



Empowered lives.  
Resilient nations.



**FFA**

OCEANIC FISHERIES MANAGEMENT PROJECT II  
WESTERN AND CENTRAL PACIFIC OCEAN

# TRANSBOUNDARY DIAGNOSTIC ANALYSIS

**PACIFIC ISLANDS**



OCEANIC FISHERIES MANAGEMENT



This Transboundary Diagnostic Analysis was prepared by:

**PROFESSOR DAVID VOUSDEN** of Rhodes University South Africa

through the support of the following organisations and agencies



The GEF unites 182 countries in partnership with international institutions, non-governmental organizations (NGOs), and the private sector to address global environmental issues while supporting national sustainable development initiatives. Today the GEF is the largest public funder of projects to improve the global environment. An independently operating financial organization, the GEF provides grants for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants. Since 1991, GEF has achieved a strong track record with developing countries and countries with economies in transition, providing \$9.2 billion in grants and leveraging \$40 billion in co-financing for over 2,700 projects in over 168 countries. **[www.thegef.org](http://www.thegef.org)**



*Empowered lives.  
Resilient nations.*

UNDP partners with people at all levels of society to help build nations that can withstand crisis, and drive and sustain the kind of growth that improves the quality of life for everyone. On the ground in 177 countries and territories, we offer global perspective and local insight to help empower lives and build resilient nations. **[www.undp.org](http://www.undp.org)**



The Food and Agriculture Organization (FAO) is specialized agency of the United Nations that leads international efforts to defeat hunger. Its goal is to achieve food security for all and make sure that people have regular access to enough high-quality food to lead active, healthy lives. With over 194 member states, FAO works in over 130 countries worldwide. FAO believes that everyone can play a part in ending hunger. **<http://www.fao.org/home/en/>**



The Pacific Islands Forum Fisheries Agency (FFA) strengthens national capacity and regional solidarity so its 17 Pacific island members can manage, control and develop their tuna fisheries now and in the future. Based in Honiara, Solomon Islands, FFA was established to help countries sustainably manage their fishery resources that fall within their 200-mile Exclusive Economic Zones (EEZs). FFA is an advisory body providing expertise, technical assistance and other support to its members who make sovereign decisions about their tuna resources and participate in regional decision making on tuna management through agencies such as the Western and Central Pacific Fisheries Commission (WCPFC). **<https://www.ffa.int/>**

# ACKNOWLEDGEMENTS

Professor David Vousden wished to acknowledge the many persons who have contributed to the development of this Transboundary Diagnostic Analysis. This document is the result of a number of working groups and consultations with specific inputs from many organisations. Much of the information herein has been gathered from high-quality existing reports and publications which are all clearly cited and acknowledged throughout the document and through the reference section. So many people have proved input, guidance and correction that it would require another lengthy document just to acknowledge them all. However, some individuals and agencies have been particularly supportive and essential to the process. First and foremost in this list must be Hugh Walton, the Chief Technical Adviser and Project Coordinator for the UNDP FAO GEF Project Oceanic Fisheries Management Project II – Pacific Islands Forum Fisheries Agency. Hugh has been enormously supportive throughout the process and provided much of the correction and improvement to the draft document. The inputs from other FFA staff were also indispensable and key to the accurate development of the TDA. In particular, Tim Adams (Director of Fisheries Management) provided patient advice and adjustment to the factual content of the TDA and James Movick (current Director-General) provided a valuable overview of the function, political position and ongoing needs of FFA and the Convention. Both Joe Padilla and Andrew Hudson of UNDP have also contributed through their kind guidance and advice, particularly through the logistical process. Also vital to this process were the many colleagues at Fisheries, Aquaculture and Marine Ecosystems Division (FAME) of the Secretariat of the Pacific Community, too many of them to mention, who gave up so much of their time focusing on vital fisheries management issues to assist and advise. The list would not be complete without mentioning Les Clark who has been so instrumental in driving effective fisheries management in the region and who, despite his commitments and constant involvement at the heart of fisheries management, found time to gently but forcefully correct the mistakes and sensitivities of the original draft. It has been a pleasure reuniting with these people and with the region after an absence of some 15 years since the early days of the Convention and the GEF and UNDP support back at the turn of the century. It has been even more gratifying to see what enormous advances have been made since those early days regarding more effective management and sustainability of the fish stocks and the associated ecosystem. Although there is still much to do there is no doubt that both the will and the expertise are in place.

## DAVID VOUSDEN

Grahamstown, South Africa. July 2018

# WESTERN CENTRAL PACIFIC OCEANIC FISHERIES MANAGEMENT TRANSBOUNDARY DIAGNOSTIC ANALYSIS

## TABLE OF CONTENTS

<b>ACKNOWLEDGEMENTS</b>	<b>2</b>
<b>ACRONYMS AND ABBREVIATIONS</b>	<b>5</b>
<b>EXECUTIVE SUMMARY AND OVERVIEW OF THE ANALYSIS</b>	<b>7</b>
<b>1. INTRODUCTION – OBJECTIVE OF A TDA</b>	<b>16</b>
<b>2. HISTORICAL BACKGROUND AND GUIDANCE FOR CURRENT TDA</b>	<b>17</b>
A. UN GEF PROJECT SUPPORT TO OCEANIC FISHERIES MANAGEMENT IN THE PACIFIC SIDS THROUGH SPC AND FFA (AND PREVIOUSLY SPREP)	19
B. SYSTEM BOUNDARY FOR THE TRANSBOUNDARY DIAGNOSTIC ANALYSIS –THE CONVENTION AREA AND RELATIONSHIP TO ECOSYSTEM OTHER SUB-REGIONAL AGREEMENTS AND TREATIES	22
<b>3. EXISTING MANAGEMENT ARRANGEMENTS FOR OCEANIC FISHERIES IN THE CONVENTION AREA</b>	<b>28</b>
A. REGIONAL INSTITUTIONS AND MANAGEMENT ARRANGEMENTS FOR OCEANIC FISHERIES	28
B. NATIONAL INSTITUTIONAL AND MANAGEMENT ARRANGEMENTS FOR OFFSHORE FISHERIES IN THE INDEPENDENT PACIFIC ISLAND COUNTRIES	42
C. NON-GOVERNMENTAL BODIES INVOLVED IN OCEANIC FISHERIES MANAGEMENT	48
<b>4. ASSESSMENT OF STATUS OF THE OCEANIC FISHERIES AND ITS MANAGEMENT IN THE CONVENTION AREA</b>	<b>52</b>
A. GENERAL BIOLOGY AND STOCK ASSESSMENT OF THE TUNA TARGET SPECIES	52
B. SOCIOECONOMIC STATUS IN THE CONVENTION AREA	78
C. SCIENTIFIC ASSESSMENT AND MONITORING	94
D. REGULATORY COMPLIANCE, MONITORING AND MANAGEMENT	103
E. CAPACITY BUILDING AND TRAINING	121
<b>5. CONCLUSIONS FROM THE TRANSBOUNDARY DIGANOSTIC ANALYSIS AND POTENTIAL WAYS FORWARD FOR IMPROVING MANAGEMENT</b>	<b>124</b>
A. OUTSTANDING AREAS OF CONCERN	124
B. CAUSAL CHAIN ANALYSIS	127
C. THE FUTURE FOR OCEANIC FISHERIES IN THE WCPF REGION – THE REGIONAL ROAD-MAP AND A STRATEGIC WAY FORWARD	131

<b>6. REFERENCES</b>	<b>134</b>
<b>7. ANNEXES</b>	<b>138</b>
A. LIST OF CURRENT CONSERVATION AND MANAGEMENT MEASURES AND RESOLUTIONS OF THE WESTERN AND CENTRAL PACIFIC FISHERIES COMMISSION	138
B. MOU BETWEEN WCPCF AND SPC	140
C. MOU BETWEEN WCPFC AND FFA	144
D. NATIONAL INSTITUTIONAL AND MANAGEMENT ARRANGEMENTS FOR OFFSHORE FISHERIES IN THE INDEPENDENT PACIFIC ISLAND COUNTRIES	146



# ACRONYMS AND ABBREVIATIONS

<b>3IA</b>	Third Implementing Arrangement of the Nauru Agreement
<b>ABNJ</b>	Areas Beyond National Jurisdiction
<b>ALC</b>	Automatic Location Communicator
<b>BMIS</b>	Bycatch Mitigation Information System
<b>BMIS</b>	Bycatch Management Information System
<b>CCAMLR</b>	Convention on Antarctic Marine Living Resources
<b>CCMs</b>	Commission Members, Cooperating Non-Members and Participating Territories
<b>CCSBT</b>	Commission for the Conservation of Southern Bluefin Tuna
<b>CMM</b>	Conservation and Management Measure(s)
<b>CPUE</b>	Catch Per Unit of fishing Effort
<b>DBEM</b>	Dynamic Bioclimate Envelope Model
<b>DWFN</b>	Distant Water Fishing Nation
<b>EBFM</b>	Ecosystem-based Fisheries Management
<b>ECOPATH /ECOSIM</b>	A software programme that allows for the modelling of entire ecosystems
<b>EEZ</b>	Exclusive Economic Zone
<b>EM</b>	Electronic Monitoring
<b>ENSO</b>	El Niño Southern Oscillation
<b>EPO</b>	Eastern Pacific Ocean
<b>ER</b>	Electronic Reporting
<b>ETP</b>	Eastern Tropical Pacific
<b>EU</b>	European Union
<b>FAD</b>	Fish Aggregating Device
<b>FAME</b>	Fisheries, Aquaculture and Marine Ecosystems Division of SPC
<b>FAO</b>	Food and Agriculture Organisation of the United Nations
<b>FFA</b>	Forum Fisheries Agency
<b>FFC</b>	Forum Fisheries Committee
<b>FL</b>	Fork length
<b>FSM</b>	Federated States of Micronesia
<b>GDP</b>	Gross Domestic Product
<b>GEF</b>	Global Environment Facility

<b>HCR</b>	Harvest Control Rules
<b>IA</b>	Implementing Agency
<b>IATTC</b>	Inter-American Tropical Tuna Commission
<b>IOTC</b>	Indian Ocean Tuna Commission
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>ISNR</b>	Issue Specific National Reports
<b>ISSF</b>	International Seafood Sustainability Foundation
<b>IUU</b>	Illegal, Unregulated and Unreported (fishing)
<b>IW</b>	International Waters
<b>LME</b>	Large Marine Ecosystem
<b>LOSC</b>	UN Law of the Sea Convention, 1982
<b>LRP</b>	Limit Reference Point
<b>MCP</b>	Maximum Potential Catch
<b>MCS</b>	Monitoring, Control and Surveillance
<b>MEA</b>	Multilateral Environmental Agreement
<b>MHLC</b>	Multilateral High-Level Conference
<b>MoU</b>	Memorandum of Understanding
<b>MP</b>	Management Procedures
<b>MSC</b>	Marine Stewardship Council
<b>MSG</b>	Melanesian Spearhead Group
<b>MSY</b>	Maximum Sustainable Yield
<b>MT</b>	Metric Tonnes
<b>MTCs</b>	Minimum Terms and Conditions (of access)
<b>MTR</b>	Mid-Term Review
<b>MULTIFAN-CL</b>	A length-based age-structured computer model used for fish stock assessment
<b>NFA</b>	National Fisheries Assessment
<b>NGO</b>	Non-Governmental Organisation
<b>NTFSR</b>	National Tuna Fisheries Status Reports
<b>OFM</b>	Oceanic Fisheries Management
<b>OFF</b>	Oceanic Fisheries Programme of the Secretariat to the Pacific Community

<b>Pacific SIDS</b>	Pacific Small Island Developing States
<b>PCCOS</b>	Pacific Community Centre for Ocean Science
<b>PDO</b>	Pacific Decadal Oscillation
<b>PEQD</b>	Pacific Equatorial Divergence
<b>PICs</b>	Pacific Island Countries
<b>PICT</b>	Pacific Island Countries and Territories
<b>PIOFMP</b>	Pacific Islands Oceanic Fisheries Management Project
<b>PIRFO</b>	Pacific Island Regional Fisheries Observer
<b>PLA</b>	Population-Level Assessment
<b>PMU</b>	Project Management Unit
<b>PNA</b>	Parties to the Nauru Agreement
<b>PNG</b>	Papua New Guinea
<b>PS</b>	Purse Seine
<b>PSMA</b>	Port State Measures Agreement
<b>PTTP</b>	Pacific Tuna Tagging Programme
<b>QAR</b>	Quality Assurance Review
<b>RBM</b>	Results Based Management
<b>RFMO</b>	Regional fisheries management organisation
<b>ROP</b>	Regional Observer Programme
<b>RP</b>	Reference Point
<b>RTTP</b>	Regional Tuna Tagging Programme
<b>SAP</b>	Strategic Action Programme
<b>SAW</b>	Stock Assessment Workshops
<b>SB, SB0</b>	Spawning stock biomass, spawning stock biomass in the absence of fishing
<b>SC</b>	Scientific Committee (of the WCPFC)
<b>SCTB</b>	Standing Committee on Tuna and Billfish
<b>SEAPODYM</b>	Spatial Ecosystem and Population Dynamics Model
<b>SIDS</b>	Small Island Developing States
<b>SLL</b>	Southern Longline
<b>SPC</b>	Secretariat to the Pacific Community
<b>SSAP</b>	Skipjack Survey and Assessment Programme
<b>STCZ</b>	Sub-Tropical Convergence Zone
<b>TAC</b>	Total Allowable Catch
<b>TAE</b>	Total Allowable Effort
<b>TCC</b>	Technical and Compliance Committee
<b>TDA</b>	Transboundary Diagnostic Analysis

<b>TFA</b>	Tuna Fisheries Assessment
<b>TKA</b>	Tokelau Arrangement
<b>TL</b>	Trophic Level
<b>TLL</b>	Tropical Longline
<b>TR</b>	Terminal Report
<b>TRP</b>	Target Reference Point
<b>TUFMAN</b>	Tuna Fisheries Database Management System
<b>TVM</b>	Te Vaka Moana
<b>UN</b>	United Nations
<b>UNCLOS</b>	United Nations Convention on the Law of the Sea
<b>UNDP</b>	United Nations Development Programme
<b>UNFSA</b>	United Nations Implementing Agreement on Highly Migratory Fish Stocks and Straddling Fish Stocks 1995 (short title)
<b>VDS</b>	Vessel Day Scheme
<b>WCPFC</b>	Western and Central Pacific Fisheries Commission/Convention
<b>WCPO</b>	Western and Central Pacific Ocean
<b>WPWP</b>	Western Pacific Warm Pool (Large Marine Ecosystem)
<b>WTP</b>	Western Tropical Pacific
<b>WTP</b>	Western Tropical Pacific
<b>WWF</b>	World Wide Fund for Nature

# EXECUTIVE SUMMARY AND OVERVIEW OF THE ANALYSIS

This TDA fills an earlier gap in the management development process for the Pacific Islands Oceanic Fisheries. When the original Strategic Action Programme (SAP) was adopted back in 1997 (over 20 years ago), it was not based on a detailed TDA. In any event, a TDA of this nature requires updating regularly, at least every 5-10 years (as does the SAP), in order to adapt the information and the management strategy to changing political, administrative, scientific and ecosystem level circumstances and parameters.

The Western and Central Pacific Fisheries Commission (WCPFC) was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC Convention), which entered into force on 19 June 2004. The WCPFC Convention draws on many of the provisions of the UN Fish Stocks Agreement (UNFSA) while, at the same time, reflecting the special political, socio-economic, geographical and environmental characteristics of the WCPO region.

The Western Pacific Warm Pool straddles the WCPFC Convention Area and provides approximately 90% of the catch of tunas and other pelagic species in the Convention Area. It covers a wide area of the Pacific Ocean, lying to the west of the strong divergent equatorial upwelling in the central equatorial Pacific known as the “cold tongue” and between the sub-tropical gyres in the North and South Pacific.

Over the past two decades, a number of regional and sub-regional initiatives have evolved that have focused on strengthening the fisheries management regime and approaches in the Convention area. These initiatives have been notable so far in i) facilitating the establishment of the WCPFC and ensuring that Pacific Small Island Developing States are able to contribute fully to the deliberations of the Commission and to meet their membership obligations, and ii) strengthening capacity and expertise in the region that has helped to ensure that Pacific SIDS’ fishery representatives have been able to be actively involved in the technical meetings of the Commission alongside the Distant Water Fishing Nations (DWFNs).

One of the primary sources of support to the Pacific SIDS and to the WCPFC Commission Members generally has been the various GEF projects implemented by UNDP and FAO. These include (sequentially):

## **South Pacific International Waters Strategic Action Programme formulation (1997)**

This included the preparation of a Strategic Action Programme (SAP) and the formulation of a project document covering the Oceanic Fisheries Management (OFM) and the Integrated Coastal and Watershed Management (ICWM) components

## **Implementation of the Strategic Action Programme (SAP) of the Pacific Small Island Developing States (2000-2005)**

This focused on sustainable ocean fisheries; improved national and regional management capability; stock and by-catch monitoring and research; and, enhanced national and regional management links.

## **PIOFMP 1 – Pacific Island Oceanic Fisheries Management Project (2005-2011)**

The aim of this project was to achieve ratification of the Western and Central Pacific Fisheries Convention; to facilitate the establishment of the Western and Central Pacific Fisheries Commission (WCPFC); to support the South Pacific Small Island Developing States (PacSIDS) in engaging with and meeting the obligations of membership of the WCPFC, and; to contribute to the knowledge and understanding necessary for the Commission and its membership to assess fish stock condition and to make informed and responsible decisions about the management of those stocks.

## PIOFMP 2 - Implementation of Global and Regional Oceanic Fisheries Conventions and Related Instruments in the Pacific Small Island Developing States (2014-2018)

This has four main components which aim to i) support Pacific SIDS as the major bloc at the WCPFC to adopt regional conservation and management measures, ii) support the innovative approaches being developed by Pacific SIDS at a sub-regional level as they collaborate in common fisheries, iii) assist Pacific SIDS to apply measures nationally in their own waters and to their fleets, which is the major component of the Project, and iv) enhance stakeholder participation, including industry participation in oceanic fisheries management processes, and improve understanding and awareness more generally of the challenges and opportunities facing Pacific SIDS in oceanic fisheries management.

All the tropical tuna target stocks in the region are currently estimated as being fished sustainably as is discussed in the main section of the TDA and confirmed by the latest Overview of Stocks of Interest to the WCPFC as of 22<sup>nd</sup> June 2018<sup>1</sup>.

Stock	Latest Assessment	Overfished	Overfishing	Next Assessment
<b>WCPO Tuna</b>				
01 Bigeye tuna ( <i>Thunnus obesus</i> )	2017 (SC13)	No (84%)	No (77%)	2020
02 Yellowfin tuna ( <i>Thunnus albacares</i> )	2017 (SC13)	No (92%)	No (96%)	2020
03 Skipjack tuna ( <i>Katsuwonus pelamis</i> )	2016 (SC12)	No	No	2019
04 South Pacific albacore tuna ( <i>Thunnus alalunga</i> )	2015 (SC11)	No	No	2018

There had previously been some concern and uncertainty about the status of the Bigeye stocks. However, the 15th Annual Ministerial Forum Fisheries Committee Meeting (4-5 July 2018) notes that:

*"In terms of goal 1 (sustainability) the main change has been the improved stock status of bigeye tuna. While this is a result of changes to the parameters in the stock assessment, more than a response to management action, it is still very encouraging to be able to report that all four main tuna stocks in the WCPO are 'in the green' – the only tuna fishing region for which this is the case".*

Therefore, the main Tuna Fishery in WCPF Area is currently deemed sustainable and within acceptable catch limits. However, this could alter significantly into an (economically) unsustainable scenario A. if current management practices are not further improved in line with current (and predicted) fishing pressures and B. through recognition of and adaption to the impacts already being felt from climate change.

Furthermore, because the WCPO tuna fisheries provide more than 50% of global tuna catches and the WCPO is the only oceanic region where stocks are currently being fished sustainably, the value of the WCPO tuna fisheries can be expected to attract increased commercial pressure for higher catches in future. The management structures in place are still not sufficiently well developed or sufficiently ecosystem-based that they can ensure future sustainability in the face of this expected increase in commercial pressure, along with insufficient data for effective long-term, ecosystem-based management purposes.

Fisheries exports are of major important to some countries and territories in the region and represent over 40% of the value of all exports in about half of the countries/territories. The three countries/territories that have the largest values of fishery exports are American Samoa, PNG, and French Polynesia (of the total of about US\$820 million in fishery exports from the region in 2014, about 76% were from these three). All Pacific Island countries (and some territories) prepare national fishery reports for the annual meeting of the Scientific Committee of the WCPFC. The fisheries-related employment information available for each country and territory is very much a 'mixed bag' of facts.

<sup>1</sup> <https://www.wcpfc.int/doc/00/overview-stocks-interest-wcpfc>

However, studies undertaken into the economies of the PICTs conclude that the total amount of fishery exports from the region fell by about 42% in real value in the period 2007 to 2014. The fall in the value of canned tuna exports from American Samoa was responsible for about 37% in the total regional decline. Another important conclusion arising from these studies is that the fisheries contribution to GDP is underestimated in most Pacific Island countries.

Recent studies into food security for the region have revealed that coastal fisheries in 16 of the 22 PICTs will not be able to continue providing the fish recommended for good nutrition of growing Pacific Island populations, and that by 2020 tuna will need to supply 12% of the fish required by PICTs for food security, increasing to 25% by 2035. Yet, in relative terms, the percentages of the region's tuna catch that will be needed in 2020 and 2035 to fill the gap in domestic fish supply are small, i.e., 2.1% and 5.9% of the average present-day industrial catch, respectively. The projected population growth in the Pacific Island countries, combined with their narrow resource base, declines in net food production per capita and growing reliance on imported foods, will lead to a further decline in food security. The potential social impacts that may result from this lack of food security are discussed and are considered to be critical national and regional policy issues facing Pacific Island countries.

Most of the catch in the WCPO is taken in waters of developing Pacific Island States. Most of the rest of the catch is taken in Indonesian and Philippines waters. In essence, this means that over 85% of the catch is taken in the waters of developing coastal states who see themselves as the major owners of these resources. This is very different to other regions where tuna catches are largely made in the high seas and creates unique opportunities and difficulties for effective resource management. In terms of opportunities, zone-based management (through which compatible measures are applied by coastal states in their EEZs while the Commission focuses on setting overall standards and focusing on implementation in the high seas) provides for a much wider and potentially more effective range of measures to be applied reflecting the diverse conditions across the WCPO. However, this may also tend to foster tensions between the resource-owning developing coastal states and the distant water fleets who still take much of the catch, especially in Pacific SIDS waters.

Despite the undoubted successes in maintain sustainability in this fishery to date, the overall management process at the WCPFC level is still somewhat ad hoc, involving almost annual renegotiations; and is vulnerable to failure to reach agreement among competing interests. To confirm and ensure future sustainability there needs to be substantially more development of harvest strategies with robust harvest control rules in place for how fishing patterns will be adjusted to respond to changes in stock status.

Unloading and port sampling data are an important element in the overall Fisheries Information Management system (FIMS), especially given the transnational nature of WCPO tuna fisheries and the lack of port/transshipment facilities in many countries. Port sampling is conducted to collect data on the species composition and the length-frequency of the landed catch. The Oceanic Fisheries Programme (OFP) of the Secretariat to the Pacific Community continues to support the collection of biological data and/or the collection of landings data from around 18 ports in the Pacific Islands area of the WCP Convention Area, including ports in 8 FFA member countries. Support for this work includes port sampler training, technical and financial assistance, data processing, provision of forms and sampling equipment such as callipers and support for tag recovery and biological sample support staff.

Stock assessment of the major targeted tuna species and population modelling continue to be major components of the OFP's work, in support of scientific advice on the status of the stocks that is provided regularly. A major role of the OFP is communicating the results of assessments and ad-hoc reports requiring scientific advice. Data and research/stock assessment reports to the Commission are promulgated through a range of publications including SC reports and the Regional Tuna Bulletin and Tuna Fishery Yearbook. At the regional level SPC also works with the FFA to provide analytical support for regional fisheries management initiatives. This includes support of sub-regional bodies, such as the Office of the Parties to the Nauru Agreement (PNAO) and Te Vaka Moana. SPC has also begun to provide analytical support to the Tokelau Arrangement which is a sub-regional management arrangement that has developed since OFPM 2 was designed, and which is currently administered by FFA. At the national level, SPC works closely with national fisheries counterparts to provide scientific advice. Two key elements of that advice have been assistance with the development of tuna management and development plans

(with FFA) and completion of National Tuna Fisheries Status Reports (NTFSRs). The NTFSRs have been phased out more recently due to the introduction of country web pages and Issue Specific National Reports, which were initiated in 2013. The Offshore Fisheries Project's National Scientists conduct Stock Assessment Workshops (SAW), which seek to provide PICT fisheries staff with the skills to interpret, critique, use, and communicate the results of the regional tuna stock assessments conducted by SPC. Tufman 2 is a web-application where fisheries data can be entered and analysed directly from any location, subject to rules agreed between countries and regional agencies. This new application model means that data (once entered) are available in near real time anywhere in the world by authorised users with a secure login. This facility is of great value to PICs, e.g. to inform positions at regional/ Commission meetings and during access negotiations.

A food web study of the WCPO tuna ecosystem was completed by an earlier GEF project and provides an initial characterization of the Western Pacific Warm Pool Ecosystem. In particular, trophic relationships among major components have been determined by conducting biological sampling, and databases to support detailed ecosystem modelling. Two forms of ecosystem modelling have been developed by the OFP. One is a spatial ecosystem and population dynamics model (SEAPODYM), which was initially developed for investigating physical-biological interactions between tuna populations and the pelagic ecosystem of the Pacific Ocean. The other is Ecopath with Ecosim, which is a complementary, biodynamic trophic modelling approach, based on the requirement that the biomass of the ecosystem is balanced and consequently the effects of altered biomass production or harvest on the entire ecosystem assemblage can be explored. These two modelling strategies provide the capacity to test different fishing policies and environmental (climate) change scenarios to assist managers with identifying plausible management options that will achieve their objectives.

The outcomes of this modelling showed that the structure of the warm pool ecosystem is resistant to considerable perturbation (e.g. large changes in the harvest of the surface fish community). The intrinsic resistance of the ecosystem to perturbation appears to be related to the high diversity of predators in the food web that consume a wide range of prey.

The tuna fisheries of the WCPO principally target the four main tuna species. However, the fisheries also catch a range of other species in association with these. Some of the associated species (bycatch) are of commercial value (by-products), while many others are discarded. There are also incidents of the capture of species of ecological and/or social significance (protected species), including marine mammals, sea birds, sea turtles and some species of shark (e.g. whale sharks). Information concerning the catch composition of the main tuna fisheries in the WCPO comes largely from the various observer programmes operating in the region. The Bycatch Management Information System (BMIS) focuses on bycatch mitigation and management in oceanic tuna and billfish fisheries. It is an open resource useful for fishery managers, fishers, scientists, observers, educators and anyone with an interest in fisheries management. As a reference and educational tool, the BMIS aims to support the adoption and implementation of science-based management measures so that bycatch is managed comprehensively and sustainably.

The Ecopath and Ecosim modelling have found that the structure of the ecosystem is most sensitive to changes in the biomass of prey groups (e.g. small pelagic fish such as anchovy) because these important mid-trophic level species are both important prey for tuna and are predators of organisms in the lower trophic levels. The simulations showed that the largest impacts of changes in purse-seine and longline fishing effort are likely to be on the groups comprising long-lived, bycatch species with lower productivity (e.g. silky and white-tip sharks, opah, swordfish and blue marlin). These groups are the most sensitive to changes in harvests of fish species due to their longevity, age-at-first maturity, and low rate of reproduction.

Compliance and monitoring for management purposes within the WCPFC area ultimately depends on i) the original access arrangements and licencing, ii) how accurately compliance to those agreements can be evaluated and enforced, iii) having sufficient information to see if the agreements are 'fit-for-purpose' and are effectively managing the stock in a sustainable and 'ecosystem-friendly' manner, and iv) having the necessary management strategies in place that can adapt rapidly to identified changes in (and threats to) the target stocks and to a sustainable fishery overall. In the context of original arrangements/agreements and licencing, the two management practices most commonly employed are those of access management agreements (such as the

Vessel Day Scheme) and traditional catch-based management agreements. Essentially, it is both the quality and the availability of data which represents one of the greatest challenges to effective monitoring and management processes.

Since 2011, the Commission has been implementing the Compliance and Monitoring Scheme (CMS) through a series of Conservation and Management Measures (CMMs) that have applied the CMS on an annual basis. Subsequent CMMs have often included incremental changes to the assessment procedure and the breadth of coverage of the CMS.

The purpose of the WCPFC Compliance Monitoring Scheme (CMS) is to ensure that Members, Cooperating Non-Members and Participating Territories (CCMs) implement and comply with obligations arising under the Convention and conservation and management measures (CMMs) adopted by the Commission. The Commission and its members have adopted a number of monitoring based CMMs (Conservation and Management Measures) since its formation which are discussed in the main text.

E-Reporting provides 'open-system' (i.e. accessible for entry) hardware and software for manual recording of fisheries data which can be transmitted to a database at the end of a trip over a mobile network or daily from a fishing vessel using a satellite data connection. The information saved and transmitted can include catch log-sheets, observer reports, transshipment reports, and port sampling records.

E-Monitoring refers to hardware and software which automatically collects and transmits fisheries information from a vessel. It is a closed system (black box) that does not accept manual input or any other input external to the system. It is tamper-proof and automatic and there is no opportunity to manipulate data being transmitted. The information captured and transmitted includes that from the onboard video, winch and engine sensors, vessel VMS/AIS, satellite tracking of FADS and fish tagging program monitoring.

The combination of e-Reporting and e-Monitoring will make compliance monitoring and enforcement a faster and easier job. Effective compliance operations require multiple parallel information sources. E-reporting and e-monitoring will provide simultaneous access to multiple sources of information (log-sheets, observer, port, CMM) at end of trip or in near real time

The Regional Fisheries Surveillance Centre (RFSC) was established in 1997, the primary roles of the RFSC was to administer the FFA Vessel Register and manage the FFA VMS on behalf of FFA member countries. The development of the Operations Room in 2009 added a new dimension to the role and functions of the RFSC which now includes the collection, analysis and dissemination of a range of fisheries information. The Operations Room depends on the ongoing development of the Regional Information Management Facility (RIMF), which is an adjunct to the RFSC and allows for fisheries information collected by FFA to be stored in secure databases and easily accessed for analysis using a compliance analysis system to support the Regional Surveillance Picture.

Many of the Pacific SIDS are challenged and constrained by the increasing demands of WCPFC processes balanced against their having small operational teams. A number of administrations have recruited new personnel which require training and there is also generally a fairly constant staff turnover. In addition, many administrations are unable to cover the skill set in key technical areas such as law and regulation and must rely on broader support from the office of the attorney general or from FFA. One of the greatest achievements of the various GEF support projects has been the capacity building elements which have helped to give Pacific SIDS' fishery representatives the enhanced confidence to present and negotiate their positions at Commission meetings, to be actively involved in the technical meetings of the Commission, and to sit as equals at the same table as Distant Water Fishing Nations (DWFNs). Clearly, much has been achieved already over the past 20 years in the context of training and capacity building but there are still areas of weakness and the need to recognise that such capacity building and training is an on-going process in order to develop the skills and expertise of new scientists, technicians, managers and, indeed policy-makers as they progress 'up-the-ladder'. Building capacities of Pacific SIDS as responsible flag states as well as responsible coastal states is an increasing priority as Pacific SIDS progressively replace the foreign fleets in their waters with their own vessels and find themselves increasingly engaged also in fishing in the high seas and the waters of other states.

The certification of fisheries as sustainable, and the eco-labelling of fish and seafood products from certified fisheries, along with robust systems for tracing fish products to ensure they originate from certified fisheries are an increasingly powerful set of instruments for promoting sustainable fisheries and increasing economic benefits from fisheries. These programmes with associated programmes to raise consumer awareness enable consumer interest in sustainability to be harnessed to provide incentives for sustainable well-managed fisheries. The success of the MSC certification of the PNA free school fishery and the associated Pacific marketing venture in incentivising free school fishing that provides returns to vessel operators, processors, brand-owners and PNA resource-owning states is a good example of this approach which is of increasing importance as more WCPO fisheries, including Pacific SIDS' fisheries, are certified.

The TDA has identified the main areas of impact and associated threats identified and these inevitably must focus on oceanic fisheries as the major transboundary issue. A number of environmental impacts and associated socioeconomic impacts have been identified through a Causal Chain Analysis. These can be summarised as:

- Risk of overfishing developing (associated with weaknesses in existing management arrangements, some shortfalls in scientific understanding, need for strengthening of compliance and addressing of data gaps) which could lead to a possible collapse in fisheries revenues and associated livelihoods
- Bycatch of many important non-target species (especially vulnerable species such as sharks and turtles) either unknown or too high which could result in the potential loss of food sources from by-catch as well as a loss of ecosystem services to Pacific SIDS
- Tuna stock ranges altering, expanding and probably moving eastwards. This could lead to A. Increased access to stocks in eastern area of WCPFC (e.g. Kiribati) alongside B. Decrease in Access to stocks in western area of WCPFC (e.g. PNG)
- General decrease in both primary and secondary productivity and tuna forage with a subsequent potential fall in income due to lower yields and CPUE and general decline in market supply of tuna stocks
- Potential for overall disruption and deterioration of the WCWP Large Marine Ecosystem and its services including damage to unique ecosystems and species within the WPWP LME (e.g. through overfishing on seamounts) which could lead to the loss of ecosystem services and unique biodiversity to Pacific SIDS which could further lead to threats to food security and livelihoods as well as national and regional economies
- Detrimental impacts from coastal degradation and pollution on coastal species that A. form part of oceanic food chain (and particularly reef larvae that are young tuna forage which could lead to a fall in revenues from oceanic fisheries), and B. that provide subsistence or form part of small scale artisanal fishery resulting in the loss of coastal food security

The main Root Causes of these impacts as defined through the Causal Chain Analysis are presented in the TDA, along with a list of the possible actions that could be adopted in order to address them (as follows):

## PRIORITY ACTIONS TO ADDRESS THE CAUSES OF THREATS AND IMPACTS ON THE TRANSBOUNDARY OCEANIC FISHERIES IN THE WESTERN PACIFIC WARM POOL LME

### 1. WEAKNESSES IN MANAGEMENT AND COMPLIANCE, BOTH 'IN-ZONE' AND ON THE HIGH SEAS

#### **Actions:**

- a. Stronger emphasis on the precautionary approach and stronger long-term management strategies and objectives (including the adoption of harvest strategies based on reference points and harvest control rules as detailed in Annex II of the UN Fish Stocks Agreement)
- b. Reform longline management including enhancing zone-based management arrangements in Pacific SIDS waters and improving the effectiveness of management systems and control of longline fishing in the high seas
- c. Strengthen purse seine management with a focus on improved FAD management and improved control of purse seine effort in the high seas
- d. Support the move toward adoption and/or improvement in ecolabelling, consumer awareness and consequent market influences on better management, including through identifying and adopting improvements to catch documentation and traceability
- e. Improvements and expansion in information on catch, effort, bycatch, unloading and transshipping etc. through better coverage and technology (particularly on the high seas with longline activity). Ideally aiming for trip-by-trip and vessel-specific data on species and sizes, fishing gear, etc.
- f. Improvements (and standardisation) in guidelines for national fisheries officers and staff along with expanded training and capacity building with an emphasis on preventing under-reporting and discrepancies between trip and landing reports.
- g. Strengthen the capacity of SIDS to address and improve their compliance as flag states. This is of increasing importance and need as the SIDS fleets grow and replace the 'distant-water' fleets.
- h. Better integration of E-Monitoring and E-Reporting into national administrative processes and port state practices.
- i. Coordination between regional and sub-regional management strategies, agreements and administrative bodies to address any 'conflicts of interest' between smaller coastal states and larger fishing states
- j. Strengthening of capacity in SIDS to effectively address increases in administrative and institutional burden
- k. Strengthening of Observer Programmes (at both national and regional levels), including in areas such as observer health and safety, improved coverage of the longline fishery and transshipment, especially in the high seas, shifting of some reporting responsibilities to vessel operators to enable observers to undertake higher priority activities

## **2. IMPACTS FROM CLIMATE CHANGE AND ASSOCIATED CONCERNS DUE TO EXCESSIVE CARBON EMISSIONS AND LACK OF ADOPTED GLOBAL MITIGATION PROCEDURES**

### **Actions:**

- a. Continuing and expanding data capture and modelling related to climate change and especially i) predictions for the size and extent of the Warm Pool, ii) predicted temperature and pH changes, iii) the consequent change in distribution and access to tuna target species
- b. improved responsiveness to climate-induced changes in stock distribution through zone-based adaptive management arrangements and procedures.
- c. pursuing legal recognition of the defined baselines established under UNCLOS to remain in perpetuity
- d. More focus on capture of productivity data (both primary and secondary) and specific tuna forage availability
- e. Inclusion of studies to ascertain the interconnectivity between coastal changes and impacts related to climate change and offshore effects and impacts on the oceanic fisheries (e.g. larval tuna/top predator forage and larval tuna)
- f. Improved and continuous assessments of the likely socioeconomic effects from these impacts from climate change
- g. Regular input from the above modelling and predictions into adaptive management guidelines and policy briefs for CCM (WCPFC Members)

## **3. INADEQUATE APPLICATION OF ECOSYSTEM-BASED MANAGEMENT**

### **Actions:**

- a. Capture of pertinent data and development of modelling to deal with species management (target and non-target) on an interactive basis rather than single-species management decisions (such as catch limits)
- b. Scientific assessment on the role and impact of bycatch within the ecosystem including the interactive function with the target species
- c. Studies on the effects of the removal of apex predators from isolated and unique ecosystems like seamounts on which information is currently very limited or unknown
- d. Improvements in data capture, analysis and management application at the regional and ecosystem level through more effective 'translation' of results and 'trends' into management processes and policy guidance, including optimisation of ecosystem values

## **4. EFFECTS OF COASTAL IMPACTS ON THE OFFSHORE OCEANIC ECOSYSTEM**

### **Actions:**

- a. Assessment of the effects of land-based impacts on habitats and species with interconnectivity into the oceanic ecosystem, particularly large predators (tuna and others) and their prey
- b. Provide support to island communities and subsistence/artisanal fishermen related to growing dependence on offshore fisheries as coastal fisheries decline

## **5. DISCHARGES AND WASTE DISPOSAL AT SEA AND FROM LAND-BASED SOURCES**

### **Actions:**

- a. Assessment of the impacts from waste material and discharges on the oceanic ecosystem and recommendations for mitigation
- b. Strategy for preventing the loss of FADs and other fishing gear and mitigating/reducing the impacts where such losses may occur.
- c. Improvements in compliance with international, legally-binding agreements to prevent pollution in the oceans that can impact on the WPWP LME and its fisheries

The actions proposed above could provide part of the framework for an on-going Strategic Action Programme for Sustainable Management of Oceanic Fisheries and related species within the Western Pacific Warm Pool LME.

