

**AN ECOSYSTEM APPROACH TO FISHERIES  
MANAGEMENT**

**THE LARGE PELAGIC FISHERY**

**COOK ISLANDS**

24 March 2020

**AN ECOSYSTEM APPROACH TO FISHERIES MANAGEMENT (EAFM)  
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## Acronyms

$B_{\text{current}}$	Current biomass
$B_{\text{extinct}}$	Biomass at extinction level
$B_{\text{msy}}$	Biomass at maximum sustainable yield level
CBD	Convention on Biological Diversity
CMM	WCPFC Conservation and Management Measure
CPUE	Catch per unit effort
EAFM	Ecosystem approach to fisheries management
EBFM	Ecosystem-based fishery management
EBM	Ecosystem-based management
EU	European Union
EEZ	Exclusive Economic Zone
ENSO	El Nino Southern Oscillation
$F_{2020}$	Fishing mortality in 2020
FAD	Fish aggregating device
FAO	United Nations Food and Agriculture Organization
FFA	Pacific Islands Forum Fisheries Agency
$F_{\text{msy}}$	Level of fishing effort at maximum sustainable yield
GRT	Gross Registered Tonnage
IOM	Integrated oceans management
ISC	International Scientific Committee
IATTC	Inter-American Tropical Tuna Commission
IMO	International Maritime Organisation
LRP	Limit reference point
MFEM	Ministry of Finance and Economic Management
MMR	Ministry of Marine Resources
MARPOL	The International Convention for the Prevention of Pollution from Ships (MARPOL) and associated regulations
mt	Metric tonne
nm	Nautical mile
NES	National Environment Service
NGO	Non-Government organization
PICTs	Pacific Islands Countries and Territories
QMS	Quota management system
RFMO	Regional Fisheries Management Organisation
ROP	WCPFC Regional Observer Programme
SST	Sea surface temperature
SPC	The Pacific Community
SEC	Southern Equatorial Current
SECC	Southern Equatorial Counter Current
$SB_{F=0}$	Spawning biomass in a virgin state
$SB_{2020}$	Spawning biomass in 2020
$SB_{\text{MSY}}$	Spawning biomass at MSY
SPREP	Secretariat for the Pacific Regional Environment Programme
STCC	Sub-tropical Counter Current
SFPA	Sustainable Fisheries Partnership Agreement
TRP	Target reference point

TAC	Total Allowable Catch
TACC	Total Allowable Commercial Catch
UNCLOS	1982 United Nations Convention on the Law of the Sea
USA	United States of America
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	Western and Central Pacific Ocean

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# **AN ECOSYSTEM APPROACH TO FISHERIES MANAGEMENT (EAFM)**

## **THE LARGE PELAGIC FISHERY**

### **COOK ISLANDS**

#### **Introduction**

MMR has prepared this report on the Cooks Islands pelagic fishery in consultation with the National Environment Service (NES). Insofar as practicable, it addresses the matters identified in the Court of Appeal's decision of 26 September 2018 (Judgment), which is currently under appeal to the Privy Council and has been guided by the:

- Environment Act 2003;
- draft (i.e. not yet enacted) Environment (Permits & Consents) Regulations 2016, covering the permit and consent processes; and
- Regional EIA Guidelines for Pacific Island Countries and Territories, as published by the Secretariat for the Pacific Regional Environment Programme (SPREP) in 2016 (Regional Guidelines).

Before preparing this report, MMR consulted extensively with numerous Pacific tuna experts about how it could best undertake the work required and/or contemplated by the Judgment. It did so because NES does not have any internal fisheries expertise, NES's list of specialists to develop EIAs are mostly engineers for land-based activities and NES's existing legislation and policies regarding EIAs do not cater for fisheries programmes. Additionally, the Cook Islands has never undertaken an EIA for a national fishery or a national fishery management plan. MMR was also concerned about the significant challenges inherent in any attempt by the Cook Islands to assess accurately at a domestic level tuna stock productivity and fisheries impacts. That is because tuna are a highly migratory species and range far beyond the EEZ of any one State and across the Western and Central Pacific Ocean (WCPO) basin. The Cook Islands' total catch across longline and purse seine fisheries is also less than 1% of the total WCPO tuna catch and the bulk of the tuna fishery and influences on ecosystem impacts predominantly occur beyond the Cook Islands' EEZ and management influence.

Table 6 summarises the responses MMR received from relevant States, organisations and expert fisheries consultants. As Table 6 shows, other States often use regional assessment processes to inform their national management arrangements. Several States also apply the Ecosystem Assessment to Fisheries Management (EAFM) method. But none of the persons, States and/or organisations which MMR consulted were aware of the use of an EIA for tuna fisheries and none of the States consulted used an EIA in their own jurisdiction. Experts from the Forum Fisheries Agency (FFA) also confirmed that no Pacific Island State uses an EIA for tuna fisheries. In large part, the key reasons why other States do not use an EIA are the highly migratory nature of tuna fish stocks (and the difficulties that presents, including scale and scope issues) and the fact that tuna stocks are regulated at a regional and international level (rather than domestically) via both international treaties and management and mitigation measures developed by expert Regional Fisheries

Management Organisations (RFMOs), in this case the Western and Central Pacific Fisheries Commission (WCPFC).

The Regional Guidelines identify two approaches for environmental assessments, i.e. EIAs and Strategic Environmental Assessments (SEAs). As explained at page 9 of the Regional Guidelines, SEAs serve, “to inform planning and decision-making from the local to the national level, across different types of economic activity, and across the public and private sectors.”

Under the Regional Guidelines, the relevant activity’s scale determines whether an EIA or a SEA should be applied, and SEAs should be used where an industry wide plan is being developed and administered by a government. As the Regional Guidelines confirm (at page 9), SEAs can “establish a sustainable and resilient development context for EIA by identifying what forms of development are environmentally sound and appropriate; pinpointing locations where developments are/are not permissible; stipulating desired types and characteristics of developments; and identifying broad environmental management measures that need to be followed.” However, as noted in the Regional Guidelines, SEAs are not widely used in the Pacific and the Regional Guidelines themselves are focused on EIA-report/site-specific activity (see Regional Guidelines, at pages 9-10 and 13).

Further to the Court’s Judgment, when preparing this report, MMR specifically consulted with NES about how best to satisfy the requirements of s 36(1) of the Environment Act 2003, noting that neither SPREP nor NES have yet developed SEA guidelines.

The approach adopted in this report, i.e. an EAFM, is consistent with advice received from NES and other States, organisations and fisheries experts as noted above. Among other things, the EAFM considers ecosystem impacts, mitigation and management responses. These are particularly important if this report is to be used to inform the development of fisheries management plans.

To the extent that a separate domestic assessment is required by the Cook Islands, the EAFM methodology adopted in this report ensures that appropriate consideration occurs of the diverse factors and issues relevant in any assessment of fishery impacts on the marine environment or otherwise. For example, the transboundary nature of tuna fish stocks, the regional regulatory environment in which tuna fish stocks are managed, relevant social dimensions, political aspects and economic considerations.

NES has endorsed the EAFM methodology as the most appropriate means of satisfying the requirements of s 36(1) of the Environment Act 2003. As explained above, to the extent differences exist between an EAFM and EIA, those are principally matters of context and scale.

The EAFM approach used in this report achieves the same objectives as an EIA (i.e. it identifies impacts on the environment from proposed tuna fishing activities and considers what could be done to address those). As such, taken together with NES’s endorsement with respect to s 36(1) of the Environment Act 2003, it also satisfies the Court’s Judgment.

## 1.0 Background

The Cook Islands supports a population of approximately 15,800 (2019<sup>1</sup>), a land area of 237 km<sup>2</sup>, a coastline of 419 km, and the Exclusive Economic Zone (EEZ) of 1.976 million km<sup>2</sup>.<sup>2</sup> The EEZ of the Cook Islands adjoins the high seas and zones of Niue, American Samoa, Tokelau, Kiribati and French Polynesia. A high seas pocket is surrounded by the EEZs of Cook Islands, French Polynesia and Kiribati. The islands form two groups: the Northern Cooks, all of which are atolls, and the Southern Cooks, which are mostly high islands divided around approximately 15°S.

The large pelagic fishery in the EEZ of the Cook Islands<sup>3</sup> consists of a longline fishery with vessels based both locally and operating from ports of neighbouring countries including American Samoa, Samoa and Fiji. The large pelagic purse seine fishery consists predominantly of vessels flagged to the United States (US), Korea, Kiribati, Vanuatu and the European Union. Small scale subsistence, artisanal and recreational fisheries operate from all 12 populated islands.

The longline fisheries that operate in the Cook Islands EEZ and on the adjacent high seas are characterized by two fleets. Vessels in the southern Cook Islands fishery, based out of Rarotonga, are small-scale vessels, carrying out fresh fish operations to produce fish for domestic and international markets. These vessels target tuna and swordfish. By-catch species are sold locally. Vessels operating in the northern fishery are principally based out of Pago Pago, American Samoa and target albacore for canning.

The commercial large pelagic fishery in Cook Islands targets tuna and billfish. These fisheries also harvest several by-catch species some of which also have commercial value. As migratory species, these stocks are shared across national and international jurisdictions in the WCPO. They are fished throughout their range in the zones of other WCPO countries and territories and on the high seas. The effective management and conservation of these stocks thus requires multilateral collaboration.

The Cook Islands participates in several regional and international arrangements that contribute to the management and conservation of these resources. The Pacific Community, based in New Caledonia, is responsible for most of the data management and science associated with these fisheries. The Forum Fisheries Agency, based in Solomon Islands, supports Pacific Island countries with a range of legal, policy, economic development, and monitoring and enforcement services focussed on the regional tuna fishery. With technical and policy support of SPC and FFA, Cook Islands also participates in the Western and Central Pacific Fisheries Commission. The WCPFC supports a membership that includes all States and territories with an interest in the WCPO tuna resource. As a result, riparian States which include Pacific Island countries and territories participate in WCPFC on an equal basis with distant water fishing nations. Most decisions taken at WCPFC are binding and thus have implications for the development, management and conservation of tuna and

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<sup>1</sup> [http://www.mfem.gov.ck/images/Vital\\_Statistics\\_March\\_Quarter\\_2019.pdf](http://www.mfem.gov.ck/images/Vital_Statistics_March_Quarter_2019.pdf)

<sup>2</sup> <http://www.marineregions.org/gazetteer.php?p=details&id=8446>

<sup>3</sup> See Section 9.1.2 (below) for the definition of the 'commercial large pelagic fishery' that is the focus of this EAFM.

associated resources in Cook Islands. This is one reason why Cook Islands maintains strong representation to WCPFC.

Since 2006, FFA members have been implementing an ecosystems approach to fisheries management or EAFM for the tuna fisheries that take place within their EEZs. These initiatives have been supported by the FFA and SPC Secretariats through:

- technical and policy advice
- data summaries
- assessments of tuna resource status and trends, and
- broader ecosystem considerations particularly in relation to bycatch and species taken incidentally in tuna fisheries.

Cook Islands commenced an EAFM in 2006 however found that the scope required more streamlining to ensure that the assessment was focussed on the fisheries aspects and would contribute to fisheries management. This resulted in an updated approach in 2008, with the revised EAFM used to inform the development of the Marine Resources (Longline Fishery) Regulations 2008. Ideally, a review of the EAFM should be undertaken every 5 years. Throughout these processes MMR has not yet received significant resources to support its implementation, however the Ministry of Finance and Economic Management's (MFEM) recent medium-term fiscal planning will contribute to any related future work.

The purpose of an EAFM is to provide a systematic process of identifying issues, agreeing to objectives to address current issues, consideration of priorities and providing guidance on the desirable future status of the fisheries sector. The process includes the selection of indicators to monitor performance in achieving the agreed objectives and the measures to be supported to facilitate periodic review. As implied, an EAFM takes account of broader ecosystem issues associated with a fishery as opposed to a management approach that is primarily concerned with target fisheries resources.

This report forms part of an initiative by MMR to apply an EAFM to the conservation and management of large pelagic fisheries operating within the Cook Islands EEZ. A summary of EAFM concepts is presented, then based on assessments of regional stocks undertaken by SPC, and reviewed by WCPFC, it then summarises the status of tuna and bycatch species taken in Cook Island fisheries for large pelagics. A profile of the Cook Islands fishery in 2018, the last year for which fishery data is complete, is included. The remainder of the Report focusses on EAFM. It starts with a description of the key considerations in preparing an EAFM for a particular fishery. Taking a risk-based approach, these considerations are then applied to the Cook Islands fishery for large pelagics. It outlines actions and/or changes to management activities that could be undertaken to achieve desired outcomes. This is presented in a series of templates that provide guidance on objectives for different components of the fishery and the basis for periodic reporting on the status of EAFM implementation.

## 2.0 Ecosystems Approach to Fisheries Management (EAFM)

Modern fisheries management has undergone major reform over the last five decades as global attention on the over exploitation of marine resources, including those taken incidentally, and degradation of marine ecosystems has demanded management decision-making embrace a broader focus than simply the status of target species. The effect has led to increased societal attention for the sustainability of fisheries and the health of the environment supporting them.

In order to improve the sector's performance, particularly with respect to resource sustainability, fisheries governance has been required to become more risk adverse, taking account of ecosystem limits, being responsive to environmental changes and preserving ecosystem components. Fisheries development planning has become more integrated with the planning and management of other sectors sharing aquatic space and resources. Agencies responsible for fisheries and environmental management are increasingly collaborating in a multisectoral effort to improve their individual and collective capacity to meet national obligations in this regard.

While responses continue to evolve, more holistic approaches to sustainable development incorporating environmental considerations, economic and social implications are increasingly reflected in national economic development plans, supporting fisheries, environmental legislation and international instruments alike.

An EAFM is a risk-based methodology formulated to support an environmental impact assessment-related process specifically for the fisheries sector (e.g. Garcia *et al.*, 2003). It is synonymous with Ecosystem Based Management (EBM; e.g. Ward *et al.* 2002), Ecosystem Based Fishery Management (EBFM; e.g. Link *et al.*, 2002) and Integrated Oceans Management (IOM, e.g. Tibbetts, 2005).

Although there is no universally accepted definition for EAFM, one that is reasonably widely used is:

*an approach that takes major ecosystem components and services — both structural and functional — into account in managing fisheries... It values habitat, embraces a multispecies perspective, and is committed to understanding ecosystem processes... Its goal is to rebuild and sustain populations, species, biological communities and marine ecosystems at high levels of productivity and biological diversity so as not to jeopardize a wide range of goods and services from marine ecosystems while providing food, revenues and recreation for humans (US National Research Council, 1998).*

The focus is the management of the economic activity<sup>4</sup>.

While a definition of EAFM might still not be universally agreed the justification for EAFM is widely reflected in the features of degraded ecosystems impacted by fisheries and other activities. This has led to a large number of international instruments relevant to ecosystem-based management which describe principles and

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<sup>4</sup> The definition of EAFM is not universally agreed. Some stakeholders consider that the US National Research Council's definition gives undue weight to environmental considerations over socio-economic and cultural considerations raising concerns about equity, political as well as socio-economic costs and feasibility (see Garcia *et al.* 2003).

conceptual objectives that provide guidance for implementation (for example, the Convention on Biological Diversity (CBD) and the FAO Code of Conduct for Responsible Fisheries). A major difficulty in elaborating an EAFM is in translating concepts and principles into operational objectives from which an EAFM implementation plan can be developed (Garcia *et al.*, 2003).

EAFM provides a framework that promotes stakeholder engagement in an incremental process of issue identification, prioritisation and developing appropriate responses. It is rarely 'finished' as experience with implementation generates new information that can be adapted to improve EAFM application efficiency in any particular circumstance.

EAFM is not a new approach nor necessarily a major change in direction for many fisheries administrations. It is an additional tool to assist in the development of appropriate management arrangements. By providing an opportunity to also consider issues of community wellbeing and economic benefit, EAFM also has a direct role in fisheries development, not just management.

Since 2006, FFA island member States across the WCPO have been engaged in a process, facilitated by the FFA and SPC Secretariats, to support the development, implementation and review of national tuna fisheries management strategies and plans applying an EAFM (see bibliography for examples from the FFA membership). In this application, EAFM provides a comprehensive framework for fisheries management that integrates ecological considerations, including an understanding of the influences of natural variations on ecological systems, with related social and economic considerations.

EAFM is designed to address issues that can be managed, or at least directly influenced, by the relevant fisheries management administration. It can be applied to part of a fishery or an entire fishery including fisheries spanning a region under multiple jurisdictions as is the case in the WCPO. In the case of stocks shared across multiple jurisdictions, EAFM should, ideally, accommodate all the fisheries operating in a region and extend to cumulative impacts and the allocation of access amongst the individual sectors. As that is currently impractical in the WCPO, national efforts within EEZs that take account of the best available information for the regional stocks, are encouraged.

## **2.1 Regional considerations in the WCPFC**

Oceanic tunas are highly migratory species which form a significant component of the complex marine ecosystem that encompasses the western and central Pacific region. In this region, the Pacific island countries and territories that share the tuna resources participate in international and regional arrangements that support development of conservation and management arrangements to address issues such as resource sustainability. In this endeavour, measures to control fishing capacity and fishing effort, strategies to optimize harvest or management regimes and efforts to mitigate the impacts of fishing on the environment and non-target species are among a range of impact factors that are considered in developing conservation and management arrangements. These considerations are specifically covered by the objective of the

Convention on the Conservation and Management of Highly Migratory Fish Stocks (the WCPFC Convention) in the WCPO which is:

*to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stock in the WCPO in accordance with the United Nations Convention on the Law of the Sea (1982).*

EAFM is fully consistent with the provisions of the WCPFC Convention. In relation to the principles for conservation and management, Article 5 of the Convention provides that Members will, *inter alia*:

*adopt measures to minimize waste, discards, catch by lost or abandoned gear, pollution originating from fishing vessels, catch of non-target species, both fish and non-fish species, (hereinafter referred to as non-target species) and impacts on associated or dependent species, in particular endangered species and promote the development and use of selective, environmentally safe and cost-effective fishing gear and techniques and protect biodiversity in the marine environment;*

Article 6 provides guidance on the application of the precautionary approach and Article 7 describes the application of these principles described in Article 5 to areas under national jurisdiction. Article 7(1) states:

*The principles and measures for conservation and management enumerated in article 5 shall be applied by coastal States within areas under national jurisdiction in the Convention Area in the exercise of their sovereign rights for the purpose of exploring and exploiting, conserving and managing highly migratory fish stocks.*

There have been several attempts to promote ecosystems-based risk assessment to the management of the shared tuna resources, at the basin scale, in WCPO fisheries (see Kirby *et al.* 2005; Smith *et al.* 2015, for example). Such a process is challenging. The scale of such an initiative is substantial (the geographic scale, the diversity of stakeholders, political and economic environment and institutional capacities, for example). It is characterised by difficulties associated with securing political buy-in, the demands on institutional resources required to support the process that is often already stretched focussing on target resources, and, not least, the availability and veracity of suitable data, particularly for bycatch species.

In relation to recent initiatives to integrate an ecosystem-based approach to the management of WCPO tuna fisheries at a regional scale, the 11<sup>th</sup> Session of the WCPFC Scientific Committee, in 2015, considered the status of a spatial ecosystem and population dynamics model, called SEAPODYM, which provides a general framework for the integration of biological and ecological knowledge of tuna species and other oceanic top predators and their responses to fishing pressure<sup>5</sup>. The Scientific Committee requested guidance from the Commission on the possibility of commissioning future work to develop ecosystem indicators for incorporation into management strategy evaluation processes. The subsequent 12<sup>th</sup> Regular Session of the Commission (WCPFC12) later that year considered the Scientific Committee's recommendations without deciding on a specific course of action.

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<sup>5</sup> SEAPODYM was utilised by MMR during the preparations of the Marine Resources (Purse Seine Fishery) Regulations 2013 and associated Fishery Plan.

In the following year, the 12<sup>th</sup> Session of the Scientific Committee recommended that WCPFC13 endorse SEAPODYM's potential as a complementary model to the stock assessment methodologies utilized in the management strategy evaluation work which the Commission was progressing. The Scientific Committee was of the view that, as SEAPODYM includes spatial management and ocean state variability (e.g. ENSO phases and climate change projections) it offered additional capability to reduce risks and explore opportunities associated with climate change. Apart from consideration of a Draft Strategic Plan for the Commission and its Secretariat, which proposed the inclusion of a strategic goal to implement an ecosystem-based approach, the 13<sup>th</sup> Regular Session of the Commission in 2016 spent no time considering an ecosystem-based approach. The Draft Strategic Plan was referred to a future meeting of the Commission for further consideration. However, a small working group at WCPFC13 did propose an interim list of items to minimise ecosystem impact and bycatch of non-target species for inclusion as objectives for future harvest control rules. The list did not have consensus support (WCPFC13, Summary Report, paragraph 286 and Attachment M).

There was no discussion on ecosystem indicators at the 13<sup>th</sup> Session of the Scientific Committee, or of SEAPODYM. However, the Scientific Committee adopted a research plan to reduce the impacts on small yellowfin and bigeye from fishing on fish aggregating devices (FAD) and research on non-entangling design and the use of biodegradable FAD material. The 14<sup>th</sup> Regular Session of the Commission in 2017 provided no guidance in relation to SEAPODYM, or an ecosystems-based approach, but did direct further work on FAD management including research associated with a FAD marking system. In addition, the Commission adopted a Conservation and Management Measure (CMM) relating to marine pollution (CMM 2017-04).

In 2018, although there was no discussion on the FAD research plan, the 14<sup>th</sup> Session of the Scientific Committee did discuss FAD design, particularly in relation to the use of non-entangling materials. There was no specific discussion on ecosystem indicators. However, the meeting discussed projections for the impacts of climate change on the distribution and abundance of skipjack, yellowfin and bigeye tuna and South Pacific albacore, at the Pacific basin scale, and within the EEZs of Pacific Island countries and territories (PICTs) through the application of SEAPODYM (Senina *et al.* 2018).

The projections confirmed an eastern shift in the biomass of skipjack and yellowfin tuna over time, with a large and increasing uncertainty for the second half of the century, especially for skipjack tuna. The impact was forecast to be weaker for bigeye and albacore as a result of the availability of a wider and warmer range of favourable spawning habitat. For albacore, a strong sensitivity to sub-surface oxygen conditions resulted in a very large envelope of projections with the effects of fishing on biomass strongly outweighing decreases attributed to climate change. As a result, fishing pressure was expected to be the dominant driver of tuna population status until at least mid-century.

The Scientific Committee noted that the projected changes in abundance and redistribution of tuna species associated with climate change could have significant implications for the economic development of Pacific Island Countries and Territories (PICTs), and the management of tuna resources, at basin scale. In particular, the proportion of the catch of each species in international waters is expected to increase.

FFA members subsequently encouraged the Scientific Committee to continue to prioritise ecosystem research projects in the Scientific Committee's work plan, including the continuation of targeted and relevant ecosystem research. FFA members also supported further development of the SEAPODYM model and its application to other species, such as swordfish, wahoo and mahi mahi as the availability of data of suitable quality allowed.

Subsequently, at the 15<sup>th</sup> Regular Session of the Commission in 2018, although there was substantive discussion relating to FADs, particularly in relation to the tropical tuna Conservation and Management Measure (CMM), there was limited discussion of ecosystem indicators or an ecosystem approach. In relation to on-going discussions regarding the development of science-management dialogue, with particular consideration of harvest strategies for the principle target species, some FFA members were of the view that it should not be restricted to the application of the harvest strategy alone. They considered it should include aspects of best practice management including the application of the ecosystem approach and measuring and accounting for social and economic drivers of fishery performance (WCPFC15, Summary Report, paragraph 306).

There was no discussion concerning ecosystem indicators or ecosystem-based approaches recorded in the Outcome Document for the 15<sup>th</sup> Regular Session of the WCPFC Scientific Committee in 2019.

## **2.2 National applications among FFA members**

Since 2006, the FFA Secretariat has been working with its members to implement EAFM for the purpose of tuna fisheries management. The approach is based on guidelines prepared specifically for FFA island member countries (Fletcher, 2008). The level at which EAFM is applied depends upon the scope of the assessment required and the jurisdiction, and institutional capacity, of the national agencies responsible.

National EAFM processes among FFA members have been broadly aimed at revising existing tuna management and development plans. They have included high level objectives which address, *inter alia*:

- Species sustainability
- Economic outcomes
- Social outcomes
- Food security, and
- Waste minimization

Although at different stages of development and implementation, Palau, Federated States of Micronesia, Marshall Islands, Tuvalu, Kiribati, Tonga, Samoa, Niue and Cook Islands have at least started, and in many cases, completed an EAFM process (see bibliography).

## **2.3 EAFM/EIA**

An EAFM essentially considers the same issues as an EIA as provided for at Article 36 (3) of the provisions of the Environment Act 2003 as outlined at paragraph 228 of

the decision of the Court of Appeal in September 2018. It starts from a baseline of current knowledge of the state of the ecosystem and apparent trends that may be evident in response to both the historical harvesting of ecosystem resources and environmental change, including change occurring as a result of climate variability.

EAFM provides a framework for managing risks that fisheries may pose for the marine ecosystem based on principles of environmental, economic and social sustainable development, i.e. for the long term. If risk is assessed to be high or elevated, by adopting a precautionary approach, an EAFM provides the framework for determining appropriate responses. Subsequent monitoring and periodically reporting on the outcomes of those responses is an integral feature of EAFM. As is appropriate in a dynamic marine ecosystem such as that of the WCPO, the framework thus provides the basis for adapting responses incrementally as new information becomes available. In the context of the fishery for large pelagics in the Cook Islands this must take account of regional management and conservation initiatives for the tuna resources that are shared among Pacific Island States.

As a small island State, Cook Islands has few other renewable resources on which to base its economic and social development. It is in the long-term interests of Cook Islands that these resources be managed so that future generations benefit from their use in the same way that current generations do.

Prior to considering the specific circumstances for the fisheries for large pelagics in the Cook Islands EEZ, the following section summarises the status of key target and bycatch stocks taken in WCPO tuna fisheries. In this respect, it summarises current knowledge on the state of tuna stocks that have been fished in the WCPO for decades as a basis for assessing the implications of the Cook Islands fishery for local and regional tuna resources. It demonstrates that, on the basis of the best available science, and at the historically elevated levels of fishing that have been experienced in the last 20 years, target tuna stocks of the region are sustainable at the levels of fishing authorised under current management arrangements. These arrangements are the subject to regular review and so will be refined as new information, particularly new scientific advice, becomes available.

### **3.0 Regional status of key target stocks**

As WCPFC's scientific and data management services provider, the SPC Secretariat conducts regional stock assessments of the major tuna stocks in the WCPO on behalf of the WCPFC and its members. Stock assessments are generally presented to the Scientific Committee of the WCPFC. Summaries of the Scientific Committee's advice and recommendations in relation to the stocks of primary interest to Cook Islands are presented here (from the Draft Outcome Document, 15<sup>th</sup> Regular Session of the WCPFC Scientific Committee, August 2019). The full assessment papers, meeting reports and supporting documents can be found at: <http://www.wcpfc.int/><sup>6</sup>.

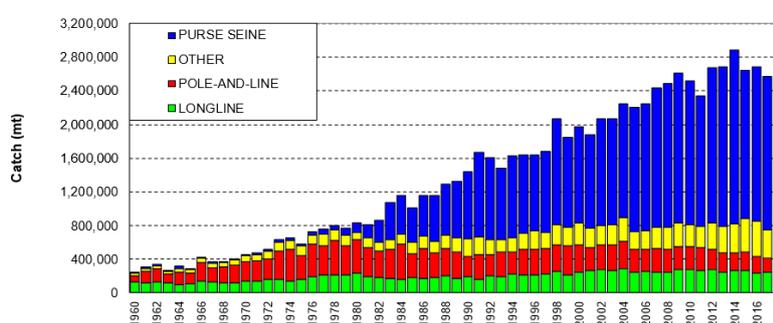
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<sup>6</sup> The 15<sup>th</sup> Regular Session of the Scientific Committee (SC15) was at Pohnpei, Federated States of Micronesia, 12-20 August, 2019. The summaries presented here draw on the SC15 Draft Outcome Document provided by the WCPFC Secretariat.

