table 38. Scores for this and related fisheries where harmonisation is required.

PI	This fishery (ALB)	Fiji ALB (Akroyd et al., 2012)	Cook Islands ALB (Final Report – Gascoigne et al., 2014)	Northern prawn (Banks et al., 2012b)	Comments where applicable
1.1.1	100	100	100		
1.1.2	75	75	75		
1.2.1	70	70	70		
1.2.2	60	60	60		
1.2.3	80	80	80		
1.2.4	95	85	85		Difference in interpretation
3.1.1	85			100	Marked down due to regional level management for large pelagics
3.1.2	85			100	Difference in interpretation
3.1.3	100			100	
3.1.4	100			100	

4.2. Previous assessments

There have been no previous assessments of this fishery.

4.3. Assessment Methodologies

The assessment methodology is given in Table 39.

Table 39. Assessment methodology used.

Version of Certification Requirements used	1.3, except for PI1.2.2 SG60, which was scored using version 2.0 (see below)
Version of Full Assessment Reporting Template used	1.3
Default assessment tree used with adjustments?	RBF used
Details of adjustments made	RBF used for bycatch species (2.2)

In relation to the scoring of PI1.2.2. SG60, the MEC assessment team followed advice from MSC as follows (MSC Standards CAB Update 25 November 2014):

Following examination by ASI of a complaint raised by a Stakeholder, MSC is aware that there has been some variability in the interpretation and scoring of PI 1.2.2 (CR v1.3, v1.2, v1.1). A number of certified fisheries have been scored as meeting 1.2.2 scoring issue (c) using an interpretation that harvest control tools are available but not necessarily in use within the fishery, which was not in accordance with the requirements in CR v1.3. This incorrect interpretation has not been used by all CABs or assessment teams.

The issue of HCRs was debated between all stakeholders during the recent Fishery Standard Review (2013-2014), and resulted in MSC's new fisheries standard version 2.0 (1 October 2014) providing clarification as well as additional explicit requirements for scoring PI1.2.2. Version 2.0 maintains the previous general requirement whereby a 60 score can be achieved by the HCR being 'generally understood and in place' but also allows HCRs to be only 'available' in the specific situation that the stock has been above B_{MSY} for a recent period of time and is not expected to decline below B_{MSY} in the medium term (i.e. where $B>B_{MSY}$ and $F<F_{MSY}$; and in some other special cases). However, to be 'available', HCRs must be effectively used in some other fisheries under the control of the management body, or there must be an agreement in place to adopt an HCR before the stock declines to B_{MSY}.

MSC advises that to avoid promulgation of the incorrect interpretation of PI1.2.2 under v1.3 (or earlier versions) and also to avoid conflicting harmonization conclusions between fisheries using v1.3 and v2.0, any CABs that identify certified or in-assessment fisheries scored using v1.3 or earlier that they consider have used the early misinterpretation of PI1.2.2 may rescore them using the clarified requirements set out in PI1.2.2 version 2.0. Scoring justification should be made explicitly addressing paragraphs SA2.5.2-2.5.3 and SA2.5.5-2.5.7.1 and associated guidance from v2.0, as related to the scoring of the SG60 level in scoring issues (a) and (c). CABs should advise MSC for which fisheries they intend to do this.

In order to avoid disruption to fisheries and CAB activities, MSC advises CABs to undertake this activity at an early opportunity, including for instance at their next surveillance audit, but that an expedited audit may not be necessary. Harmonisation discussions should be held where appropriate between CABs in the case of overlapping fisheries.

These changes should only affect the SG60 scoring level. MSC does not expect that any changes to conditions or action plans should result from this action.

In order to avoid complications of harmonisation between different versions of the standard, MSC strongly advises any fishery for which the above solution is adopted to apply Version 2.0 in its entirety at the next reassessment. In particular, CABs should note that the v2.0 guidance recognizes that the timescales for closing out conditions may be relaxed in the case that stock abundance remains high (above B_{MSY} levels, again with the expectation that it will not decline rapidly, i.e. $F<F_{MSY}$) and HCRs are regarded as 'available' but not yet 'well

defined' (see guidance in FCR section GSA2.5.2-2.5.5, page 397). CABs should note that extensions to existing PI 1.2.2 condition timelines beyond a recertification date on the basis of this guidance shall only be accepted for fisheries undertaking reassessment against v2.0 in its entirety.

Fisheries completing their conditions at reassessment will no longer need to apply the 2.0 interpretation to PI 1.2.2 and may continue to undertake reassessment against v1.3, if applicable (i.e. if reassessment takes place before 1 October 2017).

4.4. Evaluation Processes and Techniques

4.4.1. Site Visits and consultations

The site visit for this assessment was held on 10-13 August 2014 in Mooloolaba, Australia. The stakeholders consulted during the site visit, or consulted in other ways, or who submitted information or comments, are set out in Table 40. A SICA analysis was also conducted during the site visit, and SICA participants are also shown in Table 40.

Table 40. Stakeholders who participated in the site visit and SICA.

Name	Role / organisation	Type of consultation
Pavo and Heidi Walker	Owners and Managers of Walker Seafoods Australia	Site visit and SICA
Ben Mueller	Fishing Operations Manager, Walker Seafoods	Site visit
Gary Heilmann	Managing Director at De Brett Seafoods, member of TTMAC and TTRAG	Site visit and SICA
Steven Auld	ETBF Fishery Manager, AFMA	Site visit and SICA
Trent Timmiss	Senior fishery manager, AFMA	Responded to question by email
Peter Trott	WWF Australia	Site visit and SICA, also written submission (Appendix 4. Stakeholder submissions)(Appendix 4)
Dale Kolody	CSIRO Stock Assessment Scientist	Responded to questions by email
Bill Holden	MSC Fisheries Outreach	SICA

At key stages of the assessment process, stakeholders were contacted and provided with an opportunity to comment (for a full list of stakeholders, please see Appendix 8. Stakeholders). Stakeholders were contacted at the following stages:

i) Fishery announcement – 18/03/14

ii) Assessment team and timeline – 18/03/2014 (Note that a revised assessment team was submitted on 15/04/14 and an amended timeline was submitted on 23/12/2014)

iii) Assessment team confirmation (28/04/2014)

iv) Use of default assessment tree and possible use of Risk-Based Framework (01/05/2014)

v) Site visit notification (10/06/2014)

vi) Revision of Unit of Certification (10/09/14)

4.4.2. Stakeholder comments during evaluation

Stakeholder written comments are provided in Appendix 4. Stakeholder submissions. Stakeholder verbal comments which expressed an opinion on the fishery are summarised below; comments which provided information used in the assessment are not summarised, but the information has been incorporated into the assessment and referenced as appropriate. Stakeholder views on the SICA analysis are summarised in Appendix 2. SICA tables with scores and justifications.

Fishery stakeholders (Walker Seafoods and De Bretts):

- Effort in the ETBF is constrained by the TACC – particularly the swordfish TACC. Suggested that longline effort is higher outside the AFZ than inside
- Fleet has declined massively in recent years (2003 – 165 vessels, 2014 - ~35 vessels), due to high input prices mainly. No new vessels built since 2002. All vessels are small (<24m except one)
- CCTV – would welcome on board as lower costs than observers. Due to be introduced in June 2014, but not arrived so far
- Turtles are caught very rarely – perhaps one every few years?
- Moonfish mainly taken if deep-setting for albacore
- Sunfish can be released alive
- Are TACC for bigeye and yellowfin too conservative? Under WCPFC rules they could be set higher. But TACCs for swordfish and marlin are the limiting factors in any case
- Mahi mahi – trends are reportedly reviewed by the TTRAG annually, at least in a qualitative way; but not reported to have come up in discussion at the MAC

WWF (see also written submission in Appendix 4. Stakeholder submissions):

- Key concerns: Chinese subsidies in the WCPO albacore fishery, regional management for the tunas, bigeye stock status.
- Thinks Australian TACC for bigeye is set too high – it is not constraining catches by the ETBF
- ERA process needs updating – under discussion – but thinks that more thorough than the SICA
- Would like a ban on landing for all sharks – i.e. shortfin mako to be discarded even if dead. It is an EPBC-listed species, so landing it in a commercial fishery is not appropriate
- Questions whether all of them are always dead – convenient
- Hammerhead sharks – notes that CITES-listed come September 2014, and AFMA have not yet introduced appropriate regulations
- Confusion in identification between silky sharks (no retention) and dusky whaler sharks (can be retained). Would like to see retention of dusky whalers banned on the basis of their similarity, but the industry and recreational fishers did not support it.
- In general, would like to see Walker lead the way with a strong policy on shark conservation

AFMA:

- Notes that there is a big effort to keep fishers updated and in touch – formal and informal visits and consultations. Good relationship
- Notes that Australia is taking the lead on swordfish management within WCPFC

4.4.3. Evaluation Techniques

a) Media announcements

Two media outlets: The Australia Fisheries Management Authority (AFMA) website and the MSC website. The AFMA website was selected to reach predominantly local stakeholders while the MSC press release targeted a wide range of stakeholders within the sustainable seafood industry. The combination of both ensured that key stakeholders were notified of this fishery's announcement.

b) Methodology for information gathering

Information for the assessment was gathered during the site visits and in separate correspondence with individual stakeholders. AFMA were key in providing most of the operational and regulatory information on the fishery and were extremely helpful and cooperative throughout the assessment process. Regional information (e.g. SPC stock assessments and WCPFC CMMs) was obtained from online sources.

c) Scoring process

Scoring was partly completed during the site visit and partly completed afterwards. Principle 1 was provisionally scored during the site visit, but scores were then reviewed and in some cases modified during further team discussions and after harmonisation discussions with other CABs in relation to yellowfin and albacore (see Section 4.1). In relation to Principle 2, some further research was required after the site visit on some issues (e.g. a review of the results of ecosystem models).

The scores were decided as follows:

How many scoring issues met?	SG60	SG80	SG100
All	60	80	100
Half	FAIL	70	90
Less than half, most not met	FAIL	65	85
More than half, many or most	FAIL	75	95

Note that where there is only one scoring issue in the SG, the issue can be partially scored – in this case the team used their judgement to determine what proportion of it was met, e.g. at the 100 level, a small part met = 85, about half met = 90, nearly all met = 95.

d) Decision rules for final outcome

The decision rule for MSC certification is as follows:

- No PIs scores below 60;
- The aggregate score for each Principle, rounded to the nearest whole number, is 80 or above.

The aggregate score for each Principle is calculated by taking the average score for each section followed by the average of all the section scores (see Table 42).

e) Scoring elements

The set of scoring elements that were considered in each outcome PI in Principles 1 and 2 are listed in Table 41.

Table 41. Scoring elements

Component	Scoring elements	Main/not main	Data-deficient or not
1 – Target species (UoC 1)	Albacore	Target	No
1 – Target species (UoC 2)	Yellowfin	Target	No
1 – Target species (UoC 3)	Swordfish	Target	No
2.1 - Retained species	Bigeye	Main	No
	Striped marlin	Main	No
	Mahi mahi	Main	Yes
	All other retained species (see Table 21 and Table 24)	Not Main	No
	Bait (squid)	Not Main	No
2.2 – Bycatch species	Lancetfish	Not Main	Yes
	Snake mackerel	Not Main	Yes
2.3 - ETP species	Seabirds	N/A	No
	Sea turtles	N/A	No
	Sharks and rays	N/A	No
	Marine mammals	N/A	No

5. Traceability

5.1. Eligibility Date

The Target Eligibility Date (TED) has been set as 1st February 2015. Originally the TED was set for the certification of the fishery but after a delay to the certification process, the date was changed to the date above at the request of the client. Whilst the fishery is not yet certified, WCPO yellowfin, south Pacific swordfish and south-west Pacific swordfish caught after the 1st February 2015 may be sold as Under MSC Assessment Fish (UMAF) under specific CoC requirements as the assessment team deem the traceability system in the fishery is adequate (see 5.2 below for further details).

5.2. Traceability within the Fishery

a) Tracking, tracing and segregation systems within the fishery

Aboard all vessels within the Unit of Certification, the retained catch undergoes primary processing onboard. For tunas and mahi mahi, fish are de-gilled and gutted before being placed in individual polythene bags and placed in the holds in refrigerated seawater. Large fish are secured in fish holds by the tail and roughly separated by bycatch product, tunas, marlin, swordfish etc. As no further processing occurs onboard or prior to landing, the removal of gills and guts doesn't not affect species physical characteristics crucial to identification, and therefore requires no further labelling. The exemptions are swordfish and striped marlin, as the head is removed, but due to their body shape and markings, they too are easily identified without further labelling or identification (see Figure 44). Each licensed vessel fishing in the ETBF must carry and complete an AFMA logbook (AL06) for each trip. The following mandatory reporting information is recorded: the departure and arrival port, departure and arrival dates, set and haul times, their respective latitude and longitude co-ordinates, number of hooks in the set and whether an AFMA observer was onboard. Information must be submitted for all target and primary discarded catch as well as those species listed on the Protected Species List. Retained catch information includes species, number of individuals and estimated weight in kilograms. Upon landing, fish are unloaded roughly by category (tuna/swordfish etc.) and catch documentation completed. The logbooks accompany the catch, where each individual fish is weighed and the accurate weight of each fish recorded on the catch disposal records (CDRs). Records are completed by both fisher and fish receiver permit holder. Data such as boat name, date of fish reception, SFR number, port of unloading, species and their respective accurate weights in kilograms, logbook number and page number of logbook are recorded on the CDR. Both logbooks and CDRs are then submitted to AFMA.

Transhipment is not undertaken by the client group. Under the Fisheries Management (International Agreements) Amendment Regulations 2012, strict guidelines are in place for the transhipment of highly migratory fish stocks and are in accordance with the WCPFC CMM-2009-06 on the regulation of transhipment, including a transhipment declaration, having an observer present at the time of unloading, and reporting requirements to the Executive Director of the Commission of the WCPFC.

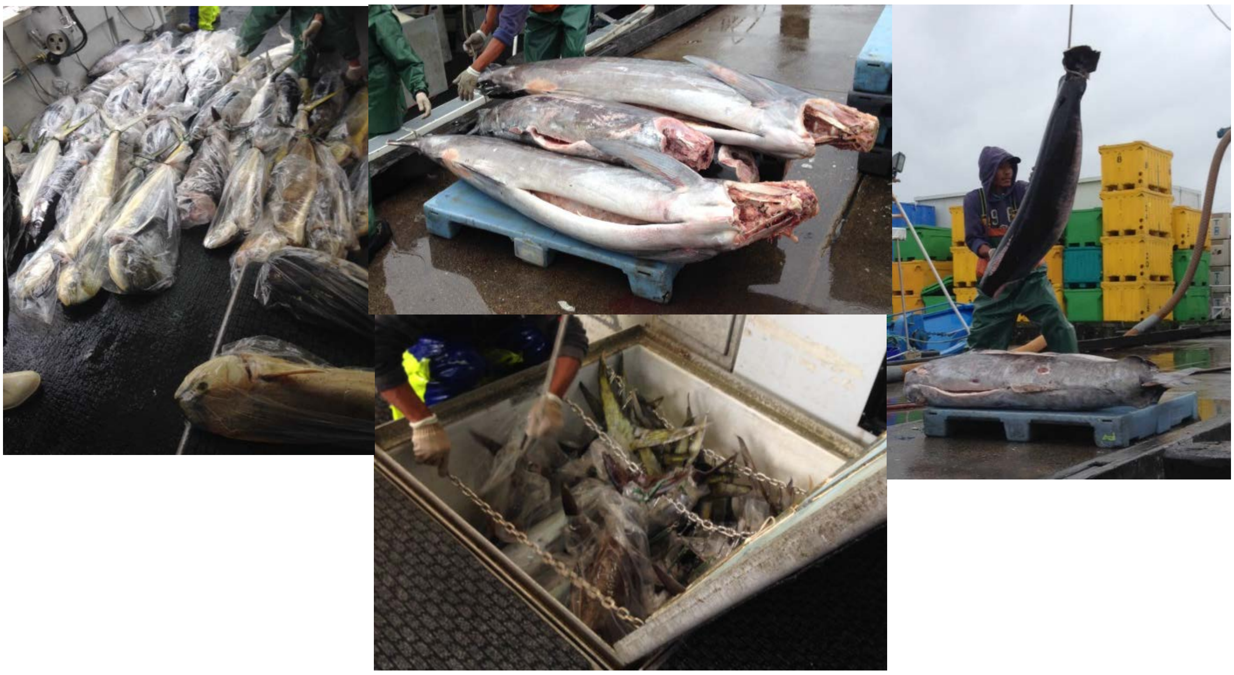

Figure 44. An example of a Walker Seafoods vessel unloading process

b) Risk of substitution of certified products with non-certified products

Walker Seafoods vessels target primarily swordfish, but also yellowfin tuna, albacore tuna and mahi mahi within the Australia's EEZ in the Eastern Tuna and Billfish Fishery (ETBF). The Unit of Certification is defined by the boundary of the ETBF. VMS records can be matched to logbook entries for set starts and these can be verified against logbook entries. As fishing does not occur outside the limit of the ETBF, all catches of P1 species assessed here can be classed as MSC certified and are eligible to carry the MSC ecolabel. Only one boat unloading occurs at a time, preventing the substitution of non-certified catch from another longline vessel operating in the fishery.

c) Points of landing

There are two designated ports for Walker Seafoods vessels to land, Mooloolaba or Ulludulla in Queensland. The most commonly used port of landing is Mooloolaba. There is no risk of mixing MSC with non-MSC product from Walker Seafood vessels as all swordfish, yellowfin and albacore caught during a trip is MSC certified. Upon landing, ownership changes to the processor organisations (PO) and separate chain of custody certification is then required. Documentation regarding the catch, including the vessel and catch area accompanies the catch unloaded into further chains of custody (see section 5.2a above for more details). Catch is kept physically separated by vessel, either by unloading one vessel at a time (usual practice) or by grouping each vessels' catch together, preventing mixing. This is to ensure that fishers are only remunerated for their own catch, but this also works to prevent mixing of client MSC and other vessels' non-MSC catch.

5.3. Eligibility to Enter Further Chains of Custody

Yellowfin and albacore tuna and swordfish caught by the Walker Seafoods vessels within the ETBF (see section 3.2) and after the target eligibility date will be eligible to enter further chains of custody, pending the outcome of this evaluation. **Separate chain of custody certification will be required with the first change of ownership.**

There are two eligible points of landing:

- Mooloolaba, Queensland
- Ulludulla, Queensland

5.4. Eligibility of Inseparable or Practically Inseparable (IPI) stock(s) to Enter Further Chains of Custody

There are no IPI stocks involved in this assessment.

6. Evaluation Results

6.1. Principle Level Scores

Table 42. Final Principle Scores

Principle		Score
Principle 1 – Target Species	UoC 1 - Albacore	81.9
	UoC 2 - Yellowfin	85.0
	UoC 3 - Swordfish	80.6
Principle 2 – Ecosystem		87.3
Principle 3 – Management System		86.8

6.2. Summary of Scores

Principle	Component	Weighting	Weighting by PI	PI number	Performance Indicator	UoC 1 – Albacore	UoC 2 - Yellowfin	UoC 3 - Swordfish
1	Outcome	0.5	0.25	1.1.1	Stock status	100	90	90
			0.25	1.1.2	Reference points	75	90	75
				1.1.3	Stock rebuilding	N/A	N/A	N/A
	Management	0.5	0.125	1.2.1	Harvest Strategy	70	70	80
			0.125	1.2.2	Harvest control rules and tools	60	65	65
			0.125	1.2.3	Information and monitoring	80	80	80
			0.125	1.2.4	Assessment of stock status	95	100	90
2	Retained species	0.2	0.067	2.1.1	Outcome	80		
			0.067	2.1.2	Management	100		
			0.067	2.1.3	Information	80		
	Bycatch species	0.2	0.067	2.2.1	Outcome	100		
			0.067	2.2.2	Management	80		
			0.067	2.2.3	Information	80		
	ETP species	0.2	0.067	2.3.1	Outcome	75		
			0.067	2.3.2	Management	90		
			0.067	2.3.3	Information	75		
	Habitats	0.2	0.067	2.4.1	Outcome	100		
			0.067	2.4.2	Management	80		
			0.067	2.4.3	Information	100		
	Ecosystem	0.2	0.067	2.5.1	Outcome	80		
			0.067	2.5.2	Management	90		
			0.067	2.5.3	Information	100		
3	Governance and Policy	0.5	0.125	3.1.1	Legal and customary framework	85		
			0.125	3.1.2	Consultation, roles and responsibilities	85		
			0.125	3.1.3	Long term objectives	90		
			0.125	3.1.4	Incentives for	90		

					sustainability	
	Fishery-specific management system	0.5	0.1	3.2.1	Fishery specific objectives	90
			0.1	3.2.2	Decision making processes	80
			0.1	3.2.3	Compliance and enforcement	100
			0.1	3.2.4	Research plan	80
			0.1	3.2.5	Management performance evaluation	80

6.3. Summary of Conditions

Condition number	Condition	Performance Indicator
1	The management system should formally adopt a target reference point for the South Pacific albacore stock, which is consistent with maintaining the stock at B_{MSY} or some other measure with similar intent or outcome. This target reference point should be used for management purposes.	**1.1.2 (albacore)**
2	The fishery management system should put in place a regional harvest strategy, incorporating limit and target reference points (management objectives), a harvest control rule and management actions, such that the strategy is responsive to the status of the stock and the elements of the strategy work together to maintain the stock at or around the target level. The key missing elements of the harvest strategy at present are 1. a target reference point formally adopted by the regional management system, and 2. a well-defined harvest control rule with associated management actions. These issues are also addressed specifically in conditions 1 and 3.	**1.2.1 (albacore)**
3	A well-defined regional-level harvest control rule should be put in place; with associated management actions (in the form of a WCPFC CMM or another form as appropriate) which together act effectively to reduce exploitation rates as the limit reference point is approached. The selection of the harvest control rule should take into account the main uncertainties regarding the status of the stock or the impact of the fishery (or other uncertainties if considered important). This condition can be addressed together with conditions 1 and 2.	**1.2.2 (albacore)**
4	The fishery management system should put in place a regional harvest strategy, incorporating limit and target reference points (management objectives), a harvest control rule and management actions, such that the strategy is responsive to the status of the stock and the elements of the strategy work together to maintain the stock at or around the target level. The key missing element of the harvest strategy at present is a well-defined harvest control rule with associated management actions. This issue is also addressed specifically in condition 5.	**1.2.1 (yellowfin)**
5	A well-defined regional-level harvest control rule should be put in place; with associated management actions (in the form of a WCPFC CMM or another form as appropriate) which together act effectively to reduce exploitation rates as the limit reference point is approached. The selection of the harvest control rule should take into account the main uncertainties regarding the status of the stock or the impact of the fishery (or other uncertainties if considered important). This condition can be addressed together with condition 4.	**1.2.2 (yellowfin)**
6	A limit reference point needs to be defined for the total stock area (WCPFC). This is to ensure that the stock does not fall below a level at which there is an appreciable risk to impairing reproductive capacity.	**1.1.2 (swordfish)**
7	A well-defined regional-level harvest control rule should be put in place; with associated management actions (in the form of a WCPFC CMM or another form as appropriate) which together act effectively to reduce exploitation rates as the limit reference point is	**1.2.2 (swordfish)**

Condition number	Condition	Performance Indicator
	approached. The selection of the harvest control rule should take into account the main uncertainties regarding the status of the stock or the impact of the fishery (or other uncertainties if considered important). Note: This condition can be address together with conditions 1 and 2.	
8	Turtles: • Continue to collect data, which allows turtle interactions per 1000 hooks to be estimated. • If data show that interactions have reduced to below the trigger level, no further action is required. • If data show that there remains a significant risk of interactions above the trigger level, further management measures should be implemented, either by Walker Seafoods Australia or by the ETBF as a whole. Shortfin mako: The fishery may show that it is not having an unacceptable impact on this species by various means: i) further reducing the mortality of this species from the fishery such that impacts are highly unlikely; and/or ii) providing an estimate of the total population size of shortfin mako against which the existing catch rate can be compared and shown to be acceptable; and/or iii) providing evidence on trends in shortfin mako population in the area of the fishery, to show that there is no evidence of any reduction in the population in the area associated with the fishery; and/or iv) any other appropriate method.	**2.3.1**
9	Collect and analyse data to provide an estimate of the total population size of shortfin mako against which the existing catch rate can be compared, and/or provide evidence on trends in shortfin mako population in the area of the fishery, in relation to the activity of the fishery.	**2.3.3**

6.3.1. Recommendations

The team did not have any recommendations.

6.4. Determination, Formal Conclusion and Agreement

Following review of the draft Final Report, as well as all stakeholder comments submitted prior to and in relation to the Public Comment Draft Report, the Assessment Team was in unanimous agreement to grant MSC certification to this fishery, pending the outcome of the objections period.

The MEC Certification Decision Making entity was informed of the intention to certify the fishery on the 26th August 2015. The final certification decision was made on the 27th August 2015 with the Certification Decision Maker approving the decision to certify the fishery.

6.5. Changes in the fishery prior to and since Pre-Assessment

No pre-assessment was conducted for this fishery.

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Appendix 1 Scoring and Rationales

Appendix 1.1 Performance Indicator Scores and Rationale

Appendix 1.1.1 Principle 1 (UoC 1 - Albacore)

Evaluation table 1 - PI 1.1.1 Albacore

PI 1.1.1		**The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	It is likely that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired.
	Met?	Y	Y	Y
	Justification	The most recent stock assessment (Hoyle et al., 2012) gives median estimates for $B_{current}/B_{MSY}$ and $SB_{current}/SB_{MSY}$ of 1.6 (5% and 95% CIs 1.4-1.9) and 2.6 (5% and 95% CIs 1.5-5.2) respectively. The median estimate for $F_{current}/F_{MSY}$ is 0.21 (5% and 95% CIs 0.04-1.08). The median estimate of MSY is 99,085 mt (5% and 95% CIs 46,560–215,445 mt), which is comparable to recent catches (2012 catch reported to WCPFC = 71145 mt, from stock assessment C_{latest} (July 2010-July 2011) = 89790, $C_{current}$ (July 2007-July 2010 average) = 78664 mt. These results are consistent with the previous stock assessments in 2009 and 2011. Note, however, that confidence intervals on estimates of MSY from the stock assessment are wide. The stock assessment model estimates trends in recruitment over time as shown in Figure 1 below. The initial decline in recruitment is an attempt by the model to deal with the early observed steep decline in CPUE, which cannot be fully explained within the model by a decline in biomass from fishing. Hoyle et al. (2012) note that there are other explanations for this pattern which are perhaps more likely: notably a decline in catchability arising from removal of the most catchable individuals from the population, learned avoidance behaviour and/or genetic selection for traits which reduce catchability. Similar rapid initial declines have been observed in CPUE of several tuna populations and the cause remains uncertain (e.g. Walters (2003), Hampton et al. (2005)). The authors of the stock assessment conclude that there is no evidence that the fishery is having any impact on recruitment. WCPFC-SC8 (2012), in their review of the assessment, agrees with this conclusion.		

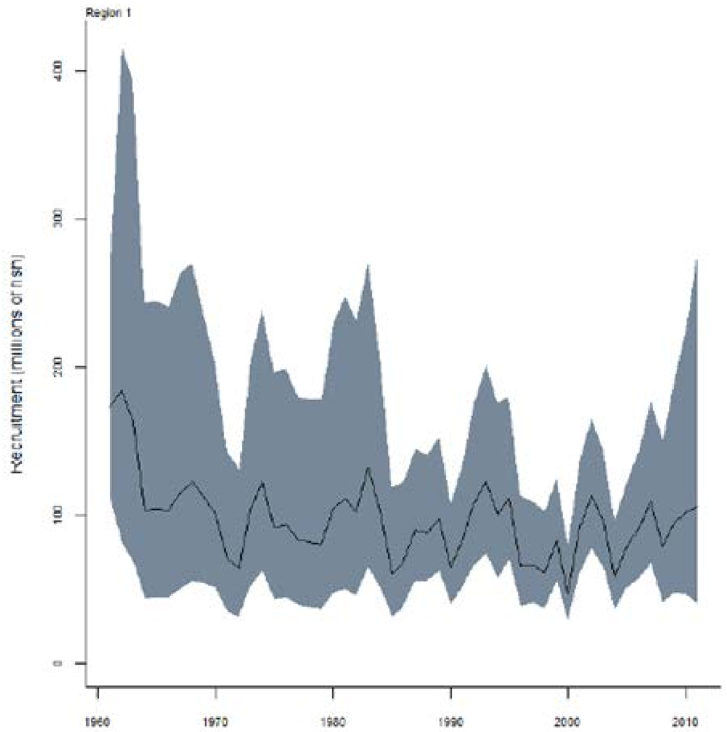

Figure 1. Estimated trends in recruitment from the most recent stock assessment model, with 5% and 95% CIs.

Reference points relating to spawner biomass give a more quantitative idea of the current spawning potential of the stock ($SB_{current}$ and SB_{latest} defined as above; $SB_{Fcurrent}$ equilibrium spawner biomass at current levels of F) relative to unfished level (SB_0), MSY level (SB_{MSY}), the level with fishery impact removed ($SB_{current,F=0}$) and with the estimated initial value in the time series (SB_{init}) (Table 1). The SB as estimated in this way has a high probability of being above the MSY level; >95% for $SB_{current}$ and SB_{latest}, and <95% but >50% for $SB_{Fcurrent}$. In addition, none of the sensitivity analyses (at least singly) resulted in a median estimate of $SB_{current}$ which was below SB_{MSY} (lowest estimate of $SB_{current}/SB_{MSY}$ = 1.95) (Table 2).

Table 1. SB-related reference indices. Colour-coding for MSY reference indices: green – 5% CI indicates a >95% probability that the value estimating current stock status (the numerator) is greater than SB_{MSY}; orange – 5% CI indicates that the probability is <95% (although not a great deal less in this case.

Reference index	Median value of output grid	Mean value of output grid	Reference case model run	5% CI	95% CI
SB_{MSY} / SB_0	0.28	0.22	0.23	0.12	0.30

$SB_{current} / SB_0$	0.59	0.59	0.61	0.41	0.76
SB_{latest} / SB_0	0.56	0.56	0.60	0.37	0.72
$SB_{Fcurrent} / SB_0$	0.56	0.53	0.65	0.26	0.76
$SB_{current} / SB_{MSY}$	2.56	2.88	2.58	1.46	5.2
SB_{latest} / SB_{MSY}	2.38	2.74	2.56	1.33	5.18
$SB_{Fcurrent} / SB_{MSY}$	2.39	2.64	2.77	0.94	5.27
$SB_{current} / SB_{current,F=0}$	0.63	0.60	0.71	0.35	0.80
$SB_{latest} / SB_{latest,F=0}$	0.58	0.56	0.67	0.31	0.77
$SB_{current} / SB_{init}$	0.44	0.47	0.36	0.30	0.75

Table 2. Median estimates of $SB_{current}/SB_{MSY}$ under alternative scenarios run as part of the sensitivity analysis of the stock assessment model (the details of the different models are explained in the main body of the report, Section 3.4.8.

Model	SBcurrent/SBMSY	Model	SBcurrent/SBMSY
2012 reference case model	2.56	S1	1.95
G2	1.95	S3	3.95
G3	2.49	Cr2	2.48
G4	2.35	EC2	2.54
G5	2.62	M1	2.09
G6	2.93	M3	2.95
G7	2.87	CPUE2	2.78
		CPUE3	2.37

WCPFC have set a limit reference point for South Pacific albacore of $20\%SB_{current,F=0}$ and SB is above this level with >95% probability (see Table 1, 5%-95% range 35%-80%).

Finally, the age-selectivity of albacore fisheries of the WCP (dominated by longline fisheries) is relevant to consider. Figure 2 (from Langley and Hampton 2005, reprinted in Moloney 2007) shows the composition of a theoretical albacore cohort by weight at age, showing that the proportion of the stock that is vulnerable to longline fishing is above the age at maturity. This does not mean that it is impossible for fishing to impair recruitment, but clearly it is less likely under these circumstances. The exact form of the relationship varies with the assessment assumptions, but the general result is qualitatively consistent.

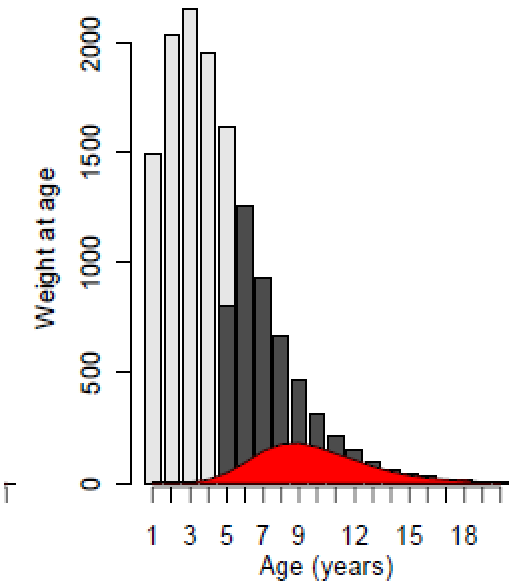

Figure 2. Composition of a theoretical albacore cohort, by weight at age. White columns = immature, grey = mature, red = available to the longline fishery.

In summary, the team considered the following:

- There is a probability of >95% that 'current' and 'latest' spawner biomass is above the level giving MSY and above the limit reference point.
- The best estimate of current total biomass is also above the MSY level with >95% probability; current fishing mortality is estimated to be below the MSY level but with <95% probability; catches are approximately at the MSY level (noting, however, that confidence intervals in these estimates are very wide).
- Estimates of recruitment from the stock assessment model show an initial decline, which is, however, very uncertain and subject to multiple explanations. Since then, recruitment has been fluctuating without trend – the most recent (~5 year) trend (or fluctuation) has been upwards.
- The main fisheries on this stock (longline fisheries) target animals above the median age at maturity.
- The stock assessment was considered by the WCPFC Scientific Committee to be credible ('*SC endorsed the assessment results as the best available science for the basis of management*'; SC8 report).

On this basis, the team concluded that there is a high degree of certainty that the stock is above the point at which recruitment would be

		impaired.		
b	**Guide-post**		The stock is at or fluctuating around its target reference point.	There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years.
	Met?		Y	Y
	Justification	For management purposes, no single target reference point has been agreed for the whole stock, and CMM 2010-05 does not specify a quantitative target in relation to stock status. The Australian CHSP sets a target reference point of B_{MEY} (defaulting to $1.2B_{MSY}$) but since they consider that the Australian fishery covers only a small proportion of the stock (see Section 3.4.6 of the main report), the harvest strategy is not applied. The issue of target reference points for management is considered further under 1.1.2, 1.2.1 and 1.2.2 below. For the purposes of the stock assessment, the stock status is evaluated against a variety of reference points, including MSY-based reference points (B_{MSY}, SB_{MSY}, F_{MSY}), as well as B_0 and SB_0 (equilibrium total and spawner biomass without fishing) and $B_{current,F=0}$ and $SB_{current,F=0}$ (removal of the 'fishery impact'). Estimates of the stock status relative to these reference points are given in Table 3. Taking again the MSC definition of 'high degree of certainty' as a 95% confidence level, these estimates suggest that there is a high degree of certainty that current total biomass is above the MSY level, and likewise for spawner biomass, with the exception of current spawner biomass measured as $SB_{Fcurrent}$ (as discussed above).		

Table 3. Estimates of stock status relative to reference point levels from the most recent stock assessment (Hoyle et al., 2012). Colour coding for MSY reference points as Table 1 above.

Reference index	Median value of output grid	Mean value of output grid	Reference case model run	5% CI	95% CI
$B_{current}$ / B_{MSY}	1.62	1.61	1.51	1.37	1.88
B_{latest} / B_{MSY}	1.57	1.56	1.55	1.28	1.78
$B_{Fcurrent}$ / B_{MSY}	1.49	1.45	1.59	0.96	1.81
$B_{current}$ / $B_{current,F=0}$	0.82	0.80	0.86	0.62	0.93
B_{latest} / $B_{latest,F=0}$	0.80	0.77	0.85	0.56	0.92
$SB_{current}$ / SB_{MSY}	2.56	2.88	2.58	1.46	5.2
SB_{latest} / SB_{MSY}	2.38	2.74	2.56	1.33	5.18
$SB_{Fcurrent}$ / SB_{MSY}	2.39	2.64	2.77	0.94	5.27
$SB_{current}$ / $SB_{current,F=0}$	0.63	0.60	0.71	0.35	0.80
SB_{latest} / $SB_{latest,F=0}$	0.58	0.56	0.67	0.31	0.77

Considering the sensitivity analyses for the stock assessment (Table 4), the median output for the different scenarios tested (albeit taken individually) likewise suggests that there is a high probability under a range of scenarios that current biomass is significantly above the MSY level. This includes the different growth scenarios, which have a significant impact on biomass trends in the model output, as discussed in the main body of the report (Section 3.4.8) (although they also have an influence on estimates of B_{MSY}, which may explain why the overall influence on B relative to B_{MSY} is relatively small).

Table 4. Median estimates of $B_{current}/B_{MSY}$ under alternative scenarios run as part of the structured uncertainty analysis (The first entry represents a single model, all subsequent entries represent the median from the subset of 540 models that include the indicated option; the details of the different model options are explained in the main body of the report, Section 3.4.8).

Model	$B_{current}/B_{MSY}$
2012 reference case model	1.51
G2	1.68
G3	1.66
G4	1.70
G5	1.62
G6	1.61
G7	1.55
S1	1.50
S3	1.74
Cr2	1.59
EC2	1.62
M1	1.56
M3	1.65
CPUE2	1.71
CPUE3	1.55

Trends in total stock biomass over recent years, as well as trends in F, relative to MSY reference points, are shown in Figure 3 for the best point estimates of the reference case. Although stock assessments have changed over this period, and catches have increased in recent years, the information available suggests that stock biomass has been well above MSY reference point levels since assessments began; with fishing mortality likewise below MSY levels.

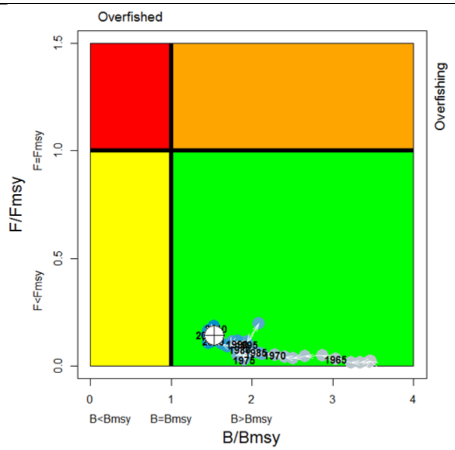

Figure 3. Reference case trends in biomass and fishing mortality relatively to MSY reference points over time.

Overall, the team considered on this basis that there is a high degree of certainty that the stock has never been below the target reference point (taken to be B_{MSY}).

References	Hoyle et al., 2012 Langley & Hampton, 2005 Moloney, 2007 Walters, 2003 Hampton et al., 2005 SC8 report CMM 2010-05

Stock Status relative to Reference Points

	Type of reference point	Value of reference point	Current stock status relative to reference point
Target	B_{MSY}	587,000 t (median estimate)	$B_{current}$ 1,028,983 t (median), 1,263,700 (ref.

reference point		835,200 t (ref. model)	model) $SB_{current}$ 253,100 t, 436,600 t $B_{current}/B_{MSY}$ = 1.62, 1.51 $SB_{current}/SB_{MSY}$ = 2.56, 2.58 $SB_{current}/SB_{current,F=0}$ = 0.63, 0.71 $SB_{current}/(0.6SB_{current,F=0})$ = 1.05, 1.18 $SB_{current}/(0.4SB_{current,F=0})$ = 1.58, 1.77 $SB_{current}/(0.2SB_{0})$ = 3.15, 3.53
	SB_{MSY}	108,100 t, 168,900 t	
	$SB_{current,F=0}$	448,300 t, 617,900 t	
	$0.6SB_{current,F=0}$	269,000 t, 370,740 t	
	$0.4SB_{current,F=0}$	179,315 t, 247,179 t	
Limit reference point	$0.2*SB_{current,F=0}$	89,660 t, 123,580 t	

OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation table 2 - PI 1.1.2 Albacore

<table>
<tr><td colspan="2">PI 1.1.2</td><td colspan="3">Limit and target reference points are appropriate for the stock</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guide post</td><td>Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.</td><td>Reference points are appropriate for the stock and can be estimated.</td><td></td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td></td></tr>
<tr><td>Justification</td><td colspan="3">WCPFC reference points

For management purposes, only a biomass limit reference point is formally agreed by WCPFC for the albacore stock, in the form 20%$SB_{current,F=0}$, where ‘current’ is defined as the most recent 10-year period for which data are available for the stock assessment. This reference point was agreed after the most recent stock assessment was carried out; the stock assessment reports an estimate of $SB_{current,F=0}$, (Hoyle et al. (2012) given above in PI 1.1.1) but apparently not with the same definition of current. Nonetheless, the team felt that if not identical, it was reasonable to assume that this parameter would be close to the limit reference point value.

A target reference point has not been formally agreed by WCPFC, although the issue is under discussion. Two Management Objectives Workshops(MOW) have been convened and funded by the Commission with the objective of developing harvest strategies, including reference points, for key WCPFC tuna species including albacore. A third MOW (MOW3) was held at the end of November 2014, with the objective of drafting a CMM establishing a harvest strategy for key tuna species in the WCPO, which was passed in a watered-down form (CMM 2014-06). MOW2 in November 2013 considered the use of MEY as a target reference point and a range of stock (and economic) conditions, relative to the current stock status, to achieve it. The FFA Southern Committee is also actively considering the development of a target reference point for albacore, and has developed proposals for consideration at MOW3. SC10 (August 2014) discussed possible target reference points for skipjack, but this discussion did not extent (for the moment) to other species.

The stock assessment estimates stock status in relation to MSY reference points (B_{MSY}, SB_{MSY} and F_{MSY} – figures given in PI 1.1.1 above). These can be considered to be implicit target reference points, since, for example for yellowfin and bigeye, the stated objective of CMM 2013-01 (and CMM-2012-01) is in the case of bigeye to reduce fishing mortality, to reach $F<=F_{MSY}$ by 2017, and in the case of yellowfin to ensure that the fishing mortality does not exceed F_{MSY}, although CMM 2010-05 does not have such an explicit objective. The WCPFC Scientific Committee, however, has expressed a preference for an alternative target reference point to avoid the uncertainties associated with estimating MSY-based options (discussed below). It seems most likely, therefore, that target reference points will be agreed in relation to some measure of the unfished state of the stock, as has been the case for the limit reference point. It is reported that the target reference points currently (mid-2014) under consideration for bigeye, yellowfin and skipjack are in the range 40-60%$B_{current,F=0}$, and it is likely that the Commission will take the same approach with albacore, as it has for the limit reference point. In any case, these values are all estimated as part of the stock assessment, with figures given above. SG80 is met</td></tr>
</table>

b	**Guide post**		The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of precautionary issues.
	Met?		Y	Y
	Justification	In the most recent stock assessment, the agreed limit reference point, $20\%SB_{current,F=0,}$ equates to ~75-80% of SB_{MSY} (taking median estimates, LRP/SB_{MSY}=0.83, taking the reference model LRP/SB_{MSY} = 0.73), and ~20% of SB_0 (0.20, 0.17). MSC note that a default limit reference points for a stock not requiring additional precaution could be appropriately set as $20\%B_0$ ~ $50\%B_{MSY}$. Because the WCPFC reference point is expressed in spawner biomass rather than total biomass, it is difficult to evaluate how it relates to the default option given by MSC, but the team noted that a limit reference point of 20% of SB_0 is usually more precautionary than a limit of 20% of B_0 (because biomass of older age classes declines more rapidly under a given level of fishing mortality). For the same reason, however, SB_{MSY} tends to be a smaller proportion of SB_0 than B_{MSY} is of B_0, so B vs SB MSY reference point are more difficult to compare in this way (in this case, SB_{MSY}/SB_0 = 0.24, 0.23 under the most recent stock assessment; Hoyle et al. (2012). WCPFC has deliberately steered away from MSY-based reference points for level 2 and level 3 stocks (including all the main commercially-exploited species) because uncertainty in the stock-recruit relationship leads to larger uncertainties in estimates of MSY-related parameters than in other (e.g. depletion-based) reference point options (details given in Section 3.4.5 of the main report). Nonetheless, based on the above analysis, the team concluded that the limit reference point has been set at a precautionary level and is likely to be well above the point of impaired reproductive capacity. SG80 is met. In relation to impairing reproductive capacity (recruitment, specifically) and precautionary issues (SG100) the team noted that there has been considerable discussion within the Scientific Committee around the issues of i) how to define a ‘recent period’ and ii) how recruitment should be dealt with in estimating the value of the limit reference point. For the recent period, a 10-year window, up to and including the most recent year in the stock assessment, was selected. For recruitment, two options were considered: one where recruitment estimates were adopted directly from the model, and one where recruitment was scaled according to the stock-recruit relationship (i.e. recruitment expected to be somewhat higher in the absence of fishing). The latter option was found to be consistently more precautionary, and was the option selected by the Scientific Committee and endorsed by the Commission. On this basis, the team felt that relevant precautionary issues had been considered, and that SG100 is met.		
c	**Guide post**		The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a higher level, and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.
	Met?		N	N

	Justification	There is no explicit target reference point agreed by WCPFC for use in management (as opposed to use in the stock assessment process), although the issue is under discussion. Although there is an Australian target, it is not applied. This scoring issue is not met at the SG80 level.		
d	**Guide post**		For key low trophic level stocks, the target reference point takes into account the ecological role of the stock.	
	Met?		Not relevant	
	Justification	This stock is not a low trophic level stock and this scoring issue is thus not applicable.		
References		Hoyle et al., 2012 SC7, SC8, SC9 and SC10 reports MOW2 and MOW3 reports CMM 2010-05, CMM 2012-01, CMM 2013-01, CMM 2014-06		
OVERALL PERFORMANCE INDICATOR SCORE:				**75**
CONDITION NUMBER (if relevant):				**1**

Evaluation Table for PI 1.1.3 – only scored if PI 1.1.1 60-80

Evaluation table 3 - PI 1.2.1 Albacore

<table>
<tr><td colspan="2">PI 1.2.1</td><td colspan="3">There is a robust and precautionary harvest strategy in place</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points.</td><td>The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.</td><td>The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points.</td></tr>
<tr><td>Met?</td><td>Y</td><td>N</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">MSC defines a harvest strategy as ‘the combination of monitoring, stock assessment, harvest control rules and management actions, which may include an MP or an MP (implicit) and be tested by MSE’ (MSC CR v1.3).

For the assessment of this fishery, we consider the management strategy at two levels: WCPFC and Australia, noting that WCPFC is the most important from the point of view of the whole stock.

The elements of the WCPFC harvest strategy are the following:
• Data collection on the stock and fishery (considered in detail in PI 1.2.3 below)
• Stock assessment process (considered in detail in PI 1.2.4 below)
• Limit reference point (explicit) and target reference point (implicit) (discussed in detail in PI 1.1.2 above)
• Harvest control rule (CMM 2010-05) (considered in detail in PI 1.2.2 below)
• Monitoring of implementation of CMM 2010-05 via data gathering and Part 2 reports to the Commission

This management strategy is reviewed annually during the Commission meeting.

It is relevant to consider first of all what the objectives of the WCPFC harvest strategy are, particularly given that there is no explicit target reference points (see PI1.1.2 above). There are two sources of objectives:
• Objectives associated with the (implicit) TRPs as discussed in the rationale for PI 1.1.2 (and above) – these would be those associated with MSY, MEY and/or 40-60%$B_{F=0}$ (see rationale for PI 1.1.2);
• Objectives associated with CMM 2010-05: this is not clearly expressed in the CMM, but the explicit objective can be assumed to be (as per paragraph 1) no increase in the number of fishing vessels actively fishing for South Pacific albacore south of 20ºS</td></tr>
</table>

over current or recent historic levels.

Given that the stock status of South Pacific albacore is healthy, as it has been since stock assessments started (see PI 1.1.1 Figure 3), the efficacy of the harvest strategy for South Pacific albacore has not been tested. However, Hoyle et al. (2012) noted that if the fishery continued with current fishing mortality rates (estimated to mid-2011), the biomass was predicted to decline to ~MSY levels; i.e. taking the fishery to levels around likely target reference points. Objectives associated with the (implicit) TRP are therefore being met.

Fishing effort on albacore has increased considerably over the last few years, however, particularly above 20ºS, where there is no CMM in place. Even with the current stock status well above likely target levels, there are already concerns about declining catch rates and the economic viability of some albacore fisheries, as discussed in Section 3.4 of the main report. Catches of South Pacific albacore do, however, appear to have stabilised since 2010, albeit at a relatively high level compared to historical catches (Table 1). On this basis, it is reasonable to argue that the WCPFC harvest strategy has not been 100% successful in stabilising the fishing impact on the stock, but it has most likely had some effect in slowing the increase in fishing mortality. It is also worth noting that the longline fishery targets albacore above the size at maturity, so is impacting potential recruitment, even at high exploitation rates, less than, say, the purse seine bigeye fishery. In addition, the Tokelau Arrangement, once implemented, will provide a more clearly defined harvest strategy, at least within EEZs.

On this basis, the team felt that SG60 is met in relation to the regional harvest strategy (‘expected to achieve’ objectives associated with stock status).