# INTRODUCTION – OBJECTIVE OF A TDA



1

The purpose of conducting a TDA is to scale the relative importance of sources and causes (from the ‘immediate’ to the ‘root’) of the transboundary problems within a large marine ecosystem or similar body of water, and to identify potential preventive and remedial actions. In particular, the TDA aims to:

- Identify or confirm, and prioritise the transboundary problems and issues;
- Gather and interpret information on the environmental impacts and socio-economic consequences of each problem
- Analyse the immediate, underlying, and root causes for each problem, with a specific focus on which practices or activities are driving and/or maintaining these root causes
- Define potential solutions and actions that can be taken to remove or alter these drivers and thus mitigate the root causes

The TDA then provides the technical and factual basis that is agreed by the ‘transboundary’ countries and upon which these countries and other stakeholders can undertake negotiation and adoption of a Strategic Action Programme (SAP) that provides the formal basis for a road-map of actions to address the transboundary problems and issues.

# HISTORICAL BACKGROUND & GUIDANCE FOR CURRENT TDA

## 2

The original Strategic Action Programme for the International Waters of the Pacific Islands was adopted by 13 countries in 1997<sup>2</sup>. This was unorthodox in its formulation and composition in that it was not preceded by a detailed TDA process or document. However, the SAP document itself did somewhat unusually define the transboundary environmental concerns, threats and root causes (including tables highlighting the proximate and ultimate root causes, environmental and socio-economic effects, associated management issues and the information gaps that required filling). This SAP for the Pacific Islands LME (Warm Central Pacific Pool) identified the main Priority Concerns to be:

- Degradation of water quality from land-based activities
- Degradation/modification of critical habitats
- Unsustainable exploitation of resources

The Ultimate Root Causes were seen to be management deficiencies in a) governance and b) understanding. As a consequence of these conclusions, two major UNDP GEF projects were endorsed for funding two separate activities to address the priority concerns. These two projects focused on:

**Integrated Watershed and Coastal Management**, with an emphasis on:

- Improved waste management
- Better water quality
- Sustainable coastal fisheries
- Effective marine protected areas, and

**Oceanic Fisheries Management**, with an emphasis on:

- Sustainable ocean fisheries
- Improved national and regional management capability
- Stock and by-catch monitoring and research
- Enhanced national and regional management links

Since then it has been more or less agreed by all parties that the main and significant transboundary issues for the LME are the oceanic fisheries issues. A second OFM project (PIOFMP II)<sup>3</sup> was thus developed and funded through GEF, UNDP and FAO that recognised six major inter-related concerns for the sustainability of transboundary oceanic fish stocks in the Western and Central Pacific as:

- the impact on target transboundary oceanic fish stocks;
- the impact on other fish species, such as sharks and billfish;
- the impact on other species of interest (such as marine mammals, seabirds and turtles);
- the impact on food-webs;
- other impacts on biodiversity; and
- the impact of climate change.

<sup>2</sup> Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu

<sup>3</sup> Implementation of Global and Regional Oceanic Fisheries Conventions and Related Instruments in the Pacific Small Island Developing States

In attempting to address these concerns, the PIOFMP II Project has been and continues to focus on

1. Regional Actions for Ecosystem-Based Management,
2. Sub-regional Actions for Ecosystem-Based Management,
3. National Actions for Ecosystem-Based Management,
4. Stakeholder Participation and Knowledge Management

This is discussed further below under the section on UNDP GEF Project Support to Oceanic Fisheries Management in the Pacific SIDS

With the WCPFC Convention and Commission in place, the major management deficiency for oceanic fisheries (as identified in the SAP) has been addressed. Now, in order to bring all these processes up-to-date after some 20 years of various related initiatives, the PIOFMP II project also identifies the need to develop and adopt a TDA focusing on Oceanic Fisheries Management with migratory tuna stocks as the primary transboundary concern, and to follow this with recommendations for a Strategic Action Programme that can provide formal agreement (by the WCPFC countries) on the priority actions necessary to address these transboundary concerns. The significant recent work undertaken in the preparation of the revised baseline study and the prior work on the preparation of the OFMP 2 Project Document collectively provide considerable substantive background for the preparation of such a WCPO Oceanic Fisheries TDA. Concerns arising from the impacts of climate change and variability, the effects of greatly increased fishing pressure on target stock status and non-target species and information, and other institutional changes including the emergence of the sub-regional organisations and arrangements also need to be incorporated into the TDA and SAP. Selected challenges in governance (at various levels) were previously identified to be the main 'root cause' driving some forms of unsustainable use. Where possible then, the TDA should review the current regional and national governance arrangements and identify any perceived gaps and weaknesses that still exist.

Specifically, this TDA needed to look at the current state of the science and existing knowledge in relation to:

- Latest information and understanding of the stocks, biomass, trends, MSY, etc.,
- Current knowledge of the impacts of fishing on the broader ecosystem
- The impacts of climate change (including oceanic acidification) on fisheries specifically on the geographic distribution of oceanic tuna the sustainability of tuna stocks under existing harvest strategies, fisheries jurisdictions among others, with impacts assessed at the regional, sub-regional and national levels;
- Where possible, the TDA should also bring forth the socioeconomic element (fishery contribution to GDP, exports, jobs, poverty reduction, etc.).

Most of the above can be and was drawn from existing information and did not require significant additional research or data collection in view of the wealth of information already captured and collected through the various support projects over the last 20 years.

## **A. UN GEF PROJECT SUPPORT TO OCEANIC FISHERIES MANAGEMENT IN THE PACIFIC SIDS THROUGH SPC AND FFA (AND PREVIOUSLY SPREP)**

One of the primary sources of support to the Pacific SIDS and to the WCPF Commission Members generally has been the various GEF projects implemented by UNDP and FAO. IN 1997, UNDP and GEF undertook the South Pacific International Waters Strategic Action Programme formulation pilot project. This included the preparation of a Strategic Action Programme (SAP) and the formulation of a project document covering the Oceanic Fisheries Management (OFM) and the Integrated Coastal and Watershed Management (ICWM) components. Following this were three sequential interventions to support the countries and the region in implementing this SAP and in adopting an effective treaty for management and protection of the sustainable oceanic fisheries of the Western Central Pacific, including the Western Pacific Warm Pool Large Marine Ecosystem.

### **IMPLEMENTATION OF THE STRATEGIC ACTION PROGRAMME (SAP) OF THE PACIFIC SMALL ISLAND DEVELOPING STATES (2000 – 2005)**

This initial SAP Implementation Project was designed to address the concerns, threats and root causes identified in the SAP which focused on the entire LME on a ridge-to-reef basis and out to (and including) the high seas.

The SAP identified the ultimate root cause underlying the concerns about, and threats to, International Waters in the region as deficiencies in management and grouped the deficiencies into two linked subsets – (i) governance; and (ii) lack of understanding.

Targeted actions within the South Pacific SAP Project were carried out under two complementary consultative project approaches: An Integrated Coastal and Watershed Management (ICWM) Component and an Oceanic Fisheries Management (OFM) Component. The two approaches (ICWM and OFM) were implemented by UNDP and executed by SPREP, in collaboration with FFA and SPC. A SAP was prepared then prior to the 2000 Implementation project but NOT through a formal TDA process and not with an effect Transboundary focus.

The key pilot activities of the OFM Component of the South Pacific SAP Project were:

- providing technical assistance, training and support for Pacific SIDS to participate in the preparation of the WCPF Convention and the WCPF Preparatory Conference, ratify the Convention and prepare national management plans; and
- supporting the improvement of scientific knowledge and information about regional transboundary oceanic stocks and the WTP LME, including analysis of stock-specific reference points; improved flows of information from regional monitoring programmes and databases; and the first stages of work to characterise the WTP LME, through a programme of biological and ecological monitoring, research and analysis.

The Terminal Evaluation for this SAP implementation project noted the Root Causes as stated in the Project Document and as determined in the Logical Framework Matrix to be “Lack of monitoring and enforcement of regulations” and “Lack of trained staff for surveillance” and the OFM Project would have been expected to focus on monitoring, enforcement of regulations and capacity building (mainly training) for surveillance. There is no denying that the OFM Project did indeed address these aspects, however, they were not its main focus and it centred predominantly on preparation for and participation in the MHLCS (Multilateral High-Level Conference) for development of Tuna Convention) and the PrepCons together with scientific research for management.

The Terminal Evaluation made the following Recommendations/Proposals:

- That the prime benefit that should be targeted from the follow-up project is the framework, capacity and functioning of the proposed Tuna Commission so that it can undertake its crucial role of providing the management context for the tuna resource and its ecosystem in a manner which will provide the greatest benefits to the Pacific Island countries and their citizens on a sustainable basis.
- That an equally important target of the follow-up project is the further building of capacity and capability of the Pacific Island region, at regional, government, private sector and community levels so that each sector can participate meaningfully in the management of the tuna resource and its ecosystem.
- That the follow-up project places emphasis on the realignment, restructuring and strengthening of national fisheries laws, policies, institutions and programmes to take up the new opportunities that the Convention has created and discharge the new responsibilities that it requires.
- That fisheries management capacity at country level be enhanced for data collection and analysis, stock assessment, MCS and enforcement and the development and application of contemporary fisheries management tools, through a strategy that views capacity building and training as a continuing activity rather than a one-off exercise to overcome the problem of capacity retention.
- That Pacific Island countries that have adopted Tuna Management Plans and are having difficulties with implementation, be assisted to identify and address the barriers that are hindering implementation.

These proposals were then used as the basis for the design of the follow-up OFM project

## **PACIFIC ISLAND OCEANIC FISHERIES MANAGEMENT PROJECT (2005-2011)**

The first Pacific Islands Oceanic Fisheries Management Project (2005-2011) followed on from the GEF IW South Pacific SAP Project (Implementation of the Strategic Action Programme for International Waters of the Pacific Islands. The broad Goal of this project was 'To assist the Pacific Island States to improve the contribution to their sustainable development from improved management of transboundary oceanic fishery resources and from the conservation of oceanic marine biodiversity generally'.

Six major aspects of the global, regional and national concerns about unsustainability in fisheries were identified. Some of them are inter-related. They are:

- the impact on target transboundary oceanic fish stocks;
- the impact on non-target fish stocks;
- the impact on other species of interest (such as marine mammals, seabirds and turtles);
- the impact of fishing around seamounts;
- the impact on food-webs; and
- the impact on biodiversity.

In this context, the Project had two immediate objectives:

***An Information and Knowledge objective:*** to improve understanding of the transboundary oceanic fish resources and related features of the Western and Central Pacific Warm Pool Large Marine Ecosystem.

***A Governance objective:*** to create new regional institutional arrangements and reform, realign and strengthen national arrangements for conservation and management of transboundary oceanic fishery resources.

To achieve these objectives, the Project had the following Components:

**Component 1.** Scientific Assessment and Monitoring Enhancement aimed at the Knowledge and Information Objective; and

**Component 2:** Law, Policy and Institutional Reform, Realignment and Strengthening, aimed at the Governance Objective;  
and a third component,

**Component 3.** Coordination, Participation and Information Services, designed to support and enhance the outcomes of the two technical components.

The Terminal Evaluation of this Project noted that the Project's two greatest achievements were:

- facilitating the establishment of the WCPFC and ensuring that Pacific Small Island Developing States are able to contribute fully to the deliberations of the Commission and to meet their membership obligations (in terms of legislation, fishery policies, and monitoring, control and surveillance systems).
- the capacity building elements of the project which have helped to give Pacific SIDS' fishery representatives the enhanced confidence to present and negotiate their positions at Commission meetings, to be actively involved in the technical meetings of the Commission, and to sit as equals at the same table as Distant Water Fishing Nations (DWFNs).

## **IMPLEMENTATION OF GLOBAL AND REGIONAL OCEANIC FISHERIES CONVENTIONS AND RELATED INSTRUMENTS IN THE PACIFIC SMALL ISLAND DEVELOPING STATES (SIDS)**

This is the UNDP FAO GEF project currently under implementation. The Project's overall Objective is "To support Pacific SIDS in meeting their obligations to implement and effectively enforce global, regional and sub-regional arrangements for the conservation and management of transboundary oceanic fisheries thereby increasing sustainable benefits derived from these fisheries".

To this effect, the Project has four main Components:

1. Regional Actions for Ecosystem-Based Management,
2. Sub-regional Actions for Ecosystem-Based Management,
3. National Actions for Ecosystem-Based Management
4. Stakeholder Participation and Knowledge Management

(A 5<sup>th</sup> component focuses on specific aspects related to Project Management and monitoring of project delivery).

Under Component 1, one of the identified Outputs (1.2.3) is an Updated Transboundary Diagnostic Analysis (TDA) for oceanic fisheries and updated oceanic fisheries management aspects of the Pacific Islands IW Strategic Action Programme (SAP). This is the basis for the current TDA development.

A Mid-Term Review was undertaken in 2018. Overall, the Mid-Term Review considered the project to be well managed, with constructive working relationships between the multiple project partners. At the same time the MTR identifies some adjustments, including:

- Some revisions of the results framework
- Increased focus on gender, monitoring and evaluation, and communications / visibility.
- Measures to enhance delivery at sub-regional and national level.

The Review considered there to be a good case for extending the project within the current budget in order to ensure effective use of funds and progress towards the project's objective and outcomes. The Review also made a number of pertinent recommendations to improve aspects of delivery and outputs during the rest of the project's lifetime. The substantive ones related to the actual project objectives include:

- that FFA reviews approaches to sub-regional arrangements and identifies key or necessary success factors to be recorded as lessons learned from the Project and used in developing sub-regional management arrangements
- that the Steering Committee, through the PMU, promotes active engagement with national fisheries departments highlighting role and potential for support for eligible national projects
- that FFA / PMU develop case studies / lessons learned about what works best for national implementation – especially in relation to a systematic approach to compliance/implementation of CMMs
- that the PMU develop a proposal for Project extension of up to 18 months to provide sufficient time for effective delivery of activities and expenditure in support of Project outcomes that would not otherwise be achieved
- that the IAs and executing partners commence a discussion towards development of a successor project targeting emerging issues/risks to Pacific fisheries

The Review also notes the emerging high priority that now needs to be placed on work addressing climate change impacts on fisheries. This is one of a number of issues that are emerging with greater prominence in the fisheries sector and includes the importance of MCS for maintaining sustainability and value in Pacific fisheries.

As of May 2018, the Project Steering Committee adopted the recommendation to extend this project at no cost to the funding agency

## **B. SYSTEM BOUNDARY FOR THE TRANSBOUNDARY DIAGNOSTIC ANALYSIS –THE CONVENTION AREA AND RELATIONSHIP TO ECOSYSTEM OTHER SUB-REGIONAL AGREEMENTS AND TREATIES**

### **THE COMMISSION AND THE CONVENTION<sup>4</sup>**

The Western and Central Pacific Fisheries Commission (WCPFC) was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC Convention), which entered into force on 19 June 2004.

The WCPFC Convention draws on many of the provisions of the UN Fish Stocks Agreement (UNFSA) while, at the same time, reflecting the special political, socio-economic, geographical and environmental characteristics of the WCPO region. The WCPFC Convention seeks to address problems in the management of high seas fisheries resulting from unregulated fishing, over-capitalization, excessive fleet capacity, vessel re-flagging to escape controls, insufficiently selective gear, unreliable databases and insufficient multilateral cooperation in respect to conservation and management of highly migratory fish stocks.

The Convention also provides a framework for the participation of fishing entities in the Commission, which legally binds fishing entities to the provisions of the Convention, recognises the special requirements of developing States, and acknowledges the need for cooperation with other Regional Fisheries Management Organizations (RFMOs) whose respective areas of competence overlap with the WCPFC.

<sup>4</sup> Information taken from [www.wcpfc.int](http://www.wcpfc.int)

The Commission supports three subsidiary bodies; the Scientific Committee, the Technical and Compliance Committee and the Northern Committee, that each meet once annually. The meetings of the subsidiary bodies are followed by a full annual session of the Commission, usually held each December. The work of the Commission is assisted by a Finance and Administration Committee.

## COMMISSION MEMBERSHIP STATUS OF VARIOUS COUNTRIES

COUNTRIES	CURRENT MEMBERSHIP	COOPERATING NON-MEMBERS	PARTICIPATING TERRITORIES
Australia	X		
China	X		
Canada	X		
Cook Islands	X		
European Union	X		
Federated States of Micronesia	X		
Fiji	X		
France	X		
Indonesia	X		
Japan	X		
Kiribati	X		
Republic of Korea	X		
Republic of Marshal Islands	X		
Nauru	X		
New Zealand	X		
Niue	X		
Palau	X		
Papua New Guinea	X		
Philippines	X		
Samoa	X		
Solomon Islands	X		
Chinese Taipei	X		
Tonga	X		
Tuvalu	X		
United States of America	X		
Vanuatu	X		
Ecuador		X	
El Salvador		X	
Mexico		X	
Panama		X	
Liberia		X	
Thailand		X	
Vietnam		X	
American Samoa			X
Commonwealth of the Northern Mariana Islands			X
French Polynesia			X
Guam			X
New Caledonia			X
Tokelau			X
Wallis and Futuna			X

Collectively, these three groups are known as CCMs (Commission Members, Cooperating Non-Members and Participating Territories).

Since its establishment, the Commission has agreed to a number of binding Conservation and Management Measures (CMMs) as well as non-binding resolutions, the latter on non-target species, SIDS' aspirations and the use of the best available science. CMMs in force can be found at <https://www.wcpfc.int/conservation-and-management-measures>. In addition, The WCPFC has concluded a number of Memoranda of Understanding (MoU) with related fisheries organizations having mandates or responsibilities in other geographical areas, including the Inter-American Tropical Tuna Commission (IATTC), the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), the Indian Ocean Tuna Commission (IOTC) and the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). These MoUs help foster a close relationship between the WCPFC and these organizations and ensures that the lines of communication are open to discuss matters of common interest.

It is necessary for members of the Commission to review their legislation to align their laws with the Convention and the decisions of the Commission, including CMMs. While this requirement may place a significant additional burden on SIDS in relation to institutional and management arrangements (and the associated costs), the PIOFMP II project has been designed to provide support and assistance at a sub-regional and national level toward meeting these obligations. This burden is exacerbated by the growing need to meet more and more port states measures resulting from new international conventions.

Within the WCPFC, FFA assists and facilitates members' discussion to put forward CMMs, resolutions and other initiatives to the Commission, many of which are based on the Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement and the MTCs (Minimum Terms and Conditions of Access) that have largely set the standard for many of the WCPFC requirements. The FFA hosts the WCPFC vessel monitoring system (VMS), and (along with SPC) supports the Pacific Island Regional Fisheries Observer (PIRFO) training program for FFA UST Observers and National and PNA Observer programs which are audited against WCPFC standards in the WCPFC Regional Observer Programme (ROP).

Annex A provides a list of current Conservation and Management Measures and Resolutions of the Western and Central Pacific Fisheries Commission. Full details can be downloaded from <https://www.wcpfc.int/conservation-and-management-measures>

As per the text of the Convention itself, the area of competence of the Commission (the Convention Area) comprises all waters of the Pacific Ocean bounded to the south and to the east by the following line:

*From the south coast of Australia due south along the 141° meridian of east longitude to its intersection with the 55° parallel of south latitude; thence due east along the 55° parallel of south latitude to its intersection with the 150° meridian of east longitude; thence due south along the 150° meridian of east longitude to its intersection with the 60° parallel of south latitude; thence due east along the 60° parallel of south latitude to its intersection with the 130° meridian of west longitude; thence due north along the 130° meridian of west longitude to its intersection with the 4° parallel of south latitude; thence due west along the 4° parallel of south latitude to its intersection with the 150° meridian of west longitude; thence due north along the 150° meridian of west longitude. (see Figure 1 below showing a map of the Convention Area)*

The text of the Convention further notes that 'Nothing in the Convention shall constitute recognition of the claims or positions of any of the members of the Commission concerning the legal status and extent of waters and zones claimed by any such members'. The area covered by the Convention covers almost 20 per cent of the Earth's surface (see Fig. 1 below).

The functions of the Commission set out in Article 10 of the Convention are exercised *“Without prejudice to the sovereign rights of coastal States”*



Figure 1. Map of the area covered by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPF Convention)

## **RELATIONSHIP BETWEEN THE WESTERN TROPICAL PACIFIC WARM POOL AND THE CONVENTION AREA**

Some 70% of the world's annual tuna harvest comes from the Pacific Ocean. Skipjack tuna (*Katsuwonus pelamis*) dominate the catch. Although skipjack are distributed in the surface mixed layer throughout the equatorial and subtropical Pacific, catches are highest in the western equatorial Pacific warm pool, a region characterized by low primary productivity rates that has the warmest surface waters of the world's oceans. Assessments of tuna stocks indicate that recent western Pacific skipjack catches approaching one million tonnes annually are sustainable (McKenchie et al., 2016).

The Western Tropical Pacific Warm Pool, which is fundamental to the El Niño Southern Oscillation (ENSO) and the Earth's climate in general (McPhaden and Picaut, 1990; Jin, 1996; Picaut et al., 1996), must therefore also provide a habitat capable of supporting this highly productive tuna population. Spatial shifts in tuna populations are linked to large zonal displacements of the warm pool that occur during ENSO events (Picaut and Delcroix, 1995; Picaut et al., 1996). This relationship could be used to predict (several months in advance) the region of highest tuna abundance, within a fishing ground extending over 6,000 km along the Equator.

The **Western Tropical Pacific Warm Pool** (WTPWP) provides approximately 90% of the catch of tunas and other pelagic species within the WCPFC Convention Area. It covers a wide area of the Pacific Ocean (see Fig.2 below) extending beyond the Convention Area, lying to the west of the strong divergent equatorial upwelling in the central equatorial Pacific known as the “cold tongue” and between the sub-tropical gyres in the North and South Pacific. The key physical and biological characteristics of the WTPWP are:

- sea-surface temperatures of 28.5 degrees C or greater;
- a relatively deep surface mixed layer, with the Sea Surface Temperature minus 0.5degree C isotherm typically 100-150 metres depth;
- relatively low salinity (<34.5 ppt) with a very well-defined salinity front on the eastern boundary with the cold tongue;
- relatively low primary productivity compared to the cold tongue, but with important El Niño related interannual variability;
- westward-flowing surface currents that infuse primary production from the cold tongue;
- relatively high secondary production characterised by zooplankton and micronekton species with high turnover and metabolic rates due to the warm-temperature environment, which in turn supports a complex pelagic ecosystem ranging from zooplankton and micronekton to large apex predators such as tunas, billfishes and sharks

The health of the International Waters of the WTP Warm Pool is critical to the communities and economies of the Pacific Islands. Almost all of the land area of the Pacific SIDS is coastal in character and almost all of the people of the region live and work in ways that are dependent on healthy International Waters. A major strength in looking at the WTP Warm Pool as an integral part of the management approach is the well-developed political framework of integrated multi-sectoral regional cooperation across this region that derives largely from the high level of shared dependence on this Warm Pool area. The periodic shifts and changes to the Warm Pool caused by the El Niño Southern Oscillation (and now influenced by climate change) have a direct influence on fisheries production in the Convention Area, which will almost certainly grow and affect the distribution and catches of tuna over coming years (McPhaden and Picaut, 1990; Lehodey et al., 2010).

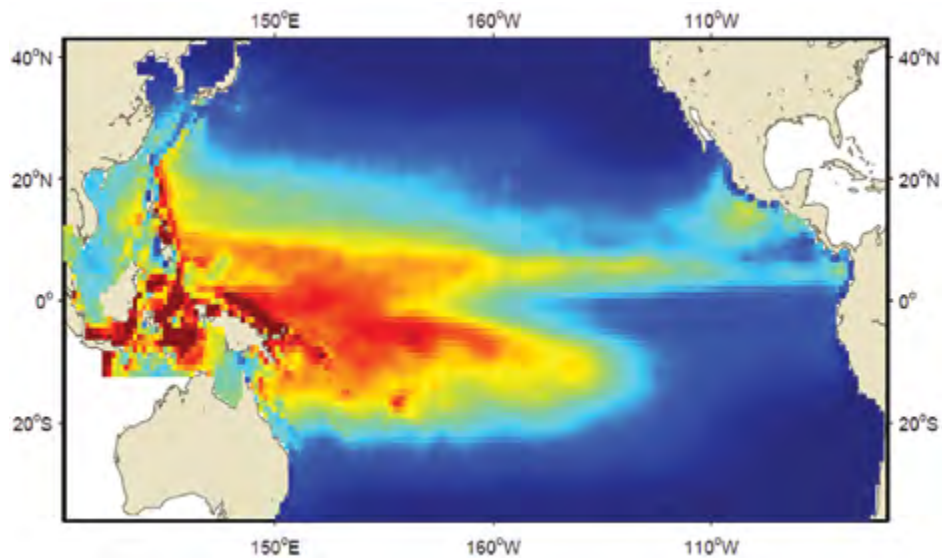
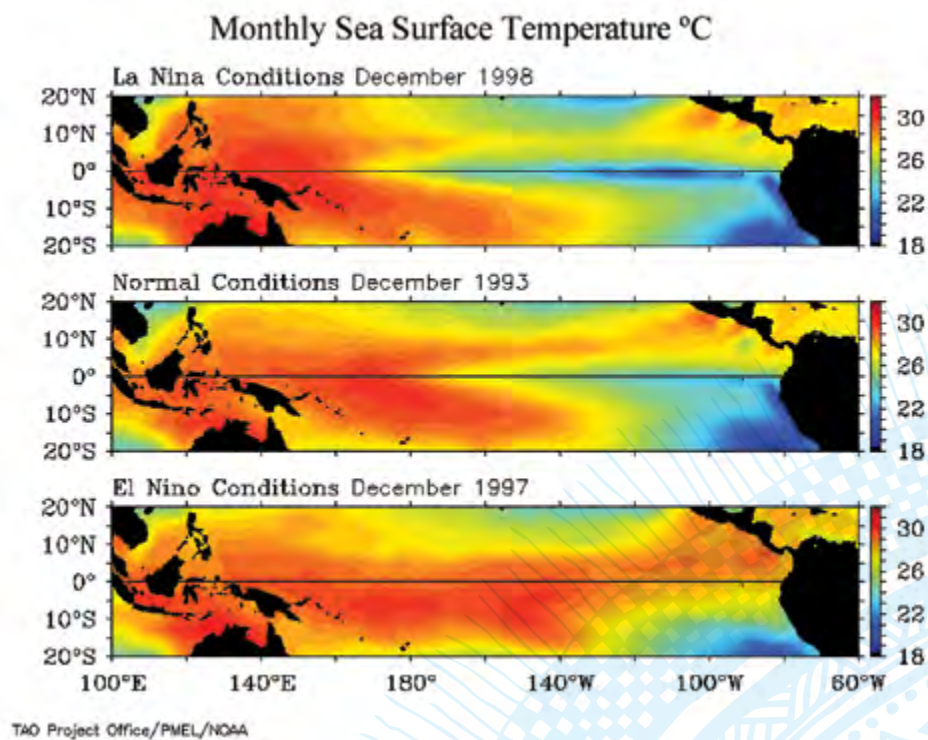


Figure 2: Sea Surface Temperature Differences in WTP Warm Pool between La Nina and El Nino Conditions showing the General Location of the WTP Warm Pool between eastern and western South Pacific (provided by SPC/FFA)



# EXISTING MANAGEMENT ARRANGEMENTS FOR OCEANIC FISHERIES IN THE CONVENTION AREA

3

## A. REGIONAL INSTITUTIONS AND MANAGEMENT ARRANGEMENTS FOR OCEANIC FISHERIES

The major regional institutions involved with fisheries are the Forum Fisheries Agency (FFA), located in Honiara and the Pacific Community (SPC) in Noumea. Other players are the Parties to the Nauru Agreement (PNA) Office in Majuro, the Pacific Islands Forum Secretariat (PIFS) in Suva, the Secretariat of the Pacific Regional Environment Programme (SPREP) in Apia, and the University of the South Pacific (USP) in Suva. The various characteristics of those institutions are given in Table 1 (Modified from Gillett and Tauati, 2018)

	FFA	SPC	OTHER REGIONAL ORGANIZATIONS WITH FISHERY INVOLVEMENT
MAIN AREA OF EMPHASIS	Providing management advice on tuna fisheries and increasing benefits to Pacific Island countries from tuna fishing activities.	Most aspects of coastal fisheries and scientific research on tuna. Fisheries are only one aspect of SPC's work programme, which also covers such issues as health, demography and agriculture.	<p><b>PNA</b> – sub-regional grouping of countries where most purse seining occurs;</p> <p><b>SPREP</b> – environmental aspects of fisheries;</p> <p><b>USP</b> – School of Marine Studies (SMS) involved in a wide range of training;</p> <p><b>PIFS</b> – major political initiatives, some natural resource economics; leads trade negotiations with EU, which have a major fisheries component</p> <p><b>MSG</b> – promotion and strengthening of trade, economic and technical cooperation and the alignment of policies and shared goals of economic growth, sustainable development, good governance and security</p> <p><b>TVM</b> – Aims to secure, protect and enhance associated long-term economic benefits able to be derived from fisheries and protect the important contribution fisheries make to the food security of the communities</p>
INTER-REGIONAL RELATIONSHIPS	<p>The FFA/SPC relationship has had ups/downs over the years. It was most difficult in the early 1990s, but tremendous improvement in mid/late 1990s.</p> <p>An annual colloquium has helped the relationship. Staff who have moved between the two organizations have made a noticeable improvement in understanding.</p> <p>Much of the success/benefits achieved by FFA/SPC cooperation depends on the personalities of FFA's Director/Deputy and SPC's Director of the Division of Fisheries, Aquaculture and Marine Ecosystems.</p>		<p>The activities of FFA, SPC, PIFS and SPREP are coordinated by the Council of Regional Organisations in the Pacific (CROP), which has a Marine Sector Working Group that meets at least once per year but is limited by lack of resources for follow-up.</p> <p>FFA originally provided secretariat services to the PNA. Now the PNA has established its own office in Majuro in 2010. Currently, there are some sensitivities in the relationship, but it appears to be improving.</p>

<b>MAIN STRENGTHS</b>	Direct contact with its governing body many times per year results in a high degree of accountability. Mandate of tight focus on tuna eliminates considerable dissipation of effort.	There has historically been considerable staff continuity. The Oceanic Fisheries Programme often sets the standard for tuna research in the world.  Documentation of work is very good.	Because PIFS is under the national leaders, it is considered the premier regional organization.  PNA has achieved considerable success and credibility in such areas as raising access fees, 100 percent observer coverage, eco-certification, high seas closures, and controls on FADs.  USP is centrally located in the region and SMS has substantial infrastructure.  SPREP has close ties to NGOs active in the marine sector.
	Australia and New Zealand, plus Cook Islands, the Federated States of Micronesia, Fiji, Kiribati, the Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu and Vanuatu	Includes the major metropolitan countries, all Pacific Island countries, and the French/UK/US territories; the most inclusive of any regional organization.	<p><b>PNA:</b> The Federated States of Micronesia, Kiribati, the Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands and Tuvalu.</p> <p><b>USP:</b> Cook Islands, Fiji, Kiribati, the Marshall Islands, Nauru, Niue, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu and Vanuatu.</p> <p><b>SPREP:</b> 21 Pacific Island countries and territories, plus Australia, France, New Zealand and United States of America.</p> <p><b>PIFS:</b> same as FFA</p>

Source: Adapted from Gillett (2014a).

**Table 1: Pacific Island Regional Organizations Involved in Fisheries**

## **Secretariat of the Pacific Community (SPC) and its Oceanic Fisheries Programme**

One of the oldest regional organisations in the world, SPC (or South Pacific Commission as it was formerly known) celebrated its 60th anniversary in 2007 making it one of the oldest regional organisations in the world. The SPC is a non-political, technical assistance and research body and performs a consultative and advisory role. All 22 island countries and territories, with varying political status from colony to sovereign republic, are full members, along with the four remaining founder members: Australia, France, New Zealand and the United States of America. (The Netherlands and the United Kingdom are no longer members). Each member has equal status and one vote at the Conference of the Pacific Community, which meets every two years, although debates are usually resolved by the Pacific way of consensus rather than voting.

The Secretariat is headed by a Director-General assisted by two deputies. Its activities are conducted by a range of programmes grouped into 6 divisions (Health, Social Resources, Marine Resources, Land Resources, Science and Technology and Economic Development).

The Oceanic Fisheries Programme (OFP) is part of the Fisheries, Aquaculture and Marine Ecosystems (FAME) Division of SPC, which is based in Noumea in New Caledonia. OFP at SPC is the Pacific Community's regional centre for tuna fisheries research, fishery monitoring, stock assessment and data management. It was established by the 1980 South Pacific Conference (as the Tuna and Billfish Assessment Programme) to continue and expand the work initiated by its predecessor project, the Skipjack Survey and Assessment Programme.

The OFP has three main objectives as outlined in the FAME Strategic Plan:

- Provision of high-quality scientific information and advice for regional and national fisheries management authorities on the status of, and fishery impacts on, stocks targeted or otherwise impacted by regional oceanic fisheries;
- Accurate and comprehensive scientific data for regional and national fisheries management authorities on fisheries targeting the region's resources of tuna, billfish and other oceanic species; and
- Improved understanding of pelagic ecosystems in the western and central Pacific Ocean.

OFP achieves these objectives through work programme across four different but interactive sections:

1. Stock Assessment and Modelling
2. Oceanic Fisheries Data management
3. Oceanic Fisheries Monitoring
4. Ecosystem Monitoring and Assessment

SPC's key fisheries clients are the fisheries administrations of SPC members, for whom it processes and manages data from commercial tuna fishing fleets (both domestic and foreign licensed), assists in the development and implementation of effective fishery monitoring programmes, provides advice on the status of tuna and other affected pelagic fish stocks, conducts research on the biology and ecology of the pelagic ecosystem and provides training and other capacity building in these areas. The Forum Fisheries Agency (FFA) and its various sub-groups (particularly the Parties to the Nauru Arrangement (PNA) to a much lesser extent, the Te Vaka Moana Arrangement (TVMA) are also key clients. The OFP provides data products, scientific analyses and advice to assist these groups with the assessment and development of fisheries management measures.

SPC is also the data services and scientific services provider to the WCPFC. In 2016, SPC signed a Memorandum of Understanding with the Secretariat of the Commission. Through this MoU (see Annex B for the full document), the Commission and the SPC agreed to establish and maintain cooperation in respect of matters of common interest to the two organizations. In particular, the Commission and the SPC agreed to:

- encourage reciprocal participation in relevant meetings of each organization;
- encourage the collaboration of national scientists in the scientific work undertaken by, or on behalf of, the Commission;
- actively and regularly exchange relevant meeting reports, information, project plans, documents, and publications regarding matters of mutual interest, up to the limits allowed by the information-sharing policies agreed by each organization's members; and
- consult on a regular basis to enhance cooperation and minimize duplication

In addition, it was agreed that SPC would provide input and support in the following areas:

- Provision of Scientific Services to the Commission
- Provision of Assistance to Commission Members
- General Administrative and Financial Arrangements

## **Forum Fisheries Agency FFA**

The Pacific Islands Forum Fisheries Agency (FFA) based in Honiara, in the Solomon Islands, is an intergovernmental agency established in 1979 to facilitate regional co-operation and co-ordination on fisheries policies between its member states<sup>5</sup> in order to achieve conservation and optimum utilisation of living marine resources, in particular highly migratory fish stocks, for the benefit of the peoples of the region, in particular the developing countries.

FFA assists its member governments and administrations in applying a coordinated and mutually beneficial approach to the conservation, management and development of regional tuna stocks. FFA has assisted its members in developing or negotiating a number of regional or sub-regional instruments for this purpose. These include - The Nauru Agreement (PNA); The Tokelau Arrangement (TKA); The Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC); The Niue Treaty; The Multilateral Treaty on Fisheries Between Certain Governments of the Pacific Island States and the Government of the United States of America (The US Treaty); The Harmonized Minimum Terms and Conditions for Access by Foreign Fishing vessels (MTCs).

As well as its policy coordination functions in tuna fisheries management and MCS (Monitoring, Control and Surveillance), the FFA Secretariat also has a substantial role in assisting its member countries in tuna fisheries development, including economic analysis, appraisal and promotion of investment opportunities, and in upgrading national standards that maintain access to major foreign markets. This latter work includes the establishment or updating of National Plans of Action to implement FAO standards, and the development of regionally-harmonised Catch Documentation Schemes and Port-based MCS measures for fish originating from Pacific Island SIDS waters

In 2009, FFA signed a Memorandum of Understanding with the Commission for the Conservation and Management of Highly Migratory Fish Stocks in The Western and Central Pacific Ocean. This MoU (see Annex C for full document) recognises the need to maximise the effectiveness of scientific, compliance and other activities and the two parties agree to exchange information relating to their activities and programmes of work on highly migratory fish stocks and associated and dependent species in the Pacific Islands region, subject to arrangements concerning the confidentiality of information held by each organisation on behalf of its members. The parties further agree to meet regularly in order to exchange information on activities of mutual interest, and to explore ways of minimising duplication of their work.