### 3.1 Tuna: catches and stock status

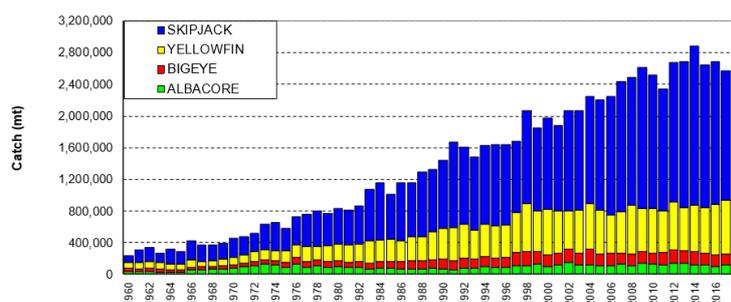
The provisional total catch of tuna for the WCPO in 2018 is estimated to have been 2,716,396 mt (**Figure 1**). This is the second highest on record, at around 170,000 mt below the record catch in 2014 of 2,885,044 mt. In 2018, the purse seine fishery accounted for 1,910,725 mt (70% of the total catch), pole-and-line harvested an estimated 170,038 mt (6%) and the longline fishery 254,850 mt (9%). The remainder (14%) was taken by troll gear and a variety of artisanal gears, mostly in eastern Indonesia and the Philippines.

**Figure 1.** Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCPFC Convention Area by longline, pole-and line, purse seine and other gear types (Williams and Reid, 2019)



The provisional catch of skipjack in WCPO fisheries in 2018 was 1,795,048 mt – 66% of the total catch. This was the fifth highest on record or nearly 215,000 mt less than the record in 2014 (2,008,934 mt). The yellowfin catch for 2018 was estimated to have been 666,971 mt (25% of the total). This was the second highest recorded (15,000 mt lower than the record catch of 2017). The last three years have supported the highest annual yellowfin catches recorded. The bigeye catch for 2018 was estimated to have been 142,402 mt (5% of the total tuna catch). This was lower than the previous 10-year average but 15,000 mt higher than in 2017. The 2018 albacore catch was 108,974 mt (4% of the total). This was amongst the lowest for the past twenty years and nearly 40,000 mt lower than the record catch in 2002 of 147,793 mt (**Figure 2**).

**Figure 2.** Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCPFC Convention Area (Williams and Reid, 2019)



### 3.1.1 *South Pacific albacore tuna*

The 2019 Session of the Scientific committee noted that, although updated information on fishery trends and indicators were reviewed by the Scientific Committee, no stock assessments were conducted for South Pacific albacore in 2019. Therefore, the stock status descriptions from 2018 remain current for South Pacific albacore.

The total provisional South Pacific-wide catch in 2018 was 80,820 mt, a 9% decrease from 2017 and an 8.5% decrease from the average 2013-2017. Longline catch in 2018 (77,776 mt) was a 14% decrease from 2017 and an 8% decrease from the 2013-2017 average.

The average stock status in 2016 (the last full assessment year) was  $SB_{\text{latest}}/SB_{F=0} = 0.52$ , below the interim Target Reference Point (TRP) ( $SB_{\text{latest}}/SB_{F=0} = 0.56$ ) established by the WCPFC in 2018. The probability of being below the TRP is 63% with the result that the stock is not overfished nor is overfishing occurring.

The Scientific Committee noted that, under recent fishery conditions, and assuming that the 2018 catch remains constant, the albacore stock is initially projected to increase as recent estimated relatively high recruitment support adult stock biomass, then decline as future recruitment returns to the long-term historical estimates.

The projections indicate that median  $F_{2020}/F_{\text{MSY}} = 0.24$ ; median  $SB_{2020}/SB_{F=0} = 0.43$ ; and median  $SB_{2020}/SB_{\text{MSY}} = 3.2$ . The risk that  $SB_{2020}/SB_{F=0} < \text{LRP} = 0\%$ ,  $SB_{2020} < SB_{\text{MSY}} = 0\%$  and  $F_{2020} > F_{\text{MSY}} = 0\%$ .

The Scientific Committee reiterated its previous advice over several years that longline fishing mortality and longline catch be reduced to avoid decline in the vulnerable biomass so that economically viable catch rates can be maintained, especially for the longline catch of adult albacore.

In 2019 the Scientific Committee also noted that the 2018 stock assessment was for the WCPFC Convention Area. The South Pacific albacore catch in the eastern Pacific Ocean has recently increased. As a result, it recommended that future assessments apply to the entire South Pacific albacore stock so as to incorporate stock-wide population dynamics. The Scientific Committee observed that WCPFC and IATTC compatible measures would be more easily implemented should an entire South Pacific assessment be conducted.

### 3.1.2 *Skipjack tuna*

The 2019 Session of the Scientific Committee noted that the skipjack assessment continues to show that the stock is currently moderately exploited, and the level of fishing mortality is sustainable.

The Scientific Committee reported that the total provisional catch in 2018 was 1,795,048 mt, a 10% increase from 2017 and a 1% decrease from the average over 2013-2017. Purse seine catch in 2018 (1,469,520 mt) was 15% more than taken in

2017 and a 2% increase from the 2013-2017 average. Pole and line catch (138,534 mt) was a 4% increase from 2017 and a 9% decrease from the average 2013-2017 catch. Catch by other gear (182,888 mt) was a 16% decrease from 2017 and 19% decrease from the average catch in 2013-2017.

The Scientific Committee noted that the stock was assessed to be above the adopted Limit Reference Point (LRP) and is fished at rates below  $F_{MSY}$  with 100% probability. Therefore, the skipjack stock is not overfished, nor subject to overfishing. At the same time, it was also noted that fishing mortality is continuously increasing for both adults and juveniles while the spawning biomass reached its historical lowest level.

The skipjack interim TRP is 50% of spawning biomass in the absence of fishing. The trajectory of the median spawning biomass depletion indicates a long-term trend and has been under the interim TRP since 2009. Since the median spawning biomass has been consistently below the interim TRP, the 2019 Session of the Scientific Committee recommended that the Commission take appropriate management action to ensure that the biomass depletion level fluctuates around the TRP (e.g., through the adoption of a harvest control rule).

### *3.1.3 Yellowfin tuna*

No stock assessment was conducted for WCPO yellowfin tuna in 2019. Therefore, the stock status description from 2017 was not revised.

The Scientific Committee noted that the total yellowfin catch in 2018 was 666,971 mt (the second highest catch on record), a 2% decrease from 2017 and a 9% increase from the average 2013-2017.

Purse seine catch in 2018 (374,062 mt) was a 22% decrease from 2017 and a 1% increase from the 2013-2017 average. Longline catch in 2018 (94,509 mt) was a 11% increase from 2017 and a 4% increase from the 2013-2017 average. Pole and line catch (12,201 mt) decreased 1% from 2017 and there was a 48% decrease from the average 2013-2017 catch. Catch by other gear (186,199 mt) was a 79% increase from 2017 and 51% increase from the average catch in 2013-2017.

Projected fishing mortality is below  $F_{MSY}$  (median  $F_{2020}/F_{MSY} = 0.74$ , the risk of  $F_{2020} > F_{MSY} = 3\%$ ) and projected median spawning biomass is above the LRP ( $SB_{2020}/SB_{F=0} = 0.2$ ) (median  $SB_{2020}/SB_{F=0} = 0.32$ ; median  $SB_{2020}/SB_{MSY} = 1.33$ . Risk that  $SB_{2020} < LRP = 8\%$ ).

The 2017 Session of the Scientific Committee advised that the spawning biomass of yellowfin is highly likely to be above the biomass LRP and recent fishing mortality is highly likely to be below  $F_{MSY}$ . Therefore, noting the level of uncertainties in the assessment, it appeared that the stock is not experiencing overfishing (96% probability) and that the stock is not in an overfished condition (92% probability).

In 2017, the Scientific Committee reiterated its previous advice that the Commission should consider measures to reduce fishing mortality from fisheries that take juveniles, with the goal to increase maximum fishery yields and reduce any further impacts on the spawning potential for this stock in the tropical regions. It also

advised the Commission that measures should be implemented to maintain current spawning biomass levels until the Commission can agree on an appropriate TRP.

The Scientific Committee in 2018 noted that, under recent fishery conditions, the yellowfin stock is initially projected to increase as high recent estimated recruitments support adult stock biomass. Adult stock biomass is then projected to decline slightly before again increasing.

### 3.1.4 Bigeye tuna

No stock assessment was conducted for WCPO bigeye tuna in 2019. Therefore, the stock status description from 2018 was not revised.

The total bigeye catch reported for 2018 was 145,402 mt, a 13% increase from 2017 and a 1% decrease from the average 2013-2017.

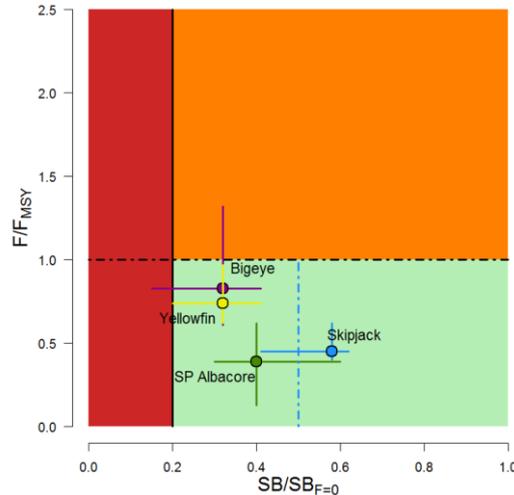
Longline catch in 2018 (71,305 mt) was a 23% increase from 2017 and a 7% increase from the 2013-2017 average. Purse seine catch in 2018 (64,119 mt) was a 10% increase from 2017 and a 4% increase from the 2013-2017 average. The pole and line catch (1,677 mt) was a 3% increase from 2017 and a 60% decrease from the average 2013-2017 catch. Catch by other gear (8,301 mt) was a 25% decrease from 2017 and 45% decrease from the average catch in 2013-2017.

The WCPFC Scientific Committee noted that, under recent fishery conditions, the bigeye stock is initially projected to increase as recent estimated recruitments support adult stock biomass. Adult stock biomass is then projected to decline slightly before again increasing. Projected fishing mortality is below  $F_{MSY}$  (median  $F_{2020}/F_{MSY} = 0.62$ , the risk of  $F_{2020} > F_{MSY} = 0\%$ ) and projected median spawning biomass is above the LRP ( $SB_{2020}/SB_{F=0} = 0.2$ ) (median  $SB_{2020}/SB_{F=0} = 0.41$ ; median  $SB_{2020}/SB_{MSY} = 1.79$ . Risk that  $SB_{2020} < LRP = 0\%$ ). Projections are from the updated model runs of Vincent *et al.* (2018).

Based on the analysis presented, the WCPO bigeye tuna spawning biomass is above the biomass LRP and recent fishing mortality is very likely below  $F_{MSY}$ . The stock is not experiencing overfishing (94% probability  $F < F_{MSY}$ ) and it is not in an overfished condition (0% probability  $SB/SB_{F=0} < LRP$ ).

In 2018, the Scientific Committee noted that levels of fishing mortality and depletion differ among regions, and that fishery impact was higher in the tropical region, with particularly high fishing mortality on juvenile bigeye tuna in these regions. The Scientific Committee consequently recommended that the Commission continue to consider measures to reduce fishing mortality from fisheries that take juveniles, with the goal to increase bigeye fishery yields and reduce any further impacts on the spawning biomass for this stock in the tropical regions.

**Figure 3.** Stock status of the four major target tuna species harvested in WCPO tuna fisheries. Model uncertainty is illustrated by the horizontal and vertical lines extending from the point estimates. Overfishing is measured along the y-axis; overfished status along the x-axis. The dashed vertical line is the Target Reference Point established for skipjack (Hare, 2019).



### 3.1.5 Pacific bluefin

There is significant concern relating to the status of the Pacific bluefin stock in the north Pacific, as expressed in WCPFC CMM 2018-02, a Measure that has been revised seven times since its initial adoption in 2009. Since the early 1990s, purse seine fisheries targeting Pacific bluefin, in particular those targeting small fish (age 0-1), have had an increasing impact on the spawning stock biomass. Being pan-Pacific in distribution, primarily in the North Pacific, this stock is jointly managed with the Inter-American Tropical Tuna Commission (IATTC).

According to analysis completed by the International Scientific Committee (ISC), which provides the WCPFC Northern Committee with scientific advice, the stock remains near an historic low of 2.6% of unfished SSB. If the WCPFC Measure is adhered to, the ISC assesses that the probability of SSB recovering to the initial rebuilding target by 2024 is 69%.

Pacific bluefin tuna is rarely caught by Pacific Islands-based fleets or in EEZs of FFA members. It is primarily a fishery based in the North Pacific and FFA members have limited influence over conservation and management arrangements for it.

A recent paper presented to the WCPFC Northern Committee records no catch of Pacific Bluefin north of 20°N in the Pacific for Cook Islands vessels (WCPFC, 2019). Rare encounters are reported in the Cook Islands southern longline fishery.

### 3.2 Other species<sup>7</sup>

Very little scientific work has been undertaken for bycatch and species encountered incidentally by commercial fleets fishing oceanic tunas including in the EEZ of the Cook Islands. Old assessments exist for blue marlin (Kleiber *et al.* 2003) and blue shark (Kleiber *et al.* 2001), while in more recent years' assessments have been conducted on south-west Pacific striped marlin (Ducharme-Barth *et al.* 2019) and south-west Pacific swordfish (Takeuchi *et al.* 2017). Although the fishery in the Cook Islands does not target these species interactions occur in the longline fishery. Shark bycatch is poorly quantified and swordfish catches are understood to be currently low. Billfish species are targeted by the Cook Islands recreational fishery, although data is lacking and most of the catch from this sector will be within the marine protected area included under the Marae Moana Act 2017.

In relation to sharks, the 11<sup>th</sup> Session of the Scientific Committee in 2015 encouraged additional research associated with shark catch mitigation methods (e.g. hook type, leader material and non-deployment of shallow hooks) to reduce catch rates and at-vessel mortality. The Scientific Committee noted that, according to information provided by SPC, finning was still occurring in the Convention Area and that information that could be used to evaluate the effectiveness of the WCPFC ban on shark finning (CMM 2010-07) was limited.

At this Session, the Scientific Committee also noted that a lack of guidance on the structure and content of shark management plans particularly in relation to the definition of a target fishery and how a review of a shark management plan should be performed. It recommended that a list of minimum requirements to address these shortcomings be developed.

The 11<sup>th</sup> Session of the Scientific Committee adopted a research plan and stock assessment schedule which was endorsed by WCPFC12 (SC11, Summary Report, Attachment H). The Plan provided for, *inter alia*:

- A schedule of assessments for southwest- or pan-Pacific stocks of striped marlin, swordfish, silky, oceanic white tip, blue, mako and thresher shark, and
- additional research for hammerheads and whale shark and plans to commence work on limit reference points for elasmobranchs, post-longline release survival for sharks from longline and purse seine gear, an experimental investigation of branch and longline leader material impact on shark catch, and
- noting the limitations associated with shark assessments because of the low levels of observer coverage and lack of representativeness in the observer data, recommended the re-development of observer data collection forms to obtain additional information on handling and release of sharks landed.

The Scientific Committee also requested available information on mobulid species (mantas and devil rays) and their interactions with fisheries managed by the WCPFC be prepared for review at future meetings.

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<sup>7</sup> Refer also to the WCPFC's Bycatch Mitigation Information System (BMIS): <http://www.wcpfc.int/bmis>.

### 3.2.1 *Blue marlin*

No new assessment of Pacific blue marlin has been considered by the Scientific Committee since 2016. At that time, the Scientific Committee noted the stock status for Pacific blue marlin provided by the ISC exhibited a long-term decline. Population biomass (age-1 and older) averaged roughly 130,965 mt in 1971-1975, the first 5 years of the assessment time frame, and had declined by approximately 40% to 78,082 mt in 2014. Female spawning biomass was estimated to be 24,809 mt in 2014, or about 25% above  $SSB_{MSY}$ . Fishing mortality (average  $F$ , ages 2 and older) averaged approximately 0.28 in the period 2012- 2014, or about 12% below  $F_{MSY}$ . Since the stock was almost fully exploited at that time, the ISC recommended that fishing mortality remain at or below the 2012-2014 levels.

### 3.2.2 *South-west Pacific striped marlin*

A new assessment was conducted in 2019 for south-west Pacific striped marlin with advice from the WCPFC Scientific Committee noting that the median of recent spawning biomass depletion relative to the unfished condition was  $(SB_{recent}/SB_{F=0}) = 0.198$ , with a roughly 50.33% probability that the recent spawning biomass depletion relative to the unfished condition was below the LRP adopted for tunas ( $SB_{recent}/SB_{F=0} = 0.2$ ), noting that there are no agreed LRP's for WCPO billfish. An updated structural uncertainty grid was also used to formulate management advice.

The 15<sup>th</sup> Session of the Scientific Committee noted that the southwest Pacific striped marlin assessment results indicated that the stock is likely overfished, and close to undergoing overfishing according to MSY-based reference points. A range of research activities including inter alia the Commission's consideration of measures to reduce the overall catch of this stock, and the adoption of an LRP for this stock were recommended.

### 3.2.3 *South-central Pacific swordfish*

In 2017 the 13<sup>th</sup> Session of the Scientific Committee considered the assessment for south-central Pacific swordfish. The assessment indicated that relative recent spawning biomass was median  $(SB_{recent}/SB_{F=0}) = 0.35$  with a probable range of 0.29 to 0.43 (80% probability interval). The median estimate for  $SB_{recent}/SB_{MSY}$  is 1.23.

Relative recent fishing mortality was median  $(F_{recent}/F_{MSY}) = 0.86$  with an 80% probability interval (0.51 to 1.23). While this likely suggests a buffer between recent fishing mortality and  $F_{MSY}$ , it also showed that there was some probability (32%) that recent fishing mortality was above  $F_{MSY}$ .

With recent fishing mortality likely below  $F_{MSY}$ , and spawning biomass likely above the 20%  $SB_{F=0}$ , biomass LRP adopted for tunas and the  $SB_{MSY}$  level, noting that there are no agreed LRP's for WCPO billfish, and highly likely that the stock is not in an overfished condition (0% probability), the stock is not overfished and overfishing is not occurring.

The Scientific Committee recommended consideration for the development of appropriate management measures beyond the scope of the existing CMM, and maintaining current restrictions on catches south of 20°S.

#### **3.2.4 *Blue shark***

In 2016, the Scientific Committee noted that the 2015 catch of south Pacific blue shark provided within aggregate 5-degree square catch data was 26% lower than in 2014, and a 34% reduction over the average for 2010-14. It also advised the Commission that realistic estimates of equilibrium unexploited recruitment and spawning biomass could not be obtained in the 2016 South Pacific blue shark assessment due to the lack of available data, conflicting CPUE time series, and uncertainty in the estimated stock recruitment relationship. As a result, the 2016 South Pacific blue shark assessment was considered to be preliminary and could not be used to determine stock status and form the basis of management advice.

The 12<sup>th</sup> Session of the Scientific Committee noted that there are a number of data uncertainties within the South Pacific blue shark assessment, especially regarding historical and contemporary longline catch and CPUE estimates. The data-poor nature of the South Pacific blue shark assessment indicates that an improvement in the amount and quality of available biological and fishery information will be required in order to develop a useful integrated stock assessment model.

The Scientific Committee recommended prioritising initiatives to improve data and associated analytical work so a thorough assessment for South Pacific blue shark could be supported.

**Table 1.** Stock status and WCPFC Scientific Committee recommendations for other species stocks caught in the Cook Islands. NP = North Pacific; SWPO = Southwest Pacific Ocean; SPO = South Pacific Ocean; SEPO=Southeast Pacific Ocean (Brouwer, 2019)<sup>8</sup>.

Species/Stock	Status	SC recommendation	Reference
Blue marlin	No overfishing, not overfished	Fishing mortality rate should not be increased from the 2009-2011 level	ISC (2013)
Striped marlin (SWPO)	The stock is fully exploited, is not experiencing overfishing but may be overfished	Reduce overall catch of this stock, through the expansion of the geographical scope of CMM 2006-04 to cover the entire distribution range	Davies <i>et al.</i> (2012)
Swordfish (SPO)	SWPO stock - No overfishing, not overfished; SEPO stock- uncertain	No increase in fishing mortality over 2007-2010 levels	Takeuchi <i>et al.</i> (2017)
Blue shark (NP)	No overfishing, not overfished	Catch and fishing effort on blue shark should be carefully monitored	Rice <i>et al.</i> (2014)
Oceanic whitetip shark	Overfishing, overfished	Management measures to reduce fishing mortality and to rebuild spawning biomass required and mitigation to avoid capture is recommended.	Rice and Harley (2012)
Silky shark	Overfishing, overfished	Develop mitigation as well as measures control targeted catch.	Rice <i>et al.</i> (2013)

### 3.2.5 Whale shark

Based on a recommendation from the 11<sup>th</sup> Session of the Scientific Committee, the 12<sup>th</sup> Session of the Commission adopted the guidelines for safe release of encircled animals including whale sharks<sup>9</sup>.

In summary, data and information is generally not currently available to support robust assessments for some of the non-tuna large pelagics harvested in WCPO tuna fisheries. Sustained efforts are underway in WCPFC to collect and assimilate the data required to support the analysis required. Where fishing mortality has been assessed to be unsustainable, for example in the case of oceanic white tip shark, the Commission is developing strategies to reduce fishing mortality, as a precautionary measure, prior to the necessary assessments being completed.

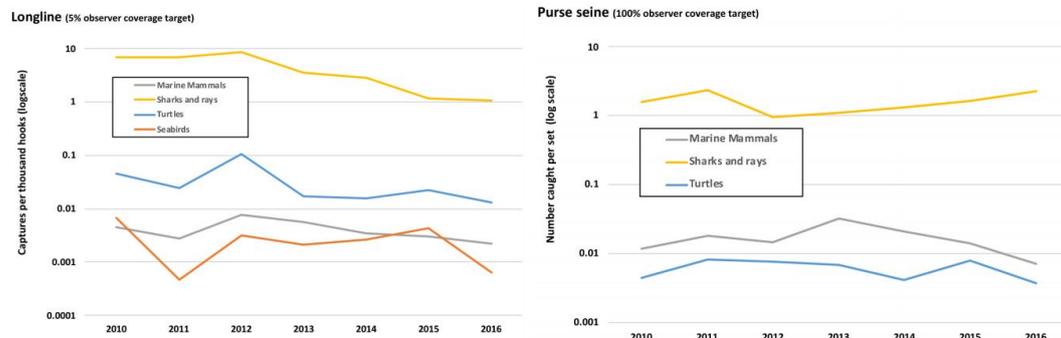
FFA members share an objective of reducing the catch for bycatch species such as sharks, turtles, marine mammals and seabirds. In longline fisheries the bycatch rate recorded by observers for sharks and turtles has decreased notably in recent years, which coincides with measures to reduce capture (**Figure 4**). However, assessments indicate concerns over the declining populations of several shark species including Silky shark and Oceanic Whitetip shark (FFA, 2018).

<sup>8</sup> Note this report was produced prior to the WCPFC's 15<sup>th</sup> Session of the Scientific Committee meeting where the most recent striped marlin assessment was considered. Refer to section 3.2.2.

<sup>9</sup> Originally adopted on 8 December 2015. The title of this decision was amended through the Commission decision at WCPFC13, through adopting the SC12 Summary Report which contains in paragraph 742: 'SC12 agreed to change the title of 'Guidelines for the safe release of encircled animals, including whale sharks' to 'Guidelines for the safe release of encircled whale sharks'.

**Figure 4.** Trends in reported principal bycatch species from purse seine (based on sets) and longline (per ‘000 hooks) tuna fisheries operating in the zones of FFA members (2010-2016) reported by observers (FFA, 2018).

#### Longline and purse seine and bycatch rates as measured by ROP observers in EEZs of FFA members



## 4.0 Summary of tuna fishing in the Cook Islands and resource status<sup>10</sup>

### 4.1 Legislative environment

The following legislation governs activities in the commercial large pelagic fisheries sector in Cook Islands:

- the Marine Resources Act (2005),
- a Plan of Action to Deter and Eliminate IUU Fishing (2006),
- Action Plan for Sea Turtle Mitigation (2008)
- Cook Islands National Plan of Action for Reducing Incidental Catch of Seabirds (NPOA-Seabirds) (2008)
- the Marine Resources (Licensing) Regulations (2012),
- Marine Resources (Shark Conservation) Regulations (2012),
- a National Plan of Action for the Management and Conservation of Sharks (2012),
- the Marine Resources (Purse seine fishery) Regulations (2013),
- the Marine Resources (Large Pelagic Longline Fishery and Quota Management System) Regulations (2016) including Schedule 4, the Large Pelagic Longline Fishery Plan (2016),
- the Marae Moana Act (2017), and
- the Maritime Zones Act (2018).

Schedule 4 of the Marine Resources (Large Pelagic Longline Fishery and Quota Management System) Regulations (2016), the Large Pelagic Longline Fishery Plan (2016), sets a total allowable commercial catch (TACC) of 9,698 tonnes of albacore

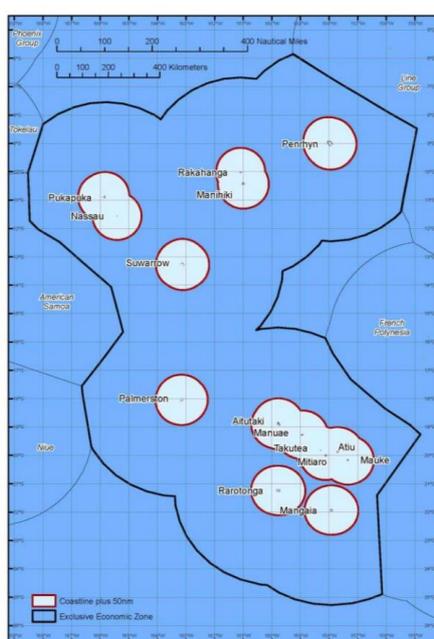
<sup>10</sup> The principal sources for the following summary include the 2011 National Tuna Fisheries Status Report; Hare, 2019; Brouwer, 2018, and the Cook Islands 2019 Annual Report Part 1 to the WCPFC Scientific Committee.  
Summarised from: Hare, S. 2019. *Fisheries Productivity Analysis for the Cook Islands: History and Indicators*. Secretariat of the Pacific Community, Offshore Fisheries Programme, Noumea, New Caledonia.

tuna and 2,500 tonnes of bigeye tuna for longline vessels. Of this, 80% has been allocated to sell as quota in any given calendar year.

Under the Marine Resources (Purse seine fishery) Regulations (2013), the Cook Islands purse seine fishery is limited to 1,250 days in any consecutive 4 quarter period. In addition, if the purse seine catch exceeds 30,000 mt in any four consecutive quarters, the Secretary of MMR is required to review the impact of this level of catch on the objectives of the Fishery Plan.

The Marae Moana Act 2017 established a multipurpose marine protected area (MPA) covering the entire Cook Islands EEZ (**Figure 5**). The Act provides that two commercial activities – fishing and seabed mineral exploration – are banned in regions 50 nautical miles (nm) from all 15 island baselines within the EEZ.

**Figure 5.** The Cook Islands exclusive economic zone with the 50 nautical mile multipurpose marine protected area around islands declared under the Marae Moana Act 2017 (from <http://maraemoana.gov.ck>).



The area of the exclusive economic zone is 1,976,459 km<sup>2</sup>.<sup>11</sup>

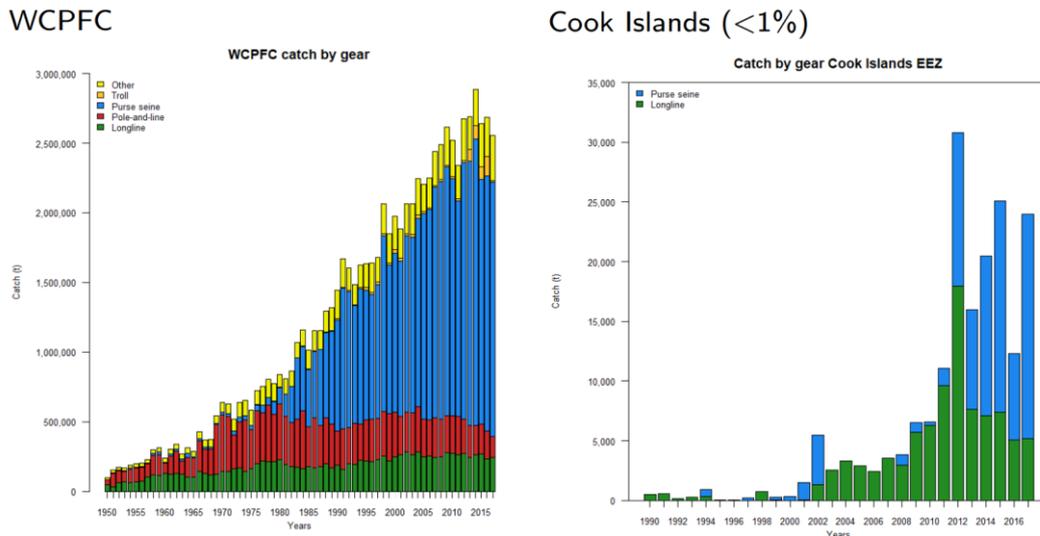
## 4.2 History

This EAFM for the large pelagic fishery is confined to the gear types currently deployed in the commercial longline and purse seine fisheries. Over the history of the commercial fishery, fishing has occurred across the entire EEZ, from inshore to the limit of the EEZ. The Marae Moana Act 2017 excludes commercial tuna fishing from within 50 nm of the 15 main islands within the EEZ.