Table 1. Total South Pacific albacore catches as reported to WCPFC (from Tuna Fishery Year Book 2013a)

Year	Total catch (t)
2000	47338
2001	58344
2002	73240
2003	62477
2004	61871
2005	63566
2006	62444
2007	58591
2008	62740
2009	82901
2010	88942
2011	66476
2012	87895

		<table><tr><td>2013</td><td>84835</td></tr></table> In relation to SG80 'responsive to the status of the stock', it is difficult to evaluate what might happen in the future, should the stock status decline to target levels or below. One line of evidence is to consider the harvest strategy put in place for bigeye, where the most recent stock assessment considers that the stock is ~at the limit reference point level, with overfishing is likely to be occurring ($B<B_{MSY}$ and $F>F_{MSY}$). The details of the harvest strategy for bigeye over the last few years, as set out in CMMs 2012-01, 2013-01 and 2014-01 are given in Section 3.4.6 of the main report. In this case, WCPFC has been somewhat responsive to the state of the stock, in that 2012-01 (the first management measure) was a response to the 2011 stock assessment showing the F was too high, while the impact of this and subsequent management measures are yet to be evaluated by a stock assessment (the 2014 assessment uses data only to the end of 2012). Nevertheless, several WCPFC members, and NGOs, expressed their disappointment at the weakness of the response. Overall, therefore, the team considered that SG80 is not fully met in relation to the regional harvest strategy. An alternative (for the moment) harvest strategy for South Pacific albacore is the Tokelau Arrangement, established in the framework of FFA. The objective in the long run is to establish a robust harvest strategy based on catch limits within the WCPFC. As an 'interim measure', the arrangement establishes catch limits by EEZ based on a maximum of the highest catch in that EEZ in any given year between 2001 and 2012, with a baseline of 2500 t. This rule will therefore not likely result in any reduction in catches, but depending on the limits set (and caught) by countries, it should be able to constraint catches within EEZs to ~78,000, compared to an estimate of MSY of 133,000 t ref case) / 99,000 t (model median) of MSY, leaving 20-40% of the catch for the high seas (noting, however, that estimates of MSY are uncertain – CIs 47-215,000). This again, therefore, can be argued to be 'expected' to achieve objectives as per implicit target reference points (e.g. MSY reference points) (SG60) but it is harder to argue that it is 'responsive to the status of the stock' to any great extent (SG80). Australia has a much clearer harvest strategy in place, which is set out in three key documents: the CHSP (overarching strategy framework), the ETBF harvest strategy (the CHSP as applied to the ETBF) and the ETBF management plan (how the ETBF harvest strategy is implemented). The ETBF harvest strategy includes the following elements: • An objective (target reference point) and a limit reference point (default from the CHSP) • A plan for data gathering and analysis • A decision rule for management, based on the objective and the data analysis • An explanation as to how the harvest strategy will be implemented (institutional structures) • A provision for testing by MSE (see Kolody et al. 2010) The ETBF harvest strategy is implemented for some species in the ETBF (notably swordfish – see below) but not, currently for the tuna species, because it is not considered likely to have much / any impact on the overall management of the stock. On this basis, the team considered that it was not relevant to consider this harvest strategy in scoring for albacore, although they note that if an

		Australian approach was adopted and implemented by the WCPFC, or even by a majority of members with an interest in this stock, the score for this PI would have been considerably higher.		
b	**Guidepost**	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	Y	Y	N
	Justification	As noted above, the WCPFC harvest strategy is considered the only relevant harvest strategy for S. Pacific albacore. Currently, the efficacy of the harvest strategy has not been fully tested, because the stock status has always been good. Concerns around the stock centre mainly on maintaining economically viable catch rates; this is a serious issue, but in biological terms, fishing mortality and catches are consistent with exploiting the stock at ~the MSY level (see PI 1.1.1). Since there is no evidence that the stock status is in jeopardy in the short-term, it is difficult to reject SG80 with a conclusion that the harvest strategy is failing to achieve the fundamental management objectives. In terms of management actions, the key element of the harvest strategy at the regional level is the implementation of CMM 2010-05, which caps the number of (non-SIDS) vessels targeting albacore south of 20º. Although this has not apparently succeeded in capping effort overall, it does at least limit effort in relation to the immature part of the stock. The Tokelau Arrangement has also strengthened the harvest strategy at the regional level, although applying only to EEZs. Overall, the team concluded 1) that management objectives (in terms of stock status) are being achieved and 2) there is evidence (as given above) that the harvest strategy has made at least some contribution to that, and continues to be improved (e.g. the Tokalau Arrangements, WCPFC's aspiration to establish a formal strategy as per CMM 2014-06). Thus SG80 is met. For SG100, the harvest strategy has not been fully evaluated, and although the stock is at target levels, other factors than the harvest strategy (e.g. economic limitations on the fishery) have most likely played a significant role. The score is therefore 80.		
c	**Guidepost**	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	Y		
	Justification	Monitoring of the fishery for the purposes of stock assessment is considered in PI 1.2.3 below, and the analysis of data is considered under PI 1.2.4. Monitoring of the implementation of the harvest strategy (notably CMM 2010-05) is carried out via self-assessment by CCMs, included in their Part 2 reports submitted to WCPFC annually. The Part 1 reports contain basic information about their fishery (licensed vessels, landings etc.).		

d	**Guidepost**			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			N
	Justification	The harvest strategy is reviewed annually by the Scientific Committee and by WCPFC plenary meeting. It is not clear, however, that it is always 'improved as necessary'. For example, the 2013 Scientific Committee meeting (SC9) concluded (paragraph 172) '*The current CMM 2010-05 appears not to be effective in constraining effort in the subtropics (south of 20oS)*'. Nevertheless, no change was made to CMM 2010-05 by WCPFC10. A provision for annual review of scientific and other data and adjustment of the PTAC and other management elements as required is a central element of the Tokelau Arrangement, but this has not happened as yet.		
e	**Guidepost**	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Not relevant	Not relevant	Not relevant
	Justification	The target species is not a shark		
References		Hoyle et al., 2012 WCPFC 2013c – WCPFC10 WCPFC 2013d – WCPFC10-2013-IP02 WCPFC 2014a – Draft Report for WCPFC11 CMM-2010-05, CMM 2012-01, CMM 2013-01, CMM 2014-01, CMM 2014-06		
OVERALL PERFORMANCE INDICATOR SCORE:				**70**
CONDITION NUMBER (if relevant):				**2**

Evaluation table 4 - PI 1.2.2 Albacore

NOTE: Further to agreement with MSC and other CABs carrying out assessments on the same or similar stocks, SG60 for this PI has been scored using the wording of the Scoring Guideposts in the Certification Requirements version 2.0 (the rest of the PI and assessment follows version 1.3). Further information is given in the main report Section 4.3.

<table>
<tr><th colspan="2">PI 1.2.2</th><th colspan="3">There are well defined and effective harvest control rules in place</th></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guide post</td><td>Generally understood HCRs are in place or available that are expected to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached.</td><td>Well-defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.</td><td></td></tr>
<tr><td>Met?</td><td>Y</td><td>N</td><td></td></tr>
<tr><td>Justification</td><td colspan="3">For the WCPFC harvest strategy, the harvest control rule is set out in CMM 2010-05 (South Pacific albacore), which can be summarised as follows:

1. CCMs shall not increase the number of their fishing vessels actively fishing for South Pacific albacore in the Convention Area south of 20°S above current (2005) levels or recent historical (2000-2004) levels.
2. The provisions of paragraph 1 shall not prejudice the legitimate right of SIDS CCMs to pursue a responsible level of development of their fisheries for South Pacific albacore.
3. CCMs that actively fish for South Pacific albacore in the Convention Area south of the equator shall cooperate to ensure the long-term sustainability and economic viability of the fishery, including on research.
4. CCMs shall report annually to the Commission catch levels of South Pacific Albacore (including bycatch) as well as the number of vessels actively fishing for South Pacific albacore in the Convention area south of 20°S.

The objective of CMM 2010-05 is to stabilise fishing mortality and catch rates for South Pacific albacore as a precautionary measure, since although the stock status is above likely target levels, catch rates are currently lower than they were a decade ago, and lower than desired for economic reasons. It is important to note, however, that the stock status is far above the limit reference point ($SB_{current}$ = 3-3.5 times higher than the limit reference point – see PI 1.1.1).

At the SG60 level, therefore, the discussion centres around whether the HCRs currently in place or available could reasonably be argued to act to reduce the exploitation rate if required.

Bigeye is the only stock which has been assessed to be below target levels, with the situation over recent years in WCPFC being as follows:

2011 – stock assessment estimates that B>BMSY but F>FMSY and C>MSY, using data to end 2008;

2012 – first management measure put in place (CMM 2012-01)

2013 – further management put in place (CMM 2013-01)

2014 – stock assessment estimates that B ~at Blim, using data to end 2011 (current), or below Blim using 2012 data (but this considered</td></tr>
</table>

to be uncertain)

2014 – CMM 2013-01 updated to 2014-01, without much change.

The question is, therefore, taking this timeline whether WCPFC can be argued to have responded to the stock status – and hence whether by analogy with bigeye, a responsive HCR is ‘available’ for albacore, despite the lack of response at WCPFC11 to the 2014 stock assessment. The team noted the following:

- the first stock assessment indicating problems with the stock (in 2011) was responded to be WCPFC in 2012 in the form of CMM 2012-01 and subsequent CMMs
- the impact of this management on the stock has not yet been evaluated by a stock assessment (since the 2014 assessment used data only to the end of 2012 which is when CMM 2012-01 was introduced)
- the impact of management on total catches cannot even yet be evaluated, except for one year (2013), for which catch data have just become available (total bigeye catches (‘000 t): 2011 – 158, 2012 – 162, 2013 – 150) – i.e. catches declined 7% in 2013 relative to 2012)
- a Pacific-wide joint SPC-IATTC stock assessment for bigeye is planned for 2015 (SC10 final report)
- PNA are proposing to establish additional management measures for bigeye in 2015, including charging a premium for bigeye vessel-days

On this basis, the team considered that it was not unreasonable for the WCPFC to maintain the status quo for bigeye in 2015, pending more information about the impact of the management measures already put in place. The team concluded on this basis that responsive HCRs are ‘available’ at WCPFC.

The Tokelau Arrangement sets out a more clearly defined harvest control rule for albacore (the PTAC implemented via transferrable national quotas), which is now ‘in place’, having come into force in December 2014. It is, however, not yet clear how the parties will react to information from the stock assessments – there is nothing in the arrangement as yet requiring that the PTAC be adjusted according to the outcome of stock assessments in any pre-agreed way, although it does allow for the parties to agree reference points and harvest control rules in the future.

The combined impact of CMM 2010-05, the Tokelau Arrangement and the approach for bigeye over the last few years imply that the existing or available HCRs, although somewhat weak, are somewhat responsive to the status of the stock. On this basis, SG60 is met for WCPO albacore. Nonetheless, this approach cannot be described as ‘well-defined’ pre-agreed rules, nor can it be said to ‘ensure’ that the exploitation rate is reduced.

Both Tokalau Arrangement members and WCPFC have a stated aspiration to develop a stronger harvest strategy with a robust HCR (see CMM 2014-06).

On this basis, we would conclude SG60 is met, but SG80 is not.

b	**Guide post**		The HCRs are likely to be robust to the main uncertainties	The HCRs take account of a **wide** range of uncertainties including the ecological role of the stock, and there is **evidence** that the HCRs are robust to the main uncertainties
	Met?		N	N
	Justification	While the stock assessment considers a wide range of uncertainties, CMM 2010-05 is expressed in terms of capping the number of fishing vessels actively targeting albacore. This approach only indirectly addresses the actual objective (stabilising catch rates and/or fishing mortality). There is a large degree of uncertainty in how effective the CMM would be even if perfectly implemented, e.g. a limited number of vessels can still greatly increase fishing mortality by increasing the number of days spent fishing, the number of sets per day, the number of hooks per set, the efficiency of targeting, etc.. Furthermore SIDS fleets are not constrained, nor are any fleets north of 20ºS, and bycatch is exempt. The Tokelau Arrangement is aiming to implement a harvest control rule which is both more clearly defined and less uncertain in terms of its implementation, at least within EEZs, but in practice how it works remains to be seen; the national quotas as currently defined are not likely to reduce catches.		
c	**Guide post**	There is **some evidence** that tools used **or available** to implement HCRs are appropriate and effective in controlling exploitation	**Available evidence indicates** that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs	**Evidence clearly shows** that the tools in use are effective in achieving the exploitation levels required under the HCRs
	Met?	Y	N	N
	Justification	The stock status of South Pacific albacore is healthy (see rationale for PI1.1.1). On this basis, there is some evidence that the tools used in management to date have been effective at not allowing effort to reach unsustainable levels (biologically speaking) (SG60). Economic objectives, however, (maintaining catch rates at a profitable level) have not been achieved. If implemented appropriately, CMM 2010-05 limits the increase in vessels targeting albacore flagged to distant water fishing nations and domestic developed countries (Australia, New Zealand and the USA), because SIDS have an exemption to be allowed to expand their domestic fisheries if desired. Of course, this does not mean that no action has been taken by SIDS. The Tokelau Arrangement sets out provisions for a PTAC across South Pacific EEZs, implemented as transferrable quotas, and this should act to control catches in EEZs. On this basis, as long as CMM 2010-05 is implemented, it might be somewhat effective in restraining increases in catch and fishing mortality. So far, however, it has not achieved this objective, as noted by the Scientific Committee (SC9 – see above). The impact of the Tokelau Arrangement cannot yet be evaluated. Again arguing by analogy with bigeye, there is evidence that as reference point levels are approach and exceeded, the Commission can be expected to take stronger action to restrain effort (e.g. as per CMM 2012-01 and CMM 2013-01). Hence as noted above, more effective tools are likely to be available for albacore if required (SG60). Overall the team considered that there is some evidence that available tools are effective (e.g. stock status, approach to bigeye), but not		

		all available evidence indicates this (e.g. evaluating impacts of CMMs on reducing effort). We argue on this basis that the SG60 level is met, but not SG80.
References		WCPFC 2013d – WCPFC10-2013-IP02 WCPFC 2014a – Draft Report for WCPFC11 SC9 report SC10 report CMM-2010-05, CMM-2012-01, CMM 2013-01, CMM 2014-02, CMM 2014-06

OVERALL PERFORMANCE INDICATOR SCORE:	**60**
CONDITION NUMBER (if relevant):	**3**

Evaluation table 5 - PI 1.2.3 Albacore

<table>
<tr><td colspan="2">PI 1.2.3</td><td colspan="3">Relevant information is collected to support the harvest strategy</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guide post</td><td>Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.</td><td>Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.</td><td>A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">The following information is available, and is used as part of the harvest strategy – notably to inform the stock assessment model:

1. Fishery-dependent information

<u>Catch, effort and CPUE</u>: It is a requirement for all CCM fisheries to provide catch and effort data to WCPFC – this is either in the form of logsheet data (from most coastal states) or aggregated by month/5º squares (from most distant water fishing states). The logsheet data is raised to best estimates of total catch by SPC-OFP, to account for missing data. CPUE data are standardised as described in detail in the main report (Section 3.4.6). Data go back to 1960, although as expected, historical data are sparser and generally less reliable than more recent data. It is often not clear what the relevant factors are for effective catch rate standardization, and they may not be recorded in the logbooks.

<u>Length-frequency data</u>: Length-frequency data comes from various port sampling programmes and some observer reports, and goes back to 1962. These data are weighted in the stock assessment according to spatial representation, to account for differences in length-frequency by geographic region.

<u>Fleet composition</u>: Each CCM provides information to WCPFC annually on their active fleet, in their Part 1 reports. For albacore specifically, it is a requirement of CMM 2010-05 to inform the Commission annually of the number of vessels actively targeting albacore.

2. Fishery-independent information

<u>Size and age data</u>: There has been considerable recent work on age and growth (Farley et al., 2012), which demonstrated that females most likely grow slower than males after the age of maturity, rather than having higher natural mortality as previously supposed. This has informed the most recent stock assessment (Hoyle et al., 2012), although further work has been recommended on growth curves.

<u>Natural mortality</u>: Estimating natural mortality is always a big problem, although the detailed information on age and growth cited above has shed some light on apparent gender differences. Previous tagging work has not provided enough data to estimate M; however, SPC has recent started a new tagging programme.

<u>Environmental data</u>: The Ocean Fisheries Programme of SPC undertaken environmental research as part of their ecosystem monitoring</td></tr>
</table>

		programme, focusing particularly on potential environmental drivers of tuna population dynamics. 3. Information inferred from the stock assessment A significant range of information relating to stock status comes as the output of the stock assessment. This is described in detail in the main report (Section 3.4.8), and includes estimates of stock abundance, fishery impact etc., as set out in SG100. 4. Data gaps Stock structure - the south Pacific albacore fishery is assessed and managed as a single stock. However, the growth curve estimates and conflicting CPUE trends suggest that (longitudinal) mixing may be relatively limited. Suggestive evidence for population structure is emerging for the tropical tunas (e.g. Kolody et al., 2013), and it would not be surprising if similar evidence was uncovered for albacore as well. Observer coverage (providing external verification of logbook data and information about discards) is low, particularly for the longline fishery and particularly on the high seas. Williams 2013 identified data gaps (for all key species, rather than albacore in particular) as follows: • Vietnamese domestic fleet: no annual catch data provided; • Philippines and Indonesian fleets: catch data not broken down by gear type; operation (logsheet) data not provided; • Taiwanese fleet: no operational data, aggregated effort data or size data prior to 2004; likewise for the Japanese coastal fleet up to the present data; likewise for the Japanese pole and line fleet prior to 1972; • Several countries may have historical data which has not been identified • Historical estimates of coverage rates from logsheets and port sampling are missing in some cases; • Some key (distant water) fleets provide only aggregated rather than operation level data – this is identified as a constraint on stock assessments, and on the use of more details spatial models such as SEAPOPDYM. Overall, given the size and complexity of the fishery, the range and comprehensiveness of the data available is impressive and improving all the time. Nonetheless, these data gaps do constrain stock assessments – as does bias and lack of precision in some of the data sets, particularly historical data (discussed in the main report Section 3.4.8). Perhaps more importantly, the stock assessment continues to rely on commercial CPUE as an index of stock abundance, and although these data are carefully analysed and standardised as far as possible, there are no fishery-independent data sets with which they can be compared, while issues such as spatial and temporal changes in catchability remain problematic. On this basis, the team concluded that SG80 is met, but SG100 is not met.

b	Guide post	Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.
	Met?	Y	Y	N
	Justification	Fishery removals are monitored by individual CCMs via logsheets and port sampling, and are required to be submitted to the Commission annually, in the form of estimates of total catch plus catch and effort data broken down by gear and either aggregated (5o squares by month) or (preferably) at operational level (individual logsheets). Despite some gaps in this data set noted above, coverage is pretty good overall. This catch, effort and CPUE data set is the key indicator for stock assessment. Other key fisheries data which support management are length-frequency data (collected via port sampling and observer programmes) and tag returns. Biological data is also collected via research programmes. Formal stock assessments have taken place every few years (2009, updated in 2011, 2012.). In between formal stock assessments, SPC provide some information on trends in fishery indicators (total catch, nominal CPUE, catch at length and at weight), to guide management (Pilling et al., 2014). On this basis, the team felt that SG80 was met. SG100 is not met, for the following reasons: • The characteristics of tuna longline CPUE are often poorly understood and it is unclear how successful most effort standardization analyses are or how to properly represent the uncertainties. • Some data gaps remain in fishery-dependent data (see above); • Some key fleets provide only aggregated data; • The requirement to 'raise' logsheet data by estimates of total catch (to account for missing logsheets) results in some loss of precision; • Historical data is often lacking in precision; • There are concerns about biased sampling in some data sets (e.g. length-frequency data – see discussion in Hoyle et al. (2012) Although the frequency of stock assessments is reasonable, they are not carried out with 'high frequency' (i.e. not always updated annually); it is not completely clear how robust the management is to uncertainty – the management system is still a work in progress.		
c	Guide post		There is good information on all other fishery removals from the stock.	

	Met?		Y	
	Justification	The stock assessment covers all fishery removals from the stock, and despite some data gaps (notably Vietnam, also Philippines, Indonesia and some smaller coastal fleets), overall the data coverage is quite comprehensive. Where data gaps exist, the WCPFC Secretariat and SPC are working to support and develop data collection systems (see information in Williams, 2013).		
References		Farley et al., 2012 Hoyle et al., 2012 Williams, 2013 Pilling et al., 2014 Harley and Williams, 2013 Kolody et al., 2013 SC9 report CMM 2010-05 Information on OFP environmental / fisheries research: http://www.spc.int/OceanFish/en/ofpsection/ema/environmental-research/78-oceanographic-variability/115-oceanographic-variability		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation table 6 - PI 1.2.4 Albacore

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**		The assessment is appropriate for the stock and for the harvest control rule.	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.
	Met?		Y	Y
	Justification	The model, which has been developed for the stock assessment is complex and sophisticated, and takes into account the biology of the species (e.g. by incorporating the results of research into age and growth by sex and region, maturity and fecundity at size and age etc.). The model is able to estimate a variety of reference points which are or might be used as limit and target reference points for management (see discussion under PI 1.1.2 above). SG80 is met. In relation to SG100, the assessment takes into account major features of the biology of yellowfin, including growth curves, spatial structuring of the stock and movement patterns. One remaining issue is that MULTIFAN cannot be structured by sex, to take into account of sex-specific growth and natural mortality curves, but this is a research direction of the MULTIFAN development team at the moment. The stock assessment also takes into account the nature of the fishery, in as much as considerable research effort has gone into CPUE time series standardization to reflect operational changes in each fishery. Overall, the team considered that SG100 is met.		
b	**Guide post**	The assessment estimates stock status relative to reference points.		
	Met?	Y		
	Justification	The output of the stock assessment in relation to reference points is given in the rationale for PI 1.1.1 above.		
c	**Guide post**	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.
	Met?	Y	Y	Y
	Justifi	The stock assessment attempts to reduce uncertainties and biases in input data sets (e.g. via stratification in space and time, and via CPUE standardisation using GLM). It also includes a detailed exploration of uncertainties in the model assumptions, via sensitivity		

	cation	analyses for various different model options (growth curves, natural mortality, steepness, effort creep and different treatment of the CPUE data set). The model uses a statistical framework to estimate states and parameters conditional on a suite of structural assumptions and the data. The model outputs the best (Maximum Posterior Density) point estimates, along with estimates of uncertainty for desired parameters. The most recent assessment emphasizes the uncertainty in point estimates conditional on a broad range of alternative fixed assumptions, rather than the parameter estimation uncertainty estimated conditional on individual models. As a consequence, the probabilistic stock status statements do not have the classical probabilistic interpretation, but are expected to provide a broader and more realistic representation of uncertainty than classical approaches.		
d	Guide post			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			Y
	Justifi cation	Exploration of alternative hypotheses via sensitivity analyses is considered above. The stock assessment has been updated progressively: structural changes in the most recent assessment (Hoyle et al., 2012) include the following: • Change in steepness of stock-recruit relationship; • Changes to standardisation of key CPUE data series; • New approach to modelling early CPUE; • New natural mortality curve and changes to sex ratio at age and spawning potential at age, following new biological data; • Size data re-stratified by spatial distribution of catches, to remove bias; • Lognormal bias adjustment; • Updated version of MULTIFAN-CL. Hoyle et al. (2012) made an impressive effort to evaluate a range of structural assumptions, and the results demonstrated that the key stock status conclusions are very robust to this range of assumptions (and their interactions). In such a large and complex fishery, it is inevitable that unresolved issues will remain (e.g. conflicts between CPUE and length-frequency data, sensitivity to intractable issues such as estimates of natural mortality and steepness etc.), and these issues remain a priority for consideration in future work. Overall, the team concluded that as issues arise in the assessment, the stock assessment explores and deals with them, and while the assessment is not perfect, nor probably ever will be, the exploration of alternative hypotheses and assumptions has been rigorous. SG100 is met.		
e	Guide post		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		Y	N

	Justification	The stock assessment is internally peer reviewed within the WCPFC system (by the Scientific Committee). A process of formal external peer review has been started and applied to some WCPFC stock assessments (e.g. bigeye) but not so far to albacore, since the most recent assessment in 2012 was prior to the results of the review being applied. The results of the bigeye review have been applied by SPC more generally across the whole set of tuna stock assessments (see WCPFC-SC10-2014/SA-WP-02), and will presumably be applied to the next albacore assessment in 2015, but so far they have not been. Aspects of the methodology have also been published in peer-reviewed journals (e.g. Hampton and Fournier, 2001). Overall, the team that SG100 is not fully met, although it will be in the future.
References		Hoyle et al., 2012 Hoyle and Langley, 2007 Hampton and Fournier, 2001 SC10 report
OVERALL PERFORMANCE INDICATOR SCORE:		**95**
CONDITION NUMBER (if relevant):		**N/A**

Appendix 1.1.2 Principle 1 (UoC 2 – Yellowfin)

Evaluation table 7 - PI 1.1.1 Yellowfin

<table>
<tr><td colspan="2">PI 1.1.1</td><td colspan="3">The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guide post</td><td>It is likely that the stock is above the point where recruitment would be impaired.</td><td>It is highly likely that the stock is above the point where recruitment would be impaired.</td><td>There is a high degree of certainty that the stock is above the point where recruitment would be impaired.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">Estimates of biomass and fishing mortality in relation to MSY reference points are as follows (NB: current = 2008-2011 average, latest = 2012):

$SB_{current}$ = 1.37*SB_{MSY}; SB_{latest} = 1.24*SB_{MSY}; $F_{current}$ = 0.72*F_{MSY}

Estimates of biomass in relation to the situation in the absence of fishing are as follows:

$SB_{current}$ = 0.42*$SB_{F=0}$, SB_{latest} = 0.38*$SB_{F=0}$ (Note: LRP=0.2*$SB_{F=0}$)

According to the stock assessment, there have been no particular trends in recruitment for WCPO yellowfin throughout the assessment period (Figure 1 below), although the overall average of estimated recruitment since 1990 average is ~6% lower than long-term mean (but this is most likely within the range of uncertainty in the estimates – see Figure 1). Current spawner biomass in the absence of fishing ($SB_{F=0}$) is 4% lower than SB_0, likewise indicating slightly lower recent recruitment than the overall average of the assessment period, but again, most likely with no statistical difference.

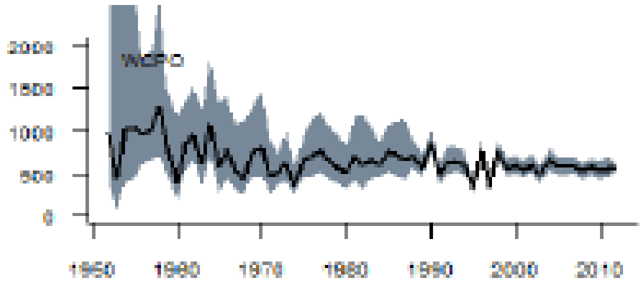

Figure 1. Estimate of recruitment from 1960 to 2011 for the whole WCPO region (millions), with 95% confidence intervals, from Hoyle et al. 2014.
Reference points relating to spawner biomass give a more quantitative idea of the current spawning potential of the stock ($SB_{current}$ and</td></tr>
</table>

SB_{2012}; relative to MSY level (SB_{MSY}) and the biomass with recruitment as estimated and fishery impact removed ($SB_{current,F=0}$) (Table 1). $SB_{current}$ and SB_{2012} have a probability of being above the MSY level of ~95%. In addition, none of the sensitivity analyses (at least singly) resulted in a median estimate of $SB_{current}$, which was below SB_{MSY} (lowest estimated of $SB_{current}/SB_{MSY}$ = 1.16) (Table 2).

Table 1. SB-related reference indices. Colour-coding for MSY reference indices: green – 5% CI indicates a >95% probability that the value estimating current stock status (the numerator) is greater than SB_{MSY}; orange – 5% CI indicates that the probability is <95% (although not a great deal less in this case)

Type of comparison	Ratio	Reference case model	Grid median	Grid 5%ile	Grid 95%ile
vs. MSY ref. points	SB_{curr}/SB_{MSY}	1.37	1.37	0.97	1.82
	SB_{2012}/SB_{MSY}	1.24	1.29	1.00	1.69
vs. situation in absence of fishing	$SB_{curr}/SB_{curr,F=0}$	0.42	0.41	0.29	0.55
	$SB_{2012}/SB_{2012,F=0}$	0.38	0.38	0.29	0.52

Table 2. Outcome of sensitivity analysis for SBcurrent relative to SBMSY, for yellowfin stock assessment

Feature	Sensitivity analysis	MSY reference points
		SB_{curr}/SB_{MSY}
Natural mortality	Estimated by the model rather that fixed	1.55
Steepness	Steepness = 0.95	1.68
Ref. case model		1.37
Standardised CPUE indices	Include Philippines handline fishery index, which apparently conflicts with others in Region 7	1.37
Tag mixing	Reduce the tag mixing period to one quarter	1.37
Relative weighting of size data	Downweighted relative to ref. case	1.34
Steepness	Steepness = 0.65	1.16

In summary, the team considered the following:

- There is a probability of ~~95% that spawner biomass is above the level giving MSY.
- Current fishing mortality is estimated to be below the MSY level but with <95% probability; catches are approximately at the MSY level (noting, however, that confidence intervals in these estimates are quite wide).

		• Estimates of recruitment from the stock assessment model suggest that it has been fluctuating without trend. • The assessment report was welcomed by members of the WCFPC scientific committee (see report SC10 pp.38-41) who, although making some suggestions, did not find anything significant to criticise the approach taken by SPC. On this basis, the team concluded that there is a high degree of certainty that the stock is above the point at which recruitment would be impaired, since the MSC definition of 'a high degree of certainty' is 95% confidence.		
b	**Guide-post**		The stock is at or fluctuating around its target reference point.	There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years.
	Met?		Y	N
	Justification	WCPFC are reported to be considering formal target reference points for the stock in the range 40-60%$B_{current,F=0}$ – i.e. 2-3 times the LRP, but at time of writing, no decision has been taken. The most recent stock assessment (2014) estimates $SB_{current}/SB_{current,F=0}$ at 0.42 (42% - 5% and 95% confidence intervals 0.29-0.55) and $SB_{latest}/SB_{current,F=0}$ at 0.38 (0.29-0.52), i.e. approximately at the lowest end of the range under consideration (40%). For the moment, the formal target reference point (as set out in CMM 2014-01) is the MSY level (B_{MSY} and F_{MSY} – see rationale for PI 1.1.2 below). As noted above, the most recent stock assessment estimated that SB is above SB_{MSY} with almost but not quite 95% probability ($SB_{current}/SB_{MSY}$ 5% confidence intervals 0.97-1.82, $B_{current}/B_{MSY}$ 5% confidence intervals 1.00-1.69). Fcurrent/FMSY is estimated to be 0.72 (0.51-1.09). In terms of trends 'over recent years' (SG100) – these are shown (as estimated by the stock assessment) in Figure 1 below.		

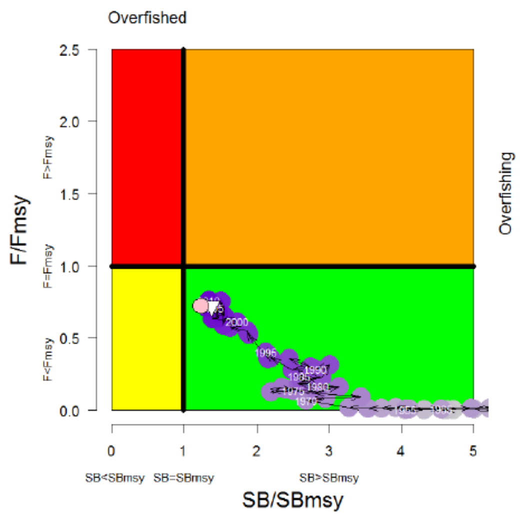

Figure 1. Kobe plot showing SB and F in relation to MSY reference points since the start of the assessment period (1960), with the pink dot representing the situation as assessed in 2014.

In other words, taking MSY reference points as the current target (see rationale for PI 1.1.2 below), while B is above BMSY with ~95% probability, SB/SBMSY and F/FMSY do not quite meet the requirement for a ‘high degree of certainty’. SG100 is therefore not met.

Note: If the fishery is certified, and if and when WCPFC selects a different formal target reference point for this stock, this PI should be re-evaluated on that basis, although the move to Certification Requirements version 2.0 will also change the requirements for this scoring issue. These changes could be made at the same time.

References	Davies et al. 2014 SC10 report CMM 2014-01

Stock Status relative to Reference Points

	Type of reference point	Value of reference point	Current stock status relative to reference point

Target reference point	SB_{MSY}	607,000 t (median estimate) 728,300 t (ref. model)	$SB_{current}$ 881,000 t (median), 998,600 t (ref. model) $SB_{current}/SB_{MSY}$ = 1.37, 1.37 $SB_{current}/(0.2SB_{current,f=0})$ = 2.05, 2.1
Limit reference point	$20\%SB_{current,F=0}$	398,100 t (median estimate) 473,700 t (ref. model)	

OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation table 8 - PI 1.1.2 Yellowfin

<table>
<tr><td colspan="2">PI 1.1.2</td><td colspan="3">Limit and target reference points are appropriate for the stock</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guide post</td><td>Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.</td><td>Reference points are appropriate for the stock and can be estimated.</td><td></td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td></td></tr>
<tr><td>Justification</td><td colspan="3">WCPFC reference points:

CMM 2014-01 states the following (our emphasis):

Paragraph 1. Compatible measures for the high seas and exclusive economic zones (EEZs) are implemented so that bigeye, yellowfin and skipjack tuna stocks are, at a minimum, maintained at levels capable of producing their maximum sustainable yield as qualified by relevant environmental and economic factors including the special requirements of developing States in the Convention Area as expressed by Article 5 of the Convention. The Commission will amend, or replace the objectives with target reference points after their adoption.
…
Paragraph 4. [for yellowfin] the fishing mortality rate is not greater than Fmsy, i.e. F/Fmsy ≤ 1.

In other words, while WCPFC, in drafting CMM 2014-01 does not consider MSY reference points as formal targets (as per the last sentence of paragraph 1), both B_{MSY} (‘levels capable of producing their maximum sustainable yield’) and F_{MSY} are nevertheless explicitly set out as the objective of WCPFC management for the moment. The stock assessment therefore estimates stock status in relation to MSY reference points (SB_{MSY}, B_{MSY} and F_{MSY} – figures given in PI 1.1.1 above).

A formal target reference point is under discussion by WCPFC. Two Management Objectives Workshops (MOW) have been convened and funded by the Commission with the objective of developing harvest strategies, including reference points, for key WCPFC tuna species. A third MOW (MOW3) is to be held at the end of November 2014, with the objective of drafting a CMM establishing a harvest strategy for key tuna species in the WCPO. MOW2 in November 2013 considered the use of MEY as a target reference point and a range of stock (and economic) conditions, relative to the current stock status, to achieve it. SC10 (August 2014) discussed possible target reference points for skipjack, but this discussion did not extent (for the moment) to other species. The Scientific Committee favours depletion-based reference points (in the form $B_{current}/B_{curr,F=0}$) because estimates of MSY reference points are considered to be uncertain, and has proposed 40-60% as a suitable range. These values can all also be estimated as part of the stock assessment.

A formal biomass limit reference point is agreed by WCPFC for the yellowfin stock, in the form $20\%SB_{current,F=0}$, where ‘current’ is defined as the most recent 10-year period for which data are available for the stock assessment. The most recent stock assessment estimates stock status relative to this reference point (see Section 0 of main report).</td></tr>
</table>

		Australian reference points: Target and limit reference points are set by Australia under the CHSP. The default target reference points is B_{MEY} (default proxy $1.2B_{MSY}$), while the default limit is $20\%B_0$. Both these reference points can be estimated by the existing stock assessment (B_{MEY} in its proxy version). They are not, however, applied in management, because the Australian fishery covers only a small proportion of the stock and catch, such that management has to be at a wider regional level. Overall, the team considered that the stock has explicit limit and target reference points set by WCPFC, although the target is likely subject to change at some future date. These reference points are in line with the standard approach used for many other stocks, and are estimated by the stock assessment. SG80 is met.		
b	**Guide post**		The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of precautionary issues.
	Met?		Y	Y
	Justification	In the most recent stock assessment (Davies et al. 2014), the limit reference point, $20\%SB_{current,F=0,}$ equates to ~~65-70% of SB_{MSY} (taking median estimates, LRP/SB_{MSY}=0.67, taking the reference model LRP/SB_{MSY} = 0.65). MSC notes that a default limit reference point for a stock not requiring additional precaution could be appropriately set as $20\%B_0$ ~ $50\%B_{MSY}$. Because the WCPFC reference point is expressed in spawner biomass rather than total biomass, it is difficult to evaluate how it relates to the default option given by MSC, but the team noted that a limit reference point of 20% of SB_0 is usually more precautionary than a limit of 20% of B_0 (because biomass of older age classes declines more rapidly under a given level of fishing mortality). For the same reason, however, SB_{MSY} tends to be a smaller proportion of SB_0 than B_{MSY} is of B_0, so B vs SB MSY reference points are more difficult to compare in this way (in this case, $SB_{MSY}/SB_{curr,F=0}$ = 0.30, 0.31 under the most recent stock assessment). WCPFC have deliberately steered away from MSY-based reference points for level 2 and level 3 stocks (including all the main commercially-exploited species) because uncertainty in the stock-recruit relationship leads to larger uncertainties in estimates of MSY-related parameters than in other (e.g. depletion-based) reference point options (details given in Section 3.4.5 of the main report). Nonetheless, based on the above analysis, the team concluded that the limit reference point has been set at a precautionary level. In relation to impairing reproductive capacity (recruitment, specifically) the team noted that there has been considerable discussion within the Scientific Committee around the issue of how recruitment should be dealt with in estimating the value of the limit reference point. Two options were considered: one where recruitment estimates were adopted directly from the model, and one where recruitment was scaled according to the stock-recruit relationship (i.e. recruitment expected to be somewhat higher in the absence of fishing). The latter option was found to be consistently more precautionary, and was the option selected by the Scientific Committee and endorsed by the Commission. On this basis, the team felt that relevant precautionary issues had been considered, and that SG100 is met.		

c	**Guide post**		The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a higher level, and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.
	Met?		Y	N
	Justification	As per CMM 2014-01, which outlines the main management measure currently in place, the stated objective of the WCPFC in relation to yellowfin tuna is to maintain fishing mortality below F_{MSY} (see also SIa). Consistent with CR1.3 CB2.3.2.3, exploitation at the explicit target reference point of F_{MSY} (1.38) implies an implicit target biomass reference point of SB_{MSY}. An explicit biomass target reference point has not yet been established although the SC is considering a range of options (e.g. 40-60% $SB_{CURRENT,F=0}$) along with the analytically estimated SB_{MSY} (728,300). Issues being considered are similar to those being currently discussed for biomass limit reference points – use of the recent 10-year window to estimate $SB_{CURRENT}$ and consideration of uncertainty in the stock – recruitment steepness parameter. It is therefore evident that the target reference point of FMSY is consistent with maintaining the stock at SB_{MSY}. SG80 is therefore met. Estimates of MSY reference points are, however, reportedly quite uncertain, which is why the Scientific Committee favours an approach based on depletion reference points (B/BF=0). There is also no particular consideration of the ecological role of the stock in the stock assessment or in setting reference points and other management objectives. On this basis, SG100 is not met.		
d	**Guide post**		For key low trophic level stocks, the target reference point takes into account the ecological role of the stock.	
	Met?		Not relevant	
	Justification	The stock is not a LTL stock		
References		Davies et al. 2014 SC7, SC8, SC9 and SC10 reports MOW2 and MOW3 reports CMM 2014-01		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation Table for PI 1.1.3 – only scored if PI 1.1.1 60-80 see above for details

Evaluation table 9 - PI 1.2.1 Yellowfin

PI 1.2.1		**There is a robust and precautionary harvest strategy in place**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points.
	Met?	Y	N	N
	Justification	MSC defines a harvest strategy as 'the combination of monitoring, stock assessment, harvest control rules and management actions, which may include an MP or an MP (implicit) and be tested by MSE' (MSC CR v1.3). For the assessment of this fishery, we consider the management strategy at three levels: WCPFC, PNA and Australia, noting that WCPFC is the most important from the point of view of the whole stock. The harvest strategy put in place by PNA does not touch this fishery directly, but nevertheless has some impact on the management of the stock as a whole, since catches subject to PNA management account for a little over half of the total catches on the stock (Sandy Morison, SCS, pers. comm.). For this reason, it is considered to be relevant here. Australian management measures apply to this fishery directly, but do not have any impact on the overall management of the stock, because Australia represents a small percentage of the total catch. There are therefore mentioned here for completeness but are not considered in scoring. WCPFC harvest strategy: The stated objective of the WCPFC harvest strategy (as defined in the target reference points) is to maintain the stock at the MSY level (see rationale for PIs1.1.1 and 1.1.2). The elements of the WCPFC harvest strategy are the following: • Data collection on the stock and fishery (considered in detail in PI 1.2.3 below) • Stock assessment process (considered in detail in PI 1.2.4 below) • Limit reference point (explicit) and target reference point (implicit) (discussed in detail in PI 1.1.2 above) • Harvest control rule (CMM 2010-05) (considered in detail in PI 1.2.2 below)		

- Monitoring of implementation of CMM 2010-05 via data gathering and Part 2 reports to the Commission

This management strategy is reviewed annually during the Commission meeting.

Given that the stock status of WCPO yellowfin is healthy, as it has been since stock assessments started (see PI 1.1.1 Figure 3), the efficacy of the harvest strategy for yellowfin has not been tested. The most recent stock assessment suggests that catches are approximately at MSY level, such that in the long run, this level of fishing mortality would result in biomass declining to ~MSY levels, which is the current implicit target biomass (explicit target of F_{MSY} set out in CMM 2013-01).

Fishing effort on yellowfin has increased more or less continuously over the last few decades (see Figure 11 of the main report).Unlike albacore, however, there are no significant concerns in relation to declining catch rates and the associated economics of the fishery. Since 2000, catches have stabilised at just over 500,000 t (Table 1).

Overall, the fishery is achieving stock management objectives (reference points), since F is estimated to be <F_{MSY} with ~~95% confidence, although it is not clear how much the harvest strategy implemented by WCPFC has to do with this. On this basis, the team felt that SG60 is met in relation to the regional harvest strategy.

Table 1. Total yellowfin from the WCPFC statistical area (WCPFC Tuna Year Book 2013)

Year	Reported YFT catch ('000 tonnes)
2000	567
2001	533
2002	491
2003	548
2004	583
2005	543
2006	473
2007	501
2008	592
2009	530
2010	543
2011	502
2012	587
2013	524

		It is impossible to evaluate what WCPFC might do in the future, should yellowfin stock status decline to target levels or below. One line of evidence is to consider the harvest strategy put in place for bigeye, where the most recent stock assessment considers that the stock is ~at the limit reference point level, with overfishing is likely to be occurring ($B<B_{MSY}$ and $F>F_{MSY}$). The details of the harvest strategy for bigeye over the last few years, as set out in CMMs 2012-01, 2013-01 and 2014-01 are given in Section 3.4.6 of the main report. In this case, WCPFC has been somewhat responsive to the state of the stock, in that 2012-01 (the first management measure) was a response to the 2011 stock assessment showing the F was too high, while the impact of this and subsequent management measures are yet to be evaluated by a stock assessment (since the 2014 assessment uses data only to the end of 2012). Nevertheless, several WCPFC members, and NGOs, expressed their disappointment at the weakness of the response. PNA harvest strategy: PNA operate a vessel day scheme (VDS) which limits effort by setting an overall ‘TAE’ (total allowable effort) which is divided up for each of the parties to the agreement. The TAE is set annually based on objectives of ‘optimal exploitation’ as well as WCPFC provisions (which presumably means MSY, given that this is the stated objective of CMM 2014-01) – the focus of the scheme is, however, skipjack rather than yellowfin. For skipjack, fishing effort in 2010 is suggested as a proxy reference point for 50%SBF=0 (VDSTSC3 Working Paper 1a), but this reference point is not apparently applied to yellowfin. Nevertheless, the document shows that the stock status of yellowfin is taken into account in setting the TAE. Reportedly (Banks et al., 2012a), the PNA vessel day scheme does not function perfectly, but a recent review may improve the situation (Sandy Morison, pers. comm.). Australia harvest strategy: Australia has a clear harvest strategy in place, which is set out in three key documents: the CHSP (overarching strategy framework), the ETBF harvest strategy (the CHSP as applied to the ETBF) and the ETBF management plan (how the ETBF harvest strategy is implemented). The ETBF harvest strategy includes the following elements: • An objective (target reference point) and a limit reference point (default from the CHSP) • A plan for data gathering and analysis • A decision rule for management, based on the objective and the data analysis • An explanation as to how the harvest strategy will be implemented (institutional structures) • A provision for testing by MSE (see Kolody et al. 2010)

		The ETBF harvest strategy is implemented for some species in the ETBF (notably swordfish – see below) but not, currently for the tuna species, because it is not considered likely to have much / any impact on the overall management of the stock. On this basis, the team considered that it was not relevant to consider this harvest strategy in scoring for yellowfin, although if an Australian approach was adopted and implemented by the WCPFC, or even by a majority of members with an interest in this stock, the score for this PI would have been considerably higher. Overall scoring: Overall, given the following points, the team considered that SG60 is met: • The stock status is good, and status quo projections suggest that it will remain above the MSY level (Pilling et al. 2014) • A combination of WCPFC and PNA harvest strategies are able to limit effort to an appropriate level • WCPFC and PNA are able to be at least somewhat responsive to the status of the stocks (cf bigeye) The team concluded, however, that SG80 is not met, because the harvest strategy is insufficiently responsive to the status of the stock. The team were not confident based on past form that, should yellowfin stock status be revealed at the next stock assessment to be approaching or below target levels, WCPFC and/or PNA would be able to stabilise or decrease fishing mortality in a fully effective and timely way. SG80 is therefore not met in relation to the regional harvest strategy.		
b	**Guidepost**	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	Y	Y	N

	Justification	Currently, the efficacy of the harvest strategy has not been fully tested, because the stock status has always been good. The most recent stock assessment suggests that at the current level of catch, the stock would decline to ~~target reference point level. Since there is no evidence that the stock status is in jeopardy in the short-term, and since the stock is above target levels, it is difficult to reject SG80 with a conclusion that the harvest strategy is failing to achieve the fundamental management objectives. In terms of management actions, the key element of the harvest strategy at the regional level is the implementation of CMM 2014-01, which includes specific measures to restrict purse seine effort (notably on FADs) and includes the general provision that CCMs should 'take measures not to increase their yellowfin catch'. In terms of the latter, it is too early to say whether or not this is being achieved, because a stock assessment for the time period post-CMM 2012-01 (the first measure) is not yet available, although catch data from 2013 shows that overall yellowfin catch declined from 2012 (although the extent to which this relates to changes in management is not known). It is clear, however, that CCMs have submitted FAD management plans, setting out how they will comply with the provisions of 2013-01 relating to FADs – these are available here: http://www.wcpfc.int/folder/fad-management-plans Overall, the team concluded 1) that management objectives (in terms of stock status) are being achieved and 2) there is evidence that the harvest strategy has made some contribution to ensuring that the situations remains good. Thus SG80 is met. For SG100, the harvest strategy has not been fully evaluated. The score is therefore 80.		
c	**Guidepost**	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	Y		
	Justification	Monitoring of the fishery for the purposes of stock assessment is considered in PI 1.2.3 below, and the analysis of data is considered under PI 1.2.4. Monitoring of the implementation of the harvest strategy (notably CMM 2013-01) is carried out via self-assessment by CCMs, included in their Part 2 reports submitted to WCPFC annually.		
d	**Guidepost**			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			N
	Justification	The harvest strategy is reviewed annually by the Scientific Committee and by WCPFC plenary meeting. It is not clear, however, that it is always 'improved as necessary'. For example, when 2013-01 was approved by the WCPFC plenary session as a successor to 2012-01, multiple stakeholders expressed their disappointment that it was not stronger (e.g. Japan, FFA, PNA, Philippines, PNG and NGOs).		

e	**Guidepost**	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Not relevant	Not relevant	Not relevant
	Justification	The target species is not a shark		
References		Davies et al. 2014 McKechnie et al. 2014 Pilling et al. 2014 Banks et al. 2012a Kolody et al., 2010 PNA 2014 - VDSTSC3 Working Paper 1(a) WCPFC 2013a -Tuna Fishery Yearbook WCPFC 2013c – WCPFC10 CMM 2010-05, CMM-2012-01, CMM 2013-01, CMM 2014-1		
OVERALL PERFORMANCE INDICATOR SCORE:				**70**
CONDITION NUMBER (if relevant):				**4**

Evaluation table 10 - PI 1.2.2 Yellowfin

NOTE: Further to agreement with MSC and other CABs carrying out assessments on the same or similar stocks, SG60 for this PI has been scored using the wording of the Scoring Guideposts in the Certification Requirements version 2.0 (the rest of the PI and assessment follows version 1.3). Further information is given in the main report Section 4.3.

PI 1.2.2		**There are well defined and effective harvest control rules in place**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Generally understood HCRs are in place or available that are expected to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached.	Well-defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.	
	Met?	Y	N	
	Justification	For the WCPFC harvest strategy, the harvest control rule is set out in CMM 2014-01 (WPCO bigeye, yellowfin and skipjack), which is summarised in Section 3.4.6 of the main report. For PNA, the harvest control rule is to adjust the TAE to maintain ‘optimal exploitation’ (assumed to be likewise a proxy for F_{MSY} – see discussion in 1.2.1 above). In practice, because yellowfin stock status is good (target F being achieved with ~~90% probability, as noted above), and has always been good, limits on the fishery have not really been required up till now. At the SG60 level, therefore, the discussion centres around whether the HCRs currently in place or available could reasonably be argued to act to reduce the exploitation rate if required. Bigeye is the only stock which has been assessed to be below target levels, with the situation over recent years in WCPFC being as follows: 2011 – stock assessment estimates that B>BMSY but F>FMSY and C>MSY, using data to end 2008; 2012 – first management measure put in place (CMM 2012-01) 2013 – further management put in place (CMM 2013-01) 2014 – stock assessment estimates that B ~at Blim, using data to end 2011 (current), or below Blim using 2012 data (but this considered to be uncertain) 2014 – CMM 2013-01 updated to 2014-01, without much change. The question is, therefore, taking this timeline whether WCPFC can be argued to have responded to the stock status – and hence whether by analogy with bigeye, a responsive HCR is ‘available’ for yellowfin, despite the lack of response at WCPFC11 to the 2014 stock assessment. The team noted the following:		

<table>
<tr><td></td><td></td><td colspan="3">

- The first stock assessment indicating problems with the stock (in 2011) was responded to be WCPFC in 2012 in the form of CMM 2012-01 and subsequent CMMs
- The impact of this management on the stock has not yet been evaluated by a stock assessment (since the 2014 assessment used data only to the end of 2012 which is when CMM 2012-01 was introduced)
- The impact of management on total catches cannot even yet be evaluated, except for one year (2013), for which catch data have just become available (total bigeye catches (‘000 t): 2011 – 158, 2012 – 162, 2013 – 150) – i.e. catches declined 7% in 2013 relative to 2012)
- A Pacific-wide joint SPC-IATTC stock assessment for bigeye is planned for 2015 (SC10 final report)
- PNA are proposing to establish additional management measures for bigeye in 2015, including charging a premium for bigeye vessel-days

On this basis, the team considered that it was not unreasonable for the WCPFC to maintain the status quo in 2015, pending more information about the impact of the management measures already put in place. The team concluded on this basis that responsive HCRs are ‘available’ at WCPFC and PNA. In addition, the combined impact of CMM 2014-01 and the PNA vessel day scheme imply that the existing HCRs, although somewhat weak, are somewhat responsive to the status of the stock. On this basis, SG60 is met for WCPO yellowfin.

The team did not consider, however, that this approach could be described as ‘well-defined’ pre-agreed rules, nor can it be said to ‘ensure’ that the exploitation rate is reduced.

On this basis, we would conclude SG60 is met, but SG80 is not.

(The scoring of this scoring issue has been harmonised with the expedited P1 assessment for PNA yellowfin.)
</td></tr>
<tr><td rowspan="2">b</td><td>Guide post</td><td></td><td>The HCRs are likely to be robust to the main uncertainties</td><td>The HCRs take account of a wide range of uncertainties including the ecological role of the stock, and there is evidence that the HCRs are robust to the main uncertainties</td></tr>
<tr><td>Met?</td><td></td><td>N</td><td>N</td></tr>
</table>

	Justification	While the stock assessment considers a wide range of uncertainties, CMM 2014-01 is expressed mainly in terms of restricting effort, without expressing the units of effort – presumably this is up to individual CCMs. This means that there is some uncertainty as to how effective the CMM will be; for example, if effort is limited by fixing a maximum number of vessels, effective effort could still increase, if the vessels increased the number of days spent fishing, the gear configuration, the efficiency of targeting, etc. This is also true of the PNA vessel-day scheme to some extent, although days are adjusted for vessel size category. CMM 2014-01 does specify that CCMs should 'take measures not to increase their catch of yellowfin tuna' for both purse seine and longline fisheries, but again it does not specify any details. Overall, given the robust nature of the stock assessment ('(the) result indicates there to be sufficient and coherent information in the observations from which absolute abundance can be inferred') and its conclusions regarding the stock status (above target levels), the team considered that there are no large looming uncertainties that might threatened the outcome if CMM 2014-01 and the vessel-day scheme are implemented. It is nonetheless not clear, if uncertainties are uncovered, how the HCR could react to them. The situation for bigeye shows that the management system can be reactive, but slowly (e.g. response by WCPFC in December 2012 to stock assessment from summer 2011). On this basis, the team concluded that it is difficult to argue that the HCR is 'robust', and SG80 is not met.		
c	**Guide post**	There is **some evidence** that tools used **or available** to implement HCRs are appropriate and effective in controlling exploitation	**Available evidence indicates** that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs	**Evidence clearly shows** that the tools in use are effective in achieving the exploitation levels required under the HCRs
	Met?	Y	Y	N
	Justification	The tools in place to manage yellowfin tuna are outlined in section 3.4.6.2 in the body of the report. The main tools consist of controls on Fishing Aggregating Devices (FADs) in specified times and areas, restrictions of purse seine effort and additional limits specific to yellowfin to be adopted by WCPFC12 (December 2015). Implementation of these tools varies by country and fishery. The stock assessment, which determines fishing mortality relative to F_{MSY}, provides the means to measure the effectiveness of the package of effort tools used to control exploitation. This approach is also used to measure the effectiveness of catch controls (e.g. TACs), which are commonly used in other fisheries around the world. The most recent stock assessment for yellowfin tuna (Davies et al. 2014) indicates that fishing mortality for yellowfin tuna has always been below the F_{MSY} level, that the stock has not declined below the default target of B_{MSY} The disappointment expressed by some CCMs and NGOs in CMM 2013-01 and 2014-01 during WCPFC10 and 11 suggests that they do not consider that that this management is robust – however, bigeye is the main issue for management rather than yellowfin. On this basis, the available evidence indicates that the tools in use are appropriate and effective. Overall, the team considered that SG80 is met for yellowfin. While the status quo projections (Pilling et al. 2014) indicate that it is very unlikely (<1%) that fishing mortality would increase above FMSY by 2032, this depends upon the continued effectiveness of the implementation of the effort-based tools across a wide range of states involved in the fishery. Effort tools can under circumstances not be effective at controlling exploitation (e.g. increasing catchability over time). Thus while the current tools appear to be effective, it is not possible to state that they are clearly effective. SG100 is not met.		