## **UN GEF Project Support to the Oceanic Fisheries Management in the Pacific SIDS through SPC and FFA (and previously SPREP)**

One of the primary sources of support to the Pacific SIDS and to the WCPF Commission Members generally has been the various GEF projects implemented by UNDP and FAO. These include:

1. Implementation of the Strategic Action Programme (SAP) of the Pacific Small Island
2. Pacific Islands Oceanic Fisheries Management Project (PIOFMP-1)
3. Implementation of Global and Regional Oceanic Fisheries Conventions and Related Instruments in the Pacific Small Island Developing States (PIOFMP-2)

<sup>5</sup> Australia, Cook Islands, Fiji, Kiribati, Marshall Islands, Federated States of Micronesia, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu

## **Parties to the Nauru Agreement (PNA)**

The Nauru Agreement (Concerning Cooperation in the Management of Fisheries of Common Interest) is a well-established sub-regional agreement between the states of Micronesia, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands and Tuvalu. The eight signatories, known as the PNA, collectively account for around 80% of the WCPO purse seine catch from their waters and control the world's largest sustainable tuna purse seine fishery.

From its initial enactment in 1982, the implementation of the Nauru Agreement was coordinated by the Pacific Islands Forum Fisheries Agency (FFA). However, a separate PNA Office was created in 2010, based in Majuro, Marshall Islands. The PNA is governed by Annual Meetings of Officials and Ministers of the Parties and occasional Summit meetings of PNA Leaders.

The core business of PNA was recently confirmed by PNA Leaders as collaborating on strategy and policy to coordinate and harmonize the management of fisheries of common interest for the benefit of their peoples. For this purpose, the PNA has concluded a number of binding management arrangements, including the 3 Implementing Arrangements to the Nauru Agreement summarised below, the FSM Arrangement designed to promote domestic fleets and the Palau Arrangement which implements the PNA Vessel Day Schemes. The PNA also has:

- a) A PNA Observer Agency (POA) for placement of observers on domestic vessels operating under the FSM Arrangement; and
- b) The PNA Fisheries Information Management Information System (FIMS) for monitoring and control of the purse seine fishery in PNA waters, including the VDSs

Key features of the 3 Nauru Agreement Implementing Arrangements (1982, 1990 and 2008), include:



### **1st Implementing Arrangement**

- The introduction of a regional register for foreign fishing vessels, which was adopted by the FFA and became operational in 1988; and
- The establishment of a set of minimum terms and conditions of access to the zones of the Parties, including licensing procedures, provision of access and support for authorised personnel, Catch Logs and Catch Reporting, Telephonic/Fax Reporting of Catch, and Zone Entry and Exit, and Identification of Licensed Vessels

These became the basis for the FFA MTCs, which later became the starting point for many of the conditions of fishing adopted by the WCPFC



### **2nd Implementing Arrangement**

- The introduction of Electronic Vessel Monitoring System (VMS); and
- Additional terms and conditions of access including prohibition of transshipment at sea, high seas catch reporting and maintenance of log books, recording catch and effort on a daily basis, and placement of observers.



### **3rd Implementing Arrangement**

- A closure for 3 months on the use of Fish Aggregating Devices (FADs) on purse seine vessels between July and September of each year;
- 100% observer coverage on purse seine vessels
- A ban on fishing vessels from operating in high seas pockets adjacent to the EEZs as a term of their licences;

- Catch retention of bigeye, skipjack and yellowfin tuna on board purse seine vessels as a disincentive to fishing on FADs;
- Prohibition of setting on schools associated with whale sharks; and
- Minimum mesh net size (9mm).

The 3<sup>rd</sup> Implementing Arrangement was originally developed in association with the purse seine VDS to address the overfishing of bigeye.



### **Palau Arrangement and Vessel Day Schemes**

The Palau Arrangement with the Purse Seine and Longline Vessel Day Schemes is the most influential management arrangement in the region. It began in 1978 as an arrangement to limit the number of purse seine vessels in PNA waters. Since 2007 the purse seine vessel number limits have been replaced by the purse seine VDS. Features of the VDS include:

- It's a cap and trade scheme
- Effort in terms of fishing days is capped at an appropriate level reflecting scientific advice, currently the Total Allowable Effort (TAE) is capped at the 2010 level
- The TAE is allocated to Parties based on zonal biomass and historical effort as Party Allowable Effort (PAEs)
- Fishing days are sold to fleets for fishing in each EEZ
- Days are adjusted according to vessel size to manage effort creep
- There is a minimum benchmark price for VDS days sold to foreign vessels
- Fishing days are monitored by VMS, supported by observers on board all vessels
- Parties monitor/manage their PAEs by a Fisheries Info Management System (FIMS)
- Days are tradable between Parties
- Scheme costs are financed by levies on vessels
- More recently, a VDS has also been implemented for the longline fishery in PNA EEZs
- Tokelau participates in the VDSs and applies all PNA conservation and management measures

PNA Leaders have also supported the development of initiatives to increase Parties' share of the value of the tuna fishery through vertical integration in the tuna fisheries value chain. Prominent PNA initiatives in this direction include:

- a) Eco-labelling: certification by the Marine Stewardship Council (MSC) of skipjack and yellowfin catches from the free school fishery in PNA waters which increases returns to the fleets in a way that contributes to improved sustainability by creating an incentive to fleets to fish more on free schools and less on FADs; and
- b) A joint venture in co-branding through the Pacific brand which has now achieved global distribution for products from the MSC certified free school fishery and which captures additional rents for PNA Member countries from this sustainability initiative.

In this context, the PNA is making a valuable contribution to conservation and management of WCPO tuna resources in that it is helping to ensure that the major target stocks are now all fished sustainably (i.e. no overfishing and none are overfished). As approximately 60% of the WCP ocean tuna catch is taken in PNA waters, it is reasonable to conclude that the effectiveness of the purse seine VDS in controlling purse seine effort is making a significant contribution to this outcome, along with the FAD closure for bigeye conservation, also originally a PNA measure and now being applied more broadly by the Commission. Simultaneously, the revenues from the purse seine fishery have more than quadrupled in the last decade to an estimated \$450m in 2016.

## **Tokelau Arrangement (TKA)**

The Tokelau Arrangement (TKA) for the Management of the South Pacific Albacore Fishery is another newly-emerged management arrangement which came into effect on 14th December 2014. Signatories to the TKA are Tokelau, Vanuatu, Australia, Cook Islands, New Zealand, Niue, Samoa, Tonga, Tuvalu, Fiji, Solomon Islands. The Tokelau Arrangement limits the catch of southern albacore tuna in their EEZ waters. One of the main functions of the arrangement is to establish a management scheme to implement cooperative measures that regulate catch or effort, apply the Harvest Strategy Approach, and restore profitability and sustainability to the fishery, while the formal objective cited in the agreement is to promote optimal utilisation, conservation and management of stocks that fall within the scope of this Arrangement.

The Tokelau Arrangement also provides for “Associate Participation” by other FFA members and non-FFA South Pacific Territories – whose waters host fisheries for south Pacific albacore tuna, and who declare zone limits on the catch of albacore in ways that are compatible with the limits adopted by Participants to the Arrangement.



### **Management and Administrative arrangements include:**

- i) Management meetings which are to be held at least once a year by the participants with associated participants being invited.
- ii) The Management Meetings may designate Special Working Groups to examine issues arising out of the implementation of this Arrangement.
- iii) The Pacific Islands Forum Fisheries Agency will assist the Participants, and Associate Participants as necessary, to the extent possible, in the implementation and coordination of the provisions of this Arrangement, including providing Secretariat and Technical services to the Management Meeting and Special Working Groups.

While not having the leverage over the southern longline fishery that the PNA have over the purse seine fishery, the TKA have greater leverage over the southern longline fishery than the PNA have over the tropical longline fishery and form a significant sub regional grouping. However, in October 2017, the Solomon Islands withdrew from discussion of the South Pacific Albacore Catch Management Agreement being developed by the majority of TKA Participants, expressing a concern that the application of catch limits envisaged under that Agreement would put at risk the effective implementation of the PNA longline VDS in the Solomon Islands EEZ. Economic game theory analyses suggest that the non-participation by two of the “big four” southern longline EEZs in this Catch Management Agreement would crucially reduce the negotiating influence of the proposed coalition below effective levels. However, some regional experts suggest that the TKA CMA would retain the same influence as the PNA LL-VDS, in terms of fishery share, and that a Regional Longline Strategy that identified and promoted the objectives that these two sub-regional arrangements held in common – particularly the concept of collaborative zone-based (rather than flag-based) management - could have considerable influence within RFMO longline fishery decision-making processes.

## **The Niue Treaty**

The Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific Region (**Niue Treaty**) is a multilateral treaty of members of the Pacific Islands Forum Fisheries Agency (FFA). The Treaty was completed and opened for signature on the 9th July 1992 and came into force on the 20<sup>th</sup> May 1993. To date all 17 member countries of FFA have ratified the Treaty.

The objective of the Niue Treaty is to enhance regional coordination and cooperation in fisheries surveillance and law enforcement and increase the ability of Pacific Island countries to effectively enforce their fisheries laws.

The Niue Treaty is a 'head agreement' intended to provide flexible arrangements for co-operation in fisheries surveillance and law enforcement. It is proposed that bilateral or Subsidiary Agreements will contain clauses facilitating closer cooperation in more concrete ways, such as physical sharing of surveillance and enforcement equipment, the empowerment of each other's officers to perform enforcement duties, and enhancement of extradition procedures and evidentiary provisions.

This allowed for the negotiation and adoption of the Niue Treaty Subsidiary Agreement (NTSA) on the 2<sup>nd</sup> November 2012.

### **Niue Treaty Subsidiary Agreement (NTSA)**

The NTSA is a treaty level agreement which operates to strengthen and operationalise the Niue Treaty. It came into force on the 30<sup>th</sup> July 2014. As of to date, there are ten (10<sup>6</sup>) FFA Member States that have ratified the NTSA. The NTSA is a multilateral subsidiary agreement under the Niue Treaty and is intended to implement the Niue Treaty by establishing a robust legal framework for integrated, cost effective fisheries surveillance in the region, including: the exchange of fisheries law enforcement data and cross vesting of enforcement powers; enhancing active participation in cooperative fisheries surveillance and enforcement activities in the Pacific region; improving resource and information sharing; and improving fisheries management outcomes.

The FFA Secretariat is working closely with its member states to provide support during the ratifications process and to ensure the effective implementation of the NTSA to meet the overall objective of the Niue Treaty.

Full details of the Treaty can be found at [https://www.ffa.int/system/files/Niue%20Treaty\\_0.pdf](https://www.ffa.int/system/files/Niue%20Treaty_0.pdf).

### **Te Vaka Moana**

Te Vaka Moana (TVM) consists of the fisheries administrations of the Cook Islands, New Zealand, Niue, Samoa, Tokelau and Tonga. The TVM's overarching goal is 'to secure, protect and enhance associated long-term economic benefits able to be derived from fisheries and protect the important contribution fisheries make to the food security of the communities'. The TVM participants have endorsed several high-level objectives to achieve this goal. They are:

- a) Strengthen cooperative relationships between the Participants, based on mutual trust and understanding, with the aim of furthering shared goals with respect to the sustainable use of fisheries resources, including increasing the economic benefit that can be derived from fisheries resources and protecting the contribution they make to the food security of communities;
- b) Assist with ongoing fisheries related capacity development and enhancing sub-regional capability through enabling the sharing of resources, including fisheries monitoring control, surveillance and enforcement (MCS) resources;
- c) Promote the sharing of information between the Participants with regard to fisheries policy, fisheries management, fisheries development, fishing industry related issues, fisheries science, MCS, and other technical expertise in fisheries;
- d) Enhance the ability of the Countries and Territory to cooperate and promote the interests of the sub-region in regional organisations and international fora dealing with fisheries issues, including where appropriate, in collaboration with the FFA and SPC;
- e) Promote cooperation between the Participants with regard to MCS, both domestically and on the high seas, including in seeking to increase the value of fisheries through countering illegal, unregulated and unreported fishing; and
- f) Support and strengthen fisheries development initiatives, including via links between the fishing industry sectors.

<sup>6</sup> FFA Secretariat, 2018.

Management and Administrative arrangements include:

- I. A Governing Committee comprising the Heads of the Fisheries Administrations of TVMA participating countries, or their representatives. The Governing Committee takes decisions for the TVM Work Programme.
- II. Technical Networks to look at specific issues or complete specific tasks from the Governing Council. Not necessarily meeting-based, the networks also provide an opportunity for peer-to-peer support, sharing of ideas and mentoring
- III. TVM Programme Coordinator. The role of the Coordinator is to undertake all co-ordination and management-related tasks as directed by the Governing Committee to implement the TVM work plan. The MC is also the primary point of contact for TVM with partners.

The future of TVM is currently uncertain. The part-time Coordinator position is no longer funded and in late 2017, New Zealand advised that it would no longer provide a funding base for TVM. At the 2018 GC meeting it was agreed that OFMP2 support for TVM would be focused on ensuring TVM members were supported to fully participate in the high seas allocations meetings process. There was a general consensus that there was nothing specific that sat TVM members apart or that we held in common that was not shared by other FFA members. It was agreed that it would be useful for TVM to remain established as organization but that the need for formal stand-alone meetings was not a priority. It was suggested that the monitoring of the ongoing utilization of the OFMP 2 funds could be undertaken by holding brief update meetings in the margins of other FFA or WCPFC meetings and workshops. It was further noted TVM would continue without a formal adopted work plan other than the allocation of resources in support of high seas rights allocation. This means that there will not be a collective work program but rather, internally agreed national work programs.

### **Melanesian Spearhead Group (MSG)**

The Melanesian Spearhead Group (MSG) was founded in 2007 and its membership consists of the four Melanesian states of Fiji, Papua New Guinea, Solomon Islands and Vanuatu, as well as the Kanak and Socialist National Liberation Front of New Caledonia. In 2015, Indonesia was also recognized as an associate member.

The Objective of the MSG focuses on the promotion and strengthening of trade, economic and technical cooperation and the alignment of policies and shared goals of economic growth, sustainable development, good governance and security.

A MSG Fisheries Technical Advisory Committee was established in 2008 and the first meeting of the Committee was in April 2010, which was attended by MSG senior fisheries officials, including regional organizations (i.e. FFA, SPC, WWF South Pacific and Greenpeace). The Committee aims to play a role in:

- i) promoting cooperation on sea surveillance;
- ii) strengthening observer programmes between members;
- iii) enhancing conservation and management of tuna stocks within the boundaries of the member countries;
- iv) cooperating to carry out on-shore processing development of tuna;
- v) strengthening trade of fish products such as canned, chilled and frozen amongst MSG members;
- vi) enabling cooperation on allocation of fishing days under the Vessel day scheme (VDS) to fishing vessels which are flagged to MSG members;
- vii) enhancing MSG solidarity on conservation issues pertinent to MSG members within the WCPFC Meetings;
- viii) ensuring cooperation and consultations on issues relating to the delineation of maritime boundaries between MSG members;
- ix) and strengthening MSG cooperation on in-shore resource and aquaculture development

In recent years there seems to have been a limited amount of interest in fisheries management and monitoring activities and it may be more appropriate to focus resources on supporting the TKA. However, this may also be problematic now in view of the uncertainty surrounding the long-term membership of the TKA.

The MSG FTAC did meet in 2017 after a considerable hiatus. However, there was no really clear direction as to the further application of fisheries matters in the MSG wider framework.

## **United States Multilateral Treaty**

The Treaty on Fisheries Between the Governments of Certain Pacific Island States and the Government of the United States of America (commonly referred to as the US Tuna Treaty) entered into force in 1988. The access and aid envelope for Pacific Forum Fisheries members went through a series of negotiations and interim agreements since the last multi-year agreement ended in 2012.

The multilateral Treaty has paved the way for US vessels to fish in the Pacific since the 1980s as well as delivering critical economic assistance from the US Government. It had been under renegotiation since 2009 and a series of annually negotiated 12-month deals kept the arrangement working on an interim basis.

The 2016-2020 Treaty deal provides a 'first right of refusal' to the US fleet for a significant number of fishing days, along with a new flexibility to compete in the market place with other vessel owners. This represents a newly negotiated Treaty Framework that is ongoing, and pre-agreed access arrangements for the next six years.

The Treaty sets the operational terms and conditions for the U.S. tuna purse seine fleet to fish in waters under the jurisdiction of the Pacific Island Parties, which cover a wide swath of the Western and Central Pacific Ocean containing the largest and most valuable tuna fisheries in the world. The United States has for decades sought to be a valued partner in developing regional fisheries in this area. The Treaty has supported U.S. contributions to sound sustainable fishery management and efforts to combat illegal, unreported, and unregulated fishing. It has been a cornerstone for cooperation between the Pacific Islands and the United States and has helped establish best practices for fisheries management in the region.

## **FAO**



### **FAO Code of Conduct for Responsible Fisheries**

This Code is voluntary. However, certain parts of it are based on relevant rules of international law, including those reflected in the United Nations Convention on the Law of the Sea, December 1982. The Code also contains provisions that may be or have already been given binding effect by means of other obligatory legal instruments amongst the Parties, such as the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, 1993, which forms an integral part of the Code. The Code is global in scope, and is directed toward members and non-members of FAO, fishing entities, sub-regional, regional and global organizations, whether governmental or non-governmental, and all persons concerned with the conservation of fishery resources and management and development of fisheries, such as fishers, those engaged in processing and marketing of fish and fishery products and other users of the aquatic environment in relation to fisheries. The Code provides principles and standards applicable to the conservation, management and development of all fisheries. It also covers the capture, processing and trade of fish and fishery products, fishing operations, aquaculture, fisheries research and the integration of fisheries into coastal area management. In this Code, and the term fisheries applies equally to capture fisheries and aquaculture. Further information on the Code for Responsible Fisheries can be found at <http://www.fao.org/docrep/005/v9878e/v9878e00.htm>



## **The FAO GEF Sustainable Management of Tuna Fisheries and Biodiversity Conservation in the Areas Beyond National Jurisdiction (ABNJ) Project**

This project was approved by GEF for Implementation in 2013. Its overall objective is to achieve efficiency and sustainability in tuna production and biodiversity conservation in the ABNJ (i.e. outside national jurisdictions / EEZs), through the systematic application of an ecosystem approach in tuna fisheries for: (i) supporting the use of sustainable and efficient fisheries management and fishing practices by the stakeholders of the tuna resources, (ii) reducing illegal, unreported and unregulated [IUU] fishing, and (iii) mitigating adverse impacts of bycatch on biodiversity. The Project aims to achieve this through a series of Outcomes:

**OUTCOME 1.1:** Improved management decision making concerning tuna resources in the areas under the jurisdiction of the five Regional Fisheries Management Organizations for tuna (t-RFMOs), through enhanced engagement and motivation of the stakeholders, including the tuna industry shown by 23 stocks covered by CMMs with HCRs and RPs and 98% of global catch is by full Members of t-RFMOs.

**OUTCOME 1.2:** An efficient and effective RBM system has been designed, tested and implemented in one tRFMO region with greater management control exercised over fishing fleets and increased economic revenue flows to Small Island Developing States.

**OUTCOME 2.1:** Harmonization and adoption of MCS best practices across all t-RFMOs strengthens the capacity of t-RFMOs and States to detect and deter IUU fishing shown by at least 25 MCS measures supported under the project being considered by t-RFMOs.

**OUTCOME 2.2:** Implementation of best practices reduces the number of illegal vessels operating by 20% in one t-RFMO and has a positive catalytic effect on IUU fishing in other t-RFMO regions shown by an increase of the number of “black-listed” tuna vessels from 49 to 61 in t-RFMO Commission documents.

**OUTCOME 3.1:** WCPFC and IATTC integrate improved bycatch mitigation technologies and practices into their regular management planning process at regional and national levels.

**OUTCOME 3.2:** Bycatch mitigation best practices adopted by at least 40% of the tuna vessels operating in the two t-RFMOs’ areas.

FAO’s technical role in the Project will be to provide overall support to achieving each of the above Outcomes including backstopping from its Fisheries and Aquaculture Policy and Economics Division and its Resources Use and Conservation Division especially where it relates to more effective implementation of its global fisheries instruments. FAO’s Governing body, the Committee on Fisheries (COFI) will be used as a forum for discussion of key aspects of project implementation and to raise issues of global significance.

WCPFC, FFA and SPC are all Executing Agencies for this project (along with other bodies and institutions) as well as providing co-funding and ‘partnership’ input for a number of the activities being undertaken by the Project.

Support to the Project from FFA comes in the form of in-kind technical assistance associated with their FFA’s regular program of activities in support of compliance, data management, policy and legal advice to FFA members and information sharing as well as through salaries, office space and utilities. Specifically, the Project Document notes that the FFA will:

- (i) take the technical lead on the development of the integrated MCS system in FFA
- (ii) provide in kind policy and legal support to the Fiji fisheries administration in the pilot testing and implementation of electronic observer systems
- (iii) provide policy and technical support to PNA countries in support of the review and implementation of a revised vessel day scheme
- (iv) provide support to the development of training curricula

Support to the project from SPC will come in the form of in-kind technical assistance associated with the SPC's Oceanic Fisheries program of activities in support of compliance, data management, stock assessment and information sharing. Specifically, the Project Document notes that SPC will:

- (i) provide technical leadership in the development of a Global Bycatch Management and Information Portal capable of supplying information for management decision-making
- (ii) support to development of regional action plans (through MSE science management dialogue reports containing CMMs, HCRs and RPs) for priority tuna stocks in the WPO and EAF evaluations and plans in the WPO
- (iii) provide support to Fiji pilot trials of electronic observer systems (observer data)

### **South Pacific Regional Fisheries Management Organisation**

South Pacific Regional Fisheries Management Organisation (SPRFMO) has a focus confined to the high seas, but its convention area overlaps the WCPFC convention area. There is no actual overlap with WCPFC work because they specifically cover stocks that are not covered by WCPFC - i.e. demersal/benthic straddling, and discrete high seas stocks, and fisheries for migratory species like jack mackerel and squid that are not officially classified by UNCLOS as highly migratory species and thus fall outside the WCPFC mandate. The fisheries that they cover are (currently) all outside the tropical area and thus attract little involvement from Pacific Islands, except for those with flag vessels fishing for non-tuna stocks at high latitudes. These are Vanuatu and Cook Islands. This would only change if benthic or midwater trawl (or other non-UNCLOS-Annex-1) fisheries were ever to open on the western Pacific high seas. Then Pacific Island countries would need to join SPRFMO.

### **United Nations Straddling Fish Stocks Agreement**

The Straddling Fish Stocks Agreement (formally, the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks) is a multilateral treaty created by the United Nations to enhance the cooperative management of fisheries resources that span wide areas and are of economic and environmental concern to a number of nations. The Agreement sets out principles for the conservation and management of those fish stocks and establishes that such management must be based on the precautionary approach and the best available scientific information. The Agreement elaborates on the fundamental principle, established in the Convention, that States should cooperate to ensure conservation and promote the objective of the optimum utilization of fisheries resources both within and beyond the exclusive economic zone. The Agreement attempts to achieve this objective by providing a framework for cooperation in the conservation and management of those resources. It promotes good order in the oceans through the effective management and conservation of high seas resources by establishing, among other things, detailed minimum international standards for the conservation and management of straddling fish stocks and highly migratory fish stocks; ensuring that measures taken for the conservation and management of those stocks in areas under national jurisdiction and in the adjacent high seas are compatible and coherent; ensuring that there are effective mechanisms for compliance and enforcement of those measures on the high seas; and recognizing the special requirements of developing States in relation to conservation and management as well as the development and participation in fisheries of straddling fish stocks and highly migratory fish stocks.

As of December 2016, the treaty had been ratified by 84 parties, which includes 83 states and the European Union. Straddling stocks are fish stocks that migrate through, or occur in, more than one exclusive economic zone. The Agreement was adopted in 1995 and came into force in 2001. Highly migratory fish is a term which has its origins in the United Nations Convention on the Law of the Sea. It refers to fish species which undertake ocean migrations and also have wide geographic distributions, and usually denotes tuna and tuna-like species, shark, marlin and swordfish. Straddling fish stocks are especially vulnerable to overexploitation because of ineffective management regimes and noncompliance by fishing interests. Further information on this Agreement can be found at [http://www.un.org/depts/los/convention\\_agreements/convention\\_overview\\_fish\\_stocks.htm](http://www.un.org/depts/los/convention_agreements/convention_overview_fish_stocks.htm)

## **Pacific Islands Regional Ocean Policy for Integrated Strategic Action (PIROP-ISA)**

At their 1999 meeting, Pacific Islands Forum Leaders endorsed a recommendation that a regional ocean policy be produced. The Marine Sector Working Group (MSWG) of the Council of Regional Organisations in the Pacific (CROP) was tasked with developing a regional ocean policy. The draft policy produced by the MSWG was subsequently endorsed by the 33rd Pacific Islands Forum, in 2002. This Policy is the result of a regional effort to achieve responsible ocean governance. It is based on existing international and regional agreements that establish a broad framework for regional cooperation and coordination to sustainably manage and conserve the ocean ecosystem in the region. It provides the basis for the harmonisation of national and regional actions. The implementation process will require a commitment by all stakeholders. This Policy articulates guiding principles and strategic actions that will define a regional Pacific Ocean Initiative. The Initiative will include a Pacific Islands Regional Ocean Summit to define the status of current knowledge and activities, and a review process to define progress, and will provide an integrated framework to include existing programmes and identify and prioritise future Action Plans.



**VISION:** A healthy ocean that sustains the livelihoods and aspirations of Pacific Island Communities,



**GOAL:** The goal of this Policy is to ensure the future sustainable use of our ocean and its resources by Pacific Islands communities and external partners.



**GUIDING PRINCIPLES:** The five Guiding Principles to achieve this goal are given below along with the Strategic Action agreed to achieve them:

### **1. Improve our Understanding of the Oceans**

- To identify and prioritise information needs and the co-operative mechanisms for acquiring, accessing and disseminating information.
- To strengthen national and regional capacity, encourage partnerships between regional and international organisations, and the public and private sectors, to improve our understanding of the ocean.
- To facilitate access to this information, encourage its wide application in the implementation of this Policy and any compatible national ocean policies that may be developed in association with it.
- To have regard for traditional knowledge and its potential to contribute to better understanding the ocean and to the effective management of resources.
- To promote further formal education and training of local people in marine science and marine affairs disciplines.

### **2. Sustainably Developing and Managing the Use of Ocean Resources**

- To identify, prioritise and implement resource development and management actions and regimes, in accordance with the precautionary approach.
- To encourage equitable sharing of resource access and benefits at local, national and regional levels.
- To engage, as appropriate, local communities and other stakeholders in resource management decision making.
- To build capacity of Pacific Island communities for sustainable resource development and management.
- To establish and protect traditional knowledge rights.
- To establish and protect intellectual property rights.

### **3. Maintaining the Health of the Ocean**

- To adopt an integrated transboundary approach, through harmonised institutional arrangements, including existing international and regional agreements, to managing marine ecosystems for long-term sustainable benefit.
- To incorporate sound environmental and social practices into economic development activities.
- To protect and conserve biological diversity of the ocean ecosystem at local, national and regional scales.
- To reduce the impact of all sources of pollution on our ocean environment.

### **4. Promoting the Peaceful Use of the Ocean**

- To ensure that all activities carried out in our ocean meet all relevant international and regional standards, and do not cause environmental damage, social or economic hardship in the region.
- To seek remedial action in the event of an incident resulting from non-peaceful use of the ocean.
- To ensure that the ocean is not used for criminal activities nor for other activities that breach local, national or international laws.
- To encourage co-operation amongst law enforcement agencies.

### **5. Creating Partnerships and Promoting Cooperation**

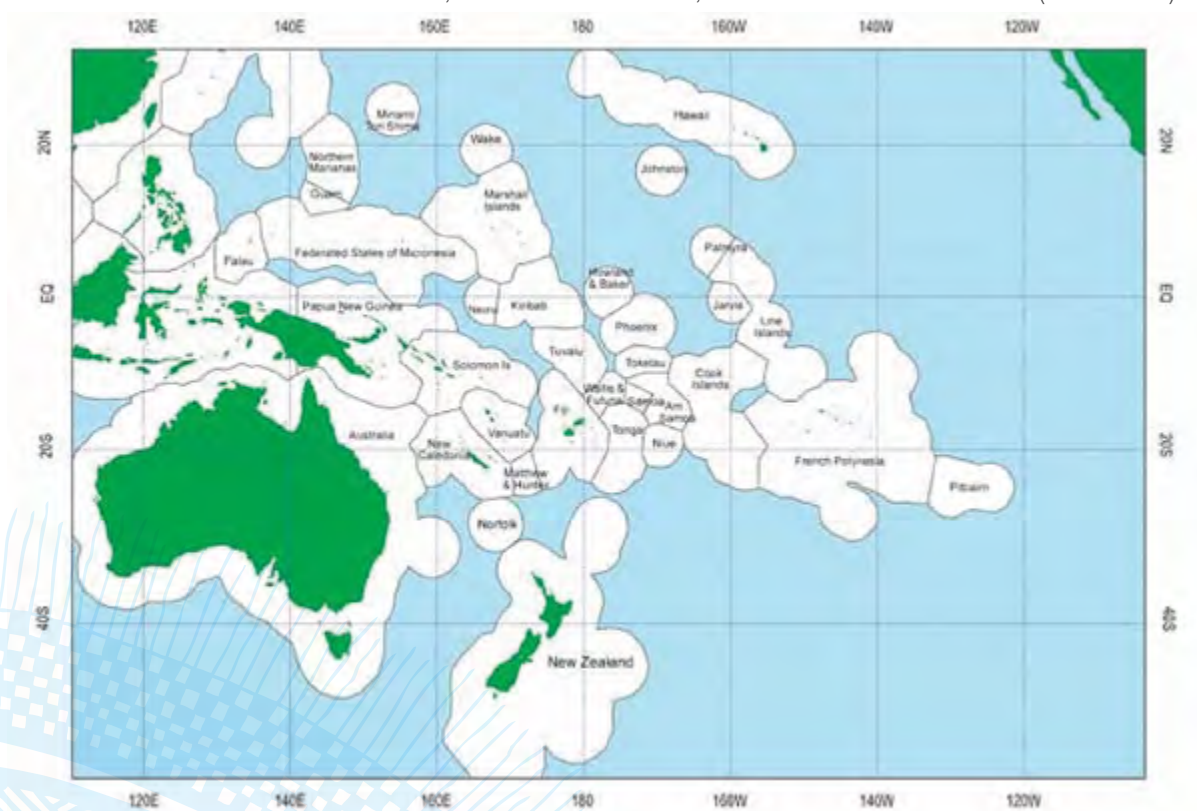
- To foster partnerships and cooperation in the areas of security, monitoring, enforcement and the sustainable use of resources.
- To make fullest possible use of regional and international partnerships and collaboration, such as regional organisations, ocean-related treaties, and bilateral arrangements as appropriate.
- To have regard for the ocean policies of ocean jurisdictions adjoining our own, and advocate that their policies have regard for this Policy.
- To encourage Pacific Island communities to develop national ocean policies that complement and are consistent with this Policy.

Assuming that these guiding principles and associated strategic actions are still valid, it would be both sensible and appropriate to capture their relevance in any Oceanic Fisheries Strategic Action Programme arising from the TDA process.

## B. NATIONAL INSTITUTIONAL AND MANAGEMENT ARRANGEMENTS FOR OFFSHORE FISHERIES IN THE INDEPENDENT PACIFIC ISLAND COUNTRIES

The following section summarises and describes the national management arrangements for the 14 independent PICs. Annex D provides greater details for each country. The information provided in this section and in Annex D is extracted from Gillett, R and Tauati, M. (2018) **Fisheries of the Pacific Islands – Regional and National Information**, FAO Fisheries and Aquaculture Technical Paper 625. Further detail and description of national legislation and management strategies related to fisheries can be found within that publication. This information has been further reviewed and updated by both SPC and FFA as part of the TDA development and review process.

The Pacific Islands region consists of fourteen independent countries and eight territories located in the western and central Pacific Ocean. There is also a substantial amount of international waters (high seas) in the area. Figure 3 shows these countries/territories, their 200-mile zones, and the international waters (Gillett 2011).



Source: Courtesy of SPC

Figure 3: The Pacific Islands Region

The fisheries legislation of many countries in the region stipulates that management of significant commercial fisheries is to be done through fisheries management plans. The management of the offshore fishery resources in the Pacific Island area is complex and involves political, resource and historical considerations (Gillett and Tauati, 2018). Current management occurs at the national, regional and international levels.

A general feature of national-level tuna management in the region is the use of tuna management plans (TMPs). In 1998, the Canada-South Pacific Oceans Development Programme cooperated with FFA to produce a detailed TMP for the Solomon Islands. FFA/Canada then subsequently prepared plans, on country request, for Palau, Vanuatu, Fiji and Kiribati. The Asian Development Bank and Australia have also assisted in the formulation of TMPs for the Federated States of Micronesia and Samoa respectively. FFA has continued with this process using its own staff, and has prepared or updated TMPs for Tonga, Marshall Islands, Niue, Tokelau and the Federated States of Micronesia. Recently New Zealand has provided fisheries assistance that includes support for TMPs

in the Cook Islands and Solomon Islands. Currently, all Pacific Island countries have prepared national TMPs, and most have been formally adopted. Characteristically, TMPs give a description of the current national tuna fisheries, the status of the tuna resources (mostly from the work of SPC's OFP), overall government goals in the fisheries sector, specific objectives for the management of the fishery, and the interventions used to obtain the objectives. Tuna resource sustainability is often given as the priority objective in TMPs. Other objectives are related to increasing employment, increasing access fees, and creating and/or enhancing domestic tuna fisheries.

Gillet (2009b) highlights the fact that the experience gained in studying the formulation and implementation of tuna management plans in the region indicates that TMPs have had both successes and disappointments yet there have been substantial benefits. The first experience of some countries in formally establishing fisheries policies and articulating management goals has been during the process of formulating these plans. The plans have brought a degree of transparency to the fisheries management process, which was otherwise vague and indeterminate in several countries. The solid and definitive set of policy measures advanced by the plans are of significant and vital importance for attracting domestic and foreign investors into the fisheries sector. In some countries, the first government/industry consultative mechanisms in the fisheries sector are those established by the plans.

There are a number of regional tuna fishery management arrangements in the Pacific Islands. They are promoted and coordinated by FFA and/or PNA. The region's first conservation-oriented management move in the tuna fisheries was the Palau Agreement for the Management of the Western Pacific Purse-Seine Fishery, which entered into force in November 1995. The arrangement places a ceiling on the number of purse-seine licences that can be issued by the seven Pacific Island countries that are party to the agreement. The limit was originally set at 164 vessels and has been progressively increased. For several years, there has been discussion of modifying the Palau arrangement so that purse-seine vessel fishing days (rather than vessel numbers) are used as the basis for management.

In this context, one important development that has taken place more recently within the region has been the adoption of the Vessel Day Scheme through the parties to the Nauru Agreement. In 2000, an FFA study suggested that the purse-seine management scheme that was then based on vessel numbers be replaced by a scheme based on purse-seine fishing days. The transition was actually made seven years later. In 2007, the Parties to the Nauru Agreement began implementing the Vessel Day Scheme (VDS), transitioning from permitting a total number of purse-seine vessels in the region (205) to permitting a total allowable number of purse-seine fishing days (44 703 for 2012). Given the volume, value and multi-jurisdictional nature of the fishery, it is arguably the most complex fishery management arrangement ever put in place (Campling, 2013). Nevertheless, the VDS has produced substantial benefits for PNA countries. The system is creating competition for a limited number of days, thereby increasing the value of each day and has already increased revenue to the Pacific Islands from the purse-seine fishery more than three-fold. Furthermore, the VDS moves fisheries management in the region to a desirable rights-based system. That is, fishing rights (such as vessel days) can be defined, allocated and traded. By limiting the rights (e.g. a cap on vessel days) scarcity is created and value increased. Consistent with this transition to a rights-based approach, a VDS-style arrangement for management of the tropical longline fishery is being implemented (Campling, 2013).

At the International level, negotiations between the coastal states of the western and central Pacific and distant-water fishing nations has led to the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. The objective of the Convention is to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the western and central Pacific Ocean in accordance with the 1982 United Nations Convention on the Law of the Sea and the 1995 UN Fish Stocks Agreement. For this purpose, the Convention establishes a Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. The Contracting Parties to the Convention are members of the Commission (Taken from WCPCF website). The Convention applies to all species of highly migratory fish stocks, except sauries. Conservation and management measures under the Convention are to be applied throughout the range of the stocks, or to specific areas within the Convention Area, as determined by the Commission. As of late 2017, participation in the Commission consisted of:

**Members:** Australia, China, Canada, Cook Islands, European Union, Federated States of Micronesia, Fiji, France, Indonesia, Japan, Kiribati, Republic of Korea, the Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Taiwan Province of China, Tonga, Tuvalu, United States of America, Vanuatu.

**Participating territories:** American Samoa, Commonwealth of the Northern Mariana Islands, French Polynesia, Guam, New Caledonia, Tokelau, Wallis and Futuna Islands.

**Cooperating non-members:** Ecuador, El Salvador, Mexico, Panama, Liberia, Thailand, Viet Nam.

Gillet and Tauati (2018) noted that “the relationship between management of the offshore resource at the regional and international levels is complex. To some degree, the international management encompasses objectives that are common to its members, which are largely those measures that relate to resource sustainability. For some other objectives, such as maximizing government revenue from foreign fishing or encouraging the basing of vessels in the region, the interests of Pacific Island countries may be very different from those of distant water fishing nations. Those are the types of objectives where regional management coordinated by FFA and PNA has an important role”.

According to Gillet and Tauati (2018) a major feature of the Pacific Islands region over the past decades has been the solidarity among countries on fisheries issues. In the late 1970s and early 1980s, many distant water fishing nations wishing to fish in the Pacific Islands area would deal directly with each country and could thus play countries off against each other leaving them in a weak bargaining position. Eventually, the countries banded together to achieve an effective block for negotiation, which was possible because the tuna resources of the western and central Pacific Ocean are (unlike other regions of the world) largely within the 200-mile zones of Pacific Island countries.