<sup>11</sup> <http://www.marineregions.org/>

The history of tuna catches from the WCPO and the Cook Islands EEZ by gear type (except troll) is presented in **Figure 6**. The total catch by purse seine and longline gear from Cook Islands tuna fisheries historically accounts for less than 1% of the WCPO tuna catch.

**Figure 6.** The catch (tonnes) by year (1960-2017) for gear types deployed in western and central Pacific tuna fisheries (WCPFC, 2018).



### 4.3 Longline

Commercial tuna fishing, using longline gear, probably commenced in 1953 (SPC and MMR, 2011). Longline vessels from more than 20 different nations have operated within the 200-mile EEZ since then with most of the catch reported for fleets from China, Vanuatu, Korea, Chinese Taipei and Cook Islands. Vessels flagged to Korea and Chinese Taipei were most prevalent prior to 2000. Chinese and Vanuatu vessels, along with vessels chartered by Cook Islands' interests, have taken most of the catch since (Hare, 2019).

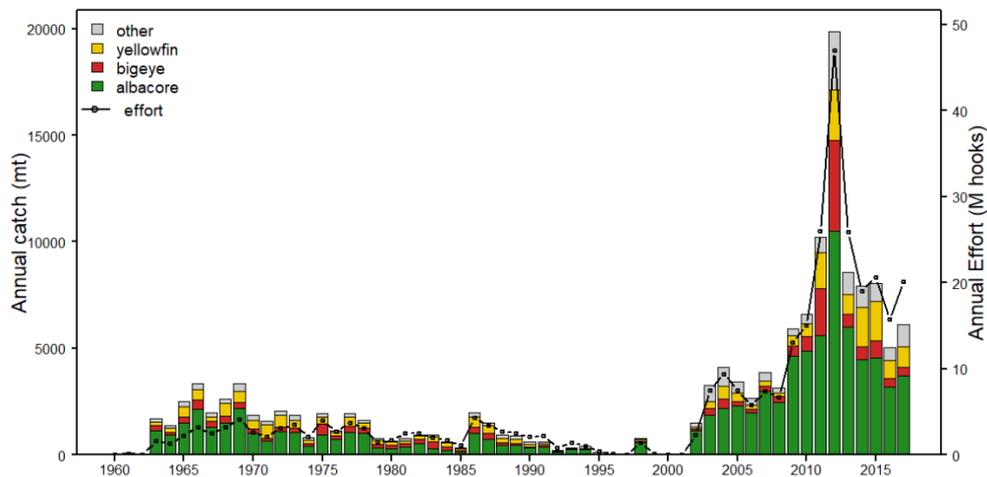
During the early period of the fishery, the annual total catch was less than 5,000 mt and associated effort never exceeded 5 million hooks. Between 1960 and 2000, longline catch and effort were relatively low compared to levels after 2000. There was a moratorium on foreign commercial longlining around 2000 prior to a resumption of fishing in 2002 following which the annual catch increased to a reported 10,000 mt in 2011 and 19,000 mt in 2012. Effort peaked at nearly 50 million hooks in 2012. The catch (and associated effort) of 2012 has not been repeated and total catch has remained at or below 8,000 mt annually through to 2017 (**Figure 8**). Since 2012, the Cook Islands has averaged the 4th highest albacore, 10th highest bigeye and 11th highest yellowfin catch among SPC's island members (Hare, 2019).

Longline fishing effort is characterised by a northern and southern fishery delineated at approximately 15°S, although, historically, longline effort and catch has occurred across the EEZ. However, effort in the northern half of the EEZ is currently 3-4 times

as great as in the southern region. There is a prominent band of fishing effort from the northwest and central northern regions of the EEZ with increased yellowfin and albacore catch west of Pukapuka (Cook Islands, 2019).

This pattern is typically attributed to the fact that most Cook Islands vessels operate out of the Pago Pago, American Samoa and Apia, Samoa. They generally undertake relatively short, more frequent trips to the Cook Islands EEZ and do not venture far into the zone. Approximately 14% of the total national catch is historically caught within the north western sector of the EEZ which borders American Samoa’s EEZ. Approximately 10% of Cook Islands catch is taken in the EEZ of Niue and 9% in the Samoan EEZ. The small domestic fleet that operates out of Avatiu accounts for a small amount of catch in the vicinity of Rarotonga.

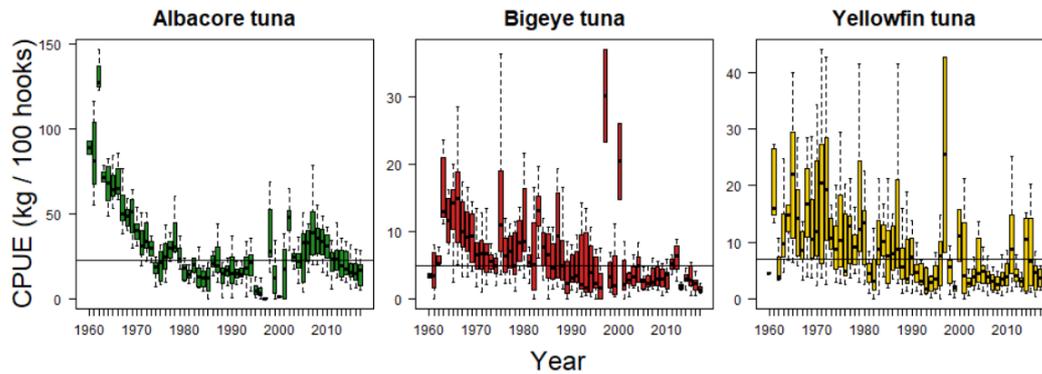
**Figure 8.** Commercial longline catch and effort in the Cooks Islands EEZ, 1960-2017 (raised values for catch and effort (correcting for missing or incomplete logbook data). The “Other” category comprises non-tuna retained species such as marlins and mahi mahi, but more recent years include some discarded catch (Hare, 2019).



Although there is some annual variation, albacore, bigeye and yellowfin tuna dominate the longline catch. Albacore average 60% of the catch, yellowfin around 20% and bigeye approximately 5%. The remainder is comprised of a variety of other species, including marlins, spearfish, wahoo and mahi mahi (**Figure 8**).

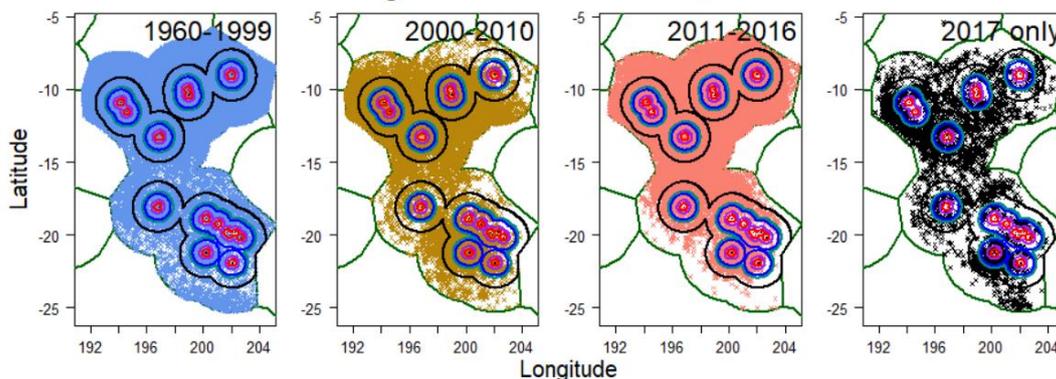
Annual catch per unit effort in the Cook Islands commercial longline fishery to 2017, for the three major tuna species, is illustrated in **Figure 9** (Hare, 2019). The highest CPUE is for albacore, with yellowfin and bigeye occasionally alternating within years for the higher CPUE. The declining CPUE, which is characteristic of WCPO tuna fisheries generally, is a feature of most world fisheries as they are fished down from virgin populations.

**Figure 9.** Annual CPUE (in kg per 100 hooks) for the major tuna species caught in the Cook Islands EEZ, 1960-2017. Within year variability reflects monthly average CPUE. The horizontal line is the median annual CPUE over the entire time period (Hare, 2019).



Fishing effort is seasonal in the Cook Islands. The prime fishing period is May-July when an average of nearly 3 million hooks are fished per month. During the period November to February effort eases to less than 0.5 million hooks per month. If fishing intensity is standardised by dividing the effort by the size of the EEZ the effort represents approximately 1.5 hooks fished per km<sup>2</sup> of EEZ area per month (Hare, 2019). The location of all recorded longline sets in the Cook Islands EEZ grouped by time period is presented in **Figure 10**.

**Figure 10.** Location of all recorded longline sets in the Cook Islands EEZ grouped by time period. The coloured lines represent fishing zones at the following distances from land: 12 (red), 24 (purple), 50 (dark blue), 60 (light blue), and 100 (black) nautical miles. The 200-mile EEZ is shown in dark green (Hare, 2019).



#### 4.4 Implications of the Marae Moana Act 2017

In an assessment of the implications of the implementation of the Marae Moana Act, Hare (2019) noted that, since 2014, about 20% of the longline fishery within the Cook Islands EEZ occurred inside 50nm of the islands. However, the density of effort deployment, measured as number of hooks fished annually per km<sup>2</sup>, has been similar inside 50 nm as outside 50 nm of the islands. The CPUE for the total catch in the zone outside 50nm is between 13% (Southern half of the EEZ) and 20% (Northern half of the EEZ) higher than in the 24-50nm zone.

Hare (2019) noted that the single local operator has accounted for about 20% of the commercial longline effort inside of 50 nm and the proportion of catch of the three

major tuna species has been much less than 20%, reflecting lower catch rates than the larger vessels that operate outside 50 nm.

Hare (2019) concluded that relocating the longline effort from within 50nm of the islands to the region outside 50nm may further depress CPUE in the zone outside 50nm and, eventually, increase CPUE inside 50 nm. However, he noted that “..... *the many factors that influence the distribution of tuna make a statistical prediction of the rate and scale of changes challenging or pointless*”.

A business feasibility assessment completed by Skirtun (2019) suggested that, based on a supporting survey, longline vessels will be only marginally viable operating in the same manner as before the marine protected area extension to 50 nm. Should economic conditions deteriorate, she concluded that it will no longer be financially viable for the average vessel to operate between 50 and 200 nm in the Cook Islands.

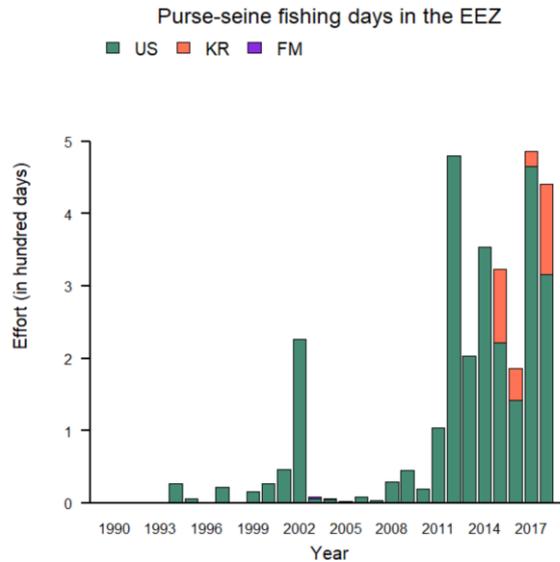
The exclusion zone was estimated to increase operating costs for the average vessel by US\$34,571 annually and reduce vessel income by 30%. Domestic vessels were expected to be more severely impacted as the fleet is comprised of smaller vessels that undertake shorter trips, in which the increase in steaming days would have a proportionally larger effect. In addition, domestic vessels fish full time in the Cook Islands during high and low catch rate seasons as their vessel size prevents them from fishing in more distant waters during times of low catch rates.

On the basis of the burden on domestically-based vessels, and the significant contribution they make to the Cook Islands economy of around US\$202,191 each year, Skirtun (2019) advised that current exemption of the 50nm closure for these vessels be maintained.

#### 4.5 Purse seine

The first year of purse seine activity in the Cook Islands EEZ was 1988 when a U.S. purse seiner made three sets. There was occasional purse seine activity through the 1990s, with a total of 45 sets made prior to 2000.

**Figure 11.** Purse seine fishing effort (in days) in the Cook Islands has been almost entirely undertaken by the US fleet, with minor effort in 2004 by FSM and, since 2015, Korea.

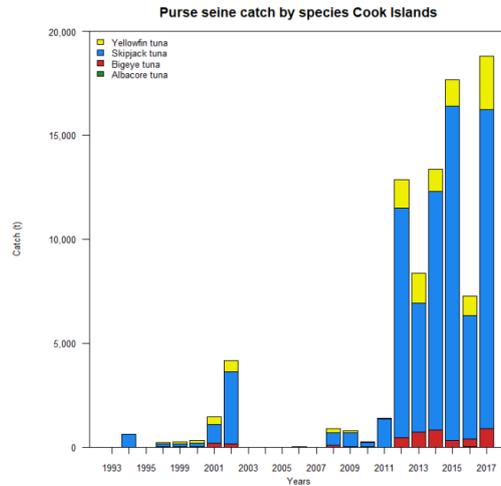


It was not until 2008 that purse seining established a regular presence in the Cook Islands although catches remained relatively low. Since then, fleets from Korea, the EU, the United States and, more recently, Kiribati-flagged vessels (operating under the FSM Arrangement), have fished the EEZ under bilateral or, in the case of the US-flagged vessels, multilateral access arrangements (**Figure 11**).

Total purse seine effort in the EEZ has typically been less than 50 days per year, with the exception of 2002 when over 200 days were fished, and 2011 when around 100 days were fished by the US fleet. In 2012 effort increased and almost 500 days were reported from Cook Island waters. Between 2012 and 2017, the number of purse seine fishing days varied between 180 and nearly 500, with the EU fleet contributing an average of 55 days of effort per year.

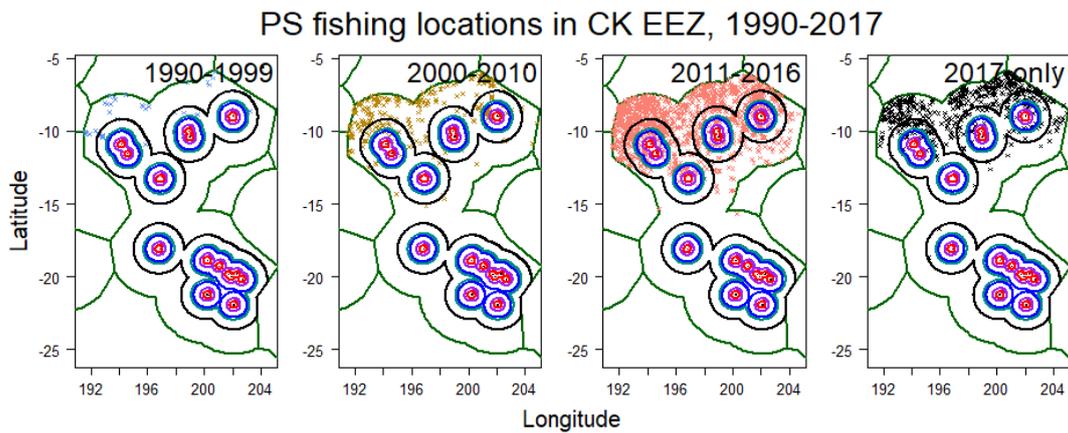
Purse seine catches to 2011 varied between 0 mt and 4,146 mt, and only exceeded 1,000 mt on three occasions (2001, 2002 and 2011). The majority of the catch comprised skipjack tuna which peaked at 3,282 mt in 2002. Bigeye tuna catches varied between 0 and 190mt, while yellowfin varied between 0 and 672 mt. The majority of the catch has been taken by the US fleet (**Figure 12**), with less than 10% of catches taken by the EU fleet since 2017. The catch of yellowfin and bigeye by purse seiners has equalled that in the longline fisheries for several years since 2010 (Hare, 2019).

**Figure 12.** Purse seine catches by the active fleets in the Cook Islands EEZ since 1990 (Hare, 2019).

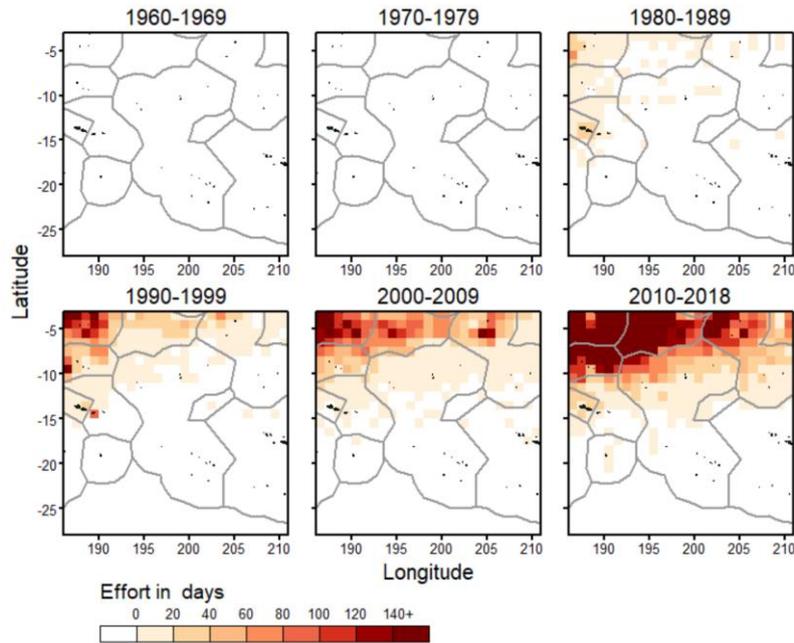


Purse seine activity has occurred only in the region north of about 12°S, i.e., entirely in the northern region of the Cook Islands EEZ (**Figure 13**). The majority of purse seine catch has taken place between 50 nm and the outer limit of the EEZ (Hare, 2019).

**Figure 13a.** Location of all recorded purse seine sets in the Cook Islands EEZ grouped by several time periods. The coloured lines represent fishing zones at the following distances from all points of land: 12 nautical miles (red – Territorial Sea), 24 (purple), 50 (dark blue – Marae Moana Act), 60 (light blue), and 100 (black) nautical miles. The 200-mile EEZ is shown in dark green (Hare, 2019).



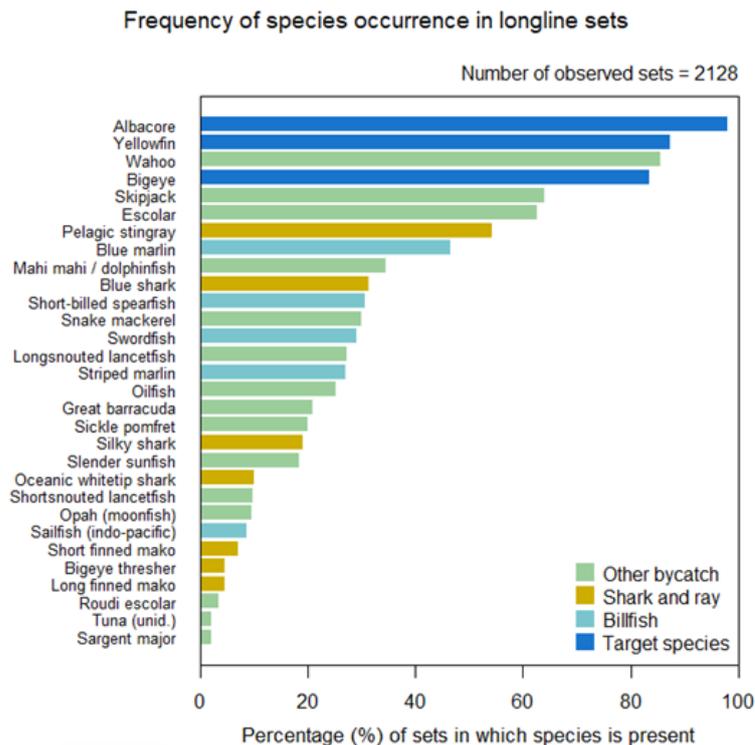
**Figure 13b.** Location of all recorded purse seine sets in the Cook Islands EEZ grouped by decade (1990-2017).



## 4.6 Bycatch

### 4.6.1 Longline fishery

At-sea observers deployed to the longline fleet, operating in or close to, Cook Islands waters through 1994 to 2018 recorded the following proportion of species encountered in longline sets.



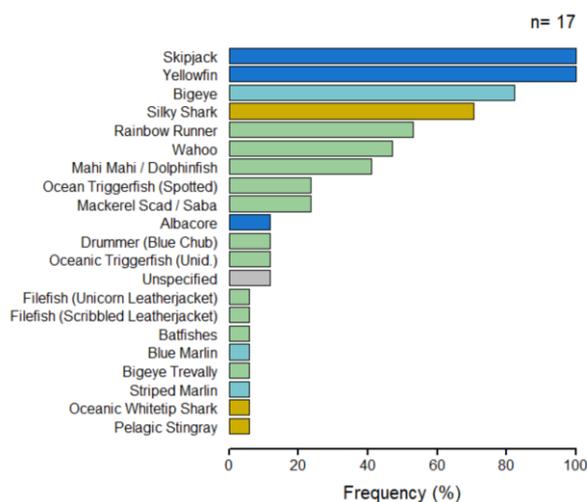
#### 4.6.2 Purse-seine fishery

Observers aboard purse-seine vessels operating in or close to Cook Islands waters through 1994 to 2018 recorded the following species as each contributing more than 1% of the average catch by weight:

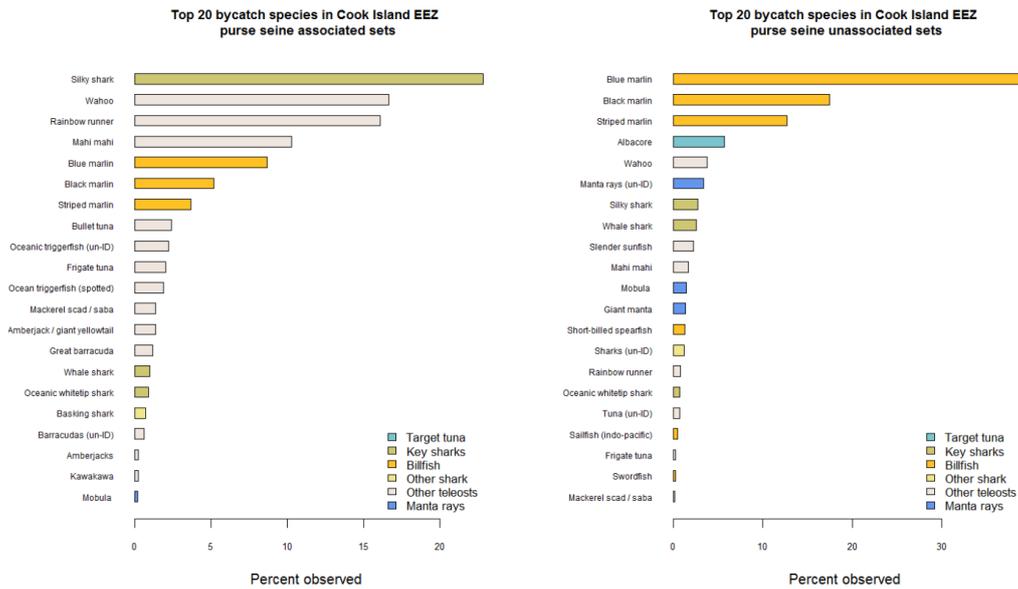
Species	% of catch
Skipjack	89.8
Yellowfin	7.2
Bigeye	2.6

Source: Cook Islands TUBS

Observer data indicate that some by-catch species (aside from bigeye tuna) are encountered in a high proportion of purse seine sets (predominantly associated sets on floating objects). Silky shark, rainbow runner, wahoo and mahi mahi (dolphinfish) are also encountered in a high proportion of observed purse seine sets. However, this data is based on a limited data set - 17 purse seine sets (**Figure 14**). Consequently, the purse seine catch composition in the Cook Islands EEZ requires additional sampling.



**Figure 14a.** Frequency of species occurrence in all purse seine sets.



**Figure 14b.** Frequency of species occurrence in purse seine associated and unassociated sets (Brouwer, 2019).

## 5.0 The Cook Islands ocean environment<sup>12</sup>

Ocean-climate system dynamics including sea surface temperature (SST), temperature throughout the water column and the profile of the thermocline, current strength and direction, bottom topography, location, depth, upwellings, convergences and proximity to land masses, determine the distributions of tuna species in all oceans at different spatial and temporal scales (Bour *et al.* 1981; Lehodey *et al.* 2013; Lehodey *et al.* 2014; Senina *et al.* 2018). The affects vary among species, and life cycle stages, as each respond to system variations ranging from annual seasonal cycles to decadal climate processes, daily tidal cycles to pan-ocean climatic processes. The availability of fish to fishing operations in Cook Islands EEZ is directly influenced by these variations in ocean systems.

In this dynamic environment, tuna harvests may vary significantly spatially and temporally as is the case for the Cook Islands longline fishery (see Section 5.4 above). These changes are reflected in changes in fishing methods, fishing effort levels, catch composition, and effort dispersion or distribution all of which are indicative of the availability of tuna to fishing gear.

In a large EEZ such as that of the Cook Islands, these conditions are not uniform with different regions experiencing different conditions at any given time. An understanding of the ocean environment and its variables is important in tuna fishery management planning where the objectives of tuna fishery management include ecological sustainability and economic viability.

<sup>12</sup> This summary is drawn primarily from SPC and MMR (2011).

Oceanographic parameters such as SST, thermocline depth, current direction and strength and phytoplankton composition and concentration exhibit seasonal patterns in the Cook Islands EEZ. These seasonal patterns are driven by a dynamic climate environment characterised by El Niño and La Niña fluctuations. The Cook Islands EEZ is influenced by three main current systems:

- The Southern Equatorial Current (SEC) which flows to the west between latitudes 6°S and 15°S. The SEC is the strongest current in the South Pacific and current strength peaks between April and September.
- The Southern Equatorial Counter Current (SECC) flows to the east between latitudes 7°S and 12°S. The SECC is strongest between January and March
- The Sub-Tropical Counter Current (STCC) flows to the east between latitudes 17°S and 25°S. The STCC is a weaker current than the SEC and SECC and is strongest in the first and last quarters of the year.

During La Niña conditions:

- The northern regions of the Cook Islands are influenced by the strong westward flowing currents from the SEC (2nd and 3rd quarters), cooler SST, a shallower 27°C thermocline (3rd quarter), and increased primary production. In the first and fourth quarters, the southwest current flow is weaker and can revert to the east under the influence of the SECC, the SST is warmer, the 27°C isotherm is deeper, and phytoplankton concentrations are lower.
- The oceanographic patterns are very similar in the central region of the Cook Islands, but often weaker than in the northern region, except that there appears to be no effect on SST.
- The southern region of the Cook Islands is not influenced by the SEC or SECC, but it does experience increased current speeds to the east and west, increased SST, deeper 27°C isotherm in the 1st and 4th quarters and shallower 27°C isotherm in the 3rd quarter.

During El Niño conditions:

- The northern and central regions of the Cook Islands are influenced by the strong eastward flowing currents from the SECC that bring nutrient-poor warm pool waters east, resulting in elevated SST but a relatively shallow thermocline (the warm pool spread appears to be horizontal rather than pooling deeper in the Cook Islands EEZ), and primary production is relatively reduced.
- The southern region of the Cook Islands experiences decreased current speeds to the east and west, lower SST, and shallower 27°C isotherm. The interannual and seasonal horizontal shear between the SEC and SECC create oceanographic structures such as eddies or thermal fronts that might play an important role in fishery activity. These zones are highly productive and associated with high aggregations of micronekton, and subsequently high albacore tuna aggregation and availability.