References	Davies et al., 2014 Pilling et al., 2014 WCPFC 2013c - WCPFC10 WCPFC 2014a – Draft Report for WCPFC11 WCPFC, 2013a - Tuna Fishery Yearbook SC10 report CMM 2012-01, CMM 2013-01, CMM2014-01	
OVERALL PERFORMANCE INDICATOR SCORE:		**65**
CONDITION NUMBER (if relevant):		**5**

Evaluation table 11 - PI 1.2.3 Yellowfin

<table>
<tr><td colspan="2">PI 1.2.3</td><td colspan="3">Relevant information is collected to support the harvest strategy</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guide post</td><td>Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.</td><td>Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.</td><td>A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">The following information is available, and is used as part of the harvest strategy – notably to inform the stock assessment model:

1. Fishery-dependent information

<u>Catch, effort and CPUE</u>: It is a requirement for all CCM fisheries to provide catch and effort data to WCPFC – this is either in the form of logsheet data (from most coastal states) or aggregated by month/5o squares (from most distant water fishing states). The logsheet data is raised to best estimates of total catch by SPC-OFP, to account for missing data. CPUE data are standardised as described in detail in the main report (Section 1.1.1). Data go back to 1960, although as expected, historical data are sparser and generally less reliable than more recent data. It is often not clear what the relevant factors are for effective catch rate standardization, and they may not be recorded in the logbooks – this is a particular problem for purse seine data.

<u>Length-frequency data</u>: Length-frequency data comes from various port sampling programmes and some observer reports, and goes back to 1962. These data are weighted in the stock assessment according to spatial representation, to account for differences in length-frequency by geographic region.

<u>Fleet composition</u>: Each CCM provides information to WCPFC annually on their active fleet, in their Part 1 reports.

2. Fishery-independent information

<u>Size and age data</u>: Data on age and growth are available to inform the stock assessment, although growth rates remain somewhat uncertain.

<u>Natural mortality</u>: Estimating natural mortality is always a big problem. Unlike albacore, there are sufficient tagging data available for yellowfin to allow the stock assessment model to estimate natural mortality, although the outcome was somewhat different to the reference case model where natural mortality was fixed (more optimistic).

<u>Environmental data</u>: The Ocean Fisheries Programme of SPC undertaken environmental research as part of their ecosystem monitoring programme, focusing particularly on potential environmental drivers of tuna population dynamics.</td></tr>
</table>

		3. Information inferred from the stock assessment A significant range of information relating to stock status comes as the output of the stock assessment. This is described in detail in the main report (Section 3.4.8), and includes estimates of stock abundance, fishery impact etc., as set out in SG100. 4. Data gaps Stock structure - the WCPO yellowfin fishery is assessed and managed as a single stock. However, suggestive evidence for population structure is emerging for the tropical tunas (e.g. Kolody et al., 2013). Observer coverage (providing external verification of logbook data and information about discards) is low, particularly for the longline fishery and particularly on the high seas. Williams (2013) identified data gaps (for all key species, rather than yellowfin in particular) as follows: • Vietnamese domestic fleet: no annual catch data provided (NB this now appears to be provided – see Davies et al. 2014); • Philippines and Indonesian fleets: catch data not broken down by gear type; operation (logsheet) data not provided; • Taiwanese fleet: no operational data, aggregated effort data or size data prior to 2004; likewise for the Japanese coastal fleet up to the present data; likewise for the Japanese pole and line fleet prior to 1972; • Several countries may have historical data which has not been identified • Historical estimates of coverage rates from logsheets and port sampling are missing in some cases; • Some key (distant water) fleets provide only aggregated rather than operation level data – this is identified as a constraint on stock assessments, and on the use of more details spatial models such as SEAPOPDYM. Overall, given the size and complexity of the fishery, the range and comprehensiveness of the data available is impressive and improving all the time. Nonetheless, these data gaps do constrain stock assessments – as does bias and lack of precision in some of the data sets, particularly historical data (discussed in the main report Sections 1.1.1 and 3.4.8). Perhaps more importantly, the stock assessment continues to rely on commercial CPUE as an index of stock abundance, and although these data are carefully analysed and standardised as far as possible, there are no fishery-independent data sets with which they can be compared, while issues such as spatial and temporal changes in catchability remain problematic. On this basis, the team concluded that SG80 is met, but SG100 is not met.

b	**Guide post**	Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.
	Met?	Y	Y	N
	Justification	Fishery removals are monitored by individual CCMs via logsheets and port sampling, and are required to be submitted to the Commission annually, in the form of estimates of total catch plus catch and effort data broken down by gear and either aggregated (5^o squares by month) or (preferably) at operational level (individual logsheets). Despite some gaps in this data set noted above, coverage is good overall. This catch, effort and CPUE data set is the key indicator for stock assessment. Other key fisheries data which support management are length-frequency data (collected via port sampling and observer programmes) and tag returns. Port sampling covering is high, but observer coverage is low, particularly for (non-Australian) longline fisheries. Biological data is also collected via research programmes. Formal stock assessments have taken place every few years (2011, 2014). In between formal stock assessments, SPC provide some information on trends in fishery indicators (total catch, nominal CPUE, catch at length and at weight), to guide management (Harley and Williams 2013). On this basis, the team felt that SG80 was met. SG100 is not met, for the following reasons: • The characteristics of tuna longline CPUE are often poorly understood and it is unclear how successful most effort standardization analyses are or how to properly represent the uncertainties • Purse seine catch and length-frequency data can be biased by grab-sampling techniques used to estimate species composition • Some data gaps remain in fishery-dependent data (see above) • Some key fleets provide only aggregated data • The requirement to 'raise' logsheet data by estimates of total catch (to account for missing logsheets) results in some loss of precision • Historical data is often lacking in precision Although the frequency of stock assessments is reasonable, they are not carried out with 'high frequency' (i.e. not always updated annually); it is not completely clear how robust the management is to uncertainty – the management system is still a work in progress.		
c	**Guide post**		There is good information on all other fishery removals from the stock.	

	Met?		Y	
	Justification	The stock assessment covers all fishery removals from the stock, and despite some data gaps (notably Vietnam, also Philippines, Indonesia and some smaller coastal fleets), overall the data coverage is quite comprehensive. Where data gaps exist, the WCPFC Secretariat and SPC are working to support and develop data collection systems (see information in Williams, 2013).		
References		Davies et al. 2014 Williams, 2013 Kolody et al., 2014 Harley and Williams, 2013 SC9 report Information on OFP environmental / fisheries research: http://www.spc.int/OceanFish/en/ofpsection/ema/environmental-research/78-oceanographic-variability/115-oceanographic-variability		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation table 12 - PI 1.2.4 Yellowfin

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**		The assessment is appropriate for the stock and for the harvest control rule.	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.
	Met?		Y	Y
	Justification	The stock assessment is described in detail in the main report, Section 3.4.8. The model, which has been developed for the stock assessment, is complex and sophisticated, and takes into account the biology of the species (e.g. by incorporating the results of research into age and growth by sex and region, maturity and fecundity at size and age etc.). The model is able to estimate a variety of reference points, which are, or might be used as limit and target reference points for management (see discussion under PI 1.1.2 above). SG80 is met. In relation to SG100, the assessment takes into account major features of the biology of yellowfin, including growth curves, spatial structuring of the stock and movement patterns. One remaining issue is that MULTIFAN cannot be structured by sex, to take into account of sex-specific growth and natural mortality curves, but this is a research direction of the MULTIFAN development team at the moment. The stock assessment also takes into account the nature of the fishery, in as much as considerable research effort has gone in to trying to standardise CPUE time series to reflect operational changes in each fishery. Overall, the team considered that SG100 is met.		
b	**Guide post**	The assessment estimates stock status relative to reference points.		
	Met?	Y		
	Justification	The output of the stock assessment in relation to reference points is given in the rationale for PI 1.1.1 above.		
c	**Guide post**	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.
	Met?	Y	Y	Y

	Justification	The stock assessment attempts to reduce uncertainties and biases in input data sets (e.g. via stratification in space and time, and via CPUE standardisation using GLM). It also includes a detailed exploration of uncertainties in the model assumptions, via sensitivity analyses for various different model options (tag mixing, natural mortality, steepness, different treatment of the CPUE data set). The model uses a statistical framework to estimate states and parameters conditional on a suite of structural assumptions and the data. The model outputs the best (Maximum Posterior Density) point estimates, along with estimates of uncertainty for desired parameters. The most recent assessment emphasizes the uncertainty in point estimates conditional on a broad range of alternative fixed assumptions, rather than the parameter estimation uncertainty estimated conditional on individual models. As a consequence, the probabilistic stock status statements do not have the classical probabilistic interpretation, but are actually expected to provide a broader and more realistic representation of uncertainty than classical approaches.		
d	**Guide post**			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			Y
	Justification	Exploration of alternative hypotheses via sensitivity analyses is considered above. The stock assessment has been updated progressively: structural changes in the most recent assessment (Davies et al. 2014) include the following: • Increase in the number of spatial regions to improve modelling of tagging and size data • Catch estimates included from Vietnam and some Japanese coastal longline data • More operational data used • Improved modelling of recruitment • A large amount of new tagging data added, corrected for post-release dynamics Davies et al. (2014) made an impressive effort to evaluate a range of structural assumptions, and the results demonstrated that the key stock status conclusions are very robust to this range of assumptions (and their interactions). In such a large and complex fishery, it is inevitable that unresolved issues will remain (e.g. conflicts between data sets, sensitivity to intractable issues such as estimates of natural mortality and steepness etc.), and these issues remain a priority for consideration in future work. Overall, the team concluded that as issues arise in the assessment, the stock assessment explores and deals with them, and while the assessment is not perfect, nor probably ever will be, the exploration of alternative hypotheses and assumptions has been rigorous. SG100 is met.		

e	**Guide post**		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		Y	Y
	Justification	The stock assessment is internally peer reviewed within the WCPFC system (by the Scientific Committee). A process of formal external peer review has been started and applied to some WCPFC stock assessments (e.g. bigeye) but not so far this one specifically. However, the results of the bigeye review have been applied by SPC more generally across the whole set of recent tuna stock assessments (see WCPFC-SC10-2014/SA-WP-02), and on that basis, it is reasonable to argue that the external review applies to the most recent yellowfin assessment. Aspects of the methodology have also been published in peer-reviewed journals (e.g. Hampton and Fournier, 2001). SG100 is met.		
References		Davies et al. 2014 Hampton and Fournier 2001 SC10 report		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**N/A**

Appendix 1.1.3 Principle 1 (UoC 3 – Swordfish)

Evaluation table 13 - PI 1.1.1

PI 1.1.1		**The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	It is likely that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired.
	Met?	Y	Y	Y
	Justification	The stock assessment estimates that for the whole SW Pacific region, recruitment has fluctuated without trend over the model period (since the 1950s). The two model regions show contrasting patterns of recruitment, with recruitment in Region 1 estimated to have increased in the 1970s and 1980s before falling back to previous levels in the mid-1990s; conversely recruitment in Region 2 is estimated to have declined and then increased in the same timeframe. It is not clear, however, to what extent these patterns reflect 'true' patterns of regional recruitment, vs. changing migratory patterns, vs. some other model artefact (Figure 1). In relation to the ETBF specifically, TTRAG 8 (2013) note that the proportion of fish in the prime size class has increased, and the proportion in the small size class has decreased – they do not, however, interpret this has related to a recruitment issue.		

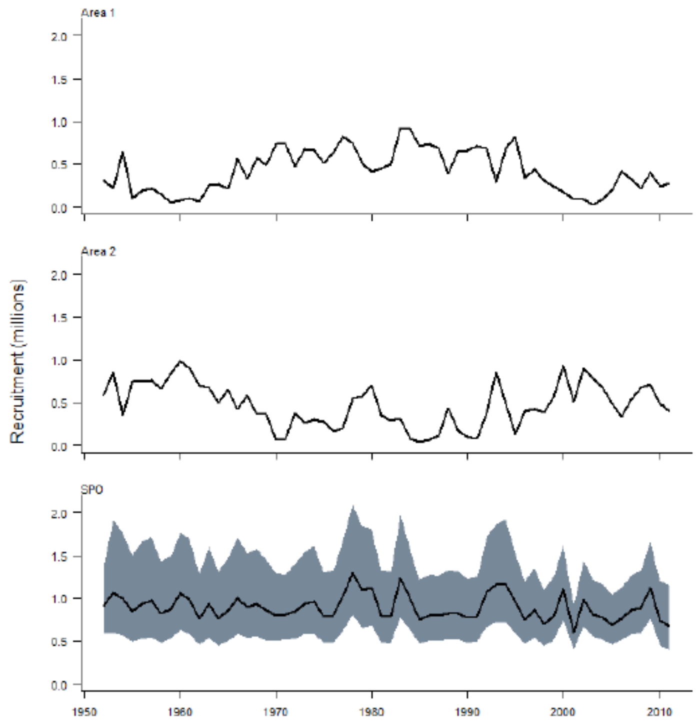

Figure 1. Estimated recruitment (millions) from the stock assessment model, in region 1 (top), region 2 (middle) and the whole SW Pacific (bottom).

Although the conflicting results from the two growth schedules make the stock assessment results uncertain, B and SB are estimated to be above the MSY level under both growth schedules, with a 'high degree of certainty' under the MSC definition (95% probability):

Ratio	Range of estimates according to different growth schedules	5% and 95% CIs for reference case model
B_{curr}/B_{MSY}	1.51-1.58 (Hawai'i), 1.15-1.37 (Australia)	1.17-2.24
SB_{curr}/SB_{MSY}	1.86-2.54 (Hawai'i), 1.15-1.80 (Australia)	1.14-4.72

On this basis, since i) the stock is above the MSY level with a high degree of certainty and ii) that there is no evidence of any impact of the fishery on recruitment, the team concluded that there is a high degree of certainty (>95% probability) that the stock is above the point at

		which recruitment is impaired, and hence SG100 is met.		
b	**Guide post**		The stock is at or fluctuating around its target reference point.	There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years.
	Met?		Y	N
	Justification	For swordfish, there are two potential sets of target reference points: from WCPFC and from the Australian Commonwealth Harvest Strategy (CHS). WCPFC has not formally fixed a TRP for SW Pacific swordfish, although CMM 2009-03 notes that '*due to the uncertainty in the 2008 stock assessment for south-western Pacific swordfish, the SC recommended that there be no further increase in catch or effort in order to keep the stock above its associated reference points*' – suggesting some implicit reference points. Assuming that the SC is referring to the reference points used in the stock assessment, these would be either MSY reference points, or some percentage of $B_{current,F=0}$, as for the tuna. No reference is made to swordfish in the framework set out by WCPFC for tuna, however (see main report Section 1.1.1 and Table 7), so for the purposes of this analysis, we take the MSY reference point as the MSC default. As noted above, $B_{current}$ and $SB_{current}$ are estimated to be above the MSY level with 95% probability. However, SB_{latest} (2010) is not above the MSY level with 95% confidence (confidence intervals for reference case model 0.86-4.3), and F is also estimated to be above the MSY level under the Australian growth schedule. More generally, the confidence intervals provided for the reference case model do not express the full uncertainty in the stock assessment, since they assume the Hawai'ian growth schedule, which is the more optimistic of the two possibilities. Overall confidence intervals are likely to be very wide, and thus 95% confidence is unlikely. SG80 is met for the WCPFC (default) reference point, but SG100 is not met. The TRP for the CHS is MEY, which is estimated by default as $1.2B_{MSY}$. According to the reference case model, the stock is estimated to be above this level with ~~95% probability (lower 5% confidence interval for $B_{current}/1.2B_{MSY}$ = 0.98 – noting the caveats regarding these confidence intervals apply here). Note, however, that it is not completely clear in this context which stock or sub-stock this 'MEY' applies to – hence, presumably, why the approach has been to use an empirical proxy. The agreed empirical proxy for MEY in the ETBF (for all the key species) is the average standardised catch rate from 1997-2001, during which period the fishery is considered to have been exploited at ~MEY. Trends in CPUE over time relative to CHS limit and target reference points are shown in Figure 26 of the main report. The CPUE is currently measured at levels just above the target. Confidence intervals are not provided, and are not easy (perhaps not appropriate) to estimate for this kind of empirical model. Overall, the team concluded that the stock is very likely to be at or above the level of all the various targets, but a 'high degree of confidence' cannot be justified, particularly given the high uncertainty in the stock assessment. SG80 is met but SG100 is not met.		

References	Davies et al. 2013 TTRAG 8 minutes 2013 CHSP		
Stock Status relative to Reference Points			
	Type of reference point	**Value of reference point**	**Current stock status relative to reference point**
	Target	Note: figures given from reference case model B_{MSY} = 60290 t SB_{MSY} = 20150 t $1.2B_{MSY}$ = 72348 t $CPUE_{prime}$ (only relative values given)	Note: figures given from reference case model B_{curr}/B_{MSY} = 1.58 SB_{curr}/SB_{MSY} = 2.17 $B_{curr}/1.2B_{MSY}$ = 1.32 $CPUE_{prime}/CPUE_{prime}$ target = ~1.2
	Limit	$0.2B_0$ = 30300 t $CPUE_{prime}$ (only relative values given)	$B_{curr}/0.2B_0$ = 3.15 $CPUE_{prime}/CPUE_{prime}$ limit = ~2.4
OVERALL PERFORMANCE INDICATOR SCORE:			**90**
CONDITION NUMBER (if relevant):			**N/A**

Evaluation table 14 - PI 1.1.2

PI 1.1.2		Limit and target reference points are appropriate for the stock		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.	Reference points are appropriate for the stock and can be estimated.	
	Met?	Y	Y	
	Justification	As noted above, there are various sets of reference points for the swordfish stock. WCPFC uses MSY reference points in the stock assessment and implicitly in management – see CMM 2009-03. The Australian CHSP sets explicit biomass reference points: B_{lim} = 0.2B0, and B_{target} = B_{MEY}, as approximated as 1.2B_{MSY}. In practice, however, the Australian harvest strategy operates using empirical reference points based on standardised CPUE of prime-sized fish – it is considered that the fishery was operating at ~MEY level in the period 1997-2001, so the standardised CPUE for this time period is considered to be a reasonable empirical proxy for B_{MEY}. All these various approaches are reasonable given the nature of the stock, and all are estimated (see rationale for 1.1.1 above for figures). SG80 is met.		
b	**Guide post**		The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of precautionary issues.
	Met?		N	N
	Justification	The Australian system sets an explicit limit reference point (0.2B_0), which can be estimated by the stock assessment (see figures provided in the main report Table 7). Based on the reference case model, this is estimated to be ~~0.5B_{MSY}, which is a reasonable precautionary level based on normal practice. WCPFC has not agreed to a limit reference point for swordfish (in contrast to the tuna stocks) and the stock assessment only considers targets. The achievement of a management target implies avoidance of a limit although the latter is not explicitly stated. Given that there is no explicit LRP for the Pacific – wide swordfish stock, SG80 is not met.		

c	**Guide post**		The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a higher level, and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.
	Met?		Y	N
	Justification	As noted above, Australia has set a formal target reference point for this stock of B_{target} = BMEY= $1.2B_{MSY}$ = standardised $CPUE_{prime,1997-2001}$. This is consistent with the MSY level, or indeed somewhat more precautionary. WCPFC has target reference points for the stock in CMM 2009-03 (see discussion above) but does not state what these are. Based on the stock assessment, it is assumed that these are MSY reference points. On this basis, SG80 is met. In relation to SG100, we have already argued that given the considerable uncertainties regarding the biology of the stock and hence the stock assessment, a 'high degree of certainty' is difficult to argue – particularly when one set of targets (those applying to the whole stock – or both stocks) are implicit rather than explicit. SG100 is not met.		
d	**Guide post**		For key low trophic level stocks, the target reference point takes into account the ecological role of the stock.	
	Met?		Not relevant	
	Justification	Not a LTL stock		
References		CMM 2009-03 CHSP Davies et al. 2013 TTRAG 8 minutes 2013		
OVERALL PERFORMANCE INDICATOR SCORE:				**75**
CONDITION NUMBER (if relevant):				**6**

Evaluation Table for PI 1.1.3 – only scored if PI 1.1.1 60-80 see above for details

Evaluation table 15 - PI 1.2.1

PI 1.2.1		**There is a robust and precautionary harvest strategy in place**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points.
	Met?	Y	Y	N
	Justification	MSC defines a harvest strategy as ‘the combination of monitoring, stock assessment, harvest control rules and management actions, which may include an MP or an MP (implicit) and be tested by MSE’ (MSC CR v1.3). As indicated in the main report (Section 3.4.6), the team concluded that it would be most appropriate to score the swordfish harvest strategy and control rules based on the Australian harvest strategy, but also taking the WCPFC harvest strategy into account as necessary. The Australian harvest strategy (CHSP) is based on a review of the WCPFC stock assessments, but also on running their own model for the ETBF to evaluate standardised CPUE relative to the reference points described above. The harvest control rule on which the harvest strategy is based is set out in Figure 28 of the main report, and is evaluated in detail below. Monitoring and stock assessment are described in detail in PIs 1.2.3 and 1.2.4. In terms of management actions, the harvest control rule is implemented via a TACC (total allowable commercial catch), which is an output from the harvest strategy model. On this basis, the harvest strategy is responsive to the status of the stock (because it is based on an assessment of the ETBF, but can also be adjusted based on the outcome of WCPFC stock assessments if necessary), and has been designed specifically to achieve the stock management objectives of reflected in the target reference point (productivity, economic efficiency) and the limit reference point (precaution, reduced risk). The WCPFC harvest strategy is set out in CMM 2009-03 which is designed to limit increases in effort and catch for precautionary reasons. So far, CMM 2009-03 has most likely not much affected national harvest strategies, but the stock remains in good condition. For the moment, the TTRAG has ‘high confidence’ in the Australian harvest strategy for swordfish to deliver effectively the objectives of the CHSP (as reflected in the reference points described above) (TTRAG 8, 2013). On this basis, SG80 is met.		

		In relation to SG100, the Australian harvest strategy can be argued to be 'designed' to achieve stock management objectives, but the WCPFC harvest strategy cannot, given that stock management objectives remain implicit, as argued in the rationales for PIs 1.1.1 and 1.1.2 above. SG100 is not met.		
b	**Guidepost**	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	Y	Y	N
	Justification	In 2010, the ETBF harvest strategy was evaluated by CSIRO, using MSE. The conclusions of this evaluation were as follows (Kolody et al. 2010): • *We have the most confidence in the swordfish operating model [compared to those for other species in the ETBF] because the assessment was developed with the MSE project in mind: the spatial representation partitions conveniently into ETBF and non-ETBF regions, there are good reasons for thinking that the assessment population is reasonably discrete from northern and eastern populations, and there was a concerted effort to quantify several important sources of assessment uncertainty.* • *It is estimated that the ETBF potentially has a considerable impact on the SW Pacific swordfish population relative to the other fleets, and the HS adopted by the RAG/MAC seems to have a reasonable capacity to manage the uncertainty in the stock dynamics, and produce a reasonable management outcome in the short-medium term.* • *However, the HS does show some performance sensitivity to population connectivity, the effects of the non-ETBF fleet, and biases in the CPUE series (under the simulation conditions, the use of size-based indices in the decision rule did not show any evidence of mitigating the effects of effort creep).* Note that since 2010, the proportion of the fishery in stock assessment 'region 1' (otherwise known as 'region 5' – see Figure 15 of the main report) taken by the ETBF has continued to reduce, and now stands at around 59% according to AFMA. Nevertheless, the TTRAG continues to conclude that it has high confidence in the harvest strategy for swordfish. The WCPFC harvest strategy, in contrast to that of the ETBF has not been fully tested. Notwithstanding this, the existing evidence suggests that the two harvest strategies are achieving their objectives, in that the stock is at or above target levels, both in terms of the WCPFC stock assessment and (implicit) MSY reference points, and also in terms of the empirical CPUE reference points used by AFMA. SG80 is therefore met. The team concluded, however, that it was questionable whether the strategy was 'clearly' able to maintain the stock at target levels into the future, given the uncertainties noted by the MSE, and most particularly given that the non-Australian fishery on the stock continues to take an increasing proportion, at least for the moment. SG100 is not met.		

c	**Guidepost**	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	Y		
	Justification	The annual assessments conducted by the SPC on behalf of the WCPFC provide the monitoring necessary to determine whether or not the WCPFC and ETBF strategies are working. Further, in the case of the ETBF, its harvest strategy model is run annually, and the output presented to the TTRAG, who provide a recommendation to the MAC, who then take into account the views of industry and stakeholders, and provide a recommendation to the AFMA Commission, who take a decision (see Section 3.4.6 of the main report). Catches are monitoring in ~real time via logsheets and processor declarations, in order to monitor take up of individual quota allocations. Effort is also reported via logsheets, in order to evaluate standardised CPUE for the various size categories of fish, which is the key input into the harvest strategy. SG60 is met.		
d	**Guidepost**			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			N
	Justification	Australia has a process of periodic MSE for fisheries harvest strategies, and the ETBF strategy was evaluated most recently in 2010. The TTRAG annually reviews how well each harvest strategy is working, and the level of confidence they have in it for each of the main species in the ETBF. For the tuna species, for example, a decision has been taken not to use the ETBF harvest strategy to set the TACC, because the ETBF takes a sufficiently small proportion of the stock that it is having no impact on the overall stock status – hence the strategy cannot achieve its objectives for these species. For swordfish, this approach was discussed but it was concluded that the harvest strategy continues to be effective for the moment. For WCPFC, the main element of the harvest strategy (CMM 2009-03) has not been reviewed since 2009. The team had no information about any plans to revise it. Thus, while the ETBF strategy is periodically reviewed, such is not the case for that of the WCPFC. Therefore, the SG100 guidepost is not met.		
e	**Guidepost**	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Not relevant	Not relevant	Not relevant
	Justification	The target species is not a shark. Shark finning in relation to bycatch species is considered under Principle 2.		
References		TTRAG 8 minutes (2013)		

	Davies et al. 2013 Kolody et al. 2010

OVERALL PERFORMANCE INDICATOR SCORE:	**80**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation table 16 - PI 1.2.2

PI 1.2.2		There are well defined and effective harvest control rules in place		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Generally understood harvest rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.	Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.	
	Met?	Y	N	
	Justification	As per the main report (Section 3.4.6), the team concluded that it would be most appropriate to score the swordfish control rules based on the Australian HCR, but also taking that of WCPFC into account as necessary. In the case of the WCPFC, the MSY targets of management imply that limit reference points will be avoided. However, this is only generally understood and not well defined. For the ETBF, there is a detailed HCR in place, which is described in the main report (see flow chart, Figure 28). The purpose of the harvest control rule is to achieve the objectives of the harvest strategy – B_{MEY}, with standardised CPUE in the period 1997-2001 as a proxy. The output of the HCR is an advisory TAC, which will act to ensure that the ETBF exploitation rate is adjusted according to where the stock is in relation to the limit and target reference points. This output then goes for discussion by the TTRAG and the MAC, before a final decision on the TACC is made by the AFMA Commissioners. Note that at the discussion stage, other inputs may go into setting the TACC, including the view of stakeholders and the WCPFC stock assessment outcome. The final TACC may on this basis be set at a lower level than the output from the HCR, but it will not be set at a higher level. The extent to which this HCR acts to reduce the exploitation rate across the whole stock depends on the view of the stock structure, and hence the proportion of the exploitation rate which comes from the ETBF. Currently, the view of the TTRAG and AFMA is that the HCR continues to be effective in controlling the exploitation rate across the whole stock, but clearly if current trends continue then this may be open to question in a few years. Given that the WCPFC HCR is not well defined, in contrast to that of the ETBF, SG80 is not met.		
b	**Guide post**		The selection of the harvest control rules takes into account the main uncertainties.	The design of the harvest control rules takes into account a wide range of uncertainties.
	Met?		N	N

	Justification	The MSE undertaken to evaluate the Australian HCR considered different assumed rates of swordfish mixing with the non-ETBF areas. This is one of the main uncertainties in this HCR. Further, the Australian HCR is based on tracking standardised CPUE, but the final decision on the TACC can take into account other inputs, including industry and stakeholder views and the WCPFC stock assessment output. Decision-making is precautionary (it will not exceed the advice of the model output of the TTRAG). On this basis, it is reasonable to say that the main uncertainties are taken into account in this HCR given that the WCPFC stock assessment covers all the fisheries on the stock. However, there is a limit to the extent to which the Australian HCR can deal with all the uncertainties, since the ETBF is not the only fishery on the stock. Uncertainties are also identified by Kolody et al. (2010), as set out in the rationale for PI 1.2.1 above. Also, regarding the WCPFC, there has not been an examination of its performance in the face of the main uncertainties confronting its HCR. SG80 is not met.		
c	**Guide post**	There is some evidence that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.	Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.
	Met?	Y	Y	N
	Justification	The tool used to implement the harvest strategy is a TACC – total allowable commercial catch – which is divided up into individual transferrable quotas. Until recently, the fishery used effort management, but AFMA concluded that an ITQ system would be more effective in achieving an appropriate exploitation rate in an efficient way. Both sets of analyses of stock status (the harvest strategy model and the WCPFC stock assessment) suggest that the stock is at or above target levels. The MSE carried out on the Australian harvest strategy also suggested that it was likely to be effective. On this basis, it is reasonable to argue empirically that the evidence shows that harvest strategy has been effective up to this point. SG80 is therefore met. In relation to SG100, the team considered that there are too many uncertainties to argue that 'evidence clearly shows' – notably the level of connectivity between the stocks in regions 1 and 2 (using the terminology of the WCPF stock assessment) and hence the extent to which ETBF management is controlling exploitation rate over the whole stock. SG100 is not met.		
References		Davies et al. 2013 Kolody et al. 2010		
OVERALL PERFORMANCE INDICATOR SCORE:				**65**
CONDITION NUMBER (if relevant):				**7**

Evaluation table 17 - PI 1.2.3

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring Issue		SG 60	SG 80	SG 100
a	Guide post	Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.	Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.	A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	Y	Y	N
	Justification	Stock structure: Extensive tagging and genetic information is available as described in Section 3.4.1 of the main report Stock productivity: There are various sources of information on growth, reproduction and mortality, although this issue remains an uncertainty in the stock assessment – working is, however, ongoing (e.g. see Farley et al. 2014 in SC10) Fleet composition: The various fleets operating on the stock(s) and their characteristics are described in the stock assessment Stock abundance: The key input into both the stock assessment and the Australian harvest strategy are standardised CPUE trends, which are available from the ETBF (standardised by time, area, operational parameters and environmental factors), New Zealand (standardised likewise) and other fleets (the EU, Japan, Taiwan, Korea and the USA – standardised in less detail). FIshery removals: Landings by vessel in the ETBF are closely tracked and cross-checked from processor reports, in order that the ITQ system can be enforced. Discards are monitored by observers. Catches by the other fleets are reported to WCPFC, including historical catches. Environmental information: As noted above, Australian and New Zealand catch and effort data can be standardised by environmental variables, which are recorded in logbooks. Some tagging work can also record environmental variables directly. The migrations of the fish in relation to ontogenetic and environmental factors can also be inferred to some extent by the distribution of catches of fish of different size, sex, reproductive condition etc. This information is reviewed in the stock assessment. Overall, the team considered that there is a reasonable amount of information available in relation to this stock and fishery, such that SG80 is met. There are, however, no fishery-independent indices that can be used in the stock assessment; unlike the tuna, the tagging data are not suitable. On this basis, and given the significant uncertainties in species biology, SG100 is not met.		

b	**Guide post**	Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.
	Met?	Y	Y	N
	Justification	For the Australian harvest control rule, landings and effort are monitored with a high frequency and high degree of certainty, allowing the harvest strategy model to be run annually, in order to start the process of setting the TACC for the following year. For the non-ETBF fisheries, data are provided to WCPFC at varying levels of detail (operational by the EU and New Zealand as well as Australia, aggregated by the Asian nations). The key uncertainty in the WCPFC stock assessment is the growth model, which is currently being addressed by a CSIRO research project (Farley et al. 2014). On this basis, SG80 is met. Taking the Australian fishery and HCR alone, SG100 is met. However, taking the whole of the SW Pacific stock as managed by WCPFC, significant uncertainties remain in some key data sets that inform the WCPFC stock assessment – notably in relation to the basic biology of the species. Furthermore, the connectivity of the various (sub) populations remains somewhat unclear. Both these issues have impacts on the uncertainty of the stock assessment. Hence SG100 is not met, overall.		
c	**Guide post**		There is good information on all other fishery removals from the stock.	
	Met?		Y	
	Justification	All the key fisheries on the stock provide catch data to WCPFC, which is incorporated into the stock assessment. As far as SPC scientists are aware, there are no significant fisheries missing from the assessment, although historical data sets are more uncertain than recent data. Recreational catches of swordfish in Australia are not reported to be an issue for the assessment, according to AFMA.		
References		Farley et al. 2014		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation table 18 - PI 1.2.4

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**		The assessment is appropriate for the stock and for the harvest control rule.	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.
	Met?		Y	N
	Justification	SPC periodically carries out a full stock assessment on behalf of WCPFC – most recently in 2013. For AFMA, CSIRO runs the harvest strategy model annually – this compares standardised CPUE in the ETBF with reference points, and can be considered a partial or empirical stock assessment. These two assessments form the basic inputs into the harvest control rule. On this basis, SG80 is met. In relation to SG100, the Australian assessment is empirical, and in that sense takes into account the various uncertainties, although it does not try to model them. The WCPFC assessment is based on a full population model, which takes into account the details of various different fisheries (via standardisation of their CPUE trends) but has difficulty in relation to the biology of the species, which remains a key uncertainty. On this basis, SG100 is not met.		
b	**Guide post**	The assessment estimates stock status relative to reference points.		
	Met?	Y		
	Justification	The WCPFC estimates stock status in relation to MSY reference points and reference points relating to the situation in the absence of fishing (e.g. B_0, $B_{current,F=0}$). Full details are given in the main report and in the rationales for PIs 1.1.1 and 1.1.2. The Australian harvest strategy model compares standardised CPUE in relation to the period 1997-2001, which is considered to be a proxy for MEY. Details are likewise given in the main report and in the rationale for PI 1.1.2. SG60 is met.		
c	**Guide post**	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.
	Met?	Y	Y	Y

	Justification	The stock assessment attempts to reduce uncertainties and biases in input data sets (e.g. via stratification in space and time, and via standardisation using GLM). It also includes a detailed exploration of uncertainties in the model assumptions, via sensitivity analyses for various different model options (growth and mortality schedules, steepness, connectivity patterns and different treatment of the CPUE data set). The model uses a statistical framework to estimate states and parameters conditional on a suite of structural assumptions and the data. The model outputs the best (Maximum Posterior Density) point estimates, along with estimates of uncertainty for desired parameters. The most recent assessment emphasizes the uncertainty in point estimates conditional on a broad range of alternative fixed assumptions, rather than the parameter estimation uncertainty estimated conditional on individual models. As a consequence, the probabilistic stock status statements do not have the classical probabilistic interpretation, but are actually expected to provide a broader and more realistic representation of uncertainty than classical approaches. SG100 is met.		
d	**Guide post**			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			Y
	Justification	Exploration of alternative hypotheses via sensitivity analyses is considered above. The stock assessment has been updated progressively: structural changes in the most recent assessment (Davies et al. 2013) compared to the previous (Kolody et al. 2008) include the following: • Structure the model according to two connected regions, and relaxing assumptions about relative recruitment to each region; • Steepness fixed at 0.8 (but other values tested via sensitivity analysis); • Estimating selectivities for the main longline fisheries; • Allowing precision in model fitting to standardised CPUE indices to vary with time; • Addition of new data, including sampling data from New Zealand and several Pacific Island nations, a new standardised Taiwanese CPUE index and an index of relative abundance from Spanish CPUE Davies et al. (2013) made an impressive effort to evaluate a range of structural assumptions (and their interactions). In such a large and complex fishery it is inevitable that unresolved issues will remain (notably the growth/mortality schedule but also some other issues), and these issues remain a priority for consideration in future work. Overall, the team concluded that as issues arise in the assessment, the stock assessment explores and deals with them, and while the assessment is not perfect, nor probably ever will be, the exploration of alternative hypotheses and assumptions has been rigorous. SG100 is met.		
e	**Guide post**		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		Y	N

	Justification	The WCPFC stock assessment is carried out by SPC and reviewed by the Scientific Committee of WCPFC – this counts as internal review. Some WCPFC stock assessments have been externally reviewed, but not this one as far as we are aware. The Australian harvest strategy model was reviewed by Kolody et al. (2010). Because the WCPFC stock assessment has not been externally reviewed, SG100 is not met.
References		Davies et al. 2013; Kolody et al. 2010

OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	**N/A**

Appendix 1.1.4 Principle 2

Evaluation table 19 - PI 2.1.1

<table>
<tr><td colspan="2">PI 2.1.1</td><td colspan="3">The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guide post</td><td>Main retained species are likely to be within biologically based limits (if not, go to scoring issue c below).</td><td>Main retained species are highly likely to be within biologically based limits (if not, go to scoring issue c below).</td><td>There is a high degree of certainty that retained species are within biologically based limits and fluctuating around their target reference points.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">See Section 3.5.3 of the main report for more detail.

Based on logbook data submitted for the ETBF, bigeye tuna and striped marlin make up >5% of the total catch, and are therefore considered main retained species. Mahi mahi are also an important component of the Walker Seafoods production and so has been considered a main retained species. Opah, escolar and ray's bream were identified by the stakeholder group at the SICA as the highest risk retained species in the fishery. These species do not constitute more than a 5% in any year over the five-year data period. For this reason, they were not considered further. Note that the bait species (Illex argentinus and Nototodarus sloanii & N.gouldi) were also considered under this component but as the volume of these species also do not constitute more than 5% of the total catch, they are not considered as 'main'.

<u>Bigeye tuna (see also Section 3.5.3.1)</u>: according to the latest stock assessment (Harley et al., 2014), current catches exceed maximum sustainable yield (MSY), recent levels of fishing mortality exceed F_{MSY} and recent levels of spawning biomass are most likely at (based on 2008-11 average) or below (based on 2012) SB_{MSY} and the agreed WCPFC limit reference point. Bigeye tuna is therefore not likely to be within biologically based limits and is further addressed in scoring issue c.

<u>Striped marlin (see also Section 3.5.3.2)</u>: the latest stock assessment for striped marlin (Davies et al., 2012) estimates $F_{current}/F_{MSY}$ to be below 1 and overfishing is therefore not estimated to be occurring. Current total and spawning biomass are close to the associated MSY levels ($B_{current}/B_{MSY} = 0.96$ and $SB_{current}/SB_{MSY} = 1.09$), with a ~50% probability that spawner biomass is above/below the MSY level. The 2011 SB was estimated to be ~46% of the level in the absence of fishing, taking recent low recruitment into account. Based on the results, and the recent trend in spawning biomass, the stock assessment concluded that striped marlin is 'approaching an overfished state'. WCPFC does not define a limit reference point for this stock. In relation to the Australian reference points, the stock is estimated to be below the target but above the limit reference point (TTRAG, 2013c). This is an empirical reference point (based on standardised CPUE) and probability estimates are not given. The team concluded that, since the stock is estimated to be around the MSY level, and above the CHS limit reference point (although with an unknown probability), SG80 is met for striped marlin.

<u>Mahi mahi</u>: scored using the SICA (see Appendix 2. SICA tables with scores and justifications). SG80 is met.</td></tr>
</table>

		SG100 is not met because of the stock status of bigeye, as well as limited information on non-main retained species in some cases.		
b	**Guide post**			Target reference points are defined for retained species.
	Met?			N
	Justification	Bigeye has an agreed limit reference point at the WCPFC, and agreed targets and limits in the Australian CHS, but the former is not yet incorporated into management, while the latter are not being used for management purposes since the CHS is not currently being used for bigeye, for reasons explained in the main report. For bigeye and striped marlin MSY-based reference points are used in the stock assessments; however they have not been formally adopted as part of a regional management strategy for these species either. In addition, several of the retained species have no reference points (e.g. mahi mahi, opah, escolar and ray's bream). This scoring issue is therefore not met.		
c	**Guide post**	If main retained species are outside the limits there are measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.	If main retained species are outside the limits there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding.	
	Met?	Y	Y	
	Justification	Only bigeye is considered outside of its biologically based limits and so is the only species to be discussed in this scoring issue. Bigeye tuna: Under WCPFC CMM-2013-01, Australia has a catch allocation of 2000 tonnes. AFMA determined a TACC of 1,056 tonnes in the ETBF harvest strategy. Actual ETBF 2012/13 quota year catch: 553t (20.7% higher than 458t catch in 2011/12 quota year). The ETBF catch for region 5 was 17.5% of this total and has averaged 20.3% over the past 5 years (based on logbook data supplied by SPC). ETBF catch was 0.4% of WCPFC catch in 2012/13 (150,000 tonnes). The team therefore concluded that the fishery does not hinder recovery and rebuilding of the stock as the fishery's catch is negligible. SG80 is therefore met.		
d	**Guide post**	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.		
	Met?	Y		

	Justification	Both bigeye and striped marlin have regional stock assessments available (Harley et al., 2014; Davies et al., 2013 respectively). Using the RBF, mahi mahi scored 80, opah, escolar and ray's bream all scored 100, suggesting that that is not evidence that the fishery is causing the fishery to be outside biologically-based limits. In the ERA, opah scored 'medium risk' because although it is a vulnerable species it has low overlap with the fishery, while escolar, ray's bream and mahi mahi scored 'low risk'. SG60 is therefore met.
References		Davies et al. (2012); TTRAG (2013c); Harley et al. (2014)
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		**N/A**

Evaluation table 20 - PI 2.1.2

PI 2.1.2		**There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing retained species.
	Met?	Y	Y	Y
	Justification	Also see Section 3.5.3. Bigeye tuna (see 3.5.3.1): at a regional level, the WCPFC management strategy is not operating effectively as the 2014 stock assessment is testimony (B estimated at or below Blim). However, the Australian fishery is constrained such that it is not hindering recovery and rebuilding, based on a fixed TACC which accounts for ~0.7% of the total catch on the stock (WCPFC catch 2013: 150,000 t, ETBF TACC: 1056 t). The Australian system therefore has a partial strategy in place and SG80 is met. Striped marlin: As for bigeye, the ETBF striped marlin catch is managed using a TACC, as described in Sections 3.4.6 and 3.5.3.2. At present, Australia is still using the striped marlin harvest strategy to set TACCs on an annual basis but TTRAG (2013c) have limited confidence on how effective the harvest strategy is for managing fishing mortality within region 5 at current levels, since ETBF catch has dropped below 50% of the total region 5 catch in recent years (2012 – 41.5%; average 47% over last 5 years). The question here, however, is whether the fishery is hindering the recovery and rebuilding of the stock. Considering that the TACC is set according to a precautionary decision rule based on standardised CPUE for the fishery (a data set that is also incorporated into the stock assessment), the team considered that while the Australian harvest strategy may have limited utility in controlling the overall exploitation rate on the		

		stock, it was nevertheless able to maintain the exploitation rate of the ETBF such that it is not hindering recovery. There is therefore i) a strategy in place for this species (although it should be considered only a partial strategy because it only acts on part of the total catch), which ii) ensures that that the fishery is not hindering the recovery of the stock. SG80 is therefore met. Mahi mahi: TTRAG (2013b) reviewed the catch data of mahi mahi to investigate if the fishery was having a significant impact on non-target species. As part of this, TTRAG analysed nominal CPUE in 2013 with the conclusion that there was no evidence that the ETBF is impacting the stock at present. Based on this, it was not deemed necessary to put measures in place. Subsequent to this, however, AFMA have set in motion a process which will incorporate mahi mahi into the harvest strategy process. AFMA are in the process of standardising CPUE for mahi mahi, and evaluating how the harvest strategy can best be applied to this species (S. Auld, AFMA, pers. comm.). On this basis, the team considered that a partial strategy is in place, which is appropriate to the likely impact of the ETBF on the stock, and hence SG80 is met. Note that there is also a general strategy for the management of all retained species (non-target retained and discarded) in the form of the ERA, which aims to identify which of these species are likely to be a high risk from the fishery and hence to focus assessment and management measures accordingly. This process would identify any cases where the fishery is posing a risk. Strategies for managing all retained species include the development of a management plan of which quota species are specifically included and the implementation of catch limits. The fishery must also re-apply with a full strategic assessment to the Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) to assess the management arrangements under the EPBC Act when a major change is made to the management of the fishery. This was completed most recently in 2014 but also in 2010. SG100 is met.		
b	**Guide post**	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Y	Y	N
	Justification	The two species where a partial strategy is required at the SG80 level are i) bigeye and ii) striped marlin. Bigeye tuna: Based on the constraints placed on Australian catches by the TACC (set at 1,056 tonnes), impact on the regional stock by this fishery is negligible and are well below the WCPFC allocation for Australia under CMM-2013-01 (2000 tonnes). ETBF catch was 0.4% of WCPFC catch in 2012/13 (150,000 tonnes). It is considered on that basis that the partial strategy will work. SG80 is met. Striped marlin: Using Australian swordfish measures as an example of a similar fishery species; the strategy is considered likely to work in constraining Australian catches at a sustainable level, although it may not be effective for the management of the whole stock (but this is not the question here). SG80 is therefore met. Mahi mahi: There is an objective basis for considering that the interactions of the ETBF with mahi mahi (which makes up <5% of the total catch) is not likely to have any population-level impact – i.e. the low level of catches, as well as the life history of mahi mahi (i.e. fast growth, short life span and early maturity). Nevertheless, AFMA are working currently on incorporating mahi mahi into the harvest		

		strategy process. The team considered that on this basis SG80 is met. As noted above, there is a general strategy for bycatch management, which is based on information about the fishery and species (the ERA process). It is currently, however, somewhat out-of-date, although an updating is pending. On this basis, the team felt that there was not 'a high degree of confidence' that the strategy will work.		
c	**Guide post**		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	N
	Justification	Bigeye tuna: There is evidence that the partial strategy is being implemented successfully. This is demonstrated by the allocation of the TACC, which is not exceeded (see Table 2 of the main report). SG80 is met. Striped marlin: As with bigeye tuna above – there is evidence that the harvest strategy is run, TACC is set and there is good monitoring of catch through logbook and observer records. The TACC has reduced when required according to harvest strategy and scientific assessment, which caused the RBCC to be reduced. SG80 is therefore met. Mahi mahi: The 'strategy' of low catches of mahi mahi is implemented (see Table 21 of the main report). AFMA are working on incorporating mahi mahi into the harvest strategy. SG80 is met. Species assessed through the ERA process, resulting with a high risk rating (to the effect of fishing), are placed onto a priority list. The AFMA Ecological Risk Management Strategy (ERM) for the ETBF then outlines the management strategy for mitigating environmental impacts of those species identified, with the aim to reduce the effects brought about by fishing. No targeted retained species have been evaluated as high risk and therefore no further management action for them is required through the ERM process. The team considered that this process meets the requirements of SG80. However, the ERA is now quite out-of-date, and while the TTRAG may review nominal catch and effort data for species such as mahi mahi, this is not a particularly reliable indicator of stock trends to trigger management action. SG100 is not met for these species (including mahi mahi).		
d	**Guide post**			There is some evidence that the strategy is achieving its overall objective.
	Met?			N
	Justification	Through the ERA process, impacts of the fishery on species interacting with the fishery is reviewed. At present there are no retained teleost species of high risk of overfishing determined in the fishery (AFMA, 2014a). Harvest strategies in use for bigeye tuna and striped marlin are judged as effective. The team considered, however ERA is current outdated and RAG only reviews nominal catch and effort trends on other retained bycatch species. For mahi mahi, the harvest strategy is not yet in place, so SG100 is not met for this species.		

e	**Guide post**	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Y	Y	Y
	Justification	Under clause 23 of the ETBF longline boat SFR conditions – “The holder must not carry or possess any shark (Class Chondricthyes) dorsal, pectoral, caudal, pelvic or anal fins on board the boat nominated to this concession that are not attached to the shark’s carcass.” All sharks are therefore landed with fins naturally attached and SG80 is met as per CB3.6.5.of the MSC CR v1.3. Only minor compliance issues in the ETBF were reported in 2013/14 (such as failure to accurately fill out logbooks). Illegal shark finning was not recorded (AFMA, 2014e). SG100 is met.		
References		Davies et al. (2012); CMM-2013-01; TTRAG (2013b); TTRAG (2013c); ETBF longline boat SFR conditions; AFMA (2014a); AFMA (2014e)		
OVERALL PERFORMANCE INDICATOR SCORE:			**80**	
CONDITION NUMBER (if relevant):			**N/A**	

Evaluation table 21 - PI 2.1.3

PI 2.1.3		**Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Qualitative information is available on the amount of main retained species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery.	Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.
	Met?	Y	Y	N
	Justification	Good catch data are available on all species retained by the fishery. This is provided through logbook records, observer reports and catch disposal records (CDRs) record those species which are discarded. A CSIRO study in 2002 (Bravington et al., 2002) investigated possible designs for the observer programme and estimated each design's likely precision for five representative species or species groups (turtles - identified to family, not to species, black marlin (*Makaira indica*), blue marlin (*Makaira mazara*), dolphinfish (*Coryphaena hippurus*), and blue shark (*Prionace glauca*). The conclusion was that long-term trend data were further needed to fully evaluate precision. Results from the study showed that even coverage at 5.1% of sets observed (proportional coverage) provided very precise bycatch estimates for commonly caught species (coefficient of variation (CV) for blue sharks was approximately seven percent). These are verified through AFMA's process. There are stock assessments available for the main retained species (bigeye tuna and striped marlin); however this is not the case for all (non-main) retained species. For bait species, catch is monitored throughout the fishing season. Invoices of bait purchased are maintained by the fishery, allowing a total volume of bait used to be determined/monitored. The team considered that qualitative information and quantitative information is available on the amount of main retained species taken by the fishery and that SG80 is met. The population status of all retained species, however, is not monitored, although risks are assessed via the ERA process. SG100 is therefore not met.		
b	**Guide post**	Information is adequate to qualitatively assess outcome status with respect to biologically based limits.	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.
	Met?	Y	Y	N

	Justification	Bigeye tuna and striped marlin: The stock assessments (Harley et al.; 2014, Davies et al.; 2012) for these species allows for the quantitative outcome status to be estimated, although perhaps not with 'a high degree of certainty', given that there remain significant uncertainties in the stock assessments – the bigeye assessment is probably the more robust of the two, and the authors conclude that the general conclusions of the assessment are robust. However, SG80 is met for both species. Quantitative estimates (such as stock assessments) of the outcome status of all retained species cannot be made however so SG100 is not met. This scoring issue has not been addressed for mahi mahi and other retained species because a SICA was conducted for these species in PI 2.1.1 (as per CB3.7.2.2. of the CRs, v1.3).		
c	**Guide post**	Information is adequate to support measures to manage main retained species.	Information is adequate to support a partial strategy to manage main retained species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	Y	Y	N
	Justification	For all main retained species, the available information (ERA process) is sufficient to determine whether the respective stocks are likely to be within biologically based limits and therefore whether or not management action is required. SG60 is therefore met. There is not a partial strategy in place for mahi mahi currently, but sufficient information is available (e.g. via ERAs) to support a partial strategy should one be deemed necessary. SG80 is met on this basis. There is not, however, quantitative information on all retained species allowing management with 'a high degree of certainty'. SG100 is not met.		
d	**Guide post**		Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator score or the operation of the fishery or the effectiveness of the strategy)	Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.
	Met?		Y	N
	Justification	For both bigeye tuna and striped marlin, sufficient data are collected for stock assessments which would allow for the detection of any risk increases. Mahi mahi, opah, escolar, ray's bream and other retained species are evaluated periodically via the ERA process, and the TTRAG have sufficient operational level data to be able to monitor standardised CPUE; they would therefore would have a method to detect any increase in risk level to the species. SG80 is met. Enough information is not available on the populations of all retained species to warrant the SG100 score.		
References		Bravington et al. 2002; Davies et al.; 2012; Harley et al.; 2014		

OVERALL PERFORMANCE INDICATOR SCORE:	**80**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation table 22 - PI 2.2.1

PI 2.2.1		**The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Main bycatch species are likely to be within biologically based limits (if not, go to scoring issue b below).	Main bycatch species are highly likely to be within biologically based limits (if not, go to scoring issue b below).	There is a high degree of certainty that bycatch species are within biologically based limits.
	Met?	Y	Y	Scored using SICA
	Justification	No 'main' bycatch species were identified in the observer data supplied to the team. Following a precautionary approach, the RBF was used for this PI. A SICA was conducted on the 12th August 2014 for two species deemed by the stakeholders as being of highest risk. These were snake mackerel (*Gempylus serpens*) and lancetfish (*Alepisaurus ferox* and *A.brevirostris*). The outcome for both of these species translates to an MSC score of 100. See Appendix 2. SICA tables with scores and justifications.		
b	**Guide post**	If main bycatch species are outside biologically based limits there are mitigation measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding.	If main bycatch species are outside biologically based limits there is a partial strategy of demonstrably effective mitigation measures in place such that the fishery does not hinder recovery and rebuilding.	
	Met?	Y	Y	
	Justification	Both species identified as bycatch species in the SICA process were awarded scores of 100, SG80 is therefore met by default.		
c	**Guide post**	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the bycatch species to be outside biologically based limits or hindering recovery.		
	Met?	Y		

	Justification	The regional 2005 Resolution on Non-Target Fish Species (Resolution-2005-03) encourages CCMs to “avoid to the extent practicable, the capture of all non-target fish species that are not to be retained. Any such non-target fish species that are not to be retained, shall, to the extent practicable, be promptly released to the water unharmed”. Although rather generic and non-binding, this measure is expected to result in the fishery not causing bycatch species to be outside biologically based limits. Nationally, bycatch species are covered by the bycatch and discarding workplan. The ERA process monitors the risk of fishing on species in the fishery (AFMA, 2014a). In addition, TTRAG also review bycatch data, for example discard rates and CPUEs. Management action would be taken as necessary. SG60 is therefore met.	
References		Appendix 2. SICA tables with scores and justifications; AFMA, 2014a	
OVERALL PERFORMANCE INDICATOR SCORE:			**SICA score = 100**
CONDITION NUMBER (if relevant):			**N/A**

Evaluation table 23 - PI 2.2.2

PI 2.2.2		**There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	There are measures in place, if necessary, that are expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing and minimizing bycatch.
	Met?	Y	Y	N
	Justification	Based on discard rates in data submitted to AFMA from logbooks, there are no ‘main’ discard species. As discussed in PI 2.2.1, lancetfish and snake mackerel were considered by the stakeholders to be of highest risk in the fishery. According to logbook records, 53kg of lancetfish and 3kg of snake mackerel discarded and 11 lancetfish and 153 snake mackerel (individual fish) were observed to be discarded in 2012. These species scored 100 in outcome, the term ‘if necessary’ is invoked here and SG60 and 80 are met by default. However, this management strategy focuses on managing and reducing the impact of the fishery on ‘high risk’ species such as turtles and seabirds but not all bycatch species (i.e. teleosts). SG100 is thus not met.		

b	**Guide post**	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Y	Y	N
	Justification	A partial strategy is not required (see scoring issue a). SG80 is met. However, this management strategy focuses on managing and reducing the impact of the fishery on 'high risk' species such as turtles and seabirds but not all bycatch species (i.e. teleosts). SG100 is thus not met.		
c	**Guide post**		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?	Y	Y	N
	Justification	A partial strategy is not required (see scoring issue a). SG80 is met. However, this management strategy focuses on managing and reducing the impact of the fishery on 'high risk' species such as turtles and seabirds but not all bycatch species (i.e. teleosts). SG100 is thus not met.		
d	**Guide post**			There is some evidence that the strategy is achieving its overall objective.
	Met?			N
	Justification	There is no overall strategy to manage all bycatch species (see scoring issue a) SG100 is not met.		
References		Bravington et al.; 2002; 2005 Resolution on Non-Target Fish Species (Resolution-2005-03); AFMA, 2014c		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation table 24 - PI 2.2.3

<table>
<tr><td colspan="2">PI 2.2.3</td><td colspan="3">Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guide post</td><td>Qualitative information is available on the amount of main bycatch species taken by the fishery.</td><td>Qualitative information and some quantitative information are available on the amount of main bycatch species taken by the fishery.</td><td>Accurate and verifiable information is available on the catch of all bycatch species and the consequences for the status of affected populations.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">None of the bycatch species could be qualified as ‘main’. Qualitative and some quantitative information on discards is available for the fishery, provided in both logbooks and observer reports. SG80 is therefore met.