One of the first effective manifestations of regional solidarity was the agreement by all countries of the region on the Harmonized Minimum Terms and Conditions for Foreign Fishing Vessel Access (see Table 2 below), which specify consistent conditions across the region with respect to several features, including requirements for being in good standing on the regional register of fishing vessels, trans-shipment, catch logbooks, vessel reporting and observers. The application of this non-negotiable, “take it or leave it” policy by all Pacific Island countries in their dealing with foreign fishing entities has resulted in significant benefits over the years.

### Terms and conditions for foreign fishing vessel access

Pacific Island countries developed and implemented a set of Harmonized Minimum Terms and Conditions for Foreign Fishing Vessel Access (MTCs) that apply to all foreign tuna fishing vessels seeking access to the EEZs of Pacific Island countries. Currently, the application of these MTCs is both widespread and comprehensive by Pacific Island countries in areas under their respective national jurisdictions. The MTCs provide the following guidance to PICs in licensing foreign fishing vessels:

- Use of a common regional licence form
- Vessels are required to be in “good standing” on the Regional Register of Foreign Fishing Vessels and Vessel Monitoring System (VMS) Register of Foreign Fishing Vessels as a condition of licensing
- Monitoring and control of transshipment
- Submission of prescribed forms reporting all catch and by-catch taken in EEZs and on the high seas
- Vessel reporting requirements
- Observers and observer coverage
- Appointment of an agent in the relevant Pacific Island licensing country
- Requirements for foreign fishing vessels to stow gear when transiting fisheries zones
- Application of MTC in port and exercise of port State authority
- Enforcement cooperation
- Flag State or Fishermen’s Associations responsibility
- Requirement to implement regional Vessel Monitoring System
- Identification of fish aggregating devices
- Pre-fishing inspections

Source: FFA (unpublished document)

**Table 2: Minimum terms and conditions for foreign fishing vessel access**  
**(taken from Gillett and Tauati, 2018)**

Many other regions of the world are now aspiring to achieve the solidarity that Pacific Island countries have attained. In the SPC/ FFA report on the long-term future of fisheries in the region it is stated: “For the offshore fisheries, regional solidarity amongst Pacific Island countries will be central to mitigating most of the challenges listed, as well as for taking advantage of most of the opportunities” (Gillett and Cartwright, 2010).

However, Gillett and Tauati (2016) note that in recent years, there has been increasing challenges in some aspects of regional fisheries solidarity. In some situations, in dealings with foreign fishing entities, aspects of the regionally agreed MTCs have not featured. Foreign interests have successfully applied pressure on some countries to ignore purse-seine effort limits and high seas closures. As a consequence, some countries have been having difficulty resolving their differences and taking collective control of the southern albacore longline fishery, as was done two decades earlier for the purse-seine fishery. There appears to be some degree of consensus that improvements in solidarity must come from a higher level than that of fisheries officials.

Gillett and Tauati (2018) refer a number of other important issues that relate directly to both the evolving national and related regional institutional and management arrangements for offshore fisheries including:

## **Illegal, Unreported and Unregulated Fishing**

IUU fishing is sometimes discussed in the context of the difficulties of the fisheries of the region. It has been implied that this is the worst problem facing the offshore fishing in the region. Several of the recent high-level fishery policy papers mention the severity of the IUU problem in the region. As part of the European Union's (EU) effort to mitigate the large amount of IUU fishing in the region, the EU has introduced (and selectively enforced) a scheme whereby a country must fulfil a number of requirements in order to export fishery products to the EU. FFA (2013) states that more resources are being dedicated by donors to addressing IUU related issues.

Gillett and Tauati (2018) note that there is a consensus by those individuals familiar with IUU that:

- it is extremely difficult to accurately estimate the level of IUU in the region;
- IUU on the high seas is a problem;
- IUU in the region has tended to decrease and change in character over the years, from fishing in a 200-mile zone without a licence in the past, to misreporting of catches at present.

They further note that this last point is supported by a recent report commissioned by FFA, which indicates that unlicensed fishing accounts for only 4 percent of the volume of catch by IUU fishing (MRAG, 2016).

However, it is clear from these various reports that IUU fishing is not insignificant in the region and that the proper reporting of catches is essential for Pacific Island countries to maximize benefits from their tuna resources, including benefits from foreign fishing access fees. The stock assessments that are critical for proper management are dependent on accurate data from vessels. Vessels that misreport and are not apprehended encourage other vessels to misreport.

Purse seiners operating in the region are now required to have 100 percent observer coverage, a feature that minimizes misreporting. It is therefore likely that most misreporting problems involve longlining. With several thousand longliners operating in the region, the misreporting difficulties are not small and cannot easily be resolved.

## **Access Fees versus Domestic Industry Development**

All Pacific Island countries collect access fees for foreign fishing in their waters and all have aspirations to develop their own fishing and/or processing industries. According to Gillett and Tauari (2018), the various considerations and trade-offs involved in balancing these two opportunities have been a major issue in the region for many years.

Because of a scarcity of local private capital in most countries of the region, and mistrust in potential overseas investors, this involvement usually entailed governments investing in the tuna industry. Unfortunately, with very few exceptions, government tuna ventures that have operated for more than two years have been unprofitable and have required additional heavy injections of public funds to maintain operations (Pollard, 1995).

As a result, some countries have re-focused on obtaining benefits from their tuna resources through access fees, others sought overseas investment to build industries, while some pursued both. Currently access fees are at an all-time high, assisted by the introduction of the PNA Vessel Day Scheme. Domestic tuna industry development is also advancing (Terawasi and Reid, 2017) and much of this industry development came about by using access to tuna resources to leverage fishing and processing companies to base locally.

Other important offshore fisheries management issues that are likely to affect national as well as regional management needs and institutional strengths in the Pacific Island region include:

## **Climate Change**

Alterations in ocean temperatures and currents, and the food chains in the open ocean, are projected to affect the future location and abundance of tuna species in the Pacific Islands region. An SPC policy brief (SPC, 2014) indicates that the projected changes to the tropical Pacific Ocean are likely to redistribute the abundant skipjack tuna to the central-eastern Pacific. Abundance of bigeye tuna is also expected to decrease in the western Pacific and increase in the east, whereas albacore are likely to shift poleward to avoid a projected increase in oxygen-poor waters in their present-day distribution (Brill, 1994; Pörtner and Knust, 2007). The response of yellowfin tuna has yet to be modelled. However, there are concerns that survival and growth of their larvae may be affected by intense ocean acidification (Johnson et al., 2016).

## **Stock Assessment Work**

Studies undertaken by SPC related to stock assessment indicate that tuna fishing in Indonesia and the Philippines is having a large impact on stocks in the WCPO region. These studies also show that the Indonesian fishery is a large contributor to the depletion of the WCPO yellowfin stock. Much of the tuna captured in Indonesia and the Philippines is taken with very small-scale gear and it is difficult to place controls on this type of fishing. So, there is a very real possibility that, even if Pacific Island countries put considerable effort into establishing national and regional tuna management, those regimes may be undermined by the unmanaged tuna fisheries in Indonesia and the Philippines.

## **Domestic Consumption**

The countries of the region will almost certainly have to start turning more to the use of offshore fish for domestic consumption to compensate for declining food resources from coastal fisheries, support adaptation to climate change, and provide benefits to small-scale fishers. This may require countries of the region to consider management measures in WCPFC or domestic access conditions that encourage industrial fishing vessels to offload at least some catch in Pacific Island ports and to support small-scale tuna fisheries. This offloading may come at some cost (i.e. reduction in some access fees). In addition, there will likely be an increasing focus on well-managed national nearshore FAD programmes to support artisanal fishers.

## **C. NON-GOVERNMENTAL BODIES INVOLVED IN OCEANIC FISHERIES MANAGEMENT**

### **PITIA**

The Pacific Islands Tuna Industry Association (PITIA) is described on their website<sup>7</sup> as ‘an association of associations with the membership consisting of the Papua New Guinea, FSM and Solomon Islands and working partners with the industry reps in Fiji, Kiribati, Samoa, Tonga, Cook Islands, Niue, Tuvalu. The full PITIA engages with the domestic industry in the 14 Pacific Island countries and several national industry associations. A key function of PITIA is to keep the smaller Industry associations fully informed on WCPFC developments and proposals and activities at FFA and SPC which may be of concern to them. PITIA, as an “industrial” NGO, has no national borders and can look at the ‘non-geopolitical’ issues and alternatives and provide ‘impartial’ advice to government(s) on issues such as comparing the benefits of deriving income from tendering vessel days under the VDS to facilitating domestic catching/ processing activities. PITIA is essentially a voluntary organization, based in Suva, Fiji Islands, with only the Executive Secretary as a paid employee. PITIA’s main objectives are:

1. To provide a united voice for the domestic fishing and associated industries of members
2. To facilitate and encourage the economically and biologically sustainable use of tuna and tuna-related resources
3. To undertake, coordinate and promote liaison and negotiations with national, regional and international bodies and other entities with similar interest

PITIA aims to achieve this through A. Representation of commercial interests to policy making forums, B. Information dissemination and profile building, and C. Promotion of sustainable fishing behaviour which adds value to the industry.

At the 2014 PITIA AGM held in Brisbane, it was agreed to consider an alternative format whereby sector interests were represented rather than National Associations and the interim executive of PITIA (who cover a broad range of interests from processing, purse seine and longline fishing) is working towards this goal.

### **THE PEW CHARITABLE TRUSTS GLOBAL TUNA CONSERVATION PROGRAMME**

The objectives of Pew’s Global Tuna programme are to promote the sustainability of tuna fisheries in the Atlantic and Pacific, improve international and regional agreements, and increase the sustainability of the oceans’ tuna stocks. Pew’s goals for tuna in the Pacific include:

- Conserve bigeye, yellowfin, skipjack, and Pacific bluefin tuna through strong conservation and management measures adopted and implemented by WCPFC and IATTC.
- Agree and implement harvest strategies for each tuna stock managed by WCPFC and IATTC, which include science-based catch limits or equally effective fishing effort controls.
- Minimize the impacts of destructive fishing gears by:
  - Ensuring the use of Fish Aggregation Devices (FADs) by industrial fishing fleets is regulated and managed to support the long-term sustainability of the tropical tunas and the marine ecosystem.
  - Strengthening the management and monitoring of longline vessel and transshipment operations to improve scientific data collection and ensure compliance with WCPFC and IATTC regulations, including by increasing the level of observer coverage, through a combination of human observers and electronic monitoring,
- Improve transparency and accountability of the WCPFC and IATTC.

<sup>7</sup> <http://pacifictuna.org/about/>

## **THE PEW CHARITABLE TRUSTS GLOBAL CAMPAIGN TO END ILLEGAL FISHING**

The objective of the project is to work with stakeholders to build and implement a global system to detect, deter and combat illegal fishing. We do this through advocating for the adoption and implementation of regulations, policies, and tools to improve information sharing, monitoring activity, and prosecuting illicit operators. By working with governments, fisheries management bodies, enforcement authorities, the seafood industry, and scientists, we seek to:

- Make vessels and their locations easily identifiable through advocating for the use and sharing of VMS and AIS
- Close avenues to illegal catch through implementation of the Port State Measures Agreement
- Assess compliance with international instruments through creating and making a flag state assessment tool
- Boost policing abilities through regional pilot projects similar to FISH-I Africa
- Leverage technology and fisheries intelligence by working with stakeholders to use satellite technology, information sharing and analysis
- Assess the role of transshipment and establish best practices for regulating and monitoring the activity
- Engage and align the seafood industry to ensure compliance with fisheries management provisions and conducting outreach on how the industry can assess and limit their risk of illegal fish in their supply chain

## **WWF**

The World-Wide Fund for Nature (WWF) Pacific Programme Office (PPO) is largely focused on conservation and natural resource management of the marine environment. The WWF PPO Offshore Fisheries Programme is an advocacy, awareness, research and policy input and project implementation initiative that has been working with the network of WWF offices globally and with partners to improve the health and management of tuna (offshore) and small scale (inshore) fisheries in the Pacific Islands region<sup>8</sup>. Due to the highly migratory nature of tuna in the Pacific, to effectively safeguard their populations from overfishing across their extensive range, a highly collaborative approach between Pacific nations, territories and DWFNs is essential. As such, the programme focuses on lobbying, advocacy and partnership with national, regional and international organisations to promote responsible tuna fishing practices across large swathes of the Pacific. The WWF PPO focuses on three main activities through three separate projects:

### **1. Sustainable Fisheries**

- Promoting fishery certification, namely Marine Stewardship Council (MSC), to ensure that wild fisheries are implementing high standards of management.
- Raising consumer awareness of oceanic fishery conservation issues and promoting sustainable sourcing by major purchasers.
- Securing commitments from major retailers to sustainably source their seafood.

### **2. WCPFC Advocacy**

WWF was given the responsibility by the Oceanic Fisheries Management Programme and the Forum Fisheries Agency (FFA) to carry out awareness and advocacy on the Western and Central Pacific Fisheries Commission and tuna fisheries issues in the Pacific Islands region by:

- Increasing the number of environmental NGOs who include oceanic fisheries in their mandate and participate in oceanic fisheries management processes.
- Engaging civil society organisations and environmental NGOs with oceanic fisheries management issues.

<sup>8</sup> From [http://www.wwfpacific.org/what\\_we\\_do/offshore\\_fisheries/](http://www.wwfpacific.org/what_we_do/offshore_fisheries/)

- Raising awareness of the link between developmental and economic priorities and sustainable fisheries management.

WWF involvement in the current OFMP reflects the strong record of collaboration between WWF and Pacific Island countries as well as FFA and PNA in regional tuna fisheries activities.

### 3. Bycatch Reduction

The bycatch project aims to support the implementation of fishing best practices to reduce bycatch in Fiji's long line and purse seine tuna fishing industries through the cultivation of strategic working partnerships with the fishing industry and policy advocacy and engagement on bycatch mitigation with the Fiji Department of Fisheries.

The focal bycatch species are juvenile bigeye and yellowfin tunas in purse seine fishing, as well as turtles and sharks in longline fishing.

## **INTERNATIONAL SEAFOOD SUSTAINABILITY FOUNDATION**

The International Seafood Sustainability Foundation (ISSF) is a global coalition of scientists, the tuna industry and World Wildlife Fund (WWF) promoting science-based initiatives for the long-term conservation and sustainable use of tuna stocks, reducing bycatch and promoting ecosystem health, largely industry-funded.

The objectives of ISSF in its current Strategic Plan are:

- Improve the sustainability of global tuna stocks by developing and implementing verifiable, science-based practices, commitments and international management measures that result in tuna fisheries meeting the MSC certification standard without conditions, and becoming the industry standard for vessel owners, traders, processors and marketers.
- ISSF will cooperate with and support Regional Fisheries Management Organizations (RFMOs), and vigorously advocate to RFMO members for the adoption and implementation of science-based management measures so that tuna stocks and their ecosystems are managed comprehensively and sustainably.

ISSF identifies as the 3 pillars of its programmes:

- **Science:** Advance the sustainability of tuna stocks & their ecosystems through continuous improvement —measurably demonstrated— across global tuna fisheries.
- **Influence:** Exercise influence among stakeholders to promote and expedite actions necessary to advance the sustainability of tuna stocks & their ecosystems.
- **Verification:** Maintain & enhance credibility through transparency and compliance.

ISSF implements conservation and management measures directly through ISSF members and supports research and trial activities at the global level.

ISSF participates systematically in WCPFC activities and cooperates with PNA through a MOU.

## **GREENPEACE**

Greenpeace is a global environmental campaigning organisation, which uses *peaceful, creative confrontation to expose global environmental problems, and develop solutions for a green and peaceful future*. Its objectives are to:

- protect biodiversity in all its forms
- prevent pollution and abuse of the earth's ocean, land, air and fresh water
- end all nuclear threats
- promote peace, global disarmament and non-violence.

Greenpeace participates in regional tuna activities through its Oceans Programme and its Australia-Pacific and New Zealand programmes.

It is probably best known in Pacific tuna affairs for its ocean missions using Greenpeace vessels to campaign at sea including boarding fishing vessels. The Greenpeace missions in the region are typically undertaken in collaboration with Pacific Island fisheries administrations. Greenpeace also participates in WCPFC activities.

# ASSESSMENT OF STATUS OF THE OCEANIC FISHERIES AND ITS MANAGEMENT IN THE CONVENTION AREA

## 4

### A. GENERAL BIOLOGY AND STOCK ASSESSMENT OF THE TUNA TARGET SPECIES

(Much of the following information has been taken from 'Baseline study and performance indicators for the Pacific Islands Oceanic Fisheries Management Project'. A Report prepared for the Pacific Islands Forum Fisheries Agency (FFA) by Ian Cartwright, Thalassa Consulting Pty Ltd. February 2017)

The tuna fisheries of the WCPO are based on four key species– skipjack (*Katsuwonus pelamis*), yellowfin (*Thunnus albacares*), bigeye (*Thunnus obesus*) and albacore (*Thunnus alalunga*) tuna. The most productive area in the WCPO for tuna lies in the equatorial zone (10°N-10°S) where around 80% of all tuna landed in 2014 from the WCPO were caught (SPC data).

Skipjack and juvenile yellowfin and bigeye tuna school (frequently together) on the ocean surface and are commonly found in the tropical and subtropical waters of the WCPO. Schooling behaviour makes these fish vulnerable to surface fishing methods, the most significant being purse seine and, to a much lesser extent, pole and line. Larger adult yellowfin and bigeye are generally found in deeper water, where they are more widespread and are caught using longlines. Some larger yellowfin (two-three years of age) are also caught in free-swimming schools. Yellowfin and skipjack tuna spawn year-round within 10 degrees of the equator and in the waters of higher latitudes when warm enough (>23-24°C). Bigeye tuna spawn at slightly higher latitudes but the duration of the spawning season is not known.

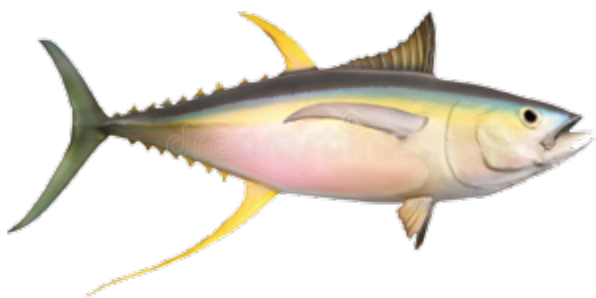


Bigeye tuna are an important component of tuna fisheries throughout the Pacific Ocean and are taken by both surface gears, mostly as juveniles, and longline gear, as valuable adult fish. They are a principal target species in tropical waters of both the large, distant-water longline fleets of Japan, Korea, China and Chinese Taipei and the smaller, fresh sashimi longline fleets based in several Pacific Island countries and Hawaii. Prices paid for both frozen and fresh product on the Japanese sashimi market are the highest of all the tropical tunas. The longline catch of bigeye in the WCPFC area had a “delivered” value in 2015 of approximately US\$563 million, mostly taken in the high seas. Bigeye caught by purse seine vessels are taken almost exclusively from sets on natural and artificial floating objects (FADs). Coastal Japanese pole-and-line fishery also take bigeye tuna (McKechnie et al., 2017).



Skipjack growth is rapid compared to yellowfin and bigeye tuna. In general, skipjack movement is highly variable and is thought to be influenced by large-scale oceanographic variability. Skipjack tuna are caught using a wide variety of fishing gears and comprise the largest component of tuna fisheries throughout the WCPO. Fisheries can be broadly classified into the Japanese pole-and-line fleets (both distant-water and offshore), domestic pole-and-line

fleets based in Pacific Island countries, artisanal fleets fishing a wide range of gear based in the Philippines, eastern Indonesia and the Pacific Islands, and distant-water and Pacific Island-based purse seine fleets. The purse catch of skipjack in the WCPFC area had a “delivered” value in 2015 of approximately US\$1.8 billion, taken mostly in the waters of Pacific Island Countries. The Japanese pole-and-line fleets operate over a large area of the WCPO, although effort and the spatial extent of this fishery has gradually declined since the 1980's. A domestic pole-and-line fishery occurred in PNG from 1970 to 1985 and active fisheries have occurred in Fiji since 1974 (now discontinued), and the Solomon Islands since 1971 (now operating at a very low level). A variety of gear types (e.g. gillnet, hook and line, longline, purse seine, ring net, pole-and-line and unclassified) capture a significant amount of skipjack in the Philippines and Indonesia. Small but locally important artisanal fisheries for skipjack and other tuna (mainly using traditional methods and trolling) also occur in many of the Pacific Islands. Tagging programmes are very important for skipjack assessment (Sibert et al., 1999) but this has always relied on pole-and-line fishing methods for tagging but very few active pole-and-line vessels now left.



Albacore tuna comprise a discrete stock in the South Pacific. Mature albacore (i.e. above a minimum fork length (FL) of about 80 cm) spawn in tropical and sub-tropical waters between latitudes 10° S and 25° S during the austral summer (Ramon and Bailey, 1996). Juveniles are caught in surface fisheries in New Zealand's coastal waters, and in the vicinity of the sub-tropical convergence zone (STCZ, at about 40° S) in the central Pacific, about one year later at a size of 45-50 cm FL. Catch rates in

sub-equatorial waters peak during December-January and May-July, indicating that albacore migrate south during early summer, and north during winter. This movement tends to correspond with the seasonal shift in the 23-28° C sea surface temperature isotherm location. In contrast to skipjack and yellowfin tuna, albacore tend to concentrate in temperate areas where food is abundant. Juvenile albacore are particularly common at the ocean surface where different water masses converge and are caught in relatively small numbers by trolling. Larger albacore are found in deeper waters (around the thermocline) and are caught on longlines (Murray, 1994).



Yellowfin tuna are relatively fast growing (although there may be regional differences in growth rate) and have a maximum fork length (FL) of about 180 cm. They are distributed throughout the tropical and sub-tropical waters of the Pacific Ocean. There is some indication of restricted mixing between the western and eastern Pacific based on analysis of tagging data and genetic samples also suggest spatial separation at potentially finer scales. Adults (larger than about 100 cm) spawn, probably opportunistically, in waters warmer than 26° C, while juvenile yellowfin are first encountered in commercial fisheries (mainly surface fisheries in Philippines and

eastern Indonesia) at several months of age. Yellowfin tuna, an important component of tuna fisheries throughout the WCPO, are harvested with a wide variety of gear types, from small-scale artisanal fisheries in Pacific Island and southeast Asian waters to large, distant-water longliners and purse seiners that operate widely in equatorial and tropical waters. Purse seiners catch a wide size range of yellowfin tuna, whereas the longline fishery takes mostly adult fish. Most of the catch is taken in western equatorial areas, with declines in both purse-seine and longline catch towards the east. The east-west distribution of catch is strongly influenced by ENSO events, with larger catches taken east of 160° E during El Niño episodes. Catches from outside the equatorial region are relatively minor (5%) and are dominated by longline catches south of the equator and purse-seine and pole-and-line catches in the north-western area of the WCPO (Langley et al, 2004).

Tropical tunas are very productive and are generally much faster growing than their temperate counterparts (including albacore and southern bluefin tuna). A two-year old skipjack is around 5-6 kg in weight and 65cm in length, while a two-year old yellowfin can weigh close to 30 kg, with a length of 115-120 cm. Skipjack can be sexually mature at one-year old or less, while yellowfin achieve maturity in usually less than two years. Bigeye is the longest lived, slowest maturing (about three years) and largest of the tropical tunas, reaching a maximum length of over 200 cm. It is therefore less resilient to fishing than skipjack or yellowfin tuna. Albacore, as may be expected in colder water habitats, are slower growing and longer lived, taking around 10 years to reach 20 kg in weight.

The biology (especially feeding habits, behaviour and mobility) of the key tuna species has an overriding influence on the distribution and type of fishing effort in WCPO oceanic fishery (Allain et al. 2015). The climatic and oceanographic effects associated with the El Niño/La Niña (or ENSO) effects are known to have a particularly profound effect on the fishery. In this sense, an increased understanding of the biology and dynamics of the WCPO tunas within the context of the warm pool large marine ecosystem (LME) of the WCPO, is essential to achieving long term sustainability and optimal economic yields from the fishery (Langley, 2004; Langley et al., 2009)

### 1.B. Latest information and understanding of the current status of oceanic fisheries stocks in the WCPFC region

Gillet (2011) provides a list of the major tuna species of commercial important in the region. This is reproduced below as Table 3.





TUNA SPECIES	TYPICAL SIZE CAPTURED	IMPORTANT ASPECTS
	40 to 70 cm	Skipjack are caught mainly on the surface by purse seine and pole/line gear and are mainly used for producing canned tuna. Most fish caught are from 1 to 3 years old. In the WCPO, the skipjack biomass is greater than that of the other three main tuna species combined and skipjack provide around half of the total value of tropical tuna catches.
	40 to 70 cm and 90 to 160 cm	Small yellowfin are caught on the surface by purse seine and pole/line gear, while larger/older fish are caught in deeper water using longline gear. Small fish are used mainly for canning while high quality larger fish are often shipped fresh to overseas markets. Most fish caught are from 1 to 6 years old.
	40 to 70 cm and 90 to 160 cm	Small bigeye are caught on the surface by purse seine and pole/line gear, while larger/older fish are caught in deeper water using longline gear. Small fish are used mainly for canning while high quality larger fish are especially valuable as fresh fish in the Japanese market. Most fish caught are from 1 to 10 years old. Bigeye tuna account for a relatively small proportion of the total tuna catch in the region, but these tuna are extremely valuable.
	60 to 110 cm	Small albacore are caught by trolling at the surface in cool water outside the tropics, while larger fish are caught in deeper water and mainly at lower latitudes using longline gear. Most of the catch is used for producing “white meat” canned tuna. Fish caught are typically from 1.5 to 10 years old.

Table 3: The Tuna Species of Major Commercial Importance in The Region (Taken from Gillet 2011)

## **Description of the types of fishing gear and species targeted (Taken from Gillet 2011)**

**Purse seine:** Mainly skipjack and small yellowfin are caught by purse seine gear. Most catch is for canning. About 72 percent of the tuna catch in the WCPO region is by purse seine gear. Most of the purse seine catch is taken within 5° of the equator

**Longline:** Most tuna caught are large size yellowfin, bigeye, and albacore. The prime yellowfin and bigeye often are exported fresh to overseas markets. Most of the albacore is for canning. About 10 percent of the tuna catch in the WCPO region is by longline gear. There are two major types of longliners: (1) relatively large vessels with mechanical freezing equipment (often based outside the Pacific Islands), and (2) smaller vessels that mostly use ice to preserve fish and are typically based at a port in the Pacific Islands.

**Pole-and-line:** Mainly skipjack and small yellowfin are caught by pole-and-line gear. Most catch is for canning or producing a dried product. About 10 percent of the tuna catch in the WCPO region is by pole-and-line gear. In the 1980s, several Pacific Island countries had fleets of these vessels, but most no longer operate because of competition with the more productive purse seine gear. Most of the catch by this gear is made in Asian waters

**Trolling:** Large-scale trolling targets albacore for canning. Gear types other than the three listed above are responsible for about 10 percent of tuna catch in the WCPO. Large-scale trolling is an important part of this. It is carried out in the cool water to the south and north of the Pacific Islands region.

The Tuna Fisheries Report Card 2017 (Future of Fisheries) provides the most recent information on the status of stocks and biomass as well as the trends in the oceanic fishery. These Tuna Fishery Report Cards provide high-level advice on the current status of Pacific tuna fisheries in relation to the goals, indicators and strategies adopted by Forum Leaders under the Regional Roadmap for Sustainable Pacific Fisheries. Figure 4 shows the Majuro Plot for the status of the stocks in 2017. The 'Majuro' Plot describes the 2017 stock status for the four species of tuna fished commercial in the Convention Area. Stock located in the light green area are considered to be healthy. Overfishing is occurring for stocks in the orange area (i.e. catches are too high for sustainability). Stocks in the red area are overfished (i.e. the level of the spawning biomass is too low to sustain the stock). Many stock assessment runs are performed for each stock, using different combinations of input parameters (e.g., different estimates of growth rate, rates at which fish die due to natural causes, etc.). These lead to slightly different estimates of current stock status. Hence the stock assessment run selected as the 'reference case' for management advice is shown as the main 'point' (plain circle), and the range of estimated status from key uncertainty runs with these different input parameters are shown as lines radiating out from that point. The status of the main tuna species, according to the Report Card, is as follows:

**South Pacific albacore tuna** is not overfished and overfishing is not occurring. However, the fishery is facing serious economic challenges. Parties to the Tokelau Arrangement have made some progress towards agreement on measures to reduce effort in their own waters in order to maintain economically viable catch rates. A reduction in long-line catch has been previously recommended in 2016 to increase the economic viability of the catch. According to Brouwer et al. (2017), Fishing mortality has generally been increasing over time and estimated to be 0.39 times the fishing mortality that will support the maximum sustainable yield. The indications from stock assessments are that overfishing is not occurring, but fishing mortality on adults is approaching the assumed level of natural mortality. Spawning biomass levels are above the level that will support the maximum sustainable yield.

**Bigeye tuna stock**, according to the latest assessment undertaken in 2017, is not overfished and overfishing is not occurring. The change in stock status is a result of the incorporation of a new growth curve and spatial structure into the model and recent high recruitment. Attribution of the improve stock status to management measures or environmental conditions is not possible at this time with the WCPFC Science Committee recommending that fishing mortality not be increased from current levels and that the current level of spawning biomass should be maintained, especially noting the range of uncertainties. The science committee has since initiated work to address some of this uncertainty and supported the need for additional research to expand growth data sets and evaluate alternative regional structures. Based on initial findings, new information on growth from otoliths

is indicating faster growth to a smaller maximum size than previously assumed, while new information on age-at-maturity is indicating younger entry to spawning biomass. Brouwer et al. (2017) noted that fishing mortality is estimated to have increased over time, particularly on juveniles over the last two decades. The biomass of spawners is estimated to have declined over the duration of the fishery, with current median spawning biomass estimated to be about 32% of the level predicted in the absence of fishing. The median spawning biomass levels estimated by the grid was above the recently adopted limit reference point of 20% of the level predicted in the absence of fishing.

**Skipjack tuna** is not overfished and overfishing is not occurring. An assessment in 2016 showed an improvement in the stock status relative to previous years, and this is reflected in the plot which shows the stock is above the 'desirable' TRP (Target Reference Point). Current fishing mortality rates for skipjack tuna are estimated to be about 0.45 times the level of fishing mortality associated with maximum sustainable yield. Estimated recruitment shows an upward trend over time, and biomass is estimated to be at 58% of the level predicted in the absence of fishing. Recent spawning biomass levels are estimated to be well above the recently adopted limit reference point of 20% of the level predicted in the absence of fishing (Brouwer et al., 2017).

**Yellowfin tuna** according to the 2017 assessment is not overfished and overfishing is not occurring. The stock is however approaching the 'cross hairs', particularly when the uncertainty of the assessment is taken into account. This plot only shows status against the biological Limit Reference Point. No work has been undertaken yet as to where a Target Reference Point indicative of an economically viable fishery would be placed. However, an assessment of the status of the stock in 2016 recommended maintaining the current level of spawning biomass. Current fishing mortality rates for yellowfin tuna, however, are mostly estimated to be below level of fishing mortality associated with maximum sustainable yield which indicates that overfishing is not occurring. Spawning potential has shown a long continuous decline from the 1950s to the 2000s but, since the early 2000s, the spawning potential has declined at a lower rate. Recent spawning biomass levels are mostly estimated to be above the spawning biomass – maximum sustainable yield level and the recently adopted limit reference point of 20% of the level predicted in the absence of fishing. (Brouwer et al., 2017).

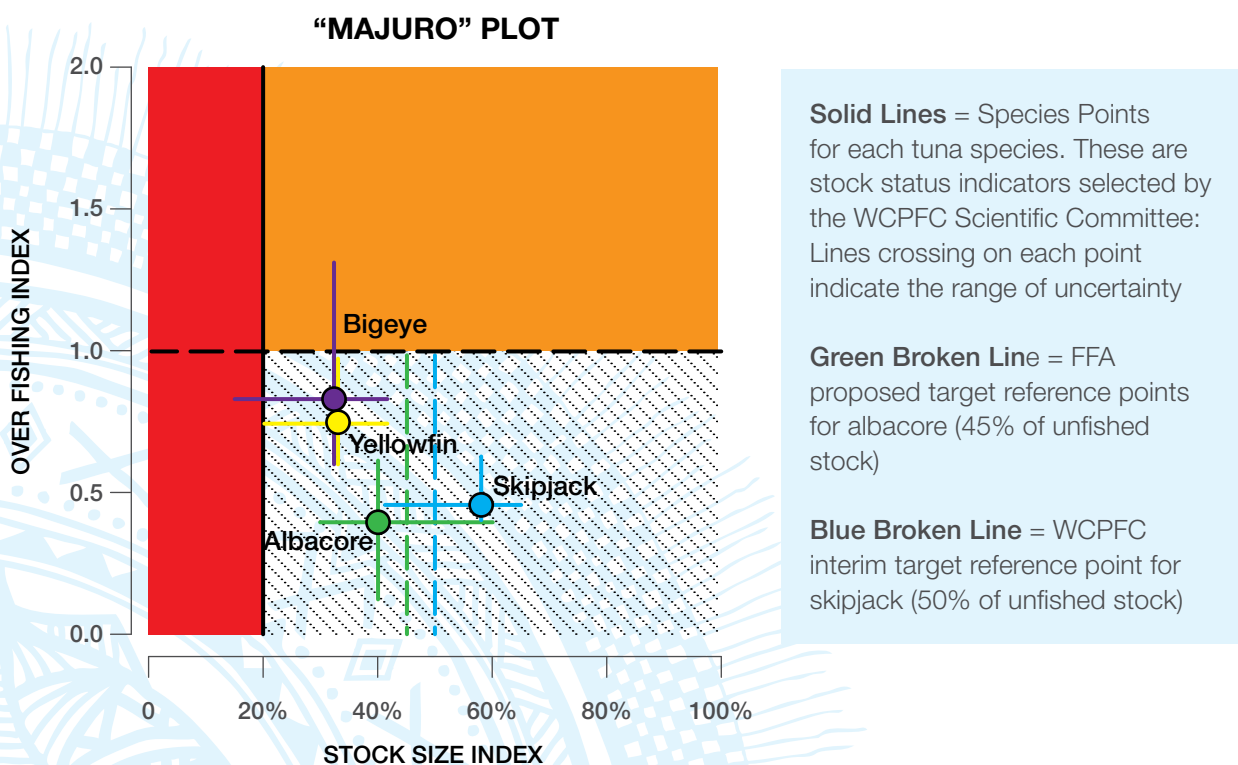


Figure 4: 2017 Majuro Plot for the four main tuna species in the Convention Area

The above information on stock status is also confirmed on the WCPFC website. This provides an overview of all stocks of interest to the WCPFC and its members<sup>9</sup>. Table 4 below is taken from that site which also provides the current status and management advice for each species (updated as of June 2018).