Model simulations suggest that increasing greenhouse gas effects on ocean dynamics could affect the future distribution and abundance of the four main tuna species in response to changes in water temperature, dissolved oxygen, ocean currents and ocean acidification as well as indirect changes in food web structure (Bromhead *et al.* 2014; Lehodey *et al.*, 2011; Senina *et al.* 2018).

While there is uncertainty about the effect of climate change on tuna fisheries, considerable research is underway (Nicol *et al.* 2014; Senina *et al.* 2018).

## 6.0 The 2018 Cook Islands fishery<sup>13</sup>

Apart from an important artisanal fleet operating from the 12 inhabited islands, in 2018 the Cook Islands national tuna fishing fleet consisted of longline fishing vessels targeting tuna, principally albacore, and tuna-like species. In December 2016 a new longline regulation for a quota management system (QMS) was promulgated. Under the QMS, purchased quota is reported on a weekly basis, with daily reporting when 80% of quota allocation is reached. The QMS was operationalised in January 2017.

A total allowable commercial catch (TACC) of 9,750 tonnes of albacore tuna and 3,500 tonnes of bigeye tuna has been set for commercial longline vessels. Of this, 80% has been allocated to sell as quota in any given calendar year.

Historically, the majority of the longline fishing activity is concentrated in the northern Cook Islands waters, delineated north of 15°S. This was the case in 2018. Some longline fishing by Cook Islands vessels also takes place in areas beyond national jurisdiction within the WCPF Convention Area. Historically purse seine fishing has been conducted in the Cook Islands EEZ by US Treaty vessels only. **Table 2** presents a breakdown of foreign flagged vessels, by gear type, that operated in the Cook Island fishery in 2018.

### 6.1 Longline

In 2018, the foreign flagged longline vessel catch within the Cook Islands EEZ was 2,158 mt, which comprised 43% of the total longline catch. The Cook Islands national fleet, which included chartered vessels, accounted for the remaining 56% (2,800 mt) of the total catch. Albacore comprised 70% of the longline catch, yellowfin tuna (16%) and other species (9%). Bigeye tuna comprised 5% of the total catch (**Figure 15**).

**Table 2.** Number of active foreign-flagged vessels by gear authorised to operate within the Cook Islands EEZ by size in 2018.

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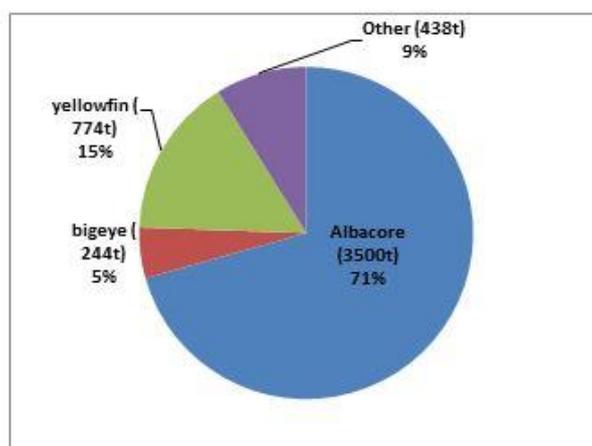
<sup>13</sup> Cook Islands. 2019. Annual Report to the Commission Part 1: Information on fisheries, research and statistics: Cook Islands. WCPFC-SC15-AR/CCM-04. Fifteenth Regular Session of the Scientific Committee, Pohnpei, Federated States of Micronesia, 12-20 August, 2019.

GRT Range	Longline	Carrier	Bunker	Purse seine	Total
0-10	-	-	-	-	-
10-50	-	-	-	-	-
50-200	0	-	-	-	0
200-500	7	-	-	-	7
500+	-	-	11	50	61
<b>Total</b>	<b>7</b>	<b>-</b>	<b>11</b>	<b>50</b>	<b>68</b>

**Table 3.** Annual catch estimates in metric tonnes for all licensed foreign vessels by gear within the Cook Islands EEZ, for tuna and billfish species in 2018. Operational log sheet data was raised using VMS data, with 100% log sheet coverage for foreign-flagged vessels.

Foreign vessels	Gear	Effort	ALB	BET	YFT	SKJ	PBF	BLM	BUM	MLS	SWO	Total (inc OTH)
CK EEZ	LL	24,809 Hhks	1,486	118	387	27	-	3	53	3	10	2,158
	PS	668	-	317	1,145	32,770	-	-	-	-	-	34,257

**Figure 15.** 2018 longline catch of all vessels by species composition within the Cook Islands EEZ.



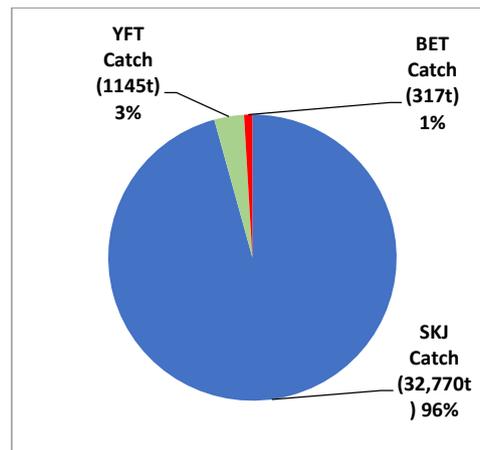
Two small locally-based vessels operated out of Rarotonga in 2018 and targeted fish mainly for the local market, with some exports to Japan. These vessels are below 80t GRT and typically operate between 50nm and 100nm of Rarotonga.

Other Cook Islands-flagged vessels are based out of the foreign ports of Suva, Pago Pago and Apia with most of the unloading taking place in Apia, Samoa.

## 6.2 Purse seine

In the purse seine fishery, in 2018 the US fleet accounted for 46% of the total catch (34,257mt) followed by Korea (29%) and Kiribati (12%). Foreign flagged purse seine vessels reported a total catch of 34, 257t (**Table 3**). The catch was predominantly skipjack tuna, comprising 96% of the total purse seine catch (**Figure 16**).

**Figure 16.** 2018 purse seine catch of all vessels by species composition within the Cook Islands EEZ.



## 6.3 Outlook<sup>14</sup>

Annual catches of skipjack in the Cook Islands averaged 11,247 mt between 2012 and 2017, representing 0.6% of the WCPFC Convention Area skipjack catch. Regional catch of skipjack tuna, including those within or by the Cook Islands, are considered sustainable at recent average levels.

Annual catch of yellowfin in the Cook Islands averaged 2,902 mt between 2012 and 2017, representing 0.5% of the WCPFC Convention Area yellowfin catch. As such, the Cook Islands fishery does not contribute significantly to overall regional impacts on the stock (Brouwer, 2018).

Annual catch of bigeye in the Cook Islands averaged 1,867 mt between 2012 and 2017, representing 1.2% of WCPFC Convention Area bigeye catch. The national catch of bigeye tuna is low if maintained at recent average levels. However, the FAD component of the regional purse seine fishery (the main fishery for skipjack tuna) catches juvenile bigeye and yellowfin tuna, and that fishery is impacting the status of these stocks (Brouwer, 2018).

<sup>14</sup> From: Brouwer, S. 2018. *Summary of tuna stock status and national implications for the Cook Islands*. Issue Specific National Report (Summary of tuna stock status) - CK - November 2018. Oceanic Fisheries Programme Secretariat of the Pacific Community Noumea, New Caledonia.

## 6.4 Other matters

In addition to bilateral fisheries access arrangements, which are often negotiated on an annual basis, the Cook Islands is party to two multi-year access arrangements, one with the United States (U.S.A.) and the other with the E.U.

### 6.4.1 *The multilateral Treaty on Fisheries*

The multilateral Treaty on Fisheries between the U.S. and 16 Pacific island countries, including the Cook Islands, provides for U.S. flagged purse seine vessels to fish in the EEZs of the Pacific island countries that are party to the Treaty. Entering into force in 1988, the Treaty has lasted more than 30 years (it was extended in 1993, 2002 and 2016).

The 2016 amendments provide for the number of fishing days in waters of the parties to the Treaty that are exclusively available to fishing vessels from the United States, as well as defining a mechanism for U.S. vessels to arrange for additional fishing access directly with the countries involved. Under the agreement the Cook Islands commits 350 fishing days annually before the start of the calendar year. In addition, the U.S fishing industry also entered into bilateral arrangements for 200 additional fishing days for vessels which have not acquired pooled days or whose days are short.

The term of the current Treaty is scheduled to expire in 2020.

### 6.4.2 *The EU*

In October 2016, the EU and the Cook Islands signed a new SFPA and an associated Implementation Protocol setting out the fishing opportunities for EU vessels, the financial compensation to be paid by the EU and the modalities of sectoral support to the fishing sector of the Cook Islands. The SFPA marked the beginning of a new partnership given that there has never been a SFPA between the EU and the Cook Islands.

The 8-year agreement, consisting of two 4-year Protocols, allows a maximum of four EU purse seiners to fish for tuna and other highly migratory species in the Cook Islands' fishing zone. They are authorised to take up to 7,000 mt per year under the first 4-year Protocol. The Protocol provides for renewable fishing licences for twelve-month periods.

There is also a right for an additional eight years unless terminated by one of the parties because of “unusual circumstances” as defined in the SFPA.

### 6.4.3 *Other regional initiatives to monitor*

Launched in 2016, FisheryProgress.org is supporting a process with Bumble Bee Seafoods and FCF Fishery to strengthen conservation and management arrangements for WCPO albacore and yellowfin.

While the fishery's target stocks are healthy and their management effective FisheryProgress.org is seeking to promote i) the deployment of independent observers, ii) electronic monitoring, iii) the collection of qualitative information about

bycatch, and iv) develop harvest control rules and harvest strategies to limit the risk of overfishing. The objective is to achieve sustainability certification by 2024.

Such private sector driven initiatives should be beneficial for the regional tuna stocks, including for yellowfin and albacore fished in Cook Islands.

#### **6.4.4 Marine pollution**

At its 14<sup>th</sup> Session in 2017, the WCPFC Commission adopted a CMM to limit marine pollution from fishing vessels. This was in support of efforts to minimise the impacts of marine pollution on the WCPO ocean environment including the incidental mortality of non-target species. The Commission noted that abandoned, lost or otherwise discarded fishing gear damages marine, reef and coastal ecosystems through, for example, ghost fishing, entanglement, ingestion and providing a habitat for the spread of invasive species. It was noted that the proposal was consistent with the International Maritime Organisation (IMO) legal instruments aimed at addressing marine pollution.

The proposal was adopted as CMM 2017-04 Conservation and Management Measure on Marine Pollution for implementation from 1 January 2019 (WCPFC14, Summary Report, Attachment H).

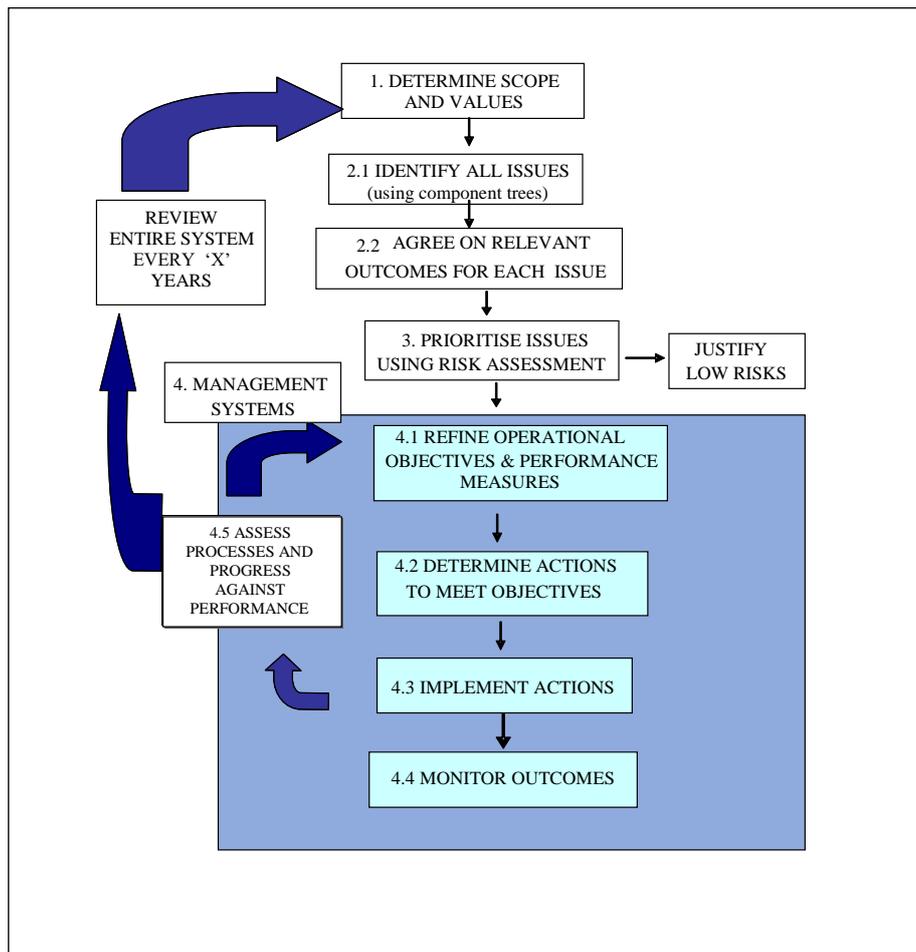
### **7.0 The EAFM process**

The following sections present a framework for the application of EAFM in Cook Islands. The approach seeks to deal with both the ecological consequences and the social and economic implications of fishing for large pelagics in the Cook Islands EEZ. The framework considers both positive and negative aspects of fishing for large pelagics in Cook Islands and outlines where management responses are needed.

Following the FFA Guide (Fletcher, 2008), the EAFM process involves four steps (**Figure 17**).

1. determine the scope of the assessment – develop a clear description of what is to be managed/assessed;
2. given the scope, identify issues to be assessed across five key areas of EAFM (retained species; non-retained species; ecosystem; community, and administration) and agreeing on the values to be achieved for each of these;
3. use risk analysis to determine which of these issues needs to be managed directly; and
4. for those issues requiring management actions, establish the levels of performance that are acceptable, the management arrangements that will be used to achieve these levels, and the review processes needed to assess performance.

**Figure 17.** Summary of the EAFM process.



An EAFM for the fisheries targeting large pelagics within Cook Islands EEZ further demonstrates Cook Island’s commitment to operationalizing concepts outlined in the WCPFC Convention. With particular reference to Article 5, an EAFM describes the objectives for sustainable management, risks and associated actions relating to target species, non-target species, other dependent species within the ecosystem, minimising waste and pollution, species of special interest including threatened species, biodiversity, optimum utilisation, the interests of artisanal and subsistence fishers and regional considerations.

An EAFM is rarely developed in the absence of uncertainty be that ecological, economic and/or social. EAFM utilises the best available information to assess risk associated with a development or action. The level of uncertainty is generally reflected in the level of precaution applied to a management response (Fletcher, 2008). The process provides the basis for assessing the management action and future research that is appropriate given the level of risk and the current level of knowledge available. Therefore, periodic review to accommodate new information or a change in circumstances is essential. Review and subsequent adaptation are key processes for optimizing sustainable outcomes from an EAFM.

The following section provides a summary of the major tasks have been supported to progress an EAFM for Cook Islands.

### 7.1 Purpose

The objectives for the conservation, management and development of the large pelagic fishery in Cook Islands is as expressed in the Marine Resources Act 2005: “.....provide for the sustainable use of the living and non-living marine resources for the benefit of the people of the Cook Islands .....”

### 7.2 Goals

The main outcomes that are expected to result in pursuing the objectives of the conservation, management and development of the large pelagic fishery through the application of an EAFM are outlined in **Table 4**.

**Table 4.** Expected outcomes of conservation, management, and development of the commercial large pelagic fishery

Objectives	Goals
Conservation and Management	Sustainability of the tuna resources particularly for national food security.  Minimize any adverse impacts of tuna fishing on the marine environment and non-target species.
Administrative procedures	Efficient administration of the commercial large pelagic fishery.  Implementation of appropriate review, revision and evaluation procedures for fisheries management.
Optimize economic potential	Further orderly and efficient development of the domestic fishery for large pelagics.  Increase revenue generated from the commercial large pelagic fishery.

### 7.3 Guiding Principles

Principles provide guidance to the development of goals and strategies and also to support routine decision-making. Five key principles that are all consistent with an EAFM approach have been considered in the development of an EAFM for the Cook Islands (**Table 5**).

**Table 5.** Guiding Principles for an EAFM in Cook Islands

<b>Principle</b>	<b>Explanation</b>
Sustainability	Commercial large pelagic fishery is sustainable.
Economic	Optimize the benefits from the commercial large pelagic resources.
Ecological	Minimize the adverse impacts on non-target resources, species taken incidentally and the marine environment.
Social	Promote opportunities, and minimize adverse impacts, for communities.
Administration	Maximize efficiency in administration.

## 7.4 The Scope

Given the involvement of stakeholders later in the process, it is essential that the component elements of the EAFM are clearly articulated early in the process. Utilising the FFA Guide the following questions assist in defining the Scope:

1. What societal values must be factored into the process (e.g. e.g. species sustainability, food security, etc.)
2. What groups or type of fishers should be involved in the management (e.g. all commercial, distant water fishing nations (DWFNs), local; artisanal, recreational, etc.)?
3. What fishing methods are involved – just one (e.g. purse seine) or all relevant methods (long line purse seine, etc.)?
4. What is the geographic area it will cover (the EEZ, national waters, the WCPO region, specific depth strata, specific distance from land - waters in between islands; archipelagic waters, etc.)?
5. The species caught (tuna; billfish, bycatch, etc.)?
6. The agencies involved in the management of the resource (e.g. the national fisheries agency, other national agencies – customs, police; FFA, SPC, WCPFC, etc.)?
7. What authority do these bodies have to control what happens, over what area, species, activities, do they have control? (e.g. what controls does the WCPF Convention require, what controls do individual agencies have?).

Defining the scope is complicated by the fact that tunas are a transboundary resource and, consequently, management is required to be cognizant of issues at island, national and regional scales. Complications that may arise will not necessarily be a consequence of the EAFM system. Nevertheless, the system may be used to identify where such issues are a problem so that an appropriate response can be formulated.

The Scope was determined on the basis of early EAFM work undertaken in Cook Islands in 2008 (See Cook Islands EAFM Report, Revision 18 September 2008) supplemented by additional discussions within MMR and with FFA and SPC prior to the involvement of a wider group of stakeholders. As the agency expected to

implement any outcomes from the project it is appropriate that MMR is the key driver for this task.

## 7.5 Issues identification

The identification of key issues relevant to the development of the EAFM is assisted by mapping a series of generic ‘component trees’ for the fishery. The generic component trees cover:

Thematic issue	Components
Ecological elements	Retained species
	Non-retained species
	Ecosystem considerations
Human elements	Community wellbeing
	Administration

The Guiding Principles are applied to the mapping of component trees for each key issue: fishery resources (retained and not retained), ecosystem considerations, community well-being and administration. Risk assessment and associated monitoring, described in performance report templates for each component, are then developed.

These have been prepared to support consultations with communities and stakeholders in Cook Islands. The consultations will help with the review of tuna fisheries management plans.

In addition, this EAFM will be subject to periodic review. The outcome of any review will likely result in refinements to the EAFM. Reviews may focus on a single component of the EAFM or multiple components simultaneously.

Implementation, monitoring and adaptation of the EAFM, as considered appropriate, will have resource implications for MMR. Considering the outcomes of on-going consultations with Government and communities, it will be the responsibility of the Secretary, MMR, to secure the resources required to support the effective implementation of an EAFM for the Cook Islands commercial large pelagic fishery.

## 7.6 Outcomes: values and objectives

Another key task is to clarify specific management values or objectives. It is important for later steps that each issue is assessed against an agreed management outcome. For issues such as target species, sustainability values are often easy to determine and measure, whereas for some other EAFM components, such as community wellbeing, it is much more difficult to determine exactly what the intended outcome is.

The FFA Guide suggests a range of values that could be applied in various circumstances. These have been modified for application in the Cook Islands situation.

## 7.7 Prioritising issues

Many relevant issues are generally identified throughout an EAFM process. However, for a variety of reasons including the capacity of management authorities to influence outcomes and institutional resource limitations impacting management, implementation and monitoring, prioritisation of those issues, for management attention, is necessary.

The FFA Guide describes a process of risk assessment to assist in the prioritisation of the issues identified in the component trees.

### 7.7.1 Risk assessment

There are numerous risk assessment methods that can be used. The FFA Guide recommends one which is based on “Likelihood” and “Consequence”. Likelihood is the chance that a management objective will not be met. The consequence is the seriousness of associated impact if it occurs. Because of the difficulty to determine likelihood and consequence it is sometimes necessary to make a qualitative assessment of the magnitude of risk.

Risk assessment is commonly useful in fisheries management to highlight issues that require immediate attention (high- and medium-risk) and those that can be assigned a lower priority (low-risk).

Risks are assessed at four levels of likelihood – likely, possible, unlikely or remote. The definitions used in the risk assessments, taken from the FFA Guide, were as follows:

Level	Descriptor
Likely (4)	It is expected to occur (Probability of 40 - 100%)
Possible (3)	Evidence to suggest this is possible and will occur occasionally (Probability of 10 - 35%)
Unlikely (2)	Uncommon here, or has been known to occur elsewhere (Probability of 2 -10%)
Remote (1)	Never heard of, but not impossible (Probability < 2%)

The consequence levels, also taken from the FFA Guide, are as follows:

Consequence Level	Local Depletion (country level)
Minor	Possibly detectable, but no real impact on the economic pathways for the industry or the community.
Moderate	Some level of reduction for a major fishery or a large reduction in a small fishery that the community is not dependent upon.
Major	Fishery/Industry has declined significantly in economic generation and this will have clear flow on effects to

	other parts of the community.
Extreme	Total collapse of any activity coming from what was industry that the community derived a significant level of their income or employment (resources dependency). Including possible debts.

For each issue, the likelihood and consequences of objectives not being met are presented in a matrix, as follows:

		Consequence Level			
		Minor	Moderate	Major	Extreme
Likelihood		1	2	3	4
Remote	1	1	2	3	4
Unlikely	2	2	4	6	8
Possible	3	3	6	9	12
Likely	4	4	8	12	16

As each fishery has many component issues of varying importance, a prioritization exercise, applying a risk-based assessment, is necessary. This assists with the assignment of usually limited institutional resources to address those issues requiring management attention where the management authority can exert influence.

The risk of not attaining agreed objectives forms the basis of a risk-based assessment. It works by assigning a level of consequence (impact) (from low to severe) and the likelihood (probability) of this consequence actually occurring (from remote to likely) to generate an estimate of the risk (from low to high) for each issue.

Based on the weightings from the risk assessment, each issue is assigned a Risk Category, as follows:

Low Risk	not considered further
Medium Risk	management responses considered, with an emphasis on monitoring
High Risk	appropriate management responses identified.

Risk Category	Risk Values	Likely Management Response	Likely Reporting Requirements
Low	1-4	None Specific	Full Justification needed
Medium	6-8	Specific Management/Monitoring Needed	Full Performance Report

<b>High</b>	9-16	Increases to management activities needed	Full Performance Report
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## 7.8 Management Responses

Provided adequate justification of the risk rating is available, issues identified as low-risk do not require management responses.

Medium- and high-risk issues are subject to full performance reporting. A template for a Performance Report, available in the Guide, was utilised in this exercise.

## 8.0 The Cook Islands EAFM

### 8.1 Scope

If the scope of the assessment is to only deal with part of a regionally shared fishery resource, as is the case for the Cook Islands, the assessment needs to consider relevant potential impacts and issues outside the scope of what is being directly assessed. This may include other fisheries that may also be affecting the shared stocks, other activities that may be affecting the environment where the fishing activity operates or other activities that may be competing for alternative uses of the space or resources.

The explicit identification of what can be controlled, and what influences performance, is an important outcome of an EAFM initiative. For example, island State members of the WCPFC *manage* fishing within their EEZ. However, they can only *influence* the level of fishing that occurs in other regions through active engagement in the WCPFC. Further, they can only *react to* issues, such as any fishing that occurs outside of the WCPFC Convention Area that may impact WCPO stocks (such as in the eastern Pacific), or environmental changes, such as shifts in oceanographic conditions that may influence local fish availability.

#### 8.1.1 Purpose

The purpose of the EAFM Report is to review key issues associated with authorised commercial fishing for large pelagics in the Cook Islands EEZ, assess the relative environmental, social and economic implications and consider potential management responses. In this regard, the following terms, from the Marine Resources Act 2005, are used:

"Fishery" or "Fisheries" means one or more stocks of fish or any fishing operation based on such stocks which can be treated as a unit for purposes of conservation and management, taking into account geographical, scientific, social, technical, recreational, economic, and other relevant characteristics;

"Fishery plan" means a plan for the conservation, management and development of fisheries implemented pursuant to section 6 of this Act;

"Fishery waters" means the waters of the territorial sea of the Cook Islands and of the exclusive economic zone (EEZ) and other internal waters, including lagoons, as defined in the Territorial Sea and Exclusive Economic Zone Act 1977 and includes any other waters over which the Government of the Cook Islands has fisheries jurisdiction.

### 8.1.2 Application

This EAFM applies to the EEZ for the Cook Islands as established under the Maritime Zones Act 2018. It excludes the fishery waters within 50 nautical miles of each island which are designated special-use marine protected areas under the Marae Moana Act 2017.

Taking into account the implications for the implementation of the Marae Moana Act 2017, the purse seine fishery is as described in the Marine Resources (purse seine fishery) Regulations 2013. The longline fishery is as described in the Marine Resources (large pelagic longline fishery and quota management system) Regulations 2016.

The species subject to this EAFM are the large pelagic tunas and other species taken as by-catch, or incidentally, in the commercial fisheries authorised to operate within the Cook Islands EEZ.

### 8.1.3 Stakeholders

Within the fishery waters available, the scope of the commercial large pelagic fishery which is the subject of this EAFM, extend to stakeholders fishing:

- for large pelagic species, including tunas, billfish and related species, conducted by all gear types;
- by large scale commercial vessels, i.e. excluding fishing by artisanal, recreational and subsistence fishers, but taking account of the effects of commercial fishing on artisanal, recreational and subsistence fishers, and
- within Cook Islands fishery waters i.e. not covering fishing by Cook Islands vessels outside the Cook Islands fishery waters.

Other stakeholders include island communities, non-government organisations, regional organisations and other Government agencies.

### 8.1.4 Management authority

There are generally three types of potential management action which are determined by the level of responsibility of an agency:

Management action	Responsibilities
Manage	Full legislative responsibility for an issue. For example, controlling the number of fishing boats authorised to fish.
Influence	Issues are not under full legislative responsibility but where input is required/possible. An example is regional fisheries decision-making.

React to	Issues generated by the external environment that is beyond management or influence, but which cause affect. Examples include natural changes in the oceanography, cyclones, changes in currency exchange rates, market prices, fuel prices which require a reaction.
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All three types of actions can be considered within the EAFM framework, although the specific actions and activities that need to be taken will differ depending upon what type of control an agency has. Within the WCPO many EAFM-related issues are associated with being part of the regional fishery and its multilateral character. As a result, regional agencies, multi-lateral and bilateral fishing agreements and Conventions have impact and effect (e.g. FFA, SPC, WCPFC, US multi-lateral Treaty on Fisheries and bilateral fishing access agreements).

For fisheries within the Cook Islands EEZ, these include:

Agency	Responsibilities and competencies
Ministry of Marine Resources	Manage (as provided for under the Marine Resources Act 2005)
Other Government bodies e.g. National Environment Service, Attorney General	Influence
The Pacific Community	Influence
Secretariat of the Pacific Regional Environment Programme	Influence
Western and Central Pacific Fisheries Commission	Influence
Forum Fisheries Agency	Influence
Other Pacific Island Countries	React to/Influence

These principles are applied to the development of component trees for the target resources, retained and not retained, in the Cook Islands commercial large pelagic fishery (**Figure 18**). Risk assessment and associated monitoring, described in performance report templates for each component, are included.

Components relating to social aspects and community well-being (such as food security), ecosystem considerations and administration are considered in subsequent sections.