While bycatch may be under-reported in logbooks, observer coverage is currently operating at 6.2% (most recent observer coverage rate available was for 2012 – AFMA, 2014a). Results from the study conducted by Bravington et al. (2002) showed that even coverage at 5.1% of sets observed (proportional coverage) provided very precise bycatch estimates for commonly caught species. However, for low-level interaction species such as turtles, this 5.1% coverage estimated the CV to be between 30 and 35%. On this basis, information may not be fully accurate or fully verified and so SG100 is not met.</td></tr>
<tr><td rowspan="3">b</td><td>Guide post</td><td>Information is adequate to broadly understand outcome status with respect to biologically based limits</td><td>Information is sufficient to estimate outcome status with respect to biologically based limits.</td><td>Information is sufficient to quantitatively estimate outcome status with respect to biologically based limits with a high degree of certainty.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">As no main bycatch species were identified, the scoring issue meets SG80 by default</td></tr>
<tr><td rowspan="3">c</td><td>Guide post</td><td>Information is adequate to support measures to manage bycatch.</td><td>Information is adequate to support a partial strategy to manage main bycatch species.</td><td>Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">As b) above, SG80 is met.</td></tr>
</table>

d	**Guide post**		Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectively of the strategy).	Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.
	Met?		Y	N
	Justification	As b) above, SG80 is met.		
References		AFMA, 2014a		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation table 25 - PI 2.3.1

PI 2.3.1		The fishery meets national and international requirements for the protection of ETP species The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Known effects of the fishery are likely to be within limits of national and international requirements for protection of ETP species.	The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species.	There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species.
	Met?	Y	Y	N
	Justification	Seabirds: no observed interactions between Walker Seafood vessels or within the entire ETBF since 2010. The 2008 ERA Level 2 analysis originally listed 23 species of seabird as 'high-risk' of being impacted by fishing operations in the ETBF. Through further analysis, the risk classifications of these taxa were downgraded to 'medium' and 'low' risk based. Management measures enacted through the Threat Abatement Plan (TAP) (Commonwealth of Australia, 2014) were successful enough to reduce interactions with the fishery below the limit and warrant the downgrading of risk to seabirds. For the ETBF, the bycatch rate of seabirds must remain below 0.05 seabirds per 1000 hooks. In both areas (between 23ºN and 30ºS and south of 30ºS), seabird encounters with longline gear in the fishery have been well within interaction limits for the last six years. On this basis, there is a high degree of certainty that the effects of the fishery are within limits of national and international requirements. SG100 is therefore met. Turtles: The interaction rates exceeded the minimal levels of interactions within the ETBF for green turtles in 2011 and leatherback turtles in 2010 – 2013 (WCPFC, 2013b, WCPFC 2014b). These levels were set in 2009 in the ETBF Sea Turtle Mitigation Plan (Australia Government, 2009) and took effect on the 1st January 2010. In response to surpassing biologically safe limits, the mitigation plan was revoked by AFMA and further management measures enacted. These included large circle hooks to be used on shallow sets (if less than 8 hooks per float are used) to significantly reduce longline catches and improve survival rates. Although no data are currently available for the fishery, demonstrating the reduction in turtle bycatch as a result of the implementation of circle hooks in the fishery, evidence for other fisheries strongly suggests this measure will be effective in the ETBF (Watson et al, 2005; Gilman, 2006; Gilman et al., 2007). It also became compulsory to keep line-cutters and de-hookers to aid the safe release of live turtles, with a minimal amount of stress to the animal (AFMA, 2014b). In the ERA (2008) completed by AFMA, only the leatherback turtle remained as a 'high risk' species due to its low productivity and uncertain extent of its full geographical range. In 2013, catch rates of turtles in ETBF logbooks were under WCPFC and AFMA minimal levels. Trigger interaction rates for both WCPFC and AFMA are the following: for green turtles: 0.0048 interactions per 1000 hooks. For loggerhead, leatherbacks and other species: 0.0040 interactions per 1000 hooks. SG80 is met but not SG100 due to the need for further mitigation actions. Marine mammals: for cetaceans, depredation is the main issue. The ETBF Ecological Risk Assessment (AFMA, 2012a) also notes that it is a rare occurrence for animals to experience "immediate mortality due to these interactions". Since 2012, no interactions have been observed in the fishery. Line cutters and dehookers are mandatory management measures, which ensure their safe		

release. Two species of toothed whale (*Pseudorca crassidens* and *Globicephala macrorhynchos*) remained high risk in the ERA – this was attributed to the species having high susceptibility despite observed interactions being zero with a negligible level of cryptic mortality (AFMA, 2008). For pinnipeds, only one seal interacted with the fishery in 2012 and it was released safely. On this basis, it is highly likely that the effects of the fishery are within limits of national and international requirements. SG80 is met but the high-risk ERA rankings of the toothed whales prevent SG100 from being awarded.

<u>Elasmobranchs</u>: the ETP elasmobranchs of concern to this fishery are the short-finned mako (*Isurus oxyrinchus*), long-finned mako (*I.paucus*), porbeagle shark (*Lamna nasus*), silky shark (*Carcharhinus falciformis*), and oceanic whitetip shark (*C.longimanus*). The average shark catch rate in the ETBF 2007-2010 is 1.4 per 1000 hooks (AFMA, 2012a). This includes both ETP and non-ETP shark species.

<u>ETBF logbook landing records for ETP elasmobranch species in ETBF (number of fish retained)</u>

Species	2009	2010	2011	2012	2013	Most recent estimate of individuals captured at the stock level
Silky – *C.falciformis*	12	0	0	5	49	238,500 – 633,800 ind. (Rice and Harley, 2013)
Oceanic whitetip – *C.longimanus*	129	85	66	82	106	53,700 – 205,800 ind. (Rice and Harley, 2012b)
Shortfin mako – *I.oxyrinchus*	2815 (468 discarded)	1907 (326 discarded)	1643 (355 discarded)	2060 (400 discarded)	1514	No estimate available at stock level
Longfin mako – *I.paucus*	4 (1 discarded)	6 (1 discarded)	2 (1 discarded)	2 (3 discarded)	2	No estimate available at stock level
Porbeagle – *L.nasus*	2 (1 discarded)	4 (0 discarded)	5 (1 discarded)	4 (2 discarded)	12	No estimate available at stock level

*for silky and oceanic whitetips, number of individuals retained were prior to their respective WCPFC CMMs being implemented at the national level.

From the above table, it is apparent that the number of oceanic whitetips and silky sharks caught by the ETBF fishery is a very small portion of all those taken at the stock level. It is therefore unlikely to have a stock-level effect. SG80 is therefore met for those two stock-assessed species.

AFMA (2008) ERA lists shortfin mako as 'medium risk'. Tag recapture suggests regional separation between those in the south Pacific and north (Sippel et al., 2011). It has a mid-range intrinsic rebound potential (r^2M = 0.04–0.07), meaning it is relatively fast-growing early maturing (Smith et al., 1998). Given that shortfin mako's ERA rating and every mitigation measure is being used by the fishery – there is evidence from the Hawaiian tuna longline fishery that these measures are effective in reducing shark catch (Walsh et al.; 2009) - the team believe for shortfin mako and therefore for ETP sharks that the effects of the fishery are highly likely to be within limits of national and international requirements for protection of ETP species. SG80 is met.

		With regard to longfin makos and porbeagles, logbook report such low numbers in this fishery of these species that it is highly likely that the effects of the fishery are within national and international limits. Without quantitative stock information for shortfin and longfin mako and porbeagle in the south Pacific, SG100 cannot be awarded.		
b	**Guidepost**	Known direct effects are unlikely to create unacceptable impacts to ETP species.	Direct effects are highly unlikely to create unacceptable impacts to ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the fishery on ETP species.
	Met?	Y	N	N
	Justification	Seabirds: Current catch rates for the fishery is well below trigger limits designated under the TAP (Commonwealth of Australia, 2014) for at least four years. The 23 species of seabirds analysed in the ERA (2008) evaluated them as medium risk. Observer coverage is potentially not representative of the fishery enough for rarely caught species such as seabirds. It was therefore concluded by the team that impacts are highly unlikely to create unacceptable impacts but not with a high degree of certainty. SG80 is therefore met but not SG100. Marine mammals: Recorded interactions show live release of both cetaceans and pinnipeds and AFMA (2008) reports negligible cryptic mortality levels. Based on this, there is a high degree of confidence that there are no significant detrimental direct effects to marine mammals in this fishery. SG80 is met but the high-risk ERA rankings of the toothed whales prevent SG100 from being awarded. Turtles: Through the introduction of circle hooks in the fishery, anecodotal evidence from other pelagic longline fisheries suggests that turtle bycatch will be significantly reduced (Watson et al, 2005; Gilman, 2006; Gilman et al. 2007). Bravington et al. (2002) noted that for low-level interaction species such as turtles, 5.1% coverage of sets observed provided annual estimates of turtle bycatch precise to ±70% (a 95% confidence interval). SG60 is therefore met. SG80 cannot be awarded as no fishery dependent data were available to determine direct effects in this fishery. Elasmobranchs: The main elasmobranch species of concern is shortfin mako (see Section 3.5.5.3 of the main report). As discussed in the main report, there is no evidence of any trends in catch rates of shortfin mako over the last 15 years, and they are still reported (e.g. by recreational fishers) to be ‘abundant’. On this basis, and given that effort in the ETBF has declined by a factor of ~5 since 2003, the team considered that the known direct effects of the fishery are unlikely to be having an unacceptable impact on shortfin mako. Catch of other shark species is negligible (see Table 24 of the main report). A comparison of mako shark catch reported in ETBF logbooks between 2009 and 2011 shows positive results with a decrease 37% and between 2010 and 2011, a further 13% decrease in mako and porbeagle sharks (from logbook data) after operators were encouraged to release live sharks (AFMA, 2012b). The prohibition of wire traces has also led to a 30% reduction in shark catch (AFMA, 2012a). The team concluded that for species such as silky and oceanic whitetips, the fishery’s impact on the overall stock is not unacceptable (see table in 2.3.1a above). SG80 is not, however, met, because a stock assessment for shortfin mako in the south Pacific (Bruce et al.; 2013) is not available at present and so we cannot determine the impact the fishery has at the population level. SG60 is met but SG80 is not met.		

c	Guidepost		Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.	There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.
	Met?		Y	N
	Justification	ERA (Level 1 species) considers a variety of impacts from hazard analysis and takes the highest risk activity (which is fishing). Any interactions with the gear for marine mammals must be recorded, i.e. collisions, disturbance etc. With sharks, no evidence could be found to suggest shark mortality as a result of biting off hooks. Observer data indicate that on most occasions ETP species are released alive but with uncertainty in the probability of post-release survival. While survival rates of sharks in particular are difficult to estimate and while it is clear that some practices can be improved on (see PI 2.3.2), it is highly unlikely that this fishery creates unacceptable impacts on the species concerned. SG80 is therefore met. However, as previously stated, because the effects of fishery are not accurately quantified, there is no high degree of confidence in this statement. SG100 is therefore not met.		
References		Smith et al., 1998; AFMA, 2008; Australia Government, 2009; Walsh et al.; 2009; Sippel et al., 2011; AFMA, 2012a; Rice & Harley, 2012a; Rice & Harley, 2012b; Bruce et al., 2013; Harley et al., 2013; AFMA, 2014b; Commonwealth of Australia, 2014, WCPFC, 2013b; WCPFC 2014b		
OVERALL PERFORMANCE INDICATOR SCORE:				75
CONDITION NUMBER (if relevant):				8

Evaluation table 26 - PI 2.3.2

<table>
<tr><td colspan="2">PI 2.3.2</td><td colspan="3">The fishery has in place precautionary management strategies designed to:
Meet national and international requirements;
Ensure the fishery does not pose a risk of serious harm to ETP species;
Ensure the fishery does not hinder recovery of ETP species; and
Minimise mortality of ETP species.</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guide post</td><td>There are measures in place that minimise mortality of ETP species, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.</td><td>There is a strategy in place for managing the fishery's impact on ETP species, including measures to minimise mortality, which is designed to be highly likely to achieve national and international requirements for the protection of ETP species.</td><td>There is a comprehensive strategy in place for managing the fishery's impact on ETP species, including measures to minimise mortality, which is designed to achieve above national and international requirements for the protection of ETP species.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">AFMA are required to complete a strategic assessment of the fishery every year to ensure ecological sustainability in order to gain export approval by SEWPAC under Wildlife Trade Operation (AFMA, 2014a). This provides transparency as other organisations (like NGOs) may appeal against the fishery's continuation to operate. In addition, the ERM/ERA process, as discussed earlier, considers a variety of impacts from hazard analysis and takes the highest-risk species into further analyses and provides an overarching strategy. The ATB bycatch and discard workplan (AFMA, 2014c) also has specific objectives to address reduction of bycatch in ETP species.

<u>Turtles</u>: WCPFC has issued measures under CMM-2008-03, on the conservation and management of sea turtles, requiring the implementation of the FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations and to ensure the safe handling of all captured sea turtles, in order to improve their survival. A turtle mitigation plan was put in place (Australia Government, 2009) in conjunction with an earlier turtle recovery plan (Environment Australia, 2003). These constitute a comprehensive management strategy for turtles as it operated on a trigger system, i.e. when the level of catch exceeded minimal levels, the mitigation plan was revoked by AFMA and further management measures were enacted. These included large circle hooks to be used on shallow sets (if less than 8 hooks per float are used) to significantly reduce longline catches and improve survival rates. It also became compulsory to keep line-cutters and de-hookers to aid the safe release of live turtles, with a minimal amount of stress to the animal (AFMA, 2014b). SG100 is therefore met.

<u>Seabirds</u>: In compliance with the WCPFC CMM for seabirds, the ETBF set the following management measures as mandatory in 2013 (WCPFC, 2013b): at least one assembled tori line on board; vessels carry either 1000 weighted swivels each weighing at least 60 g or 1000 weights each weighting at least 40 g and the ban of offal discharge while setting or whilst hauling. There is also a Threat Abatement Plan (TAP) (Commonwealth of Australia, 2014) for the incidental catch, or bycatch of seabirds during oceanic longline fishing operations is in place. The TAP is legislated through the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The TAP applies to all fisheries under the Commonwealth jurisdiction and meets the requirements of a National Plan of Action (NPOA).</td></tr>
</table>

		In addition to the TAP, a recovery plan for albatross and giant petrels was implemented in 2001, as a recognition of the need to develop a conservation strategy for 19 species of albatross and two species of giant petrel, most of which are listed under the EPBC Act, 1999 (DSEWPAC, 2011). These constitute comprehensive strategies for the managing of fishery impacts on seabirds. SG100 is therefore met. <u>Marine mammals</u>: At the regional level, there are no CMMs addressing marine mammals in longline fisheries. As with all Australian ETP species, interactions must be recorded in vessel logbooks, those records are submitted to AFMA, and then subsequently to the Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) at three-month intervals (AFMA, 2012a). Consistent with the mitigation measures for sea turtles, it is compulsory to carry line cutters and de-hookers onboard to help safely release hooked or entangled cetaceans. Operators in the ATBF are also encouraged to trial marine mammal bycatch mitigation devices such as tuna-guards that have been developed by the Australian Antarctic Division. Recovery plans were also developed for blue, fin, sei, humpback and southern right whales for 2005 – 2010. These were due to undergo review in 2010, but as yet, no updated plan is available. Marine mammals are also specifically addressed in the ETBF Management Plan (AFMA, 2010a): "all reasonable steps are taken to minimise interaction with sea birds, marine reptiles, marine mammals". The team considered this requirement to constitute a partial strategy and sufficient for SG80 to be met but not SG100. <u>Elasmobranchs</u>: Management measures brought into the ETBF include a bycatch limit 20 sharks per trip (although must be balanced by 20 quota species) and a ban on wire traces. Porbeagle, shortfin mako, longfin mako sharks caught alive must be released with only dead sharks retained. The prohibition of wire traces has led to a 30% reduction in shark catch (AFMA, 2012a). Management measures brought into the ETBF include a bycatch limit of 20 sharks per trip (which must be balanced by 20 individuals of one or more quota species) and a ban on wire traces. Level 3 risk analysis on four species of ETP shark led to the downgrading of 'high risk' ETP shark species to medium, due to the ban on wire traces having reduced gear selectivity for catching sharks. Longfin mako was the only ETP shark species to remain high risk and this was due to insufficient population data (AFMA, 2008). Mandatory measures for turtles such as the line cutters and dehookers also aid shark bycatch mitigation. CSIRO and ABARES developed identification guides (Patterson and Tudson, 2009) and shark handling training has also been included in the fishery to aid skipper and crew awareness (AFMA, 2012a). Porbeagle, shortfin mako, longfin mako sharks caught alive must be released with only dead sharks retained. A comparison of mako shark catch reported in ETBF logbooks between 2009 and 2011 shows positive results with a decrease of 37% in mako and porbeagle sharks (from logbook data) after operators were encouraged to release live sharks (AFMA, 2012b). The prohibition of wire traces has led to a 30% reduction in shark catch (AFMA, 2012a). The ERA process in place at AFMA (2014a) provides a strategy to ascertain those species at highest risk to the fishery and whether further management measures are further needed in addition to those put in place under the National Plan of Action for the conservation and management of sharks (2012) (see section 3.5.5.3). The team concluded that a strategy was in place for elasmobranchs. SG80 is therefore met. Given the concerns that remain about bycatch of shortfin mako, however, SG100 is not met.		
b	**Guide post**	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is an objective basis for confidence that the strategy will work, based on information directly about the fishery and/or the species involved.	The strategy is mainly based on information directly about the fishery and/or species involved, and a quantitative analysis supports high confidence that the strategy will work.

	Met?	Y	Y	N
	Justification	The ERA/ERM overarching system in place for the fishery provides an objective basis for confidence that the management strategies in place are working. The process has highlighted problem areas/species in the fishery in a qualitative/semi-quantitative way, which in turn has directed management actions. The process has further provided quantitative analysis for species which came out high risk in ERA (Level 3). SG80 is therefore met. Except for seabirds which meet the SG100 criteria, the fishery does not have full quantitative analysis to support the strategies in place (for example lack of trigger points and stock assessment for shortfin mako and recovery rates of turtles are difficult to measure due to the use of historical data which is likely to be undereported) and so a high level of confidence cannot be placed on this. SG100 is therefore not met.		
c	**Guide post**		There is evidence that the strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	Y
	Justification	As above, there are management strategies in place for all ETP species, including sharks. Observer coverage is thought to be representative of what is going on in the fishery (Bravington et al., 2002) and a national compliance and enforcement programme is in place. High compliance has been found in the ETBF (AFMA, 2014b) which random complete vessel and port inspections (During 2013-14, fisheries officers conducted 166 boat inspections and 84 fish receiver inspections in various ports across Australia; AFMA, 2014b). In accordance with the objectives in the AFMA National Compliance and Enforcement Policy (the Policy) AFMA has adopted a risk-based compliance and enforcement programme for 2013-14. The team considered that the strategy is being implemented successfully, meeting SG80. Clear evidence is provided through accurate reporting in logbooks of ETP species – SG100 is therefore met.		
d	**Guide post**			There is evidence that the strategy is achieving its objective.
	Met?			Y

	Justification	Seabirds and marine mammals: The available evidence (logbooks and observer reports) does not suggest that either seabirds or marine mammals are an issue in this fishery. Where possible, the animals are released alive. The team considered this to be clear evidence that the respective strategies were being implemented successfully. SG100 is therefore met. Turtles: Population recovery is difficult to determine due to long life histories however there is evidence from other similar fisheries (US Atlantic swordfish and US Hawaii longline fisheries) that the introduction of management measures such as circle hooks are effective in reducing the turtle bycatch rates significantly (Gilman et al., 2006). SG100 is met. Elasmobranchs: As concluded in scoring issue a, a strategy is in place for elasmobranchs, provided through the ERA process and NPOA (2012). The prohibition of wire traces has led to a 30% reduction in shark catch (AFMA, 2012a) and a comparison of mako shark catch reported in ETBF logbooks between 2009 and 2011 shows positive results with a decrease 37% and between 2010 and 2011. A further 13% decrease in mako and porbeagle sharks (from logbook data) was seen after operators were encouraged to release live sharks (AFMA, 2012b). These reductions indicate that the strategy in place is achieving its objective. SG100 is met.
References		Bravington et al.; 2002; Gilman et al; 2006; DSEWPAC, 2011; AFMA, 2012a; AFMA, 2014a, AFMA, 2014b; Commonwealth of Australia, 2014; NPOA, 2012; Patterson and Tudson, 2009.
OVERALL PERFORMANCE INDICATOR SCORE:		**90**
CONDITION NUMBER (if relevant):		**N/A**

Evaluation table 27 - PI 2.3.3

PI 2.3.3		**Relevant information is collected to support the management of fishery impacts on ETP species, including:** • **Information for the development of the management strategy;** • **Information to assess the effectiveness of the management strategy; and** • **Information to determine the outcome status of ETP species.**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Information is sufficient to qualitatively estimate the fishery related mortality of ETP species.	Sufficient information is available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species.	Information is sufficient to quantitatively estimate outcome status of ETP species with a high degree of certainty.
	Met?	Y	Y	N
	Justification	AFMA regularly assesses the impacts of fishing on all parts of Australia's marine environment as part of their strategy to pursue "Ecologically Sustainable Development" (AFMA, 2014a). This is achieved through ecological risk assessments (ERAs), which encompasses an ecosystem-based approach (discussed further in 3.5.7) and provides a quantitative analysis for species, which come out as high risk in ERA (Level 3). The ERAs are then used to prioritise research and data collection needs and subsequent necessary management actions for the fisheries. A study in 2002, (Bravington et al., 2002) inferred that coverage as low as 5.1% could provide a good representation of what is occurring in the fishery and provided very precise bycatch estimates for commonly caught species. It is also mandatory to record all interactions with ETP species in logbooks and their fate (released, retained, escaped etc.). For all ETP species concerned, information gathered through observer reports is sufficient to enable a quantitative evaluation of fishery-related mortality. Lack of population estimates on some shark species such as mako and porbeagle sharks in the fishery does not allow for a high degree of certainty to be applied to the quantitative information presented in the logbook and observer records. As such, the team considered that SG80 is met, but not SG100.		
b	**Guide post**	Information is adequate to broadly understand the impact of the fishery on ETP species.	Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species.	Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.
	Met?	Y	N	N
	Justification	As above, the information is adequate to broadly understand the impact of the fishery; SG60 is met. Interactions with ETP species are well recorded through logbook and observer reports. Due to the lack of population estimates on some shark species such as mako and porbeagle sharks in the fishery, it was concluded that there is not sufficient information to determine whether the fishery may be a threat to the protection and recovery of these species. SG80 is therefore not met for makos and therefore for this scoring issue.		

c	**Guide post**	Information is adequate to support measures to manage the impacts on ETP species.	Information is sufficient to measure trends and support a full strategy to manage impacts on ETP species.	Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.
	Met?	Y	Y	N
	Justification	For all ETP species concerned, information gathered for this fishery and regionally is adequate to support the relevant CMMs, NPOAs, ERAs and research. Bravington et al. (2002) indicates representative observer sampling for the fishery. Information is adequate to support a comprehensive strategy to manage impacts to minimise mortality (AFMA, 2014a). SG100 is therefore met.		
References		AFMA, 2014a; Bravington et al.,2002		
OVERALL PERFORMANCE INDICATOR SCORE:				**75**
CONDITION NUMBER (if relevant):				**9**

Evaluation table 28 - PI 2.4.1

PI 2.4.1		**The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	There is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
	Met?	Y	Y	Y
	Justification	The longline fishery operates mainly on the continental shelf, where depths range from 2,000 to 5,000 metres (Brewer et al., 2007). This provides evidence that the gear is highly unlikely to interact with the benthic habitat. Lost gear may consist of monofilament and/or hooks and is only likely to continue to fish as long as bait remains on the hooks. Bait tends to be stripped relatively quickly off the hooks and as such, the mortality rate associated to lost longlines is usually low (Macfadyen et al., 2009). No habitats or communities were identified as high risk from the effects of pelagic longline fishing in the ERA process (AFMA, 2014a).		
References		Brewer et al., 2007; Macfadyen et al., 2009		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation table 29 - PI 2.4.2

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	There are measures in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a strategy in place for managing the impact of the fishery on habitat types.
	Met?	Y	Y	N
	Justification	Considering the unlikelihood of this fishery impacting on benthic habitats, the term 'if necessary' applies here and management measures should not be required. SGs 60 and 80 are therefore met by default. There is, however, no strategy in place that specifically aims to manage the impacts of the fishery on habitat types (either directly or through ghost fishing). SG100 is therefore not met.		
b	**Guide post**	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).	There is some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and/or habitats involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or habitats involved.
	Met?	Y	Y	N
	Justification	The fishery takes place in deep oceanic waters as confirmed by VMS data for the fleet as well as observer reports and AFMA assessments and this fishery does not interact directly with any benthic habitats. As stated in scoring issue a. above, management measures as described under SGs 60 and 80 are not required and these are met by default. However in the absence of a full strategy which has been tested, SG100 is not met.		
c	**Guide post**		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	N
	Justification	As above, SG80 is met, but in the absence of a strategy SG100 is not met.		
d	**Guide post**			There is some evidence that the strategy is achieving its objective.
	Met?			N

	Justification	In the absence of a strategy, SG100 is not met.	
References		Observer reports reviewed by assessment team	
OVERALL PERFORMANCE INDICATOR SCORE:			**80**
CONDITION NUMBER (if relevant):			**N/A**

Evaluation table 30 - PI 2.4.3

PI 2.4.3		**Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	There is basic understanding of the types and distribution of main habitats in the area of the fishery.	The nature, distribution and vulnerability of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.
	Met?	Y	Y	Y
	Justification	Habitat distribution has been studied in detail by Geoscience Australia and 3-D mapped (Whiteway, 2009). The presence of seamounts is known and these do not interact with fishing operations in the ETBF (AFMA, 2014a). SG100 is met.		
b	**Guide post**	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.	Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.	The physical impacts of the gear on the habitat types have been quantified fully.
	Met?	Y	Y	Y
	Justification	AFMA assessments and observer reports provide reliable data on the spatial extent and effort of fishing activities. ERAs are performed by AFMA and no habitats were identified to be at risk from the effects of pelagic longline fishing in SICA performed in 2008 (AFMA, 2014a). Gear loss is known as there are only three vessels in the fleet. Gear is expensive and would be retrieved by the client group if lost. No losses to date. SG100 is therefore met.		

c	**Guide post**		Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Changes in habitat distributions over time are measured.
	Met?		Y	Y
	Justification	AFMA assessments and observer reports provide ongoing, reliable data on the spatial extent and effort of fishing activities. ERAs are performed by AFMA and no habitats were identified to be at risk from the effects of pelagic longline fishing in SICA performed in 2008 (AFMA, 2014a). A data collaboration effort between Geoscience Australia, other Australian government agencies and industrial sources have been used to create AMSIS (2014), a web-based interactive mapping system that provides access to integrated government and non-government information in the Australian Marine Jurisdiction. SG100 is met.		
References		AFMA, 2014a; AMSIS, 2014; Whiteway, 2009. Observer reports reviewed by assessment team.		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation table 31 - PI 2.5.1

PI 2.5.1		The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Guide post	The fishery is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is evidence that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	Y	Y	N
	Justification	At a regional scale, the latest stock assessment for albacore suggests that the stock is being maintained above B_{MSY} level, the same can be said for yellowfin, swordfish and striped marlin, however not for bigeye. Based on historical data (1952 – 2006), the ecosystem model run on the ETBF (Griffiths et al.; 2010) simulated the ecosystem response to changes in trophic structure and climate change. The model further simulated changes in fishing effort and mortality rates on individual target species for 2008 – 2018. The effect of fishing on the ecosystem did not significantly modify the trophic structure of the fishery, suggesting an amount of ecological redundancy among high trophic level predators since they share a diverse suite of prey and collectively only represent less than 1% of the total system biomass. On this basis and at the scale of the UoC, it is highly unlikely that the fishery under assessment would lead to irreversible ecosystem impacts. Likewise, main retained species are within biologically-based limits and a strategy is in place to protect the most commonly caught ETP species (seabirds, cetaceans, turtles and sharks). ERAs are performed by AFMA and no habitats/communities were identified to be at risk from the effects of pelagic longline fishing in SICA performed in 2008 (AFMA, 2014a). The fishery is therefore highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm and SG80 is met. There is however limited evidence supporting this conclusion, in terms of direct information about the ecosystem and the impact of tuna and billfish longlining upon it. SG100 is thus not met.		
References		Griffiths et al.; 2010; AFMA, 2014a		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation table 32 - PI 2.5.2

PI 2.5.2		**There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	There are measures in place, if necessary.	There is a partial strategy in place, if necessary.	There is a strategy that consists of a plan, in place.
	Met?	Y	Y	Y
	Justification	At the regional level, The 1995 FAO Code of Conduct for Responsible Fisheries is used as the framework for sustainable fisheries for an “Ecosystem Approach to Fisheries Management (EAFM), otherwise known as “Ecosystem-Based Fisheries Management (EBFM)”. The WCPFC’s application of the FAO code extends to the highly migratory fish species including tuna through CMM-2013-01 on the management of bigeye, yellowfin and skipjack, as well as to the management of non-target species, in particular through Resolution 2005-03 on Non-Target Fish Species. The Fisheries Administration Act (1991) requires that “the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making”. The objective of the ETBF harvest strategy is to achieve catch rates of the five key target species similar to 1997-2001 levels over a long period of time. Prior to its implementation in the new fishery season, the likely performance of the harvest strategy is tested through simulation modelling in a Management Strategy Evaluation (MSE). The FRDC, AFMA and CSIRO funded a MSE project to further develop and test the harvest strategy for the ETBF. This has allowed Eastern Tuna MAC and AFMA to select a form of the harvest strategy that is most likely to meet the economic, operational and stock objectives for the fishery. AFMA’s main areas of work relating to the preservation of marine ecosystems are through Ecological Risk Management (ERM) and strategic assessment to develop management plans for Commonwealth fisheries. The various management systems in place form a hierarchy to integrate the Ecologically Sustainable Development approach. In relation to climate change, AFMA also have a climate change strategy called “The Climate Change Action Plan for Fisheries and Aquaculture”. The plan recommends a national climate change and fisheries action plan be developed that identifies risks associated with climate change for the sustainable use of Australia’s fish stocks. The area fished by the ETBF is covered by bioregional marine management plans and the Commonwealth marine reserve network management plan, 2013-23 for the south-east region. Both plans identify the bio-physical, environmental and socio-economic characteristics of the area, has evaluated their potential pressures (for example for habitats or specific protected species) and formulated strategies with corresponding actions and expected outcomes. SG100 is therefore met.		

b	**Guide post**	The measures take into account potential impacts of the fishery on key elements of the ecosystem.	The partial strategy takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	The strategy, which consists of a plan, contains measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem. This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm.
	Met?	Y	Y	Y
	Justification	The WCPFC and national measures which form the partial strategy all take into account the available information with the expectation that impacts on the ecosystem are restrained. Measures to address the main impacts of fishing on the Australian ecosystem are implemented through a number of ways, for example ERM and strategic assessment (ERAs) as discussed above. This process is designed to assess and rank ecological effects of fishing in the Commonwealth fisheries. The ERM report provides how AFMA will respond to high risk environmental components. This strategy has been demonstrated through the inclusion of management measures, for example for ETP species as required. The National Ecological Sustainability Development Reference Group (NESDRG) has also developed a framework strategy (Fletcher et al., 2006) for the reporting and assessment of wild capture fisheries encompasses eight major components (ESD, 2014). Furthermore, the area fished by the ETBF is covered by bioregional marine management plans and the Commonwealth marine reserve network management plan, 2013-23 for the south-east region. Both plans identify the bio-physical, environmental and socio-economic characteristics of the area, has evaluated their potential pressures (for example for habitats or specific protected species) and formulated strategies with corresponding actions and expected outcomes. Restriction of ecosystem impacts is demonstrated within the south-eastern marine reserve network management plan. The 14 reserves have been designated IUCN zones in order to restrict certain activities such as fishing and mining in designated national park zones. Areas marked as nature reserves "will be managed to minimise disturbance to the environment from human activities". The plans demonstrate detailed understanding of the functional components of the ecosystems, target and protected species and restrictions of potentially damaging activities on the environments. Based on this SG100 is met.		
c	**Guide post**	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved.

	Met?	Y	Y	N
	Justification	Previous discussions on the various CMMs, NPOAs, TAPs and TACC regulations have established that those measures forming the partial strategy are considered likely to work for the ecosystem components they address. The Ecopath with Ecosim model, which used historical data from 1952 - 2006 (Griffiths et al.; 2010) predicted the direction and magnitude of biomass change in response to ecosystem changes and provides "what if" scenarios triggered by the effects of fishing and climate change. Further to this, the Atlantis model has now been applied to the region in relation to climate change. The model is inclusive of a plethora of components to represent the ecosystem as a whole, these include recreational and commercial fisheries, trophic interactions, habitats, biodiversity, economic and market components and main management types in the region (including closures, incentive-based structures and gear controls). Fulton and Gorton (2014) write "the ecosystem components are largely biologically capable of adapting, meaning that associated socioeconomic impacts of changes in target species and their food webs is less than the extremes suggested by taxonomically based exposure assessments." Sufficient information is available on the fishery's impact of the respective ecosystem components to give a score of 80. As the Atlantis model has not yet been applied to the effect of the ETBF fleet, SG100 cannot be awarded as information directly from the fishery is not known.		
d	**Guide post**		There is some evidence that the measures comprising the partial strategy are being implemented successfully.	There is evidence that the measures are being implemented successfully.
	Met?		Y	N
	Justification	As previously discussed, the combination of regional stock assessments, the ERA/ERM identification and evaluation process, ETBF harvest strategies and management plan (AFMA, 2010a) have been successful in maintaining target species about the B_{MSY} level, with the exception of bigeye tuna. Recently run ecosystem models have also provided ecosystem-derived outcomes in response to climate change and fishing effort changes. The models have been derived with ESD framework in order to assess the challenges to recreational and commercial fisheries and aquaculture management arrangements within a changing climate and inform on changes to management arrangements that could provide for sustainable management of the resource. There is therefore evidence that the partial strategy is being implemented successfully. There is however insufficient evidence on key ecosystem indicators to inform on all measures with a high degree of certainty. SG80 is met but not SG100.		
References		AFMA, 2010a; ESD, 2014; Fletcher et al.; 2006; Griffiths et al.; 2010; Fulton and Gorton, 2014		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation table 33 - PI 2.5.3

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	Guide post	Information is adequate to identify the key elements of the ecosystem (e.g., trophic structure and function, community composition, productivity pattern and biodiversity).	Information is adequate to broadly understand the key elements of the ecosystem.	
	Met?	Y	Y	
	Justification	There is increasing effort by a range of organisations to collect detailed data on the structure of the Pacific Ocean pelagic ecosystem. This effort occurs through observer programmes (e.g. bycatch composition and quantities), trophic analyses (e.g. stomach contents, stable isotopes), and mid-trophic level sampling (e.g. acoustics and net sampling of micronekton and zooplankton). At the national level, in order to address ecosystem-based fisheries management, the ecological risk assessment for the effects of fishing (ERAEF) was devised. The ERAEF provides information on the risks of fishing activity to all elements of the ecosystem. By taking a precautionary approach to uncertainty, it helps to prioritise research, data collection monitoring needs and management actions for all fisheries in the Commonwealth. In addition, data collected on the diets of a wide range of organisms, including target species, living within the ETBF have led to the ETBF ecosystem model (Griffiths et al., 2010) and Atlantis model (Fulton and Gorton, 2014). This information is thought to be adequate to broadly understand the key elements of the ecosystem. Currently, there is also a 'whole-of-system' model of Australia's East Marine Region in its development stages (Hutton et al., 2012), which has not yet undergone peer-review. "Northern Atlantis" is largely pelagic fish focused, and considered them explicitly as individual Functional Groups for each target pelagic species in the ETBF (e.g. yellowfin tuna, bigeye tuna, albacore). This allows a general comparison with Griffiths' et al. (2010) model of the ETBF. "Northern Atlantis" is not inaugurated to fit model biomass trends to stock assessment estimated biomass trends unlike Griffiths' et al. (2010). "There is the future potential option for running the model to obtain multi-species model estimates of biomass for some of the target and bycatch species in the ETBF (and then compare and correct CPUE trends)" (Hutton, T.; personal communication, 23rd October, 2014). SG80 is met.		
b	Guide post	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, and have not been investigated in detail.	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information and some have been investigated in detail.	Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and have been investigated.
	Met?	Y	Y	Y

	Justification	Trophic structure of pelagic ecosystems in the Pacific, including the WCPO, has been characterised using Ecopath and Ecosim models based on diet data. The dynamic system model SEAPODYM, is a model developed for investigating spatial tuna population dynamics, under the influence of both fishing and environmental effects (Lehodey et al., 2013). The continued development and application of the SEAPODYM model to the work of the WCPFC Scientific Committee is facilitated through Project 62 which affiliates the independently funded work on SEAPODYM into the SC's work programme (Lehodey et al., 2013). A list of current projects is given in Lehodey et al. (2013). The main interactions between the fishery and ecosystem elements have been investigated in detail with the use of an Ecopath with Ecosim model used on the ETBF specifically. Discussed in section 3.5.7, the model used existing biomass data and fishery catch data from 1952 – 2006, and simulated changes in fishing effort and mortality rates on individual target and species for 2008 – 2018. The Atlantis ecosystem model adds further weight to evaluating main interactions with the fishery by investigating the effects of climate change on the region by assessing the challenges to recreational and commercial fisheries and aquaculture management arrangements within a changing climate. As explained in 2.5.2 c) above, a 'whole-of-system' model of Australia's East Marine Region in its development stages (Hutton et al.; 2012) which has not yet undergone peer-review. "Northern Atlantis" (Hutton et al., 2012) is largely pelagic fish focused, and considered them explicitly as individual Functional Groups for each target pelagic species in the ETBF. Based on these studies, SG100 is met.		
c	**Guide post**		The main functions of the Components (i.e., target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known.	The impacts of the fishery on target, Bycatch, Retained and ETP species are identified and the main functions of these Components in the ecosystem are understood.
	Met?		Y	Y
	Justification	Information on target and non-target species (bycatch and ETP species) is gathered by the SPC through logbooks and its regional observer programme. The available information is managed by the Bycatch mitigation information system (BMIS) which acts as a reference and educational tool that supports the WCPFC's responsibilities with regard to the sustainable management of non-target, or bycatch, species in WCPO fisheries targeting highly migratory species, including tuna and billfish (Fitzsimmons, 2011). Furthermore, the Kobe By-catch Technical Working Group (KBTWG) was established in 2009 with the aim of supporting, streamlining, and seeking to harmonize the bycatch related activities of Ecosystems/Bycatch working groups across RFMOs and feeding its findings through to those RFMOs. Sufficient information is being gathered to understand the main functions of the ecosystem components. Within the ETBF, information on target, byproduct, bycatch and ETP species is collected through logbooks and observer coverage (coverage in the ETBF is set at a minimum of 5% of all hooks set and hauled in each fishing area (Commonwealth of Australia, 2014)). In reality, observer coverage has been functioning in recent years at 6.2% of the total number of hooks deployed (WCPFC, 2013). Results from a study conducted in 2002 (Bravington et al., 2002) showed that coverage at 5.1% of sets observed (proportional coverage) provided very precise bycatch estimates for commonly caught species. Even for low-level interaction species such as turtles, this 5.1% coverage provided annual estimates of turtle bycatch precise to ±70% (a 95% confidence interval). The Tropical Tunas Resource Assessment Group (TTRAG) and ERA process continues to monitor and evaluate the fishery's impact on the above mentioned components. AFMA (2014a) states the nature of impacts that the ETBF has on the ecosystem is mainly through the take of		

		target, by-product and bycatch species. No habitats or communities were identified as high risk from the effects of pelagic longline fishing in the SICA performed in the ERA process. (AFMA, 2014). Ecosystem models as presented by Griffiths et al. (2010) and Fulton and Gorton (2014) add further dimensions of understanding to the roles of different ecosystem components (as previously discussed) in the fishery. On this basis, SG100 is met.		
d	**Guide post**		Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.	Sufficient information is available on the impacts of the fishery on the Components and elements to allow the main consequences for the ecosystem to be inferred.
	Met?		Y	Y
	Justification	As explained in scoring issue c, sufficient information is available on the impacts of the fishery. Through the delivery of catch, discard rates and mortality (fate of discard and ETP species are recorded by observers and in logbooks), stock assessments for key species, trophic relationships and possible consequence outcomes are run through ecosystem modelling. In addition, CSIRO determined the level of observer coverage (5% as required by TAP (Commonwealth of Australia, 2014) to be sufficient as a representative look at the fishery.		
e	**Guide post**		Sufficient data continue to be collected to detect any increase in risk level (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Information is sufficient to support the development of strategies to manage ecosystem impacts.
	Met?		Y	Y
	Justification	Data collected on the key target and non-target tuna and billfish species in conjunction with the observer data for other, non-target species, and ecosystem modelling are considered sufficient to detect any increase in risk level at both the regional and national level. SG80 is therefore met. Australia's Oceans Policy (1998) sets in place the framework for Ecologically Sustainable Development (ESD) for all of Australia's marine jurisdictions through integrated and ecosystem-based planning and management. Data collected through various fisheries dependent data, observers, CSIRO and FRDC programmes have enabled the development of strategies to manage ecosystem impacts, for example bioregional and marine reserve management plans and the ERA process which guides management actions for target, bycatch and ETP species and habitats. On this basis, SG100 is met.		
References		Griffiths et al., 2010; Lehodey et al., 2013; WCPFC, 2013; Fitzsimmons, 2011; Hutton et al., 2012; Fulton and Gorton, 2014; Commonwealth of Australia, 2014		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**

CONDITION NUMBER (if relevant):	N/A

Appendix 1.1.5 Principle 3

Evaluation table 34 - PI 3.1.1

<table>
<tr><td colspan="2">PI 3.1.1</td><td colspan="3">The management system exists within an appropriate legal and/or customary framework which ensures that it:
• Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and
• Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and
• Incorporates an appropriate dispute resolution framework.</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guide post</td><td>There is an effective national legal system and <u>a framework for cooperation</u> with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2</td><td>There is an effective national legal system and <u>organised and effective cooperation</u> with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.</td><td>There is an effective national legal system and <u>binding procedures governing cooperation with other parties</u> which delivers management outcomes consistent with MSC Principles 1 and 2.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">At the national level, overarching Commonwealth legislation relevant to fisheries in Australia includes the Fisheries Management Act 1991 (FMA 1991) and Environment, Protection and Biodiversity Act 1999 (EPBC Act 1999). The FMA 1991 enables AFMA to prepare and determine a management plan for each Commonwealth fishery and allocate statutory fishing rights for access to resources. The FMA Act 1991 also facilitates cooperation between different legislative jurisdictions in the management of fish stocks through the formulation of joint authorities (i.e. specifies which jurisdiction’s laws will apply to the fishery managed by joint authority) or offshore constitutional settlements (OCS) (i.e. specifies which jurisdiction will be responsible for management). The EPBC Act 1999 under Part 10 requires that each fishery requiring export approval undergo a strategic assessment in order to ensure current management is ecologically sustainable and in accordance with the principles of ecological sustainable development and the precautionary approach, both of which are legislative objectives. The main legislative instrument for management of the eastern tuna and billfish fishery (ETBF) is the Eastern Tuna and Billfish Management Plan 2010 (AFMA, 2010a).