Stock	Latest Assessment	Overfished <sup>10</sup>	Overfishing	Next Assessment
<b>WCPO Tuna</b>				
01 Bigeye tuna ( <i>Thunnus obesus</i> )	2017 (SC13)	No (84%)	No (77%)	2020
02 Yellowfin tuna ( <i>Thunnus albacares</i> )	2017 (SC13)	No (92%)	No (96%)	2020
03 Skipjack tuna ( <i>Katsuwonus pelamis</i> )	2016 (SC12)	No	No	2019
04 South Pacific albacore tuna ( <i>Thunnus alalunga</i> )	2015 (SC11)	No	No	2018
<b>Northern Stocks</b>				
05 North Pacific albacore ( <i>Thunnus alalunga</i> )	2017 (SC13)	No	No	?
06 Pacific bluefin tuna ( <i>Thunnus orientalis</i> )	2016 (SC12)	Yes	Yes	?
07 North Pacific Swordfish ( <i>Xiphius gladius</i> )	2014 (SC10)	No	No	
<b>WCPO Billfish</b>				
08 South Pacific swordfish ( <i>Xiphius gladius</i> )	2017 (SC13)	No (100%)	No (68%)	?
09 Southwest Pacific striped marlin ( <i>Kajikia audax</i> )	2012 (SC8)	May be	No	? <sup>11</sup>
10 North Pacific striped marlin ( <i>Kajikia audax</i> )	2015 (SC11)	Yes	Yes	?
11 Pacific blue marlin ( <i>Makaira nigricans</i> )	2015 (SC11)	No	No	?
<b>WCPO Sharks</b>				
12 Oceanic Whitetip Shark ( <i>Carcharhinus longimanus</i> )	2012 (SC8)	Yes	Yes	2019 (if data allows)
13 Silky shark ( <i>Carcharhinus falciformis</i> )	2013 (SC9)	Yes	Highly likely	?
14 South Pacific blue shark ( <i>Prionace glauca</i> )	2016 (SC12)	?	?	?
15 North Pacific blue shark ( <i>Prionace glauca</i> )	2017 (SC13)	No	No	?
16 North Pacific shortfin mako ( <i>Isurus oxyrinchus</i> )	2015 (SC11)	?	?	2018
17 Pacific bigeye thresher shark ( <i>Alopias superciliosus</i> )	2017 (SC13)	?	?	
18 Southern Hemisphere Porbeagle shark ( <i>Lamna nasus</i> )	2017 (SC13)	?	v. low risk	

**Table 4: Overview of Stocks of Interest to the WCPFC (As of 22nd June 2018)**

Other species for which stocks have been assessed and require management action include:

- Southwest Pacific striped marlin
- Western and central north Pacific striped marlin
- Silky shark
- Oceanic whitetip shark

Scientific advice is to reduce catches and/or fishing effort on all of these stocks

The Tuna Fisheries Report Card 2017 can be accessed from [https://www.ffa.int/system/files/Tuna\\_fishery\\_report\\_card\\_2017.pdf](https://www.ffa.int/system/files/Tuna_fishery_report_card_2017.pdf)

<sup>9</sup> <https://www.wcpfc.int/current-stock-status-and-advice>

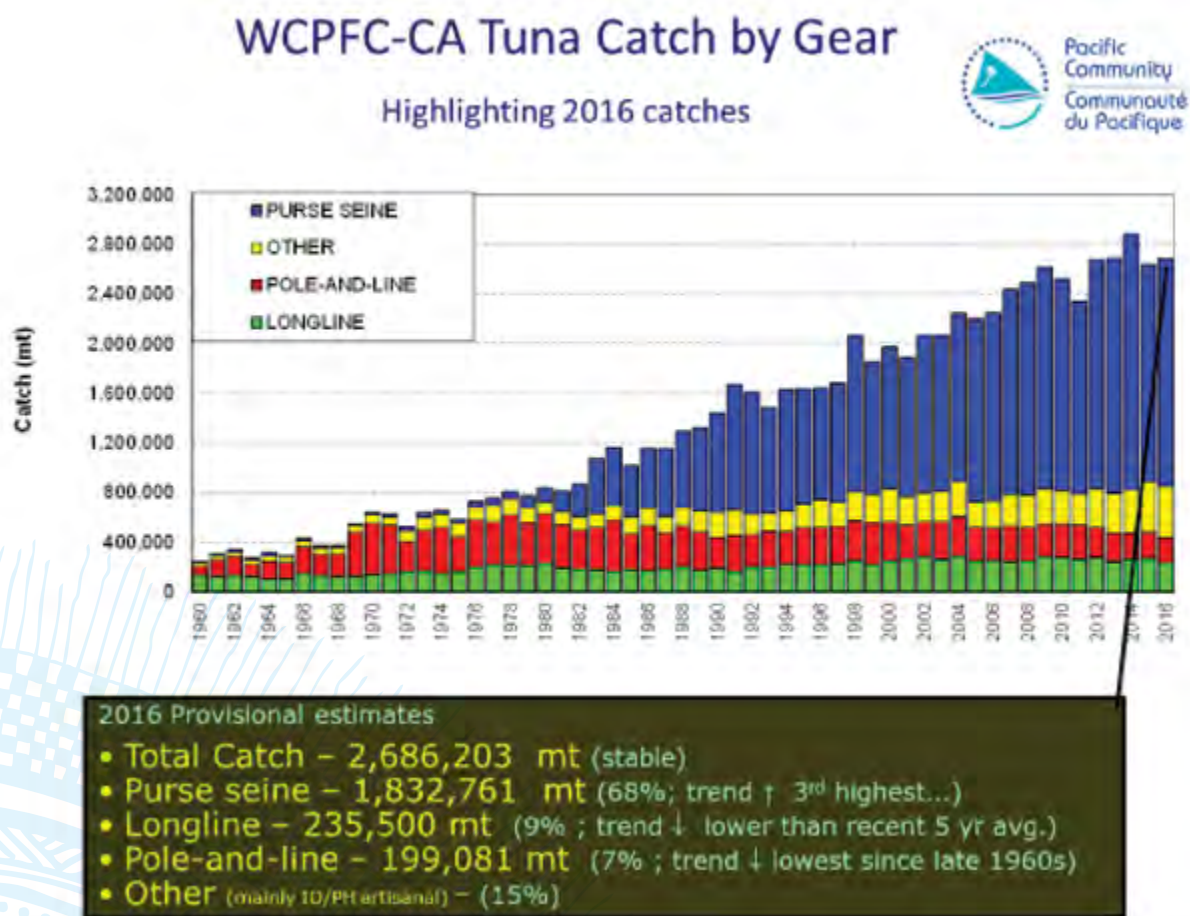
<sup>10</sup> The determination of overfished and overfishing is a likelihood not a firm statement – where a percentage is provided that indicates probability.

<sup>11</sup> Planned for 2018 but will be rescheduled due to other priorities

As this TDA was being finalised the Tuna Fisheries Report Card 2018 was also being prepared. Its text addresses the progress with the implementation of the Roadmap for Tuna Fisheries and its goals and Indicators. In particular, it notes that:

*“In terms of goal 1 (sustainability) the main change has been the improved stock status of bigeye tuna. While this is a result of changes to the parameters in the stock assessment, more than a response to management action, it is still very encouraging to be able to report that all four main tuna stocks in the WCPO are ‘in the green’ – the only tuna fishing region for which this is the case. There is likely to be increasing emphasis on non-target species and by-catch in future, where the picture is not so favourable”.*

Figure 5 below shows the trends in fishing methods and tuna catches over the last half century or more.



**Figure 5: WCPFC-CA Tuna Catch by Gear since 1960**

(Taken from ‘Status of Stocks & Fisheries, Fourteenth Regular Session of the WCPFC (WCPFC14), Manila, Philippines, 3-7 December 2017’)

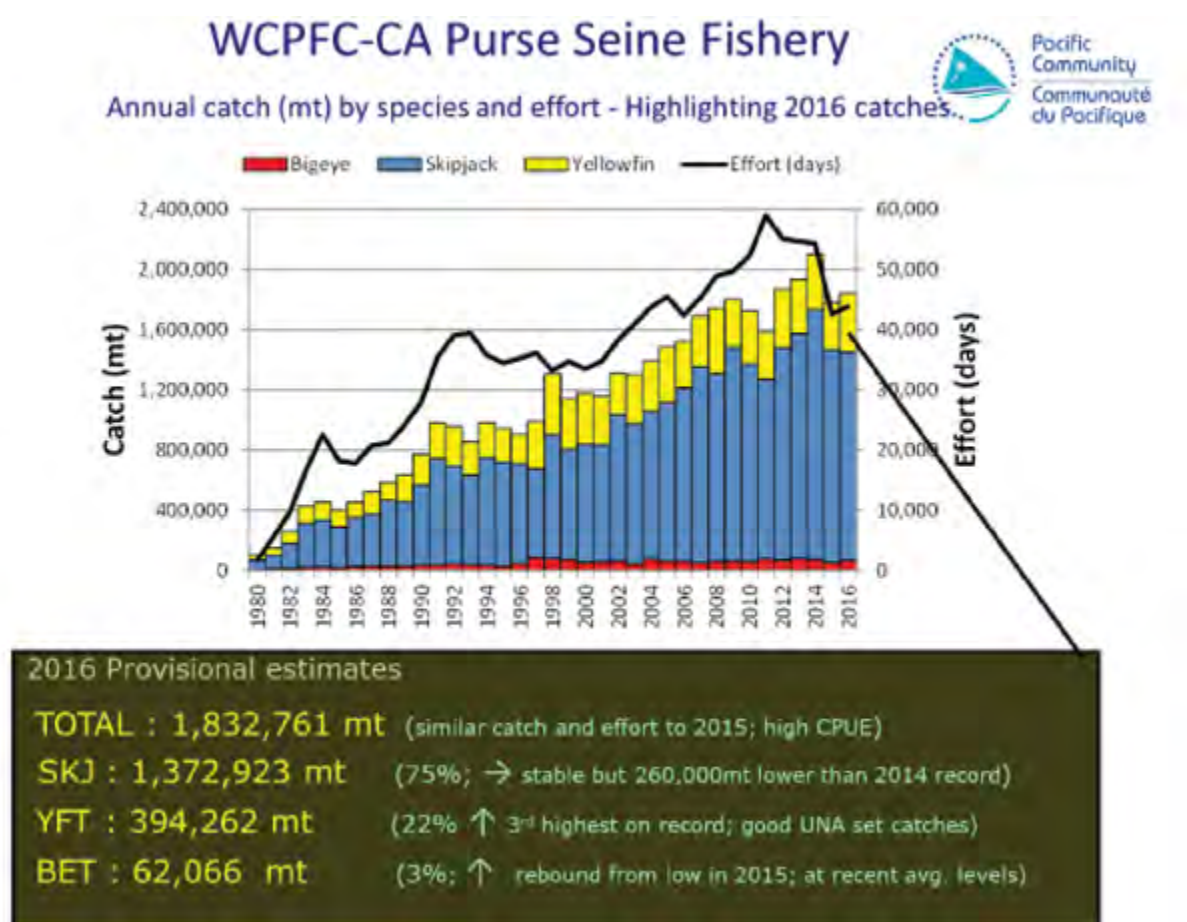
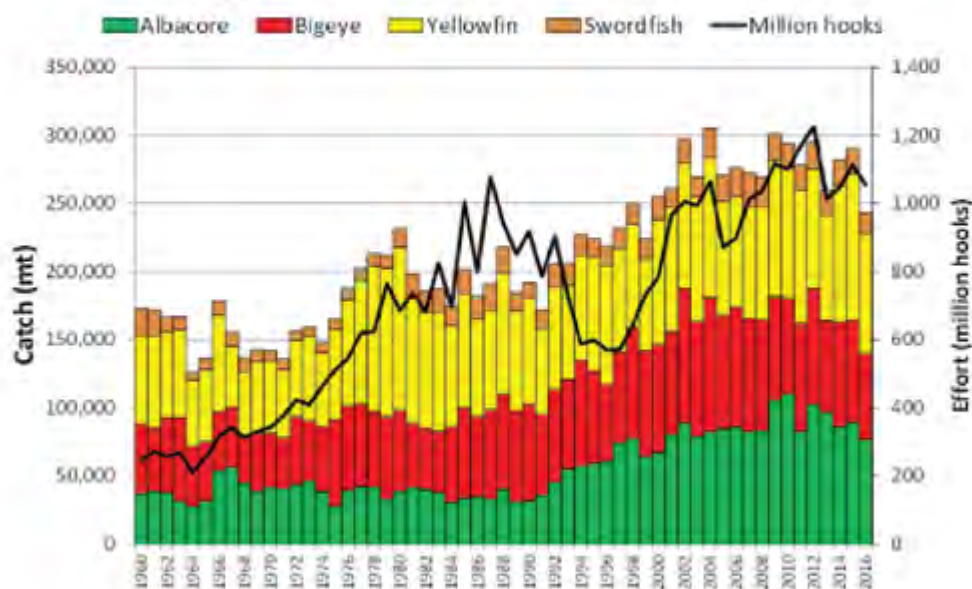


Figure 6: WCPFC-CA Status of Purse Seine Catch and Effort since 1980

(Taken from 'Status of Stocks & Fisheries, Fourteenth Regular Session of the WCPFC (WCPFC14), Manila, Philippines, 3-7 December 2017')

# Longline Catch and Effort



YFT catch ↑ since 2012 ... despite apparent drop in effort  
BET catch ↓ 2012 to 2013, then stable since...

Figure 7: WCPFC-CA Status of Long-Line Catch and Effort since 1960  
(Taken from 'Status of Stocks & Fisheries, Fourteenth Regular Session of the WCPFC (WCPFC14),  
Manila, Philippines, 3-7 December 2017')

Table 5 below shows the catch by tuna species for the WCPO between 1997 and 2016

	ALBACORE	BIGEYE	SKIPJACK	YELLOWFIN	TOTAL
1997	113	166	905	497	1,681
1998	112	175	1,165	612	2,064
1999	124	158	1,044	519	1,845
2000	102	148	1,151	573	1,973
2001	122	150	1,077	537	1,885
2002	148	169	1,253	495	2,064
2003	123	142	1,254	547	2,067
2004	123	192	1,347	583	2,245
2005	104	151	1,395	554	2,204
2006	105	159	1,496	489	2,248
2007	121	144	1,649	519	2,433
2008	104	151	1,628	604	2,487
2009	133	149	1,789	540	2,612
2010	125	138	1,696	556	2,514
2011	115	158	1,538	525	2,336
2012	139	163	1,759	607	2,667
2013	136	154	1,844	554	2,688
2014	120	158	1,982	590	2,849
2015	112	141	1,811	584	2,649
2016	100	150	1,813	658	2,720

Table 5: Catch by Species in WCPO in Thousands of Metric Tonnes

## **Status of Illegal, Unreported and Unregulated Fisheries**

A report by MRAG Asia Pacific (2016. Towards the Quantification of Illegal, Unreported and Unregulated (IUU) Fishing in the Pacific Islands Region. 101pp.) provides the first attempt made to quantify the volume, species composition and value of IUU fishing in Pacific tuna fisheries specifically and this section of the TDA has lifted this information directly for its assessment of status of IUU.

The report looked at four risk categories: (i) unlicensed/unauthorised fishing, (ii) misreporting, (iii) non-compliance with other license conditions (e.g. FAD fishing during the purse seine closure period) and (iv) post-harvest risks (e.g. illegal transshipping). Estimates of IUU volume and value were developed for each of the three main fishing sectors - purse seine (PS), tropical longline (TLL) and southern longline (SLL) – and then aggregated to produce an overall estimate for Pacific Islands region tuna fisheries. Data was used for the period 2010 to 2015.

The simulations used to produce the findings in the MRAG Report suggest that the best estimate total volume of product either harvested or transhipped involving IUU activity in Pacific tuna fisheries is 306,440t (with 90% confidence that the actual figure lies within a range of 276,546t to 338,475). Based on the expected species composition and markets, the ex-vessel value of the best estimate figure is \$616.11 million. The 90% confidence range is between \$517.91m and \$740.17m. That is, there is a 95% chance the figure is greater than \$517.91m and a 5% chance the figure is greater than \$740.17m.

The estimated volume of IUU product was seen to be highest in the purse seine fishery, accounting for 70% of overall volume. Estimated IUU volumes in this sector were largely driven by reporting violations and illegal FAD fishing during the closure period. Under-reporting is an ongoing problem in the fishery as a whole with frequent discrepancies between trip reports and unloading reports related to under-reporting of the catch as well as mis-recording of species).

The tropical and southern long-line fishery accounted for 19% and 11% of the overall volume of IUU fishing respectively and these were largely a result of misreporting and post-harvest risks, primarily illegal transshipping.

The Report found that, of the four main IUU risk categories assessed, reporting violations and non-compliance related to illegal FAD fishing accounted for more than half of the estimated IUU while the use of non-prescribed gear accounted for just under one-third of estimated IUU. Post-harvest risks, mainly from illegal transshipping, accounted for 13% of the estimated volume but 27% of the estimated value. This was driven by higher estimates of illegal transshipping in the longline sectors which receive proportionally higher prices for product. Unlicensed fishing accounted for only 4% of the estimated overall volume.

The report also assesses the effects of IUU on the individual tuna species in terms of volume and ex-vessel value. The report then concludes with a number of key messages related to IUU in the Pacific Islands Region. These include:

- The estimates of IUU volume and value generated here are lower than most commonly quoted estimate of IUU fishing in the WCPO region
- The estimates of IUU fishing are dominated by the licensed fleet. Assuming catch transhipped illegally is taken by licensed vessels, IUU fishing by the licensed fleet accounts for over 95% of the total volume and value of IUU activity as estimated in the report. This is consistent with previous studies and has important implications for MCS planning and investment;
- Ex-vessel value is not seen to be a good indicator of actual loss to FFA members because the full value of the catch is not returned to coastal states under normal circumstances (only a proportion of total revenue is, typically through access fees) and because of their nature, some risks may not necessarily result in direct losses. A better measure of the actual impact on coastal states is likely to be the economic rent lost as a result of IUU activity and the report estimates the rent associated with IUU product to be around \$153 million (however, it is possible that much of the rent associated with IUU activity is captured anyway, and this estimate either overstates, or is at least at the upper end of, actual impacts on the real economy).

- Stronger catch monitoring arrangements are required in the longline sector in order to capture more accurate estimates of IUU activity and to strengthen confidence in catch reporting and compliance with catch-based CMMs. While in some cases, this may require ‘new’ initiatives, in many cases it will simply require more effective use of existing facilities. This also requires that MCS arrangements within EEZs need to be duplicated on the high seas to provide stronger monitoring of catch and transshipment activity across all sectors (in particular the longline sectors) given the shared nature of stocks in the region.

Finally, the report recognises the efforts that have already been taken at the national, sub-regional (FFA/SPC/PNA) and regional levels (WCPFC) to mitigate IUU fishing in Pacific tuna fisheries. In particular, it makes reference to the effectiveness of the FFA and WCPFC VMS, the FFA Regional Register, the FFA Harmonised Minimum Terms and Conditions for Foreign Fishing Access, the Pacific Patrol Boat Program, the Niue Treaty, and the 100% observer coverage on the purse seine fleet. However, the study goes on to note that substantial uncertainty still exists in relation to IUU activity across a range of key risks, and additional measures are required to strengthen incentives for voluntary compliance, reinforce deterrents to non-compliance and improve monitoring throughout the supply chain. The report then provides recommendations on what additional measures need to be taken to mitigate and eliminate IUU fishing.

#### **Key priorities identified in the longline sectors include:**

- Strengthen mechanisms for independent monitoring of catch through the supply chain;
- Strengthen transshipment monitoring and control;
- Strengthen on-board monitoring of fishing activity through improved observer coverage and the introduction of electronic monitoring technology.

#### **Key priorities identified in the purse seine sector (where MCS arrangements are generally stronger than the longline sector, though based on the current management of the fishery priorities) include:**

- Strengthening mechanisms to verify fishing activity (e.g. to assess non-fishing day claims; FAD fishing during the closure);
- Catch verification through the use of cannery data;
- Better monitoring and management of FAD usage.

For more detail, the MRAG Report cited above can be accessed via <http://www.ffa.int/node/1672>

It is worth noting that, in the context of IUU fishing, it is often the licensed vessels that represent the key risk for ‘unreported’ or ‘misreported’ catches. Inevitably, it is both the quality and the availability of data which represents a major challenge to monitoring and management processes

#### **Effects of fisheries pressure on non-target species and by-catch**

The tuna fisheries of the WCPO principally target the four main tuna species. However, the fisheries also catch a range of other species in association with these. Some of the associated species (bycatch) are of commercial value (by-products), while many others are discarded. There are also incidents of the capture of species of ecological and/or social significance (protected species), including marine mammals, sea birds, sea turtles and some species of shark (e.g. whale sharks). Information concerning the catch composition of the main tuna fisheries in the WCPO comes largely from the various observer programmes operating in the region (Brouwer et al., 2017).

Overall species diversity in the WCPO varies in association with habitat features and latitudes. Rarefied pelagic diversity was significantly higher in seamount habitats and was higher at intermediate latitudes (10-35°S and 10-15°N). Regions with higher pelagic diversity included Indonesia, Palau, Federated States of Micronesia and Marshall Islands in the Northern hemisphere and Tonga, New Caledonia, and Norfolk Island in the Southern Hemisphere.

Albacore, bigeye, skipjack and yellowfin tunas have traditionally dominated annual catches from the WCPO. However, the fisheries also interact with non-tuna taxa, such as billfishes and sharks, which are important components of the retained catches and a range of other species with no commercial value (e.g. turtles, birds). The Western and Central Pacific Fisheries Commission (WCPFC) is responsible not just for managing the catch of target species but also non-target species.

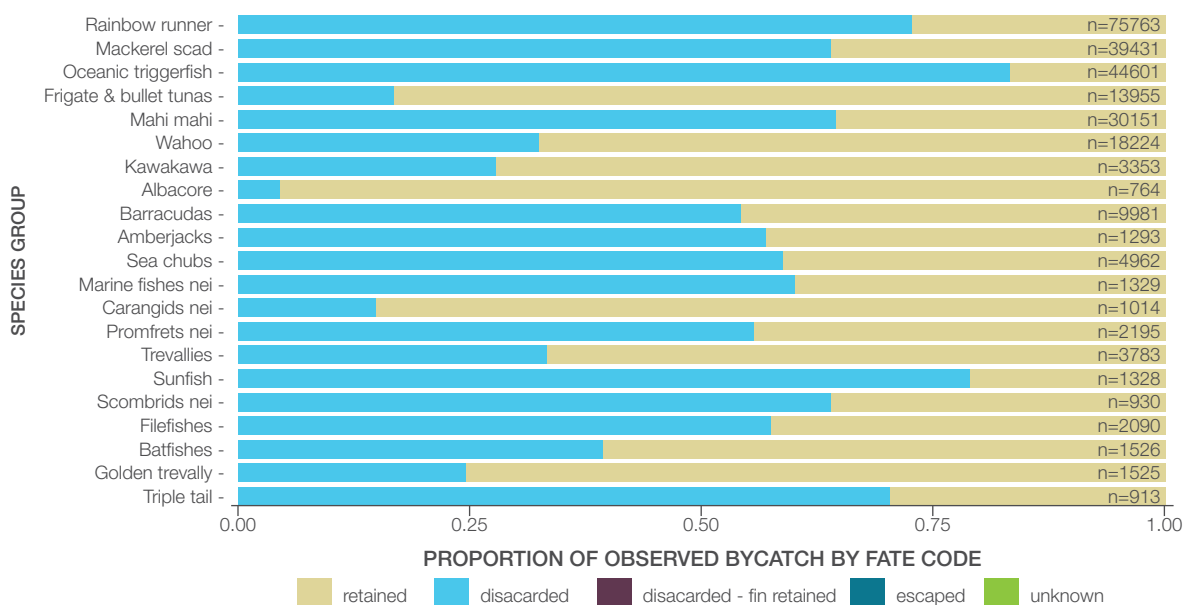
According to the report of the **WCPFC Scientific Committee Sixth Regular Session (2010) on Non-Target Species Interactions with the Tuna Fisheries of the Western and Central Pacific Ocean**, non-target species composition varies between purse-seine and longline with higher observations of sharks and a higher proportion of non-target species being taken on longline sets in comparison to purse-seine sets (the latter being dominated by surface teleosts such as rainbow runner, silky shark, oceanic triggerfish, mackerel scad and mahi mahi). Over 98% of the catch on purse-seine sets are the main target species (including juvenile yellowfin and bigeye) whereas on longline sets the target species comprise 74% (WSP-albacore), 66% (WTP-Deep) and 43% (WTP-Shallow) of the observations. Non-target species catch was highest on log sets for purse-seine and WTP-shallow sets for longline. Non-target species account for only 0.89% of the observed purse-seine catch (assuming that the unidentified tunas were target species), whereas for the longline fleets, the available data show that non-target species account for about half of the observed catch, with sharks accounting for 29.7%. In this report, which focuses on tuna purse seine fisheries in the western and central Pacific Ocean, bycatch is defined as non-skipjack, non-yellowfin and non-bigeye tuna species. Discarded skipjack, yellowfin and bigeye will not be considered in this report. All other species, including albacore tuna will be considered as a bycatch whether they are retained or discarded. One important concern is that discarded bycatch (e.g. from longliners) frequently goes unrecorded although there are almost certainly high mortality rates.

In the purse seine fishery, bycatch was more frequently observed on sets on drifting FADs, anchored FADs and logs than for sets on unassociated schools, and schools associated with whales and whale sharks. Finfish species (rainbow runner, mackerel scad, mahi, frigate and bullet tunas, oceanic triggerfish, wahoo) and silky sharks were most frequently observed on anchored FAD, drifting FAD and log sets. Silky shark, blue marlin and manta rays accounted for the majority of observations of bycatch on unassociated sets, and schools associated with whales and whale sharks (noting that whale sharks were recorded as caught in approximately a third of whale shark associated sets). Diversity in catches were highest for log sets (generally with 10 or less species recorded), followed by anchored and drifting FAD sets (7 species or less), whale shark sets (5 species or less), whale sets (4 species or less), and unassociated sets (3 species or less). For the finfish bycatch composition, rainbow runner accounted for the largest proportion (~42%) of observed finfish bycatch, not including billfish, and mackerel scad, oceanic triggerfish, frigate and bullet tunas, and mahi mahi/dolphinfish each accounted for greater than 5 % of total finfish bycatch.

For most finfish bycatch species 50-80 % of observed bycatch was discarded, however retention rate was over 60 % for frigate and bullet tunas, albacore, kawakawa, wahoo, trevallies and batfishes. Blue marlin accounted for approximately half of the total observed billfish, with black marlin accounting for approximately a quarter. Approximately one half to two-thirds of billfish bycatch was discarded, with the exception of swordfish for which two-thirds of observed bycatch was retained. Silky shark accounted for approximately 85 % of total shark bycatch. Observed shark bycatch was generally discarded, but several species were discarded with fins retained (mako and blue sharks particularly). Marine mammals, whilst rarely caught, accounted for the majority of catch records for species of special interest (i.e. marine mammals, turtles and seabirds) in number of individuals. The vast majority of marine mammal and turtle bycatch was discarded.

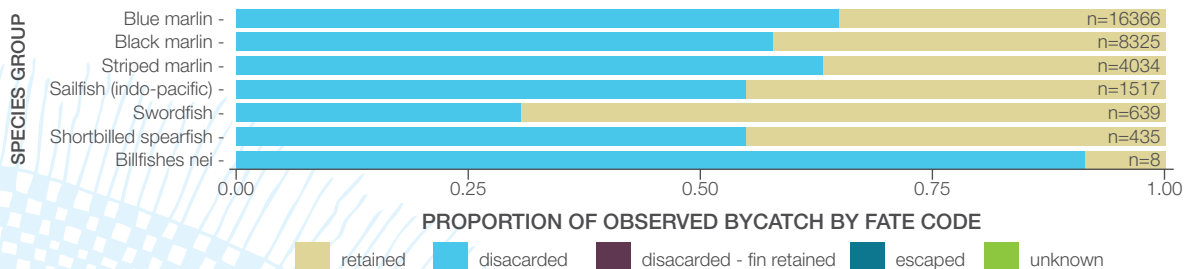
Estimated total turtle bycatch for large-scale purse seine fleets peaked in 2013 at 390 individuals, decreasing to approximately 240 individuals from 2014 onwards. Unassociated sets accounted for the highest proportion of turtle bycatch. Green turtle (24 %), olive ridley (23 %), loggerhead (20 %) and hawksbill turtles (16 %) accounted for the majority of turtle bycatch, noting that turtles started to be reported at the species level from 2006. Estimated total marine mammal bycatch for largescale purse seine fleets was higher from 2003 to 2009 at ~ 1,200 individuals caught mainly on log sets, decreasing to 550 individuals on average from 2010 onwards caught mainly on drifting FAD sets.

Figures 8, 9 and 10 show the recorded fate of observed finfish, billfish, turtle and marine mammal bycatch by species/species group, as a proportion of total observed bycatch (metric tonnes) for the species/species group in the purse seine fisheries. The number of records is provided (n = ... for each species/group).



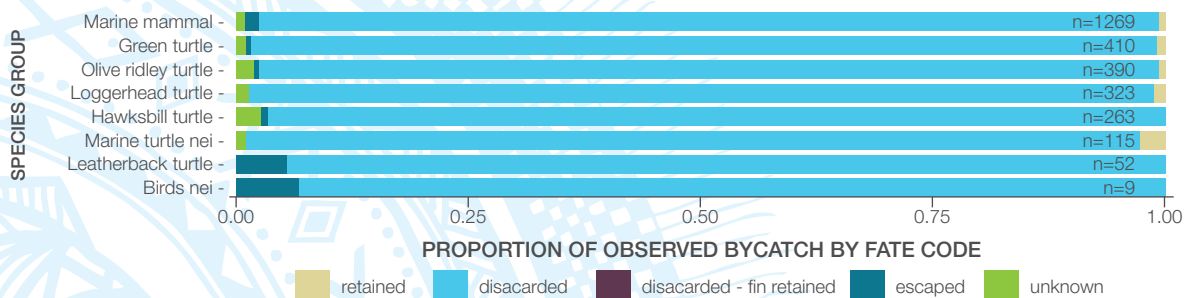
**Figure 8: Recorded fate of observed finfish bycatch by species/species group.**

(Taken from T. Peatman, V. Allain, S. Caillot, P. Williams, and N. Smith. Summary of purse seine fishery bycatch at a regional scale, 2003-2016. (WCPFC-SC13-2017/ST-WP-05). WCPFC Scientific Committee Thirteenth Regular Session. Rarotonga, Cook Islands, 9-17 August 2017).



**Figure 9: Recorded fate of observed billfish bycatch by species/species group.**

(Taken from T. Peatman, V. Allain, S. Caillot, P. Williams, and N. Smith. Summary of purse seine fishery bycatch at a regional scale, 2003-2016. (WCPFC-SC13-2017/ST-WP-05). WCPFC Scientific Committee Thirteenth Regular Session. Rarotonga, Cook Islands, 9-17 August 2017).



**Figure 10: Recorded fate of observed turtle and marine mammal bycatch (individuals) by species/species.**

(Taken from T. Peatman, V. Allain, S. Caillot, P. Williams, and N. Smith. Summary of purse seine fishery bycatch at a regional scale, 2003-2016. (WCPFC-SC13-2017/ST-WP-05). WCPFC Scientific Committee Thirteenth Regular Session. Rarotonga, Cook Islands, 9-17 August 2017).

There has been 100% observer coverage on purse seiners since 1 January 2010 according to the CMM 2008-01 (Western and Central Pacific Fisheries Commission, 2008). Information for the longliner fishery, on the other hand, is very limited due to the very low percentage of observers onboard longliners over the last two decades. However, what data is available suggests that, in many of the Pacific longline fisheries, shark bycatch rates are higher than in any other fishery and sharks are frequently unwanted and discarded at sea, often after having their fins removed. Globally many pelagic shark populations are reported to be in decline. In the western and central Pacific Ocean, stock assessments by Rice & Harley (2012 & 2013) for both oceanic whitetip and silky sharks concluded both populations are currently in decline, overfished, and found that overfishing is currently occurring. Two areas of discussion currently on the table include the need to ban wire traces and shark lines in the high seas for compatibility with the bans on these gears in FFA Members waters through the MTCs and to improvement the effectiveness of the current WCPFC ban on finning to reduce the catch and mortality of sharks.

Estimated total finfish bycatch for large-scale purse seine fleets peaked in 2004 at 10,000 tonnes, declining to approximately 5,000 tonnes from 2010 onwards. Over the period 2003 to 2016, rainbow runner accounted for 47 % of total finfish bycatch. Mackerel scad, oceanic triggerfish, frigate & bullet tuna and mahi together accounted for 42 % of total finfish bycatch. Log sets accounted for the highest proportion of finfish bycatch from 2003 to 2010, after which drifting FAD sets accounted for the majority of bycatch.

Estimated total billfish bycatch for large-scale purse seine fleets remained in the region of 6,500 individuals from 2003 to 2011. In 2012 billfish bycatch increased to 8,500 individuals, before decreasing from 8,500 individuals to 6,000 individuals from 2013 to 2016. Blue marlin accounted for half of total billfish bycatch over the period 2003 to 2016, with black marlin and striped marlin accounting for 26 % and 11 % respectively.

Estimated total turtle bycatch displayed a generally increasing trend from 2004 to 2013, from 130 to 390 individuals per year. Bycatches in 2014 to 2016 represented a substantial decrease compared to preceding years, with average catches in the region of 240 individuals. Conversely, turtle bycatch in 2003 was higher than might be expected given the general temporal trends, at 340 individuals. Green turtle (24 %), olive ridley (23 %), loggerhead (20 %) and hawksbill turtles (16 %) accounted for the majority of turtle bycatch for the whole period (2003-2016).

Bycatch of marine mammal displayed strong interannual variability, though bycatch was generally higher from 2003 to 2009 (averaging 1,200 individuals), and lower from 2010 to 2016 (averaging 550 individuals per year). Log sets accounted for the highest proportion of marine mammal bycatch from 2003 to 2008, with drifting FAD sets accounting for the highest proportion from 2009 onwards.

The number of reported interactions between marine mammals, seabirds and turtles are insufficient for more complex analyses. The percentage dead on landing for seabirds, marine mammals and turtles are 86%, 7% and 33% respectively. The most important gap in the data required to examine catches of non-target species in the WCPO is observer data covering the distant-water longline fleets, for which coverage by data held by the OFP is minimal.

The information above is taken from a **Summary of purse seine fishery bycatch at a regional scale, 2003-2016**. (WCPFC-SC13-2017/ST-WP-05). WCPFC Scientific Committee Thirteenth Regular Session. Rarotonga, Cook Islands, 9–17 August 2017. More information and detail can be found in this report at the following link. (<https://www.wcpfc.int/system/files/ST-WP-05%20regional%20bycatch%20summary%20purse%20seine%20%28submitted%29.pdf>)

The tables below document the observed catches of seabirds and sharks for those encounters where vessel length is known. Table 6 illustrates that for vessels >24 m catch rates (birds/set) is 3 times greater than for smaller vessels. The CMM is therefore covering the length class that poses the highest risk of seabird mortality. Table 7 illustrates that there is no such difference when it comes to sharks, with catches rates of TOTAL SHARKS being essentially the same between vessel length classes.

The main potential confounding factor when interpreting the tables below in relation to the CMMs is the lack of area and fleet stratification in the data presented. With better observer coverage providing more data, a more comprehensive analysis could be carried out, including more detailed consideration of the species concerned.

CATEGORY	SETS	No. OF BIRDS	CPUE (BIRDS/100 SETS)
<=24 mt	2,737	100	4
>24 mt	8,680	1,043	12
DW Vessel	308	0	0

**Table 6: Observed bird catches and catch rates by vessel length category**

(Taken from David Seán Kirby, Ecological risk assessment (era) progress report (2007/8) & work plan (2008/9) (WCPFC-SC4-2008/EBSWG-WP-1). DW: distant water vessel, length not available but assumed >24m)

VESSEL LENGTH CATEGORY		<= 24 mt	>24 mt	DW
NUMBER OF SETS		2,737	8,680	308
Blue	No. of Observations	6082	57740	1043
	CPUE	2.2	6.7	3.4
Oceanic White Tip	No. of Observations	1761	2904	619
	CPUE	0.6	0.3	2.0
Silky	No. of Observations	14577	9459	2317
	CPUE	5.3	1.1	7.5
Mako	No. of Observations	960	3197	138
	CPUE	0.4	0.4	0.4
Thresher	No. of Observations	1004	3045	51
	CPUE	0.4	0.4	0.2
Other Species	No. of Observations	7018	11583	476
	CPUE	2.6	1.3	1.5
<b>TOTAL SHARKS</b>	<b>No. of Observations</b>	<b>31402</b>	<b>87928</b>	<b>4644</b>
	<b>CPUE</b>	<b>11.5</b>	<b>10.1</b>	<b>15.1</b>

**Table 7: Observed shark catches and catch rates by vessel length category**

(Taken from David Seán Kirby, Ecological risk assessment (era) progress report (2007/8) & work plan (2008/9) (WCPFC-SC4-2008/EBSWG-WP-1). DW: distant water vessel, length not available but assumed >24m)

Estimated total shark bycatch displayed a generally declining trend from 2004 to 2010, reducing from 70,000 to 36,000 individuals per year, and an increasing trend from 2012 to 2016 when it reached 68,000 individuals. Shark bycatch estimates in 2010 and 2015 were lower than might be expected given the general trend, with shark bycatch in 2011 comparatively high. Silky shark accounted for 88 % of estimated shark bycatch from 2003 to 2016, with mantas, mobula rays, and oceanic whitetip accounting for 5 and 1.6 % respectively.

For a more detailed analysis of target versus non-target species catches and the impact on non-target by-catch in the WCPFC Scientific Committee Sixth Regular Session (2010) on Non-Target Species Interactions with the Tuna Fisheries of the Western and Central Pacific Ocean. Go to [https://www.wcpfc.int/system/files/WCPFC-SC6-2010-EB-IP-08\\_Non\\_target\\_spp\\_interactions.pdf](https://www.wcpfc.int/system/files/WCPFC-SC6-2010-EB-IP-08_Non_target_spp_interactions.pdf)

WCPF Commission has, more recently, supported a Bycatch Management Information System (BMIS) which focuses on bycatch mitigation and management in oceanic tuna and billfish fisheries. BMIS focuses predominantly on longline and purse seine fishing. The BMIS does not deal with traps, trawls, dredges, gillnets or surrounding net fishing gear. It is an open resource useful for fishery managers, fishers, scientists, observers, educators and anyone with an interest in fisheries management. As a reference and educational tool, the BMIS aims to

support the adoption and implementation of science-based management measures so that bycatch is managed comprehensively and sustainably. The BMIS mainly focuses on highly migratory species with low reproductive rates, including seabirds, sharks and rays, sea turtles and marine mammals. The BMIS is discussed further under the section on Scientific Assessment and Monitoring and can be accessed on the WCPFC website at <https://www.bmis-bycatch.org/about-bmis>

### **Current knowledge on the impacts of offshore oceanic fishing on the broader ecosystem (the Warm Central Pacific Pool LME)**

Allain et al. (2015) presented a set of ecosystem scale indicators related to monitoring the pelagic ecosystem effects of different levels of fishing effort on the western Pacific Ocean warm pool. The indicators were based on exploration of different scenarios of fishing effort, including approaches designed to reduce and/or increase the amount of bycatch taken, and decrease and/or increase the amount of tuna harvested. That modelling showed warm pool ecosystem structure to be relatively resilient due in part to the high diversity of predators in food webs, each consuming a wide range of prey. This work also identified some key indicators: the catch level of bycatch species; the size of catch in the fishery; and the diversity and biomass at higher trophic levels.

Rice et al. (2015) presented a range of indicators for seven of the fourteen key shark species, including trends in the indicators over time where data were available. The indicators reported include changes in species occurrence through space and time, changes in species composition in catch data through space and time, catch per unit of effort trends over time and fisheries and a range of biological indicators (sex ratios in catch, maturity status of catch, and trends in measured size of catch). In addition to identifying several recommendations for improving data collection and analysis of shark data, they recommended future indicator analyses for relevant key shark species.

Allain et al. (2015) notes that all work to date strongly recommends a range of ecosystem indicators, and that some are simple whilst others need to be more complex. What is also clear from work within the WCPO and outside is that to support the design, testing and future use of ecosystem indicators we need to maintain our efforts to improve currently held data, collect better data, and to continue to collect a broad range of data (Smith et al., 2016). All of this will be needed to support the implementation of indicators. At the same time, the design and testing of indicators can occur independent of those developments. The WCPFCs Bycatch Management Information System (BMIS) already provides a source of highly relevant information on aspects of ecosystem indicator availability and will be an important resource in this work.