## 9.0 Risk analysis and performance monitoring

### 9.1 Retained Species

As discussed above at Section 8.2, 8.3 and 8.5, aspirations for the conservation, management, and development of the commercial large pelagic fishery for retained and non-retained species include:

*Conservation and Management:*

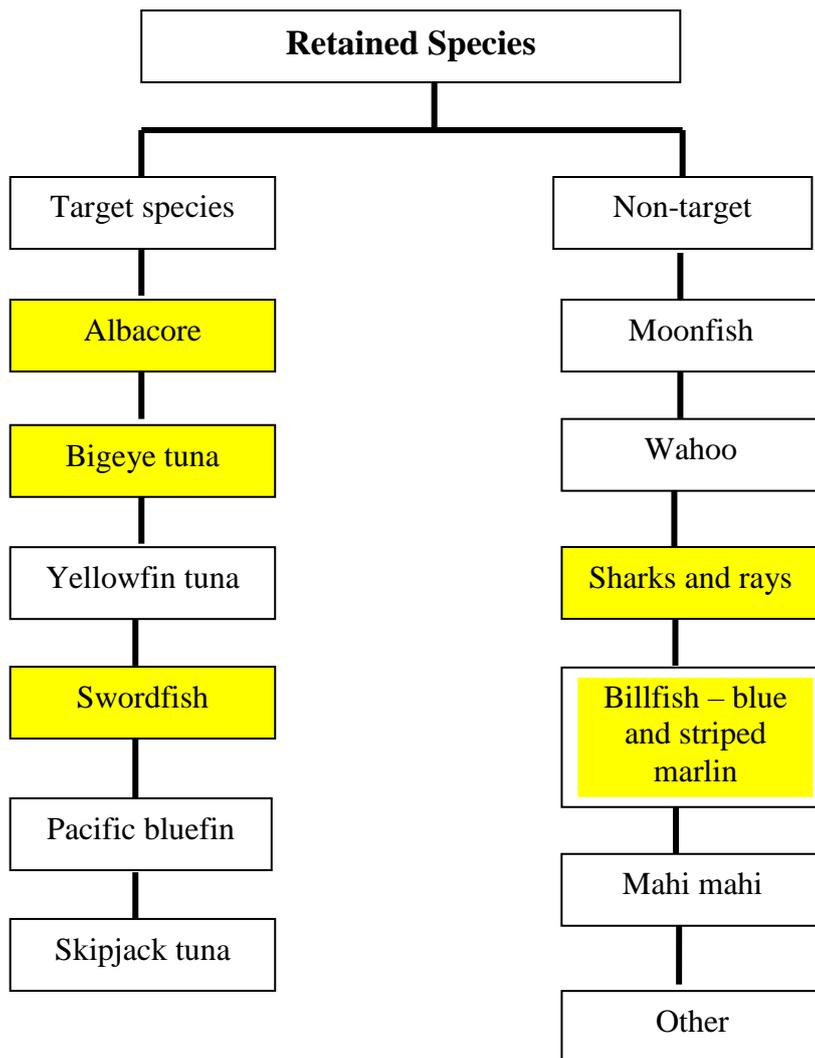
- Sustainability of the fishery resources, nationally and regionally, particularly for national food security considerations,

- Minimize any adverse impacts of fishing for large pelagics on the marine environment and non-target species, and
- Meet international obligations.

*Optimize economic potential:*

- managed the sustainable development of the domestic fishery for large pelagics, and
- increase revenue generated from the commercial large pelagic fishery.

**9.1.1 Component tree**



**Figure 18.** Component tree for retained species in the commercial large pelagic fishery in the Cook Islands EEZ.

These principles are applied to the development of component trees for the target resources, retained and not retained, in the Cook Islands commercial large pelagic fishery (Figure 18). Risk assessment and associated monitoring, described in performance report templates for each component, are included.

## 9.1.2 Target species

### 9.1.2.1 Risk Analysis

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Albacore	A long-term economically viable Cook Islands South Pacific albacore fishery based on the sustainability <sup>15</sup> of the national and regional stock.	2	3	6	One of the most important commercial species in the catch of large pelagics from the Cook Islands EEZ. The regional stock is assessed to not be overfished and overfishing is not currently occurring. The Cook Islands will need to monitor management responses in WCPFC that attempt to reduce the biomass targeted by the fishery in regional efforts to maintain economically viable catch rates.
Bigeye tuna	A long-term economically viable Cook Islands bigeye fishery based on the sustainability <sup>16</sup>	2	3	6	Secondary but valuable catch component. The regional stock is not experiencing overfishing and the stock is not overfished. There are no limits in place for Cook Islands flagged vessels under WCPFC CMM 2018-01 as an exemption applies to Cook Islands domestic fleets. Foreign flagged fleets i.e. not developing States' fleets, are limited to annual catches prescribed in Table 3.

<sup>15</sup> Adapted from WCPFC CMM 2015-02

<sup>16</sup> Adapted from WCPFC CMM 2018-01

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Yellowfin tuna	of the national and regional stock A long-term economically viable Cook Islands fishery that includes yellowfin based on the sustainability <sup>17</sup> of the national and regional stock.	2	2	4	Based on the most recent assessment by the WCPFC Scientific Committee, the regional yellowfin stock is not experiencing overfishing and the stock is not overfished. This is a secondary but valuable catch component of the Cook Islands longline fishery. There are no limits in place for the Cook Islands domestic fleet under the exemptions applying in WCPFC CMM 2018-01. The Cook Islands needs to protect the existing exemptions and remain vigilant by engaging in future management negotiations at the WCPFC.
Pacific. Bluefin	The long-term conservation and management of the regional Pacific bluefin stock.	2	2	4	The fishery, and WCPFC management decisions, is focussed on the region supporting the majority of the fishery for Pacific bluefin – north of 20°N (WCPFC CMM 2018-02). The species is a rare occurrence in the Cook Islands fishery.
Swordfish	A long-term economically viable Cook Islands fishery	2	4	8	The most recent assessment for south-west Pacific swordfish was in 2017. Although the assessments indicated that overfishing was not occurring and the stocks were not in an overfished state, the Scientific Committee recommended there be no further increase in catch or effort

<sup>17</sup> Adapted from WCPFC CMM 2018-01.

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Skipjack	<p>that includes swordfish based on the sustainability<sup>18</sup> of the national and regional stock.</p> <p>A long-term economically viable Cook Islands skipjack fishery based on the sustainability<sup>19</sup> of the national and regional stock.</p>	1	1	1	<p>as precautionary measures and until there is a better understanding of fishing impacts. The Cook Islands is exempt from the constraints on the expansion of the fishery established under WCPFC CMM 2009-03 and swordfish is an important target species for domestic based vessels in the southern region.</p> <p>This is the main species harvested in the purse seine fishery. Based on the latest advice, from the 2019 Session of the Scientific Committee, the skipjack regional assessment continues to show that the stock is currently moderately exploited, and the level of fishing is sustainable.</p>

<sup>18</sup> Adapted from WCPFC CMM 2018-01.

<sup>19</sup> Adapted from WCPFC CMM 2015-02.

9.1.2.2 Performance reports

Albacore

Report heading	Notes
1. Reason for inclusion	<p>One of the most important commercial species in the catch of large pelagics from the Cook Islands EEZ. There are currently no limits in place for Cook Islands (WCPFC CMM 2015-02). The Cook Islands has a national Quota Management Systems (QMS) where a Total Allowable Catch of 9,750 MT is allocated for Albacore.</p> <p>The 2019 Session of the WCPFC Scientific Committee reported that the stock assessment from 2018 remained current for South Pacific albacore: the stock is not overfished, and overfishing is not currently occurring.</p> <p>The Scientific Committee has previously noted that longline catch should be reduced to avoid decline in the vulnerable biomass so that economically viable catch rates can be maintained, especially for longline catch of adult albacore.</p> <p>Therefore, the Cook Islands will be required to monitor management responses that attempt to achieve this without compromising the on-going economic viability of the Cook Islands fishery.</p>
2. Operational Objective	<p>A long-term economically viable Cook Islands South Pacific albacore fishery based on the sustainability of the national and regional stock.</p> <p>[Avoid major reduction in albacore CPUE in the longline fishery (<i>primarily beyond CI capacity to influence</i>, requires continued regional engagement) and comply with WCPFC measures.]</p>
3. Indicator	Catch rates. WCPFC Scientific Committee agreed spawning stock biomass status.
4. Performance Measure/Limit	Catch rates and stock status relative to WCPFC adopted reference points.
5. Evaluation	WCPFC Scientific Committee scheduled assessments. The last was undertaken in 2018.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	TAC of 9,750 mt and TACC of 9,698 mtMonitoring and submission of catch and effort log sheet and observer data to SPC for processing and analysis.
- Future	Improve observer and port sampling programmes. Apply WCPFC/FFA measures noting exemptions that are available to Cook Islands.

- Actions if Performance Limit is exceeded	<i>Establish a licensing committee.</i> Limit capacity, catch or effort.
- Review Cycle	Two-yearly, proposed Fishery Plan review
8. Other Issues	IUU. Economic, oceanographic trends and region-wide stock effects. Technological developments in the fishery. WCPFC decisions.

## Bigeye tuna

Report heading	Notes
1. Reason for inclusion	<p>Bigeye is a secondary but valuable catch component. The regional stock is not experiencing overfishing and the stock is not overfished. Previous uncertainties with growth estimates addressed through dedicated studies. WCPFC has agreed that, pending agreement on a target reference point the spawning biomass, depletion ratio (SB/SBF=0) is to be maintained at or above the average SB/SBF=0 for 2012-2015. This is scheduled for review at the 2019 Session of the Commission.</p> <p>The WCPFC Scientific Committee has noted that levels of fishing mortality and depletion differ among regions, and that fishery impact is higher in the tropical region, with particularly high fishing mortality of juvenile bigeye tuna in these regions – taken primarily in association with FAD sets.</p> <p>There are no limits in place for Cook Islands flagged vessels under WCPFC CMM 2018-01 as an exemption applies to Cook Islands-flagged fleets. The distant water fleets, i.e. not developing States' fleets but those operating under other's flags, are limited to 2,000 mt annual catch. QMS longline TAC 3,500 mt and TACC 2,500 mt.</p> <p>The WCPFC Scientific Committee has recommended that the Commission continue to consider measures to reduce fishing mortality from fisheries that take juveniles, with the goal to increase bigeye fishery yields and reduce any further impacts on the spawning biomass for this stock in the tropical tuna fishery. WCPFC CMM 2018-01 provides that all purse seiners operating between 20N and 20S must retain on board all skipjack, yellowfin and bigeye as a measure to reduce the impact of purse seine fishing on juveniles.</p> <p>As for albacore, the Cook Islands will be required to monitor management responses that attempt to achieve this without compromising the on-going economic viability of the Cook Islands fishery. Note that under WCPFC CMM 2018-01, the Commission intends to adopt hard limits for WCPO bigeye catches.</p>

2. Operational Objective	A long-term economically viable Cook Islands bigeye fishery based on the sustainability <sup>20</sup> of the national and regional stock
3. Indicator	Catch rates. WCPFC Scientific Committee agreed spawning stock biomass status.
4. Performance Measure/Limit	Catch rates and stock status relative to WCPFC adopted reference points.
5. Evaluation	WCPFC Scientific Committee scheduled assessments. The last was undertaken in 2018.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Monitoring and submission of catch and effort log sheet and observer data to SPC for processing and analysis.
- Future	Improve observer and port sampling programmes. Apply WCPFC/FFA measures
- Actions if Performance Limit is exceeded	Review fishery development policy and licensing conditions.
- Review Cycle	Two-yearly, proposed period of Fishery Plan review
8. Other Issues	WCPO oceanographic trends. Region-wide stock effects. On-going efforts to reduce juvenile bigeye catch in the tropical purse seine FAD fishery.

## Yellowfin

Report heading	Notes
1. Reason for inclusion	<p>Based on the most recent assessment by the WCPFC Scientific Committee, the regional yellowfin stock is not experiencing overfishing and the stock is not overfished.</p> <p>Pending agreement on a target reference point the spawning biomass depletion ratio (SB/SBF=0) is to be maintained at or above the average SB/SBF=0 for 2012-2015. This is scheduled for review at the 2019 Session of the Commission.</p> <p>Following the last assessment, in 2017, the Scientific Committee reiterated its previous advice that the Commission consider measures to reduce fishing mortality from fisheries that take juveniles, with the goal to increase to maximum fishery yields and reduce any further impacts on the spawning potential for this stock in the tropical regions. It advised the Commission that measures should be implemented to maintain current spawning biomass levels until the Commission can agree on an appropriate target reference point. WCPFC CMM 2018-01 provides that all purse seiners operating between 20N and 20S must retain on board all skipjack, yellowfin and bigeye as a measure to reduce the impact of purse seine fishing on juveniles.</p>

<sup>20</sup>

Adapted from WCPFC CMM 2018-01.

	This is a secondary but valuable catch component of the Cook Islands longline fishery, particularly in the southern region, and is taken in the purse seine fishery ( <b>Figure 15</b> and <b>16</b> ). There are no limits in place for a Cook Islands-flagged fleet under the exemptions applying in WCPFC CMM 2018-01. The Cook Islands needs to remain vigilant in monitoring the outcomes of future management advice to the WCPFC.
2. Operational Objective (plus justification)	A long-term economically viable Cook Islands fishery that includes yellowfin based on the sustainability <sup>21</sup> of the national and regional stock.
3. Indicator	Catch rates. WCPFC Scientific Committee agreed spawning stock biomass status.
4. Performance Measure/Limit	Catch rates and stock status relative to WCPFC adopted reference points.
5. Evaluation	WCPFC Scientific Committee scheduled assessments. The last was undertaken in 2018.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Monitoring and submission of catch and effort log sheet and observer data to SPC for processing and analysis. Note Cook Islands exemptions in WCPFC CMM 2018-01.
- Future	Improve observer and port sampling programmes. Limit distant water fleet to 2000 mt.
- Actions if Performance Limit is exceeded	Review fishery development policy and licensing conditions.
- Review Cycle	Two-yearly, proposed period of Fishery Plan review
8. Other Issues	WCPO oceanographic trends. Region-wide stock effects. On-going efforts to reduce juvenile bigeye catch in the tropical purse seine FAD fishery.

## Swordfish

Report heading	Notes
1. Reason for inclusion	<p>Swordfish is an important species for the domestic market. Previous tagging work indicates shared south-central stock with New Zealand and some connectivity to the East Australian Tuna and Billfish fishery.</p> <p>The most recent assessments for <i>south-west</i> and <i>south-central Pacific swordfish</i> were in 2008. For the south-west stock, the assessments indicated that overfishing was not occurring, and the stock was not in an overfished state. However, due to uncertainty in the 2008 assessment, the Scientific Committee recommended there be no further</p>

<sup>21</sup>

Adapted from WCPFC CMM 2018-01.

	<p>increase in catch or effort in order to maintain the stock above its associated reference points. It also recommended that there be no increases in fishing mortality for south-central Pacific swordfish as a precautionary measure and until there is a better understanding of fishing impacts in the south-central Pacific stock and the relationship between this stock and other south Pacific stocks is more certain.</p> <p>The Cook Islands is exempt from the constraints on the expansion of the fishery established under WCPFC CMM 2009-03. Swordfish is an important target species for some vessels in the southern region. The Cook Islands will continue to follow WCPFC Scientific Committee discussions in relation to this stock closely. If the swordfish catch reported for Cook Islands shows signs of a change in status, reduced or increased catch rates, the Cook Islands should consider lobbying FFA/SPC colleagues, particularly from neighboring countries and territories, for support for a new assessment by SPC.</p>
2. Operational Objective	<p>A long-term economically viable Cook Islands fishery that includes yellowfin based on the sustainability<sup>22</sup> of the national and regional stock.</p> <p><i>Avoid major declines in CPUE</i></p>
3. Indicator	Catch rates. WCPFC Scientific Committee agreed spawning stock biomass status.
4. Performance Measure/Limit	Catch rates and stock status relative to WCPFC adopted reference points.
5. Evaluation	WCPFC Scientific Committee scheduled assessments. The last was undertaken in 2008.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Monitoring and submission of catch and effort log sheet and observer data to SPC for processing and analysis. Note Cook Islands exemptions in WCPFC CMM 2009-03.
- Future	Improve observer and port sampling programmes.
- Actions if Performance Limit is exceeded	Review fishery development policy and licensing conditions.
- Review Cycle	Two-yearly, proposed period of Fishery Plan review
8. Other Issues	WCPO oceanographic trends. Region-wide stock effects.

<sup>22</sup>

Adapted from WCPFC CMM 2018-01.

## Pacific bluefin

Report heading	Notes
1. Reason for inclusion	The fishery, and WCPFC management decisions, is focused on the region supporting the majority of the fishery for Pacific bluefin – north of 20°N. The component of the stock occurring in the Eastern Pacific is managed by IATTC. Other than lobbying for concerted management action in WCPFC, the Cook Islands can do little to influence fishing effort decision-making in the North Pacific fishery. Decisions there have implications for the pan-Pacific stock. Occasionally individuals may be taken as bycatch in the longline fishery in Cook Islands. Monitoring bycatch records for this species should be maintained.
2. Operational Objective (plus justification)	The long-term conservation and management of regional stock
3. Indicator	Catch rates. WCPFC Scientific Committee agreed spawning stock biomass status.
4. Performance Measure/Limit	Catch rates and stock status relative to WCPFC adopted reference points.
5. Evaluation	WCPFC Scientific Committee review of Northern Committee decisions based on scheduled assessments by the International Scientific Committee.
6. Robustness	Increasingly robust
7. Fisheries Management Response	
- Current	Monitoring and submission of catch and effort log sheet and observer data to SPC for processing and analysis.
- Future	Improve observer and port sampling programmes.
- Actions if Performance Limit is exceeded	Review fishery development policy and licensing conditions.
- Review Cycle	Two-yearly, proposed period of Fishery Plan review
8. Other Issues	WCPO oceanographic trends. Region-wide stock effects.

## Skipjack

<b>Report heading</b>	<b>Notes</b>
1. Reason for inclusion	This is an important component of the Cook Islands commercial large pelagic fishery and is the main species harvested in the purse seine fishery in the WCPO. Based on the latest advice, from the 2019 Session of the Scientific Committee, the skipjack regional assessment continues to show that the stock is currently moderately exploited, and the level of fishing mortality is sustainable. The interim management objective, pending the finalization of a harvest strategy, is to maintain the spawning biomass of skipjack at an average level consistent with the interim target reference point of 50% of the spawning biomass in the absence of fishing, in accordance with CMM 2015-06.
2. Operational Objective (plus justification)	A long-term economically viable Cook Islands skipjack fishery based on the sustainability <sup>23</sup> of the national and regional stock.
3. Indicator	Catch rates. WCPFC Scientific Committee agreed spawning stock biomass status.
4. Performance Measure/Limit	Catch rates and stock status relative to WCPFC adopted reference points.
5. Evaluation	WCPFC Scientific Committee scheduled assessments.
6. Robustness	Catch rates. WCPFC Scientific Committee agreed spawning stock biomass status.
7. Fisheries Management Response	
- Current	Monitoring and submission of catch and effort log sheet and observer data to SPC for processing and analysis.
- Future	Improve observer programmes and unloadings.
- Actions if Performance Limit is exceeded	Review fishery development policy and licensing conditions.
- Review Cycle	Two-yearly, proposed period of Fishery Plan review
8. Other Issues	WCPO oceanographic trends. Region-wide stock effects. On-going efforts to develop harvest control rules in WCPFC.

<sup>23</sup>

Adapted from WCPFC CMM 2015-02.

### 9.1.3 Non-target species

#### 9.1.3.1 Risk analysis

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Sharks and rays	The effective management and conservation of sharks and rays in Cook Islands EEZ	2	3	6	Guided by the FAO International Plan of Action for the Management and Conservation of Sharks, the WCPF Convention and adopted Conservation and Management Measures and the Marine Resources Act, among other instruments. Some sharks are retained, and some are discarded. Also included in the Protected Species Component.
Moon Fish	The effective management and conservation of moonfish in Cook Islands EEZ.	2	1	2	Limited value to the commercial sector. Limited, but improving, catch data available.
Wahoo and Mahi mahi	The effective management and conservation of wahoo and mahi mahi in Cook Islands EEZ.	2	1	2	Important to artisanal/subsistence and recreational fishing sector. Limited value to the commercial sector. Limited historical catch data available.

Billfish – blue and striped marlin	The effective management and conservation of billfish in Cook Islands EEZ.	2	3	6	<p>Important to artisanal/subsistence and recreational fishing sector. Is also of some value to the commercial sector. No new assessment of <i>Pacific blue marlin</i> has been considered by the Scientific Committee since 2016. At that time, the Scientific Committee noted the stock status for Pacific blue marlin exhibited a long-term decline. Female spawning biomass was estimated to be about 25% above <math>SSB_{MSY}</math>. Since the stock was almost fully exploited at that time, the ISC recommended that fishing mortality remain at or below the 2012-2014.</p> <p>The WCPFC Scientific Committee noted that current levels of fishing mortality for <i>south-west Pacific striped marlin</i> may exceed <math>F_{MSY}</math> and current spawning biomass levels may approximate or be below <math>B_{MSY}</math>. A precautionary approach was recommended by not increasing fishing effort particularly in the Coral and Tasman Sea areas.</p>
Other species	The effective management and conservation of other species encountered in the commercial large pelagic fishery in the Cook Islands EEZ.	1	1	1	Includes, oil-fish, pomfrets, rainbow-runner etc. These species form a small proportion of the annual commercial catch. Most are of limited value to the commercial fishery and historical catch data is generally limited.

9.1.3.2 *Performance reports*

Sharks and rays

<b>Report heading</b>	<b>Notes</b>
1. Reason for inclusion	Guided by the FAO International Plan of Action for the Management and Conservation of Sharks, the WCPFC Convention, WCPFC decisions and the Marine Resources Act 2005, among other instruments. Some sharks are retained, and some are discarded. Finning is currently permitted under WCPFC CMM 2010-07 under strict conditions but there is mounting international pressure for it to be ceased completely. WCPFC has adopted several supplementary CMMs for silky sharks (2013-08), white tip oceanic sharks (2011-04) and whale sharks (2012-04) which apply to Cook Islands-flagged vessels and vessels operating in the Cook Islands EEZ under license. Efforts need to be increased to minimise interactions with oceanic mobulid, devil and manta rays or at least release them alive.
2. Operational Objective	The effective management and conservation of sharks and rays in Cook Islands EEZ.
3. Indicator	Catch rates. Shark, mobulid and manta ray species composition. WCPFC Scientific Committee agreed stock status.
4. Performance Measure/Limit	No increase in share of sharks, mobulid and manta rays in catch composition
5. Evaluation	Longline data and analysis, size distribution, species composition, observer data. WCPFC Scientific Committee assessments.
6. Robustness	Coverage is high, but fluctuations or reporting may obscure trends
7. Fisheries Management Response	
- Current	WCPFC CMMs. MMR Shark regulations 2012, and NPOA-Sharks.
- Future	Revise NPOA-sharks and apply shark specific measures including ban on targeting. Consider data collection and management measures specifically for rays.
- Actions if Performance Limit is exceeded	Review of fishing practices. Review of regulations and consideration of further controls.
- Review Cycle	Two-yearly, proposed period of Fishery Plan review
8. Other Issues	Economic and oceanographic trends, and region-wide stock effects, technology, WCPFC concerns, public and tourist opinion about cruelty of shark finning

Billfish – blue marlin and south-west Pacific striped marlin

Report heading	Notes
1. Reason for inclusion	<p>No new assessment of <i>Pacific blue marlin</i> has been considered by the Scientific Committee since 2016. At that time, the Scientific Committee noted the stock status for Pacific blue marlin provided by International Scientific Committee (ISC) exhibited a long-term decline. Population biomass (age-1 and older) averaged roughly 130,965 mt in 1971-1975, the first 5 years of the assessment time frame, and had declined by approximately 40% to 78,082 mt in 2014. Female spawning biomass was estimated to be 24,809 mt in 2014, or about 25% above <math>SSB_{MSY}</math>. Fishing mortality (average <math>F</math>, ages 2 and older) averaged approximately 0.28 in the period 2012- 2014, or about 12% below <math>F_{MSY}</math>. Since the stock was almost fully exploited at that time, the ISC recommended that fishing mortality remain at or below the 2012-2014.</p> <p>The WCPFC Scientific Committee noted that current levels of fishing mortality for <i>south-west Pacific striped marlin</i> may exceed <math>F_{MSY}</math> and current spawning biomass levels may approximate or be below <math>B_{MSY}</math>. The Scientific Committee recommended that as a precautionary measure there should be no increase in fishing mortality (i.e. fishing effort) on striped marlin in the southwestern Pacific (particularly in the Coral and Tasman Sea areas).</p> <p>For both marlin species, the Cook Islands will monitor future assessments, as they are completed, and consider efforts to better quantify interactions with marlin in its longline and recreational fisheries.</p>
2. Operational Objective	The effective management and conservation of billfish in the Cook Islands EEZ.
3. Indicator	Catch rates. WCPFC Scientific Committee agreed stock status.
4. Performance Measure/Limit	No increase in the proportion of billfish in catches
5. Evaluation	Longline data and analysis, size distribution, species composition, observer data.
6. Robustness	Coverage is high, but fluctuations or reporting may obscure trends
7. Fisheries Management Response	
- Current	Monitoring and submission of catch and effort log sheet and observer data to SPC for processing and analysis.
- Future	Improve observer and port sampling programmes.
- Actions if Performance Limit is exceeded	Review fishery development policy and licensing conditions.
- Review Cycle	Two-yearly, proposed period of Fishery Plan review
8. Other Issues	Economic and oceanographic trends. WCPO-wide stock effects.

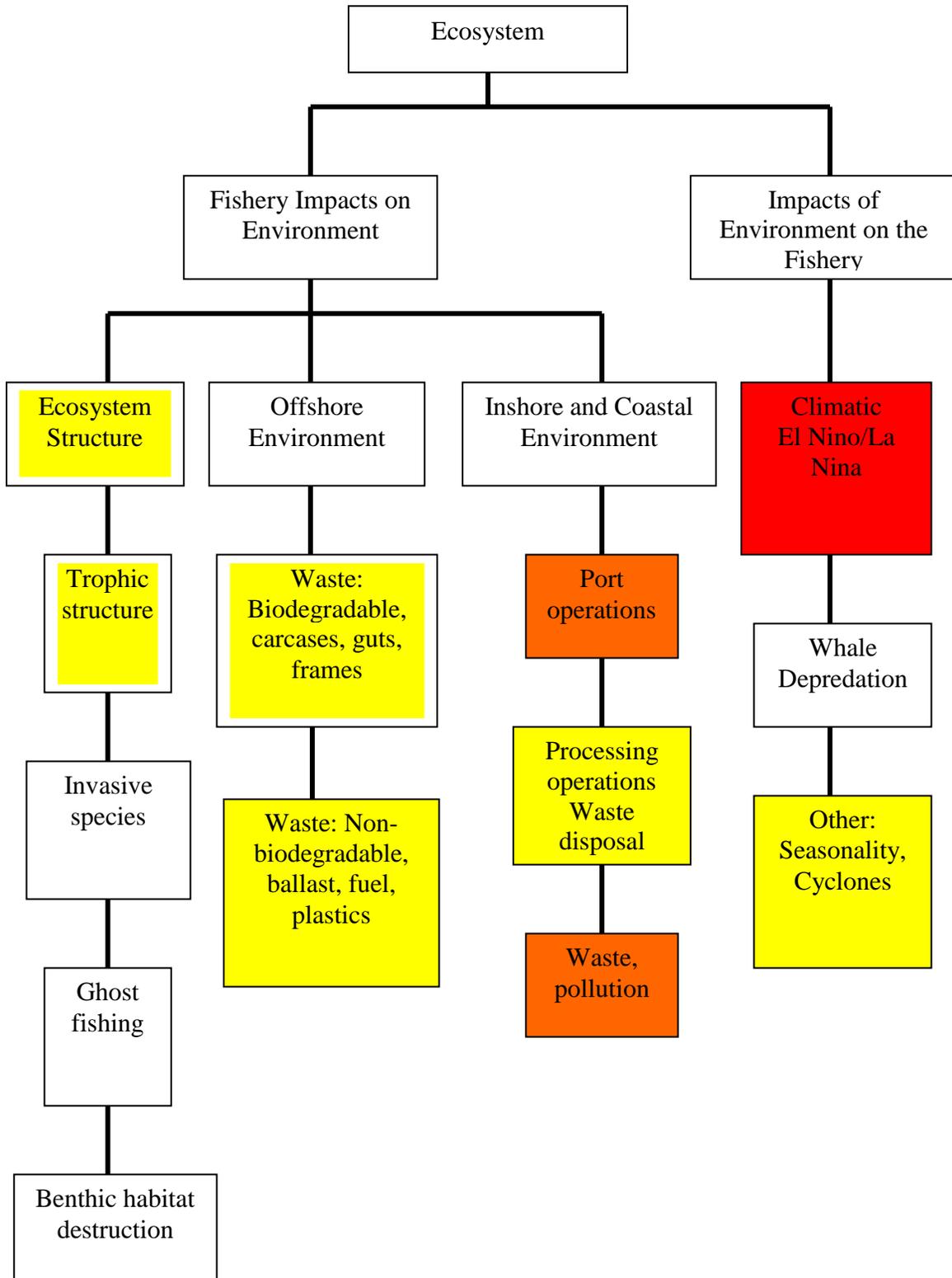
## Other species

Report heading	Notes
1. Reason for inclusion	Includes, wahoo, mahi mahi (dolphin fish), moonfish, dolphinfish, oil-fish, pomfrets, rainbow-runner etc. These species form a small proportion of the annual commercial catch. Some, for example wahoo, rainbow runner and dolphin fish are important artisanal and recreational species. Most are of limited value to the commercial fishery. The biology and fishery status of most are poorly understood as limited research funds are prioritized to principle target species.
2. Operational Objective	The effective management and conservation of other species encountered in the commercial large pelagic fishery in the Cook Islands EEZ.
3. Indicator	Species composition and trends in commercial, artisanal and recreational fisheries.
4. Performance Measure/Limit	Species composition by gear type and catch trends
5. Evaluation	Anecdotal reports and analysis of catch records from artisanal, recreational and commercial fisheries.
6. Robustness	Poor
7. Fisheries Management Response	
- Current	Limited effort associated with obligatory reporting of bycatch.
- Future	Improve at-sea and port data collection programmes.
- Actions if Performance Limit is exceeded	Review fishery development policy and licensing conditions. Lobby for an increase in research funding for “other species”.
- Review Cycle	As resources permit
8. Other Issues	Economic and oceanographic trends. WCPO-wide stock effects. Limited scientific effort associated with these species means the biology and status of stocks is relatively poorly known.