At the regional level, the Western and Central Pacific Fisheries Commission (WCPFC) Convention is consistent with the principles and provisions of the United Nations Convention on the Law of the Sea (UNCLOS), the United Nations Fish Stock Agreement (FSA) and Highly Migratory Species (HMS) as well as a range of other relevant international and regional fisheries instruments. These reflect the current international laws and standards relevant to the management of migratory species and the ecosystem and include specific references to the precautionary approach. The Commission seeks input from recognised international law experts to ensure that decision-making is informed in relation to compliance with international law and protocols. All WCPFC members (including Australia) are legally bound to apply the precautionary approach as parties to the WCPFC Convention.</td></tr>
</table>

		Australia has signed and ratified the UNCLOS, the FSA, the Food and Agricultural Organisation (FAO) Code of Conduct for Responsible Fisheries and the FAO Compliance Agreement. Consistent with its obligations under Article 118 of UNCLOS, Australia cooperates in the management of highly migratory stocks through regional fisheries organisations – the Forum Fisheries Agency (FFA) and the Secretariat of the Pacific Community's (SPC) Division of Fisheries Aquaculture and Marine Ecosystems (FAME) and internationally through the WCPFC. Australia cooperates in the development and recommendation of management outcomes through: (i) the collection and sharing of fisheries catch and effort data; (ii) regular stock assessments carried out on tuna, marlin and billfish species by SPC and CSIRO; (iii) the development and consideration of scientific and compliance advice, through the scientific and compliance committees of the WCPFC; (iv) agreement on matters of common interest between states fishing for tuna, marlin and billfish species, initially at FFA meetings/workshops and then promoted through the WCPFC Commission meetings and; (iv) regional monitoring, control and surveillance (MCS) initiatives such as the regional vessel monitoring system (VMS), record of fishing vessels and high seas boarding and inspection register. This framework for cooperation has allowed the development and implementation of sustainable management arrangements for some species as required under the obligations of UNCLOS Articles 63(2), 64, 118, 119 and FSA Article 8. Australia has in place effective processes for giving national effect to conservation and management measures (CMMs) developed at the WCPFC and in many cases chooses more precautionary targets or measures for species (e.g. bigeye tuna total allowable commercial catches (TACCs) than required under WCPFC CMMs (e.g. CMM 2013-01). At both the national and international level, there are binding procedures in place governing cooperation with other parties and the overarching legal frameworks are effective in delivering management outcomes consistent with MSC Principles 1 and 2, so SG 100 is considered met.		
b	**Guide post**	The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a transparent_mechanism for the resolution of legal disputes which is considered to be effective in dealing with most issues and that is appropriate to the context of the fishery.	The management system incorporates or subject by law to a transparent mechanism for the resolution of legal disputes that is appropriate to the context of the fishery and has been tested and proven to be effective.
	Met?	Y	Y	N
	Justification	At the national level, the Australian management system has well-established mechanisms for administrative and legal appeals of management decision-making. Under Sections 161 and 165 of the FMA 1991, parties may appeal decisions made by AFMA through judicial means in the Federal Court (Section 161) or administrative means through internal AFMA review or the Administrative Appeals Tribunal (AAT) (Section 165). This process has been tested and shown to be effective (Federal Court of Australia, 2009; AFMA, 2010b). Fishers are advised of their appeal rights and the processes involved during communications with AFMA. AFMA tries to minimize and avoid disputes by consulting extensively with industry through the Tropical Tuna Management Advisory Committee (TTMAC) and Tropical Tuna Research Assessment Group (TTRAG) process, organizing port visits and written communication. This allows parties to raise grievances and discuss alternative points of view prior to AFMA making amendments to management measures and/or policy (Auld, pers. comm. 2014). Legal advice on management and appeals is provided through internal AFMA legal advisors and external independent legal advisors as required. At the regional level, the WCPFC dispute settlement mechanism is set out under Article 31 of the Convention. Annex II of the		

		Convention establishes the authority to form a panel to review decisions made by the Commission and to settle disputes among members of the Commission. The dispute settlement mechanism outlined in the Convention allows for a transparent process to occur. While the mechanisms for dispute resolution are transparent and considered to be effective in dealing with most issues at both the national and regional level, they have only been tested and proven to be effective at a national level, so only SG 80 is considered met.		
d	**Guide post**	The management system has a mechanism to generally respect the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to observe the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
	Met?	Y	Y	N
	Justification	At the national level, customary fishing rights are not explicitly mentioned in the fishery management plan and are not considered an issue by AFMA. Individuals who wish to access the ETBF must purchase a boat statutory fishing right (SFR) and have attached quota SFRs. Several Australian State and Northern Territory Governments and authorities explicitly recognise, including through legislative provisions indigenous fishing rights, however the Commonwealth Fisheries Acts do not reference customary fishing beyond mention at Article 24, Schedule 2 (The Fish Stocks Agreement) of the *FMA 1991* (Borthwick, 2012). This issue was raised in a review of Commonwealth fisheries legislation and policy in 2012 with a recommendation that reference to indigenous interests be included in the objectives of the *FMA 1991* and *Fisheries Administration Act 1991* (*FAA, 1991*). The Commonwealth *Native Title Act 1993* does provide an avenue for indigenous persons to claim native (i.e. customary) title over areas of land and water and provides a formal system for assessing, recognising and protecting those claims (e.g. native title claims over Torres Strait waters). At the regional level, the WCPFC Convention provides for recognition of the interests of small-scale and artisanal fishers within the overall framework for sustainability in the WCPFC Convention. For example, under Article 5 the Convention states that “in order to conserve and manage highly migratory fish stocks in the Convention area…the members of the Commission shall…(h) take into account the interests of artisanal and subsistence fishers”. Under Article 10, paragraph 3, the Convention states that “in developing criteria for allocation of the total allowable catch or total allowable effort the Commission shall take into account…(d) the needs of small island developing States and territories and possessions, in the Convention area whose economies, food supplies and livelihoods are overwhelmingly dependent on the exploitation of marine living resources and (g) the needs of coastal communities which are dependent on fishing for the stock”. Furthermore under Article 30, the Convention specifies that “the Commission shall give full recognition to the special requirements of developing States parties to this Convention, in particular small island developing States, and of territories and possessions, in particular (b) the need to avoid adverse impacts on and ensure access to fisheries by, subsistence, small-scale and artisanal fishers and fish workers as well as indigenous people.” While the management system at a regional level has a mechanism to formally commit to the legal rights of customary fishers, this is absent from the national fisheries legislation, except through other legislative means such as the *Native Title Act 1993* so the team considered that only SG 80 is met.		

References	AFMA, 2010a; AFMA, 2010b; Borthwick, 2012; Agreement on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (1995). Available at: http://www.un.org/depts/los/convention_agreements/texts/fish_stocks_agreement/CONF164_37.htm Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (1993). Available at: http://www.fao.org/docrep/MEETING/003/X3130m/X3130E00.HTM Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC Convention). Available at: http://www.wcpfc.int/doc/convention-conservation-and-management-highly-migratory-fish-stocks-western-and-central-pacific Environment Protection, Biodiversity and Conservation Act 1999. Available at: http://www.comlaw.gov.au/Details/C2014C00506 Federal Court of Australia (2009) Lamason v Australian Fisheries Management Authority (2009) FCA 245 (20 March 2009). Available at: http://www.austlii.edu.au/au/cases/cth/FCA/2009/245.html Fisheries Management Act 1991. Available at: http://www.comlaw.gov.au/Details/C2014C00258 Fisheries Administration Act 1991. Available at: http://www.comlaw.gov.au/Details/C2014C00521 Native Title Act 1993. Available at: http://www.comlaw.gov.au/Details/C2014C00631 United Nations Convention on the Law of the Sea (1982). Available at: http://www.un.org/depts/los/convention_agreements/convention_overview_convention.htm WCPFC CMM 2013-01 Conservation and Management Measure for bigeye, yellowfin and skipjack tuna in the Western and Central Pacific Ocean. Available at: https://www.wcpfc.int/conservation-and-management-measures	
OVERALL PERFORMANCE INDICATOR SCORE:		**85**
CONDITION NUMBER (if relevant):		**N/A**

Evaluation table 35 - PI 3.1.2

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for all areas of responsibility and interaction.
	Met?	Y	Y	Y
	Justification	At the national level, the Commonwealth has responsibility for managing fisheries in Australian waters from 3 to 200 nautical miles. AFMA is the Australian Government entity responsible for managing Commonwealth fisheries, established under the FAA 1991. Section 7 of the FAA 1991 sets outs AFMA's functions and Section 3 of the FMA 1991 sets out AFMA's objectives. Overarching policy objectives are set by the Australian Government through the relevant Minister responsible for fisheries, acting upon advice from the Department of Agriculture. The Department of Agriculture is responsible for ensuring Australia's agricultural, fisheries food and forestry remain competitive, profitable and sustainable. Department of Agriculture (through the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)) also reports on elements of AFMA's performance against its objectives through the annual publication of fisheries status reports (Borthwick, 2012). The *FFA 1991* makes provision for AFMA to establish management advisory committees (MACs) to assist AFMA "…in the performance of its functions and exercise of its power in relation to a fishery". The MACs primary role is as a liaison body between AFMA and stakeholders in the fishery and to provide advice on a variety of issues including fisheries management arrangements, research, compliance and management costs. AFMA has established eight MACs including the relevant TTMAC where advice on the ETBF is sought. The MACs roles and responsibilities are outlined in Fishery Management Paper 1 (FMP 1). AFMA has also established seven resource assessment groups (RAGs) including the relevant TTRAG under Section 54 of the *FAA 1991*, which work independently from MACs and primarily provide advice to AFMA on the status of managed fish stocks, non-target, endangered, threatened and protected (ETP) species and the impact of fishing on the marine environment. The RAGs roles and responsibilities are outlined in Fishery Administration Paper 12 (FMP 12). The effective functioning of the MAC and RAG processes within AFMA's management framework clearly demonstrates that roles and responsibilities are well understood. At the regional level, the WCPF Convention in Articles 9-16 and 23-24 provide information on the functions, roles and responsibilities of member states and the committees formed under Commission control (e.g. Scientific Committee and Technical Compliance Committee). The Commission and its associated committees have clear operating procedures and terms of reference and the roles and responsibilities of members and non-members are clearly defined in the Convention, in the Rules of Procedure and in relevant		

		CMMs. Australia is an active member of the WCPFC and its committees and the level of collaboration and cooperation is evidence that the roles and responsibilities of AFMA and the Department of Agriculture in international fisheries management are well understood. At both the national and international level the functions, roles and responsibilities of organisations and individuals involved in the management process are explicitly defined and well understood for all areas of responsibility and interaction so SG 100 is considered met for the fishery.		
b	**Guide post**	The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information and explains how it is used or not used.
	Met?	Y	Y	N
	Justification	At the national level, the *FAA 1991* sets out several specific consultation requirements for AFMA, such as holding public meetings at least once a year, keeping registers of interested persons and undertaking specific consultation before determining a fisheries management plan. Beyond these legislative requirements, the main consultation processes are undertaken by AFMA through the MACs and RAGs with around two meetings of each held annually. Both TTMAC and TTRAG consider a wide range of information including local knowledge, which is clearly evident though the stock assessment and TAC setting processes. While some of the agenda papers are confidential, the minutes of both meetings are publically available on the AFMA website, which demonstrates how the decisions and recommendations were made. AFMA also conducts two port visits a year in the ETBF, sometimes more, if there are significant management changes in the fishery (Auld, pers. comm., 2014). These port visits are open to the public and advertised to stakeholders with meeting outcomes used internally to guide management decision-making. (Auld, pers. comm., 2014). AFMA also readily communicates to stakeholders through newsletter such as *AFMA update* and direct mail to concession holders. Any formal management changes are advertised in Australian newspapers. Decisions of the AFMA Commission (which may or may not accept MAC and RAG advice) are summarised and published regularly through the newsletter *AFMA Update* but the deliberations and decision-making (i.e. minutes) of Commissioners and the reasoning for their decisions is not made public (Timmiss, pers. comm., 2014). At the regional level, there are extensive formal and informal consultation processes at the WCPFC that regularly seek and accept information from members and cooperating non-members. The Commission is active in assisting and facilitating the regular and timely provision of fisheries data and information in order to be assessed by the Commission secretariat and scientific providers such as SPC. The Commission actively uses information from the fishery and its member states in order to inform fisheries management decisions and the formulation of CMMs. This is demonstrated through reports and outcomes of WCPFC meetings, which detail the decision-making process and are readily accessible online. It was noted that while the national and international consultative processes of the fishery were considered to be well-defined, with processes in place to regularly seek and accept information, including local knowledge, the absence at a national level of formal		

		reporting of the AFMA Commission decision-making meant that only SG 80 is considered met for the fishery.		
c	**Guide post**		The consultation process provides opportunity for all interested and affected parties to be involved.	The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.
	Met?		Y	N
	Justification	The national management system provides regular and extensive opportunities for stakeholder groups to provide input to the management of the fishery, primarily through the MAC and RAG processes. The *FAA 1991* under Section 9 outlines a non-exhaustive list of individuals and entities AFMA may consult with, including industry and recreational fishing representatives; governments or government authorities with fisheries-related functions; and “persons (including members of the scientific community) having a particular interest in matters associated with the industry”. In determining who sits on these MACs, AFMA is guided by FMP 1, with the AFMA Commission having final responsibility for determining the actual membership and ensuring the composition balances the interests of all relevant stakeholder groups. It was noted in a recent review of Commonwealth fisheries legislation and policy that MAC membership was still weighted favorably towards industry at the cost of other interests and AFMA’s engagement with the public was inadequate (Borthwick, 2012). Given AFMA uses MACs as their “main point of contact with key stakeholder groups” (AFMA, 2009), the review noted that it was important that AFMA engage beyond individuals and entities with known interest in fisheries management in order to improve AFMA’s transparency and accountability to the Australian community to whom the fisheries resources belong. At the regional level, the WCPFC Secretariat facilitates effective engagement by Stakeholders. Attendance at Commission and related meetings are comprehensive and logistic and financial support is provided to cooperating non-members to ensure attendance and meaningful involvement and interaction in the cooperative management of fisheries in the Western and Central Pacific Ocean (WCPO). Additional services are provides through the FFA and SPC. While the national and international processes currently provide opportunity for all affected parties to be involved, they are not necessarily facilitating the effective engagement of all interested parties, particularly at the national level so only SG 80 is considered met for the fishery.		
References		AFMA, 2014d; AFMA, 2009; Borthwick, 2012; AFMA, 2010a; AFMA (2013) TTMAC Minutes available at http://www.afma.gov.au/managing-our-fisheries/consultation/management-advisory-committees/tropical-tuna-mac/ AFMA (2013) TTRAG Minutes available at http://www.afma.gov.au/managing-our-fisheries/consultation/resource-assessment-groups/ttrag/ Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC Convention). Available at: http://www.wcpfc.int/doc/convention-conservation-and-management-highly-migratory-fish-stocks-western-		

	and-central-pacific Fisheries Management Act 1991. Available at: http://www.comlaw.gov.au/Details/C2014C00258 Fisheries Administration Act 1991. Available at: http://www.comlaw.gov.au/Details/C2014C00521
OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation table 36 - PI 3.1.3

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach		
Scoring Issue		SG 60	SG 80	SG 100
a	Guide post	Long-term objectives to guide decision-making, consistent with the MSC Principles and Criteria and the precautionary approach, are implicit within management policy	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach are explicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within and required by management policy.
	Met?	Y	Y	P

	Justification	Long-term objectives at the national level are clearly specified in Section 3 of the FMA 1991. AFMA's legislative objectives include: implementing efficient and cost effective management of fisheries; ensuring that the exploitation of fisheries resources is conducted consistently with the principles of ecologically sustainable development (including the precautionary principle); and maximising the net economic returns to the Australian community (FMA, 1991). These objectives are also reiterated under Part 1.5 of the ETBF Plan. The shift towards an ecosystem approach to fisheries and use of the precautionary approach is also evident through the Commonwealth Harvest Strategy Policy (HSP) with its objectives to stop overfishing, recover overfished stocks and promote longer term profitability for the fishing industry (DAFF, 2007). The HSP achieves this through a tiered system of stock assessment and precautionary setting of TACs. This is evidence this is applied with the AFMA Commission setting TACCs for target species such as bigeye tuna (1,056 tonnes) lower than the recommended WCPFC limit of 2,000 tonnes as defined in CMM 2013-01.The EPBC Act 1999 under Parts 10, 13 and 13A also requires fisheries to undertake assessment against the Guidelines for the Ecologically Sustainable Management of Fisheries, the conditions of which are consistent with the MSC Principles and Criteria and encourage practical application of the ecosystem approach to fisheries and use of the precautionary approach. AFMA has also developed and implemented a bycatch policy with objectives "to ensure that bycatch species and populations are maintained" (DAFF, 2000). This has been achieved by AFMA through the development of individual bycatch and discarding workplans for fisheries guided by an associated ecological risk assessment process, which is consistent with the MSC Principles and Criteria and application of the precautionary approach. Long-term objectives are explicit within the WCPFC Convention. For example, Article 2 specifies that the Commission has the objective to "ensure through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the WCPO in accordance with the 1982 Convention and Agreement [UNCLOS and FSA respectively]". Article 5 of the Convention then provides principles and measures for achieving this conservation and management objective. More specifically Article 5(c) requires the Commission to apply the precautionary approach in decision-making and Article 6 outlines the means by which this will be given effect, including through the application of the guidelines set out in Annex II of the FSA. Article 10 of the Convention is consistent with MSC principles and objectives in specifying long term objectives of "maintaining or restoring populations…above levels at which their preproduction may become seriously threatened". Evidence that these objectives are guiding, or are starting to guide decision-making is provided in various Commission reports and in CMMs. Commission reports also indicate that explicit action is being undertaken through CMMs to support achievement of objectives, however this is yet to result in target reference points being formulated for all managed stocks. Additionally, while there is a requirement for the WCPFC to apply the precautionary principle during decision-making it has historically struggled to do so for some stocks (e.g. bigeye tuna). At both the national and international level, management objectives, including the application of the precautionary approach are explicit in policy and legislation. At only the national level however are objectives fully operationalised through a harvest strategy policy and the precautionary approach fully implemented so the fishery received only a partial score for SG 100. .
References		AFMA, 2014c; DAFF, 2000; DAFF, 2007; AFMA, 2010a; United Nations Convention on the Law of the Sea, 1982; Agreement on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (1995). Available at: http://www.un.org/depts/los/convention_agreements/texts/fish_stocks_agreement/CONF164_37.htm Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC Convention). Available at: http://www.wcpfc.int/doc/convention-conservation-and-management-highly-migratory-fish-stocks-western-

	and-central-pacific Environment Protection, Biodiversity and Conservation Act 1999. Available at: http://www.comlaw.gov.au/Details/C2014C00506 Fisheries Management Act 1991. Available at: http://www.comlaw.gov.au/Details/C2014C00258 Fisheries Administration Act 1991. Available at: http://www.comlaw.gov.au/Details/C2014C00521

OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation table 37 - PI 3.1.4

PI 3.1.4		**The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and seeks to ensure that perverse incentives do not arise.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and explicitly considers incentives in a regular review of management policy or procedures to ensure they do not contribute to unsustainable fishing practices.
	Met?	Y	Y	P
	Justification	At the national level, AFMA has allocated SFRs in the form of individual transferable quotas (ITQs) to target species under the ETBF Plan 2010. SFRs provide security of access to fishers, reduce over-capitalisation of the fishing fleet and improve economic efficiency and theoretically promote stewardship of the resource (See, e.g. Grafton et al., 1996; Grafton et al., 2006). ITQs are the Australian Government's preferred fisheries management mechanism for attaining its long-term objectives as evidenced through Section 4(a) of the 2005 Ministerial Direction to AFMA. Fishery impacts on the broader ecosystem are managed through input controls (e.g. gear restrictions, trip limits) applied via boat SFR conditions. The success of the ITQ management system in creating appropriate incentives for economic efficiency was evidenced by the first positive economic returns for the fishery in a decade in 2010/11. This was due to associated reductions in costs through autonomous exit of vessels from the fishery due to market forces (ABARES, 2013). AFMA has an effective risk-based compliance program of enforcement and deterrence that creates disincentives for non-compliance (AFMA, 2013b). Penalties for non-compliance include fines and under the *FMA 1991* the cancellation of fishing concessions or forfeiture of possessions (e.g. catches, gear etc.). There are no perverse incentives caused by subsidies in the ETBF with costs recovered in line with AFMA's Cost Recovery Impact Statement (CRIS) (AFMA, 2010) where industry pays for costs directly attributed and recoverable from the fishing industry (e.g. licensing costs or logbook programs and data management) while the government pays for foreign compliance and activities that benefit the broader community (e.g. developing international treaty standards and regulation or policy support). The CRIS was revised in 2010 and the revisions have seen an increased contribution to management costs by industry and a decline in government contributions. Costs of research are shared between industry and the government. It was noted by the assessors that the ETBF was a beneficiary of the 2005 government-funded structural readjustment program, which introduced a levy subsidy for three years and a buyback of fishery licences program (AFMA, 2005). Under the ETBF Plan, AFMA and TTMAC must assess the effectiveness of the measures, such as ITQs taken to achieve the objectives of the plan at least once every five years, however the effectiveness of individual management measures and TACs for target species		

		are under review annually through the harvest strategy process and discussions/recommendations within TTMAC and TTRAG. The management of target fish stocks and economic status of Commonwealth fisheries are also evaluated externally through annual fishery status reports completed by ABARES. AFMA provides effective incentives for the management of non-target and ETP species through the ETBF bycatch and discarding workplan (AFMA, 2014c) and the ecological risk management (ERM) strategy (AFMA, 2012a), which designate mitigation measures in place for species (seabirds, turtles, sharks, cetaceans and sunfish) considered at high risk of ecological damage from the effects of fishing. At the international level, the WCPFC Convention provides for the allocation of TACs, although formal allocations have not yet been made. There is some evidence of effective incentives for sustainable fishing being provided through the work of the WCPFC Scientific Committee, Technical Compliance Committee and Commission in the development of CMMs. For example, CMM 2010-06, which establishes a list of presumed IUU vessels and CMM 2011-02, which requires all vessels fishing on the high seas within the areas of the Convention to have a working VMS; both of which create incentives for fishers to comply with CMMs adopted by the WCPFC or risk exclusion. There are some concerns about the inability of CMMs, specifically for South Pacific albacore (2010-05) to control rising catch and effort due to subsidies (offsetting fuel costs and access fees) offered by particular countries to fishing fleets (Ilakini, 2013). While it was expected that the WCPFC at its December 2014 Commission meeting would address this issue, it failed to implement any measures to deliver sustainable outcomes for South Pacific Albacore, highlighting the difficulties associated with consensus-based decision-making. WCPFC has in place CMMs to ensure the protection of non-target and ETP species such as sharks (CMM 2010-07) seabirds (CMM 2012-07) and sea turtles (CMM 2008-03). The national system has created a system of effective incentives through ITQ management and disincentives through compliance and enforcement activities that are consistent with achieving the objectives of MSC Principles 1 and 2 in the ETBF. Effectiveness is not undermined by perverse subsidies and the system is subject to review. At the international level, while some countries are not complying with individual CMMs in relation to restraining catch and effort on South Pacific Albacore as required under CMM 2010-05, the team noted that: (i) the WCPFC still provides effective overarching incentives through the development of CMMs and these are reviewed regularly through associated committees and; (ii) the associated subsidies undermining albacore management do not apply to the ETBF fleet. Nevertheless, the failure of the WCPFC at its recent Commission meeting in December 2014 to put in place measures to manage South Pacific Albacore highlight the problems associated with consensus-based decision-making and ensuring unsustainable fishing practices are avoided. Consequently, the fishery received only a partial score for SG 100. AFMA has an effective risk-based compliance program of enforcement and deterrence that creates disincentives for non-compliance (AFMA, 2013b). Penalties for non-compliance include fines and under the *FMA 1991* the cancellation of fishing concessions or forfeiture of possessions (e.g. catches, gear etc.). There are no perverse incentives caused by subsidies in the ETBF with costs recovered in line with AFMA's Cost Recovery Impact Statement (CRIS) (AFMA, 2010) where industry pays for costs directly attributed and recoverable from the fishing industry (e.g. licensing costs or logbook programs and data management) while the government pays for foreign compliance and activities that benefit the broader community (e.g. developing international treaty standards and regulation or policy support). The CRIS was revised in 2010 and the revisions have seen an increased contribution to management costs by industry and a decline in government contributions. Costs of research are shared between industry and the government. It was noted by the assessors that the ETBF was a beneficiary of

		the 2005 government-funded structural readjustment program, which introduced a levy subsidy for three years and a buyback of fishery licences program (AFMA, 2005). Under the ETBF Plan, AFMA and TTMAC must assess the effectiveness of the measures, such as ITQs taken to achieve the objectives of the plan at least once every five years, however the effectiveness of individual management measures and TACs for target species are under review annually through the harvest strategy process and discussions/recommendations within TTMAC and TTRAG. The management of target fish stocks and economic status of Commonwealth fisheries are also evaluated externally through annual fishery status reports completed by ABARES. At the international level, the WCPFC Convention provides for the allocation of TACs, although formal allocations have not yet been made. There is some evidence of effective incentives for sustainable fishing being provided through the work of the WCPFC Scientific Committee, Technical Compliance Committee and Commission in the development of CMMs. For example, CMM 2010-06, which establishes a list of presumed IUU vessels and CMM 2011-02, which requires all vessels fishing on the high seas within the areas of the Convention to have a working VMS; both of which create incentives for fishers to comply with CMMs adopted by the WCPFC or risk exclusion. There are some concerns about the inability of CMMs, specifically for South Pacific albacore (2010-05) to control rising catch and effort due to subsidies (offsetting fuel costs and access fees) offered by particular countries to fishing fleets (Ilakini, 2013). This has resulted in rising catch and effort on South Pacific Albacore. While it was expected that the WCPFC at its December 2014 Commission meeting would address this issue, it failed to implement any measures to deliver sustainable outcomes for South Pacific Albacore, highlighting the difficulties associated with consensus-based decision-making. The national system has created a system of effective incentives through ITQ management and disincentives through compliance and enforcement activities that are consistent with achieving the objectives of MSC Principles 1 and 2 in the ETBF. Effectiveness is not undermined by perverse subsidies and the system is subject to review. At the international level, while some countries are not complying with individual CMMs in relation to restraining catch and effort on South Pacific Albacore as required under CMM 2010-05, the team noted that: (i) the WCPFC still provides effective overarching incentives through the development of CMMs and these are reviewed regularly through associated committees and; (ii) the associated subsidies undermining albacore management do not apply to the ETBF fleet. Nevertheless, the failure of the WCPFC at its recent Commission meeting in December 2014 to put in place measures to manage South Pacific Albacore highlight the problems associated with consensus-based decision-making and ensuring unsustainable fishing practices are avoided. Consequently, the fishery received only a partial score of 90.

References	DAFF, 2007; AFMA, 2010a; Grafton, 1996; Grafton et al. 2006; Ilakini, 2013; ABARES (2013) Fishery status reports 2012. Available at: http://www.daff.gov.au/abares/pages/publications/display.aspx?url=http://143.188.17.20/anrdl/DAFFService/display.php?fid=pb_fsr12d9abm_00220131029_11a.xml ABARES (2014) Fishery status reports 2013/2014. Available at: http://data.daff.gov.au/data/warehouse/9aam/fsrXXd9abm_/fsr13d9abm_20141023/00_FishStatus2014_1.3.0.pdf AFMA (2010) Cost Recovery Impact Statement 2010. Available at: http://www.afma.gov.au/resource-centre/publications-and-forms/corporate/cost-recovery-impact-statement-2010/ AFMA (2005) AFMA Update Vol. 2 Issue 24 – November 2005. Available at: http://www.afma.gov.au/afma_update/docs/update_0224/update_0224.htm Fisheries Management Act 1991. Available at: http://www.comlaw.gov.au/Details/C2014C00258 Ministerial Direction to AFMA (2005). Available at: http://www.daff.gov.au/fisheries/domestic/harvest_strategy_policy/2005_ministerial_direction_to_afma WCPFC CMM 2010-05 Conservation and Management Measure for South Pacific Albacore. Available at: https://www.wcpfc.int/conservation-and-management-measures WCPFC CMM 2010-06 Conservation and Management Measure to establish a list of vessels presumed to have carried out illegal, unreported and unregulated fishing activities in the WCPO. Available at: https://www.wcpfc.int/conservation-and-management-measures WCPFC CMM 2011-02 Conservation and Management Measure for the Commission VMS. Available at: https://www.wcpfc.int/conservation-and-management-measures	
OVERALL PERFORMANCE INDICATOR SCORE:		**90**
CONDITION NUMBER (if relevant):		**N/A**

Evaluation table 38 - PI 3.2.1

PI 3.2.1		The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Objectives, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery's management system	Short and long-term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.	Well defined and measurable short and long-term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
	Met?	Y	Y	P
	Justification	National level long-term objectives have been highlighted in PI 3.1.3. Fishery specific long-term objectives, which reinforce the overarching objectives of the FMA 1991 are outlined in Part 1.5 of the ETBF Plan (AFMA, 2010a). In Part 1.6 of the Plan a list of measures by which these objectives are attained are described, including through the Commonwealth HSP and ecological risk assessment (ERA) process. There are clear measurable short-term objectives for target species in the ETBF. For example, the objective of the ETBF harvest strategy is to "achieve catch rates of the five key target species similar to 1997-2001 levels over a long period of time….catch over this period is thought to provide a good estimate for Maximum Economic Yield (MEY)" (AFMA, 2011a). This is being achieved through the use of a harvest strategy model (with associated reference points) based on CPUE and catch size data to recommended biological commercial catches for the five key target species. Similarly, there clear measurable short-term objectives for endangered, threatened and protected (ETP) species, such as seabirds through the threat abatement plan (TAP) for seabirds (Commonwealth of Australia, 2006). The TAP requires the fishery to maintain a bycatch rate of less than 0.05 birds per 1000 hooks set in all fishing areas (by five degree latitudinal bands) and all seasons (1 September – 30 April; 1 May – 31 August)." (AFMA, 2012a). Likewise there are clear measurable short-term objectives for sea turtles, through the sea turtle mitigation plan for the ETBF (Australia Government, 2009). This mitigation plan requires the fishery to "maintain an observed marine turtle interaction rate at or below [certain values]…and specifies management measures AFMA must implement if the interaction rates are exceeded." (AFMA, 2012a). While there are clear short-term objectives for non-target species along with ETP species in the ETBF bycatch and discarding workplan (AFMA, 2014c) and the ecological risk management (ERM) strategy (AFMA, 2012a), these are not measurable for non-target species. It was noted however that TTRAG considers annually the catch and effort on non-target retained species to determine whether measurable management targets need to be developed (Auld, pers. comm. 2014). The long-term objectives at the international level have been highlighted in PI 3.1.3. Short-term objectives for specific target, non-target and ETP species are outlined in various conservation and management measures (CMMs) and default reference points for target stocks. Objectives relating to MSC Principle 1 and 2 outcomes are set out in various WCPFC CMMs, especially 2013-01 (bigeye, yellowfin and skipjack), and CMMs relating to sharks (CMM 2010-07) seabirds (CMM 2012-07) and sea turtles (CMM 2008-03) as well		

		as national action plans (which Australia has implemented). However, many of the CMMs are not specified in terms of measurable targets or outcomes, particularly in relation to MSC Principle 2 outcomes. Well-defined short and long term objectives are explicit within the national and international management system but these are not measurable for non-target species (MSC Principle 2) at both the national and international level and ETP species at the international level. The team determined that since the national and international system for the most part had clear and measurable objectives consistent with achieving the outcomes expressed by MSC Principle 1 that the fishery would receive only a partial score for SG 100.
References		AFMA, 2010a; AFMA, 2011a; AFMA, 2012a; AFMA, 2014c Commonwealth of Australia. 2006. Fisheries Management Act 1991. Available at: http://www.comlaw.gov.au/Details/C2014C00258 WCPFC CMM 2008-03 Conservation and Management of sea turtles. Available at: https://www.wcpfc.int/conservation-and-management-measures WCPFC CMM 2010-07 Conservation and Management Measure for sharks. Available at: https://www.wcpfc.int/conservation-and-management-measures WCPFC CMM 2013-01 Conservation and Management Measure for bigeye, yellowfin and skipjack tuna in the Western and Central Pacific Ocean. Available at: https://www.wcpfc.int/conservation-and-management-measures WCPFC CMM 2012-07 Conservation and Management Measure for mitigating impacts of fishing on seabirds. Available at: https://www.wcpfc.int/conservation-and-management-measures
OVERALL PERFORMANCE INDICATOR SCORE:		**90**
CONDITION NUMBER (if relevant):		**N/A**

Evaluation table 39 - PI 3.2.2

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery under assessment.		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
	Met?	Y	Y	
	Justification	There are established decision-making processes at the national level with the AFMA Commission receiving advice from TTMAC and TTRAG as well as industry and AFMA management when making decisions. The advice provided to the Commission and the Commission's decisions must be in accordance with AFMA's legislative objectives as defined in the FMA 1991 and reiterated in the ETBF Plan (AFMA, 2010a). The TTMAC and TTRAG advice is formed taking into account the decisions of the WCPFC, on issues such as TAC setting and other relevant CMMs, for example on mitigating impacts on sea turtles or sharks. Extensive consultation processes occur prior to decisions being made by the Commission to ensure transparency and feedback mechanisms for stakeholders (see PI 3.1.2). The decision-making processes at the international level are well established and documented in aiming to apply the precautionary approach and best available scientific information. Decision-making at the Commission is by consensus and if consensus cannot be reached, voting grounds for appealing decisions, conciliation and review are all part of the established decision-making process, as described in Article 20 of the WCPFC Convention. Extensive consultation processes occur prior to and during decision-making to ensure transparency and feedback mechanisms for stakeholders (see PI 3.1.2). On the basis of the above SG 80 is considered met.		
b	**Guide post**	Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.	Decision-making processes respond to all issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.
	Met?	Y	Y	N

	Justification	At the national level, AFMA responds proactively to serious and other important issues identified in relevant research, monitoring and evaluation. An example of this is through the ERA and ERM process for the ETBF. The ERA process analysed the risk of all organisms, habitats and ecological communities that occur in the area of the fishery to the effects of fishing. It identified nine species at high risk to the effects of fishing in the ETBF and these were managed in a timely and adaptive manner by AFMA through integration into the associated ERM strategy and bycatch and discarding workplan for the fishery (AFMA, 2012a). It's not certain that AFMA responds to all issues identified through relevant research, monitoring and evaluation, particularly in regard to ecosystem components other than target species due to financial and technical constraints. A recent review of Commonwealth fisheries management and policy highlighted that AFMA focused primarily on target species through the requirements of the Commonwealth HSP, even though overarching policy required equal consideration of all ecosystem components. This was caused to some extent by the large amount of time spent understanding and discussing technical stock assessment information at TTRAG to inform decision-making, leaving little time for contemplating other issues (Borthwick, 2012). AFMA is seemingly aware of this issue as it was noted by the team that the AFMA member at a recent TTRAG meeting highlighted the importance of regularly considering bycatch species as part of their agenda (AFMA, 2013a). At the international level, the WCPFC decision-making process usually responds to serious issues that are identified through the SPC stock assessments and other regional reports. For example, WCPFC introduced measures to mitigate the capture of ETP species such as sharks (CMM 2010-07), seabirds (CMM 2012-07) and sea turtles (CMM 2008-03) as well as to reduce fishing pressure on bigeye (CMM 2013-01) through effort controls and prohibitions on fish aggregation device setting by purse seine vessels. The extent to which WCPFC responds timely to all issues that arise could be questioned, e.g. in regard to the increasing effort on South Pacific albacore - but the team considered that this needs to be considered in the context of the good stock status, as well as appropriate expectations around organisations such as RFMOs with many members and consensus decision-making where possible. SG60 is met. In relation to SG80, 'serious and other important issues', the team concluded that WCPFC have taken decisions on issues which have not been confirmed to be serious – such as some of the examples given above. There is also the stated objective of being guided by the precautionary approach. In terms of 'some account of wider implications' – it is arguable that WCPFC takes account of the wider implications of decisions, because of the need to obtain consensus. Overall, therefore, the team decided that SG80 is met for WCPFC. Note that this decision is harmonised with other WCPFC fisheries – PNA skipjack and Fiji, NZ, Cook Islands and AAFA albacore. At a national and international level, the decision-making processes respond to serious and other important issues but not all identified issues. This is completed for the most part in a transparent, timely and adaptive manner, taking into account the wider implications of decisions. Therefore only SG 80 is considered met.		
c	**Guide post**		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		Y	

	Justification	As previously outlined in PI 3.1.3, Section 3 of the *FMA 1991* requires that AFMA makes decisions that are consistent with the principles of ecological sustainable development, including the precautionary principle, which is reiterated under Section 1.5 (b) of the ETBF Plan. The ETBF harvest strategy requires the collection of catch and effort data in order to determine RBCCs for target species using a series of decision rules. The harvest strategy uses the latest and best available scientific information to support decision-making. There is evidence that decision-making processes use the precautionary approach through the AFMA Commission setting TACCs for target species such as bigeye tuna (1,056 tonnes) lower than the recommended WCPFC limit of 2,000 tonnes as defined in CMM 2013-01 (Borthwick, 2012). At the international level the WCPFC Convention Article 5(c) requires the Commission to apply the precautionary approach in decision-making and Article 6 requires the application of the precautionary approach and use of a Scientific Committee to ensure that the Commission obtains the best scientific information available for its consideration and decision-making. On the basis of the above SG 80 is considered met.		
d	**Guide post**	Some information on fishery performance and management action is generally available on request to stakeholders.	Information on fishery performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	Formal reporting to all interested stakeholders provides comprehensive information on fishery performance and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
	Met?	Y	Y	N
	Justification	At the national level, AFMA has an effective consultation process with stakeholders, particularly through the TTMAC and TTRAG processes. This has previously been highlighted under PI 3.1.2. AFMA uploads copies of the TTMAC and TTRAG minutes onto their website, which describes how the management system responds to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity. Formal reports such as the bycatch and discarding workplan (AFMA, 2014c), ABARES fishery status report (AFMA, 2011a), the ERM strategy (AFMA, 2012a) and the TACC determinations for the ETBF are all publically available on the website and stakeholders are notified of their availability through newsletters such as AFMA update and direct mail to concession holders. Any formal management changes are advertised in Australian newspapers. AFMA has to submit an annual report on its operations to the relevant Minister for Parliament (which also goes to the peak industry body), that includes an evaluation of AFMA's functioning against performance indicators set out in its corporate and operational plan. It was previously highlighted by AFMA in its submission to the review on Commonwealth fisheries legislation and policy that they needed to expand their level of public engagement through increasing the level of publically available information on fisheries management (AFMA, 2012c). It was noted by the team (as at PI 3.1.2) that decisions of the AFMA Commission (which may or may not accept MAC and RAG advice) are summarised and published regularly through the newsletter AFMA Update but the deliberations and decision-making (i.e. minutes) of Commissioners and the reasoning for their decisions is not made public (Timmiss pers. comm. 2014). At the international level, the WCPFC maintains a publically accessible website where meeting minutes, reports and scientific reports		

<table>
<tr><td></td><td></td><td colspan="3">from the Commission and subsidiary bodies are posted and are freely available for download. These provide a high level of public access and transparency, showing how scientific information is used to inform management actions, which are then monitored for effectiveness and discussed at the Commission.

At both the national and international level, information on fishery performance and management action is freely available that would provide a suitable explanation of management decision-making to stakeholders. The team considered that given there is no formal reporting of the AFMA Commission decision-making to stakeholders and AFMA itself has highlighted the need to increase publically available information on fisheries management only SG 80 is considered met.</td></tr>
<tr><td rowspan="3">e</td><td>Guide post</td><td>Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.</td><td>The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.</td><td>The management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">At the national level, there is no evidence to suggest that AFMA is disrespectful to, or defiant of Commonwealth law, or legally binding agreements reached at the international level. As outlined in PI 3.1.1, the Australian management system has well established mechanisms for administrative and legal appeals of management decision-making and has in place legal and other frameworks to respond to judicial decisions in a timely fashion (see e.g. FMA 1991). AFMA tries to minimise and avoid disputes by consulting extensively with industry through the MAC and RAG process, organising port visits and direct mail to concession holders. This allows parties to raise grievances and discuss alternative points of view, prior to AFMA making amendments to management measures and/or policy. There is some evidence stemming from recent legal disputes in the Commonwealth small pelagic fishery that AFMA could be more proactive in avoiding disputes by providing greater transparency through additional participative involvement of the public in fisheries management and a clearer and targeted advocacy/public education on the management approach in Australia fisheries (Borthwick, 2012).

At the international level WCPFC decision-making is based on consensus, so one could argue the WCPFC is to a degree proactive in avoiding legal disputes through the adoption of consensus-based decision-making.

At both the national and international level, there are formal legal frameworks in place to deal with judicial decisions in response to legal action in a timely fashion. Since a recent review considered that AFMA could be more proactive to improve its avoidance of legal disputes through greater public engagement of fisheries management in Australia, the team concluded that only SG 80 is considered met.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">AFMA, 2010a; AFMA, 2011a; AFMA, 2012a; AFMA, 2012c; AFMA, 2014c; Borthwick, 2012; TTRAG, 2013b;

AFMA (2013b) Tropical Tuna Management Advisory Committee (TTMAC) Minutes 2 May 2014 – Sydney Fish Market. Available at:</td></tr>
</table>

	http://www.afma.gov.au/managing-our-fisheries/consultation/management-advisory-committees/tropical-tuna-mac/ Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC Convention). Available at: http://www.wcpfc.int/doc/convention-conservation-and-management-highly-migratory-fish-stocks-western-and-central-pacific Fisheries Management Act 1991. Available at: http://www.comlaw.gov.au/Details/C2014C00258 WCPFC CMM 2008-03 Conservation and Management of sea turtles. Available at: https://www.wcpfc.int/conservation-and-management-measures WCPFC CMM 2010-07 Conservation and Management Measure for sharks. Available at: https://www.wcpfc.int/conservation-and-management-measures WCPFC CMM 2010-05 Conservation and Management Measure for South Pacific albacore. Available at: https://www.wcpfc.int/conservation-and-management-measures WCPFC CMM 2013-01 Conservation and Management Measure for bigeye, yellowfin and skipjack tuna in the Western and Central Pacific Ocean. Available at: https://www.wcpfc.int/conservation-and-management-measures WCPFC CMM 2012-07 Conservation and Management Measure for mitigating impacts of fishing on seabirds. Available at: https://www.wcpfc.int/conservation-and-management-measures	
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		**N/A**

Evaluation table 40 - PI 3.2.3

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with		
Scoring Issue		SG 60	SG 80	SG 100
a	Guide post	Monitoring, control and surveillance mechanisms exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A comprehensive monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	Y	Y	Y
	Justification	At the national level, AFMA takes a risk-based approach to compliance in accordance with its National Compliance Operations and Enforcement Policy 2013 (the Policy) aiming to target compliance and enforcement in the areas where it is most needed, "thereby using AFMA's resources most effectively" (AFMA, 2013b). AFMA maintains an annual compliance and enforcement program, which outlines the priority risk areas (from risk assessments conducted in the major Commonwealth fisheries), the methods proposed to address and monitor those risks and a program of general deterrence. In 2013-14 priority risks included: 1) failure to have a VMS operating at all times and 2) quota evasion. AFMA's success in targeting these high risks is assessed against a series of performance measures. AFMA's deterrence program consists of maintaining a "general presence in fishing ports and at sea…to reassure those who are complying that non-compliant activity is likely to be detected." (AFMA, 2013b). In 2013-14 the general deterrence program consisted of a series of inspections and patrols designed to target identified high-risk ports, boats and fish receivers (AFMA, 2013b). Again, AFMA's success in targeting these high risks is assessed against a series of output or performance targets. AFMA monitors catch and effort through fishing logbooks, which are required to be filled in by skippers during each trip as well as independent observers, who submit reports to AFMA that assist in verifying logbook records. AFMA's observer program targets 8.5% of all fishing effort, however a 5% level was considered representative for the fishery (CSIRO, 2002). Observers have no authority to act in an enforcement role but AFMA asks them to report on illegal fishing activity so they contribute to the overall compliance and enforcement program. There is evidence the national compliance program is working effectively with VMS compliance rates averaging 97.7% in 2013-14 compared to 96.7% in 2012-13 (AFMA, 2014). During 2013-14, 38 Commonwealth fishing concession holders faced compliance action for failing to reconcile their over-catches with one balancing their quota prior to suspension and the remaining 37 subsequently reconciling their quota after suspensions were issued by AFMA to remain in port. Non-compliance in the ETBF, specifically seems low, with only minor infringements evident for failure to complete logbooks and unauthorised processing at sea, usually resulting in warnings or cautions being issued (AFMA, 2014). At the international level, WCPFC aims to ensure compliance through VMS, IUU vessel listing, port state controls, observers, logbooks and transshipment monitoring. The combination of monitoring, control and surveillance (MCS) at WCPFC creates a system that has		

		demonstrated to be comprehensive and effective in the WCPO fisheries. AFMA contributes to the effectiveness of the regional MCS system through, for example, providing inspection vessels to the WCPFC high seas boarding and inspection program under CMM 2006-08 and ensuring that its vessels are compliant with the regional Pacific (WCPFC and FFA) VMS reporting requirements on the high seas under CMM 2011-02. The FFA also has developed a regional MCS strategy, which involves regional cooperation to monitor fishing in the area of the WCPO. The team considered that a comprehensive MSC system was in place at both a regional and national level and that it has shown to be effective, particularly at the national level to enforce relevant management measures so SG 100 is considered met.		
b	**Guide post**	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence.
	Met?	Y	Y	Y
	Justification	At the national level, the *FMA 1991* sets out penalties for infringement of fishery management measures. The penalty regime is based on two tiers of fines: low-level 'on the spot' fines (i.e. infringement notices) and larger fines, which require successful criminal prosecution. Under Section 106 and following a conviction of certain offences (Section 13 or Section 95(5)), a court may order forfeitures – including boats, gear, catches or the proceeds of the sale of catches. AFMA or a court may, in certain circumstances, also cancel fishing concessions; however, forfeiture or cancellation has been used very rarely for domestic offences in Commonwealth fisheries (Borthwick, 2012). Suspension powers are also an option but they can only be used in a supervisory manner, not as a penalty of itself (Borthwick, 2012). The existing penalty system has been highlighted as significantly constraining on AFMA's ability "to impose penalties commensurate with the offences and/or deal effectively with repeat offenders" (AFMA, 2012). Thus a more comprehensive range of penalty provisions is required at the national level to include more flexibility for AFMA in acting outs it compliance functions (Borthwick, 2012). Despite this issue it was evident that AFMA has consistently applied penalties for infringements, which are advertised to stakeholders in newsletters such as *AFMA Update* and they seem to provide effective deterrence, with overall low levels of infringements detected (see e.g. AFMA (2014)). At the international level the WCPFC relies largely on the IUU vessel listing process (CMM 2010-06) as an incentive for compliance along with port state controls, observers, logbooks and transhipment monitoring. The current IUU vessel listing highlights the success of this form of sanctioning in deterring non-compliance as only three fishing vessels remain on the 2015 vessel list (stemming from 2009 and 2010) and none have been added in the last year or more. The team considered that effective sanctions were in place to deal with non-compliance at both a national and regional level, although improvements in the range of penalty provisions and their severity is required at the national level. Despite this the team noted the success of both the national system (in terms of low number of infringements) and the international system (in terms of low number of vessels on IUU list) as evidence that SG 100 is considered met.		

c	**Guide post**	Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.	There is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	Y	Y	Y
	Justification	At the national level, there is sufficient evidence that the ETBF fishers comply with the management system, including fishers providing information of importance to ensure the effective management of the fishery, such as logbook and catch disposal records, assisting in the collection of research data, agreeing to the carriage of observers and participating in the management process through TTMAC and TTRAG. During 2013-14, 38 Commonwealth fishing concession holders faced compliance action for failing to reconcile their over-catches with one balancing their quota prior to suspension and the remaining 37 subsequently reconciling their quota after suspensions were issued by AFMA to remain in port. Non-compliance in the ETBF, specifically seems low, with only minor infringements evident for failure to complete logbooks and unauthorised processing at sea, usually resulting in warnings or cautions being issued (AFMA, 2014). There also appears to be a high level of individual fisher scrutiny of other's fishing activities as well, which exerts pressure on industry to comply (Walker, pers. comm. 2014). Fishers in the ETBF also regularly participate in compliance workshops and contribute to, and are consulted on the compliance risk assessment process. Information of importance is shared through this process and through specific intelligence gathering. Compliance reports are provided to TTMAC for information. The AFMA national compliance reports and specific levels of observer coverage (5.7% of fishing effort in 2012, which is above the 5% representative target (Bravington et al. 2002) in the ETBF provide a high degree of confidence that fishers comply with the management system at a national level. At the regional level WCPFC aims to ensure compliance through VMS, IUU vessel listing, port state controls, observers, logbooks and transshipment monitoring. The current IUU vessel listing highlights the success of the regional MCS strategy in deterring non-compliance as only three fishing vessels remain on the 2015 vessel list (stemming from 2009 and 2010) and none have been added in the last year or more. Therefore SG 100 is considered met.		
d	**Guide post**		There is no evidence of systematic non-compliance.	
	Met?		Y	
	Justification	There is no evidence of systematic non-compliance in the ETBF fishery (see, AFMA 2014) so SG 80 is considered met.		
References		AFMA, 2012c; AFMA, 2013; AFMA, 2013c; Bravington et al. 2002; Borthwick, 2012; AFMA, 2014e; AFMA, 2014f Fisheries Management Act 1991. Available at: http://www.comlaw.gov.au/Details/C2014C00258		

	WCPFC CMM 2006-08 Western and Central Pacific Fisheries Commission boarding and inspection procedures. Available at: https://www.wcpfc.int/conservation-and-management-measures WCPFC CMM 2010-06 Conservation and Management Measure to establish a list of vessels presumed to have carried out illegal, unreported and unregulated fishing activities in the WCPO. Available at: https://www.wcpfc.int/conservation-and-management-measures WCPFC CMM 2011-02 Conservation and Management Measure for the Commission VMS. Available at: https://www.wcpfc.int/conservation-and-management-measures WCPFC - IUU Vessel List for 2014. Available at: http://www.wcpfc.int/doc/wcpfc-iuu-vessel-list-2013

OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation table 41 - PI 3.2.4

PI 3.2.4		The fishery has a research plan that addresses the information needs of management		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Research is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2.	A research plan provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.	A comprehensive research plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.
	Met?	Y	Y	N
	Justification	At the national level, there is a five year strategic research plan in place for the ETBF (AFMA, 2012d) that aims to assist the TTMAC "to identify and support research that will help achieve the management goals for the tropical tuna fisheries". Research areas range from biological to economic and social with a range of priorities identified including: improved understanding of target species stock structure, bycatch mitigation, review of the ecological risk assessments and cost/benefit analysis of management costs against fishery outputs (AFMA, 2012d). These highlight that the strategic research plan covers all three MSC Principles. Annual research priorities for the fishery are then identified by TTRAG and TTMAC and disclosed in a separate document (AFMA 2014g). Priorities for the 2014/15 financial year include: 1. Data management, standardisation of CPUE and size data, development of fishery indicators, application of the ETBF harvest strategy, and provision of stock assessment advice to TTRAG; 2. Determination of the spatial dynamics and movement rates of the principal target species within the ETBF and connectivity with the broader WCPO – beyond tagging. This may include but is not limited to: Stable isotope analysis, otolith micro-chemistry or novel genetic techniques; 3. Determination of SWO growth and maturity relevant to the southwest Pacific stock; and 4. Reducing seabird bycatch in pelagic longline fisheries: Hook Pod trials Research projects are assessed by the AFMA Research Committee (ARC) and Commonwealth Fisheries Research Advisory Board (COMFRAB) for their need, feasibility and likelihood of contributing to improved management of the fishery. At the international level, the WCPFC Strategic Research Plan 2012-16 (AFMA, 2012d) addresses four overall research and data collection priorities: monitoring of fishing activities through the collection, compilation and validation of data from the fishery, monitoring and assessment of target stocks, monitoring and assessment of non-target or associated and dependent species (NTADS) and of the pelagic ecosystems of the WCPO, and evaluation of existing CMMs and of potential management options. This plan along with the SPC, FFA and national research and monitoring plans is a strategic approach to ensuring reliable and timely information is available to		

		inform management decisions. The plan itself relates largely to scientific and ecosystem research targeting MSC Principles 1 and 2 however and does not directly address governance issues under MSC Principle 3. The WCPFC also has a shark research plan (SRP) (WCPFC, 2010) that is led by the SPC and will contain assessment, research coordination and fishery statistics improvements. The overall aim of the plan is to evaluate the status of blue, mako, oceanic whitetip, silky and thresher sharks in the WCPO and to establish better datasets to support future assessments. The team considered the strength and inclusiveness of the national research plan for the ETBF but noted that at a regional level the WCPFC strategic research plan was not comprehensive due to an absence of MSC Principle 3 research, Consequently the fishery was only considered to meet SG 80.		
b	**Guide post**	Research results are available to interested parties.	Research results are disseminated to all interested parties in a timely fashion.	Research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available.
	Met?	Y	Y	N
	Justification	At the national level, the strategic research plan for the ETBF is made publically available on the AFMA website and distributed to interested stakeholders when requested as well as being provided to stakeholders through the TTMAC and TTRAG. Research results are provided to TTMAC and TTRAG and reports are published before being uploaded to the AFMA or Fisheries Research and Development Corporation (FRDC) websites. Relevant fisheries results are also published in peer-reviewed scientific journals. There is usually a lag time associated with the distribution of reports to the public through websites, reducing availability. It was evident that the research reports section of the AFMA website hasn't been updated since 2011. At the regional level, the WCPFC and SPC research plans (WCPFC, 2012a) and results are widely and publically available on their respective websites acknowledging the lag between obtaining logbook data from fleets and entry of data. However, changes in the research plan take time to become effective and therefore the information, while widely and publically available, may not be up to date and timely. The team considered that although national and international research plans and results are disseminated to interested parties, they may not be made publically available promptly due to administrative processes (e.g. clearance and upload to the website), particularly at the national level so only SG 80 is considered met.		
References		AFMA, 2012d; AFMA 2014g; WCPFC, 2010; WCPFC, 2012a		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation table 42 - PI 3.2.5

PI 3.2.5		There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives There is effective and timely review of the fishery-specific management system		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	The fishery has in place mechanisms to evaluate some parts of the management system.	The fishery has in place mechanisms to evaluate key parts of the management system	The fishery has in place mechanisms to evaluate all parts of the management system.
	Met?	Y	Y	N
	Justification	At the national level, there is a system of monitoring to evaluate key parts of the management system, including the performance of AFMA in meeting its legislative objectives, the performance of AFMA's advisory committees and the effectiveness of management measures and policies instituted. For example, it is a requirement that AFMA and TTMAC review the effectiveness of the ETBF Plan (AFMA, 2010a) including the measures taken to achieve its objectives, against certain performance criteria, at least once every five years. TTMAC is also subject to a performance assessment under FMP 1 by the Commission at intervals of no longer than two years. TTMAC conducts a self-assessment against certain criteria, which is then provided to the Commission to assist its determination of TTMAC's overall performance according to certain criteria as detailed in FMP 1. Under the FAA 1991, AFMA must also submit annual reports on its operations to the relevant Minister for presentation to Parliament. The report includes an evaluation of AFMA's "overall performance against the performance indicators set out in the corporate plan and annual operational plan". AFMA's performance against its objectives and the ETBF specifically, is also subject to external review by: (i) ABARES through the annual publication of fisheries status reports, which is an independent evaluation of the biological condition of fish stocks and economic status of fisheries; (ii) SEWPAC through the five-yearly (or more frequently if required) assessment of ecological sustainability as required under the EPBC Act 1999; (iii) the Australian Audit Office in a periodic review of aspects of AFMA's performance; and (iv) the Senate Standing Committee of Rural and Regional Affairs in Senate Estimate hearings three times a year. At the regional level, there is a regional report developed by the WCPFC Secretariat, which details compliance of members with the reporting provisions of the Commission. Internal review is also conducted by the WCPFC through assessing the implementation and performance of CMMs through reports of member countries to the Commission and stock assessments. This allows Commission meetings to provide an overall review of key processes and outcomes. Stock assessments undertaken by SPC or CSIRO are also subject to peer-review and occasional external review to ensure that scientific processes remain robust. The team agreed that key parts of the fishery specific management system could be reviewed through mechanisms in place at both the national and international level but there was no comprehensive regular evaluation of the system as a whole, particularly at the regional level, so only SG 80 is considered met.		

b	**Guide post**	The fishery-specific management system is subject to occasional internal review.	The fishery-specific management system is subject to regular internal and occasional external review.	The fishery-specific management system is subject to regular internal and external review.
	Met?	Y	Y	N
	Justification	At the national level, AFMA and the ETBF are subject to regular internal and external review as outlined in scoring element (a). Furthermore in 2012, the Australian Government initiated an external review on the performance of AFMA and the Commission in the Administration of its Statutory Responsibilities (Borthwick, 2012). This highlighted a number of recommendations to improve the legislative framework governing Commonwealth fisheries management arrangements. At the regional level, WCPFC does not have a regular program of external review. However, in 2008 the Commission agreed that an independent performance review be undertaken, which was completed in 2011 (WCPFC, 2011a). A schedule of responses and actions were developed in response to the recommendation of the review, which were considered by WCPFC in 2012. A recent Independent Review of the Commission's Transitional Science Structure and Functions recommended periodic external review of the stock assessments, which has been adopted by the WCPFC (MRAG, 2009). As specified in scoring element (a) an annual report is provided to the Commission by the Secretariat on compliance of members with the reporting provisions of the Commission. Internal review is also conducted by the WCPFC through assessing the implementation and performance of CMMs through the reporting provisions within the CMMs themselves or the annual reports of member countries to the Commission. Stock assessments undertaken by SPC or CSIRO are subject to peer-review and occasional external review. The team agreed that while the national system was subject to regular internal and external review at the regional level there is no regular external review so only SG 80 is considered met.		