Assessment of the historical, present and future states of marine ecosystem and the effects of human exploitation and climate variation have on the state of ecosystems are necessary to implement an ecosystem-based fishery management system. In particular, understanding how tuna, tuna-like populations and by-catch species respond to environment variation and anthropogenic changes (fishing pressure) is a major challenge for developing this approach. Modelling should be focused on comprehending the mechanisms linking the biological and physical components of marine ecosystems and exploring the responses of populations at higher trophic levels to different types of physical forcing, biological interactions, exploitation and their potential synergies.

SEAPODYM (Spatial Ecosystem and Population Dynamics Model) is a numerical model initially developed for investigating physical-biological interaction between tuna populations and the pelagic ecosystem of the Pacific Ocean (Senina et al., 2016). Using predicted environment from ocean-biogeochemical models, SEAPODYM integrates spatio-temporal and multi-population dynamics and considers interactions among populations of different species and between populations and their physical and biological environment (including intermediate trophic levels). The model also includes a description of multiple fisheries and then predicts spatio-temporal distribution of catch rates, and length-frequencies of catch based either on observed or simulated fishing effort, allowing respectively to evaluate the model or to test management options (e.g., changing the fishing effort, implementing marine reserves, etc.).

SEAPODYM includes three main linked components: a nutrient-phytoplankton-zooplankton model, a forage sub-model and a tuna age-structured model. The forage and predator dynamics is driven by environmental forcing fields (temperature, currents, dissolved oxygen concentration and primary production) provided by a coupled biogeochemical-physical model. In the forage model, average values of temperature, currents and dissolved oxygen concentrations in three vertical layers are used to describe the biomass distributions of six functional mid-trophic prey groups for young and adult tuna.

These groups are characterized by their habitat and their vertical migration: the epipelagic, the mesopelagic, the bathypelagic, the migrant-mesopelagic, the migrant-bathypelagic and the highly migrant-bathypelagic. Tuna population dynamics is described with a spatial age-structured model where four stages were defined including larvae, juvenile, young and adult individuals; each of these stages were modelled differently depending on their age and type of displacement (diffusion and/or advection) along the Pacific Ocean.

The model uses a likelihood approach for goodness of fit, allowing finding the maximum likelihood estimates of the model parameters, based on observed catch at a given time and region and the observed size composition. The number of estimated parameters varies depending on the number of fisheries; in general, it is 20 + number of catchability coefficients (one for each fishery) + number of selectivity coefficients (one for each fishery). SEAPODYM has been applied to three Pacific tuna species: skipjack (*Katsuwonus pelamis*), bigeye (*Thunnus obesus*) and preliminary results are also available for albacore (*Thunnus alalunga*). The general SEAPODYM framework can be accessed at: <http://oceanfish.spc.int/en/ofpsection/ema/ecosystem-a-multispecies-modelling/80-seapodym/148-seapodym>

Seapodym is discussed in further detail under the section below on **Ecosystem Monitoring and Analysis**.

Allain et al., 2015. Discuss and review monitoring of the pelagic ecosystem effects of different levels of fishing effort on the western Pacific Ocean warm pool. The Ecosystem Monitoring and Analysis section of the Oceanic Fisheries Programme (OFP) undertakes a wide range of activities that meet Objective 3 of OFP's Strategic Plan, namely: "Improved understanding of pelagic ecosystems in the western and central Pacific Ocean", There are five result areas under the strategic plan.

**Result 3.1** Enhanced data on the biological characteristics of oceanic species and their environment are available to support stock assessment and ecosystem-based fisheries management

**Result 3.2** Appropriate ecosystem models and analyses are available to inform ecosystem-based fisheries management

**Result 3.3** Regional oceanic fisheries policy and decision-making by WCPFC is informed by science-based information and advice on ecosystem issues

**Result 3.4** FFA's ecosystem-based fisheries management initiatives are supported by the best scientific information and advice

**Result 3.5** Ecosystem-based management of oceanic fisheries by SPC members is supported by the best scientific information and advice

The warm pool pelagic ecosystem was modelled using Ecopath with Ecosim ([www.ecopath.org](http://www.ecopath.org)). Ecopath describes the static state of trophic flows (predator-prey relationships) within a food web that balance the net production of functional groups (assemblages of species with a similar ecology, or a species or a size class within a species) with all sources of mortality and migration. Ecosim is a dynamic form of Ecopath that allows the forecasting of ecosystem responses to specific perturbations (e.g. changes in water temperature or fishing effort) through time. The ecosystem model constructed for the Pacific warm pool is characterised by five trophic levels (TL), a high number of trophic links between groups, and a diverse pool of prey for predators. In the model, the majority (74%) of the ecosystem's biomass is in TL 1-2 (phytoplankton, zooplankton), whereas 89% of the industrial fish catch (tuna, edible bycatch and other top predators) is in TL 3-5. The model was used to explore nine different scenarios of fishing effort, ranging from measures designed to reduce and/or increase the amount

of bycatch, decrease and/or increase the amount of tuna harvested by altering the amount of longline fishing and purse-seine fishing effort on unassociated (i.e. free) schools and on schools associated with fish aggregating devices (FADs), and by simulating the implementation of bycatch mitigation measures.

The outcomes of this modelling showed that the structure of the warm pool ecosystem is resistant to considerable perturbation (e.g. large changes in the harvest of the surface fish community). The intrinsic resistance of the ecosystem to perturbation appears to be related to the high diversity of predators in the food web that consume a wide range of prey.

The structure of the ecosystem was most sensitive to changes in the biomass of prey groups (e.g. small pelagic fish such as anchovy) because these important mid-trophic level species are both important prey for tuna and are predators of organisms in the lower trophic levels.

Key indicators of the ecosystem show that: 1) the catch of bycatch species, such as sharks and billfish, in the warm pool has increased; 2) the tuna fishery has expanded in recent decades; and 3) the diversity and biomass of groups in the higher trophic levels (TL3–TL5) have diminished.

Some of the predicted changes in the structure of the warm pool ecosystem in response to alterations in fishing effort are expected as a direct result of fishing (Allain et al. 2015), whereas others are the result of indirect effects from changes in the biomass of predator or prey groups (Allain et al. 2012).

The simulations showed that the largest impacts of changes in purse-seine and longline fishing effort are likely to be on the groups comprising long-lived, bycatch species with lower productivity (e.g. silky and white-tip sharks, opah, swordfish and blue marlin). These groups are the most sensitive to changes in harvests of fish species due to their longevity, age-at-first maturity, and low rate of reproduction.

Increases in purse-seine fishing effort on FADs result in greater mortality of sharks, and in decreases in the biomass of some tuna species and size classes. Conversely, reductions in purse-seine fishing effort on FADs increase the numbers of sharks, although such benefits are not as pronounced when purse-seine fishing effort on FADs is transferred to purse-seine fishing on free schools of tuna. Increases in longline fishing result in greater mortality of sharks, opah and some billfish species. The negative impact on opah and billfishes is also observed when longline fishing effort is unchanged, but shark mortality decreases by the implementation of shark mitigation measures.

The changes in the abundance of sharks predicted by the model should assist fisheries managers to evaluate the effects that different levels of purse-seine fishing effort (on both unassociated schools and schools associated with FADs) have on top-level predators, and to develop management measures that contribute to the conservation of sharks.

Recommendations for improving the use of ecosystem models to advise management include: 1) identifying detailed objectives for ecosystem management; 2) developing better ecosystem indicators; 3) increasing the monitoring of catch and discards for bycatch species, and expanding fisheries monitoring programmes to include prey species, to provide all necessary inputs for the models; and 4) adding a spatial component.



### **Coastal-Offshore Connectivity**

The Western and Central Pacific Ocean sustains the highest tuna production in the world. This province is also characterized by many islands and a complex bathymetry that induces specific current circulation patterns with the potential to create a high degree of interaction between coastal and oceanic ecosystems. Based on a large dataset of oceanic predator stomach contents, a study by Allain et al., 2012 used generalized linear models to explore the coastal-oceanic system interaction by analyzing predator-prey relationship. We show that reef organisms are a frequent prey of oceanic predators. Predator species such as albacore (*Thunnus alalunga*) and yellowfin tuna (*Thunnus albacares*) frequently consume reef prey with higher probability of consumption closer to land and in the western part of the Pacific Ocean (Domokos et al., 2007). The study provides important data

and information on the reef prey consumed by large oceanic predators. The study also discusses the variability of dependence on coastal organisms by large oceanic predators with spatial distribution, with the majority of reef prey being consumed in the western part of the WCPO region and at distance-to-land less than 100 km.

In view of the growing over-exploitation/depletion of coastal fisheries along with the loss of coastal habitat there will inevitably be an increasing demand for other sources of nutrition and food security (Bell et al., 2015). SPC is now looking into the feasibility of moving the fishing pressure from the overexploited lagoons and coastal reefs to nearshore FADs that is attracting pelagic fish.

In the context of socioeconomic connectivity, In the Pacific Islands several hundred persons have been trained as observers to work onboard tuna fishing vessels. Their activity is linking to the high seas and they bring back incomes into their communities and thank to this activity they have acquired higher levels of education and valuable diplomas. Furthermore, A proportion of the tuna caught offshore and in the high seas is processed on land in the Pacific Islands in canneries which employ a lot of staff, including a high proportion of women; but those shore facilities can also create pollution and social issues.

### **Existing/expected effects from climate change, and associated impacts such as ocean acidification, sea temperature, implications for migration and distribution of stocks**

Scientific partners to the WCPF Commission and its main management and scientific support bodies (SPC and FFA) have used the SEAPODYM model to attempt to understand the impacts of both climate change and associated acidification on Pacific yellowfin, skipjack, bigeye and albacore tuna. SEAPODYM<sup>12</sup> is a useful modelling framework to investigate the impact of climate changes on tuna populations as it integrates key relationships between fish population dynamics and the environmental conditions of their marine ecosystem in a spatially explicit representation, with a robust estimation approach of population dynamics and fisheries parameters. The following is a summary of their findings for the main tuna species.



#### **Yellowfin Tuna**

The overall fishing impact over the historical period is predicted to have reduced the spawning biomass by an average of 35% in 2010 in the whole Pacific with much higher impact (>50%) in the equatorial eastern and western Pacific. This was an important additional input to the model. Three additional runs for each forcing simulate low, medium and high sensitivity of larval stage to ocean acidification.

The predicted impact of climate change on yellowfin tuna population is mainly driven by the change in the spawning habitat (temperature and productivity) and subsequent larval recruitment with a decrease in the WCPO and increase in the EPO. The additional impact of ocean acidification is seen to be minor. There is no discernible impact when considering the low sensitivity scenario, very small effects (>5%) by the end of the century in the eastern equatorial Pacific Ocean with the intermediate scenario S1 and a stronger negative impact reaching locally -10% in 2050 and -15% in 2100 with the high sensitivity scenario.

The temporal trends in larval biomass predicted by all simulations are relatively stable in the WCPO until 2050 and start to decrease in the second half of the century, while the range of model responses widens after the 2060s. In the WCPO, three periods can be isolated. Until 2050, there is no detectable impact outside of natural variability. After a rapid shift around 2050, a second regime of lower productivity is maintained until 2080. Finally, the end of the time series is marked by one more decline in productivity with a wider range of uncertainty

<sup>12</sup> <http://oceanfish.spc.int/en/ofpsection/ema/ecosystem-a-multispecies-modelling/80-seapodym/148-seapodym>



## **Skipjack**

The main driver of the skipjack biomass decline in the climate change projections is the warming of surface waters affecting the spawning and larvae development. The optimal temperature for adult skipjack ranges between 19°C and 26°C. The skipjack larvae are abundant in waters above 26°C but some can be found in temperatures down to 22°C (Boehlert and Mundy, 1994). Skipjack are sensitive to oxygen concentrations in seawater, which explains why this species vertical distribution is restricted to the upper layer. The species prefers waters with dissolved oxygen levels above 5 mg/l (3.8 ml/l) while the levels of oxygen at or below 2.45 mg/l and 2.83 mg/l are lethal for 50cm and 75cm individuals correspondingly [Brill, 1994]

The modelling predicts that a large portion of the current spawning habitat would become less and less favourable over time, especially in the equatorial Pacific warm pool and the eastern equatorial Indian Ocean. The IPSL (Institut Pierre-Simon Laplace) climate model predicts the strongest temperature increase in these regions and consequently the largest decline in larval recruits and then population biomass. Additional simulations conducted with climatological variables confirmed that without an SST trend the stock would maintain and even increase its biomass (without fishing) in the Pacific Ocean. It is worth noting that the species adaptation to warmer spawning temperatures that may mitigate the effects of temperature on the spawning success was not taken into account in the simulations.



## **Bigeye**

Lehodey et.al., 2010 assessed the prospects for effective conservation of bigeye tuna stocks in the WCPO. Potential future changes in distribution and abundance under the IPCC scenario are presented but without taking into account any fishing effort. The simulation showed an improvement in bigeye tuna spawning habitat both in subtropical latitudes and in the eastern tropical Pacific (ETP) where the surface temperature becomes optimal for bigeye tuna spawning. The adult feeding habitat also improved in the ETP due to the increase of dissolved oxygen concentration in the sub-surface allowing adults to access deeper forage. Conversely, in the Western Central Pacific (the Western Pacific Warm Pool LME) the temperature becomes too warm for bigeye tuna spawning. The decrease in spawning is compensated by an increase of larvae biomass in subtropical regions. However, natural mortality of older stages increased due to lower habitat values (too warm surface temperatures, decreasing oxygen concentration in the sub-surface and less food). This increased mortality and the displacement of surviving fish to the eastern region led to stable then declining adult biomass at the end of the century.



## **Albacore**

Albacore tuna undertake seasonal migrations between feeding and spawning grounds as can be seen from the seasonality in the catch and catch size frequencies. In the South Pacific Ocean, albacore tuna have been observed to frequently occupy habitats in excess of 250 m (Domokos et al., 2007; Williams et al., 2015). The concentration of dissolved oxygen at these depths can be low, especially in the eastern Pacific (Stramma et al., 2012). The strong association between dissolved oxygen concentration and albacore distribution identified through both the modelling and the sensitivity analysis suggests that the stock distribution is strongly limited in the eastern Pacific due to dissolved oxygen concentrations below the minimum required for this species in the subsurface layer.

Results from the SEAPODYM modelling indicate that if oxygen availability projections by the IPSL-CM4 are accurate, then the future distribution and abundance of albacore tuna is likely to significantly decrease in the South Pacific Ocean. However, although Earth Climate models project consistent ongoing decrease in subsurface oxygen concentrations globally, there is still a lack of robustness for projections in the equatorial and tropical regions (Bopp et al., 2013). Alternatively, if oxygen availability remains similar to the current levels, then projected decreases in distribution and abundance will be minor by comparison. Ultimately, confidence in the model projections of albacore tuna populations is linked to the skills of the coupled physical and biogeochemical components in being

able to realistically describe future change in oxygen. For the South Pacific Ocean population of albacore tuna, understanding the likely changes in oxygen availability will be a key priority for future research. Recent research is indicating that oxygen availability may be further reduced through the process of ocean acidification (Pörtner and Knust, 2007) and coupling of this process into the Earth-Climate models would be desirable.

Asch et al. (2017) note that the distribution of yellowfin tuna is more likely to be affected by a change in environmental conditions since this species is mostly adapted to tropical regions (in comparison to albacore and bluefin tuna, which are more widely distributed). Projections from the dynamic bioclimate envelope model (DBEM) used by Asch et al. (2017) indicate that both yellowfin and skipjack tuna will shift their distribution eastward and poleward throughout the 21st century, with the potential disappearance of these species altogether from the western warm pool region where novel climatic conditions will emerge. Asch et al. maintain that these results are qualitatively consistent with projections for these species made using the Spatial Ecosystem And Populations Dynamics Model (SEAPODYM), which was designed specifically to examine changes in tuna fisheries in response to climate change and climate variability. The modelling and subsequent projects run by Asch et al. (2017) produced results that were consistent across three climate models, indicating that SST will rise by  $\geq 3^{\circ}\text{C}$ , surface dissolved oxygen will decline by  $\geq 0.01\text{ ml L}^{-1}$ , pH will drop by  $\geq 0.3$ , and NPP will decrease by  $0.5\text{ g m}^{-2}\text{ d}^{-1}$  across much of the region by 2100 under the business-as-usual scenario. These changes were associated with rates of local species extinction of greater than 50% in many regions as fishes and invertebrates decreased in abundance or migrated to regions with conditions more suitable to their bio-climate envelope. Maximum potential catch (MCP) was projected to decrease by more than 50% across many areas, with the largest impacts in the western Pacific warm pool. Climate change scenarios that included strong mitigation resulted in substantial reductions of MCP losses, with the area where MCP losses exceeded 50% reduced from 75% of the region under business-as-usual to 36% of the region under the strong mitigation scenario.

A review of the various modelling and studies strongly suggest that that a species' adaptation to climate change will likely rely on multiple factors related to optimal spawning and upper-tolerance temperatures, dissolved oxygen, acidification, etc. (Johnson et al, 2016) all of which will need to be built into any future modelling to support management strategies. Furthermore, the preliminary modelling results for bigeye and skipjack tuna predict eastwards shifts of population density in the Pacific for both species under the SRES A2 IPCC scenario. This shift is particularly strong in the case of bigeye tuna. The mechanisms involved in the shift appear to be related mainly to reduced equatorial upwelling and the resulting reduced infusion of primary productivity into the western tropical Pacific due to both reduced westward surface currents and reduced nutrient influx from the ocean depth.

Further details on the effects of climate change and associated impacts on the tuna target species can be found in the various reports presented to the Scientific Committee Sessions of the WCPFC Commission and associated publications from which most of the above information was drawn. Appropriate links are:

(yellowfin) <https://www.wcpfc.int/system/files/EB-WP-01%20SEAPODYM.pdf>

(Skipjack) <https://www.wcpfc.int/system/files/EB-WP-01%20SEAPODYM%20SKJ%20Fixed.pdf>

(Bigeye) <http://www.pnas.org/content/pnas/109/44/18221.full.pdf>

(Albacore) [https://www.researchgate.net/publication/268821473\\_Modelling\\_the\\_impact\\_of\\_climate\\_change\\_on\\_South\\_Pacific\\_albacore\\_tuna](https://www.researchgate.net/publication/268821473_Modelling_the_impact_of_climate_change_on_South_Pacific_albacore_tuna)

THE SPC Ocean Fisheries programme along with the FFA and the UNDP GEF POFMP-2 project are now planning to undertake a more comprehensive suite of analyses of the four species to characterize the uncertainty in the predictions in relation to alternative population dynamics model structures, parameter uncertainty and plausible climate change scenarios. This will require a major research effort involving considerable computer and human resources. SPC and partners are actively seeking funding support for this phase of the project.

According to another recent study by the World Bank<sup>13</sup> (2016) the impacts of climate change on tuna fisheries are likely to be pervasive, affecting the distribution, abundance, and catchability of tuna fisheries.

- Decline in primary productivity. Primary productivity in the central and eastern Pacific would decline due to the increased stratification between warmer surface waters and colder deeper water (and consequent reduction in upwelling). Productivity in the western Pacific could rise.
- Decline in tuna abundance. The decrease in upwelling would lead to a decline in the bigeye and adult yellowfin population (the species targeted by the longline fleet). The abundance of skipjack and juvenile yellowfin caught by purse seine is not expected to be affected.
- Increased pressure on longline fishing. Given the continued high demand for sashimi and the possibility that prices may rise with a decline in catches, it is likely that longline fishing pressure on adult yellowfin tuna will increase to compensate for the decline in adult bigeye abundance, leading to unsustainable exploitation if the fishery is not well managed.
- Spatial redistribution of tuna resources. The warming of surface waters and the decline in primary productivity in the central and eastern Pacific would result in a redistribution of tuna resources to higher latitudes (such as Japan) and toward the western equatorial Pacific.
- Increase in climate variability. Climate change could increase the intensity and frequency of annual climate variability (Jones and others 1999). The SPC Ocean Fisheries programme along with the FFA and the UNDP GEF PIOFMP-2 project are now planning to undertake a more comprehensive suite of analyses of the four species to characterize the uncertainty in the predictions in relation to alternative population dynamics model structures, parameter uncertainty and plausible climate change scenarios. This will require a major research effort involving considerable computer and human resources. SPC and partners are actively seeking funding support for this phase of the project.
- The likely impact would be an increase in the annual fluctuations of the spatial distribution and abundance of tuna. It is possible that more frequent cold events (such as strong La Niña episodes) could compensate for the decrease in productivity under an El Niño mean state. In addition, even though it is difficult to know what a strong El Niño would mean in the future, it is likely that such an extreme event could lead to a dramatic decline in productivity in the eastern Pacific.
- Higher impact on domestic fleets. Distant water fishing fleets should be able to adapt to changes in the spatial distribution and abundance in tuna stocks. But domestic fleets would be vulnerable to fluctuations of tuna fisheries in their Exclusive Economic Zones. Countries in the central Pacific, such as Kiribati, are likely to be more adversely affected than those in the west. Kiribati's high dependence on tuna fisheries renders it the more vulnerable to these changes, and points to the need to closely collaborate with other coastal states in minimizing the impact of year-to-year fluctuations.

According to a WWF Fact Sheet released in May 2013 (WWF-South Pacific - Impacts of Climate on Tuna Fisheries) tuna fisheries in the Western Central Pacific Ocean (WCPO) are currently affected by inter-annual and decadal variability in ocean conditions and are increasingly expected to be affected by rising ocean temperatures and reduced primary and secondary production due to weakening of currents and nutrient transport. These long-term climate changes are expected to reduce the suitability of tuna spawning and forage habitats over vast areas of the tropical Pacific Ocean (Ashe et al., 2017). The response of the four target tuna species in the WCPO to these changes vary depending on species and life stage. Concentrations of skipjack, bigeye and albacore tuna are likely to be located further east than in the past due to the warming of surface waters and the decline in primary productivity in the western Pacific. Based on scientific modelling it is assumed that tuna stocks would permanently move eastwards. This would greatly affect small PICs that are heavily reliant on tuna for economic and food security potentially leading to the collapse of a US\$4billion fishing industry

<sup>13</sup> Taken from "Chapter 5 Impact of Climate Change on Regional Tuna Fisheries". The World Bank. <http://siteresources.worldbank.org/INTPACIFICISLANDS/Resources/4-Chapter+5.pdf> accessed November 2016



## **Potential effects of ENSO fluctuation and migration**

McPhaden and Picaut (1990) first observed the migration of the Western Pacific Warm Pool in relation to ENSO; they reported a strong eastward displacement of the eastern boundary of the WPWP during El Niño and associated this shift to a reversal of the South Equatorial Current caused by weakened trade winds. Later, Lehodey et al (2010) reported a strong correlation between the location of the boundary between the WPWP and the Pacific Equatorial Divergence (PEQD (using the 29° C isotherm as a proxy), the abundance of Skipjack tuna and the phase of ENSO; they reported clear eastward population shifts of these tuna during the warm phase of ENSO.

According to Lehodey (2000), if the four main tuna species are influenced by ENSO in the tropical Pacific, the impacts are different according to each species. Large fluctuations in the catch and catch rates of skipjack tuna are driven by changes in stock size, and to a lesser extent by horizontal spatial extension (El Niño) or contraction (La Niña) of the habitat. The warm pool is the major spawning area of skipjack. Therefore, a plausible hypothesis to explain the ENSO effect on skipjack recruitment could be an increase of survival rates of juvenile skipjack correlated to the increase of primary and zooplankton production during El Niño events in this region. The effect will be delayed by 6 to 12 months, at which time skipjack are recruited to the fishery.

Again, according to Lehodey (2000), this seems not to be the case for yellowfin. Rising and vertical extension of its temperature habitat in the west during El Niño increases the catchability by the surface fishing gears. In the east, El Niño events would have a negative impact on yellowfin longline catch, while the negative effect is also well known on the purse seine fishery. This general negative effect on both surface and deep fishery suggests a horizontal displacement of the resource rather than an effect due to vertical changes. Combined with these vertical and horizontal spatial effects, Lehodey hypothesises that there would be an ENSO effect on recruitment, apparently opposite in the east to the effect observed for skipjack. Lehodey further notes that, at that stage of analysis, no conclusion can be drawn on these different hypotheses on the (opposite) effect of El Niño on the yellowfin recruitment.

Lehodey feels that similar and equally uncertain conclusions on the ENSO effect for yellowfin recruitment can likely be applied to bigeye. However, given its deeper habitat, the effects due to vertical changes are slightly different. In the west, a positive (negative) effect on bigeye longline CPUE during El Niño (La Niña) events would be associated mainly with the vertical extension rather than the rising of the habitat. Horizontal movements may also be associated with these changes. Lehodey further postulates that a positive (negative) effect of La Niña (El Niño) on the south albacore recruitment is consistent with the mechanism proposed for skipjack (and maybe yellowfin and bigeye), as the spawning ground is largely under the influence of the productivity of the cold tongue, which is a biological consequence of the equatorial upwelling as a large zonal band with high primary production, and that contrasts with the generally low primary productive waters of the western Pacific.

If future changes projected under IPCC scenarios predicting more frequent central (“Modoki-type”) El Niño events are correct, a spatial shift of the core habitat of skipjack and bigeye tuna toward the central Pacific is likely to occur. In the Pacific Ocean, it is believed that there are two stocks of albacore, one in each hemisphere. Both are characterized by spawning grounds in tropical waters and a seasonal feeding migration towards temperate water. Projections by the modelling of climate-driven fluctuations in population biomass within Pacific tuna until the 2030s highlight the need for fisheries management policies to take into account both climate-driven and fisheries impacts on the stock.



## **Potential impact on marine jurisdictions**

For most of the Pacific SIDS, the continuing validity of their maritime jurisdictions is necessary to sustain various social and economic activities and access to fisheries and other natural resources that provide food security, revenue and livelihoods. In particular, securing their maritime jurisdictions/boundaries is vital for the Pacific SIDS' development of an ocean-based economy, given the extent of their EEZs and the value of tuna resources that exist in those waters.

In addition, the 2014 Palau Declaration "The Ocean: Life & Future" called for 'strengthened regional efforts to fix baselines and maritime boundaries to ensure that the impact of climate change and sea level rise does not result in reduced jurisdiction'. The fulfilment of these objectives will safeguard the sovereignty and sovereign rights of Pacific SIDS from the adverse consequences of sea level rise caused by climate change

FAO has provided technical assistance to enable Pacific SIDS members of FFA to develop a collective response to changes in sea level due to climate change on maritime jurisdictional claims. This assistance provided for a consultative process involving two workshops held in July 2014 and May 2015. From the workshops, Pacific SIDS developed a range of national, regional and global actions to address this issue under the umbrella of a regional strategy: Securing the Maritime Jurisdictions of Pacific SIDS against Climate Change. This strategy was subsequently endorsed by FFC officials at FFC 94 in July 2015 in Funafuti, Tuvalu and subsequently by the FFC Ministerial meeting.



## **Ocean Acidification Impacts for the Pacific Islands Oceanic Fisheries**

Climate change, and ocean acidification, are expected to have profound effects on the status and distribution of coastal and oceanic habitats, the fish and invertebrates they support and, as a result, the productivity of fisheries (Johnson et al., 2016). Increased emissions of greenhouse gases have decreased the pH of the tropical Pacific Ocean by 0.06 pH units since the beginning of the industrial era (in the early 19<sup>th</sup> Century), and the current rate of decrease is ~0.02 units per decade. Ultimately, the pH of the tropical Pacific Ocean is projected to decrease by a further 0.15 units from the historical 1986–2005 period by 2050.

Based on preliminary tuna distribution modelling, Kiribati, Tuvalu, Tokelau, Cook Islands, and French Polynesia are likely to have future opportunities to negotiate increased access fees for distant water fishing nations. In contrast, the eastward shift in the distribution of skipjack tuna could pose some problems for tuna catches and processing in the western Pacific region.

The key implications of ocean acidification for governance and management centre around identifying the extent to which declines in fisheries productivity are likely to affect the regional and national plans and policies that Pacific island countries and territories have put in place to maximise the sustainable benefits for economic development, food security, and livelihoods. Although many of the impacts will directly affect the coastal areas (especially the coral reefs), the potential loss of commercial and subsistence species from around the coast will create food security issues (Bell et al., 2015) which may require policy changes and alterations in traditional community practices to resolve. Efforts to reduce dependence on marine resources may present part of the solution as the impacts of ocean acidification manifest in the Pacific region and marine resources decline.

### **1.F. Identification of some of the further scientific studies and analysis needed to strengthen understanding of the status of fisheries**

Two of the main priorities for effective future stock assessments will be the availability of reliable CPUE analyses and of tagging data. For skipjack, the main opportunity for additional data on growth is from tagging-based length-increment data. Furthermore, some tagging data is held externally to SPC creating difficulties in accessing and using such data in an acceptable and compatible format. Another priority is the development of an index of abundance based on purse seine data. Exploration of supplementary sources of relative abundance such as acoustic data from drifting FADs is considered to be warranted.

Pole-and-line fisheries still provide the standardised CPUE indices throughout much of the region, but this fishery now makes up less than 10% of the total WCPO skipjack catch, and an even smaller percentage in the main equatorial zone. Yet, it remains the only source of long-term information on relative biomass levels. As the fleets continue to reduce there will be ongoing problems in estimating and indexing relative abundance, and it may not be possible to support standardisation analyses if data becomes even more sparse. Further work is necessary to investigate if, and how alternative indices could be constructed for purse seine fisheries, at least over recent time periods. Consideration of how this might take place is needed and should include investigation of whether it would be possible to define a core fleet that may provide more robust information about relative abundance than the fishery as a whole.

WCPFC needs to consider the feasibility of establishing a process (either compulsory or voluntary) to ensure that all accessible operational longline log-sheet data are available to support the best possible regional stock assessments, including the testing and development of methods for CPUE standardization and related analyses (e.g., regional weights). This was a recommendation made to the Scientific Committee Eleventh Regular Session Pohnpei, Federated States of Micronesia in 2015 but it is uncertain as to whether this has been followed and the problem resolved. At this same meeting, in relation to south Pacific albacore tuna, several further recommendations were made regarding the need for enhanced biological studies, including the need for better age-length data and analysis for smaller fish and closer cooperation with scientists in other RFMOs to better understand the biological data.

Spawning potential has been overlooked as a potentially important parameter in the past, especially in relation to bigeye tuna. However, the 2017 stock assessment of bigeye tuna has demonstrated the importance of this function when many of the estimates of stock status rely on definitions of spawning potential and its comparison with spawning potential in the absence of fishing. Further biological studies on the components (e.g. egg production-at-age) would be beneficial in reducing uncertainty in the values used in assessments. Also, further work on maturity-at-length to allow easier back-transformation to maturity-at-age would greatly assist and improve accuracy in the Multifan CL fisheries stock assessment models.

In the context of bycatch and the capture of non-target species, a number of recommendations have been captured in the Summary of purse seine fishery bycatch at a regional scale (WCPFC Scientific Committee Thirteenth Regular Session, 2017) as follows:

- Future work should include the use of available observer data for the domestic Philippines purse seine fishery to estimate bycatches for this fleet;
- The Scientific Committee should also consider whether observer data for the domestic Philippines purse seine fishery is likely to be representative of bycatch compositions and rates for Indonesian and Vietnamese purse seine fleets, and so be used as the basis of indicative bycatch estimates for these fleets;
- Future work should consider the inclusion of fate information for species/species groups that are commonly released/discarded, particularly species of special interest
- measures be implemented at different levels to improve the data quality to produce more reliable bycatch estimates in both weight and number:

Discussions continue as to the feasibility of setting up conservation/replenishment zones, if possible in areas where the target species are not schooling but more work needs to be done on the contribution of these zones to both the fishery and the ecosystem as a whole. Some of the areas that may be most appropriate for no-catch replenishment zones may fall within the EEZ of countries that want and need the economic benefits from the fishery and arrangements would need to be negotiated in an attempt to reimburse those countries (e.g. debt swaps or similar financial reimbursement measures).

There is also a strong body of opinion that the region needs to adopt some form of monitoring mechanisms and regulation/management of exploration and exploitation of non-biological resources within the WPWP LME. Economic interest in seabed resources linked to seabed mining is a growing concern. Furthermore, with the registration of more and more Extended Continental Shelf applications by the Pacific SIDS, a new area of concern arises in that the area that will fall under a country's EEZ in terms of its rights to manage the seabed and any activities related to the seabed (within the EEZ) may then have impacts of activities in the high seas water column above the EEZ. Some of these discussions may be taken up within the proposed Integrated Oceans Management Framework. However, further studies in these areas would be both recommended and prudent.

## B. SOCIOECONOMIC STATUS IN THE CONVENTION AREA

In 2002 and 2008, the Asian Development Bank undertook studies to quantify benefits from the fisheries sectors of Pacific Island countries. Reports were issued from those studies and the information in them has been frequently cited. These reports are known in the Pacific Islands region as the “Benefish” reports<sup>14</sup>. Information on the benefits from fisheries is provided in the Benefish reports for each of the 22 Pacific Island countries and territories (Gillet, 2009). The country sections contain the most recent and available data in the following areas:

- Recent annual fishery harvests: values and volumes covering all of the fishery production categories
- Fishing contribution to gross domestic product: fishing’s current contribution, how the contribution was calculated, and re-calculation based on annual harvest levels obtained during the study
- Fishery exports: amounts, types, and the ratio to all exports
- Government revenue from the fisheries sector: access fees and other revenue
- Fisheries employment
- Fisheries contribution to nutrition

In early 2015, in response to a growing demand for up-to-date data on the contribution of fisheries to economies in the Pacific region, SPC’s Fisheries, Aquaculture and Marine Ecosystems (FAME) Division, with support from the FFA, approached the Australian Department of Foreign Affairs and Trade (DFAT) for funding to undertake a complete update of the 2009 study, Fisheries in the Economies of Pacific Island Countries and Territories, which was subsequently completed by the same author of the previous studies, in 2016. This allowed a new baseline to be set in assessing the value of fisheries to PICTs, both for measuring achievements and for assessing future improvements. It would also document changes in the management of the Pacific tuna fishery, food security concerns for coastal fisheries in the face of growing populations, and the effects these have on the economies of PICTs. Much of the following information is taken from this comprehensive and far-reaching study (Gillet, 2016).

### VALUE OF THE OFFSHORE FISHERY TO THE COUNTRIES OF THE REGION

The WCPO share of the global catch of albacore, bigeye, skipjack and yellowfin tunas been steady over the past decade (2007-16) at between 55% and 58% (Terawasi and Reid, 2017) as is shown in Figure 11 below

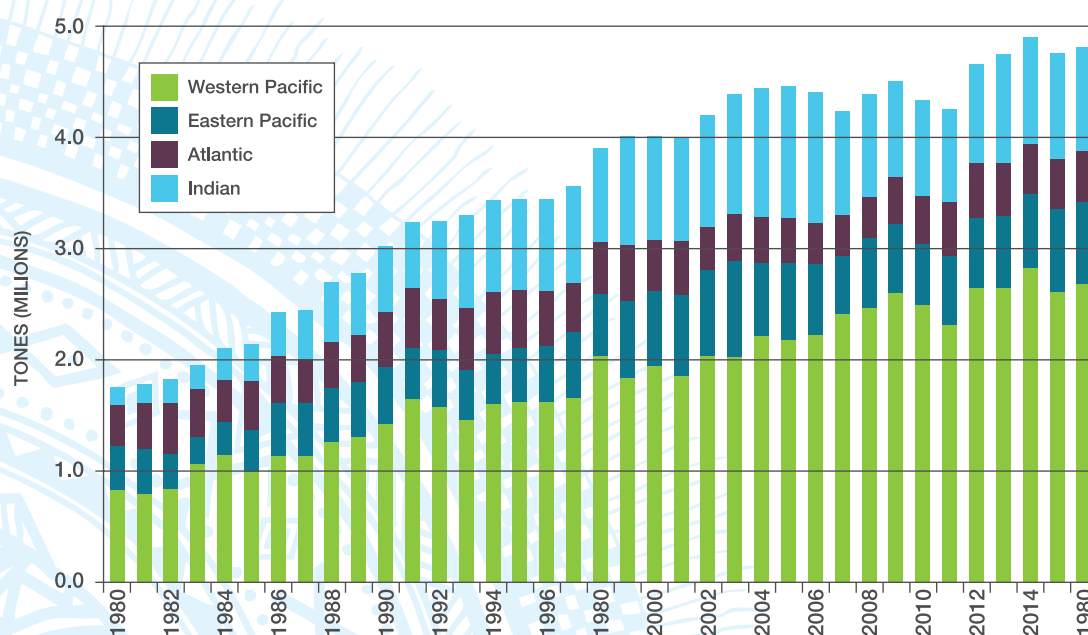


Figure 11: Global tuna production by Ocean Source: WCPO and EPO from SPC (2015), Atlantic Ocean (from ICCAT [www.iccat.int/atl.asp](http://www.iccat.int/atl.asp); Indian Ocean from [www.iotc.org/English/data.php](http://www.iotc.org/English/data.php))

<sup>14</sup> <http://purl.org/spc/digilib/doc/98xkv>

The WCPO purse seine fishery produces the majority of the global tuna purse seine catch, contributing between 76% and 81% over the period 2007-16. The purse seine fishery is also the dominant WCPO fishery accounting for between 68% and 73% of total catch in this ocean between 2007 and 2016. In 2016 the WCPO purse seine catch was around 1.9 million tonnes, 70% of the total catch from this ocean. In value terms, however, the proportion associated with the purse seine fishery is lower due to the lower unit value of the catch. The WCPO purse seine fishery catch is predominately taken in the waters of FFA member countries. Between 2007 and 2016 the purse seine catch in the waters of FFA member countries represented between 63% and 85% of the overall WCPO purse seine catch.

The WCPO longline fishery produced between 40% and 48% of the global longline catch of albacore, bigeye and yellowfin over the period 2007-16. The longline fishery accounted for around 8.7% of the total WCPO catch in 2016 continuing the ongoing decline in its contribution, which was around 13- 14% two decades ago and 10- 11% a decade ago. While the proportion of the WCPO tuna catch taken in the longline fishery previously declined as a result of the expansion in purse catch, the 2016 decline was primarily driven by declining longline catches which fell 11% in 2016 and were 9% lower than that averaged over 2011-15

Figure 12 demonstrates the relative value by percentage of Offshore (foreign and locally based) fisheries against coastal and freshwater fisheries within the EEZs showing that the offshore fishery value is massive (greater than 70%). The total production, by volume, from offshore fisheries of the region is almost nine times that of coastal fisheries).