## 9.2 Ecosystem

### 9.2.1 Component tree



## 9.2.2 Fishery impacts on the environment

### 9.2.2.1 Risk analysis

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Ecosystem Structure	Support research to monitor and inform on changes in the ecosystem regionally and sub-regionally, in the WCPO.	3	2	6	Long term ecosystem impacts as a direct result of commercial fishing for large pelagics are unknown but implications for the distribution and availability of tuna resources in response to climate change is attracting significant research.
Trophic Structure	Support research to monitor and inform on changes in the trophic structure, regionally and sub-regionally, in the WCPO.	3	2	6	Long term trophic impacts of commercial fishing for large pelagics are largely unknown. Climatic variability is forecast to influence primary and secondary productivity which will impact trophic dynamics.
Invasive species	Ensure biosecurity procedures apply to fishing vessels	4	1	4	There are no reported introductions of alien species by fishing vessels to date. However, if it occurred it could have significant impacts on the Cook Islands marine ecosystem.
Ghost fishing	Ensure fishing vessels comply with regulations relating to abandoned and discarded fishing gear.	2	2	4	Legislative provisions require review.
Benthic	Adopt a	2	1	2	Pelagic fisheries have limited encounters with benthic

habitat  
destruction

precautionary  
approach to  
minimise impacts  
of commercial  
fishing for large  
pelagics on benthic  
habitats.

habitats. The risk has been further reduced in Cook Islands  
with the adoption of the Marae Moana Act 2017.

9.2.2.2 *Performance reports*

Ecosystem structure

Report heading	Notes
1. Reason for inclusion	While numerous models continue to be developed, the ecosystem impacts as a direct result of commercial fishing for large pelagics in the WCPO are poorly quantified. No serious ecosystem structure effects known from other regions although research concerning the implications for the distribution and availability of tuna resources because of climate change is extremely active. All target tuna stocks are currently not in an overfished situation nor is overfishing occurring. Impact of fishing in Cook Islands' waters, which has historically accounted for less than one percent of the total regional tuna catch, is assessed to not be significant in terms of the region's pelagic ecosystem.
2. Operational Objective	Support research, principally through SPC, to monitor and inform on changes in the ecosystem regionally and sub-regionally, in the WCPO fishery.
3. Indicator	Changes in oceanographic parameters and/or species occurrence of commercial large pelagic fisheries or as a result of research surveys.
4. Performance Measure/Limit	Extent of change in oceanographic parameters and species occurrence relative to long-term experiences.
5. Evaluation	On-going monitoring
6. Robustness	Fair
7. Fisheries Management Response	
- Current	Opportunistic monitoring and on-going research through SPC and other research agencies such as the French Space Agency.
- Future	Secure additional resources to support more substantive research.
- Actions if problem is indicated	Increase research effort
- Review Cycle	2 years
8. Other Issues	Sustained research requires significant resources where there are multiple research funding priorities.

## Trophic structure

Report heading	Notes
1. Reason for inclusion	Trophic impacts of commercial fishing for large pelagics in the WCPO are poorly known although numerous predictive models continue to be developed. There are no substantive trophic structure effects known from other regions. Climatic variability is forecast to influence primary and secondary productivity which may impact trophic dynamics, and thus resource distribution, in the medium to long term. Impact of fishing in Cook Islands' waters is assessed to not be significant in terms of the regions' pelagic ecosystem.
2. Operational Objective	Support research, principally through SPC, to monitor and inform on changes in trophic dynamics regionally and sub-regionally, in the WCPO fishery
3. Indicator	Changes in trophic dynamics of commercial large pelagic species
4. Performance Measure/Limit	Significant changes observed in trophic relationships
5. Evaluation	Monitoring and research
6. Robustness	Fair
7. Fisheries Management Response	
- Current	On-going research supported through SPC.
- Future	Lobby for additional resources for more substantive research
- Actions if problem is indicated	Increase research priority.
- Review Cycle	2 years
8. Other Issues	Sustained research requires significant resources where there are multiple research funding priorities.

## Invasive species

Report heading	Notes
1. Reason for inclusion	The risk of fishing vessels moving pests into the Cook Islands is considered low and there are no reported introductions of alien species by fishing vessels to date. Considered more likely to occur from cargo and merchant vessels. However, if alien species were inadvertently introduced to the Cook Islands marine environment it could have significant impacts including on species such as black-lipped pearl oyster.
2. Operational Objective	Ensure biosecurity procedures apply to fishing vessels.
3. Indicator	Reports of alien species
4. Performance Measure/Limit	A single verified report

5. Evaluation	Survey the distribution and apparent impacts
6. Robustness	Fair
<b>Fisheries Management Response</b>	
- Current	The Cook Islands Biosecurity Act relates to potential introductions through marine ports and airports.
- Future	Review the Cook Islands Biosecurity Act, and related legislation, to ensure fishing vessels are included in efforts to minimise alien species introductions.
- Actions if problem is indicated	Prepare, and resource, an invasive species (marine) response plan
- Review Cycle	5 years
7. Other Issues	Securing the resources required to ensure vigilant monitoring across potential entry points in Cook Islands.

### Ghost fishing

Report heading	Notes
1. Reason for inclusion	Legislative provisions require review
2. Operational Objective	Ensure fishing vessels comply with regulations relating to abandoned and lost fishing gear.
3. Indicator	Abandoned fishing gear reports
4. Performance Measure/Limit	Trends in reports of abandoned fishing gear
5. Evaluation	Investigations quantifying abandoned fishing gear
6. Robustness	Robust
<b>7. Fisheries Management Response</b>	
- Current	Opportunistic and occasional reporting only
- Future	Develop and implement a systematic process for monitoring and reporting abandoned gear.
- Actions if problem is indicated	Review legislation to introduce severe penalties for knowingly discarding and abandoning fishing gear
- Review Cycle	5 years
8. Other Issues	Challenges associated with mounting investigations, enforcement and prosecutions.

### Benthic habitat destruction

Report heading	Notes
1. Reason for inclusion	Pelagic fisheries have limited encounters with benthic habitats. The risk has been further reduced in Cook Islands with the adoption of the Marae Moana Act 2017. However, discarded or abandoned gear does drift inshore and entangle on reef habitats.
2. Operational Objective	Adopt a precautionary approach to minimise impacts of

	commercial fishing for large pelagics on benthic habitats
3. Indicator	Commercial large pelagic fishing gear encounters documented for benthic habitats
4. Performance Measure/Limit	Number of encounters documented
5. Evaluation	Investigation Reports
6. Robustness	Robust
7. Fisheries Management Response	
- Current	<i>Ad hoc</i> reporting
- Future	Establish a mechanism to encourage report and documentation for fishing gear encounters with benthic habitats.
- Actions if Performance Limit is exceeded	Strengthen legislation so that successful prosecutions attract significant penalties
- Review Cycle	5 years
8. Other Issues	Challenges associated with mounting investigations, enforcement and prosecutions.

9.2.3 Offshore environment

9.2.3.1 Risk analysis

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Waste: biodegradable, carcasses, guts and frames	To minimise discards of fish waste, offal and biological material at sea.	2	3	6	Discards at sea contravene Cook Islands provisions of the Marine Resources Act 2005 relating to the avoidance of unnecessary waste. Animal remains and waste are defined as litter for management under the Environment Act 2003.
Waste: non-biodegradable, ballast, fuel and plastics	To prohibit the disposal of non-biodegradable material from fishing vessels	2	3	6	Dumping of pollutants causes an immediate adverse environmental impact which is in contravention of the Cook Islands, including the Environment Act 2003, and international obligations, for example, the Law of the Sea and MARPOL and its associated regulations.

### 9.2.3.2 Performance reports

#### Biodegradable waste

Report heading	Notes
1. Reason for inclusion	Offal and fish waste discards at sea attract seabirds and other marine animals exposing them to the risk of capture or injury. This is in contravention to the Cook Islands National Plans of Action for Seabirds and Turtles, the Marine Resources Act 2005 and the Environment Act 2003 relating to the avoidance and disposal of waste. It is also in contravention of the WCPF Convention, Article 5. Biological waste also may be a vector for alien species introductions.
2. Operational Objective	To minimise discards of fish waste, offal and biological material at sea.
3. Indicator	At-sea observer reports
4. Performance Measure/Limit	Number of incidents reported/observed
5. Evaluation	Subsequent investigations following the submission of an observation/report.
6. Robustness	Fair
7. Fisheries Management Response	
- Current	100% at-sea observer coverage on purse seine vessels but limited observation on longline vessels
- Future	Introduce regulations prohibiting the disposal at sea of biological material within the EEZ of Cook Islands. Work with FFA members to explore possibilities of regional regulations for consideration in WCPFC.
- Actions if problem is indicated	Motivate national and regional discussions regarding legislative possibilities.
- Review Cycle	As the prevalence of the disposal reporting increases, assess options for action.
8. Other Issues	Enforcement will be challenging.

#### Non-biodegradable waste

Report heading	Notes
1. Reason for inclusion	Dumping of pollutants and non-biodegradable waste causes an immediate adverse environmental impact. This contravenes Cook Islands national legislation including the Environment Act 2003, and international obligations, for example, Article 5 of the WCPF Convention, the Law of the Sea and MARPOL.
2. Operational Objective	To prohibit the disposal of non-biodegradable material from

	fishing vessels
3. Indicator	At-sea observer reports
4. Performance Measure/Limit	Number of incidents reported/observed
5. Evaluation	Outcomes of investigations undertaken in response to reports/observations
6. Robustness	Fair
7. Fisheries Management Response	
- Current	100% at-sea observer coverage on purse seine vessels, 20% coverage target on longline vessels and port inspections.
- Future	Introduce regulations prohibiting the disposal at sea of non-biological material within the EEZ of Cook Islands. Work with FFA members to explore possibilities of regional regulations for consideration in WCPFC
- Actions if problem is indicated	Activate national and regional discussions regarding legislative possibilities
- Review Cycle	As the prevalence of the disposal reporting increases, assess options for action.
8. Other Issues	Enforcement will be challenging.

9.2.4. Inshore and coastal environment

9.2.4.1 Risk analysis

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Port operations	Provide efficient port services for the fisheries sector in an openly regulated environment	3	3	9	Encourage use of Cook Island ports by the fishing industry through efficient, transparent and enforced regulations, cost competitiveness, and fair treatment for all port customers. Increased port patronage will provide opportunities for linked industry.
Processing operations: waste	Minimise waste and pollution	3	2	6	Environmental impacts of fish processing operations should be avoided. An EIA is required for all onshore fish processing developments. Where environmental degradation occurs, legislation should be in place to ensure remedial action is enforced.
Waste and pollution	Implement regulations to minimise waste and pollution	3	3	9	Waste and pollution caused by fishing operations, onshore or offshore, should be avoided. Where environmental degradation occurs, legislation should be in place to ensure remedial action is enforced.

## 9.2.4.2 Performance reports

### Port operations

Report heading	Notes
1. Reason for inclusion	Use of Cook Island ports by the fishing industry through efficient, transparent and enforced regulations, cost competitiveness, and fair treatment for all port customers provides opportunities for the development of linked industries and flow-on benefits. Regulations relating to port discharges and spills need to be rigidly enforced and cost recovery applied.
2. Operational Objective	Provide efficient port services for the fisheries sector in an openly regulated environment
3. Indicator	Port visits by fishing vessels. Incident reports. Economic activity linked to fishing vessel port patronage.
4. Performance Measure/Limit	Number of fishing vessel port visits. Number of incidents documented.
5. Evaluation	Port visit reports. Outcomes of investigations of incidents
6. Robustness	Robust
7. Fisheries Management Response	
- Current	MARPOL-type laws Act/Maritime/Ports
- Future	Review existing legislation (Vessel registry, transport, ports, environment, etc.) and port management practices.
- Actions if problem is indicated	Consult with responsible agencies
- Review Cycle	5-yearly
8. Other Issues	Achieving coordination among the responsible Government agencies.

### Processing operations

Report heading	Notes
1. Reason for inclusion	Adverse environmental impacts of fish processing operations should be avoided. They can impact community wellbeing, including introducing threats to human health and adversely impact tourism promotion efforts. An EIA should proceed all onshore fish processing developments. Where environmental degradation occurs, legislation should be in place to ensure remedial action is enforced.
2. Operational Objective	Minimise waste and pollution
3. Indicator	Number of Competent Authority (sanitary certification requirements) inspection reports. Community and employee health records.

4. Performance Measure/Limit	Formal assessments/investigations
5. Evaluation	Outcomes of formal assessments/investigations
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Health Department, Environment Service responsibility
- Future	Health Department Environment Service responsibility
- Actions if problem is indicated	Consult with the NES and Health to develop a response strategy.
- Review Cycle	As required
8. Other Issues	

### Waste and pollution

Report heading	Notes
1. Reason for inclusion	See separate commentary and actions relating to biodegradable and non-biodegradable waste and pollution (10.2.3.2 above)
2. Operational Objective	
3. Indicator	
4. Performance Measure/Limit	
5. Evaluation	
6. Robustness	
7. Fisheries Management Response	
- Current	
- Future	
- Actions if problem is indicated	
- Review Cycle	
8. Other Issues	

## 9.2.5 Impacts of the environment on the fishery

### 9.2.5.1 Risk analysis

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Major Climatic/ oceanographic variation	To have access to timely, robust, advice and information relating to climate-related impacts on the fishery for management decision-making	4	3	12	Over the next few decades, changes in the distribution of commercial large pelagics in the WCPO are predicted in response to climate change/ENSO events.
Whale depredation	Minimise whale depredation.	2	2	4	Whale depredation significantly impacts the economics of longline fisheries in some regions. It may be an occasional event in a specific area or occur regularly in which case fishing is generally avoided by commercial operators.
Other climatic events: cyclones	To ensure the fisheries sector is prepared for extreme weather events.	3	2	6	Onshore developments should be designed and built to withstand extreme weather events. Details of impending extreme weather events should be relayed in a timely manner to the fisheries sector. Vessel safety standards should be sufficient to withstand harsh oceanic conditions.

### 9.2.5.2 Performance reports

#### Major Climatic/Oceanographic variation

Report heading	Notes
1. Reason for inclusion	Best available science forecasts change in the distribution of commercial large pelagics in the WCPO in the coming decades in response to El Nino/La Nina events. Managers will need to vigilantly monitor and understand the implications for these changes for the Cook Islands fisheries sector to support decision making in relation to sustainable effort levels and harvest and fisheries sector investments.
2. Operational Objective	To have access to timely, robust, advice and information relating to climate-related impacts on the Cook Islands fishery for management decision-making.
3. Indicator	Catch rates, climatic and oceanographic conditions
4. Performance Measure/Limit	Trends in catch rates, climatic and oceanographic indices
5. Evaluation	Fishery data, oceanographic parameter data and scientific analysis reports.
6. Robustness	Fair
7. Fisheries Management Response	
- Current	Monitoring
- Future	Review fishery sector management and development plans to accommodate the latest scientific advice in relation to ocean fishery changes driven by climate variability.
- Actions if Performance Limit is exceeded	Advocate for additional oceanographic research
- Review Cycle	5-yearly
8. Other Issues	Global issue that is beyond the capacity of Cook Islands, acting alone, to change. Preferred course of action is robust scientific predictions and adaptive management planning.

#### Whale Depredation

Report heading	Notes
1. Reason for inclusion	Depredation events can significantly impact the economics of longline fisheries. Action may include monitoring research elsewhere to mitigate whale depredation encounters and creating risk profiles so that the likelihood of whale depredation encounters is minimised.
2. Operational Objective	Minimise whale depredation.
3. Indicator	Documented whale depredation events

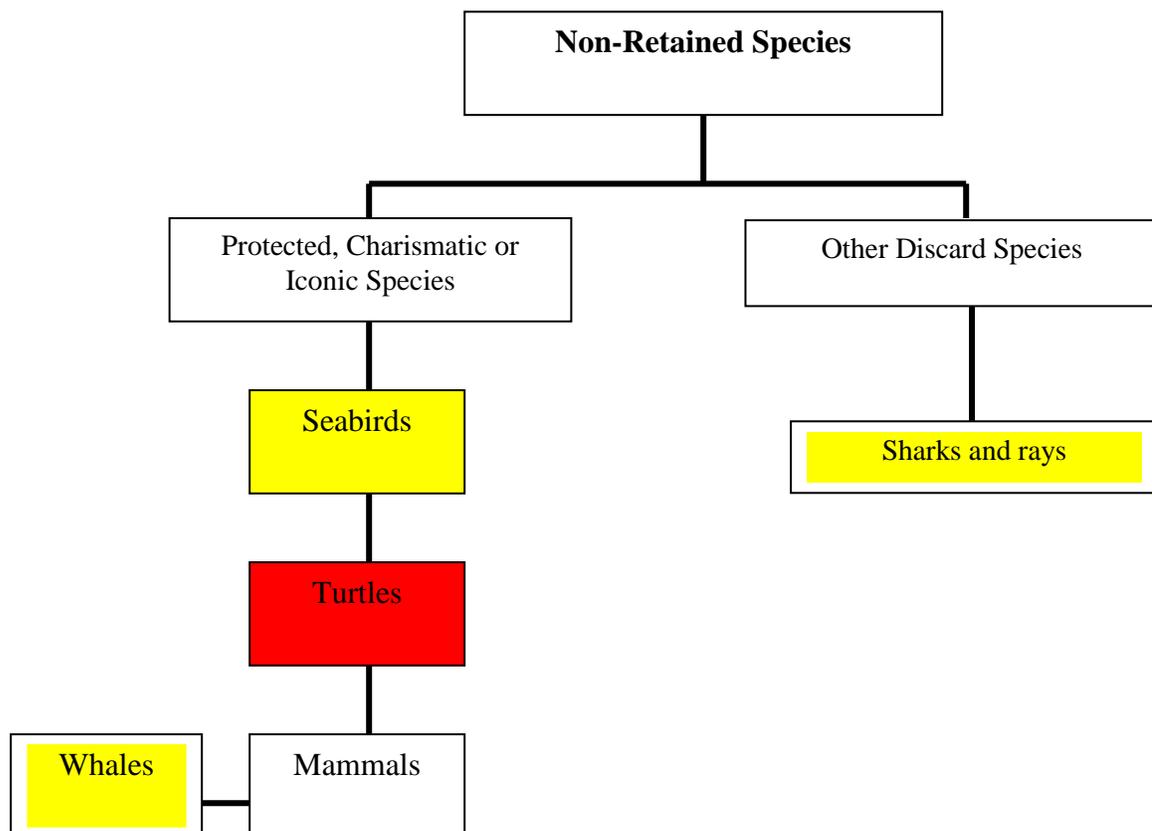
4. Performance Measure/Limit	Number of events documented/recorded
5. Evaluation	Log sheets and Observer reports, anecdotal fishing vessels' crew reports.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Nil
- Future	Study of economic losses and alternative fishing strategies
- Actions if problem is indicated	Improve information on mitigation strategies
- Review Cycle	As required
8. Other Issues	Impact of depredation on the longline fishery development potential within the Cook Islands EEZ.

Other climatic events: cyclones

Report heading	Notes
1. Reason for inclusion	Onshore developments should be designed and built to withstand extreme weather events.  Details of impending extreme weather events should be relayed in a timely manner to the fisheries sector.  Vessel safety standards that are based on harsh oceanic operating environments should be enforced.
2. Operational Objective	To ensure the fisheries sector is prepared for extreme weather events.
3. Indicator	Frequency and severity of cyclonic events
4. Performance Measure/Limit	Number of annual events trends and magnitude of destruction
5. Evaluation	Reports documenting extreme weather events.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Nil
- Future	Review building standards. Review vessel standards. Strengthen communications with all components of the fishing fleet
- Actions if problem is indicated	Review actions
- Review Cycle	5 years
8. Other Issues	Requires significant inter-departmental coordination with primary responsibility resting with other agencies.

### 9.3 Non-retained species

#### 9.3.1 Component tree



**Figure 20.** Component tree for species that are not retained.

### 9.3.2 Protected, charismatic or iconic species

#### 9.3.2.1 Risk analysis

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Seabirds	To minimize the impact of commercial fishing for large pelagics on seabirds	3	2	6	International concern over seabird mortality in longline fisheries has led to major international, regional and national efforts to mitigate impacts.
Turtles	To mitigate the impact of commercial fishing for large pelagics on sea turtles	4	4	16	International concern over longline turtle mortality is reflected in numerous international and regional initiatives to mitigate sea turtle interactions with tuna fisheries.
Whales	To avoid all interactions between whales and commercial fisheries for large pelagics	4	2	8	Globally and nationally important charismatic group of mammals.
Other Mammals	Mitigate interactions	4	1	4	The need to maintain a monitoring role to continue to provide assurances that dolphins are not incidentally harvested in Cook Islands commercial large pelagic fisheries.

### 9.3.2.2 Performance reports

#### Seabirds

Report heading	Notes
1. Reason for inclusion	International concern over seabird mortality in longline fisheries has led to major international, regional and national efforts to minimize impacts. In addition, seabirds are culturally significant in Cook Islands. On-going efforts to maintain zero seabird mortality in Cook Islands commercial pelagic fisheries is necessary. There are obligations associated with Cook Islands membership of WCPFC (CMM 2018-04 and Suppl_CMM 2018-04) and FAO through its International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries. Regulations, license conditions, education and awareness raising efforts targeting the fisheries sector will be the main means for achieving this.
2. Operational Objective	To minimize the impact of commercial fishing for large pelagics on seabirds
3. Indicator	Observed and verified seabird mortality in commercial large pelagic fisheries.
4. Performance Measure/Limit	Seabird mortality in commercial large pelagic fishery.
5. Evaluation	Observer data on seabird interactions with the commercial large pelagic fishery. Anecdotal information on seabird interactions.
6. Robustness	Fishery-wide coverage will be low, principally due to the current relatively low observer coverage (<5%) on longline fleets but the data will be reliable. Cook Islands has 20% target observer coverage to cater for scientific needs, including incidence of rare interactions with species of special interest.
7. Fisheries Management Response	
- Current	General measures on avoiding and reporting seabird interactions. Seabird interaction mitigation training for fishers and communication of measures that apply to mitigate interaction.
- Future	More comprehensive measures for reducing interaction.
- Actions if Performance Limit is exceeded	Review of other available measures.
- Review Cycle	Biennial review in the draft Fishery Plan
8. Other Issues	Longline fleet human at-sea observer coverage impacts data availability.

## Turtles

Report heading	Notes
1. Reason for inclusion	International concern over longline turtle mortality, is reflected in WCPFC CMM 2018-03 and Suppl_CMM 2018-03 and FAO's guidelines for reducing sea turtle mortality in fishing operations. Sea turtles are nationally important, charismatic, culturally significant, species in Cook Islands. While data is limited there is anecdotal information regarding sea turtle interactions with longline gear. Through Cook Islands membership of SPREP, it has agreed to a 2018-2022 Regional Marine Turtle Action Plan. Cook Islands Action Plan for Sea Turtle Mitigation will require collaboration between the NES and MMR to finalise and implement.
2. Operational Objective	To mitigate the impact of commercial fishing for large pelagics on sea turtles
3. Indicator	Observed and verified sea turtle mortality in commercial large pelagic fisheries.
4. Performance Measure/Limit	WCPFC minimum interaction rate for shallow set longline fisheries.
5. Evaluation	Observer data on sea turtle interactions with large pelagic fishery gear. Anecdotal information on turtle interactions.
6. Robustness	Coverage of purse seiners is 100%. On longliners it is significantly lower. CK target 20% in longline fishery. Robustness will be good.
7. Fisheries Management Response	
- Current	General measures for avoiding (or live release) and reporting turtle bycatch. Turtle by-catch mitigation training for fishers. Use of mitigation gear.
- Future	Specific provisions on reducing turtle bycatch and improving turtle survival. Review Turtle National Plan of Action, including review of gear (circle hook requirement). Update turtle (protection) (avoidance) or live release measures in licence conditions and plan, train fishers on turtle landing, de-hooking, and resuscitation techniques.
- Actions if Performance Limit is exceeded	Critical review of other possible measures
- Review Cycle	Biennial review in the draft Fishery Plan
8. Other Issues	Regional sea turtle tagging program and regional and international monitoring and reporting obligations.

## Whales

Report heading	Notes
1. Reason for inclusion	Globally and nationally important charismatic group of mammals. Cook Islands has been considering the declaration of a whale sanctuary inside the Cook Islands EEZ since 2002.
2. Operational Objective	To avoid all detrimental interactions between whales and commercial large pelagic fisheries.
3. Indicator	Interactions reported and documented
4. Performance Measure/Limit	Number of interactions confirmed.
5. Evaluation	Quality of reports documenting interactions
6. Robustness	Robust but, on basis of current knowledge, interactions are rare.
7. Fisheries Management Response	
- Current	Anecdotal reporting
- Future	Be prepared to review reporting requirements if interaction reports increase.
- Actions if Performance Limit is exceeded	Draft and introduce regulations.
- Review Cycle	5 years
8. Other Issues	The purse seine fishery may occasionally set on floating dead whale carcasses which act as a natural aggregation device for tuna. Depredation and behavioural learning of whales following fishing vessels.

## Other mammals

Report heading	Notes
1. Reason for inclusion	Dolphins are not reported to be taken in Cook Islands fisheries incidentally. Cook Islands needs to maintain a monitoring role to continue to provide assurances that dolphins are not harvested incidentally in Cook Islands commercial large pelagic fisheries.
2. Operational Objective	Ensure interactions between dolphins and the commercial large pelagic fishery does not occur.
3. Indicator	An interaction report
4. Performance Measure/Limit	Zero interactions reported
5. Evaluation	Investigation of any interaction reports
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Anecdotal reporting

- Future	Be prepared to review reporting requirements if interaction reports increase.
- Actions if Performance Limit is exceeded	Draft and introduce regulations.
- Review Cycle	5 years
8. Other Issues	

### 9.3.3 Other discarded species

#### 9.3.3.1 Risk analysis

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Sharks, including whale sharks, and rays (see also Retained Species Component)	The effective management and conservation of sharks and rays in Cook Islands EEZ	2	4	8	Guided by the WCPF Convention, WCPFC Commission decisions and the Marine Resources Act 2005, among other instruments. Some sharks are retained (and so included under that Component of the EAFM) some are discarded.
Other discarded species	Minimise waste and discards from commercial large pelagic fisheries	1	6	6	Includes rainbow runner, wahoo, mahi mahi, pomfrets, filefish, leatherjackets, barracuda, drummer, triggerfish, mackerel scad, etc. National and regional concerns concerning dumping, and waste, of non-retained species.