References	AFMA, 2009; AFMA, 2010a; AFMA, 2014a; AFMA, 2014d; Borthwick, 2012; MRAG, 2009; WCPFC, 2011a ABARES (2013) Fishery status reports 2012. Available at: http://www.daff.gov.au/abares/pages/publications/display.aspx?url=http://143.188.17.20/anrdl/DAFFService/display.php?fid=pb_fsr12d9abm_00220131029_11a.xml AFMA (2013) TTMAC Minutes available at http://www.afma.gov.au/managing-our-fisheries/consultation/management-advisory-committees/tropical-tuna-mac/ AFMA (2013) TTRAG Minutes available at http://www.afma.gov.au/managing-our-fisheries/consultation/resource-assessment-groups/ttrag/ Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC Convention). Available at: http://www.wcpfc.int/doc/convention-conservation-and-management-highly-migratory-fish-stocks-western-and-central-pacific Fisheries Management Act 1991. Available at: http://www.comlaw.gov.au/Details/C2014C00258 http://www.daff.gov.au/fisheries/domestic/harvest_strategy_policy/2005_ministerial_direction_to_afma	
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		**N/A**

Appendix 1.2 Conditions

As set out above, the assessment team have concluded provisionally that the fishery should be certified, subject to nine conditions, three on Principle 1 (albacore), two on Principle 1 (yellowfin), two on Principle 1 (swordfish) and two on Principle 2. These are given below, together with the corresponding milestones and client action plan.

Note that in accordance with the MSC Certification Requirements v1.3 (Annex CI), there are specific requirements in relation to harmonisation between overlapping fisheries, including regarding harmonisation of conditions and condition milestones and timelines. Where possible, the conditions of relevant PIs have been harmonised with the assessments listed in Section 4.1. These relate in particular to the conditions under P1. To ensure that the client can realistically achieve the given milestones, the allocated timelines are more generous than they would have been with full harmonisation. This approach takes into account the work already undertaken by other MSC fishery clients, including the establishment of the WCPO Tuna MSC Principle 1 Alignment Group in 2014, in which the client may participate.

Table 43. Condition 1

Performance Indicator	PI 1.1.2 – Target Reference Point - Albacore
Score	75
Rationale	For full rationale see rationale for PI 1.1.2, albacore.
Condition	The management system should formally adopt a target reference point for the South Pacific albacore stock, which is consistent with maintaining the stock at B_{MSY} or some other measure with similar intent or outcome. This target reference point should be used for management purposes. Note: This condition may be addressed jointly with conditions 2 and 3.
Milestones	By the first annual surveillance audit, there shall be evidence that the client has started or joined a process of consultation and representation for the establishment of a precautionary target reference point with appropriate regional management bodies. Score 75. By the second annual surveillance audit, there shall be evidence of ongoing representations to, and discussions in, appropriate regional management bodies, relating to a target reference point for South Pacific albacore. Score 75. By the third annual surveillance audit a target reference point for regional management of the South Pacific albacore stock should be formally adopted by the WCPFC or other appropriate regional management body with sufficient control over the fishery on the whole stock. Score 80.
Client action plan	See Appendix 6
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other members of the WCPO Tuna MSC Principle 1 Alignment Group[30], other delegations to FFA, PNA and WCPFC and environmental NGOs as appropriate.

[30]https://sites.google.com/site/seafoodcompaniestunamanagement/home/wcpo_tuna-p1_alignment

Table 44. Condition 2

Performance Indicator	PI 1.2.1 – Harvest Strategy - Albacore
Score	70
Rationale	See rationale for PI 1.2.1, albacore
Condition	The fishery management system should put in place a regional harvest strategy, incorporating limit and target reference points (management objectives), a harvest control rule and management actions, such that the strategy is responsive to the status of the stock and the elements of the strategy work together to maintain the stock at or around the target level. The key missing elements of the harvest strategy at present are 1. a target reference point formally adopted by the regional management system, and 2. a well-defined harvest control rule with associated management actions. These issues are also addressed specifically in conditions 1 and 3.
Milestones	By the first, second and third annual surveillance audits, there will be evidence that work is on-going on a target reference point and harvest control rule as required under Conditions 1 and 3. Score 70 By the fourth annual surveillance audit the client should provide evidence that the key missing elements of the harvest strategy (as covered by conditions 1 and 3) are put in place. Score 80.
Client action plan	See Appendix 6
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other members of the WCPO Tuna MSC Principle 1 Alignment Group, other delegations to FFA, PNA and WCPFC and environmental NGOs as appropriate.

Table 45. Condition 3

Performance Indicator	PI 1.2.2 – Harvest Control Rules - Albacore
Score	60
Rationale	See rationale for PI 1.2.2, albacore
Condition	A well-defined regional-level harvest control rule should be put in place, with associated management actions (in the form of a WCPFC CMM or another form as appropriate) which together act effectively to reduce exploitation rates as the limit reference point is approached. The selection of the harvest control rule should take into account the main uncertainties regarding the status of the stock or the impact of the fishery (or other uncertainties if considered important). Note: This condition can be addressed together with conditions 1 and 2.
Milestones	By the first annual surveillance audit, there shall be evidence that the client has started a process of consultation and representation for the establishment of a precautionary and robust harvest control rule with appropriate regional management bodies. Score 60. By the second and third annual surveillance audits, there shall be evidence of ongoing representations to, and discussions in, appropriate regional management bodies, relating to a robust harvest control rule for South Pacific albacore. Score 60. By the fourth annual surveillance audit, the client should provide evidence that the harvest control rule and associated management actions are put in place. Score 80.
Client action plan	See Appendix 6
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other members of the WCPO Tuna MSC Principle 1 Alignment Group, other delegations to FFA, PNA and WCPFC and environmental NGOs as appropriate.

Table 46. Condition 4

Performance Indicator	PI 1.2.1 – Harvest Strategy - Yellowfin
Score	70
Rationale	See rationale for 1.2.1 – yellowfin
Condition	The fishery management system should put in place a regional harvest strategy, incorporating limit and target reference points (management objectives), a harvest control rule and management actions, such that the strategy is responsive to the status of the stock and the elements of the strategy work together to maintain the stock at or around the target level. The key missing element of the harvest strategy at present is a well-defined harvest control rule with associated management actions. This issue is also addressed specifically in condition 5.
Milestones	By the first, second and third annual surveillance audits, there will be evidence that work is on-going on a harvest control rule as required under Condition 5. Score 70 By the fourth annual surveillance audit the client should provide evidence that the key missing element of the harvest strategy (as covered by Condition 5) is in place. Score 80.
Client action plan	See Appendix 6
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other members of the WCPO Tuna MSC Principle 1 Alignment Group, other delegations to FFA, PNA and WCPFC and environmental NGOs as appropriate.

Table 47. Condition 5

Performance Indicator	PI 1.2.2 – Harvest Control Rule - Yellowfin
Score	65
Rationale	See rationale for 1.2.2 – yellowfin
Condition	A well-defined regional-level harvest control rule should be put in place, with associated management actions (in the form of a WCPFC CMM or another form as appropriate) which together act effectively to reduce exploitation rates as the limit reference point is approached. The selection of the harvest control rule should take into account the main uncertainties regarding the status of the stock or the impact of the fishery (or other uncertainties if considered important). Note: This condition can be addressed together with condition 4.
Milestones	By the first annual surveillance audit, there shall be evidence that the client has started a process of consultation and representation for the establishment of a precautionary and robust harvest control rule with appropriate regional management bodies. Score 65. By the second and third annual surveillance audits, there shall be evidence of on-going representations to, and discussions in, appropriate regional management bodies, relating to a robust harvest control rule for western central Pacific yellowfin. Score 65. By the fourth annual surveillance audit, the client should provide evidence that the harvest control rule and associated management actions are put in place. Score 80.
Client action plan	See Appendix 6
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other members of the WCPO Tuna MSC Principle 1 Alignment Group, other delegations to FFA, PNA and WCPFC and environmental NGOs as appropriate.

Table 48. Condition 6

Performance Indicator	PI 1.1.2 – Limit Reference Point - Swordfish
Score	75
Rationale	See full rationale for PI 1.1.2 - swordfish
Condition	A limit reference point needs to be defined for the total stock area (WCPFC). This is to ensure that the stock does not fall below a level at which there is an appreciable risk to impairing reproductive capacity.
Milestones	By the first annual surveillance audit, there shall be evidence that the client has started or joined a process of consultation and representation for the establishment of a precautionary target reference point with appropriate regional management bodies. Score 75. By the second annual surveillance audit, there shall be evidence of ongoing representations to, and discussions in, appropriate regional management bodies, relating to a target reference point for South West Pacific swordfish. Score 75. By the third annual surveillance audit a target reference point for regional management of the South West Pacific swordfish stock should be formally adopted by the WCPFC or other appropriate regional management body with sufficient control over the fishery on the whole stock. Score 80.
Client action plan	See Appendix 6
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other delegations to FFA, PNA and WCPFC and environmental NGOs as appropriate.

Table 49. Condition 7

Performance Indicator	PI 1.2.2 – Harvest Control Rules - Swordfish
Score	65
Rationale	See full rationale for PI 1.2.2 - swordfish
Condition	A well-defined WCPFC harvest control rule should be put in place with associated management actions (in the form of a WCPFC CMM or another form as appropriate) which together act effectively to reduce exploitation rates as the limit reference point is approached. The selection of the harvest control rule should take into account the main uncertainties regarding the status of the stock or the impact of the fishery (or other uncertainties if considered important).
Milestones	By the first annual surveillance audit, there shall be evidence that the client has started a process of consultation and representation for the establishment of a precautionary and robust harvest control rule with appropriate regional management bodies. Score 65. By the second and third annual surveillance audits, there shall be evidence of on-going representations to, and discussions in, appropriate regional management bodies, relating to a robust harvest control rule for South West Pacific swordfish. Score 65. By the fourth annual surveillance audit, the client should provide evidence that the harvest control rule and associated management actions are put in place. Score 80.
Client action plan	See Appendix 6

Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other delegations to FFA, PNA and WCPFC and environmental NGOs as appropriate.

Table 50. Condition 8

Performance Indicator	PI 2.3.1 – ETP Species (Turtles And Shortfin Mako) Outcome
Score	75
Rationale	For turtles and shortfin mako, scoring issue b) is not met at the SG80 level: *Direct effects are highly unlikely to create unacceptable impacts to ETP species*. For turtles, the issue is that while the measures recently put in place are expected to work, based on other fisheries, no data from ETBF are yet available to show that turtle bycatch has been reduced to below trigger levels. For shortfin mako, the issue is that bycatch by this fishery is not negligible, and no population estimates exist which allow the team to judge with the appropriate degree of certainty whether or not fishing mortality impacts on the stock are ‘highly unlikely’ to be unacceptable.
Condition	Turtles: • Continue to collect data, which allows turtle interactions per 1000 hooks to be estimated. • If data show that interactions have reduced to below the trigger level, no further action is required. • If data show that there remains a significant risk of interactions above the trigger level, further management measures should be implemented, either by Walker Seafoods Australia or by the ETBF as a whole. Shortfin mako: The fishery may show that it is not having an unacceptable impact on this species by various means: i) further reducing the mortality of this species from the fishery such that impacts are highly unlikely; and/or ii) providing an estimate of the total population size of shortfin mako against which the existing catch rate can be compared and shown to be acceptable; and/or iii) providing evidence on trends in shortfin mako population in the area of the fishery, to show that there is no evidence of any reduction in the population in the area associated with the fishery; and/or iv) any other appropriate method.
Milestones	Turtles: Year 1: Collect and analyse data, assess whether trigger level is exceeded. Year 2: If trigger level exceeded, discuss appropriate management measures. Continue to collect and analyse data. Year 3: If trigger level exceeded in Year 1, implement agreed management measures. If trigger level exceeded in Year 2, discuss appropriate management measures. Continue to collect and analyse data. Year 4: If trigger level exceeded in Years 1 or 2, implement agreed management measures. If trigger level exceeded in Year 3, discuss appropriate management measures. If trigger level is not exceeded in any of the first three years, no further management action is required. Shortfin mako: For approach i) above: Year 1: Discuss further possible measures to reduce shortfin mako catch with AFMA and/or other organisations as appropriate. Client to develop draft

	mitigation plan for shortfin mako with AFMA. Performance of fishery is expected to be improved by the volume of landed shortfin mako being reduced (more live releases, improving outcome score) Year 2: AFMA to review, revise, finalise and implement mitigation plan for shortfin mako with client and stakeholder input Year 3: AFMA is to provide before and after data to show whether mitigation plan is working. Client to engage with scientists to undertake analysis of before and after implementation of mitigation plan. Year 4: If the percentage reduction in catch is insufficient, client and AFMA to review and strengthen mitigation plan. For approaches ii) and/or iii) above: Year 1: Collate and analyse data, in consultation with AFMA or any other appropriate organisation or expert. Year 2: Provide assessment of the impact of the fishery in relation to the population size, and/or evidence of trends in the population in the area of the fishery over a recent period, and/or other data, which allow the impacts of the fishery on the stock to be approximately quantified. Year 3: If the assessment does not suggest that impacts are highly unlikely to be unacceptable, implement further management measures to reduce impact. Year 4: If necessary, show that the additional management measures put in place have reduced or are likely to reduce the impact of the fishery to acceptable levels.
Client action plan	See Appendix 6
Consultation on condition	Client is to consult with AFMA

Table 51 Condition 9

Performance Indicator	PI 2.3.3 – ETP species (shortfin mako) information
Score	75
Rationale	For shortfin mako, scoring issue b) is not met at the SG80 level*: Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species*. For shortfin mako, the issue is the same as that raised in the condition for PI 2.3.1, i.e. that bycatch by this fishery is not negligible, and no population estimates exist which allow the team to judge with the appropriate degree of certainty whether or not the fishery may be a threat to the protection of the population.
Condition	Collect and analyse data to provide an estimate of the total population size of shortfin mako against which the existing catch rate can be compared, and/or provide evidence on trends in shortfin mako population in the area of the fishery, in relation to the activity of the fishery. Actions is anticipated to enhance fishery performance by providing more accurate estimates of stock structure and status of shortfin mako as an ETP species.
Milestones	Year 1: Client to collate and analyse data, in consultation with AFMA or any other appropriate organisation or expert. Year 2: Client to provide assessment of the impact of the fishery in relation to the population size, and/or evidence of trends in the population in the area of the fishery over a recent period, and/or other data, which allow the impacts of the fishery on the stock to be approximately quantified.
Client action plan	See Appendix 6
Consultation on condition	Client is to consult with AFMA

Appendix 2. SICA tables with scores and justifications

SICA scoring table for PI 2.1.1.

Performance Indicator	Risk-causing activities from fishery under assessment	Spatial scale of activity	Temporal scale of activity	Intensity of activities	Relevant subcomponents	Consequence score	MSC Score
PRINCIPLE TWO: Retained Species Outcome	• **Fishing** • Gear loss • Bait collection • Other	2	6	3	**Population size**	2	80
Rationale for selecting worst plausible case scenario	Fishing is the most significant risk-causing activity. No other significant risk-causing activities were identified. Mahi mahi (*Coryphaena hippurus*) is the most important retained, non-quota species for the ETBF. All stakeholders agreed that this species was the most vulnerable retained species in the fishery due to lack of management measures/harvest control rules etc.						
Rationale for Spatial scale of activity	The distribution of this species is thought be a southwest Pacific stock, which occurs up to depths of 85m (Collette et al.; 2011b[31]) and in greater numbers on the continental shelf. The fishery is thought to interact with about 10-15% of the population. Small juveniles are often found associated with floating objects (Kingsford & Defries, 1999[32]). Dependency on high dissolved oxygen concentrations restricts the species to the surface layers above the thermocline (Bennetti *et al*.; 1995[33]). Small schools are encountered of around 10-15 individuals, unlike tuna species such as yellowfin (*Thunnus albacares*) which school together in much larger numbers.						

[31] Collette, B., Acero, A., Amorim, A.F., Boustany, A., Canales Ramirez, C., Cardenas, G., Carpenter, K.E., de Oliveira Leite Jr., N., Di Natale, A., Fox, W., Fredou, F.L., Graves, J., Viera Hazin, F.H., Juan Jorda, M., Minte Vera, C., Miyabe, N., Montano Cruz, R., Nelson, R., Oxenford, H., Schaefer, K., Serra, R., Sun, C., Teixeira Lessa, R.P., Pires Ferreira Travassos, P.E., Uozumi, Y. & Yanez, E. 2011b. Coryphaena hippurus. The IUCN Red List of Threatened Species. Version 2014.2.

[32] Kingsford, M.J. & Defries, A. 1999. The ecology of and fishery for *Coryphaena* spp. in the water around Australia and New Zealand. Scientia Marina, 63(3-4):267-275

[33] Benetti, D., R. Brill, S. Kraul. 1995. The standard metabolic rate of dolphin fish. Journal of Fish Biology, 46(6): 987-996

	Stakeholders also note, they're caught in similar area as *T.albacares* i.e. similar habitat range.
Rationale for Temporal scale of activity	The UoC overlaps with *C.hippurus* year round. They are not a specifically targeted species, and are more an opportunistic catch of the fishery based on availability (i.e. if present, the fish are retained). Not consistent catch across the entire range of the fishery. Some trips might not catch any, some 15-20 per trip.
Rationale for Intensity of activity	Assumptions have been made on the stock distribution, that the fish occurring in the ETBF are part of a southwest Pacific stock. Areas of local depletion have been reported, all be it in other oceans. There is a lot of uncertainty surrounding the size and health of the mahi mahi stock. Independent tagging studies in New South Wales indicate the species is strongly site associated (Kingsford & Defries, 1999). It should be noted that they appear to be more widely distributed in other areas of the world (in Mexico and California for example, individuals have been shown to disperse widely. Large-scale migrations have resulted in high genetic variation and gene flow (Tripp-Valdez et al., 2010[34]; Alejo-Plata et al., 2011[35]). The stakeholders agreed it is likely that other fishing activity elsewhere in the southwest Pacific could be having impacts on the stock, but the extent is unknown. A precautionary approach was taken and a moderate detection of activity at the broader spatial scale was agreed by the group.
Rationale for choosing most vulnerable sub-component	Population size was chosen as the most vulnerable sub-component as fishing has the most direct affects the population size. The species has a high reproductive capacity (highly fecund – Smallwood et al.; 2013[36]) so reproductive capacity is not affected. The total population is not available to the fishery as not much fishing is conducted on the continental shelf and so the area remains largely unexploited. As a short-lived, highly mobile species, its geographical range and sex structure is also not likely to be affected.
Rationale for Consequence score	On the assumption that the stock impacted here is the SW Pacific stock, it is possible that changes in population size or growth rates might be detectable (although not in the ETBF), especially as there is evidence of this occurring in other areas of the world. Even in those places however, the dynamics of the species is not affected overall. The precautionary approach was therefore taken on this basis.

[34] Tripp-Valdez, M. A., García de León, F. J., Ortega-García, S., Lluch-Cota, D., López-Martínez, J., Cruz, P., 2010. Population genetic structure of dolphinfish (Coryphaena hippurus) in the Gulf of California, using microsatellite loci. Fisheries Research 105, 172-177

[35] Alejo-Plata, C., Díaz-Jaimes, P., Salgado-Ugarte, I. H., 2011. Sex ratios, size at sexual maturity, and spawning seasonality of dolphinfish (Coryphaena hippurus) captured in the Gulf of Tehuantepec, Mexico, Fisheries Research 110, 207-216

[36] Smallwood, C.B.; Hesp, S.A. Beckley, L.E. 2013. Biology, stock status and management strategies for selected species in south-western Australia. Fisheries Research Report, No. 242. Government of Western Australia, Department of Fisheries

SICA scoring table for PI 2.2.1.

Performance Indicator	Risk-causing activities from fishery under assessment	Spatial scale of activity	Temporal scale of activity	Intensity of activities	Relevant subcomponents	Consequence score	MSC Score
PRINCIPLE TWO: **Bycatch Species Outcome**	• **Fishing** • Gear loss • Bait collection •	1	4	1	**Population size**	1	100
Rationale for selecting worst plausible case scenario	Fishing was the only risk-causing activity identified. Lancetfish were identified as the species with highest risk as they are a dominant bycatch species, along with snake mackerel. Both species were considered (see table for snake mackerel below). The TTRAG monitor the discard of this species as the large volume of catch discarded may be impacting the species but not trends have been determined as yet (TTRAG, 2013b[37]).						
Rationale for Spatial scale of activity	This species is encountered more often by Walker Seafood vessels when fishing further south in the ETBF. They are caught both in and offshore, on all types of longline sets. They are widely distributed across the Pacific (Paxton *et al*., 1989[38]), meaning that the spatial extent of the unit of certification overlaps minorly with the overall stock (<1%).						
Rationale for Temporal scale of activity	Lancetfish tend to be present most of the fishing season for Walker Seafoods vessels. There are some months when they are not encountered in the areas where the vessels target.						
Rationale for Intensity of activity	Negligible impact is anticipated. No CPUE trends have so far been identified by TTRAG (2013b). Longline catch (especially of swordfish) is more heavily influenced by the lunar cycle, unlike trawling which can use localised depletion. Catch can change on a daily basis, even when setting in the same geographical location based on the phase of the moon. The closer to full moon it is, the higher the volume of catch. A dynamic environment with the movement of currents (mainly influenced by EAC) and localised upwellings associated with the seamounts (Brewer *et al*., 2007) which can make catch variable, and the likelihood of activity detection remote.						

[37] Tropical Tuna Research Assessment Group (TTRAG). 2013b. Minutes TTRAG 7. 24-25th July, 2013. Mooloolaba. Australian Fisheries Management Authority

[38] Paxton, J.R., Hoese, D.F.; Allen, G.R.; Hanley, J.E. 1989. Pisces. Petromyzontidae to Carangidae. Zoological Catalogue of Australia, Vol. 7. Australian Government Publishing Service, Canberra, 665 p.

Rationale for choosing most vulnerable sub-component	Population size was chosen as the most vulnerable sub-component. As deeper water species, there is an element of the fishery that cannot impact the stock. Very little information is known about the other life history characteristics of these species. The PSA conducted by AFMA in 2007 noted the lack of these attributes for both short and long-nosed lancetfish; for example ages at average maturity and fecundity information is unknown. Population size was chosen as the most vulnerable sub-component, as fishing has the most direct affects the population size. The species has a high reproductive capacity (highly fecund – Smallwood *et al*.; 2013) so reproductive capacity is not affected. The total population is not available to the fishery as not much fishing is conducted on the continental shelf and so the area remains largely unexploited. As a short-lived, highly mobile species, its geographical range and sex structure is also not likely to be affected.
Rationale for Consequence score	On the assumption that the stock impacted here is the western central Pacific stock, an insignificant change to the population size/growth rates is anticipated. This is due to the small number of vessels in the fishery (three in total), the catch variability. The overall volume that these species are discarded in the unit of certification is unlikely to be detectable against background variability of the population.

Performance Indicator	Risk-causing activities from fishery under assessment	Spatial scale of activity	Temporal scale of activity	Intensity of activities	Relevant subcomponents	Consequence score	MSC Score
PRINCIPLE TWO: **Bycatch Species Outcome**	• **Fishing** • Gear loss • Bait collection • Other identified risk-causing activities (please specify)	1	3	1	**Population size**	1	100
Rationale for selecting worst plausible case scenario	Snake mackerel is of high risk as they are a dominant bycatch species along with lancetfish. The TTRAG monitor the discard of this species as the large volume of catch discarded may be impacting the species.						
Rationale for Spatial scale of activity	This species is encountered more often by Walker Seafood vessels when fishing further north in the ETBF. They are widely distributed across the western central Pacific (Dambacher *et al*.; 2010), meaning that the unit of certification has a very small overlap with the overall stock (<1%).						
Rationale for Temporal scale of activity	This species tends to be seasonally encountered by Walker Seafoods vessels. There are more months when they are not encountered in the areas where the vessels target.						
Rationale for Intensity of activity	As with lancetfish, a negligible impact is anticipated. No CPUE trends have so far been identified by TTRAG (2013b). Longline catch (especially of swordfish) is more heavily influenced by the lunar cycle, unlike trawling which can use localised depletion. Catch can change on a daily basis, even when setting in the same geographical location based on the phase of the moon. The closer to full moon it is, the higher the volume of catch. A dynamic environment with the movement of currents (mainly influenced by EAC) and localised upwellings associated with the seamounts (Brewer *et al*., 2007) which can make catch variable, and the likelihood of activity detection remote.						

Rationale for choosing most vulnerable sub-component	Population size was chosen as the most vulnerable sub-component. As deeper water species, there is an element of the fishery that cannot impact the stock.
Rationale for Consequence score	On the assumption that the stock impacted here is the western central Pacific stock, an insignificant change to the population size/growth rates is anticipated. This is due to the small number of vessels in the fishery (three in total), the catch variability. The overall volume that this species is discarded in the unit of certification is unlikely to be detectable against background variability of the population.

Appendix 3. Peer Review Reports

Peer Review 1 - Overall Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	Yes	Conformity Assessment Body Response
Justification: This is a small well -managed fishery. In my view the team has arrived at an appropriate conclusion that it should be certified. I have suggested only minor changes to the original scoring (1.1.2 SWO, 1.2.1 SWO, 2.1.2, 2.2.1,3.1.3 and 3.2.1) for consideration. Most of my comments dealt with some small changes to the justifications.		See responses to detailed comments below

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe?	No	Conformity Assessment Body Response
Justification: None of the conditions have a timeframe. This is included in the client action plan. For Conditions 6 and 7 - there is no statement of how the condition is expected to achieve the outcome, rather they read as an action plan only.		As per MSC guidelines, a timeframe is given in the milestones for each condition – see Tables 43-51. Condition 8 (was 6 prior to peer review comments) states for turtles: If data show that there remains a significant risk of interactions above the trigger level, further management measures should be implemented, either by Walker Seafoods Australia or by the ETBF as a whole and for shortfin mako: The fishery may show that it is not having an unacceptable impact on this species by various means: i) further reducing the mortality of this species from the fishery such that impacts are highly unlikely; and/or ii) providing an estimate of the total population size of shortfin mako against which the existing catch rate can be compared and shown to be acceptable; and/or iii) providing evidence on trends in shortfin mako population in the area of the fishery, to show that there is no evidence of any reduction in the population in the area associated with the fishery; and/or iv) any other appropriate method (see Table 50). Condition 9 (was 7 prior to peer reviewer comments) is more straightforward since it relates to information on shortfin mako – i.e. the condition is simply to collect necessary information.

If included:

Do you think the client action plan is sufficient to close the conditions raised?	**Yes/?**	**Conformity Assessment Body Response**
Justification: ***Unfortunately the conditions for P1 involve action from the WCPFC. The CAP may play only a minor role in ensuring WCPFC action***		Indeed – this is a common problem in conditions on P1, particularly for stocks such as these.

For reports using the Risk-Based Framework please follow the link.

For reports assessing enhanced fisheries please follow the link.

General Comments on the Assessment Report (optional)

This is a well-written report providing excellent information and reasonable justifications for the scoring given. The difficulty for this fishery (as with other migratory fisheries) is that the MSC process for P1 takes account of stock wide management.

Performance Indicator Review

Please complete the table below for each Performance Indicator which are listed in the Conformity Assessment Body's Public Certification Draft Report.

Performance Indicator	**Has all the relevant information available been used to score this indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	**Conformity Assessment Body Response**
Example:1.1.2	No	No	NA	The certifier gave a score of 80 for this PI. The 80 scoring guidepost asks for a target reference point that is consistent with maintaining the stock at Bmsy or above, however the target reference point given for this fishery is Bpa, with no indication of how this is consistent with a Bmsy level.	
1.1.1 ALB	Y	Y	N/A	The CAB gave a score of 100 for this. This harmonises with Fiji longline and NZ troll however since certification of these fisheries there has been an updated stock assessment. Albacore is above biological but there is information which suggests that there is biomass depletion (N of 25 deg. S) and signs of localised overfishing. This will no doubt be reviewed at the first annual surveillance.	Indeed – this will be reviewed in a harmonised way with the other certified fisheries on the stock
1.1.1 YFT	Y	Y	N/A	The CAB scored 90 for this. The current stock assessment for YFT agrees with this score. A new assessment should be available at the first annual surveillance	
1.1.1 SWO	Y	Y	N/A	A new assessment was undertaken in 2013 which concludes the stock is not overfished.	

				The score given is appropriate	
Performance Indicator	**Has all the relevant information available been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	**Conformity Assessment Body Response**
1.1.2 ALB	Y	Y	N see justification	A scoring of 75 is justified because there are appropriate target/limit reference points (as well described in the assessment report), but these are for stock assessment, rather than management purposes. The adoption by WCPFC of a target reference point for management purposes is an appropriate condition that would raise the scoring to 80, but the likelihood of that occurring in the near future is far from certain. The condition should read the management system MUST … i.e. not should. The timeline doesn't "harmonise" with the other certified albacore fisheries (NZ and Fiji). Their certificates are due for reassessment in 2016 and 2017	The intent of the conditions is 'must' – in the sense that if the conditions are not met, the certification will be suspended and eventually withdrawn. This is exactly the same as for the other certified fisheries on the stock. MEC took advice from MSC that harmonisation of the timeline for meeting conditions is not required
1.1.2 YFT	Y	Y	N/A	The score of 90 is appropriate	
1.1.2 SWO	Y	N	N/A	Explicit limit and target reference points have not been set by WCPFC for SWO. Australian target limit and reference points are set under the Commonwealth harvest strategy. However MSC assessment for P1 elements	Defining the 'stock' for swordfish was an extremely difficult issue, which is set out and explained in detail in Section 3.4.6.1. The other reviewer also raised this issue and a review of

				must take into account of stock wide management issues and are not those specific to the fishery. This fishery should not score 80.	each scoring issue by the team concluded that the scoring was generous, particularly given that WCPFC has not explicitly established reference points. The new score is 75 and a condition raised (now condition 6) For a fuller analysis, see the response to the other peer reviewer for this PI.
Performance Indicator	**Has all the relevant information available been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	**Conformity Assessment Body Response**
1.1.3 ALB, YFT, SWO	N/A				
1.2.1 ALB	Y	Y	Y/?	The harvest strategy for ALB includes monitoring, stock assessment and management action. Again the meeting of the SG 80 is dependent on the WCPFC. The condition should read 'The fishery management system MUST…' This score is appropriate.	See comment above – the intent is 'must'
1.2.1 YFT	Y	Y	Y/?	The harvest strategy for YFT includes monitoring, stock assessment and management action. Again the meeting of the SG 80 is dependent on the WCPFC. The condition should read The fishery	As above

				management system MUST… This score is appropriate	
Performance Indicator	**Has all the relevant information available been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	**Conformity Assessment Body Response**
1.2.1 SWO	N	N	N/A	A score of 95 is given. The strategy in place for SWO does not cover the whole of the WCPO therefore I would suggest that a score of 100 at SIa is too high.	The other peer reviewer also made this comment and the team agreed. The score has been reduced to 80. Full details are given in the other peer review response.
1.2.2 ALB	Y	Y	Y/?	The condition should read a well-defined regional-level harvest control rule MUST be put in place. Score is appropriate. Again achievement of the SG80 depends on WCPFC	See previous responses
1.2.2 YFT	Y	Y	Y/?	The condition should read - The fishery management system MUST put in place a regional harvest strategy. SG80 achievement depends on WCPFC	See previous responses
1.2.2 SWO	Y	Y	N/A	Score is appropriate	The other reviewer considered that the score of this PI as well as 1.1.2 and 1.2.2 was predicated on the MEC team primarily scoring the ETBF rather than the WCPFC fisheries. The scoring has been adjusted to reflect more clearly the contribution of the

					WCPFC to these PIs. A new condition has been raised (condition 7)
Performance Indicator	**Has all the relevant information available been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary	**Conformity Assessment Body Response**
1.2.3 ALB	Y	Y	N/A	There is a comprehensive range of information available. The score and justification is appropriate.	
1.2.3 YFT	Y	Y	N/A	There is a comprehensive range of information available. The score and justification is appropriate.	
1.2.3 SWO	Y	Y	N/A	There is a comprehensive range of information available. The score and justification is appropriate.	
1.2.4 ALB	Y	Y	N/A	Stock assessment described in Hoyle et al (2011). Score is appropriate	
1.2.4 YFT	Y	Y	N/A	Stock assessment described in Langley et al (2011). Score is appropriate	
1.2.4 SWO	Y	Y	N/A	Stock assessment described in Davies et al (2013). Score is appropriate	
2.1.1	Y	Y	N/A	An updated assessment of bigeye tuna was undertaken in 2014 (Harley et al. 2014). The assessment concluded that current catches exceed MSY and that recent levels of fishing	The rationale is based on the updated assessment from 2014 (see references). The evidence that this fishery does not hinder recovery and

				mortality exceed the level that will support the MSY. The assessment also concluded that recent levels of spawning potential are most likely at or below the limit reference point of 20%SBF=0 agreed by WCPFC. CMM 2014-01 was adopted at WCPFC11 seeking to further limit fishing mortality of bigeye tuna. The evidence that this fishery does not hinder recovery and rebuilding of bigeye tuna is limited. Given the fishery operates in an area where bigeye is less common, it does not use FADs and catches are low in comparison to the total catch of bigeye by other fisheries then it can be considered that this fishery has a partial strategy in place and the catch does not hinder the recovery of bigeye. However it is recommended that the bigeye situation is reviewed at the next annual audit. This justification is in harmony with the recent surveillance audit for the Fiji albacore fishery.	rebuilding of WCPO bigeye is, in our view, very clear, and is set out in the rationale for scoring issue c – i.e. that the ETBF took 0.4% of the total WCPFC bigeye catch on this stock in 2012/13.
2.1.2	Y	N	N/A	Suggest that SIa at best only meets the SG 80 not SG100. See comments re Bigeye above also no strategy for all of the retained species In the report SIa gives a Y for SG100 but the justification says “SG100 cannot be met here as there are not management strategies for all retained species; specifically the bait species (although not main). The score of 80 is appropriate”	The team considered that this is, in fact, a strategy for managing all bycatch species (retained and discarded) in the form of the ERA/ERM process which is described in the rationale, as well as in the main report Section 3.5.2.
2.1.3	Y	Y	N/A	The information available for tuna and billfish species is good across the range of the WCPFC. The score is appropriate.	

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary	Conformity Assessment Body Response
2.2.1	N	N	N/A	SIa is scored 100. I don't agree as there is no evidence that with a high degree of certainty bycatch species (all) are within biologically based limits. Only two bycatch species are tested using SICA.	This PI was scored using the SICA, and it was misleading to fill out 'Y' for each of the SGs / SIs – the SICA should have referenced instead. This has now been done. See scoring rationale 2.2.1
2.2.2	Y	Y	N/A	The score and discussion is appropriate	
2.2.3	Y	Y	N/A	The score and discussion is appropriate	
2.3.1	Y	Y	N	Some of the sharks caught should be considered bycatch as they do not qualify as ETP. Check the status of the key shark species. The Condition needs to be rewritten to reflect timeframe and how the condition is expected to achieve outcomes and measure positive improvements to the fishery species	The sharks we have classified as ETP are all formally protected either by a WCPFC CMM or by the Australian Environmental Protection and Biodiversity Conservation (EPBC) Act – this is summarised in Table 21 of the main report. In relation to the condition, see response above. The condition includes a timeframe (milestones) and states how outcomes should be achieved. This has been further elaborated in table 50 – Condition 8.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary	Conformity Assessment Body Response
2.3.2	Y	Y	N/A	Scoring and discussion is appropriate though the effectiveness of management discussion could be expanded.	More details are provided in the main body of the report (see sections on the ERA process and on ETP species, under Principle 2)
2.3.3	Y	Y	N	It would be good if Table 27 and 29 could be updated – information is only included up to 2012. The Condition needs to be rewritten to reflect timeframe and how the condition is expected to achieve outcomes and measure positive improvements to the fishery	2013 is now available and has been inputted into tables 27 – 29 in the main report and scoring rationales See comment above - Further elaboration is now provided in table 51 – Condition 9.
2.4.1	Y	Y	N/A	Scoring and discussion is appropriate	
2.4.2	Y	Y	N/A	Scoring and discussion is appropriate	
2.4.3	Y	Y	N/A	Scoring and discussion is appropriate	
2.5.1	Y	Y	N/A	Scoring and discussion is appropriate	
2.5.2	Y	Y	N/A	Scoring and discussion is appropriate	
2.5.3	Y	Y	N/A	Scoring and discussion is appropriate	
Performance Indicator	**Has all the relevant information**	**Does the information and/or**	**Will the condition(s) raised**	**Justification** Please support your answers by referring to specific scoring issues and any relevant	**Conformity Assessment Body Response**

	available been used to score this Indicator? (Yes/No)	**rationale used to score this Indicator support the given score? (Yes/No)**	**improve the fishery's performance to the SG80 level? (Yes/No/NA)**	documentation where possible. Please attach additional pages if necessary	
3.1.1	Y	Y	N/A	The management system includes WCPFC, regional organisations and AFMA. Legal and customary framework actions adopted by WCPFC have been incorporated into Australian legislation. The scores and discussion is appropriate.	
3.1.2	Y	Y	N/A	Roles and responsibilities for the management organisations are well described. The score and discussion is appropriate	
3.1.3	N	N	N/A	A score of 100 is given Overall, clear explicit objectives incorporating the precautionary approach and ecosystem-based management in the policy meet the MSC Principles and Criteria, and defined, meeting SG80. However, it is not yet clear that the precautionary approach is applied in practice across all policy for all stocks (e.g. bigeye), so SG100 is not met.	In relation to bigeye, it is true that the Australian management system is more precautionary than the WCPFC system – Australia sets it TACC at ~half of its WCPFC allocation. The other reviewer makes the same point – as such, the score has been reduced to 90 (SG100 met at Australian but not WCPFC level). This is on the basis that the AFMA system applies the precautionary approach but there is evidence the WCPFC doesn't as yet (e.g. bigeye). The WCPFC also doesn't have its long-term objectives operationalised in the form of HCRs for targeted stocks. This has been amended in the report.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary	Conformity Assessment Body Response
3.1.4	Y	Y	N/A	Scoring and justification is appropriate	
3.2.1	Y	N	N/A	AFMA does have the TAP which has well defined measurable short and long term objectives. Fishery specific short and long term objectives are set out in e.g. WCPFC CMMs. However many of these are not well defined and measurable. A score of 80 may be more appropriate	Since there is only one scoring issue here, partial scoring is allowed. We agree with the reviewer that there are well-defined and measureable objectives within the Australian fishery-specific management system (i.e. SG100 is met) but not always within the WCPFC system (i.e. SG100 is not met). Since partial scoring is allowed for this PI, this results in a score of 90. The justification as its written in the report is a little different in that both the international and national management systems have defined and measurable objectives for P1 species but **not for** P2 species. AFMA (not for non-target species) and WCPFC (not for non-target of ETP species).
Performance Indicator	**Has all the relevant information available been**	**Does the information and/or rationale used**	**Will the condition(s) raised improve the**	**Justification** Please support your answers by referring to specific scoring issues and any relevant	**Conformity Assessment Body Response**

	used to score this Indicator? (Yes/No)	to score this Indicator support the given score? (Yes/No)	fishery's performance to the SG80 level? (Yes/No/NA)	documentation where possible. Please attach additional pages if necessary	
3.2.2	Y	Y	N/A	Scoring and justification is appropriate	
3.2.3	Y	Y	N/A	Maybe more comment on differences between logbooks and observed records Scoring and justification is appropriate.	Additional comments have been added to the report.
3.2.4	Y	Y	NA	Scoring and justification is appropriate	
3.2.5	Y	Y	N/A	Scoring and justification is appropriate	

Any Other Comments

Comments	Conformity Assessment Body Response
No comments	Not applicable

For reports using the Risk-Based Framework:

Performance Indicator	Does the report clearly explain how the process used to determine risk using the RBF led to the stated outcome? Yes/No	Are the RBF risk scores well-referenced? Yes/No	Justification: Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response:
1.1.1	***NA***			
2.1.1	*Y*	***Y***	***Text and scoring appropriate***	
2.2.1	*Y*	***Y***	***Text and scoring appropriate***	
2.4.1	*NA*			
2.5.1	*NA*			

Peer Review 2 - Overall Opinion

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
Example:1.1.2	No	No	NA	The certifier gave a score of 80 for this PI. The 80 scoring guidepost asks for a target reference point that is consistent with maintaining the stock at Bmsy or above, however the target reference point given for this fishery is Bpa, with no indication of how this is consistent with a Bmsy level.	
1.1.1	ALB: Yes YFT: Yes SWD: Yes	ALB: Yes YFT: Yes SWD: Yes	ALB: N/A YFT: N/A SWD: N/A	ALB YFT SWD	
1.1.2	ALB: Yes YFT: Yes SWD: Yes	ALB: Yes YFT: Yes SWD: N	N see justification	SWD: The scoring of this PI as well as 1.2.1 and 1.2.3 is predicated on the CAB's argument that these are being scored relative to the RP, HS and HCR implemented in the ETBF; and thus, that effectively ETBF is a separate group of SWD. While the ETBF catch is very small relative to WCPFC, there is a lot of uncertainty in the assessment and, more importantly, the stock ID. Therefore, there is a need for RPs, HSs and HCRs for the WCPFC at large. In my opinion that is what MSC requires. I would argue for lower scores on these three PIs for SWD. In the	In relation to the ETBF catch vs WCPFC, Figure 15 of the main report shows that there are two areas of the WCPFC convention area which has significant swordfish fisheries, they are very far away from each other, and come from two different stocks. The proportion of the ETBF in relation to the SW Pacific is more relevant (given in Table 10). Having said that, the other peer reviewer raised this issue as well,

				case of ALB and YFT, WCPFC has made some progress on these PIs yet they were scored low and appropriate conditions shjas et. Whereas, SWD has had less progress and scores more optimistically. The timeline doesn't "harmonise" with the other certified albacore fisheries (NZ and Fiji). Their certificates are due for reassessment in 2016 and 2017	and the team has reviewed the scoring for PI 1.1.2 for swordfish for each scoring issue. A condition has been raised subsequently due to re-scoring. This can be seen in Table 48 – Condition 6. Scoring issue a) The first thing to note is that MSC allows consideration of explicit or implicit reference points: see CR para CB2.3.2.1 For the purposes of PI 1.1.2 or pre default tree PI equivalents the team shall interpret reference points as reference points used for managing the fishery—i.e. explicit or implicit points used by management as part of management procedures, management strategies or decision rules to trigger management action. As noted in the rationale for PI1.1.1 (SWO) as well as the main report, Australia has explicit reference points for the management of the ETBF, while WCPFC does not: but WCPFC has implicit reference points (those used in the stock assessment), as can been seen from the preamble to CMM 2009-03: **Noting** that due to the uncertainty in the 2008 stock assessment for south-western Pacific swordfish, the SC recommended that there be no further increase in catch or effort in order to keep the stock above its

					associated reference points On this basis, the team felt that since a set of reference points (explicit or implicit) exists for both management systems, and since they are both appropriate for the stock and can be estimated, then SG80 is met for scoring issue a. Scoring issue b) The WCPFC implicit reference points are only targets, and therefore there are no limit reference points at the regional level, although there are at the Australian level. It is therefore probably more precautionary to agree with the reviewers and say that SG80 is not fully met. The score and rationale has been changed and a condition added on this basis.
1.1.3	Y	Y	N/A	No rebuilding needed for all three stocks	
1.2.1	ALB: Yes YFT: Yes SWD: Yes	ALB: Yes YFT: Yes SWD: No	ALB: Yes YFT: Yes SWD: NA	SWD: see 1.1.2 above	The team has likewise reviewed each scoring issue of PI 1.2.1 for swordfish: Scoring issue a) The reviewer is correct that the score of 100 was too high. The Australian harvest strategy is 'designed' to meet stock management objectives, but the WCPFC is not, given that objectives (reference points) are implicit. The

					score has been reduced to 80. Scoring issue b) The team concluded that the scoring of issue b) (80 met but 100 not met) is appropriate. Scoring issue c) Likewise the team concluded that scoring issue c) (one guidepost at the 60 level, met) was scored appropriately. Scoring issue d) While the Australian management system has a clear review and improvement process, the WCPFC does not as far as the team could make out. On this basis, the scoring was too high, and the team concluded that this scoring issue (at 100 level) is not met.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.2	ALB: Yes YFT: Yes SWD: Yes	ALB: Yes YFT: Yes SWD: No	ALB: Yes YFT: Yes SWD: N/A	SWD: see 1.1.2 above	Based on further review, the MEC team has adjusted the scores of SIa and Sib such that they now do not meet 80. Whilst the ETBF HCR has been rigorously examined, such is not the case for that of the WCPFC, requiring score reduction. This raises a condition on this PI. Further information can be seen in Table 49 – condition 7.
Performance Indicator	**Has all the relevant information available been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary	**Conformity Assessment Body Response**
1.2.3	ALB: Yes YFT: Yes SWD: Yes	ALB: Yes YFT: Yes SWD: Yes	ALB: Yes YFT: Yes SWD: N/A	SWD: see 1.1.2 above	Based on further review, the MEC team has adjusted the scores of SIa and SIb such that they now do not meet 80. While the ETBF HCR has been rigorously examined, such is not the case for that of the WCPFC, requiring score reduction. This raises

					a condition on this PI. Further information can be seen in Table 49 – Condition 7.
1.2.4					
2.1.1	Yes	Yes	N/A		
2.1.2	Yes	Yes	N/A		
2.1.3	Yes	Yes	N/A		

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary	Conformity Assessment Body Response
2.2.1	Yes	Yes	N/A		
2.2.2	Yes	Yes	N/A		
2.2.3	Yes	Yes	N/A		
2.3.1	Yes	Yes	N/A	Appropriate actions on turtles and shortfin mako are in the condition	
2.3.2	Yes	Yes	N/A		
2.3.3	Y	Y	Yes	Appropriate actions on shortfin mako are in the condition	
2.4.1	Yes	Yes	N/A		
2.4.2	Yes	Yes	N/A		
2.4.3	Yes	Yes	N/A		
2.5.1	Yes	Yes	N/A		
2.5.2	Yes	Yes	N/A		
2.5.3	Yes	Yes	N/A		

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary	Conformity Assessment Body Response
3.1.1	Yes	Yes	N/A		
3.1.2	Yes	Yes	N/A		
3.1.3	Yes	No	N/A	I return to my previous comments on the role of WCPFC. The lack of formal involvement in objectives and associated RPs, HSs and HCRs suggests a score less than 100.	The other peer reviewer also made similar comments. The score has been reduced to 90 (SG100 met at Australian but not WCPFC level). This is on the basis that the AFMA system applies the precautionary approach but there is evidence the WCPFC doesn't as yet (e.g. bigeye). The WCPFC also doesn't have its long-term objectives operationalised in the form of HCRs for targeted stocks. This has been amended in the report.
3.1.4	Yes	No	N/A	The lack of formal involvement of WCPFC in the development of appropriate incentives and associated RPs, HSs and HCRs suggests a score less than 100.	This has been amended in the report, on the basis that WCPFC failed to deal with South Pacific albacore at their December 2014 meeting, which is a sign that incentives for sustainable fishing may not be present at the international level. A partial score of 90 is appropriate given the national based system provides effective incentives.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary	Conformity Assessment Body Response
3.2.1	Yes	Yes	N/A		
3.2.2	Yes	Yes	N/A		
3.2.3	Yes	Yes	N/A		
3.2.4	Yes	Yes	N/A		
3.2.5	Yes	Yes	N/A		

Any Other Comments

Comments	Conformity Assessment Body Response
Essentially all of my comments relate to the roles of ETBF versus WCPFC in P1 and P3 (my P2 expertise is very limited). I am arguing that to fulfil MSCs objectives there needs to be WCPFC-wide HCRs, etc. For YFT and ALB some progress is being made and conditions have been established. While I approve of the actions needed to address the conditions, judging how RFMOs function, I am not fully optimistic on the probability of success within the certification time period. We'll see. But little progress has been made for SWD within WCPFC. I am arguing that the relevant PIs should be scored lower, perhaps low enough to require a condition. Or at least there should be some non-binding recommendation. Also, the role of WCPFC in P3 PIs is not fully explored in the scoring particularly in 3.1.3 and 3.1.4. Scores of 100 on these PIs are not warranted.	Peer review opinions have been accepted by the team, with the result of re-scoring of some PIs. In the case of P1, two new conditions relating to references points and harvest control rules for swordfish have been necessary due to PI scores dropping below 80, after team consultation. In relation to P3, some re-scoring has also occurred but all scores remain at 80 or above, and so no additional conditions needed to be formulated. All justifications for re-scoring have been amended in the relevant scoring rationales and summary of conditions.