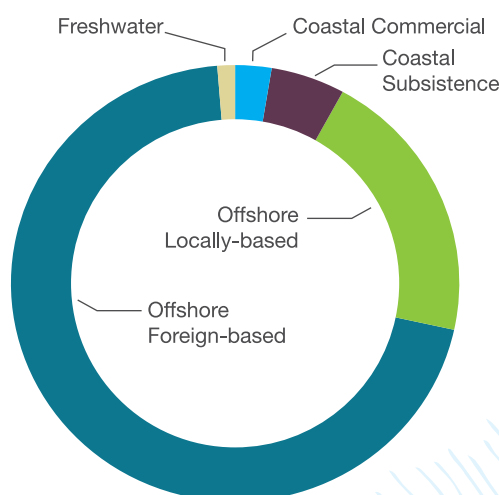


Figure 12: Share of Regional Fishery Production Volume by the Different Fishery Categories (%)

As shown in Table 8, the 'in-zone'<sup>15</sup> regional offshore fishery production in 2014 is estimated to be close to 1.9 million metric tonnes (mt) of fish, worth approximately US\$ 3,25 billion.

	OFFSHORE LOCALLY-BASED	OFFSHORE FOREIGN BASED
Total Value (US\$)	738,496,811	2,273,305,141
Total Volume (mt)	420,550	1,445,984
Unit Value (US\$/mt)	1,756	1,572

Table 8: Value per Metric Ton by Fishery Category across the Region

<sup>15</sup> Common regional parlance for the EEZs

If we consider the individual PICS, we get the following breakdown (as shown in Table 9) by tonnage and value for 'in zone' fisheries.

COUNTRY/TERRITORY	METRIC TONNAGE		US DOLLAR VALUE	
	Locally-Based	Foreign-Based	Locally-Based	Foreign-Based
Kiribati	510	701,067	3,605,557	1,111,10,457
Papua New Guinea	216,896	217,871	312,719,079	311,048,127
FSM	0	177,315	85,342,200	228,148,080
Nauru	40,838	124,481	0	231,229,508
Solomon Islands	85,918	29,754	57,520,263	79,228,378
Marshall Island	41,523	36,573	133,530,000	38,700,638
French Polynesia	0	96,898	28,829,104	0
Tuvalu	17,079	0	0	131,951,751
Fiji	0	24,286	54,364,955	0
Cook Islands	194	20,342	2,265,625	57,153,854
New Caledonia	568	10,942	13,416,896	0
Palau	5,390	0	31,471,000	18,555,070
Vanuatu	1,254	0	1,474,009	26,402,602
Tonga	1,363	1,891	4,177,419	5,058,065
Samoa	3,987	4,017	4,666,309	0
Tokelau	2,876	0	0	33,203,125
Wallis and Futana	2,154	0	0	0
American Samoa	0	0	5,113,395	0
Northern Marianas	0	547	0	0
Niue	0	0	0	1,519,487
Guam	0	0	0	0
Pitcairn	0	0	0	0
<b>TOTAL</b>	<b>420,550</b>	<b>1,445,984</b>	<b>738,496,811</b>	<b>2,273,305,141</b>

Table 9: Metric Tonnage and Value for the Offshore Fishery by Country

In his comprehensive review of Fisheries in the Economies of the Pacific Island Countries and Territories, Gillet (2016) lists some of the noteworthy aspects of the Offshore fisheries, and provides the pertinent statistical/numerical evidence to support these:

- The value of offshore fishing in the Kiribati zone in 2014 (US\$1.1 billion) approaches the combined value of offshore fishing of all other PICTs excluding PNG (US\$1.3 billion)
- The effects of the 2014 El Niño conditions on offshore fishery production are readily apparent, with greater catches in the central equatorial region.
- Three countries in an area of relatively good tuna fishing had no locally based offshore fishery production in 2014: Nauru, Tuvalu, and Tokelau. A fourth country, Kiribati, had just a tiny amount of locally based offshore fishery production
- In about one-third of the countries that are significantly involved in offshore fisheries, the fleet is all locally based; in one third it is a mixture of locally and foreign based; and in one third it is all foreign based
- Although Palau is a PNA country, the production from its offshore fishing is lower than that from several non-PNA countries

The aforementioned data and discussion all related to the 'in-zone' fishery in the Western and Central Pacific Ocean. Table 10 below provides the metric tonnage and value of fisheries in the high seas/international waters within the WCPO between 2010 and 2014

		2010	2011	2012	2013	2014
<b>PURSE SEINE</b>	Mt	76,935	66,851	89,075	89,631	134,547
	US\$	88,672,647	105,784,008	164,819,374	156,912,557	174,282,948
<b>LONGLINE</b>	Mt	122,954	112,538	115,668	111,033	89,754
	US\$	601,792,736	612,143,019	603,716,683	455,815,610	384,547,760
<b>POLE AND LINE</b>	Mt	69,778	66,653	72,271	43,184	38,273
	US\$	147,975,132	155,874,804	221,743,431	95,891,453	93,543,816
<b>TROLLING</b>	Mt	307	472	235	390	284
	US\$	739,103	1,293,091	747,441	881,712	735,106
<b>OTHER GEAR</b>	Mt	363	130	129	129	129
	US\$	442,753	213,930	280,594	251,982	203,460
<b>TOTALS</b>	Mt	270,338	246,644	277,378	244,366	262,988
	US\$	839,622,371	875,308,852	991,307,523	709,753,315	653,313,090

Table 10: Volume and Values of Fisheries Production from International Waters

Based on the above table and SPC data, Gillet (2016) made the following observations:

- In 2014 the fish catches in the 11 bodies of international waters in the WCPO (262,988 mt) are equal to about 14.4% of all offshore catches in the zones of the 22 countries and territories of the Pacific Islands area.
- The fleets that had the most catches by volume in 2014 in the international waters were Japanese pole-and-line (17% of the total IW catch), USA purse seine (13%), Kiribati purse seine (11%), Japan purse seine (10%) and Philippine purse seine (9%).
- Of the fleets flagged in PICTs, the fleets that had the most catches by volume in 2014 in the international waters were Kiribati purse seine (11% of the total IW catch), Vanuatu longline (3%), Fiji longline (1%) and PNG purse seine (1%).

Table 11 combines values for the various fishing areas within the WCPO (in-zone, and High Seas)

<b>WCPO Catch Value by Area (in Millions of US\$)</b>				
<b>YEAR</b>	<b>FFA MEMBERS' NATIONAL WATERS</b>	<b>OTHER NATIONAL WATERS</b>	<b>INTERNATIONAL WATERS</b>	<b>TOTAL</b>
1997	937	1,084	1,019	3,040
1998	1,051	1,103	1,116	3,270
1999	775	944	974	2,693
2000	797	988	925	2,711
2001	890	948	860	2,699
2002	921	891	954	2,765
2003	901	988	864	2,754
2004	1,049	1,237	1,046	3,333
2005	1,169	1,080	963	3,212
2006	1,374	1,192	931	3,498
2007	1,798	1,527	1,024	4,348
2008	2,396	1,858	1,255	5,509
2009	1,938	1,570	1,203	4,711
2010	2,448	1,525	993	4,966
2011	3,052	1,819	1,019	5,890
2012	4,153	2,176	1,128	7,457

WCPO Catch Value by Area (in Millions of US\$) (cont.)				
YEAR	FFA MEMBERS' NATIONAL WATERS	OTHER NATIONAL WATERS	INTERNATIONAL WATERS	TOTAL
2013	3,546	2,232	845	6,623
2014	3,156	1,808	808	5,772
2015	2,302	1,499	941	4,742
2016	2,628	1,772	876	5,275

Table 11: Values for the various fishing areas within the WCPO

By 2016 the total catch for WCPO amounted to US\$ 5,275 Million in value. Of this the percentage value per zone was as follows:

- FFA Members National Waters = 50%
- Other National Waters = 33.5%
- International Waters = 16.5%

Table 12 (below) shows the catch value per species of tuna in the WCPO between 1997 and 2016 (in millions of US dollars)

	ALBACORE	BIGEYE	SKIPJACK	YELLOWFIN	TOTAL
1997	248	637	1,133	1,022	3,040
1998	229	632	1,298	1,112	3,270
1999	237	690	900	866	2,693
2000	235	672	793	1,010	2,711
2001	304	557	923	915	2,699
2002	265	579	1,019	902	2,765
2003	232	548	955	1,018	2,754
2004	267	749	1,198	1,118	3,333
2005	254	587	1,272	1,098	3,212
2006	281	652	1,479	1,086	3,498
2007	236	659	2,201	1,253	4,348
2008	259	798	2,848	1,603	5,509
2009	353	802	2,193	1,363	4,711
2010	333	854	2,229	1,550	4,966
2011	351	1,015	2,660	1,865	5,890
2012	491	1,113	3,800	2,053	7,457
2013	341	780	3,777	1,726	6,623
2014	344	768	2,942	1,718	5,772
2015	338	647	2,250	1,508	4,742
2016	293	697	2,669	1,616	5,275

Table 12: Catch by Species in WCPO in Millions of US\$

## CONTRIBUTION OF OFFSHORE OCEANIC FISHERIES TO THE GDP AND EXPORTS OF THE VARIOUS WCPF CONVENTION COUNTRIES

Terawasi and Reid (2017) report that the overall contribution of the harvest sector of the tuna fishery to GDP during 2016 increased by 30% to \$355 million from \$267 million in 2015. This increase reverses the previous three years' consecutive declines. This decline from the peak of \$500 million in 2012 is driven by reductions in the value of sector's production which in turn has been driven by falls in fish prices. In real terms (that is, adjusting for inflation), the harvest sector's contribution to GDP in 2016 is now above its 2015 level when it was similar to levels seen between 2007 and 2010.

Gillet notes that, in comparison to other sectors of Pacific Island economies such as government, manufacturing, or tourism, calculating the contribution of fishing to an economy is a particularly difficult task. The fishing sector can include thousands of producers operating in many locations and using a wide variety of techniques. Crew are often paid in kind or receive a share of the catch rather than wages; and even when they do receive wages, collecting information on those wages can be difficult. Gillet compared the official figures provided by each country with his own estimates based on a more detailed methodology (See Gillet 2016). Some of the reasons for the differences between the official and the re-estimated figures are a result of i) the inclusion or exclusion of activities of locally based foreign fishing vessels, ii) the official estimate omits certain important fisheries, iii) the value-added from small-scale fishing (coastal commercial and subsistence fishing) is often quite different between the official and re-estimated figures, iv) production estimated from the "informal" and "specialised" studies of the fishing sector in the official method is often very different from that obtained in the present study, v) in some cases the compilers of national accounts do not appear to have consulted the relevant fishery agencies or the fishing industry when preparing their estimates.

Gillet then compared the 2009 Benefish study (Gillet 2009) with the study undertaken in 2016 (Gillet 2016) which used the same methodology and then expressed them as a percentage of each country's/territory's GDP. The results of the two studies are therefore comparable and provide some insight into changes that may have occurred between the dates when the data were collected and analysed (2007 and 2014). Figure 13 therefore shows the percentage contribution that fisheries make to the GDP of each country in 2007 and 2014.

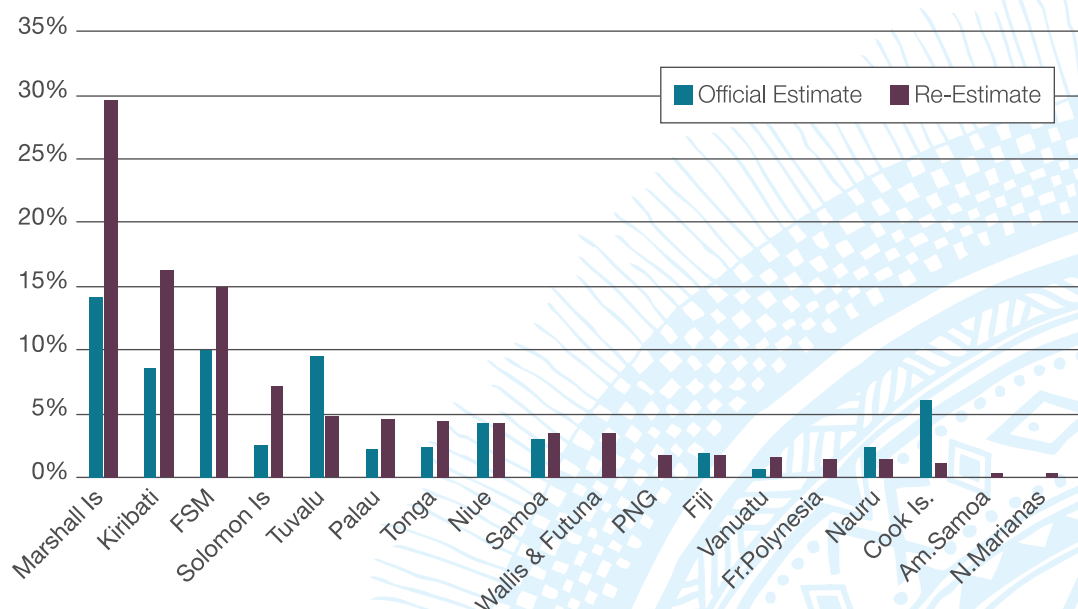


Figure 13: The Percentage Contribution (official and re-estimated) of Fishing to GDPs (N.B. not all PICTs calculate GDP) Taken from Gillet, 2016.

Although figure 13 provides useful information on the contribution that fisheries makes to the overall GDP for each country, this is only for 2014 and represents ALL fisheries (coastal and offshore) and therefore needs to be considered alongside the broad regional information given in Table 13 below which provides the Share of Regional Fishery Production Volume by the Different Fishery Categories (%)

	GDP (US\$, '000s)	Fishing GDP Contribution (US\$ '000s)	Fishing as a % of GDP
Cook Islands	\$299,063	\$17,813	6.0
FSM	\$318,100	\$31,800	10.0
Fiji	\$3,600,909	\$65,758	1.8
Kiribati	\$158,075	\$13,568	8.6
Marshall Island	\$186,700	\$26,300	14.1
Nauru	\$116,475	\$2,623	2.3
Niue	\$24,432	\$1,045	4.3
Palau	\$249,082	\$5,460	2.2
Papua New Guinea	\$16,809,339	na	
Samoa	\$804,208	\$24,045	3.0
Solomon Islands	\$1,024,842	\$25,459	2.5
Tonga	\$432,079	\$9,785	2.3
Tuvalu	\$31,567	\$2,976	9.4
Vanuatu	\$739,469	\$4,731	0.6
American Samoa	\$711,000	na	
French Polynesia	\$5,771,061	na	
Guam	\$4,882,000	\$88,303	1.5
New Caledonia	\$9,337,687	na	
Northern Marianas	\$682,000	\$15,099	0.2
Pitcairn	na	na	
Tokelau	na	na	
Wallis and Futana	\$87,500	na	

Table 13: Estimates of Fisheries Contribution to the GDP of each country for the year 2014.  
Taken from Gillet 2016.

Gillet breaks this down into the different fishing categories for each of the islands. Gillet notes that PNG is not shown in the figures as its nominal contributions are very large and would obscure the details for most of the small countries/territories.

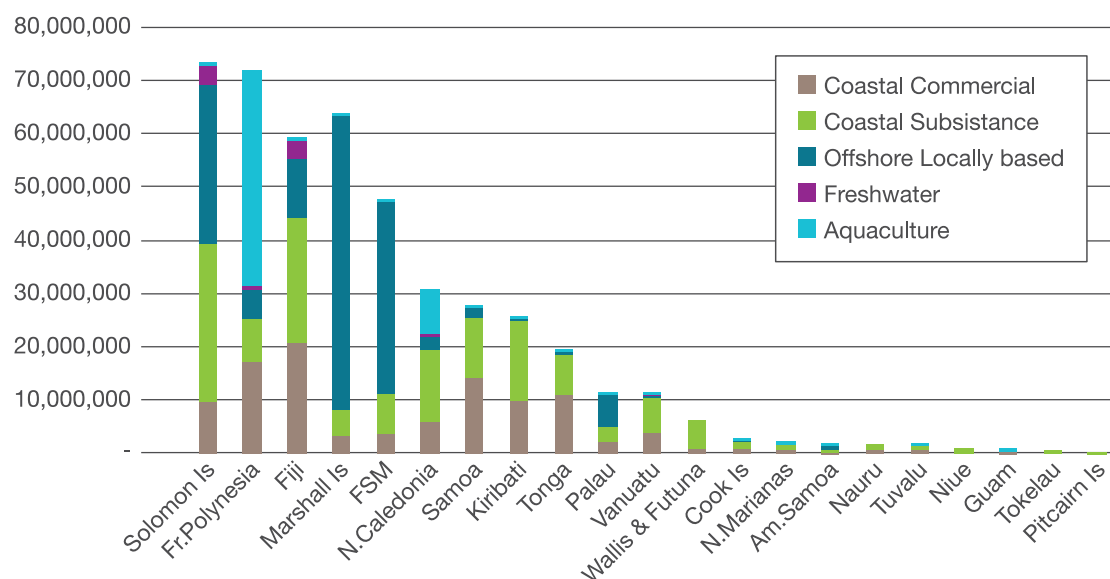


Figure 14: Fishing Contributions to GDP by Fishery Categories (US\$) for 2014 or for latest year available (from Gillet 2016)

Generally though, Gillet (as of 2016) notes that improvements are needed in estimating GDP and the fisheries component thereof and provides some recommendations for improvement as follows:

- Formulate logical fishery categories that group similar fisheries with similar value-added ratios. The present study uses the categories of coastal commercial, coastal subsistence, offshore locally based, offshore foreign based, freshwater, and aquaculture. Other categories may be more appropriate in some countries/territories, while the smaller countries/territories may have fewer categories.
- In the absence of specialised economic studies for the country/territory, use the suggested value-added ratios given (See Appendix 3 of Gillet 2016).
- For estimates of offshore fishery production, use the Western and Central Pacific Fisheries Commission (WCPFC) national fishery reports. All Pacific Island countries (and some territories) prepare these for the annual meeting of the Scientific Committee of the WCPFC (available at [www.wcpfc.int](http://www.wcpfc.int)). Staff of the government fisheries agency or the Forum Fisheries Agency (FFA) can place values on the tonnage of fishery production in the document.

Gillet (2016) also provides useful data on the value and importance of fisheries exports to the countries and territories. Clearly, fisheries exports are of major important to some countries and territories in the region and represent over 40% of the value of all exports in about half of the countries/territories.

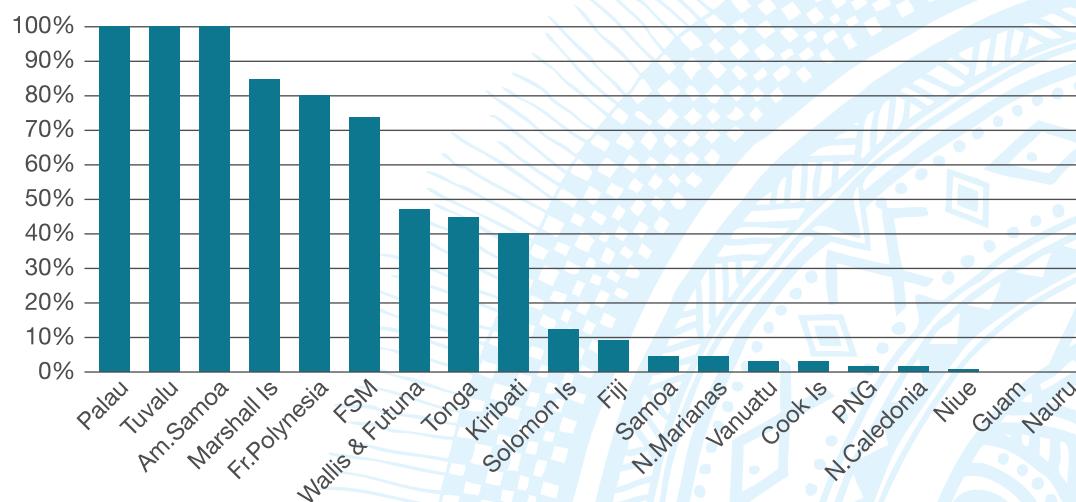


Figure 15: The Relative Importance of Fishery Exports from Pacific Island Countries and Territories in 2014 (2013 for American Samoa). From Gillet 2016.

Other noteworthy points considered by Gillet (2016) include:

- The three countries/territories that have the largest values of fishery exports are American Samoa, PNG, and French Polynesia. Interestingly, two of them are non-independent territories. Of the total of about US\$820 million in fishery exports from the region in 2014, about 76% are from these three.
- American Samoa's fishery exports are about 47% of the fishery exports from all the other countries and territories combined.
- The value of PNG's fishery exports is about 41% of all the fishery exports from all the other independent countries combined.
- The fishery exports of several countries/territories are very small or non-existent.
- Some large exporters of fishery products are countries or territories that export substantial amounts of other commodities, e.g. PNG and New Caledonia. In other words, in these countries/territories fishery exports, although large, appear small in comparison to other exports.
- Some large exporters of fishery products are countries/territories that export only small amounts of other commodities, e.g. American Samoa, French Polynesia, FSM, and the Marshall Islands.

## **CURRENT KNOWLEDGE ON THE ROLE OF OFFSHORE OCEANIC FISHERIES TO THE JOBS AND LIVELIHOODS OF THE PICS**

Total employment related to tuna fisheries in FFA member countries is shown in Figure 16. Growth in the onshore processing sector employment of 6% saw the sector's contribution to employment rise to around 13,200. Of those employed in the processing sector 62% were employed in PNG, 16% in the Solomon Islands and 13% in Fiji. Among processing workers an estimated 10,800, or 80%, were women while, in contrast, just 26 or 3% of all observers were women. Significant growth in employment was also observed in the harvest sector with numbers increasing to around 6,400, more than double the levels of 5 years previously.

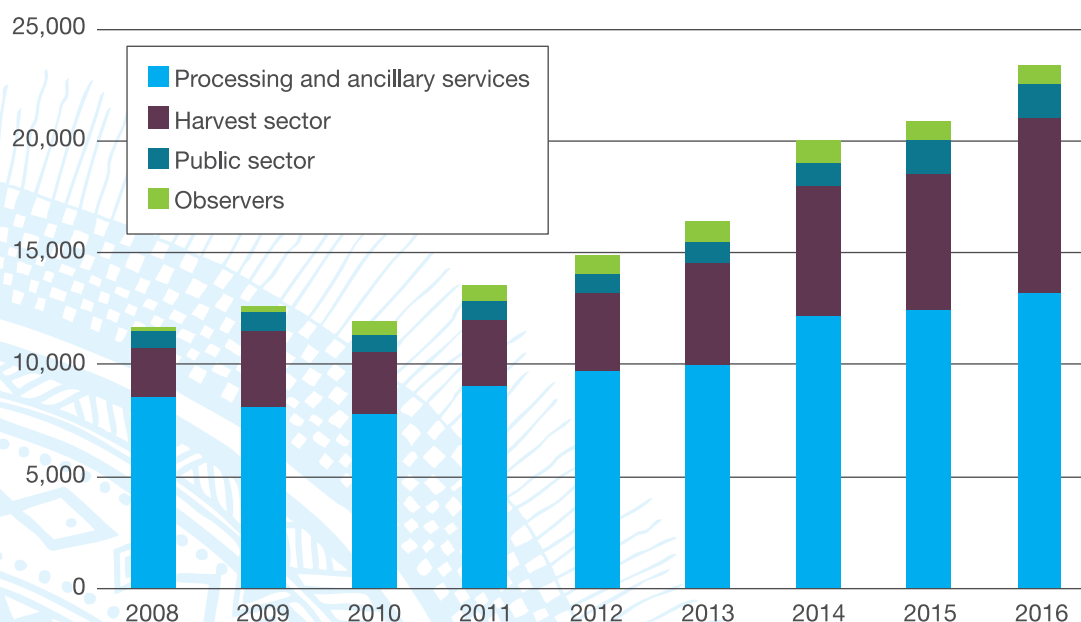






Figure 16: Employment related to the tuna fisheries in FFA countries for 2016. Taken from Gillet 2017.  
Note: Includes casual, part time and full-time employment than double the levels of 5 years ago.

In the report on Fisheries in the Economies of the Pacific Island Countries and Territories (2016), Gillet concludes that the fisheries-related employment information available for each country and territory is very much a mixed jumble of facts. However, Gillet attempts to extract the information that best characterises the national fisheries-related employment situation and then presents that information as the following Table 14.

Country/ Territory	Recent Information on Fisheries-Related Employment, and Corresponding Information from the Previous Benefish Study (in italics)
<b>Cook Islands</b> 	<p>The 2011 census indicated that 42.4% of households in Cook Islands participate in fishing, but this is declining. In 2011 57.6% of households had not engaged in any level of fishing activity whereas the previous census in 2006 showed 50.6% with no such activity.</p> <p><i>Of the employed population recorded in the 2001 census (5,928 people), 427 (7.2%) indicated they were employed in “agriculture and fishing”. Of those people, 183 were on Rarotonga. With respect to subsistence fishing, the employment situation is very different between Rarotonga and the outer islands. A recent SPC survey on Mangaia Island indicated that almost all households (92%) are engaged in fisheries with an average of 1 to 2 fishers. A similar SPC survey on Rarotonga shows that less than half of all households (44%) are engaged in fisheries with an average of one fisher per every second household only.</i></p>
<b>FSM</b> 	<p>The 2013/2014 HIES has some fisheries-related employment information:</p> <ul style="list-style-type: none"> <li>• 1.8% of total wage and salary income comes from fishing</li> <li>• 12.9% of households are involved with subsistence fishing</li> <li>• The net monthly value from subsistence fishing is \$18 per household</li> </ul> <p><i>In 2007 the “number of employed persons in fishing” was 1.3% of all employed people in FSM, but it should be noted that the survey was oriented to formal employment with the larger fishing companies. Little national level information available on participation in small-scale fisheries.</i></p>
<b>Fiji</b> 	<p>A 2008 study estimated the number of (a) subsistence fishers in the country to be about 23,000, (b) full-time artisanal fishers to be about 5,000, and (c) part-time artisanal fishers to be 12,000.</p> <p><i>Combining information in ADB study in late 2004 and the 2004/05 Fiji employment study, the estimated 9,144 fisheries jobs in the 12 fisheries sub-sectors (e.g. offshore, processing) represent about 3.8 percent of the total number of jobs in Fiji (wage, salaried, self-employed). There is little national level information available on participation in subsistence fisheries.</i></p>
<b>Kiribati</b> 	<p>The 2010 census gives the major categories of fisheries jobs broken down by age and sex of the workers. It gives a total of 3,178 employed in seven fisheries categories; on examination, the data seem to underestimate the numbers of workers in some types of jobs.</p> <p><i>The 2005 Kiribati census indicates that 7.1% of “cash workers” were in “agriculture/ fishing”. The results of earlier census in 2000 had greater detail for fisheries-related employment: “Fisheries” was the main activity for 1.5% of people. With respect to subsistence fisheries, the results of the fishery-focused surveys by the Fisheries Division are mostly narrow in scope (i.e. one company, one island, one sub-sector of fisheries) and it is difficult to draw national-level conclusions.</i></p>

## Marshall Islands



In the 2008 employment survey, fishing provided 2.8% of the jobs in the country and 4.7% of the income from jobs. The income level of fishing job-holders was only about 65% of the average level. The report of the 2011 census states that a total of 3,787 households reported fishing – that is, 48.9% of all households. Of these, 64.1% claimed it was for subsistence purposes, 34.8% claimed that fishing was for both subsistence and income, and 1.1% reported it as a means of income only.

*In early 2008 the Economic Policy, Planning and Statistics Office carried out an employment survey that showed that “fishing” accounted for 2.8% of the total number of jobs in the country and 4.7% of the income from jobs. A 2004 survey estimated that 62.2% households on Majuro did at least some fishing once a year. Little national level information is available on participation in subsistence fisheries.*

## Nauru



The 2011 census indicated that the main source of household income was: for 85% of all households, wages and/or salary; for 7% of households, own business activities; 4% relied mainly on rent of land; and 2% on the sale of fish, crops or handicrafts. Just over half (51%) of all households in Nauru were engaged in fishing activities. Participation in fishing activities varied greatly between Nauru's 14 districts. The results of the 2012/2013 HIES indicated that 26% of households were engaged in fishing. About 8.94% of the Nauruan labour force of 3,952 were involved in some form of fishing; this equates to about 353 fishers. With regards to full-time fishers, if “full-time” means those who have fishing as their main activity, the figure is 1.26% of the Nauruan labour force or about 50 fishers.

*An SPC survey in 2005 indicated that fisheries do not play a significant role in income for households. For 5% it is their first income and for 17% their second income. A total of 245 households were surveyed for income and expenditure, with 97% of these found to be engaged in fishing activities.*

## Niue



The 2009 agriculture census of Niue indicated that most households were engaged in inshore fishing (62%), 31% were involved in both inshore and offshore fishing, with the remaining 7% being involved in offshore fishing only. The main purpose of household fishing was for home consumption, accounting for 82% of fishing households, with 16% selling some of their catch and the remaining 2% selling most or all.

*The 2002 HIES indicates that “fish income” represents 0.9% of all income in Niue for the year and that 12% of all households have some “fish income”. There were 293 boats on the island in 2006 when the population was 1626, or one boat for each 5.5 people.*

## Palau



The Fiscal Year 2014 Statistical Appendices have information on employment in Palau obtained through social security and tax records. This shows the number of fishing workers to be 83 out of a total number of workers in Palau of 10,386, meaning fishing workers are 0.8% of all workers.

*The 2005 census states that (a) of the 13,800 people reporting income in 2004, 305 people (2.2%) reported income from selling fish, and (b) of 14,154 people over 18 years old in 2004, 933 people (6.6%) reported some subsistence fishing activity.*

**Papua  
New  
Guinea**



Not much new information is available on participation in small-scale fisheries in the country. The readily available documentation from the latest national census (2011) does not contain the word “fish”. The most recent PNG HIES has not been analysed for fishery participation information.

*A 2008 FFA study estimated 8,990 jobs associated with large-scale tuna fishing and canning. Considering the “monetary employment” of 774,000 in PNG in 2008, these 8,990 tuna jobs represent about 1.2% of the monetary jobs in the country. A 2005 study estimated that there are in PNG about 2,000 and 4,000 part-time artisanal fishermen. A 2001 study indicated that a large number of people, estimated at somewhere between 250,000 and 500,000, participate in the coastal subsistence fishery. Participation in freshwater fishing is very large. 23% of all rural households in the country are engaged in catching fish (both marine and fresh water fishing).*

**Samoa**



A 2012 socio-economic fisheries survey found that fishing was third to agriculture and paid salary in terms of income source. Overall, 14% of all households ranked fishing as their first source of household income; the figure for coastal communities was higher at 18%. The 2012 labour force survey found that of the working age population, 6.7% were involved with subsistence fishing.

*Formal registered employment in 2007 consisted of 22,150 people, of which 196 people (0.9%) were involved in commercial fishing. With respect to small-scale fisheries, a Fisheries Division report in 2007 indicated that, although only 7.26% of the population are fishers, 41.7% of households have at least one fisher.*

**Solomon  
Islands**



There were two recent national censuses: 1999 and 2009. The report of the 2009 census gives “changes in paid employment” in the ten-year period between the two surveys: (a) 1999: total jobs in fishing 3,367 (2,935 males and 432 females); (b) 2009: total jobs in fishing 5,736 (5,076 males and 660 females). The changes during the period were 70.4% increase in paid employment in fishing (72.9% increase for males and 52.8% increase for females). An ADB study in 2010 stated that the number of subsistence fishers in Solomon Islands could be crudely estimated by looking at the total population – about 570,000 in 2012 – and assuming 82% as the rural population. By dividing this by the average number of household members in rural households (5.2 persons) the minimum number of subsistence fishers can be derived. A minimum of 88,000 people are estimated to be engaged in fishing, assuming one household member is a fisher. This, however, is a conservative estimate. If the inputs of women and other adult men are considered in the estimate, the number of subsistence fishers would double to 175,000.

*An IMF study in 2005 indicated a total of 42,297 formal jobs in the country in 2004, of which 5,114 (12.1%) were in fisheries. For small-scale fisheries, an SPC study in 2006 found that 50% of females and 90% of males participate in fishing activities. 83% of households engage in some form of fishing activity.*

**Tonga**



The 2011 census showed that the main type of work during the last week for 64,597 people was 859 people involved with fishing mainly for sale and 437 people involved with fishing for their own consumption. Overall, 2.0% of the population was involved with fishing. Participation in fishing was highest in the 40–44 and 45–49 year classes.

*The 2003 survey of employment indicated that there were a total of 34,561 people employed in Tonga, of which 1,050 (3%) were employed in the category of “fishing”. With respect to participation in small-scale fishing, a 2003 Australian-sponsored study estimated the “number of fishers”: Tongatapu, 6,470; Ha’apai, 2,053; Vava’u, 4,375, or 12,898 total or 12.8% of the country’s population in 2003.*

## Tuvalu



The 2012 census showed that 75.3% of the sampled households participated in some kind of fishing. Overall 9.2% of households in Tuvalu received income from fish sales: 7.2% on Funafuti and 11.0% on the outer islands. Commercial fishing activities were not common – less than 4% of households were involved in these activities. Only 17% of total households had a boat, 16% owned an outboard motor while 27% reported owning a canoe. A total of 436 households in Tuvalu (24.7%) were not involved in any kind of fishing activities. Of these households, 301 were on Funafuti and 135 were on the outer islands.

*The 2002 Population and Housing Census of Tuvalu indicated that 58% of all people participated in fishing during the week before the census, of which 80% was only for “own/family use”, 2% for only sale, and 18% for mixed subsistence/commercial.*

## Vanuatu



The Vanuatu Socio-Economic Atlas uses information from both the 2009 census and the 2010 HIES. It shows the percentage of households that are involved in any fishing activity by province: Torba (76.8%), Sanma (48.7%), Penama (36.1%), Malampa (46.1%), Shefa (43.3%), Tafea (43.1%), Port Vila (9.6%) and Luganville (17.6%); the percentage of households that reported sale of fish/crops/handicrafts as a main source of income: Torba (61.2%), Sanma (67.3%), Penama (67.9%), Malampa (60.0%), Shefa (46.1%), Tafea (60.2%), Port Vila (2.2%) and Luganville (4.4%); and areas with especially high involvement in fishing: Northwest Santo, South Maewo, South Malekula, North Erromongo, South Erromongo, and Aneityum. The Vanuatu 2010 HIES found that more than 75% of the adult population practises at least one form of fishing, whether subsistence or commercial. The survey showed that 2% of urban households and 12% of rural households had income from the sale of fishery products.

*There is not much readily available information on the national level about employment in the urban-based commercial fishing/aquaculture/post-harvest activities. A 2007 Agriculture Census indicated (a) 72% of the rural households in Vanuatu possess fishing gear and engaged in fishing activities during the previous 12 months, (b) these fishing households number 15,758, and (c) of those fishing households, 11,577 (73%) fish mainly for home consumption, 4,127 (26%) for home consumption with occasional selling, and 74 (less than 1%) mainly for sale.*

## American Samoa



In 2013 (the latest year for which employment data are available) the tuna canneries employed 2,108 people. This represents 13.1% of the 16,089 people employed in American Samoa. This employment has declined sharply in recent years. In 2003 5,036 people were employed at the canneries, about 28.9% of people employed. A 2006 survey showed that 55% of respondents fished for subsistence to some degree, although most people fished only infrequently. Of those who did fish, 72% fished once a week or less (44% of these fished only 1–2 times per month), while 16% reported fishing ten or more times per month. Approximately 9% of the population surveyed could be considered “frequent subsistence fishermen”.

*A government survey in 2006 showed 5,894 government workers, 4,757 cannery workers and 6,744 employees with the rest of the private sector. The canneries therefore provided 27% of all employment. There were 153 commercial fishers involved in domestic fishing. Data on involvement in subsistence fishing is not readily available.*

**French Polynesia**

A 2015 review of labour in French Polynesia stated that the pearl workforce consisted of 1,060 employees in 2014. A 2014 study of the pearl industry stated that at the end of December 2013 there were 815 declared wage earners in pearl farming, but as many of the pearl farms are run as family businesses there are likely to be a large number of non-declared workers.

*In 2007 13 people were involved in non-pearl aquaculture, 7,000 people in pearl culture, 1,800 people in coastal fishing, 1,025 in offshore fishing, and 200 people involved with freshwater fishing. For the relative importance of this involvement: (a) the total population of French Polynesia in 2007 was 259,800, and (b) there were 68,849 “declared” jobs in the economy.*

**Guam**

A 2008 Bureau of Statistics and Plans report indicated 1,565 full-time fishermen, 60 part-time fishermen, and 170 occasional fishermen. All of these jobs were filled by men; none were reported to be held by women.

*A study in 2008 stated that the Guam Fishermen’s Cooperative membership includes 164 full-time and part-time fishermen (0.1 percent of Guam’s population) and it processes and markets an estimated 80 percent of the local commercial catch. With respect to subsistence fishing, a 2007 household survey of 400 local residents showed approximately 40 percent of local residents fish on a regular basis, which was identified to be more important as a social activity, rather than an income-generating activity.*

**New Caledonia**

A 2015 report gave information on registered commercial fishers in 2010: 613 in coastal fishing and 120 in offshore fishing. A 2014 report from the government fisheries agency updated the information on employment in offshore fishing. It estimated that in 2013 there were 120 onboard crew, 30 people in onshore vessel management, 60 people in processing, and 20 people in fish wholesaling – a total of 230 people.