### 9.3.3.2 Performance reports

#### Sharks and rays

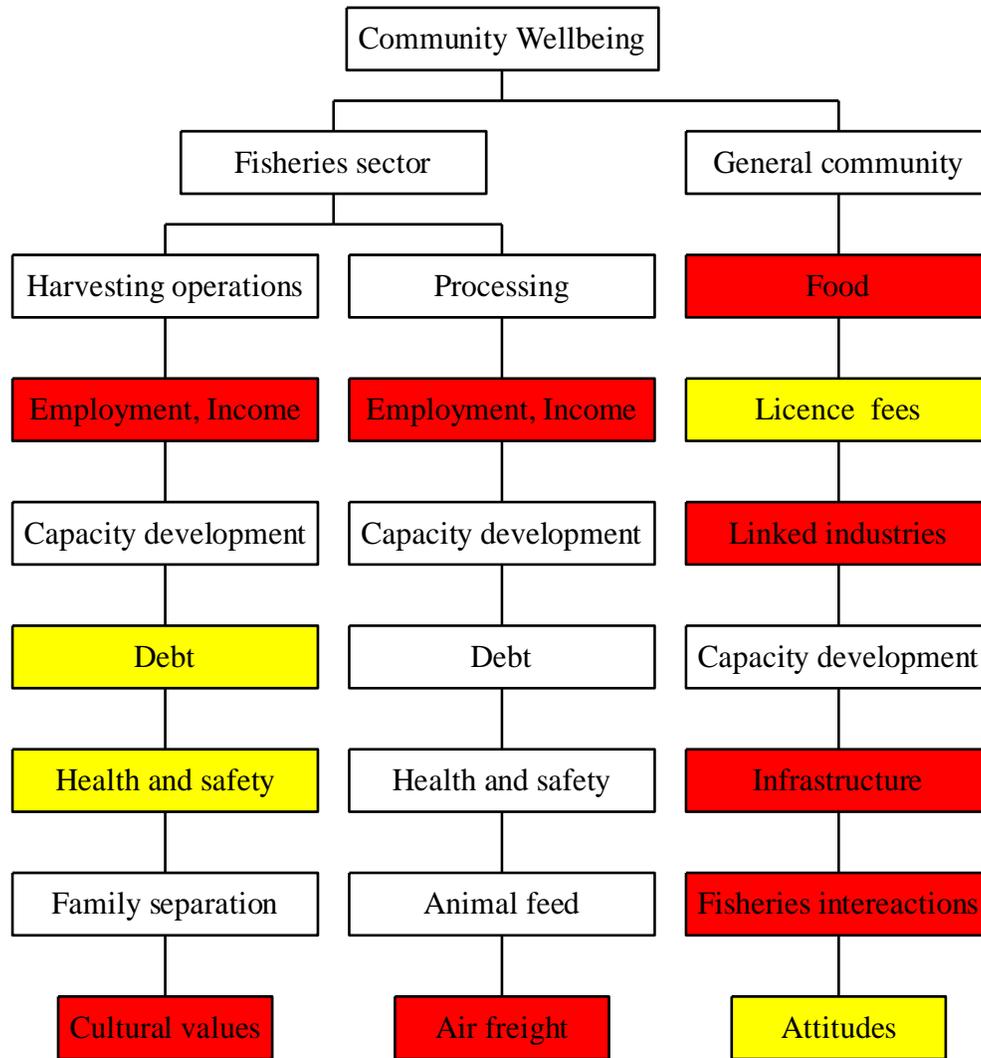
Report heading	Notes
1. Reason for inclusion	Guided by the FAO International Plan of Action for the Management and Conservation of Sharks, the WCPF Convention, Commission decisions and the Marine Resources Act 2005, among other instruments. Some sharks are retained (and so included under that Component of the EAFM) some are discarded. Finning is permitted under WCPFC CMM 2010-07 under strict conditions. WCPFC has adopted several supplementary CMMs for silky sharks (2013-08), white tip oceanic sharks (2011-04) and whale sharks (2012-04) which Cook Islands is obligated to comply with. Efforts need to be increased to minimise interactions with oceanic mobulid and manta rays or at least ensure best efforts are made to release them alive.
2. Operational Objective	The effective management and conservation of sharks and rays in Cook Islands EEZ
3. Indicator	Log sheet and observer data relating to shark and ray interactions but specifically captures, releases and the fate of releases.
4. Performance Measure/Limit	Extent shark and ray conservation and management is accommodated in national legislation and regulations.
5. Evaluation	Interrogation and analysis of observer and log sheet data. Anecdotal information on shark interactions.
6. Robustness	Fishery and observer data is generally robust.
7. Fisheries Management Response	
- Current	General measures mainly drawing from WCPFC decisions. MMR Shark Regulations.
- Future	Strengthen the provisions of Regulations and the Fishery Plan in relation to bycatch. Increase efforts towards education and awareness raising for all vessels active in the fishery and improve reporting of shark species.
- Actions if Performance Limit is exceeded	Review other available measures
- Review Cycle	Biennial review in the draft Fishery Plan
8. Other Issues	

## Other discarded species

Report heading	Notes
1. Reason for inclusion	Includes rainbow runner, mahi mahi, wahoo, pomfrets, filefish, leatherjackets, barracuda, drummer, triggerfish, mackerel scad, etc. National and regional concerns concerning dumping of non-retained species (WCPFC Regional Observer Program observers document incidents and proportion of non-retained species catch to target species). WCPF Convention, Article 5, describes principles in relation to discards and waste and similar provisions are found in the Marine Resources Act 2005. EAFM may broaden concern over non-target species.
2. Operational Objective	Minimise waste and discards from commercial large pelagic fisheries
3. Indicator	Log sheet and observer data relating to finfish bycatch.
4. Performance Measure/Limit	Extent (volume and species composition) of bycatch
5. Evaluation	Interrogation of observer and log sheet data. Anecdotal information on bycatch and fate.
6. Robustness	Fishery and observer data is generally robust.
7. Fisheries Management Response	
- Current	General measures only drawing mainly from WCPFC decisions.
- Future	Strengthen the provisions of Regulations and the Fishery Plan in relation to bycatch. Increase efforts at education and awareness raising for all vessels active in the fishery.
- Actions if Performance Limit is exceeded	Review other available measures
- Review Cycle	Biennial Review in the draft fishery plan
8. Other Issues	

## 9.4 Community well being

### 9.4.1 Component tree



**Figure 21.** Component tree for community well-being

## 9.4.2 Fisheries sector

### 9.4.2.1 Risk analysis

#### 9.4.2.1.1 Harvesting operations component

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Employment	Increase local participation	3	3	9	An efficiently managed, robust fisheries sector, provides good opportunities for direct and indirect employment and income generation.
Capacity development	Build technical and entrepreneurial capacity	2	2	4	The long-term aspiration is to increase employment opportunities and career paths for the Cook Islanders in the fisheries sector.
Individual and corporate debt	Support a strong debt service capacity in the fisheries sector for Cook Islanders	2	3	6	Debt servicing in the fisheries sector has had mixed results. Debt stress leads to family and community depression incurring additional societal costs. Adequate support for thorough feasibility assessment prior to committing to unserviceable debts in the fisheries sector is required.
Health and safety	Achieve a low incident health and safety record	3	2	6	No reports of losses in last 10 years. While loss of life and poor health adversely impacts the sector, it is the local community that experiences the most disruption through family and broader social dislocation.
Family separation	Support effective means for crew who spend long periods at sea to maintain communication with their community	2	2	4	An economical air freight service would stimulate increased activity in the fresh fish sector.

Cultural Values	Maintain cultural values	2	4	8	Minimise conflict by ensuring vessel operators are familiar with attitudes and values of Cook Islands culture.
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#### 9.4.2.2 *Performance reports*

##### Employment/incomes

<b>Report heading</b>	<b>Notes</b>
1. Reason for inclusion	As an important component of the Government's sustainable economic development agenda, the Government promotes investment which offers employment opportunities.
2. Operational Objective	Maximise opportunities for Cook Islanders' employment
3. Indicator	Employment data
4. Performance Measure/Limit	Positive growth in the proportion of the population in employment
5. Evaluation	Surveys, measures of economic activity in the fisheries sector, Government receipts
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Nil
- Future	Training, consider incentives for employment of CI crew and fisheries observers
- Actions if Performance Limit is not achieved	Review development strategies
- Review Cycle	Two-yearly,
8. Other Issues	The requirement to develop the required technical skills. In addition, long periods at sea do not appeal to all Cook Islanders.

##### Capacity development

<b>Report heading</b>	<b>Notes</b>
1. Reason for inclusion	The potential for long term economic development will be secured through a skilled and educated population. Fisheries is a highly technical sector which requires significant training and education. A skilled and educated population will attract employment opportunities in the fisheries sector within the Cook Islands EEZ and elsewhere.
2. Operational Objective	Establish a skilled and educated Cook Islands workforce in demand by the fisheries sector locally or elsewhere
3. Indicator	Employment data
4. Performance Measure/Limit	Positive growth in the proportion of the population in employment
5. Evaluation	Surveys, measures of economic activity in the fisheries sector, Government receipts

6. Robustness	Robust
7. Fisheries Management Response	
- Current	Nil
- Future	Capacity development strategy drafted in association with the fisheries sector and development assistance agencies.
- Actions if Performance Limit is not achieved	Review capacity development strategy
- Review Cycle	Two-yearly,
8. Other Issues	General lack of required technical skills. In addition, long periods at sea do not appeal to all Cook Islanders.

### Individual and corporate debt

Report heading	Notes
1. Reason for inclusion	High, unserviceable, debt is a significant impost on families, communities and adversely impacts economic development. There is also a concern that fishing enterprises that are experiencing financial hardship may be encouraged to circumvent rules including undertaking IUU fishing.
2. Operational Objective	Support a financially viable fisheries sector
3. Indicator	Tax receipts, employment figures, fisheries sector contribution to GNP
4. Performance Measure/Limit	Trends in fisheries sector activity
5. Evaluation	Annual surveys to measure economic activity in the fisheries sector. Annual Government accounts
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Nil
- Future	Business Management Training - encourage the sensible use of debt, develop business capacity within industry, provide advisory material, provide material to bank managers, fishers etc.
- Actions if Performance Limit is not achieved	Develop and implement a business advisory programme
- Review Cycle	Two-yearly,
8. Other Issues	Being able to successfully demonstrate the value of business management training to current fisheries operators.

## Health and safety

Report heading	Notes
1. Reason for inclusion	Health, disease, injury and death impact individual fishing operations and the sector generally. However, it is the local community that experience the most disruption particularly if it is the contribution of the family's primary income earner that is impacted.
2. Operational Objective	Achieve a low incident health and safety record
3. Indicator	Number of health and safety incidents
4. Performance Measure/Limit	Reducing trend of health and safety incidents in the fisheries sector
5. Evaluation	Incident Reports
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Some training relating to boat safety, vessel operations regulations, etc.
- Future	Improve fishing vessel safety programs. Assess requirements for introducing practices that comply with international standards such as those adopted by IMO.
- Actions if Performance Limit is Exceeded	Commission an independent review
- Review Cycle	5 years
8. Other Issues	Requires inter-departmental coordination and significant dedicated institutional resources for effective implementation.

## Cultural Values

Report heading	Notes
1. Reason for inclusion	The fisheries sector is often a multicultural environment which can result in both a positive, and negative, experiences for Cook Islanders employed in the sector. Employment on vessels can expose crew to culturally and socially insensitive attitudes and behaviour.
2. Operational Objective	Ensure information is available to Cook Islanders working in the fisheries sector regarding the diverse social and cultural experiences that could possibly be encountered.
3. Indicator	Reports of social- and cultural-related incidents in the fisheries sector
4. Performance Measure/Limit	Low number of incident reports
5. Evaluation	Investigations to determine root causes, observer data Gen-3 reports and debriefing

6. Robustness	Moderately Robust
7. Fisheries Management Response	
- Current	Nil
- Future	Encourage a more stable fishing fleet, with less short-term crew. Improve liaison with the Ports Authority and Police in relation to incident management. Provide education and outreach on cultural considerations and practices.
- Actions if Performance Limit exceeded	Review arrangements if there is a sudden spike in incidents.
- Review Cycle	5 years
8. Other Issues	Requires strong inter-departmental coordination.

### 9.4.3 Processing component

#### 9.4.3.1 Risk analysis

Employment Income	Increase local investment and participation	3	3	9	Potential to make a valuable contribution to the development of the Cook Islands economy
Capacity development	Build knowledge and technical capacity	2	2	4	To support efforts to increase Cook Islands direct involvement in the sector
Debt	To avoid unserviceable debt in the processing sector	2	3	6	Thorough feasibility assessments are required prior to investment of public or private Cook Islands funds into fisheries processing ventures. If justified, the Government will examine incentives to reduce risks.
Health and safety	Ensure a good record of health and safety in the fisheries processing sector	3	2	6	Systems will be developed and monitored to ensure compliance with health and safety standards
Animal feed	Promote the use of fish processing waste for farm animal use	2	2	4	Imported animal feed is expensive and the waste from locally processed fish is often discarded. An economic means to process fish waste to useable animal feed could generate significant benefits
Air Freight	Address freight volume availability and price constraints	3	4	12	The cost and availability of air freight is a currently major constraint to fisheries sector expansion in Cook Islands

### 9.3.2.2 Performance reports

#### Employment/income

Report heading	Notes
1. Reason for inclusion	Increased employment will not only be indicative of a growing national economy, but community benefits will improve as a result of increased general affluence.
2. Operational Objective (plus justification)	Grow employment in the fisheries processing sector
3. Indicator	Employment data, number of fisheries processing enterprises, Government receipts from the fisheries sector
4. Performance Measure/Limit	Positive growth in employment/contribution to GDP
5. Evaluation	Employment figures/National accounts
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Charter arrangements to encourage locally-based development
- Future	Consider additional incentives to encourage locally-based operations
- Actions if Performance Limit is Exceeded	Review development strategies
- Review Cycle	Two-yearly
8. Other Issues	Might be a trade-off between employment in fishing and processing if foreign workers are more efficient

#### Capacity development

Report heading	Notes
1. Reason for inclusion	Provided that salary expectations are not unreasonable, a skilled and educated population can provide a good foundation for economic development. The availability of local expertise will circumvent any requirements to employ foreigners.
2. Operational Objective (plus justification)	Establish a skilled and educated Cook Island workforce for the fisheries sector.
3. Indicator	Employment data
4. Performance Measure/Limit	Positive growth in the proportion of the population in employment in the fisheries sector.

5. Evaluation	Surveys, measures of economic activity in the fisheries sector. Government receipts.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Nil
- Future	Capacity development strategy developed in association with the fisheries sector and development assistance agencies.
- Actions if Performance Limit is Exceeded	Review development strategy
- Review Cycle	Two-yearly,
8. Other Issues	General lack of required technical skills. Limited availability of local training opportunities.

## Debt

Report heading	Notes
1. Reason for inclusion	To ensure that any investment in the fisheries processing sector is based on rigorous economic feasibility appraisals.
2. Operational Objective (plus justification)	Encourage investments in the fish processing sector to those assessed to be economically sustainable.
3. Indicator	Feasibility appraisals, tax receipts, employment figures, fisheries sector contribution to GNP.
4. Performance Measure/Limit	Number of ventures progressing from feasibility appraisal to implementation.
5. Evaluation	Record of feasibility appraisals, annual surveys, annual Government accounts.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Nil
- Future	Business Management Training - encourage the sensible use of debt, develop business capacity within industry, provide advisory material, provide material to bank managers, fishers etc.
- Actions if Performance Limit is exceeded	Develop and implement a business advisory programme
- Review Cycle	Two-yearly,
8. Other Issues	Investment is also constrained by the availability of credit facilities and lending conditions. Requires inter-Ministerial collaboration.

## Health and safety

Report heading	Notes
1. Reason for inclusion	As for fisheries operations at sea, health, disease, injury and death in shore-side enterprise adversely impact individual operations and the sector generally.
2. Operational Objective (plus justification)	Achieve a low incident health and safety record.
3. Indicator	Number of health and safety incidents
4. Performance Measure/Limit	Reducing trend of health and safety incidents in the fisheries sector.
5. Evaluation	Incident Reports
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Capacity building and training relating to health and safety standards in the food processing sector.
- Future	Assess requirements for introducing practices that comply with international food processing health and safety standards.
- Actions if Performance Limit is exceeded	Commission an independent review.
- Review Cycle	5 years
8. Other Issues	Requires inter-departmental coordination and significant dedicated institutional resources for effective implementation.

## Animal feed

Report heading	Notes
1. Reason for inclusion	Given the extent of animal farming in the Cook Islands, and the cost of imported feed, there is an opportunity to both make effective use of fish waste and reduce overheads for local farmers. An economic means to process fish waste to useable animal feed could generate significant benefits.
2. Operational Objective (plus justification)	Convert waste from local fisheries processing operations to animal feed for local farmers.
3. Indicator	Registered interest in assessing the viability of this opportunity.
4. Performance Measure/Limit	Feasibility assessment completed.
5. Evaluation	Outcome of feasibility assessment.
6. Robustness	Fair
7. Fisheries Management Response	

- Current	Nil.
- Future	Monitor developments in this sector and provide technical support where required.
- Actions if Performance Limit is exceeded	
- Review Cycle	As required.
8. Other Issues	Established local business developing agricultural fertiliser from fish waste products.

### Air freight

Report heading	Notes
1. Reason for inclusion	The availability of freight volume, at an economical rate, is considered a significant constraint to the expansion of the local fisheries sector.
2. Operational Objective (plus justification)	Air freight availability and cost is not a constraint to fisheries sector development.
3. Indicator	Volume of fresh exports
4. Performance Measure/Limit	Growth in exports
5. Evaluation	Export data
6. Robustness	Fair
7. Fisheries Management Response	
- Current	Nil
- Future	Nil
- Actions if Performance Limit is exceeded	Support industry representations to airlines and Government
- Review Cycle	
8. Other Issues	Needs competitive air freight services. Existing operations are dedicated to the tourist market.

## 9.4.4 General Community component

### 9.4.4.1 Risk analysis

Food	Increase the contribution of the large pelagic fishery to national food security	3	4	12	Fisheries contribute to national food security including through reducing reliance on imported protein. Local seafood also adds value to the tourist experience.
Licence Fees	Optimise license revenue	2	3	6	Fees contribute to Government revenue.
Benefits for linked industries	Stimulate opportunities for linked enterprises	3	4	12	The locally-based fishing industry and foreign vessels visiting local ports contribute financially to linked industries stimulating flow-on benefits for the economy.
Capacity Development	Increase fisheries-related technical and logistical expertise	2	2	4	To support efforts to increase the direct involvement of Cook Islanders in the fisheries sector.
Infrastructure	Promote and stimulate investment in infrastructure to support a viable fisheries sector	3	4	12	Additional investment in port infrastructure is required if modern technically-sophisticated fishing operations are to be based out of the Cook Islands.
Attitudes	Raise awareness of the national benefits from the sustainable conservation and management of local large pelagic stocks	2	3	9	An investment (for resources and expertise) in awareness raising and public relations is required to promote the long-term national benefits of a sustainably managed fishery for large pelagics in Cook Islands.

Fishery interactions	Monitor impacts of the large pelagic fishery on coastal artisanal and recreational fisheries.	3	3	9	Even with the Marae Moana Act now in place, there is an on-going need to monitor the productivity of coastal fisheries. Appropriate responses will be required if changes in the coastal fishery can be attributed to the commercial fishery. Volumes of catch from the commercial fishery will also need to be monitored to avoid over-supply and depressed prices for fish marketed by local fishermen.
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#### 9.4.4.2 Performance reports

##### Food

Report heading	Notes
1. Reason for inclusion	Commercial large pelagic fisheries contribute to national food security and Government revenue. They reduce reliance on imported protein alternatives, and pressure from fishing and the impacts of climate change on coastal fisheries resources. Tourists also value local seafood which adds value to their Cook Islands experience.
2. Operational Objective (plus justification)	Increase the contribution of the large pelagic fishery to national food security.
3. Indicator	Prices and supply.
4. Performance Measure/Limit	Prices and quantities of large pelagic species available for local consumption.
5. Evaluation	Periodic household surveys. Creel surveys.
6. Robustness	Fair
7. Fisheries Management Response	
- Current	No specific measures
- Future	Consider the introduction of internationally accepted seafood quality standards. Explore innovative fish processing developments in order to improve the quality of locally-harvested fish presented to local markets.
- Actions if Performance Limit is exceeded	Explore additional measures to stimulate local supply.
- Review Cycle	
8. Other Issues	

##### Licence fees

Report heading	Notes
1. Reason for inclusion	Contributes to the Government's sustainable economic development goals and Government revenue
2. Operational Objective (plus justification)	Optimise license revenue without jeopardizing other benefits available from the fishery
3. Indicator	Licence fee receipts
4. Performance Measure/Limit	Government revenue from license fees
5. Evaluation	MMR monitoring and surveys. Ministry of Finance records
6. Robustness	Robust
7. Fisheries Management	

Response	
- Current	Fixed fees
- Future	Assess capacity of fleets to support increases in license fees. Consider relief options for local operators to support local participation. Relate fees to management costs. Consider a cost-benefit analysis
- Actions if Performance Limit is exceeded	Review license fee policy.
- Review Cycle	Two yearly
8. Other Issues	Cost recovery opportunities require evaluation.

### Benefits for linked industries

Report heading	Notes
1. Reason for inclusion	The locally-based fishing industry and foreign vessels visiting local ports provide opportunities for linked industries stimulating flow-on benefits for the economy.
2. Operational Objective (plus justification)	Stimulate opportunities for linked enterprises.
3. Indicator	Revenue changes for existing enterprises. New enterprises established to service the fisheries sector.
4. Performance Measure/Limit	Number of new business ventures engaged in fisheries-linked business.
5. Evaluation	Government revenue, general economic reviews, public reports.
6. Robustness	Poor
7. Fisheries Management Response	
- Current	Limited
- Future	Review options for encouraging locally-based development.
- Actions if Performance Limit is exceeded	Review development strategy.
- Review Cycle	Two yearly
8. Other Issues	Some community concerns associated with the possible introduction of foreign businesses including competition with local enterprises.

## Capacity development

Report heading	Notes
1. Reason for inclusion	Provided that salary expectations are not unreasonable, a skilled and educated population can provide a good foundation for fisheries-sector development. The availability of local expertise will circumvent arguments for employing foreigners.
2. Operational Objective (plus justification)	Increase fisheries-related technical and logistical expertise
3. Indicator	Employment data
4. Performance Measure/Limit	The number of Cook Islanders employed in high-skilled technical and managerial posts.
5. Evaluation	Surveys, census.
6. Robustness	Fair
7. Fisheries Management Response	
- Current	Nil
- Future	Capacity development strategy formulated in association with the fisheries sector, Ministry of Education and development assistance agencies.
- Actions if Performance Limit is Exceeded	Review development strategy
- Review Cycle	Two-yearly,
8. Other Issues	General lack of required technical skills. Limited availability of local specialist training opportunities.

## Infrastructure

Report heading	Notes
1. Reason for inclusion	Critical constraint but necessary for broader development. Can drain resources and lead to significant Government debt.
2. Operational Objective (plus justification)	Promote and stimulate investment in infrastructure to support a viable fisheries sector.
3. Indicator	New infrastructure
4. Performance Measure/Limit	The type and cost of infrastructure investment.
5. Evaluation	Reports detailing new investment.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Limited
- Future	Explore different partnership options to stimulate investment in infrastructure.
- Actions if Performance Limit is exceeded	Infrastructure review

- Review Cycle	As required
8. Other Issues	Financing of infrastructure.

### Attitudes

Report heading	Notes
1. Reason for inclusion	Social and political acceptability for encouraging commercial fisheries is not assured.
2. Operational Objective (plus justification)	Raise awareness of the national benefits from the sustainable conservation and management of local large pelagic stocks.
3. Indicator	Political and public opinion
4. Performance Measure/Limit	The extent political and community action impacts fishery sector decision-making.
5. Evaluation	Media reports, political statements, NGO campaigns including support and advocacy.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Nil
- Future	Develop a communication strategy to engage communities through information dissemination, awareness raising and public relations initiatives. Maintain an information rich MMR website as one vehicle for promoting engagement.
- Actions if Performance Limit is exceeded	Undertake a critical review of the communication strategy.
- Review Cycle	As required
8. Other Issues	Related to the Cultural Values issue under Fishing Sector

### Fishery interactions

Report heading	Notes
1. Reason for inclusion	Community perceptions include the possibility that commercial fisheries will lead to loss of livelihoods for artisanal fishers and adversely impact coastal ecosystems that support subsistence, artisanal and recreational fisheries.
2. Operational Objective (plus justification)	Monitor impacts of the large pelagic fishery on coastal artisanal and recreational fisheries.
3. Indicator	Large pelagic species occurrence and catch rates in the artisanal and recreational fishery.
4. Performance Measure/Limit	Trends, subject to fluctuations that might also be impacted by climate variability
5. Evaluation	Catch data
6. Robustness	Robust

7. Fisheries Management Response	
- Current	Subsistence, artisanal and recreational fishery catch monitoring
- Future	On-going
- Actions if Performance Limit is Exceeded	Continue assistance
- Review Cycle	Annual
8. Other Issues	Consumers may prefer higher quality and lower prices of fish from industrial vessels.

## 9.5 Administration

### *Current MMR services to the large pelagic sector*

The Ministry currently employs approximately 60 staff. Supporting the Secretary in respect of commercial large pelagic fisheries is an Offshore Fisheries Division and a Policy and Legal Division.

The functions of the Offshore Fisheries Division include to:

- provide technical and policy support to industry stakeholders, whilst implementing sustainable management measures as set out in offshore fisheries management plans,
- provide technical and policy advice to Government to assist in the formulation of national policies, aimed at ensuring maximum economic benefits are accrued to the Cook Islands from its fisheries resources,
- establish and manage systems such as vessel monitoring system (VMS), port sampling and observers, catch reporting, and database management, that ensure compliance with any and all management measures and maintain sustainability of the key fish stocks covering all Cook Islands flagged fishing vessels fishing in the domestic waters of the Cook Islands and on the High Seas,
- assist in ensuring that the Cook Islands meets its obligations both regionally and internationally with proactive participation to ensure Cook Islands interest realised, and
- ensure coordinated delivery of marine monitoring, control and surveillance operations and that licensing register system is in place.

In addition to primary responsibility for the administration of the Marine Resources Act 2005, associated legislation and regulations, the objectives of the Policy and Legal Division include to:

- ensure appropriate legal and policy frameworks governing the Ministry and marine resources sector are in place,
- ensure consistent national policy towards international and regional obligations,
- support media and public awareness programmes, and
- Provision of sound legal advice on issues emanating from MMR-related activities.