For reports using the Risk-Based Framework:

Performance Indicator	Does the report clearly explain how the process used to determine risk using the RBF led to the stated outcome? Yes/No	Are the RBF risk scores well-referenced? Yes/No	**Justification:** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response:
1.1.1				
2.1.1				
2.2.1				
2.4.1				
2.5.1				

Appendix 4. Stakeholder submissions

Prior to the publication of the PCDR, one formal stakeholder comment was submitted by WWF, as shown below. Submission received from WWF, prior to site visit (August 2014). This submission was taken into account when scoring the fishery in August 2014.

WWF for a living planet®

WWF Submission to MacAlister Elliott & Partners MSC Certification of the Walkers Seafood Australia Albacore and yellowfin tuna *(Thunnus alalunga and Thunnus albacares),* Swordfish *(Xiphias gladius), and* Mahi Mahi *(Coryphaena hippurus)*, long line fishery

August 2014

Introduction

WWF welcomes the decision by the Walker Seafood, Australia to seek Marine Stewardship Council (MSC) certification for Albacore and yellowfin tuna *(Thunnus alalunga and Thunnus albacares,* Swordfish *(Xiphias gladius)* and Mahi Mahi *(Coryphaena hippurus)* taken in the Australian Eastern Tuna and Billfish (ETBF) longline fishery in the Eastern Australian Exclusive Economic Zone, forming part of the Western and Central Ocean (WCPO).

As input to the MSC assessment process, WWF has conducted a preliminary assessment of the Eastern Australian Exclusive Economic Zone (EEZ) Tuna Long Line Fishery against the Default Assessment Tree of the MSC Fisheries Assessment Methodology (FAM, v1.3, 1 January, 2013). While WWF has not attempted to score the Fishery against individual indicators our assessment suggests that the Fishery may score below the 80 Scoring Guidepost for some indicators (1.1.2, 1.2.1 and 1.2.1) and that, potentially, the fishery could fail to meet Scoring Guidepost 60 for some indicators (1.2.1/1.2.2 (mahi mahi and swordfish). In the case of P2 management, WWF would need to be assured that for bigeye (2.1.2) tuna to attain a score of 80 or above, a more precautionary TACC might need to be established to reflect the local conditions of the stock. WWF would also expect to see strong justification on the status of key shark species (2.3.1), and on the effectiveness of management measures, especially for shortfin mako sharks (2.3.2).

Summary conclusions

Target species: Stock status and management

Overall, WWF's concerns relate largely to the stock wide components of this assessment, and specifically, the inability of Western, Central and South Pacific Island Countries (PICs) and Distant Water vessels fishing inside their EEZs and on the High Seas to effectively embrace sound management practices. Problems in achieving effective outcomes appear especially apparent in the Pacific longline fishery where there are conflicting actions, with some fleets are in decline (Japan and Korea, along with most domestic Small Island Development States (SIDS)), while others are expanding, most specifically those fishing from China and Taiwan. That said, WWF is acutely aware of the fishery specific actions taken by the Commonwealth of Australia to manage both target and retained species, and to minimize interactions with Endangered, Threatened and Protected species. **The difficulty faced for this fishery however, is that the MSC certification process for P1 elements, takes account of stock wide management issues and are not those specific to the fishery.**

Stock status and management

WWF is supportive of AFMA and the fishery taking a leadership role in its development and implementation of setting sustainable Total Allowable Commercial Catch (TACC) levels for the key tuna species taken in the fishery.

The **Albacore stock** is above biological based limits, recent evidence suggests that B/B_{MSY} is closer to 1 (SC9, WCPFC, 2013), that there is considerable biomass depletion occurring north of 25^{0}S, and there are worrying signs of localised overfishing across the range of albacore fisheries operating in the WCPO. A recent announcement by China to cap its vessels at 400 vessels (para 345, WCPFC, summary report, 2014), with its current fleet set at 286 in 2012 (WCPFC Yearbook, 2013), and their opposition to establishing a cap on effort North of 20^{0}S, reflects a concern that some countries are not focussed on precautionary management actions. Ilakini (2013), argues that the Chinese approach to fishing, through a heavy subsidy related scheme, allows for sustained fishing activities for one group of fishermen (the Chinese) and localised reductions in CPUE which makes fishing economically unsustainable for other groups.

It is accepted that there are now explicit default limit reference points in place for the main target tuna species (skipjack, yellowfin, bigeye and albacore). However, there are no explicit regional target reference points in place for albacore tuna, nor are there explicit reference points for swordfish (except that of the Australian target and limit reference points set under the default Commonwealth Harvest Strategy Policy). The FFA coordinated Sub Committee of Southern Tuna and Billfish is working towards setting economic based limits for albacore. However, the group has yet to accept a Target Reference Point (TRP), and there still remain difficulties in setting specific Pacific Island national limits, and uncertainties over the ability to manage the high seas effort which accounts for around 40% of the total albacore catch. For albacore, as with each tuna stock, there is a requirement of the MSC process (Policy Advisory 12v2:2) that measures should be set and imbedded by management. The failure of WCPFC and the South Pacific countries to adopt precautionary conservation measures for this stock, most specifically North of 20^{0}S is a concern. Moreover, the current WCPFC CMM (2010-05) states that there should be no increase in the number of their fishing vessels actively fishing for South Pacific albacore in the Convention Area south of 20°S above current (2005) levels or recent historical (2000-2004) levels. However, there is evidence that Chinese and SIDS chartered Chinese and Taiwanese fleets have increased effort South of 20°S (WCPFC, 2011). It should be noted that the next stock assessment for albacore tuna will not be available until 2015. The ETBF has set a TACC for albacore at 2,500 mt for the 2014/15 fishing year.

The current stock assessment for **yellowfin tuna** (Langley *et al* (2011) estimates of fishing mortality indicate that F_{CURR}/F_{MSY} is 0.56-0.9 which suggests that overfishing is not occurring. However, the regional fishing mortality on yellowfin is estimated to have constantly increased. As a result, it is estimated that depletion of the stock towards B_{MSY} has steadily increased – SB_{CURR}/SB_0 50-55% (Langley *et al*, 2011). The yellowfin tuna stock will be reassessed during the time of the MSC assessment, with the results of the new assessments available in August, 2014. **WWF will expect to see the new stock assessments taken into account in the assessment.**

The harvest strategy advocated by WCPFC for yellowfin tuna (CMM 2013-01) is *not to increase their catch of yellowfin tuna.* It is noteworthy that the ETBF has set a limit at 2,200 mt for the 2014/15 fishing year. The Australian average Yellowfin catch for the period 2001-2004 is 2,656 tonnes. However, none of the other longline fleets have adopted either input or output controls for this species.

A new stock assessment of **broadbill swordfish** was undertaken in 2013 (Davies, *et al*, 2013). The stock assessment concludes that the stock is not overfished, but there was significant uncertainty as to whether overfishing was occurring. SC 9 also pointed to considerable uncertainty with the stock assessment with the inconsistencies in the Australian and Hawaii growth schedules (WCPFC, 2013). Australian growth data indicated that overfishing was occurring but that the stock was not in an overfished state. It is therefore likely that the stock may score < SG 80. It is noteworthy that the ABARES, 2012 states that the fishery is *not subject to overfishing and not overfished*, which would appear to be inconsistent with more recent analysis, but presumably represents a distinction in the interpretation of uncertainties.

Explicit limit and target reference points have not been set for broadbill swordfish by WCPFC and will need to be set in management to achieve a score for Principal Indicator 1.1.2 > 80[1]. Noting that recent catches between the equator and 20°S now represent the largest component of the catch in Region 2 (equator to 50°S, 165°E to 130°W), SC9 recommended that the Commission extending the management actions under the CMM (currently 2009-03) for the geographic region North of 20°S. The obligation would be to extend a swordfish catch register, restrict the number of vessels catching swordfish, and record catches. No changes were made to the CMM at the WCPFC general session in 2013, which suggest that the current strategy applied is inadequate. WWF recommends this be advanced by Australia on this issue at a future WCPFC General Session. The ETBF TACC is set at 1,378 mt for fishing year 2014/15. This represents a quota set at size proportion that is expected to occur when the level of mean spawners per recruit is at 48 per cent of initial unfished levels (ABARES, 2012). This is broadly consistent with the CMM requiring limits be set at historic levels and not to increase in catch or effort in order to keep the stock above its associated reference points. No other PIC has input or output controls for this species.

There is no stock assessment for **mahi mahi**. This species is considered an important byproduct (retained species) in Australia. It is not subject to any management measure, nor are there related stock specific management strategies. Given this issue, it is unlikely that mahi mahi could be scored as a P1 species. However, WWF notes that two Risk Assessments have been undertaken which categorise this species as low risk. The most recent of these was by AFMA in 2007 which gave a Level 2 Productivity Sensitivity Analysis score of 1.83 (Low risk). It is noteworthy that the same risk assessment classified swordfish as High risk with a PSA score of 3.53, but thereafter reduced to Medium risk (AFMA, 2009) with a score of 3.18.

WWF accepts that the information available for the tuna and billfish species is good, across the range of the WCPFC and is adequate to support stock assessments. Moreover, WWF accepts that the standard of stock assessments (MULTIFAN CL) applied by the Secretariat of the Pacific Community (SPC) is high, and whilst these may be taken every 2-3 years, changes in stock status are assessed annually with updates provided each year to the WCPFC Scientific Committee.

[1] CB2.3.2.1 For the purposes of PI 1.1.2 or pre default tree PI equivalents the team shall interpret reference points as reference points used for managing the fishery—i.e. explicit or implicit points used by management as part of management procedures, management strategies or decision rules to trigger management action.

Retained species, bycatch, ETP and ecosystem related issues

WWF considers the relevant species to be assessed as retained species are bigeye tuna, striped marlin, and four chondrichthyan species (shortfinfin mako, longfin mako, porbeagle and dusky sharks).

The most recent assessment of **Bigeye tuna** (*Thunnus obesus)* (Davies *et al*, 2011) indicates that overfishing is occurring (F_{CURR}/F_{MSY} = 1.49). However, results from the assessment also indicate that it is likely the stock is not in an overfished state (B_{curr}/B_{MSY} = 0.96-1.48). The varying model runs (some suggesting the possibility that the stock is overfished) creates some uncertainty in this result, but the WCPFC 10 regular session report indicates that the Commission still accepts the stock is not in an overfished state. Though, this is dependent on fishing mortality being maintained at levels current to 2010. However, it is noteworthy that the ETBF Annual Status Report (AFMA, 2012) classifies this species *as far in excess of MSY*. WCPFC 2013-01 sets limits on national longline catches of 2,000 tonnes. The ETBF has set its TACC for the 2014/15 fishing year at 1,056 tonnes, but in recent years has only managed an average catch per year of below 500 tonnes.

The latest stock assessment for **Striped marlin** (*Tetrapturus audux*) (Davies, *et al* 2012) indicates that the stock is fully exploited, is not subject to overfishing, but may be in an overfished state. A measure is in place (WCPFC CMM 2006-04), and is limited to recording the number and catch levels of vessels fishing for striped marlin in the Convention Area south of 15°S. SC 8 recommended expanding the the geographical scope of CMM 2006-04, in order to cover the distribution range of the stock. Otherwise, there are no proposed limits on effort. The current focus of the action is to identify areas of high catch concentration that could be subject to targeted management actions. Striped marlin is subject to a TAC, currently at set 351 tonnes for the fishing year 2014/15.

Oil fishes, Wahoo and Moonfish (Opah) also make up an important component of the retained species catch. However, these species catches are well within the definition of 'main', and collectively account for less than 1% of the catch. Nevertheless, each of these species has been the subject of a PSA (AFMA, 2007), and score low risk.

There has been a legislative prohibition on the commercial take of **Blue and Black marlin** (dead or alive) since 1998. This is in recognition of the importance of these species to the Australian game fishing sector. AFMA monitors the rate of capture and release. Live releases account for around 70% of the total catch (AFMA, Bycatch and discarding Workplan)

Of the 44 retained species, Several species of sharks (Hammerheads) have been listed under NSW legislation and seven marine species have been listed on the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which will take effect in September 2014. These species are; Oceanic Whitetip Shark (*Carcharhinus longimanus*); Great Hammerhead (*Sphyrna mokarran*); Smooth Hammerhead (*Sphyrna zygaena*); Manta birostris, Manta alfredi; Scalloped Hammerhead (*Sphyrna lewini*) and Porbeagle (*Lamna nasus*).

Three of these chondrichthyan species (**longfin mako, porbeagle and dusky shark**) were identified as high risk in the last round of ERA (AFMA, 2007). In January 2010 three species of mackerel sharks (Porbeagle, Shortfin Mako, and Longfin Mako) were listed as migratory species under the EPBC Act.

For the purpose of this assessment, WWF expects that these will need be classified in the assessment as ETP species. However, it is noteworthy that dusky sharks, which are identified as High Risk, are not listed in the EPBC Act but are identified as being of High Risk (AFMA, 2007). The AFMA Stock Status Report (AFMA, 2012) reports elimination of this species as High Risk through the use of expert override (Zhou, December 2007). WWF is opposed to the principle of 'expert override', especially, in the event that the fishery is elevated to a level 3 assessment. The assessors are requested to identify the details used to determine the expert override and evaluate the suitability of the arguments applied. **Shortfin mako** is the most commonly caught and landed shark species in the ETBF, with recent landings ranging from 40-70 tonnes per year. There is also a valuable market for Mako Shark meat. Whilst below the definition of 'main' (5%), they are sufficiently significant in terms of vulnerability (IUCN, EBPC Act and CMS listings) to warrant assessment. It is noted that this species is identified in the AFMA ERA (AFMA, 2007) as medium risk. The assessors are therefore requested to review the scoring of shortfin mako, and if perceived to be high risk, whether a partial strategy should apply to this species.

It is also noteworthy that fishery interacts with CITES listed species, **Hammerhead sharks** (2-5 tonnes annually) **and Oceanic whitetip** (currently a no take species in the fishery) (Table 1, AFMA, 2012). These species are not presently covered under the Stock Status Report. Both are now listed as CITES Appendix 2 species[2]. DSEWPaC does not include these species for monitoring evaluation. CMM 2011-04 requires that measures should be in place to prevent retaining on board, transhipping, storing on a fishing vessel, or landing any oceanic whitetip shark, in whole or in part, in the fisheries covered by the Convention. WWF would recommend that both hammerhead sharks and OWT be subject to monitoring, potentially along with dusky shark.

Management actions require the non-use of wire traces and a policy of releasing mako sharks alive and a maximum take of 20 sharks per trip. Operators in the ETBF are prohibited from retaining or trading live Shortfin Mako, Longfin Mako and Porbeagle sharks as they were listed as migratory species under the Environment Protection and Biodiversity Conservation (EPBC) Act in 2010. WWF notes that this fishery has seen a reduction in the catch of longfin mako (10 individuals) and porbeagle shark (15 individuals) in 2013. Records of shark catch, shown in the Bycatch and discarding Workplan, 2011-2013 (AFMA, 2010) also show high numbers of sharks released alive, including for the high risk species dusky whaler (85%) and Oceanic white tipped shark (77%), and medium risk species, shortfin mako (27%). Catches of porbeagle and longfin mako are now reported as extremely low (AFMA, 2012).

Of the 56 bycatch species, two species of Sunfish, **Mola Mola and Mola Ramsayi**, are rated as precautionary extremely high risk in the 2007 ERA risk assessment. However, whilst

[2] Entry into effect delayed by 18 months, i.e. until 14 September 2014, http://www.cites.org/eng/app/appendices.php

sunfish are caught on the longlines in relatively high numbers, few are retained and between 95% and 100% of sunfish are released alive as they are mostly cut off at the line before being brought to the boat. The Bycatch and discarding Workplan, 2011-2013 (AFMA, 2010) shows that 92% of these species are released.

The Commonwealth has listed the incidental capture of **seabirds** in oceanic longline operations as a key threatening process. Generally speaking, seabirds are attracted to fishing vessels by discarded offal and baits and on occasion ingest baited hooks during the setting or hauling of the longline. Many seabirds are long lived and late maturing with populations that are listed as vulnerable or have unknown status. As such, mortality as a result of longline fishing operations has the potential lead to further declines in seabird populations. Between 2007 and 2009 the ETBF experienced high levels of observed interactions with seabirds in the area bound by latitudes 30°S and 35°S and west of longitude 156°E. Species identified as of particularly high risk (AFMA, 2007) include Buller's Albatross (*Thalassarche bulleri*) and Shy Albatross (*Thalassarche cauta*). A Threat Abatement Plan (TAP) was implemented in 1998 to reduce seabird interactions. The Plan was updated in 2006. The TAP requires the ATBF to significantly minimise the bycatch of seabirds in oceanic longline operations and maintain a bycatch rate of less than 0.05 birds per 1000 hooks set in all fishing areas (by five degree latitudinal bands) and all seasons (1 September – 30 April; 1 May – 31 August). In the ETBF, AFMA has implemented fishing permit conditions aimed at reducing seabird mortality which are consistent with the objectives and prescriptions of the TAP. All longline operators fishing *south* of 25 degrees south must deploy a tori line (of specific design requirements), and use a line weighting system and thawed baits. In both cases, offal discharge is banned while setting and discharge during hauling should be avoided. All longline operators fishing *north* of 25 degrees south in the ETBF must carry a tori line. Operators in the ATBF have adopted voluntary measures from their respective fishery's *Industry Code of Practice* to minimise seabird bycatch. The AFMA Bycatch and Discarding Workplan reports that the rate of seabird interactions would appear to now be very low and well below the limit set.

All Australian marine mammals (e.g. whales, dolphins, seals and the dugong) are protected under the EPBC Act. The interaction between marine mammals and tuna fishing activities based on logbook data is low, however, there is very little verified data to confirm this assessment. There is some anecdotal evidence that the primary source of interactions with longline fishing activities arises from killer whales, dolphins and seals preying on fish caught on longlines.

Bait used in the ETBF comes from a number of sources: Fresh self-caught yellowtail scad and blue (slimy) mackerel; and frozen (Western Australia) pilchards (small quantities); and imported squid and pilchards. AFMA (2007) uses the Scale Intensity Consequence analysis to evaluate the capture of live bait, and these have a low consequence score. WWF notes that the assessors propose to apply the Risk Based Framework (RBF). WWF would therefore expect to see that bait fish sourced from the fishery as live bait, and other fisheries, are subjected to the RBF.

Governance and fishery specific management

The totality of the management system of the ETBF longline Fishery includes:

- The Western and Central Pacific Fisheries Commission (WCPFC), the tuna RFMO for the WCPO
- Regional organisations that provide management services to the WCPFC and Australia, including in particular the FFA and the SPC
- The Commonwealth of Australia

All of the **Legal and customary framework** actions adopted by the WCPFC have been translated into initiatives by AFMA. For this reason, WWF considers that governance objectives are met.

Roles and responsibilities are clearly demarcated between the management organisations (WCPFC and AFMA) and service providers (SPC and FFA). **Consultation** processes are followed at national levels under the auspices of the Tropical Tuna Advisory Committee (TTMAC) and the Tropical Tuna Resource Assessment Group (TTRAG). WCPFC decisions are taken with approval of the Commission Members, Cooperating Non- Members, and participating Territories and this provides opportunity for interested and affected parties to be involved.

There are clear **long-term objectives** that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, and these are explicit within applicable WCPFC CMMs. The long term objectives for the Commonwealth of Australia's management system are specified in the Fisheries Management Act and the EPBC Act, and further defined in the Commonwealth Fisheries Harvest Strategy Policy and Guidelines. These objectives and policy guidance are consistent with MSC's Principles and Criteria and explicitly require application of the precautionary principle. The fishery is also subject to the Commonwealth EPBC Act which requires periodic assessment against the *Guidelines for the Ecologically Sustainable Management of Fisheries*. These Guidelines are consistent with the MSC Principles and Criteria and encourage practical application of the ecosystem approach to fisheries Management.

Unlike other Commonwealth fisheries, where AFMA sets the achievement of maximum economic yield (MEY) as its management target, consistent with AFMA's objective to maximise net economic returns to the Australian community, the regional nature of this fishery makes this outcome difficult to achieve. WWF is aware that the scoring of **incentives** is likely to change in the foreseeable future. However, there is acute concern that the system of subsidies applied by China is having a profound impact on the outcome status of the albacore stock. Ilakini (2013), argues that the Chinese approach to fishing, through a heavy subsidy related scheme, allows for sustained fishing activities for one group of fishermen (the Chinese) and localised reductions in CPUE which makes fishing economically unsustainable for other groups. It is arguable that the Commonwealth of Australia's objective is to maximise net economic returns to the Australian community. The allocation of SFRs is the primary mechanism by which the management system seeks to provide long-term incentives for sustainable fishing in the ETBF fishery. Tradable SFRs seek to optimize economic benefits. This system is also constantly under review as part of the Harvest Strategy.

WWF's view is that this element has to be scored as follows:
The management system (overarching management system and policies) within which the fishery under assessment is found (See *appropriate to the size and scale of the fishery*). This WWF take's to mean (1) WCPFC, where there are no incentives for sustainable fishing for this fishery, but possibly limits set South of 20°S might (if they were applied, but seemingly are not) support sustainable fishing ; (2) the flag state (Australia) where there are no subsidies and a system of SFRs in place which seek to establish capacity at sustainable levels.

Short term objectives relating to P1 and P2 Outcomes are set out in various WCPFC CMMs, especially 2013-01 (skipjack, bigeye and yellowfin), and CMMs relating to albacore, swordfish, striped marlin, shark and sea turtles. These include short and long term objectives, but the RFMO level, the objectives are not well-defined and measurable, especially for the CMMs related to P2 outcomes. That said the AFMA Bycatch and Discarding Workplan, and the TAP have set very specific well defined and measurable objectives. Specific conditions are also laid down by DSEWPaC for the achievement of sustainable outcomes for target, retained, bycatch and ETP species.

The ETBF Management Plan 2010 reinforces the objectives of AFMA as the objectives of the Plan. Fishery specific objectives can be identified in the Eastern Tuna and Billfish Fishery Harvest Strategy under output Controls, 2011, and updated annually. The Plan also reinforces specific ecosystem requirements, and outlines the process for setting Total Allowable Commercial Catch (TACC) limits and provisions for the grant of Statutory Fishing Rights in the ETBF. The ETBF Management Arrangements Booklet 2014 summarises the management arrangements for the ETBF that apply under the *Eastern Tuna and Billfish Fishery Management Plan 2010*.

At the WCPFC level, there are established decision-making processes in the Convention and these are operationalised in the processes of the SC, the TCC and the Commission itself. Those decision-making processes have resulted relatively quickly in a comprehensive set of CMMs and strategies to achieve the specific objectives in the purse seine fishery. WCPFC decision-making processes are open, use the precautionary approach and best available information and are well documented.

The **decision making processes** by AFMA, based on advice from TTMAC (working with the TTRAG) are transparent with feedback provided by the Commission directly to TTMAC and to stakeholders through media such as the regular *AFMA Update* and through the Annual public meeting of both the MAC and AFMA.

The decision making process for the ETBF is consistent with those for the broader management system and responds to the defined harvest and bycatch management strategies, which respond to research, outcomes evaluations and monitoring programmes. The AFMA website contains an extensive list of evaluations, research reports and assessments, and evidence exists within the TTMAC and the TTAG that decisions respond to these findings.

The management system takes a risk-based approach to **compliance**. Compliance risk assessments are undertaken in consultation with the industry, and compliance plans are developed for the ETBF fishery by AFMA. ETBF specific risks include:

- *Breaching of seabird Threat Abatement Plan regulations*
- *Logbook misreporting*
- *Take of prohibited or protected species*
- *Breaching the ban on shark finning*
- *Exceeding trip limits (including shark limits)*
- *Unauthorised and unlicensed fishing – fishing without adequate quota holdings*

Primary compliance tools include: the *integrated computer vessel monitoring system (ICVMS), vessel inspections, fish receiver inspections, at-sea compliance, aerial surveillance and the information program*. There are appropriate provisions for penalties for infringement of fishery management measures in the FMA.

Fishers regularly participate in compliance workshops. Information of importance is shared through this process, and through intelligence gathering. TTMAC and ETBF industry are consulted on the risk assessment process.

The WCPFC Strategic Research Plan addresses four overall research and data collection priorities - collection and validation of data from the fishery, monitoring and assessment of stocks, monitoring and assessment of the ecosystem, and evaluation of management options. The WCPFC Strategic Research Plan is supplemented by the SPC, FFA and national Strategic Plans to provide a comprehensive research plan for the fisheries under assessment across P1. P2 and P3. The WCPFC and SPC Plans and results are widely and publicly available, but the FFA and national research results are not all fully accessible.

The broad direction of Research in Commonwealth fisheries is outlined in AFMA's Strategic Research Plan 2005- 2010. These plans describe the way in which AFMA will support the management and development of Commonwealth fisheries resources through research during the five years 2005–2010. Each fishery is required to have its fishery-specific plan but the last NPF Research Plan was completed in 2001, and has not subsequently been updated. However research priorities are identified annually by the NPF Research and Environment Committee (NPFREC) and provided to the Commonwealth Fisheries Research Advisory Body (CFRAB) for consideration and assessment of appropriate funding opportunities including Fisheries Research and Development Corporation. Research reports are made publicly available via the AFMA website.

Research activities cover the following areas:

- Effects of trawling
- Monitoring
- Stock assessment
- Fisheries Management controls

WCPFC has undertaken an external review.

AFMA's management system is subject to internal and external performance evaluation including: Internal peer reviews. The terms of reference can be found on http://www.wcpfc.int/system/files/WCPFC%20Performance%20Review%20Terms%20of%20Reference%20-Final%20March%2030.pdf

An AFMA review of the performance of NORMAC and the RAG; and AFMA also has an internal quality assurance program to determine whether Compliance best practice has been followed. One of a small number of breaches in the NPF was subject to review. External reviews, which include:

- Questioning by the Senate Standing Committee on Rural and Regional Affairs in Senate Estimates hearings (three times/year);
- Strategic assessment of Management Plans and ongoing assessment for export approval under the EPBC Act against the *Guidelines for the Ecologically Sustainable Management of Fisheries*;
- The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) reports on the ecological and economic sustainability of fisheries managed by AFMA; and
- The Australian National Audit Office periodic reviews of aspects of AFMA's performance. This includes a report on its audit into the Management of Domestic Fishing Compliance.

CSIRO research results are often published in peer reviewed scientific journals. DSEWPac undertake an assessment of the fisheries management activities against the principles outlined in the EPBC Act. There is a regular review of the bycatch programme and a very high level of assessment applied to retained, bycatch, habitat, ecosystem and ETP species.

Principle 1: Target Species
WWF notes the MSC has confirmed that Principle 1 applies to the whole of the fish stock exploited by the fishery:
"The Standards Council agreed that Principle 1 applies to the whole of the fish stock(s) exploited by the fishery seeking certification. So a fishery could only pass if the whole fish stock(s) meet this standard, and it would not pass if the standard was not met irrespective of who (e.g., the fishery seeking certification or other fisheries) was responsible for the stock not meeting the standard (MSC,2010a)".

Stock status
WWF requests that the stock assessments due in August 2014 be used to determine the scores for yellowfin tuna. When scoring against these assessments, WWF will not accept harmonisation with the New Zealand troll fishery, the Fiji longline fishery and the Cook Islands longline fishery.

Stock status: 1.1.1: The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing

SG60	SG80	SG100
Albacore tuna		
It is **likely** that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired. The stock is at or fluctuating around its target reference point.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired. There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years.
Albacore tuna		
SC9 identified some uncertainties which might impact on the outcome of the scoring. Notably: that there is considerable biomass depletion occurring north of 25^{0}S, and there are worrying signs of localised overfishing across the range of albacore fisheries. Given that there may be some changes to the stock assessment outcomes, WWF would object to the scores being harmonized with the Fiji longline, and New Zealand troll fishery.		
Yellowfin tuna		
WWF Reserves judgement on the scoring for this species which will be dependent on the outcome of the 2014 stock assessment. SC9 identified an increase in the catch of juvenile yellowfin tuna by some fleets (Indonesia and the Philippines), and this may suggest that overfishing is occurring.		
broadbill swordfish		
WWF accepts that the stock assessment conducted in Davies, *et al*, 2013 concludes that the spawning stock biomass is above the default limit reference point. However, it noted that there are some uncertainties as to whether overfishing is occurring. As such, there is not a high degree of certainty that the stock is above the point where recruitment would be impaired / or that over recent years that the stock has been fluctuating above the target reference point. This stock is therefore only likely to attain a score of around 80.		
Mahi mahi		
There is no assessment for this stock. When applying the RBF, mahi mahi is likely to achieve a score > 80		

Reference points

The WCPFC has now adopted formal limit reference points, for the main tuna stocks (yellowfin and albacore) covered in this assessment. For SG80 the stock status is highly likely to be above the point at which there is an appreciable risk that recruitment is impaired, and will be at or around a level consistent with B_{MSY}. The current stock assessments for yellowfin and albacore indicate that this is the case. However, only default TRPs apply and currently the actions do not follow specific requirements where measures should be set by management (which we take to be WCPFC), and implemented as part of the management plan. This suggests that this P1 is likely to score below 80. WCPFC SC 10 is expected to recommend target reference points, but it is not clear whether this will apply just to skipjack tuna.

Given that the MSC has confirmed that Principle 1 applies to the whole of the fish stock, and the low level of albacore, yellowfin tuna and broadbill swordfish caught specifically by the ETBF longline fishery, 0.6%, 0.4% and 7.5% specifically, the onus for addressing Principle 1 indicators must fall, ultimately, on the WCPFC and not AFMA.

WWF notes that when RBF is used to score PI 1.1.1, PI 1.1.2 (reference points) shall receive a score of 80.

Reference points 1.1.2: Limit and target reference points are appropriate for the stock.

Harvest strategy
Whilst WWF recognises the extensive work undertaken by CSIRO to support ETBF specific harvest strategies, MSC requires that the harvest strategy under consideration is that applied to across the WCPO and not specifically to the Australian fishery. What this says effectively is that work undertaken in Australia to promote sustainable management practices, does not have sufficient leverage to conserve stocks across the range of the WCPO.

WCPFC CMM 2013-01 represents the harvest strategy for yellowfin tuna, WCPFC 2010-05, the harvest strategy for albacore tuna, and WCPFC 2009-03, the harvest strategy for swordfish. There is no harvest strategy for mahi mahi so highly unlikely that this species can be assessed under P1.

Harvest strategy 1.2.1: There is a robust and precautionary harvest strategy in place

The harvest strategy for albacore and yellowfin tuna include monitoring, stock assessment and management action. There are no explicit harvest control rules. Monitoring of the stock is based on catch and effort data, length-frequency data and tagging data. The stock assessment has been discussed under 1.1.1.

Historically WCPFC has believed that catch levels from the South Pacific albacore stock have been sustainable, but recent evidence suggests considerable biomass depletion occurring north of 25^{0}S and the current CMM only applies a capacity limit for vessels operating South of 20^{0}S. Overall catches in 2010, 2011 and 2012 South of 20^{0}S have been above the 2001-2004 (WCPFC, 2011)[3]. These findings suggest that the current WCPFC harvest strategy for albacore is not being applied effectively, or may be insufficient to protect the biomass.

[3] Table 2. Total VMS days at sea by year and International Waters area, WCPFC, 2011, http://www.wcpfc.int/system/files/WCPFC8-2011-IP-04-Rev-1-South-Pacific-Albacore-Fishery-Rev-1.pdf

The harvest strategy for yellowfin tuna is to restrict effort to in their EEZs where effort exceeds 1,000 days annually over the period of 2006-2010, and shall limit effort in their EEZs to 2001-04 average or 2010 levels. Overall, 2012 catches for yellowfin were slightly greater (Pilling et al, 2013). Longline catches of yellowfin tuna to their 2001-2004 average levels for each CCM, excluding SIDS. However, total annual yellowfin catch in 2001-2004 averaged 75,712 tonnes. In 2010 and 2011, the provisional total longline catch of yellowfin was 75,582 tonnes and 75,393 tonnes respectively, and fell below the 2001-2004 average level in 2012 to 65,582 tonnes. Specific concerns may emerge in the failure of the current strategy to protect juvenile yellowfin tuna (SC9).

The strategy for swordfish (WCPFC 2009-03 relies) on a swordfish catch register, restricting the number of vessels catching swordfish, and record catches for the geographic region North of 20°S. SC9 noted that catches between the equator and 20°S now represent the largest component of the catch in Region 2 (equator to 50°S, 165°E to 130°W), and this area is specifically excluded by the strategy. It is noted that fishery specific control rules have been set (Campbell, 2013), but these only apply to the ETBF and not across the range of the fishery.

Based on the above, it is highly likely that the strategies in place for the WCPO are not responsive to the state of the stock and the elements of the harvest strategy do not work together towards achieving management objectives reflected in the target and limit reference points.

Harvest control rules and tools 1.2.2: There are well defined and effective harvest control rules in place

The MSC defines harvest controls rules as: a set of well-defined pre-agreed rules or actions used for determining a management action in response to changes in indicators of stock status with respect to reference points. The WCPFC harvest strategy for the albacore tuna fishery does not contain robust control rules. An insufficient set of management mechanisms are in place to restrict exploitation rates further should the default limit reference point be approached and there are no signs that WCPFC is moving to develop harvest control rules for the stock. WWF believes in order that this fishery passes that there must be generally understood harvest control rules in place, which would reduce the levels of exploitation as the limit reference points are approached, and that there is evidence that the tools used to implement harvest control rules are effective in controlling exploitation. WWF would also expect to see, as a condition, a more extensive analysis to demonstrate the effectiveness of HC rules and tools. Such a document exists for skipjack, yellowfin and bigeye tuna, but not for albacore or swordfish.

Information / monitoring 1.2.3: Relevant information is collected to support the harvest strategy

There is a comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information) available. The current stock assessments identified some uncertainties. However, there is generally good information on other fishery removals from the stock across the range of participants in the fishery.

Assessment of stock status 1.2.4: There is an adequate assessment of the stock status

Stock assessments are fully described in Hoyle *et al* (2011) (albacore), Langley *et al* (2011) (yellowfin) and Davies *et al* (2013) (swordfish). The assessments use the stock assessment model and computer software known as MULTIFAN-CL (or MFCL).

These stock assessments take uncertainty into account and evaluate stock status relevant to default reference points in a probabilistic way. WWF considers, that for the purposes of the stock assessment, it is adequate that stock assessment results are reported by the SPC against default reference points and that the WCPFC Scientific Committee provides management advice based on those reference points.

The assessment model's underlying structural assumptions are regularly reviewed, with a focus on providing reliable estimates of population dynamics. Improvements include a more precautionary stock-recruitment relationship adopted as the default and various changes to the catch and effort time series and their treatment in the model.

SPC papers and stock assessment methodologies are subject to occasional external review. The last such review was of the Bigeye stock assessment (Ianelli *et al*, 2012).

Principle 2: Ecosystem
WWF notes the MSC has confirmed that Principle 2 applies as follows:
"The Standards Council agreed that Principle 2 applies to the fishery (a combination of stock(s)/gear/practice) seeking certification, **so long as the fishery as a whole** is conducted in a way that does not substantially undermine the objectives of Principle 2 across the whole range of the fish stock(s). This was intended to allow Principle 2 to be applied across the full spatial range of the fish stock(s) involved, and the relevant ecological structure and processes, and not be limited to just the local effects of the fishery seeking certification (MSC, 2010a)".

ETBF catches in 2011 (AFMA, 2012), other than the target species identified (albacore, yellowfin, broadbill swordfish), include as a percentage of the total, bigeye tuna (8.4%), striped marlin (6.2%). Mahi mahi (proposed for assessment as a target species) (4.6%). Of the sharks, Mako shark accounts for 1%, bronze whaler (0.2%), Blue shark, black tip reef shark 2%, hammerhead (0.1) and OWT shark (0.04%). The moonfish catch is around 0.5% of the total.

WWF notes CB3.1.1 (V1.3) "Prior to scoring the fishery, certification bodies shall determine and document under which Component any Principle 2 species will be assessed. For example, when considering a shark species taken as bycatch that is also listed as threatened under relevant national legislation (EPBC Act), the certification body would recognise that the species is primarily managed as an ETP species and therefore it will only be considered when scoring the ETP species' PIs, and not in the scoring of retained or bycatch species' PIs.

In addition, the wider ecosystem impacts of, for instance, retained catch removals should also be considered under the Ecosystem Component."

In assessing the various species by category, WWF would expect to see clear distinctions between retained (bigeye tuna and striped marlin), bycatch (blue and black marlin) and Endangered, Threatened and Protected species (most sharks, turtles and seabirds).

WWF would specifically like to see that the 'main' retained species are incorporated into the assessment, along with all EPBC listed species and the blue and black marlins. These marlins being assessed as bycatch species.

2.1: Retained Catch Profile in the ETBF Longline Fishery

Retained Species Status 2.1.1: The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species.

Retained species management strategy 2.1.2: There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species.

Retained species Information / monitoring 2.1.3: Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species.

Bigeye

Like yellowfin, bigeye are taken by a variety of surface gears as juveniles and by longline gear as adults. The total bigeye catch for the ETBF in 2013 was estimated at 488 tonnes, a decrease from 552 tonnes in the preceding year.

The Bigeye tuna stock assessments using MULTIFAN-CL have been conducted almost annually since 1999, with the recent assessment in 2011 (Davies *et al.*)[4]. The assessment covers 6 spatial regions in the WCPO, with data for the period 1952-2010 grouped by quarters, for 25 defined fisheries. Catches taken in Region 5, the zone adjacent to Australia are very low relative to Regions 3, 4, 1 and 2 (Figure 5, Davies, *et al*). Nevertheless, the position of the stock is that spawning biomass is above the default limit reference point. Ocean-wide catches exceed MSY, and current fishing mortality rate exceeds that required to produce MSY (ABARES, 2012). As a result, the stock is classified as not overfished but subject to overfishing. Access to bigeye tuna in the ETBF fishery is determined by TACC, with a TACC of 1056 mt. The fishery specific limit is set following the advice received from CSIRO and presented to AFMA and the TTRAG and TTMAC. Minimal fishery specific work has been undertaken to evaluate stock interdependence with the wider WCPO and WWF aware that specific research projects have been proposed to gain a greater understanding of this matter. However, these projects have continually been ranked as low priority through out the Commonwealth research approvals processes. However, given the current levels of catch, WWF considers the TACC as far too ambitious, and suggests that these limits at best

[4] Davies *et al.*, 2011, WCPFC-SC7-2011/SA- WP-02

constitute a partial strategy. WWF would wish to see strong evidence that the ETBF TACC is such that the fishery does not hinder recovery and rebuilding in order to receive a score of 80.

Striped marlin
The total striped marlin catch for the ETBF in 2012 was estimated at 262 mt in 2012 (ABARES, 2013), increasing from 287 mt in the preceding year.

The stock assessment for striped marlin in the south-west Pacific Ocean (SWPO) was updated in 2012 (Davies et al. 2012). Catch for the ETBF decreased in 2012 (Figure 22.4). A recent increase in total catch in the WCPO has been driven in part by increases in catch in the northern area that is not subject to the current conservation and management measure (which applies south of 15°S) (WCPFC Conservation and Management Measure (CMM) 2006–04). The most recent base-case estimate of fishing mortality is below the level associated with MSY, and recent catches are close to MSY. As a result, WPO striped marlin is classified as not subject to overfishing and not overfished. The Scientific Committee of the WCPFC recommended measures to reduce overall catch, through the expansion of the geographical scope of CMM 2006–04, to cover the distribution range of the stock.

WWF is satisfied that an effective management strategy is applied by the ETBF for striped marlin and that the measure is consistent with the CMM. However, it recommends that Australia seeks to actively support the SC recommendation to extend the geographical area of the CMM to north of 15°S.

There is a high level of quantitative information available from this fishery, complemented by a very strong observer programme. This work is used extensively to support the assessments for billfish especially.

Oil fishes, Wahoo and Moonfish (Opah) also make up an important component of the retained species catch. However, these species catches are well within the definition on 'main', and collectively account for less than 1% of the catch. Nevertheless, each of these species has been the subject of a PSA (AFMA, 2007), and score low risk.

Baitfish
Bait species used includes yellowtail scad and blue (slimy) mackerel, frozen (Western Australia) pilchards (small quantities), and imported squid and pilchards. WWF notes the use of SICA to evaluate the capture of live bait (AFMA (2007)) with the resulting low consequence score. WWF would expect to see all bait fish sourced for the fishery as live bait, and other fisheries, are subjected to the RBF.

2.2: Bycatch species

Bycatch species: Status 2.2.1: The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups.

Bycatch species Management strategy: 2.2.2: There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations.

Bycatch species Information / monitoring 2.2.3: Information on the nature and amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch.

The International Scientific Committee (ISC) stock assessment of Pacific blue marlin to SC9 (SC9-SA-WP-09: Report of the billfish working group workshop – Assessment of the Pacific blue marlin stock in 2013) determines that the stock is not currently overfished and is not experiencing overfishing. However, the stock is nearly fully exploited and stock biomass has declined. AFMA (2007) has assessed the PSA for both blue and black marlin, categorising these as medium risk with scores of 3.07and 2.65 respectively.

There has been a legislative prohibition on the commercial take of Blue and Black marlin (dead or alive) since 1998. This is in recognition of the importance of these species to the Australian game fishing sector. AFMA monitors the rate of capture and release. Live releases account for around 70% of the total catch (AFMA, Bycatch and discarding Workplan). The AFMA ERA points to concerns that Blue and black marlin may escape from gear, but impaired capacity to recover from stress of capture may result in subsequent mortality. However, there is believed to be a minimal impact on population as a result of this activity. WWF accepts that catch and release policy represent a partial strategy.

2.3: Endangered, Threatened and Protected species

ETP species Status 2.3.1: The fishery meets national and international requirements for protection of ETP species. The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species.

ETP species Management strategy 2.3.2: The fishery has in place precautionary management strategies designed to:
- meet national and international requirements;
- ensure the fishery does not pose a risk of serious or irreversible harm to ETP species;
- ensure the fishery does not hinder recovery of ETP species; and
- minimise mortality of ETP species.

ETP Species Information / monitoring 2.3.3: Relevant information is collected to support the management of fishery impacts on ETP species, including:
- information for the development of the management strategy;
- information to assess the effectiveness of the management strategy; and
- information to determine the outcome status of ETP species.

There are 44 retained species. Three chondrichthyan species (**longfin mako, porbeagle and dusky shark**) were identified at high risk (AFMA, 2007). The EPBC Act also lists Shortfin Mako, Hammerhead and Oceanic White Tip sharks, where there are some interactions in the fishery. Dusky sharks, identified as High Risk (AFMA, 2007), but not listed in the EPBC

Act The AFMA Stock Status Report (AFMA, 2012) reports elimination of this species as High Risk through the use of expert override (Zhou, December 2007). WWF is opposed to the principle of 'expert override', especially, in the event that the fishery is elevated to a level 3 assessment. WWF is therefore of the view that dusky sharks should be included in the assessment, most probably under bycatch species. The assessors are requested to identify the details used to determine the expert override and evaluate the suitability of the arguments applied.

Shortfin mako represent the highest catches of all the shark species (40-70 tonnes annually) and sufficiently significant in volume to warrant assessment. It is noted that this species is identified in the AFMA ERA (AFMA, 2007) as medium risk, but curiously, the ERA states a low overlap, which is not the case. Operators in the ETBF are prohibited from retaining or trading live Shortfin Mako, Longfin Mako and Porbeagle sharks as they were listed as migratory species under the Environment Protection and Biodiversity Conservation (EPBC) Act in 2010. However, whilst WWF notes that this fishery has seen a significant reduction in the catch of longfin mako and porbeagle shark, down to less than 10 in 2011, there have been correspondingly marginal reductions in the capture of shortfin mako. WWF is very cautious of the benefits of the bycatch management policy as impacting on shortfin mako, with 1,652 species taken in 2011. WWF finds it extremely hard to believe that makos have a higher level of mortality when taken in the longline. Of the shark species, shortfin mako coincidentally represent a very marketable byproduct. The assessors are therefore asked to carefully consider the authenticity in the state of shark when caught, and why it is that shortfin mako, as opposed to any other species are retained. If high risk, the high take of shortfin mako would appear to suggest that the current strategy is not effective for this species.

Records of shark catch, shown in the Bycatch and discarding Workplan, 2011-2013 (AFMA, 2010) also show high numbers of sharks released alive, including for the high risk species dusky whaler (85%) and Oceanic white tipped shark (77%), and medium risk species, shortfin mako (27%).

It is also noteworthy that fishery interacts with CITES listed species, Hammerhead sharks and Oceanic whitetip (Table 1, AFMA, 2012). These species are not presently covered under the Stock Status Report. Both are now listed as CITES Appendix 2 species[5]. It is noteworthy that DSEWPaC does not include these species for monitoring evaluation. It is noted that AFMA has implemented a ban on retaining oceanic whitetip sharks (*Carcharhinus longimanus*) that was agreed by the WCPFC in early 2012. It is also noteworthy that management actions require the non-use of wire traces and a policy of releasing sharks alive and a maximum take of 20 sharks per trip.

WWF would recommend that both hammerhead sharks and OWT be subject to monitoring, potentially along with dusky shark. The assessors are asked to pay special attention to the following:

[5] Entry into effect delayed by 18 months, i.e. until 14 September 2014, http://www.cites.org/eng/app/appendices.php

- whether direct effects are highly unlikely to create unacceptable impacts to all shark species listed above
- Whether the measures in place are sufficient to minimise mortality of shortfin mako; and
- That there is evidence that the strategy is being implemented successfully.

Species identified as of particularly high risk (AFMA, 2007) include Buller's Albatross (*Thalassarche bulleri*) and Shy Albatross (*Thalassarche cauta*). A Threat Abatement Plan (TAP) has been effective (AFMA 2012). The TAP requires the ATBF to significantly minimise the bycatch of seabirds in oceanic longline operations and maintain a bycatch rate of less than 0.05 birds per 1000 hooks. WWF notes that the TAP has been very successful.

WWF also notes the very low level of turtle interactions in this fishery.
2.5: Ecosystems

Ecosystem Status 2.5.1: The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.

Ecosystem Management strategy 2.5.2: There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.

Ecosystem Information / monitoring 2.5.3: There is adequate knowledge of the impacts of the fishery on the ecosystem. Information is adequate to identify the key elements of the ecosystem (e.g. trophic structure and function, community composition, productivity pattern and biodiversity).

The ecosystem impacts of this fishery are limited to two issues:

(i) the removal of high level predators (e.g. the retained tuna species, albacore and yellowfin) on the underlying ecosystem and

(ii) the potential impact of climate change on tuna populations in the Pacific Ocean. Both issues are examined below:

Fisheries have removed at least 50 million tonnes of tuna and other top-level predators from the Pacific Ocean pelagic ecosystem since 1950, leading to concerns about a catastrophic reduction in population biomass and the collapse of oceanic food chains. Sibert et al. (2006) analysed available data[6] from Pacific tuna fisheries for 1950-2004 to provide comprehensive estimates of fishery impacts on population biomass and size structure. Exploited western Pacific skipjack have remained fairly stable and well above the equilibrium biomass. Exploited western Pacific yellowfin have declined steadily to levels near the equilibrium biomass that would produce the MSY in the fishery. Current biomass ranges among species from 36 to 91% of the biomass predicted in the absence of fishing, a

[6] Sibert *et al* used stock assessment methods to provide estimates of fishery impacts on population biomass, size structure, and trophic status of major top-level predator stocks in the Pacific Ocean: bigeye tuna, yellowfin tuna, skipjack tuna, albacore tuna, and blue shark

level consistent with or higher than standard fisheries management targets. Fish larger than 175 cm FL had decreased from 5% to approximately 1% of the total population. The trophic level of the catch had decreased slightly, but the authors concluded that there was no detectable decrease in the trophic level of the population. These results indicated substantial, though not irreversible, impacts of fisheries on these top-level predators and minor impacts on the ecosystem in the Pacific Ocean.

Allain (2010) studied the upper part of the trophic structure of four distinct regions of WCPO, including West Pacific Warm Pool Province (WARM). High species diversity is utilised by tuna feeding on all the preys available from the surface to the deep. This high diversity induces a strong potential resilience to perturbations.

Albacore, yellowfin tuna and broadbill swordfish are 'apex' predators. Their diet is well understood across their life history stages, while their predators when in their juvenile stages are also reasonably well known. Apex predators play a crucial role in maintaining the health of an ecosystem, exerting substantial control over the population sizes of many species at lower levels of the food web. Consequently, they may contribute to the stability of marine ecosystems, and maintain biodiversity. Both skipjack and yellowfin stocks in the region appear to be above B_{MSY}. If catches in the fishery exceed the existing biomass limits, the reduced proportion of biomass remaining in the specific ecosystem and removals at this level could to lead to some negative impacts. The status of albacore in parts of WCPFC is vulnerable to localized overfishing, and the status of yellowfin in WCPFC Region 3 may be worsening, but within the greater scheme of things the lower levels of abundance overall relative to skipjack removals are unlikely to cause irreversible or serious harm. At this stage it would be important when considering revised VPA stock assessment to also include extending the existing levels of research to include trophic structure information resulting from stomach content examination of 20 top predator species. SPC continue to strengthen ecosystem indicators and modelling through better quality data particularly with bycatches from the fisheries, a higher observer coverage rate and better biological information for bycatch species (Allain *et al*, 2012). WWF is satisfied that the strength of the research available from SPC meets all the ecosystem scoring requirements.

Principle 3: Governance and Policy
WWF notes the MSC has confirmed that Principle 3 applies as follows:
"The Standards Council agreed that Principle 3 applies to the fishery (a combination of stock(s)/gear/practice) seeking certification, except where elements of Principle 3 are required to achieve Principles 1 and 2. This was intended to allow Principle 3 to be applied flexibly to achieve Principles 1 and 2 (MSC, 2010a)."

Introductory comments
The totality of the management system of the ETBF Fishery includes:

- The Western and Central Pacific Fisheries Commission (WCPFC), the tuna RFMO for the WCPO
- Regional organisations that provide management services to the WCPFC and the Australia, including in particular the FFA and the SPC
- The Australian Fisheries Management Authority (AFMA).

WWF accepts that the management systems in place are highly effective, and that most PIs are likely to pass with high scores. A summary of findings has been covered earlier in the text.

Condition Setting

WWF notes that the most recent MSC Guidance on Setting Certification Conditions (MSC, 2010c) requires that, when setting conditions, the certification body shall consult with:
"all relevant entities…if those conditions are likely to require investment of time or money by those entities, or changes to management arrangements or regulations, or re-arrangement of research priorities by these entities, in order to satisfy the certification body that the conditions are achievable by the certification client and realistic in the time frame specified".

MSC defines 'relevant entities' as "all fisheries management or research agencies, authorities or regulating bodies that might have authority, power or control over management arrangements, research budgets and/or priorities".

WWF believes this raises a potential difficulty with respect to certification of a fishery that is subject to management by a regional fisheries management organization (RFMO). In the case of the Albacore Tuna Fishery, WWF considers that the WCPFC, including the SPC as the Commission's contracted scientific services provider, is, a relevant management and research entity. Since the WCPFC, like other RFMOs, are governed by their membership, any such consultation would need to be with the members through a Commission meeting. Given the range of interests in the Commission, WWF believes that, depending on the nature of conditions sought to be imposed, that it may be very difficult to get a commitment to changes to management arrangements, regulation or research priorities in order to satisfy the MSC requirements of a particular component of the Commission's mandate.

Concluding Comments

WWF has identified a range of underlying issues concerning the potential certification of the ETBF fishery operating across the waters of the Australian EEZ. Critically, there is not a robust and precautionary harvest strategy in place for Albacore tuna, nor swordfish, in the South Pacific regional fishery, and that no specific objectives have been set which link levels of exploitation to target and limit reference points. The WCPFC harvest strategies in place for albacore and swordfish are not sufficient to control exploitation as limit reference points (implicit or explicit) are met. There is also a lack of evidence to suggest these strategies are likely to work.

In summary WWF is concerned that:

- The application of Reference points in management needs to be strengthened.
- Mahi mahi cannot be assessed as a P1 species because there is no specific management strategy for this species.
- The stock assessment for broadbill swordfish raises some major uncertainties.
- A regional specific harvest strategy is not clearly defined; and that tools are not shown to have been implemented across the range of the fishery.

- The vulnerability status of some ETP species, especially some shark species are poorly known, and that there are insufficient measures in place to ensure that these species are within biological limits.

WWF also notes that new stock assessments for several species will be finalised in August of this year. These should be used to determine to stock assessment outcomes.

WWF's analysis has also identified a number of issues which are of particular concern in the context of potential MSC certification of the ETBF Fishery. These issues relate to the following indicators:

Principle 1:

- Reference points 1.1.2: WCPO Target reference points have yet to be adopted for the tuna species (yellowfin and albacore), and whilst there may be an implicit reference point, it has not been formally adopted nor applied in management. There also must be target and limit reference points, not just one or the other. The same reference points would need to be applied to broadbill swordfish.

- Harvest strategy 1.2.1: CMM 2010-05 does not represent a robust and precautionary harvest strategy in place, and evidence suggests that it is not being applied effectively.

- Harvest control rules and tools 1.2.2: The WCPO longline fisheries have no defined and effective harvest control rules in place. Whilst this is not necessarily the case for the ETBF, it is the regional fishery under assessment and not the Commonwealth managed fishery.

Principle 2:

- Retained Species Status 2.1.2: The partial strategy for bigeye may not maintain the species at levels which are highly likely to be within biologically based limits.

- ETP species Status 2.3.1:
    - Concerns are raised as to the vulnerability of shortfin mako and dusky sharks, the latter possibly assessed under 2.2.

- ETP species Management strategy 2.3.2: Effective precautionary management strategies to not appear to be effective in limiting the catch of shortfin mako sharks

ACRONYMS

ABARES	Australian Bureau of Agricultural and Resource Economics
AFMA	Australian Fisheries Management Authority
CCMs	Members, cooperating non-members and participating territories (of the WCPFC)
CITES	Convention for International Trade in Endangered Species of Wild Fauna and Flora
CMM	Conservation and management measure (of the WCPFC)
CMS	Convention on Migratory Species
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EEZ	Exclusive Economic Zone
EPBC	Environment Protection and Biodiversity Conservation
ERA	Ecological Risk Assessment
ETBF	Eastern Tuna and Billfish
FAM	Fisheries Assessment Methodology (MSC)
FAO	Food and Agriculture Organization of the United Nations
FFA	Forum Fisheries Agency
ISC	International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean
IUCN	The World Conservation Union
IUU	Illegal, unreported and unregulated (fishing)
MAC	Management Advisory Committee
MCS	Monitoring, control and surveillance
MSC	Marine Stewardship Council
MSY	Maximum sustainable yield
PSA	Productivity-susceptibility analysis
RFMO	Regional fisheries management organization
SG	Scoring Guidepost
SPC	Secretariat of the Pacific Community
TTAC	Tropical Tuna Advisory Committee
TTAG	Tropical Tuna Resource Assessment Group
TCC	Technical Compliance Committee (WCPFC)
UNCLOS	United Nations Convention on the Law of the Sea of 10 December 1982
UNFSA	The Agreement for the Implementation of the of the Provision of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks
VMS	Vessel monitoring system
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	Western and Central Pacific Ocean

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During the stakeholder consultation period, the MEC team received Technical Oversights (TOs) from the MSC. These are provided below and the CAB's response.

Ref	Type	Page	Requirement	Reference	Details	PI	CAB Response
15312	Minor	134-145	CR-27.6.2.3 v1.3	The CAB shall document the rationale for the target eligibility date and include and include an assessment regarding how the assessed risks to traceability systems in the fishery are adequately addressed by the applicant to give confidence in this date	No explanation is provided as to why the TED only applies to swordfish and not yellowfin or albacore (section 5.1, pg 134). This suggests the traceability systems are different for different species in the UoC, but no rationale is given as to why there is confidence in the TED for only swordfish. Section 5.3 (pg 135) suggests the TED applies yellowfin and albacore; this is inconsistent with the above.	-	Accidental omission of yellowfin and albacore in sentence. This has been modified to correctly identify that all P1 species assessed here are eligible to bear the MSC ecolabel on the same date (TED). There is no difference in the client's traceability system between P1 species.
15314	Minor	134-135	CR-27.12.1.1 v1.3	The CAB shall determine if the systems of tracking and tracing in the fishery are sufficient to make sure all fish and fish products identified and sold as certified by the fishery originate from the certified fishery. The CAB shall consider the following points and their associated risk for the integrity of certified products: 27.12.1.1 The systems in use.	Other species not included in the UoC are caught and retained (bigeye tuna, mahi mahi, striped marlin). As they are not in the UoC, these species are not eligible to enter MSC chains of custody, but little information is given as to how this catch is separated and identified until first change of ownership. For example, are the polythene bags used for tunas versus mahi mahi marked in any way? How are the non-MSC species landed and sold in a way that they cannot be confused as	-	Further explanation is provided in the sections outlined in the TO.

					being certified?		
15 31 5	Major	277	CR-27.8.7 v1.3	If the scope of the fishery contains a fishery that overlaps another certified or applicant fishery, Annex CI shall be followed.	Scoring issue b: The Cook Islands albacore fishery did not meet the SG80 at the WCPFC level for this scoring issue based off the rationale provided in the PCR stating '…the primary measure to control catch and effort in the albacore fishery within the WCPF Convention Area (CMM-2010-05) 'appears to be effective in constraining effort' (SC9 record, para 172)." A similar rationales is presented within the Walker Seafood PCDR, whereby it is stated that "the extent to which WCPFC responds timely to all issues that arise could be questioned however, over their lack of response to the inability of CMM-2010-05 to control fishing effort on South Pacific albacore for a number of years." Additionally, as a support to the team's argument in the current PCDR, reference is made to the next Commission meeting to occur in December 2014. This meeting would have already taken place and new information should therefore be available and provided. At present, it is unclear why the	3. 2. 2	3.2.2SG80 for reference: *Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions*. There is a problem here (and since this assessment and the Cooks have the same team leader, we had better acknowledge it frankly) which is that the Cooks rationale is not very well drafted. It is clear from the condition and action plan associated with this PI that the intent was that the score of <80 arises from the Cook Islands decision-making processes, not the WCPFC ones – i.e. the condition does not say anything about WCPFC, and neither does the action plan. On this basis, and because the Walker rationale was out of date, the team decided to review the scoring of this scoring issue from scratch in relation to WCPFC.

					Walker Seafood assessment meets SG80 for PI 3.2.2 scoring issue b at the WCPFC level, but the Cook Islands assessment did not. Additional information is required to justify the score at the SG80 level, and harmonisation with the Cook Islands assessment may be required.		The question of 'timely' – which is called into question by the point about failing to constrain effort – is part of SG60, so if the team concludes that it is not met, then the fishery should fail. However, the team concluded that 'timely' needs to be put in the context of what could reasonably be expected in terms of the functioning of organisations such as RFMOs, with a large number of members among which consensus is required, as well as in the context of the apparently good stock status of albacore. Hence the team concluded that this issue is met. The differences between SG60 and SG80 are not large – i.e. 'serious issues' vs. 'serious and other important issues' and 'take some account of wider implications' vs. 'take account of wider implications'. In terms of 'serious and other important issues' the team concluded that WCPFC have taken decisions on issues which have not been confirmed to be serious – in the sense that disaster was not shown to be looming – e.g. some examples of

							are given in the rationale of some of the P2-type issues. There is also the stated objective of being guided by the precautionary approach. In terms of 'some account of wider implications' – it is arguable that WCPFC takes too much account of the wider implications of decisions, in that nothing is decided unless all agree. Overall, the team decided that SG80 is met. The team also reviewed the scoring for this PI for other WCPFC fisheries – for PNA skipjack and Fiji, NZ and AAFA albacore, WCPFC scored 80 for this scoring issue in all cases. Thus this conclusion is in line with harmonisation requirements.
15316	Major	282	CR-27.10.6.1 v1.3	Rationales shall be presented to support the team's conclusion	Scoring issue b: the rationale states that at the WCPFC level CMM-2010-06 is "… thought to provide effective deterrence but there is no information to demonstrate effective deterrence." Based off this reasoning, this scoring issue should be met at the SG80 and not SG100 as it is	3.2.3	The rationale has been revised to make the scoring of SG100 clearer.

					currently scored.		
15 31 7	Major	288	CR-27.10.6 .1 v1.3	Rationale shall be presented to support the team's conclusion	Scoring issue a: The score given for the WCPFC is based off a regional report that "details compliance of members with reporting provisions". However, this report and the rationale presented seems to be more a compliance of member states issue rather than an actual mechanism to evaluate the management system. An explicit example as to the mechanisms that evaluate key parts of the management system at the WCPFC level. As they relate to the fisheries/stocks being assessed, is required to justify the score.	3. 2. 5	Please note that this justification was harmonised with the Cook Islands MSC report, which met SG 80 with a similar reasoning. The justification has been slightly modified at the end of the paragraph to highlight internal reviews of CMMs by WCPFC.
15 31 8	Guidance	138	CR-27.8.9 v1.3	The team shall use the default weighting contained within the Default Scoring Worksheet when using the default tree	Weightings need to be given for each PI applied to Table 6.2 Summary of Scores.	-	Added
15 31 9	Guidance	73	CR-CB3.11 .1 v1.3	The team shall define ETP (endangered, threatened or protected) species as follows: a) Species that are recognised by national ETP legislation; b) Species listed in the binding international agreements given below: i)	Hammerhead shark aren't listed on the EPBC Act and are listed only as CITES Appendix II species. Therefore, they should not be considered ETP for this assessment as is currently specified in Table 21.	-	Hammerheads have been removed from ETP species. The team considered whether hammerheads should be considered as 'main' retained species based on their potential vulnerability, but following the guidelines set out in the CR version 2.0 (that vulnerable species should be included as 'main' if they represent 2% or

				Appendix I of the Convention on International Trade in Endangered Species (CITES), unless it can be shown that the particular stock of the CITES listed species impacted by the fishery under assessment is not endangered.			more of the total catch, barring exception circumstances), the team concluded that they were not 'main' (<<1% of catch). Reference to hammerheads in table 21 and in scoring and rationales have therefore been removed.
15320	Minor	271	CR-27.10.6.1 v1.3	Rationale shall be presented to support team's conclusion	The rationale at both the national and regional level is heavily focussed on P1 aspects of the assessment. As required by all SG levels, Principle 1 and 2 need to be considered. Additional information and explicit examples relating to Principle 2 are required.	3.1.4	A paragraph has been added on P2 incentives at national level, and the paragraph on WCPFC has been expanded to consider P2. The score was not changed.
15321	Major	289	CR-27.10.6.1 v1.3	Rationale shall be presented to support the team's conclusion	Scoring issue b: Similar rational is used in scoring issues a and b when discussing internal reviews at the WCPFC level. At present, the information presented appears to be more about Commission Members adhering to WCPFC requirements, rather than the WCPFC being subject to a regular internal review. Additional information is required to justify the score at the SG80 level.	3.2.5	Please note that this rationale is harmonised with the Cook Islands as it relates to WCPFC. More information has been added on internal reviews of WCPFC. The score was not changed.
15324	Major	226	CR-27.10.6.1 v1.3	Rationale shall be presented to support the team's conclusion	Mahi mahi is listed as a 'main' retained species. In 2.1.2 scoring issue a, there is rationale presented that the impact on mahi	2.1.2	First of all, it is important to note that mahi mahi is identified as a 'main' retained species on the basis of its value to the fishery, not

					mahi is not significant, therefore a partial strategy is not necessary, presumably linking back to the 'if necessary' clause in the scoring issue text. However, by definition, if a species is considered main you are having an impact, it does not have to be significant so as to be detrimental. Note that CB3.3.1 clarifies this clause, that partial strategies may not be necessary when there is no impact at all on a particular element. The guidance clarifies that this will likely be the case when you have no retained species for instance. The rationale presented for scoring issues a-d in PI 2.1.2 for mahi mahi does therefore not justify the score.		on the basis of its proportion of the catch, which is <5%. On this basis, and on the basis of the SICA analysis, the team concluded that the fishery was not at all likely to be having an impact on the stock. However, MSC clarified that 'impact' should be interpreted as 'any kind of interaction'. Since the scoring was undertaken for this fishery, however, AFMA have moved to put in place a harvest strategy for mahi mahi (Steve Auld, AFMA, pers. comm.). Some information about this harvest strategy is provided in the revised rationales, and the team considered that it was considered sufficient to meet the SG80 level given the very limited impact of the fishery on the stock. Further information will be provided at the first surveillance audit, if the fishery is certified.
15325	Minor	283	CR-27.10.6.1 v1.3	Rationale shall be presented to support the team's conclusion	Scoring issue c: information relating to the fishers complying with the regional management system is required	3.2.3	Added
15326	Minor	135	CR-27.12.1.2. v1.3	27.12.1 The CAB shall determine if the systems of tracking and tracing in the fishery are sufficient to make	All species other than yellowfin tuna, albacore and swordfish as specified in the UoC on page 10 are not part of the MSC	-	This has been explained further to clarify the 'misleading' statement.

				sure all fish and fish products identified and sold as certified by the fishery originate from the certified fishery. The CAB shall consider the following points and their associated risk for the integrity of certified products: 27.12.1.3 the opportunity of substitution of certified with non-certified fish prior to or at landing fraudulent claims from within and outside the certified fishery.	assessment. Neither are they IPI. The statement "all catches can be classed as MSC certified" in 5.2b) is therefore misleading		
15 32 7	Minor	135	CR-27.12.1 .2. v1.3	27.12.1 The CAB shall determine if the systems of tracking and tracing in the fishery are sufficient to make sure all fish and fish products identified and sold as certified by the fishery originate from the certified fishery. The CAB shall consider the following points and their associated risk for the integrity of certified products: 27.12.1.3 the opportunity of substitution of certified with non-certified fish prior to or at landing fraudulent claims from within and outside the certified fishery.	The statement "there is no risk of mixing MSC with non-MSC product after landing as all swordfish, yellowfin and albacore caught during a trip is MSC certified" needs a further qualifier or revision. Are the three vessels listed on page 10 the only vessels to land these species at Mooloolaba and Ulludulla? Or, are these landings physically segregated and/or marked in such a way that the risk of mixing/mis-identifying with non-certified landings is eliminated?	-	Further elaboration is given in section 5.2 c) to explain separation and reduction of risk of substitution.
15	Minor	189	CR-	Rationale shall be presented	Scoring issue c: within the body of	1.	We prefer not to 'copy and paste'

328			27.10.6.1 v1.3	to support the team's conclusion	the report, a substantial amount of text is provided in regard to target reference point for yellowfin tuna. It is recommended that information in the body of the report is used in the rationale for scoring issue c to bolster the team's argument and justification for the SG80 score.	1.2	where possible – aside from making the report unnecessarily long, it can lead to errors if changes are made. Nevertheless, in this case, the rationale has been revised to provide more direct information.
15329	Major	198	CR-27.10.6.1 v1.3	Rationale shall be presented to support the team's conclusion	Scoring issue c: at present, the rationales provided for meeting the SG80 level for this scoring issue for yellowfin tuna centres on the forward projections of F in relation to F_{MSY} and recent and current stock status. While it is acknowledged that different factors exist between various fisheries, it is recommended that the team assess the consistency of this application in relation to other tuna fisheries within the WCPFC and RFMO managed stocks.	1.2.2	Please note that this rationale has been harmonised with the other ongoing WCPFC yellowfin assessment (PNA). Nevertheless, some additional analysis has been added which considers more specifically the tools in use (which are also outlined in the main body of the report), rather than the predicted outcome. The score was not changed.

Appendix 5. Surveillance Frequency

Version 1.3 of the MSC Certification Requirements states that CABs shall calculate a surveillance score from which the level of surveillance frequency shall then be determined. The criteria in relation to this scoring are set out below.

Table C3: Criteria to determine surveillance score

Criteria	Surveillance Score
Default Assessment Tree used?	
Yes	0
No	2 – RBF used for 2.1.1 and 2.2.1
Number of open conditions?	
Zero Conditions	0
Between 1-5 conditions	1
More than 5	2
Principle Level Scores?	
Great or equal to 85	0
Less than 85	2
Condition on Outcome PIs?	
Yes	2
No	0
TOTAL SCORE	**8**

Table C4: Fishery Surveillance Plan

Score from CR Table C3	Surveillance Category	Year 1	Year 2	Year 3	Year 4
8	Normal Surveillance	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit & re-certification site visit

PLEASE NOTE : MEC will complete the Year 1 surveillance audit in line with the procedural requirements of Version 2.0 of the MSC Certification Requirements. Should this require any changes to be made to the surveillance plan, it will be considered at this time.

Appendix 6. Client Action Plan

As set out above, the assessment team have concluded provisionally that the fishery should be certified, subject to seven conditions, three on Principle 1 (albacore), two on Principle 1 (yellowfin) and two on Principle 2. These are given below, together with the corresponding milestones and client action plan.

Note that in accordance with the MSC Certification Requirements v1.3 (Annex CI), there are specific requirements in relation to harmonisation between overlapping fisheries, including regarding harmonisation of conditions and condition milestones and timelines. Where possible, the conditions of relevant PIs have been harmonised with the assessments listed in Section 4.1. These relate in particular to the conditions under P1. To ensure that the client can realistically achieve the given milestones, the allocated timelines are more generous than they would have been with full harmonisation. This approach takes into account the work already undertaken by other MSC fishery clients, including the establishment of the WCPO Tuna MSC Principle 1 Alignment Group in 2014, in which the client may participate.

Table 52. Condition 1

Performance Indicator	PI 1.1.2 – Target Reference Point - Albacore
Score	75
Rationale	For full rationale see rationale for PI 1.1.2, albacore.
Condition	The management system should formally adopt a target reference point for the South Pacific albacore stock, which is consistent with maintaining the stock at B_{MSY} or some other measure with similar intent or outcome. This target reference point should be used for management purposes. Note: This condition may be addressed jointly with conditions 2 and 3.
Milestones	By the first annual surveillance audit, there shall be evidence that the client has started or joined a process of consultation and representation for the establishment of a precautionary target reference point with appropriate regional management bodies. Score 75. By the second annual surveillance audit, there shall be evidence of on-going representations to, and discussions in, appropriate regional management bodies, relating to a target reference point for South Pacific albacore. Score 75. By the third annual surveillance audit a target reference point for regional management of the South Pacific albacore stock should be formally adopted by the WCPFC or other appropriate regional management body with sufficient control over the fishery on the whole stock. Score 80.
Client action plan	Walker Seafoods Australia notes the need of implementing stock-specific reference points and associated harvest control rules as part of the management of tuna stocks in the ETBF. To support the development of appropriate reference points for the South Pacific albacore stock, therefore, in the respective years the client will provide evidence of: <u>Year 1</u> 1. Engagement with the AFMA to promote the completion and adoption of a target reference point for the South Pacific albacore stock. 2. Consultation with AFMA and where necessary FFA and FFA members through the Sub-Committee on South Pacific Tuna and Billfish Fisheries (SC-SPTBF) and Australian government delegates to WCPFC with the objective of

	establishing an agreed position on target reference points for the stock that is consistent with the MSC SG 80 standards. 3. The provision of any requested practical support and data for SPC, FFA and WCPFC analyses on target reference points for albacore to support discussions at FFA SC-SPTBF meetings. 4. Actions to raise awareness of the need for a South Pacific albacore management measure through the Tokelau Arrangement of which Australia is a signatory. <u>Year 2</u> 1. The provision of any requested support and data for SPC, FFA and WCPFC analyses on target reference points for albacore to support any further discussions at the FFA SC-SPTBF meetings, Tokelau Arrangement meetings and the WCPFC Scientific Committee. 2. Engagement with AFMA government officials, and where necessary FFA and its members, and WCPFC delegates from the other major countries fishing the stock in advance of the Commission meeting to seek their support for the adoption of appropriate target reference points by the WCPFC and appropriately drafted WCPFC Resolutions. 3. Collaboration with other industry sectors and NGOs in order to continue to raise awareness of the need for WCPFC to adopt appropriate reference points for the South Pacific albacore stock. 4. Actions to raise awareness of the need for a South Pacific albacore management measure through the Tokelau Arrangement of which Australia is a signatory. <u>Year 3</u> 1. Engagement with AFMA government officials, and where necessary FFA and its members, and WCPFC delegates from the other major countries fishing the stock in advance of the Commission meeting to ensure appropriately drafted WCPFC Resolutions on the adoption of target reference points for the stock, for the WCPFC annual meeting, for consideration by the Commission.
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other members of the WCPO Tuna MSC Principle 1 Alignment Group, other delegations to FFA, PNA and WCPFC and environmental NGOs as appropriate.

Table 53. Condition 2

Performance Indicator	PI 1.2.1 – Harvest Strategy - Albacore
Score	70
Rationale	See rationale for PI 1.2.1, albacore
Condition	The fishery management system should put in place a regional harvest strategy, incorporating limit and target reference points (management objectives), a harvest control rule and management actions, such that the strategy is responsive to the status of the stock and the elements of the strategy work together to maintain the stock at or around the target level. The key missing elements of the harvest strategy at present are 1. a target reference point formally adopted by the regional management system, and 2. a well-defined harvest control rule with associated management actions. These issues are also addressed specifically in conditions 1 and 3.
Milestones	By the first, second and third annual surveillance audits, there will be evidence that work is on-going on a target reference point and harvest control rule as required under Conditions 1 and 3. Score 70 By the fourth annual surveillance audit the client should provide evidence that the key missing elements of the harvest strategy (as covered by conditions 1 and 3) are put in place. Score 80.
Client action plan	In order to ensure that WCPFC implement a harvest strategy for South Pacific albacore which is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points, the client will: <u>Year 1</u> 1. Undertake activities to ensure appropriate focus is given to albacore tuna management at the Twelfth Session of the Commission (December 2015). In particular seek Tokelau Arrangement support for potential management measures resulting from development of harvest control rules and reference points as per Condition 1 and Condition 3. 2. Ensure the work plan of AFMA in 2015 includes an examination of the integrated harvest strategies needed to achieve management objectives <u>Year 2</u> 1. In consultation with AFMA, provide an assessment of how the elements of the enhanced management strategy work together to achieve the management objectives for this fishery. <u>Year 3</u> 1. Engagement with AFMA officials, and where necessary FFA and its members, and WCPFC delegates from the other major countries fishing the stock in advance of the Commission meeting to ensure an appropriately drafted CMM is prepared, for the WCPFC annual meeting, for consideration by the Commission. <u>Year 4</u> 1. The client will provide evidence that key elements of the harvest strategy are in place by the regional management organization that ensure that the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points is in place
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other members of the WCPO Tuna MSC Principle 1 Alignment Group, other delegations to FFA, PNA and WCPFC and environmental NGOs as

	appropriate.

Table 54. Condition 3

Performance Indicator	PI 1.2.2 – Harvest Control Rule - Albacore
Score	60
Rationale	See rationale for PI 1.2.2, albacore
Condition	A well-defined regional-level harvest control rule should be put in place, with associated management actions (in the form of a WCPFC CMM or another form as appropriate) which together act effectively to reduce exploitation rates as the limit reference point is approached. The selection of the harvest control rule should take into account the main uncertainties regarding the status of the stock or the impact of the fishery (or other uncertainties if considered important). Note: This condition can be addressed together with conditions 1 and 2.
Milestones	By the first annual surveillance audit, there shall be evidence that the client has started a process of consultation and representation for the establishment of a precautionary and robust harvest control rule with appropriate regional management bodies. Score 60. By the second and third annual surveillance audits, there shall be evidence of on-going representations to, and discussions in, appropriate regional management bodies, relating to a robust harvest control rule for South Pacific albacore. Score 60. By the fourth annual surveillance audit, the client should provide evidence that the harvest control rule and associated management actions are put in place. Score 80.
Client action plan	To support the development of appropriate harvest control rules for the South Pacific albacore stock the respective years the client will provide evidence of: <u>Year 1</u> 1. Engagement with the AFMA officials to promote the completion and adoption of Harvest Control Rules for South Pacific Albacore. 2. Consultation with AFMA and where necessary FFA and FFA members through the Sub-Committee on South Pacific Tuna and Billfish Fisheries (SC-SPTBF) and Australian government delegates to WCPFC with the objective of establishing an agreed position on harvest control rules for the stock that is consistent with the MSC SG 80 standards. 3. The provision of any requested practical support and data for SPC, FFA and WCPFC analyses of harvest control rules consistent with candidate reference points. 4. Engagement with AFMA officials and Australian delegates to WCPFC to: a. Promote the tabling of a statement to WCPFC at its Twelfth Session (December 2015), urging other members to work diligently to adopt formal harvest control rules for all tuna stocks, as required by the WCPFC Convention. b. Engagement with high-level contacts between AFMA officials, FFA and its members, and WCPFC delegates from the other major countries fishing the stock in advance of the Commission meeting to seek their support for the adoption of appropriate harvest control rules by the WCPFC. c. Ensure the work plan of the WCPFC Scientific Committee, members of the Tokelau Arrangement and FFA SC-SPTBF in 2015 will include analyses of candidate harvest control rules for albacore. 5. Actions to raise awareness of the need for a WCPFC albacore management measure through the Tokelau Arrangement. <u>Year 2</u> 1. Engagement with the AFMA to consolidate the Australian position on harvest

	control rules for the South Pacific albacore stock at subsequent FFA, Tokelau Arrangement and WCPFC meetings and workshops and encourage delegates from the other major countries fishing the stock to support the Australian position. This shall be undertaken in conjunction with any deliberations on appropriate reference points. 2. Provision of any requested support and data for SPC, FFA and WCPFC analyses on HCRs for albacore to support any further discussions at the FFA SC-SPTBF meetings, Tokelau Arrangement meetings and the WCPFC Scientific Committee. 3. Collaboration with other industry sectors and NGOs in order to raise awareness of the need for WCPFC to adopt well-defined harvest control rules for the South Pacific albacore stock. 4. Support and data as requested for the activities of the FFA SC-SPTBF in the analysis of harvest control rules consistent with candidate reference points. 5. Actions to raise awareness of the need for a WCPFC albacore management measure through the Tokelau Arrangement Year 3 1. Practical support and data as requested to AFMA and other regional meetings and workshops with the objective of achieving the adoption of harvest control rules for the South Pacific albacore stock by WCPFC. 2. Engagement with AFMA officials, and as required FFA and its members, and WCPFC delegates from the other major countries fishing the stock in advance of the Commission meeting to ensure appropriately drafted WCPFC Resolutions on well-defined harvest control rules for the stock, to be tabled by Australia or other countries fishing on the stock) at the 2017 (or 2018 if necessary) WCPFC annual meeting for consideration by the Commission. 3. Liaison with the AFMA officials to ensure relevant supporting research is planned both within the FFA SC-SPTBF and the WCPFC Science Committee. 4. Actions to raise awareness of the need for a WCPFC albacore management measure through the Tokelau Arrangement
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other members of the WCPO Tuna MSC Principle 1 Alignment Group, other delegations to FFA, PNA and WCPFC and environmental NGOs as appropriate.

Table 55. Condition 4

Performance Indicator	PI 1.2.1 – Harvest Strategy - Yellowfin
Score	70
Rationale	See rationale for 1.2.1 – yellowfin
Condition	The fishery management system should put in place a regional harvest strategy, incorporating limit and target reference points (management objectives), a harvest control rule and management actions, such that the strategy is responsive to the status of the stock and the elements of the strategy work together to maintain the stock at or around the target level. The key missing element of the harvest strategy at present is a well-defined harvest control rule with associated management actions. This issue is also addressed specifically in condition 5.
Milestones	By the first, second and third annual surveillance audits, there will be evidence that work is on-going on a harvest control rule as required under Condition 5. Score 70 By the fourth annual surveillance audit the client should provide evidence that the key-missing element of the harvest strategy (as covered by Condition 5) is in place. Score 80.
Client action plan	In order to ensure that WCPFC implement a harvest strategy for WCPO yellowfin which is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points. The client will: <u>Year 1</u> 1. Undertake activities to ensure appropriate focus is given to yellowfin tuna management at the Twelfth Session of the Commission (December 2015). In particular seek Tokelau Arrangement support for potential management measures resulting from development of harvest control rules and reference points as per Condition 5. 2. Ensure the work plan of AFMA in 2015 includes an examination of the integrated harvest strategies needed to achieve management objectives <u>Year 2</u> 1. In consultation with AFMA, provide an assessment of how the elements of the enhanced management strategy work together to achieve the management objectives for this fishery. <u>Year 3</u> 1. Engagement with AFMA officials, and where necessary FFA and its members, and WCPFC delegates from the other major countries fishing the stock in advance of the Commission meeting to ensure an appropriately drafted CMM is prepared, for the WCPFC annual meeting, for consideration by the Commission. <u>Year 4</u> 1. The client will provide evidence that key elements of the harvest strategy are in place by the regional management organization that ensure that the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points is in place
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other members of the WCPO Tuna MSC Principle 1 Alignment Group, other delegations to FFA, PNA and WCPFC and environmental NGOs as

	appropriate.

Table 56. Condition 5

Performance Indicator	PI 1.2.2 – Harvest Control Rule - Yellowfin
Score	65
Rationale	See rationale for 1.2.2 – yellowfin
Condition	A well-defined regional-level harvest control rule should be put in place, with associated management actions (in the form of a WCPFC CMM or another form as appropriate) which together act effectively to reduce exploitation rates as the limit reference point is approached. The selection of the harvest control rule should take into account the main uncertainties regarding the status of the stock or the impact of the fishery (or other uncertainties if considered important). Note: This condition can be addressed together with condition 4.
Milestones	By the first annual surveillance audit, there shall be evidence that the client has started a process of consultation and representation for the establishment of a precautionary and robust harvest control rule with appropriate regional management bodies. Score 65. By the second and third annual surveillance audits, there shall be evidence of on-going representations to, and discussions in, appropriate regional management bodies, relating to a robust harvest control rule for South Pacific albacore. Score 65. By the fourth annual surveillance audit, the client should provide evidence that the harvest control rule and associated management actions are put in place. Score 80.
Client action plan	To support the development of appropriate harvest control rules for the WCPO yellowfin tuna stock the respective years the client will provide evidence of: <u>Year 1</u> 1. Engagement with the AFMA officials to promote the completion and adoption of Harvest Control Rules for WCPO Yellowfin. 2. Consultation with AFMA and where necessary FFA and FFA members through the Sub-Committee on South Pacific Tuna and Billfish Fisheries (SC-SPTBF) and Australian government delegates to WCPFC with the objective of establishing an agreed position on harvest control rules for the stock that is consistent with the MSC SG 80 standards. 3. The provision of any requested practical support and data for SPC, FFA and WCPFC analyses of harvest control rules consistent with candidate reference points. 4. Engagement with AFMA officials and Australian delegates to WCPFC to: a. promote the tabling of a statement to WCPFC at its Twelfth Session (December 2015), urging other members to work diligently to adopt formal harvest control rules for all tuna stocks, as required by the WCPFC Convention. b. engagement with high-level contacts between AFMA officials, FFA and its members, and WCPFC delegates from the other major countries fishing the stock in advance of the Commission meeting to seek their support for the adoption of appropriate harvest control rules by the WCPFC. c. ensure the work plan of the WCPFC Scientific Committee, members of the Tokelau Arrangement and FFA SC-SPTBF in 2015 will include analyses of candidate harvest control rules for yellowfin. 5. Actions to raise awareness of the need for a WCPFC yellowfin management measure through the Tokelau Arrangement. <u>Year 2</u>

	1. Engagement with the AFMA to consolidate the Australian position on harvest control rules for the WCPO yellowfin stock at subsequent FFA, Tokelau Arrangement and WCPFC meetings and workshops and encourage delegates from the other major countries fishing the stock to support the Australian position. This shall be undertaken in conjunction with any deliberations on appropriate reference points. 2. Provision of any requested support and data for SPC, FFA and WCPFC analyses on HCRs for yellowfin to support any further discussions at the FFA SC-SPTBF meetings, Tokelau Arrangement meetings and the WCPFC Scientific Committee. 3. Collaboration with other industry sectors and NGOs in order to raise awareness of the need for WCPFC to adopt well-defined harvest control rules for the WCPO yellowfin stock. 4. Support and data as requested for the activities of the FFA SC-SPTBF in the analysis of harvest control rules consistent with candidate reference points. 5. Actions to raise awareness of the need for a WCPFC yellowfin management measure through the Tokelau Arrangement Year 3 1. Practical support and data as requested to AFMA and other regional meetings and workshops with the objective of achieving the adoption of harvest control rules for the WCPO yellowfin stock by WCPFC. 2. Engagement with AFMA officials, and as required FFA and its members, and WCPFC delegates from the other major countries fishing the stock in advance of the Commission meeting to ensure appropriately drafted WCPFC Resolutions on well-defined harvest control rules for the stock, to be tabled by Australia or other countries fishing on the stock) at the 2017 (or 2018 if necessary) WCPFC annual meeting for consideration by the Commission. 3. Liaison with the AFMA officials to ensure relevant supporting research is planned both within the FFA SC-SPTBF and the WCPFC Science Committee. 4. Actions to raise awareness of the need for a WCPFC yellowfin management measure through the Tokelau Arrangement.
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other members of the WCPO Tuna MSC Principle 1 Alignment Group, other delegations to FFA, PNA and WCPFC and environmental NGOs as appropriate.

Table 57. Condition 6

Performance Indicator	PI 1.1.2 – Limit Reference Point - Swordfish
Score	75
Rationale	See full rationale for PI 1.1.2 - swordfish
Condition	A limit reference point needs to be defined for the total stock area (WCPFC). This is to ensure that the stock does not fall below a level at which there is an appreciable risk to impairing reproductive capacity.
Milestones	By the first annual surveillance audit, there shall be evidence that the client has started or joined a process of consultation and representation for the establishment of a precautionary target reference point with appropriate regional management bodies. Score 75. By the second annual surveillance audit, there shall be evidence of on-going representations to, and discussions in, appropriate regional management bodies, relating to a target reference point for South West Pacific swordfish. Score 75. By the third annual surveillance audit a target reference point for regional management of the South West Pacific swordfish stock should be formally adopted by the WCPFC or other appropriate regional management body with sufficient control over the fishery on the whole stock. Score 80.
Client action plan	Walker Seafoods Australia notes the need of implementing stock-specific reference points and associated harvest control rules as part of the management of stocks in the ETBF. To support the development of appropriate reference points for the South West Pacific Swordfish, therefore, in the respective years the client will provide evidence of: Year 1 1. Engagement with the AFMA to promote the completion and adoption of a limit reference point for the South West Pacific Swordfish stock. 2. Consultation with AFMA and where necessary FFA and FFA members through the Sub-Committee on South Pacific Tuna and Billfish Fisheries (SC-SPTBF) and Australian government delegates to WCPFC with the objective of establishing an agreed position on limit reference points for the stock that is consistent with the MSC SG80 standards. 3. The provision of any requested practical support and data for SPC, FFA and WCPFC analyses on limit reference points for swordfish to support discussions at FFA SC-SPTBF meetings. 4. Actions to raise awareness of the need for a South West Pacific Swordfish management measure through the Tokelau Arrangement of which Australia is a signatory. Year 2 1. The provision of any requested support and data for SPC, FFA and WCPFC analyses on limit reference points for swordfish to support any further discussions at the FFA SC-SPTBF meetings, Tokelau Arrangement meetings and the WCPFC Scientific Committee. 2. Engagement with AFMA government officials, and where necessary FFA and its members, and WCPFC delegates from the other major countries fishing the stock in advance of the Commission meeting to seek their support for the adoption of appropriate limit reference points by the WCPFC and appropriately drafted WCPFC Resolutions. 3. Collaboration with other industry sectors and NGOs in order to continue to raise awareness of the need for WCPFC to adopt appropriate reference points for the South West Pacific Swordfish stock.

	4. Actions to raise awareness of the need for a South West Pacific swordfish management measure through the Tokelau Arrangement of which Australia is a signatory. <u>Year 3</u> 1. Engagement with AFMA government officials, and where necessary FFA and its members, and WCPFC delegates from the other major countries fishing the stock in advance of the Commission meeting to ensure appropriately drafted WCPFC Resolutions on the adoption of target reference points for the stock, for the WCPFC annual meeting, for consideration by the Commission.
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other delegations to FFA, PNA and WCPFC and environmental NGOs as appropriate.

Table 58. Condition 7

Performance Indicator	PI 1.2.2 – Harvest Control Rule - Swordfish
Score	65
Rationale	See rationale for PI 1.2.2, swordfish.
Condition	A well-defined regional-level harvest control rule should be put in place; with associated management actions (in the form of a WCPFC CMM or another form as appropriate) which together act effectively to reduce exploitation rates as the limit reference point is approached. The selection of the harvest control rule should take into account the main uncertainties regarding the status of the stock or the impact of the fishery (or other uncertainties if considered important). Note: This condition can be address together with conditions 1 and 2.
Milestones	By the first annual surveillance audit, there shall be evidence that the client has started a process of consultation and representation for the establishment of a precautionary and robust harvest control rule with appropriate regional management bodies. Score 65. By the second and third annual surveillance audits, there shall be evidence of on-going representations to, and discussions in, appropriate regional management bodies, relating to a robust harvest control rule for South West Pacific swordfish. Score 65. By the fourth annual surveillance audit, the client should provide evidence that the harvest control rule and associated management actions are put in place. Score 80.Year 1: Collate and analyse data, in consultation with AFMA or any other appropriate organisation or expert. Year 2: Provide assessment of the impact of the fishery in relation to the population size, and/or evidence of trends in the population in the area of the fishery over a recent period, and/or other data which allow the impacts of the fishery on the stock to be approximately quantified.
Client action plan	To support the development of appropriate harvest control rules for the Wouth West Pacific Swordfish the respective years the client will provide evidence of: <u>Year 1</u> 1. Engagement with the AFMA officials to promote the completion and adoption of Harvest Control Rules for South West Pacific Swordfish. 2. Consultation with AFMA and where necessary FFA and FFA members through the Sub-Committee on South Pacific Tuna and Billfish Fisheries (SC-SPTBF) and Australian government delegates to WCPFC with the objective of

	establishing an agreed position on harvest control rules for the stock that is consistent with the MSC SG 80 standards. 3. The provision of any requested practical support and data for SPC, FFA and WCPFC analyses of harvest control rules consistent with candidate reference points. 4. Engagement with AFMA officials and Australian delegates to WCPFC to: a. Promote the tabling of a statement to WCPFC at its Twelfth Session (December 2015), urging other members to work diligently to adopt formal harvest control rules for all tuna stocks, as required by the WCPFC Convention. <u>Year 2 & 3</u> 1. Engagement with the AFMA to consolidate the Australian position on harvest control rules for the South West Pacific swordfish stock at subsequent FFA, Tokelau Arrangement and WCPFC meetings and workshops and encourage delegates from the other major countries fishing the stock to support the Australian position. This shall be undertaken in conjunction with any deliberations on appropriate reference points. 2. Provision of any requested support and data for SPC, FFA and WCPFC analyses on HCRs for albacore to support any further discussions at the FFA SC-SPTBF meetings, Tokelau Arrangement meetings and the WCPFC Scientific Committee. 3. Collaboration with other industry sectors and NGOs in order to raise awareness of the need for WCPFC to adopt well-defined harvest control rules for the South West Pacific Swordfish stock. 4. Support and data as requested for the activities of the FFA SC-SPTBF in the analysis of harvest control rules consistent with candidate reference points. 5. Actions to raise awareness of the need for a WCPFC albacore management measure through the Tokelau Arrangement <u>Year 4</u> 1. Practical support and data as requested to AFMA and other regional meetings and workshops with the objective of achieving the adoption of harvest control rules for the South West Pacific stock by WCPFC. 2. Engagement with AFMA officials, and as required FFA and its members, and WCPFC delegates from the other major countries fishing the stock in advance of the Commission meeting to ensure appropriately drafted WCPFC Resolutions on well-defined harvest control rules for the stock, to be tabled by Australia or other countries fishing on the stock) at the 2018 (or 2019 if necessary) WCPFC annual meeting for consideration by the Commission. 3. Liaison with the AFMA officials to ensure relevant supporting research is planned both within the FFA SC-SPTBF and the WCPFC Science Committee. 4. Actions to raise awareness of the need for a WCPFC Swordfish management measure through the Tokelau Arrangement
Consultation on condition	The client will consult and coordinate with AFMA, the Australian delegation to WCPFC, other delegations to FFA, PNA and WCPFC and environmental NGOs as appropriate. AFMA

Table 59. Condition 8

Performance Indicator	PI 2.3.1 – ETP Species (Turtles and Shortfin Mako) Outcome
Score	75
Rationale	For turtles and shortfin mako, scoring issue b) is not met at the SG80 level: *Direct effects are highly unlikely to create unacceptable impacts to ETP species*. For turtles, the issue is that while the measures recently put in place are expected to work, based on other fisheries, no data from ETBF are yet available to show that turtle bycatch has been reduced to below trigger levels. For shortfin mako, the issue is that bycatch by this fishery is not negligible, and no population estimates exist which allow the team to judge with the appropriate degree of certainty whether or not fishing mortality impacts on the stock are 'highly unlikely' to be unacceptable.
Condition	Turtles: • Continue to collect data, which allows turtle interactions per 1000 hooks to be estimated. • If data show that interactions have reduced to below the trigger level, no further action is required. • If data show that there remains a significant risk of interactions above the trigger level, further management measures should be implemented, either by Walker Seafoods Australia or by the ETBF as a whole. Shortfin mako: The fishery may show that it is not having an unacceptable impact on this species by various means: i) further reducing the mortality of this species from the fishery such that impacts are highly unlikely; and/or ii) providing an estimate of the total population size of shortfin mako against which the existing catch rate can be compared and shown to be acceptable; and/or iii) providing evidence on trends in shortfin mako population in the area of the fishery, to show that there is no evidence of any reduction in the population in the area associated with the fishery; and/or iv) any other appropriate method.
Milestones	Turtles: Year 1: Collect and analyse data, assess whether trigger level is exceeded. Year 2: If trigger level exceeded, discuss appropriate management measures. Continue to collect and analyse data. Year 3: If trigger level exceeded in Year 1, implement agreed management measures. If trigger level exceeded in Year 2, discuss appropriate management measures. Continue to collect and analyse data. Year 4: If trigger level exceeded in Years 1 or 2, implement agreed management measures. If trigger level exceeded in Year 3, discuss appropriate management measures. If trigger level is not exceeded in any of the first three years, no further management action is required. Shortfin mako: For approach i) above: Year 1: Discuss further possible measures to reduce shortfin mako catch with AFMA and/or other organisations as appropriate. Develop draft mitigation plan for shortfin mako. Year 2: Review, revise, finalise and implement mitigation plan for shortfin mako. Year 3: Provide before and after data to show whether mitigation plan is working. Year 4: If the percentage reduction in catch is insufficient, review and strengthen mitigation plan.

	For approaches ii) and/or iii) above: Year 1: Collate and analyse data, in consultation with AFMA or any other appropriate organisation or expert. Year 2: Provide assessment of the impact of the fishery in relation to the population size, and/or evidence of trends in the population in the area of the fishery over a recent period, and/or other data which allow the impacts of the fishery on the stock to be approximately quantified. Year 3: If the assessment does not suggest that impacts are highly unlikely to be unacceptable, implement further management measures to reduce impact. Year 4: If necessary, show that the additional management measures put in place have reduced or are likely to reduce the impact of the fishery to acceptable levels.
Client action plan	<u>Year 1 – Turtles:</u> Collect and analyse data from Walker Seafood vessel logbooks and AFMA logbook summaries of ETBF that can be used to estimate turtle interactions per 1000 hooks. Data to be made available for 1st surveillance audit in 2016 to assess whether trigger level for turtles has been exceeded. <u>Year 1 – Shortfin Mako:</u> Collect and analyse data from Walker Seafood vessel logbooks and AFMA logbook summaries of ETBF that can be used to record existing catch rates. Consult with AFMA on a draft mitigation plan to be developed for vessels fishing in the ETBF. Progress to be reported during 1st surveillance audit with supporting documents from AFMA. <u>Year 2 – Turtles:</u> Continue to collect and analyse data from company and AFMA collated logbooks to determine the direct effects of this fishery. In the event that trigger levels for turtle interactions were found to have been exceeded in year 1; show evidence of consultations with AFMA for appropriate management measures. <u>Year 2 – Shortfin Mako:</u> Continue to collect and analyse data from Walker Seafood vessels and AFMA logbook summaries of ETBF of catches of shortfin mako. In consultation with AFMA review and discuss need to implement a mitigation plan for shortfin mako in the ETBF. Discuss with AFMA the timetable for a stock assessment of shortfin mako by scientists working with WCPFC. <u>Year 3 – Turtles:</u> Continue to collect and analyse data from company and AFMA collated logbooks to determine the direct effects of this fishery. In the event that trigger levels for turtle interactions were found to have been exceeded in year 1; implement agreed management measures with AFMA. <u>Year 3 – Shortfin Mako:</u> In consultation with AFMA, implement management measures in the ETBF to reduce existing catch rates. Also consult with AFMA on progress on stock assessment of shortfin mako in wider WCP convention area. Provide evidence of progress made on this front. <u>Year 4 – Turtles:</u> Continue to collect and analyse data from company and AFMA collated logbooks to determine the direct effects of this fishery. In the event that trigger levels for turtle interactions were found to have been exceeded in years 1 or 2; implement agreed management measures with AFMA. If trigger levels for turtle interactions were found to have been exceeded in year 3, consult with AFMA on strengthened management measures to be implemented.

	Year 4 – Shortfin Mako: Provide catch data post management measure implementation to analyse effectiveness of measures. Consult with AFMA on effectiveness of measures in ETBF. Also consult with AFMA on progress on stock assessment of shortfin mako in wider WCP convention area. Provide evidence of progress made on this front. If data suggest an issue with ETP interactions (such that PI 2.3.1 is not being met at the 80 level) then the fishery will develop and implement further management actions to address the issue(s) identified.
Consultation on condition	The client will consult and coordinate with AFMA

Table 60. Condition 9

Performance Indicator	PI 2.3.3 – ETP species (shortfin mako) information
Score	75
Rationale	For shortfin mako, scoring issue b) is not met at the SG80 level*: Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species*. For shortfin mako, the issue is the same as that raised in the condition for PI 2.3.1, i.e. that bycatch by this fishery is not negligible, and no population estimates exist which allow the team to judge with the appropriate degree of certainty whether or not the fishery may be a threat to the protection of the population.
Condition	Collect and analyse data to provide an estimate of the total population size of shortfin mako against which the existing catch rate can be compared, and/or provide evidence on trends in shortfin mako population in the area of the fishery, in relation to the activity of the fishery.
Milestones	Year 1: Collate and analyse data, in consultation with AFMA or any other appropriate organisation or expert. Year 2: Provide assessment of the impact of the fishery in relation to the population size, and/or evidence of trends in the population in the area of the fishery over a recent period, and/or other data which allow the impacts of the fishery on the stock to be approximately quantified.
Client action plan	Year 1 – Shortfin Mako: Collect and analyse data from Walker Seafood vessel logbooks and AFMA logbook summaries of ETBF that can be used to record existing catch rates and estimate population size. Progress to be reported during 1st surveillance audit with supporting documents from AFMA. Year 2 – Shortfin Mako: Continue to collect and analyse data from Walker Seafood vessels and AFMA logbook summaries of ETBF of catches of shortfin mako. In consultation with AFMA, provide an assessment of the impact of the fishery in relation to the population size. Discuss with AFMA the timetable for a stock assessment of shortfin mako by scientists working with WCPFC. Year 3 – Shortfin Mako: Consult with AFMA on progress on stock assessment of shortfin mako in wider WCP convention area. Provide evidence of progress made on this front. Continue to supply data to AFMA which allows the impact of the fishery on the stock to be approximately quantified.
Consultation on condition	The client will consult and coordinate with AFMA

Appendix 7. Client Agreement

Heidi Walker
To: Kat Collinson Cc: Gavin Fitzgerald, Shan Yathunanthan
Re: 2800 (Client) - Public Certification Report - client approval.
3

Hi Kat,

Thanks for your email.

Yes Pavo and I accept the PCR, please proceed in sending it to MSC.

Thanks
Heidi

walker seafoods australia

Kat Collinson
To: Heidi Walker Cc: Kat Collinson, Gavin Fitzgerald, and 1 more...
2800 (Client) - Public Certification Report - client approval.
1

Dear Heidi and Pavo,

The objection period for the report closed yesterday at 17:00 GMT. No objections were received. As a result, we have now completed the Public Certification Report (PCR) for publication on the MSC website this week. The document is ready apart from one small thing (Appendix 7).

To complete this we require (as per MSC requirements) final written approval that the client excepts the PCR. Once this is received the report is ready to be sent to the MSC. To do this I have attached the PCR (in PDF as the word file is so big) for you should you wish to review it in detail. In essence though you have already seen the report and we have only added the official certification decision (page 143 of the report). We look forward to your confirmation that you are happy for us to proceed.

With Kind Regards,
Kat

Appendix 8. Stakeholders

Organization	Contacts
Birdlife International	Rory Crawford (Rory.Crawford@rspb.org.uk
CSIRO	Dale Kolody (Dale.Kolody@csiro.au); Enquiries@csiro.au
Commonwealth Fisheries Association	ceo@comfish.com.au
Australian Fisheries Management Authority	info@afma.gov.au
Member of IUCN - Species Survival Commission: Marine Turtle Specialist Group	Dr Michael White, Marine Zoologist (crwban681@yahoo.co.uk)
Shark Advocates International	Sonja Fordham (info@sharkadvocates.org)
Pew Environment Group	Amanda Nickson (anickson@pewtrusts.org); Adam Baske (abaske@pewtrusts.org)
Parties to the Nauru Agreement (PNA)	Maurice Brownjohn, PNA Commercial Manager (maurice@pnatuna.com)
Western Central Pacific Fisheries Commission (WCPFC)	Glen Hurry, Executive Director (Glenn.Hurry@wcpfc.int); Martin.Tsamenyi@wcpfc.int
Greenpeace Australia Pacific	support.au@greenpeace.org
International Seafood Sustainability Foundation (ISSF)	Susan Jackson, President (sjackson@iss-foundation.org); Victor Restrepo (vrestrepo@iss-foundation.org)
WWF	Peter Trott, Policy Manager – Fisheries Markets (ptrott@wwf.org.au)
FFA	Alice McDonald, Fisheries Adviser (Alice.Mcdonald@ffa.int); Hugh Walton (Hugh.Walton@ffa.int); Wez Norris (wez.norris@ffa.int)
SPC	Oceanic Fisheries Programme Manager (Contact:JohnpH@spc.int), Graham Pilling Fisheries Scientist (FFA Support)(grahamp@spc.int); Aaron Berger, Fisheries Scientist (Bioeconomic)(aaronb@spc.int)

Appendix 9. Letter of Support from AFMA

Australian Government
Australian Fisheries Management Authority

REF: 2014/0394

16 April 2015

Mr Pavo Walker
Walker Seafoods Pty Ltd
PO Box 1622
MOOLOOLABA QLD 4557

Dear Mr Walker

Re: Letter of support for Marine Stewardship Council Certification of Walker Seafoods Pty Ltd

I am writing to confirm the support of the Australian Fisheries Management Authority (AFMA) for the Marine Stewardship Council's (MSC) certification process being pursued for the Eastern Tuna and Billfish Fishery (ETBF) by Walker Seafoods Pty Ltd (Walker Seafoods).

I note that in response to the MSC's assessment of the Walker Seafoods and the conditions which need to be addressed in the ETBF for Walker Seafoods to receive and maintain certification, Walker Seafoods have developed a Client Action Plan. AFMA will work closely with Walker Seafoods and the Department of Agriculture to ensure that the actions proposed in your Client Action Plan are achievable, cost effective and deliverable in a timely manner for annual auditing by MSC.

I would like to take this opportunity to congratulate Walker Seafoods on their efforts in the assessment process and wish you all the best in attaining MSC accreditation. I have no doubt that AFMA will continue to have a close and effective working relationship with you throughout this process.

Yours sincerely

Dr Nick Rayns

Executive Manager, Fisheries Management Branch

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