9.5.1 Component tree

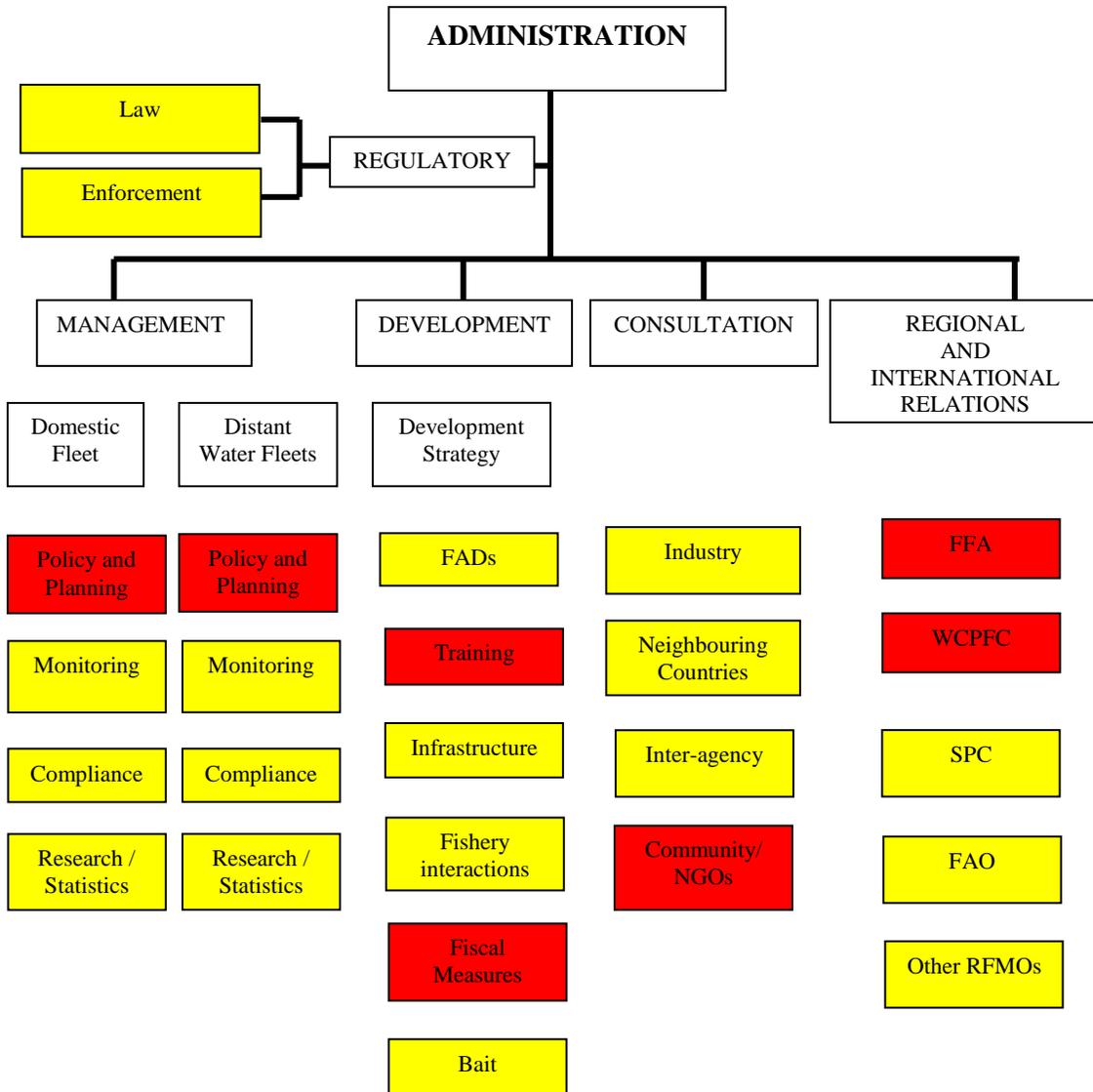


Figure 22. Component tree for sector administration

9.5.2 *Regulatory component*

9.5.2.1 *Risk assessment*

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Law	Current law reflects contemporary best practice	3	2	6	Require fisheries law to reflect national, regional and international commitments and obligations.
Enforcement	Reduced trends in non-compliance	3	2	6	A low capacity to enforce and prosecute undermines sustainable fisheries management and conservation objectives.

9.5.2.2 *Performance reports*

Law

<b>Report heading</b>	<b>Notes</b>
1. Reason for inclusion	The requirement for contemporary law, and associated regulations, to support fishery development, management and conservation.
2. Operational Objective	Comprehensive up-to-date legal framework
3. Indicator	Adequacy of legal framework
4. Performance Measure	Legal framework effectively supports management and compliance
5. Evaluation	MMR reports. Judicial outcomes.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	2005 Act and supporting regulations completed
- Future	Monitor, revise as required, and promulgate new legislation based on experience and new developments
- Actions if Performance Limit is exceeded	Review legal framework
- Review Cycle	5 yearly major reviews, specific aspects reviewed on the basis of experience.
8. Other Issues	

Enforcement

<b>Report heading</b>	<b>Notes</b>
1. Reason for inclusion	Law and policy implementation/application requires enforcement.
2. Operational Objective	Effective enforcement capacity of Cook Islands marine resources law and associated regulations.
3. Indicator	Enforcement action.
4. Performance Measure	Incidents of non-compliance recorded.
5. Evaluation	MMR reports. Case outcomes.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	On-going review
- Future	On-going review
- Actions if Performance Limit is exceeded	Comprehensive review.
- Review Cycle	5 yearly major reviews, specific aspects reviewed on the basis of experience
8. Other Issues	

### 9.5.3 Management component

#### 9.5.3.1 Risk assessment

##### 9.5.3.1.1 Domestic and locally-based fishery

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Domestic	Increase in local participation	3	3	9	To support employment, contribute to national food security and economic development through foreign exchange earnings.
Policy/planning	Coherent progressive policy	3	3	9	Participation in domestic commercial fisheries for large pelagics requires clearly articulated policy, effectively administered and publicised.
Monitoring	Effective	3	2	6	Monitoring is required to support compliance with fisheries regulations and other obligations such as labour standards, research cooperation and data provision.
Compliance	High	2	2	6	Non-compliance undermines sustainable management and conservation arrangements.
Research/statistics	Sound research supported by high quality data	2	3	6	Research relating to large pelagic species and fisheries is principally undertaken by SPC. Strengthening MMR capacity in this regard is necessary as is the collection of data required to support research and fishery analysis.

9.5.3.1.2 Domestic and Foreign vessels authorised under access arrangements

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Distant water	Securing sustainable economic benefits	3	3	9	Provided there is minimal/no adverse impact on domestic fisheries, effectively regulated and monitored foreign fleets are a valuable source of foreign exchange for Cook Islands.
Policy/ planning	Coherent progressive policy	3	3	9	Require clearly articulated policy, effectively administered and publicised.
Monitoring	Effective	3	2	6	Monitoring is required to support compliance with fisheries regulations and other obligations such as labour standards, research and data collection.
Compliance	High	3	2	6	Non-compliance undermines sustainable management and conservation arrangements.
Research/ statistics	Sound research supported by high quality data	3	2	6	Because foreign fleets account for a relatively high proportion of the regional harvest of large pelagics they are critical sources of statistics for regional stock assessments. This supports the preparation of regular reports profiling the status and trends of stocks of large pelagics in the Cook Islands EEZ.

### 9.5.3.2 Performance reports

#### 9.5.3.2.1 Domestic and foreign vessels authorised under access arrangements

##### Policy and Planning

Report heading	Notes
1. Reason for inclusion	Need to assess which current policies serve contemporary needs and which policies require review.
2. Operational Objective	Clear, comprehensive policy documentation publicly available
3. Indicator	Policy documents
4. Performance Measure	Ministerial sign off
5. Evaluation	MMR Reports
6. Robustness	High
7. Fisheries Management Response	
- Current	Fishery Plan in place
- Future	Review Fishery Plan
- Actions if Performance Limit is not met	Review priorities and resources
8. Review Cycle	Two-yearly
9. Other Issues	Challenges engaging all stakeholders

##### Monitoring

Management component	Notes
1. Reason for inclusion	Monitoring currently reasonable. Need to improve data quality, especially from at-sea observers and landing sites. This includes monitoring of Cook Islands tuna landed in foreign ports.
2. Operational Objective	High quality fishery data and information available to support research and management decision-making.
3. Indicator	Coverage of all effort and quality of data generated from fishery monitoring activities for scientific and compliance purposes.
4. Performance Measure	National data reports completed within deadlines.
5. Evaluation	Data and information quality. Compliance with data provision obligations.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Log sheet, port sampling, observer programmes
- Future	Observer coverage and port monitoring increased
- Actions if Performance	Increase observer/port sampling training, improve coverage and monitor quality of data and information.

Measure is not met	
8. Review Cycle	Two-yearly
9. Other Issues	Challenges would arise if industry growth increased rapidly.

### Compliance

Report heading	Notes
1. Reason for inclusion	Compliance function has been reasonably effective, greater challenges expected as resources become more limited, and the value of resources increases
2. Operational Objective	Reduced incidents of non-compliance with national laws
3. Indicator	Non-compliance infringements and prosecutions. Part 2 report to WCPFC.
4. Performance Measure	Number of non-compliance infringements and prosecutions
5. Evaluation	Non-compliance trends
6. Robustness	High
7. Fisheries Management Response	
- Current	Reasonable institutional (MMR) resources available to encourage compliance but more required particularly in relation to foreign vessels operating under access arrangements. Part 2 report submission and appraisal to WCPFC.
- Future	Compliance function implemented based on a sufficiently resourced strategic plan.
- Actions if Performance Measure is not met	Increased capacity building and research associated with technological developments
- Review Cycle	2 years
8. Other Issues	Need to maintain engagement with regional efforts to strengthen compliance. Need to maintain currency with the WCPFC Compliance Monitoring Scheme.

### Research and statistics

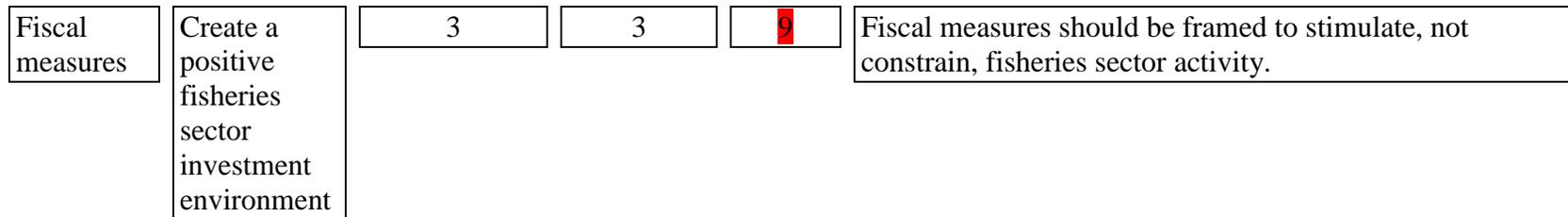
Report heading	Notes
1. Reason for inclusion	Need improved data and information to support national fishery management and comply with regional and international fishery reporting obligations such as the Part 1 Reports to WCPFC.
2. Operational Objective	Data and associated analysis support national fishery management and participation in regional fishery monitoring and research processes.
3. Indicator	Data inventory. Report publications and submissions. Part 1 Report submission to WCPFC.
4. Performance Measure	Reports comply with regional data reporting obligations and data quality metrics exhibit increasing improvement.

5. Evaluation	Reports and data inventories
6. Robustness	Robust
7. Fisheries Management Response	
8. - Current	Fishery data collection, as per SPC log sheets and the Regional Observer Programme (ROP), and assimilation for active vessels.
- Future	Extend engagement to biological research for target species and additional information relating to by-catch and species of special interest.
- Actions if Performance Measure is not met	Capacity building for MMR staff.
- Review Cycle	2 years
9. Other Issues	

## 9.5.4 Development component

### 9.5.4.1 Risk assessment

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
FADs	Research, development and deployment	3	3	9	Important for small-scale fishers for food security and income. Industrial fleets also maintain their own FAD programmes which require consistent monitoring and reporting. This is particularly the case in respect to the FAD closure provisions of WCPFC CMM 2018-01.
Training	Build human capacity	3	3	9	On-going need to strengthen capacity across scientific, technical and policy components of MMR services
Fishery interactions	Research and mitigate adverse fishery interaction	3	4	12	Mitigate community and political implications associated with adverse interaction between the commercial and artisanal/recreational fishers. To an extent, the <i>Marae Moana Act</i> will limit this risk. However, off-loading of by-catch at urban markets by the commercial fleet may adversely impact the market for artisanal fishers.
Bait	Ensure bait availability for the fishery	2	3	6	The availability of economical supplies of bait is a significant determinant in longline large pelagic investment and strength.
Infrastructure	Encourage investment in facilities to support fisheries growth	2	3	6	Government and private sector led investment in infrastructure is required to support a competitive and viable fisheries sector.



9.5.4.2 *Performance reports*

FADs

<b>Report heading</b>	<b>Notes</b>
1. Reason for inclusion	Anchored FADs offer significant increases in fishing opportunities for artisanal fishers. They are also widely deployed in the industrial fishery.
2. Operational Objective	Increase the availability of FADs to the artisanal fisheries sector. Effective monitoring of drifting FAD deployment use and fate for the fleet licensed to operate in Cook Islands EEZ.
3. Indicator	FAD catches relative to harvests from non-FAD sectors of the i) artisanal, and ii) industrial fishery.
4. Performance Measure	FAD-associated harvests
5. Evaluation	FAD catch statistics
6. Robustness	Medium/High
7. Fisheries Management Response	
- Current	FAD deployment, maintenance and catch data monitoring. Drifting FAD closures, limits and non-entangling FAD design as per WCPFC CMMs.
- Future	Improved strategic location of anchored FADs based on FAD-associated catch data. Investigate implementation options and research into biodegradable FAD construction.
- Actions if Performance Measure is not met	Re-assess FAD construction and deployment decisions
- Review Cycle	As required
8. Other Issues	Hurricanes and other damage to anchored FADs.

Training

<b>Report heading</b>	<b>Notes</b>
1. Reason for inclusion	Will strengthen technical and professional services efficiency of MMR and Cook Islands fishing industry and increase sustainable contributions of fisheries to the economy at community and national scales.
2. Operational Objective	Strengthen professional and technically competent services to the fisheries sector.
3. Indicator	Capacity building plan
4. Performance Measure	Capacity Building Plan implementation benchmarks
5. Evaluation	Benchmarks achieved

6. Robustness	Robust
7. Fisheries Management Response	
- Current	Generally <i>ad hoc</i> , opportunistic, approach to training
- Future	A road map/plan for capacity building
- Actions if Performance Measure is not met	Undertake a critical analysis of gaps and root causes
- Review Cycle	5 years
8. Other Issues	Candidates can be identified and are available for training.

## Bait

Report heading	Notes
1. Reason for inclusion	Scope to improve viability of tuna industry, grow participation and generate more local benefits.
2. Operational Objective	Regular supplies of good quality bait available at competitive prices.
3. Indicator	Bait price and availability is not assessed as a constraint to engagement in the fisheries sector.
4. Performance Measure	Bait price and availability
5. Evaluation	Surveys completed in communities and industry
6. Robustness	High
7. Fisheries Management Response	
- Current	Nil
- Future	Review cost and logistical issues associated with bait supply
- Actions if Performance Measure is not met	Consider options to support cost-effective supplies of quality bait.
- Review Cycle	As required
8. Other Issues	Possible restrictions on squid bait because of by-catch mitigation measures. Ensuring demand can justify investment required to secure supplies.

## Fiscal Measures

Report heading	Notes
1. Reason for inclusion	Prohibitive costs are a major impediment to the development of a vibrant fisheries sector.
2. Operational Objective	To provide a competitive and stable fiscal environment for the fisheries sector.
3. Indicator	Industry data
4. Performance Measure	Trends for key indicators that measure engagement

	in the fisheries sector.
5. Evaluation	MMR monitoring reports, regional economic analyses.
6. Robustness	High
7. Fisheries Management Response	
- Current	License fee levels for domestic fleet, minimum quota levels to be purchased, and fees for quota, price for vessel days
- Future	Analysis on potential assistance options
- Actions if Performance Measure is not met	
- Review Cycle	Two yearly
8. Other Issues	Many costs are subject to externalities beyond the capacity of Cook Islands Government to address. Banks reluctant to provide loans for fisheries development.

## 9.5.5 Consultation component

### 9.5.5.1 Risk assessment

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
Industry	Sustain a business environment conducive to industry investment	3	2	6	The foreign based fleets operating under access arrangements provide an important contribution to government revenue and locally-based fleets contribute to foreign exchange earnings, employment, national food security and opportunities for linked industries.
Inter-agency	Support inter-agency collaboration and cooperation	2	3	6	MMR is a partner across many government agencies where policy coordination and strategizing is essential. Key agencies include the Prime Minister's Office, Foreign Affairs and Immigration, Maritime Cook Islands, Outer Islands, Transport, Infrastructure and Planning, Finance and Economic Management and the National Environment Service.
Community/ NGOs	Strengthen community engagement and participation	3	4	12	Community engagement is a critical pillar of Cook Islands fisheries sector management and development. Mutually beneficial relations with NGOs is one valuable means to support broader community engagement and participation.
Neighbouring countries	Continue to strengthen collaboration with neighbouring countries and territories	2	2	4	Given shared interests, particularly with other Polynesian countries and territories, opportunities to promote consultation and collaboration will generate mutual benefits.

9.5.5.2 *Performance reports*

Industry

<b>Management Response heading</b>	<b>Notes</b>
1. Reason for inclusion	Both foreign fleets operating under access arrangements and domestic, locally-based fleets make important contributions to the national economy.
2. Operational Objective	Increase the large pelagic fishery's contribution to the Cook Islands economy.
3. Indicator	Economic indicators for the fisheries sector.
4. Performance Measure	Economic contribution of the fisheries sector to the national economy.
5. Evaluation	Economic trend monitoring reports.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	<i>Ad hoc</i> surveys of economic data
- Future	Scheduled periodic surveys to provide increase details relating to trends
- Actions if Performance Measure is not met	Review of policy
- Review Cycle	Two yearly
8. Other Issues	Difficulty securing resources to support surveys. Industry might not see benefit in collaboration or be able to work together.

Inter-agency

<b>Report heading</b>	<b>Notes</b>
9. Reason for inclusion	Agency coordination on policy and economic development strategies is essential to deliver Government goals associated with fisheries sector contributions to sustainable development.
10. Operational Objective	Inter-agency consultation and coordination.
11. Indicator	Outputs from inter-agency engagement.
12. Performance Measure	Quality of outputs from inter-agency collaboration.
13. Evaluation	Records of inter-agency consultation and collaboration.
14. Robustness	Robust
15. Fisheries Management Response	
- Current	<i>Ad hoc</i> and irregular issue-driven engagement.
- Future	Strategic and scheduled consultation and collaboration.
- Actions if Performance Measure is not met	Review coordination and consultation drivers and constraints.
- Review Cycle	At least annual
16. Other Issues	Industry might not see benefit in collaboration or be able

	to work together.
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### Community and NGOs relations

Report heading	Notes
1. Reason for inclusion	The community, which includes a range of status groups including the Aronga Mana and NGOs, are key stakeholders in the Cook Islands fisheries sector. They represent a diverse range of interests that influence decision-making from promoting fisheries development to support the national economy to environmental and resource conservation considerations.
2. Operational Objective	Proactive community engagement in the fisheries sector through NGOs and community associations.
3. Indicator	The extent the community and NGOs are engaged in fisheries sector decision-making processes Opportunities for community and NGO consultation
4. Performance Measure	Quality and extent of consultation
5. Evaluation	Reports of consultative meetings
6. Robustness	High
7. Fisheries Management Response	
- Current	Increasingly more structured but still <i>ad hoc</i> and issue-driven engagement.
- Future	Formal community and NGO consultative forum enshrined in fisheries development and management processes
- Actions if Performance Measure is not met	Review strategies to engage the community and NGOs.
- Review Cycle	Annually
8. Other Issues	Scepticism among NGOs regarding the sincerity of Government engagement initiatives.

### Neighbouring countries

Report heading	Notes
1. Reason for inclusion	Important to strengthen cooperation relating to compliance and management of regionally-shared fisheries resources.
2. Operational Objective	Improve cooperation with neighbouring States and territories.
3. Indicator	Level of cooperation.
4. Performance Measure	Collaborative initiatives.
5. Evaluation	Instruments in place for cooperation.
6. Robustness	Fair

7. Fisheries Management Response	
- Current	Consultations through regional and <i>ad hoc</i> arrangements.
- Future	Plan for formal, regular, consultative arrangements.
- Actions if Performance Measure is not met	Engage Ministerial-level advocacy.
- Review Cycle	Two Yearly
8. Other Issues	

## 9.5.6 Regional and international relations component

### 9.5.6.1 Risk assessment

Issue	Objective	Consequence	Likelihood	Risk Score	Reasons
FFA	Increase engagement	3	4	12	Has demonstrated significant value for Cook Islands engagement across the fisheries sector for 40 years. Important for technical and policy support to Cook Islands and serves as a regional coordinating mechanism to advocate the interests of small island States in larger fora such as WCPFC and UNFAO.
SPC	Increase engagement	2	3	6	Has demonstrated significant value for Cook Islands in relation to tuna fisheries science, data management, pelagic fisheries development, stock status and trends for nearly 70 years. This type of advice will be increasingly required by Cook Islands in future years to address key issues such as implications for the Cook Islands fisheries sector because of a changing climate.
WCPFC	Strengthen participation	3	4	12	Key decision-making body in relation to regional tuna resources. Includes constituents with interests in the fishery that do not necessarily align with Pacific small island States.
Other RFMOs/ Arrangements	Ensure quality engagement when in the interests of Cook Islands	2	2	4	Developments in other multilateral fisheries bodies often have implications for decision-making in WCPFC and regionally. In the WCPO this includes the PNAO which is a key stakeholder in regional and WCPFC decision-making and IATTC which manages tuna fisheries in the Eastern Pacific.

FAO	Continue to utilise FAO technical services as needed	2	2	4	Is a reliable source of sound technical advice that may be drawn on to supplement advice available from regional bodies.
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### 9.5.6.2 Performance reports

#### FFA

Report heading	Notes
1. Reason for inclusion	Importance of FFA for regional cooperation and provision of technical assistance.
2. Operational Objective	Cook Islands active engagement in FFA strengthened.
3. Indicator	Representation in FFA processes.
4. Performance Measure	Cook Islands input to FFA initiatives and implementation of FFA decisions at the national level in Cook Islands.
5. Evaluation	Reports profiling Cook Islands engagement in FFA activities.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Full participation in FFA activities
- Future	Increase MMR capacity to participate in FFA processes
- Actions if Performance Measure is not met	Increase capacity building initiatives to support increased engagement in regional processes.
- Review Cycle	Annually
8. Other Issues	

#### SPC

Report heading	Notes
1. Reason for inclusion	Participate in the scientific work and continue cooperation in small scale tuna development.
2. Operational Objective	Cook Islands active engagement in SPC strengthened.
3. Indicator	Representation in SPC processes.
4. Performance Measure	Cook Islands input to SPC initiatives and implementation of SPC initiatives at the national level in Cook Islands.
5. Evaluation	Reports profiling from Cook Islands engagement in SPC activities.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Full participation in SPC processes
- Future	Increase MMR capacity to participate in SPC processes
- Actions if Performance Measure is not met	Increase capacity building initiatives to support increased engagement in regional processes

- Review Cycle	As required
8. Other Issues	

#### WCPFC

Report heading	Notes
1. Reason for inclusion	Decisions at WCPFC have significant implications for Cook Islands. Through its engagement with FFA, Cook Islands also has capacity to influence decisions at WCPFC. In addition, decisions at WCPFC often have significant resource implications for MMR.
2. Operational Objective	Effective participation to secure Cook island's interests.
3. Indicator	Cook Islands' interests reflected in WCPFC decisions.
4. Performance Measure	The extent Cook Islands' interests are reflected in WCPFC decisions.
5. Evaluation	Cook Islands WCPFC negotiating briefs and WCPFC Reports.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	Full participation in WCPFC processes
- Future	Increase MMR capacity to engage in WCPFC processes
- Actions if Performance Measure is not met	Evaluate capacity building needs and develop a responsive capacity building programme
- Review Cycle	Annually
8. Other Issues	

#### FAO

Report heading	Notes
1. Reason for inclusion	Provides occasional technical advice and support. Is the primary global forum for developments impacting the fisheries sector including in relation to trade and IUU
2. Operational Objective	Effective participation and protection of Cook Islands' interests.
3. Indicator	Cook Islands engagement in FAO-related initiatives.
4. Performance Measure	Cook Islands collaborative initiatives with FAO.
5. Evaluation	Review of FAO-related initiatives adapted and implemented in the Cook Islands fisheries sector.
6. Robustness	Fair
7. Fisheries Management Response	
- Current	General monitoring and participation in FAO as resources permit.
- Future	Secure FAO services where FAO offers a comparative advantage.

- Actions if Performance Measure is not met	Review FAO engagement strategy.
- Review Cycle	As required
8. Other Issues	

#### Other RFMOs

Report heading	Notes
1. Reason for inclusion	Monitor to assess decisions and outcomes that may have implications for Cook Islands.
2. Operational Objective	Evaluate, and develop appropriate responses to, decisions in other RFMOs that have implications for Cook Islands.
3. Indicator	Cook Islands responses to relevant decisions in other RFMOs.
4. Performance Measure	Extent responses to relevant decisions in other RFMOs are reflected in Cook Islands decisions.
5. Evaluation	Periodic review of the implications for decisions in other RFMOs for Cook Islands.
6. Robustness	Robust
7. Fisheries Management Response	
- Current	<i>Ad hoc</i> , opportunistic, participation in other RFMOs generally with the support of FFA.
- Future	Increase capacity to monitor developments in other RFMOs of relevance to Cook Islands
- Actions if Performance Measure is not met	Re-assess resources dedicated to monitoring decisions and outcomes from other RFMOs.
- Review Cycle	As required
8. Other Issues	Contribution of the Vessel Registry to other Cook Islands financial sectors.

**Table 6.** Pacific tuna experts consulted to identify application and examples of EIA in tuna fisheries

Country/State	Organisation	Use of EIA in tuna fisheries	Other comments
Pacific Islands Intergovernmental Organisation	Forum Fisheries Agency (FFA)	<p>SPC used to do Ecological Risk Assessments (ERAs) around the time FFA was preparing use of EAFM.</p> <p>Purse seine fishing is not a new fishing method.</p> <p>Reviewed various consultancy sites for fisheries EIA (e.g. <a href="https://mrag.co.uk/services/environmental-assessment">https://mrag.co.uk/services/environmental-assessment</a>).</p> <p>Nothing in existence which resembles an EIA as directed by the Court of Appeal judgment, and none on tuna fisheries or in the Pacific. Tend to rely instead on regional scientific assessments and other work.</p> <p>Do not recall any EIA ever having been done on a tuna fishery (SKJ, BET, YFT or ALB) in the Pacific.</p> <p>All FFA member states rely on regional assessments for tuna fisheries under SPC and WCPFC.</p>	<p>Closest thing to EIA that FFA personnel are aware of is Australia's 2007 ecological risk assessment (ERA) for a Southern Bluefin Tuna purse-seine fishery.</p> <p>Advised that no Pacific jurisdiction has undertaken an EIA for tuna fisheries.</p>
Australia	Australian Fisheries Management Authority	<p>Australia Environment Protection and Biodiversity Conservation Act 1999 assessments.</p> <p>But Australian law does not require a full EIA for tuna fisheries.</p>	Persons consulted have extensive Pacific tuna expertise.
Federated States of Micronesia	National Oceanic Resource Management Authority	<p>An EIA has never been undertaken for the tuna fishery (SKJ, YFT and BET) because it is not required in national laws, or by WCPFC. Use EAFM.</p> <p>Regional scientific assessments, i.e. WCPFC stock assessments and total allowable effort (TAE), applied. WCPFC and sub-regional management arrangements used such as 3IA applied nationally.</p>	
Nauru	Fisheries and Marine Resources Authority	<p>Environmental standards, e.g. IOPP, IAPP, ISOPP used. These operational standards are also used elsewhere in the world re vessels, e.g. International Maritime Organisation standards. But no EIAs or any environmental assessment specifically undertaken. Sub-regional management arrangements applied nationally, PNA. Regional stock assessments and advice used.</p>	

Country/State	Organisation	Use of EIA in tuna fisheries	Other comments
New Zealand	Ministry for Primary Industries – International Fisheries Management & International Policy	New Zealand does not undertake a formal EIA for tuna species. The Minister, however, must consider environmental impacts when making decisions under the Fisheries Act. Referred to HMFS page <a href="https://www.fisheries.govt.nz/growing-and-harvesting/fisheries/fisheries-management/highly-migratory-species/">https://www.fisheries.govt.nz/growing-and-harvesting/fisheries/fisheries-management/highly-migratory-species/</a> . WCPFC stock assessments used.	National Fisheries Plan for Highly Migratory Species 2019 contains environmental objectives and targets.
Republic of Palau	Bureau of Marine Resources, Ministry of Natural Resources, Environment and Tourism	Does not use EIA for tuna fisheries or oceanic fisheries. EAFM used. SPC advice and WCPFC stock assessments used. Sub-regional management arrangements also used.	
Samoa	Ministry of Agriculture and Fisheries	EIA not used, but advice from SPC includes environmental impact considerations and WCPFC stock assessments. EAFM used.	
United States of America	National Oceanic and Atmospheric Administration	Occasionally, Environment Impact Statements (EISs) are undertaken, largely where there is a specific statutory obligation to do so. EISs involve a broader, programmatic environmental analysis of a fishery than EIAs or other project specific reports.	USA has used this method for WCPO US purse seine fishery.

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