*About 1,000 people are employed in commercial fishing/aquaculture in New Caledonia which represents about 1.2% of the 80,685 economically active people in the territory. With respect to non-commercial fishing, a study in 2000 indicates that of 1,000 people interviewed in the three provinces of New Caledonia, 50% of the respondents fish one to three times per week.*

**Northern Marianas**

An NGO-sponsored study in 2011 stated that more than 50 professional fishers are estimated to work for formal businesses, while the number of independent and semi-subsistence fishers remained unknown. The CNMI Prevailing Wage & Workforce Assessment Study indicated that of the 25,658 people employed in 2014, 425 were employed in “farming fishing and forestry”. No further disaggregation is given.

*The 2000 census and the 2005 HIES give data only disaggregated to the level of “people employed in farming fishing and forestry”: 614 people and 894 people, respectively. A survey in 2006 found that twenty percent of all the people interviewed are active fishermen and go fishing once every week or two.*

**Pitcairn**

- An SPC (2011) report states: “There are no full-time fishers, but there are eight part-time commercial fishers, seven men and one woman”. Another SPC (2011) report states: “In addition to the eight commercial fishers, there are about 15 non-commercial fishers”.

*In 1994 an SPC officer observed that there are eight or nine “hard-core fishers” on the island with another three or four who also fish fairly regularly. 12 people equate to about 19% of the island’s population.*

**Tokelau**

The report of the 2011 census disaggregated the employment data only to the level of “Labourers, agriculture, and fisheries workers” so it is not possible to determine how many people derive income from fishing. The report does show that males were much more likely than females to help with village fishing (68.4% compared with 6.7% for females). Tokelau residents in the age category 50–59 years had the highest proportion of people who helped with village fishing (44.8%).

*In 2003 an SPC/FFA mission to Tokelau surveyed 153 households on all three atolls and determined that 152 households (99.3%) were involved in fishing.*

**Wallis and Futuna**

A report in 2015 by the government statistics agency estimated that there are about 40 professional fishers (i.e. full-time commercial fishers). It also estimated that one in three households does some kind of fishing. Another 2015 report stated that the rate of participation in fishing is 39.3% in Futuna and 28.6% in Wallis.

*A fisheries inventory of Wallis and Futuna in 2001 showed that, of the 333 fishers identified on Wallis, 26% fish only once per week, 54% two times per week, and 20% three or more times per week. Of the 46 fishers on Futuna, only 10 fish often enough to be considered an “artisanal fisher”.*

**Table 14: The Importance of Fisheries-Related Employment (Commercial and Subsistence) in Pacific Island Countries and Territories**

The major report by Gillet on Fisheries in the Economies of the Pacific Island Countries and Territories (Gillet 2016) concludes by highlighting some of the key points on fisheries production and benefits arising from his study: These are:

- 52.7% of all employment in the region that is directly related to the tuna industry occurs in Papua New Guinea.
- The 2014 tuna catch in Kiribati was 40.7% of the regional total and was valued at about US\$1 billion.
- The volume of production from the coastal commercial fisheries of Samoa in 2014 approached that of PNG. The volume of production from the coastal commercial fisheries of Fiji is almost twice as much as that of PNG, despite PNG having a population almost nine times greater than Fiji.
- 93% of the value of all aquaculture in the region is produced in two French territories – French Polynesia and New Caledonia.
- American Samoa’s fishery exports represent about 47% of the fishery exports from all of the other countries and territories combined. The value of PNG’s fishery exports represents about 41% of all the value of fishery exports from all of the other independent countries combined.
- The total amount of fishery exports from the region fell by about 42% in real value in the period 2007 to 2014. The fall in the value of canned tuna exports from American Samoa was responsible for about 37% in the total regional decline.
- Access fees for foreign fishing increased by 279% in the period 2007 to 2014 (which coincided with the period when the Vessel Day Scheme was introduced and became fully operational).
- In 2014 four countries in the region received foreign access fees that represented more than \$1,000 per capita of the respective countries’ populations
- An important conclusion of the study is that fisheries contribution to GDP is underestimated in most Pacific Island countries.

## **FOOD SECURITY**

Bell et al. (2015) assessed the economic benefits to the Pacific island countries arising from the large tuna resources of the Western and Central Pacific Ocean. However, they also considered the potential contribution that could be made by these resources in increasing local access to fish as a source of good nutrition. Their analyses concluded that coastal fisheries in 16 of the 22 PICTs will not be able to continue providing the fish recommended for good nutrition of growing Pacific Island populations, and that by 2020 tuna will need to supply 12% of the fish required by PICTs for food security, increasing to 25% by 2035. In relative terms, the percentages of the region's tuna catch that will be needed in 2020 and 2035 to fill the gap in domestic fish supply are small, i.e., 2.1% and 5.9% of the average present-day industrial catch, respectively. Interventions based on expanding the use of nearshore fish aggregating devices (FADs) to assist small-scale fishers in catching tuna, distributing small tuna and bycatch offloaded by industrial fleets at regional ports, and improving access to canned tuna for inland populations, promise to increase access to fish for sustaining the health of the region's growing populations. They discuss and describe the actions, research and policies required to implement these interventions effectively, and the investments needed to maintain the stocks underpinning the considerable socio-economic benefits that flow from tuna.

Pilling et al. (2015) also note that the projected population growth in the Pacific Island countries, combined with their narrow resource base, declines in net food production per capita and growing reliance on imported foods, will lead to an increase in their food insecurity. They considered whether strategies for retention of edible, non-target catches by the Western and Central Pacific purse seine fishery could aid food security in seven Pacific Island countries. They found that the stability of supply is affected by annual catch fluctuations and only five of seven countries examined had significant tuna landings directly into their ports and that, while marine resources have a significant part to play in improving food security, use of non-target catch will not solve food insecurity alone. The potential social impacts that may result from this lack of food security are considered to be critical national and regional policy issues facing Pacific Island countries.

## C. SCIENTIFIC ASSESSMENT AND MONITORING

Cartwright (2017) provides a concise summary of scientific assessment and monitoring in his Baseline study and performance indicators for the Pacific Islands Oceanic Fisheries Management Project Report. Most of the following text is taken directly from that report.

### **FISHERIES MONITORING**

Problems have been experienced with gathering data on the substantial catches taken in the WCPO by non FFA States outside this area, particularly from Indonesia, Philippines and Vietnam. Other tuna fisheries data includes annual catch estimates, unloading data, port sampling data and observer data. Annual catch estimates by fleet, catch and effort data grouped by time-area from DWFNs and other statistical information are provided on a regular basis via OFP publications and on-line, including the Regional Tuna Bulletin and the Tuna Fishery Yearbook.



#### **Observers**

National observer programmes (NOPs) and the two sub-regional programmes (SROPs) that comprise the tropical providers of the common standards of the Regional Observer Programme (ROP) provide a wide range of monitoring data for research and compliance purposes from the industrial tuna fisheries of the WCPO region. These include data for primary target species, non-target species (including bycatch) and length data. Observer coverage for purse seiners has increased dramatically since the previous PIOFMP project, initiated with the PNA Third Implementing Agreement (3IA) requirement of 100% observer coverage for the purse seine fleet from 2010 and subsequently broadened through the WCPFC CMM2008-01 to require 100% observer coverage on purse seiners during a three-month FAD closure to begin in 2009. This decision placed a considerable training and logistic burden on national and sub-regional observer programmes and hampered efforts to increase the already marginal coverage of longline vessels (less than 2% regionally, but  $\geq 5\%$  for Pacific SIDS domestic fisheries within EEZs).

The WCPFC ROP was established in February 2008 through CMM 2007-01, utilising existing sub-regional and national observer programmes. The definition of an ROP trip and the requirement by CCMs to provide ROP data to the WCPFC Secretariat have been clearly stated in the Convention and in CMM 2007-01. One key function of the ROP is to audit regional, sub-regional and national observer programs against the data requirements of the ROP. SPC and FFA have traditionally provided observer training services to members but this has more recently been partially divested to qualified national trainers. The SPC/OFP has been processing observer data on behalf of its member countries for more than 20 years, with an increasing desire for members to enter their own data and ever-increasing use of electronic data entry at source by observers at sea. As at mid-2015, 19 staff are employed in Noumea, two in Fiji and four at FFA in Solomon Islands to enter and manage observer data. In the last few years, the emphasis of sub-regional agencies support to national programmes as observer providers to the WCPFC ROP has been to shift away from regionally delivered services and expanding numbers of observers towards building standards, capacities within countries and quality assurance via an audit process. There has also been a strong focus on data entry at source and a move towards a greater focus on data analysis. This has been achieved through three major strategies:

1. Establishment, review and regular updates of the Pacific Islands Regional Fisheries Observer (PIRFO) standards. While SPC is still directly involved in this process, broader independent recognition of PIRFO Certification Management Committee (CMC) has been established as an oversight body; the CMC is comprised of representatives from SPC and FFA, national observer coordinators (one each from PNA and non- PNA countries) and the WCPFC Secretariat (as an observer). The PIRFO certification process is well established for Observers, De-briefers, De-briefer Assessors, Trainers and Observer Program Managers. These competency-based programs were comprehensively reviewed in 2016.

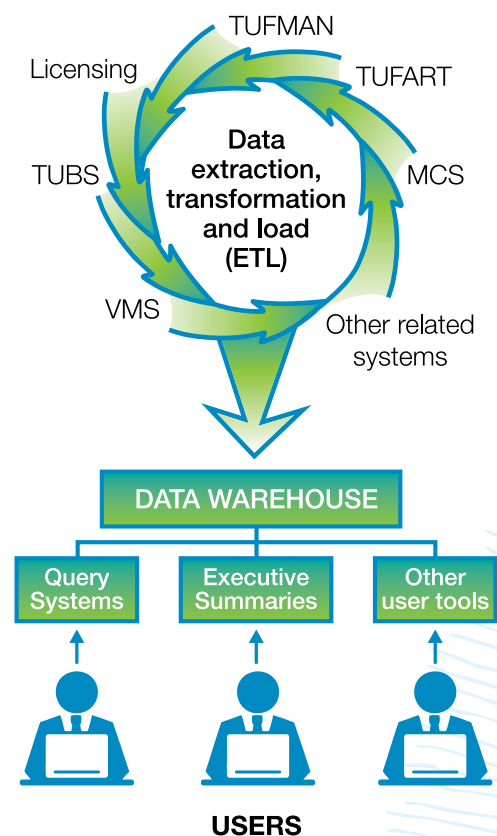
2. Delivery of observer training via a collaboration of SPC and qualified national PIRFO trainers usually hosted through national maritime vocational training institutions, based on PIRFO standards, to achieve accepted and credible qualifications; and
3. Establishing professionalism among observers with a clear career path based on PIRFO training stream, going from observer to de-briefer, trainer, assessor and finally, frontline manager qualifications.

In the next five years, priority areas for the ROP are:

- A. A shift in focus of national observer programme capacity development from quantity to quality of data collected;
- B. Broad adoption of e-reporting by observers;
- C. Formal independent recognition of PIRFO standards; and
- D. Improved national cost recovery mechanisms and improvements in national observer programmes' business plans in providing a full suite of observer services under the ROP
- E. Increasing Observer coverage aboard longlines and supplementing this with the adoption of electronic monitoring standards

Further information on the ROP can be found under the section on Regulatory Compliance, Monitoring and Adaptive Management.

Fishing effort, catch reporting, unloading, port sampling and compliance inspection data are all important elements in an overall **Fisheries Information Management System (FIMS)**, especially given the transnational nature of WCPO tuna fisheries and the lack of port/transshipment facilities in many countries. The concept of FIMS is that it uses existing database systems, integrates and enhances them where required, and provides for the addition of new integrated systems to manage data not currently catered for.



At the top of the FIMS structure is a suite of reporting systems that will pull all of the information together and provide top-level reports (integrating all of the data sources into data summaries and charts) and allow “drilling down” to see more detail if required. The types of data that may be incorporated into the system will include all tuna fisheries data, VMS (vessel monitoring systems) data, MCS (monitoring, control and surveillance) data, licensing data, and data from other important fisheries, including artisanal (possibly managed by TUFART3) and coastal fisheries, but the system will be flexible enough to cater to the specific needs of each country. The systems will also look at streamlining and formalising procedures with specialised software; for example, handling the processing of a license application from start to finish. An example structure of an FIMS is shown in the diagram below.

The WCPFC area is working in two fronts in relation to information for fisheries management. The Papua New Guinea National Fisheries Authority (PNG/NFA) and the Office of the Parties to the Nauru Agreement (PNA) are continuously developing an integrated FIMS (i-FIMS) that provides a hierarchical structure for these national and sub-regional organisations, but with additional components specific to PNG/NFA’s national database requirements. This system is designed to integrate with database systems developed and maintained by SPC’s Oceanic Fisheries Programme (TUFMAN, TUBS, TAGDAGER) for scientific purposes

The second initiative is working at a more general level with data from the Pacific Islands Forum Fisheries Agency (FFA), Secretariat of the Pacific Community (SPC), and the Western and Central Pacific Fisheries Commission (WCPFC) integrating all data streams and in compatibility with the iFIMS.

The integrated Fisheries Information Management System (iFIMS) includes an Android application (eForms) which allows vessels operators to report their effort and catch data electronically on a daily basis. A total of 250 purse seine vessels and approximately 150 longline vessels were recorded as using this iFIMS E-Reporting system as of August 2017 (Hoskin et al., 2017). E-logs are securely lodged to the PNAO's iFIMS database system and are then forwarded to SPC's TUFMAN2 database system. These vessels continue to also report their effort and catch data using the SPC/FFA Regional Purse Seine and Regional Longline Logsheet paper form.

Port sampling is conducted to collect data on the species composition and the length-frequency of the landed catch. OFP continue to support the collection of biological data and/or the collection of landings data from around 18 ports in the Pacific Islands area of the WCP-CA, including ports in 8 FFA member countries. Support for this work includes port sampler training, technical and financial assistance, data processing, provision of forms and sampling equipment such as callipers and support for tag recovery and biological sample support staff.

Port sampling data of purse seine at unloading has been discontinued, owing to the fact that port sampling data can be unreliable as it is affected by: set weight bias, grab sample bias and bias related to well mixing and sorting (but apparently not by size), and therefore the information is better collected through the ROP. Following 3IA catch retention rules, purse seine caught fish unsuitable for sale to usual markets is retained on-board, with an uncertain final destination. A small portion of this catch is sold in Pacific SIDS, where it presents government with the difficult decision of whether contribution to food security outweighs the risk of undercutting local fishing businesses. As of mid-2015, the collection and analysis of unloading data required integration with the evolving development of catch documentation schemes (CDS), iFIMS, TUFMAN2, and the PIRFO. Data standards that do not arbitrarily change with changing fishing regulations and practices are also required.

The following activities are planned across all fisheries:

- Enhancement of the Asset Tracking System, incorporating VMS, AIS and SAR
- Port to port monitoring, with shared access to licensing, catch, observer and compliance information
- Catch e-reporting and total catch verification, use of SPC's Application Programming Interface (API) cloud based cross checking system for e-reporting for both purse seine and longline data entered through FIMS
- Knowledge of fate of unloading and cross referencing unloading data with IFIMS and TUFMAN2, as planned for VMS;
- Integration of unloading data with, or replacement by, emerging CDS schemes, including the PNG/IFIMS CDS and planned Commission CDS;
- Updating, where appropriate, the unloading and port sampling data standards as developed through the SPC/FFA Data Collection Committee (DCC) process;
- Development of unloading data collection and improvement plans; and PIRFO aligned certification of monitoring staff.
- Integrated compliance verification tools (Pre-inspection checks, Boarding Officer Jobkit, and compliance recording
- Role out of e-observer support tools
- An extension to the current longline catch sampling protocol to identify and record Ultra Low Temperature frozen and highly dressed tuna and tuna-like species. The rise in frozen (part processed; e.g. head off, tail fin removed) landings.
- The utilisation of electronic monitoring applications as a means of supplementing observer coverage on board longline vessels.

## **STOCK ASSESSMENT AND POPULATION MODELLING**

Stock assessment of the major targeted tuna species and population modelling continue to be major components of the OFP's work, in support of scientific advice on the status of the stocks that is provided regularly.

MULTIFAN-CL, a length-based, spatially-explicit, age-structured model, has been under continuous development and improvement at SPC since 1991 and was first used for albacore in the early 1990s. This major step forward resulted in a modelling tool capable of providing a systematic stream of estimations of the major parameters that are needed for modern fisheries management. These include: fishing mortality, relative and absolute (with less precision) stock size, size structure, effort trends, recruitment, impact of fishing and catchability. Importantly, these estimates are provided within a spatial structure and with measures of uncertainty for each parameter. The data files used in the MULTIFAN-CL model are made available for independent review or analysis by interested scientists.

Fish movement is recognised as playing a major role in its population dynamics and in determining the extent of actual and potential interaction between fisheries. SPC runs the Pacific Tuna Tagging Programme (PTTP), tagging skipjack, yellowfin and bigeye tuna throughout the equatorial WCPO (10°N–10°S; 120°E– 130°). PTTP data on movement and behaviour contributes to, and reduces uncertainty in, WCPO tuna stock assessments. Specifically, tagging provides information on movement and mixing of tuna within the WCPO and with adjacent regions, the impact of fish aggregating devices (FADs) and species-specific vertical habitat utilisation. The PTTP, after relying solely on donor funding since 2006 now has funding through the Commission, with additional contributions from other donors including NZ, Korea and the EU. Almost 400,000 tunas have been tagged since 2006, with over 70,000 fish recaptured. This programme will be important in better understanding the rate of fishing and the connectivity of tuna across the WCPO.

By using tagging data and information from the ecological models, the simulation of skipjack populations and catch under different climatological (average) conditions has been achieved. Furthermore, the results of the comparison of the simulated CPUE from the models with observed average CPUEs has been very promising.

A major role of the OFP is communicating the results of assessments and ad-hoc reports requiring scientific advice. Data and research/stock assessment reports to the Commission are promulgated through a range of publications including SC reports and the Regional Tuna Bulletin and Tuna Fishery Yearbook.

At the regional level SPC also works with the FFA to provide analytical support for Regional fisheries management initiatives. This includes support of sub-regional bodies, such as the Office of the Parties to the Nauru Agreement (PNAO) and Te Vaka Moana. These two bodies are implementing agencies for the PTOFMP-2. SPC has also begun to provide analytical support to the Tokelau Arrangement which is a sub-regional management arrangement that has developed since OFPM 2 was designed, and which is currently administered by FFA.

At the national level, SPC works closely with national fisheries counterparts to provide scientific advice. Two key elements of that advice have been assistance with the development of Tuna management and development plans (with FFA) and completion of National Tuna Fisheries Status Reports (NTFSRs). The NTFSRs have been phased out due to the introduction of country web pages and Issue Specific National Reports (ISNRs – see below), which were initiated in 2013 and are confidential to SPC member countries (including Pacific SIDS). These web pages enable Pacific SIDS to easily access a wide range of data and analysis relating to their offshore fisheries. In addition to advice related to the status of target species and the 'standard' fisheries data contained both in stock assessments and analysis on country web pages, the OFP provides SPC member countries with assistance in the form of country specific reports (CSRs) as well as the ISNRs. The ISNRs commenced around 2011 but were not fully operational till 2013. The reports include:

- By-catch reports on the quantity, seasonality and potential value of non-target tuna species in
- longline fisheries;
- Bio-economic analyses, including on levels of fishing effort to achieve economic objectives;
- Factors influencing tuna longline CPUE;
- Interactions between artisanal and industrial fisheries;
- Impacts of FAD closure periods on catch and income from purse seine fisheries;
- Oceanographic and climatic influences on primary production and fish habitat; and
- Scientific analyses in support of the development of a VDS for the longline fisheries.

The Offshore Fisheries Project's National Scientists conduct Stock Assessment Workshops (SAW), which seek to provide PICT fisheries staff with the skills to interpret, critique, use, and communicate the results of the regional tuna stock assessments conducted by SPC. In the last five years the OFP has conducted four national stock assessment workshops with 79 attendees. Key outcomes of the SAW workshops include an increased capacity among participants to contribute to regional discussions, along with more authoritative reporting of key results and implications to managers to improve decision making at national levels. For the first time in 2015, SPC, with FFA assistance, used a survey to measure outcomes from the SAW and participation at SC 11. The results indicated that 89% of the 18 FFA members who attended the SAW felt more prepared to participate at SC11 and 88% gained an increased understanding of SC material.

OFP also provides opportunities for Pacific SIDS nationals to obtain training and experience in the activities of OFP through attachments to the various sections.

Key SPC coordinated national future activities planned and directly funded under PIOFMP-2 include:

***National assessments of regional and sub-regional management issues, and country-specific assessments***

- Development of relevant 'Issue Specific National Reports' on scientific analyses to inform PICTs on issues of national relevance;
- Bioeconomic analyses of longline fleet activity;
- Development of tuna and shark management plans;
- Assistance with development of Vessel Day Schemes; and
- Further analyses of commercial/artisanal interactions.

***Provision of scientific advice on WCPFC issues***

- Scientific support for national officials attending WCPFC meetings;
- Scientific analyses and advice provided on implementation of regional Conservation and
- Management Measures for tuna and key non-target species within national management plans;
- Updates to national country web pages to ensure they reflect the latest information and provide information to fulfil key WCPFC data provision obligations.

***Training, especially in stock assessment and ecosystem analysis***

- Annual scheduling of up to two Stock Assessment Workshops at SPC headquarters; and
- Pacific SID scientist attachments to SPC to work on matters of special concern, with work coordinated by SPC National Scientists.

## **ECOSYSTEM MONITORING AND ANALYSIS**

To understand the effect of environmental conditions (such as El Niño), climate change and the impact of fisheries on the different components of the ecosystem, it is necessary to acquire a better understanding of the functioning of the ecosystem. Knowledge of the trophic structure, interaction between trophic levels and feedbacks of the pelagic ecosystem (i.e. who is eating who in the food web and how influential is the biomass of a species or trophic group upon others in the web) provides the information necessary to comprehend ecosystem functioning.

A large sampling programme has been in place in the WCPO since 2001 to collect stomach and tissue samples of pelagic predators to determine the trophic structure of the ecosystem through analyses of their diets. The tuna tissue bank held at SPC contains 13448 fish stomachs for diet analysis. Dietary information for the main predators has been compiled into a diet matrix describing the prey-predator interactions. This information is being used in an ecosystem model of the western and central Pacific using the Ecopath with Ecosim software. This allows the testing of different scenarios of environmental forcing (e.g. ENSO effects) and impacts of fishing on the food web.

A food web study of the WCPO tuna ecosystem was completed by the first GEF project and provides an initial characterization of the Western Pacific Warm Pool Ecosystem. In particular, trophic relationships among major components have been determined by conducting biological sampling, and databases to support detailed ecosystem modelling. Two forms of ecosystem modelling have been developed by the OFP. They provide the capacity to test different fishing policies and environmental (climate) change scenarios to assist managers with identifying plausible management options that will achieve their objectives.

1. A spatial ecosystem and population dynamics model (SEAPODYM), which was initially developed for investigating physical-biological interactions between tuna populations and the pelagic ecosystem of the Pacific Ocean. It can be used to explore the underlying mechanisms by which climate and environmental variability affect the pelagic ecosystem and tuna populations. The model also includes a description of multiple fisheries and then predicts spatial-temporal distribution of catch, catch rates, and length-frequencies of catch based either on observed or simulated fishing effort. SEAPODYM has now been applied to all four, key tuna species, and captures important changes in their population dynamics (including recruitment), which explains much of the time/space variability in catch and CPUE. The ability to include multi-species interactions is considered an important enhancement to the current single species stock assessments using MULTIFAN-CL. This capability allows fisheries managers to test management options e.g., changing levels and concentrations of fishing effort or implementing seasonal or full closures.
2. Ecopath with Ecosim, which is a complementary, biodynamic trophic modelling approach, based on the requirement that the biomass of the ecosystem is balanced and consequently the effects of altered biomass production or harvest on the entire ecosystem assemblage can be explored.

Ecopath provides a framework for the construction of mass-balance models of ecosystems, estimates of how abundant the resources are (i.e. biomasses), the productivity or mortality rates of the resources, how they interact (diet compositions and food consumption rates), and how efficiently the resources are utilized in the ecosystem.

Data on the different components of the ecosystem is required and information central to the process of balancing the model is the diet matrix, which informs the links between the species. The Ecopath model includes functional groups up the food chain, including, detritus, plankton, cephalopods, pelagic fish, small top predators and adult top predators. Ecopath also allows visualizing the ecosystem and it is a very useful learning tool to better apprehend the ecosystem and its functioning.

Given the description of the ecosystem in Ecopath, Ecosim provides a tool with the capacity of testing different fishing policies and environmental change scenarios. By means of dynamic simulations it will assist managers with identifying plausible management options that will achieve their objectives.

The following future activities are planned under PIOFMP-2



***Use of SEAPODYM-CC forecast models to examine sub-regional to national impacts for target Species***

- Update biochemical and biological input data for IPCC climate models and climate scenarios;
- Forecasts to be started at the regional level, which will lead to analyses at the sub-regional level in later years of the project;
- Integrating climate change into day-to-day fisheries advice; and
- Development of climate change related ecosystem indicators, which are designed to be considered concurrently with stock status advice.



***Begin assessment of CC impacts on key bycatch species for food security***

- Bycatch monitoring and analysis and related capacity building;
- Putting bycatch issues into a climate change context; and
- Input into national bycatch assessments with regional summaries.



***Work on tuna-diet to monitor CC effects on mid-trophic levels***

- Continuation of the programme of analysis of samples of stomach contents collected by onboard observers to provide a long-term time series of data on proportions and distribution of small fish and squid.



***Analytical report on CC impacts on oceanic fisheries with recommendations***

- Ocean acidification vulnerability assessment; and
- Development of ecosystem indicators.

## **BYCATCH MANAGEMENT INFORMATION SYSTEM**

The Bycatch Management Information System (BMIS) focuses on bycatch mitigation and management in oceanic tuna and billfish fisheries. It is an open resource useful for fishery managers, fishers, scientists, observers, educators and anyone with an interest in fisheries management. As a reference and educational tool, the BMIS aims to support the adoption and implementation of science-based management measures so that bycatch is managed comprehensively and sustainably. In the BMIS, the term 'bycatch' mainly refers to the incidental capture of non-target species, including seabirds, sea turtles, sharks and rays, and marine mammals, in oceanic longline and purse-seine tuna and billfish fisheries. Sharks are always treated as bycatch for the purposes of the BMIS, although they may be targeted or treated as an associated catch in some tuna fisheries.

The BMIS website page<sup>16</sup> breaks down the information about aspects of bycatch management under the following areas:

1. Management
2. Population-Level Assessments
3. Mitigation Techniques
4. References
5. Regulations
6. STAGIS - Shark TAGing Information System

<sup>16</sup> <https://www.bmis-bycatch.org/about-bmis>

**Management** addresses a broad range of material that provides context and rationale for developing bycatch conservation and management measures, e.g., bycatch interaction rates, threats, data harmonisation, fisheries management performance, maps and tagging studies. The **Population-Level Assessments** (PLA) section includes studies that describe the status of bycatch populations. BMIS descriptions of **Mitigation Techniques** summarize their performance and refinement in experimental situations, while **References** is the entry point for searching all literature in the database, i.e., scientific and technical literature on bycatch mitigation and management. The **Regulations** section covers the decisions, such as conservation measures and resolutions, of the five tuna Regional Fisheries Management Organisations (RFMOs). Regulations are included if they encourage or require the use of any of the BMIS mitigation techniques. In keeping with the global focus of the BMIS, the website includes pages dedicated to each tuna RFMO. Finally, STAGIS is a database of shark tagging studies from the Pacific Ocean (current to 2011 but to be updated).

The BMIS also holds information on **Species Identification** and **Safe Handling and Release**, including illustrated guides. In addition, it describes the Fishing Gear used in oceanic tuna and billfish fisheries. An overview of bycatch species groups is included under the **Species** section, while under the **Resources** link there are links to other **Bycatch Databases** and bycatch organisations.

## **DATA MANAGEMENT**

The National Tuna Fisheries Database Management System (TUFMAN) was a database tool which was developed for Pacific SIDS to manage their tuna fishery data and provides for data entry, data management, data quality control, administration, and reporting into the FIMS (Fisheries Information Management System) as described above. TUFMAN was in use for many years up until mid- 2015 and a copy of TUFMAN was installed in each Pacific SID enabling countries to interact with their fisheries data directly, including data from log-sheets, unloadings and observer reports. Those data were entered either by each country or SPC and retained on their national server, with the database backed-up and sent to SPC on a regular basis. While providing Pacific SIDS with a good tool for independently managing their fisheries data, the practicalities and technical limitations of TUFMAN created a number of issues. For instance, log-sheets submitted by a vessel covering trips in multiple EEZs may have been submitted in more than one country, creating duplication, requiring correction by SPC and resulting in costs, inefficiencies and even sometimes missing data.

A new system, “Tufman 2”, has been progressively introduced since the second half of 2015. Tufman 2 is a web-application where fisheries data can be entered and analysed directly from any location, subject to rules agreed between countries and regional agencies. This new application model means that data (once entered) are available in near real time anywhere in the world by authorised users with a secure login. This facility is of great value to PICs, e.g. to inform positions at regional/ Commission meetings and during access negotiations. With data sharing agreements mostly formalised, duplication of data in databases will all but be eliminated. Data quality control and coverage have improved under Tufman 2 due to an increased suite of automatic data quality checks and a greater emphasis on data quality through increased efficiencies in data processing.

Tufman 2 enables sharing of information and integration with other regional systems such as FFA's Regional Information Management System (RIMFS) and the PNA FIMS system. For example, SPC access to authorised ‘packets’ of VMS data in near-real time through a web service developed by FFA has meant that positional data reported and recorded from log-sheets can easily be verified at the time of entry against actual vessel positions.

Entry of observer reports and the timely availability of observer data remains a significant challenge. There is a desire by Pacific SIDS to enter their own data (rather than SPC), however the resources to do so at a national level are in most cases, not readily available.

E-reporting (ER) and e-monitoring (EM) are being developed in many fisheries globally to improve data quality and flow. WCPFC10 considered a commissioned report that looked at the potential ER and EM in the Western and Central Pacific fisheries (Dunn & Knuckey, 2013) and established a working group to progress the issue at the Commission level. The PNA is well advanced with the establishment of their own systems (FIMS and iFIMS). SPC

has developed OnBoard, an eReporting tool for tablets, smart-phones and Windows 10 PCs which allows the entry of fisheries data at sea, and trials have commenced with eReporting tools for port-collected data as well. FFA have built a boarding and inspections app (BOJAK) which is in the trial phase. E-Reporting and E-Monitoring are discussed in more detail under the section on Regulatory Compliance, Monitoring and Management (B. New or Available Technologies for Better Management and Compliance)

Data standards and data collection are going through a period of major change with the advent of electronic collection through e-reporting (manual input of alpha and numeric characters) and e-monitoring (closed system collecting multiple images). The Tuna Fishery Data Collection Committee comprising membership from SPC / FFA Members, the secretariats of WCPFC and SPREP, the TVM Coordinator, and the PNA Office, will play a major role in both by:

- maintaining the existing paper-based framework for data collection; and
- developing the data collection framework for emerging technologies, particularly electronic monitoring and electronic reporting.

Capacity building in the area of monitoring programmes and data and information requirements is on ongoing activity of OFP. For three years up until 2016, this has included:

- Eight national tuna data workshops with 42 attendees
- Five regional tuna data workshops (132 participants: 57% female, 43% male).
- 21 attachments of national staff.
- Printed and video training resource materials
- Thirty-six in-country visits by SPC Tuna Fisheries Data Management staff

Implementing monitoring and data and information systems, including Tufman 2 will require additional training in the areas of the new comprehensive data quality control system within Tufman 2, how to use the comprehensive web-reporting tools and the new E-Reporting systems.

Key future activities planned and directly funded under PIOFMP-2 include:

Further development of Tufman 2 in the following areas:

- enhanced use of VMS data for catch and effort estimation;
- integration of additional data sources at regional and national levels;
- enhanced data quality control through cross-referencing a range of other types of data, including data from other systems;
- extension of Tufman 2 to support E-Reporting systems and close to real-time data submission;
- comprehensive web-reporting system producing summaries tables, graphs and maps from integrated data in national data warehouses for national and regional reporting requirements; and
- closer alignment and integration to proposed CMS/CDS systems planned for the future.

Support for national Information Management Systems, including the integration of data used for science, monitoring and management, to develop/support national data warehouses:

- continuation and enhancement of the current capacity building, especially future activities directly funded under PIOFMP-2;
- capacity building around how to resolve complex issues identified in the data by the Tufman 2 data quality control system; and
- capacity building in managing the latest integrated structure in the data using new tools, including those which will be relevant to the proposed CMS/CDS systems.

## **D. REGULATORY COMPLIANCE, MONITORING AND MANAGEMENT**

Compliance and monitoring for management purposes within the WCPFC area ultimately depends on i) the original access arrangements and licencing, ii) how accurately compliance to those agreements can be evaluated and enforced, iii) having sufficient information to see if the agreements are 'fit-for-purpose' and are effectively managing the stock in a sustainable and 'ecosystem-friendly' manner, and iv) having the necessary management strategies in place that can adapt rapidly to identified changes in (and threats to) the target stocks and to a sustainable fishery overall.

In the context of original arrangements/agreements and licencing, the two management practices most commonly employed are those of access management agreements (such as the Vessel Day Scheme) and traditional catch-based management agreements.

The PNA which aims to manage the majority of purse seine fishing in the WCPFC Area employs a Vessel Day Scheme (VDS) which sets an overall Total Allowable Effort (TAE) limit on the number of days fishing vessels can be licensed to fish in PNA Exclusive Economic Zones (EEZs) per year. Each PNA member country is allocated a share of the TAE for use in its zone each year. These VDS days can be traded between countries in cases where a country has used up all its days while another has spare days.

Catch-based management strategies set an allowable catch per vessel/licence and are based on the requirement for reporting on the actual catch taken by vessels and examining that catch (species, size, bycatch, etc) in order to ascertain whether this is sustainable for the fishery (and for the ecosystem) or whether the reported information suggests a need to amend the allowable catch. The two methodologies inevitable have their strong and weak points and their advocates.

Either way, both management approaches are dependent on A. having reliable data upon which to set catch allocations or vessel-day allocations and B. the necessary strategy in place to react to new data and information so as to adapt and amend those allocations in line with maintaining a sustainable and cost-effective fishery.

Setting access based on units of catch, can in principle, create an incentive for under-reporting and there is a justifiable argument that stock assessments are currently not robust enough or reliable enough to support the accurate implementation of a pragmatic harvest strategy approach (see below for Harvest Strategies). Managing fisheries based on vessel day access is a more 'manageable' approach but can be less responsive and proactive to changes in stock assessment results (still assuming that those results are accurate and comprehensive). This is clearly a sensitive issue with many opposing and conflicting views, especially in light of the economic implications for countries and for vessel owners, and one which will doubtless be the subject of on-going discussion and negotiation in this region and, indeed, in many of the world's fisheries.

In the context of Regulatory Compliance and Management for the high seas areas within the Convention Area, the two western-most high seas pockets were closed to fishing under CMM 2008 – 01 for a period of 4 years only. The eastern high seas pocket has never been closed but has been declared a Special Management Area that required vessels to notify surrounding states prior to entry and provide an increased VMS poll rate. There is also a ban on longline transshipment in the eastern high seas pocket. FFA have been trying to get the western pockets declared as Special Management Areas as well for the past 2 years but without success to date. For these western pockets, the PNA 3IA bans fishing in the pockets for all vessels who also want to fish in PNA members waters. This effectively means there is no purse seine fishing in the western pockets other than a limited, allowed effort by smaller Philippines ice boats. In principle, this is also supposed to apply to longliners but, in practice, it does not really happen. The main high seas issue that needs to be addressed more effectively is probably the uncontrolled and unmanaged longlining in the southern and northern high seas areas.

The following text discussed the current compliance and monitoring measures as well as the emerging new technologies and practices for CMS. Most of the examples and discussion come from the Conservation and Management Measures that have been adopted by the Commission and its Membership (CCM). The CMMs

presented below are just a few of the examples of the more pertinent CMM that address Compliance and Monitoring. A full list of the Conservation and Management Measures, and Resolutions adopted by the Commission and its members can be found on the WCPFC Commission website at <https://www.wcpfc.int/conservation-and-management-measures>.

## **EXISTING COMPLIANCE AND MONITORING MEASURES**



### **The Compliance and Monitoring Scheme**

Since 2011, the Commission has been implementing the Compliance and Monitoring Scheme (CMS) through a series of Conservation and Management Measures (CMMs) that have applied the CMS on an annual basis. Subsequent CMMs have often included incremental changes to the assessment procedure and the breadth of coverage of the CMS.

The purpose of the WCPFC Compliance Monitoring Scheme (CMS) is to ensure that Members, Cooperating Non-Members and Participating Territories (CCMs) implement and comply with obligations arising under the Convention and conservation and management measures (CMMs) adopted by the Commission. The CMS is designed to:

- I. assess CCMs' compliance with their obligations;
- II. identify areas in which technical assistance or capacity building may be needed to assist CCMs to attain compliance;
- III. identify aspects of conservation and management measures which may require refinement or amendment for effective implementation;
- IV. respond to non-compliance through remedial options that include a range of possible responses that take account of the reason for and degree of noncompliance, and include cooperative capacity-building initiatives and, in case of serious non-compliance, such penalties and other actions as may be necessary and appropriate to promote compliance with CMMs and other Commission obligations; and
- V. monitor and resolve outstanding instances of non-compliance.

A further revised Conservation and Management Measures for Compliance Monitoring Scheme was implemented during 2016 and 2017, and this was extended for implementation in 2018.

As of 2015, The Commission had recognised and/or adopted the following MSC measures:

- WCPFC Record of Fishing Vessels and Authorizations to Fish on the High Seas in the Convention Area (CMM 2013-10)
- Procedures for Cooperating Non-members (CMM 2009-11)
- Specifications for the Marking and Identification of Fishing Vessels (CMM 2004-03)
- High Seas Boarding and Inspection Procedures consistent with Articles 21 and 22 of the United Nations Fish Stocks Agreement (CMM 2006-08);
- Regional Observer Programme (ROP), which pursuant to CMM 2007-01 (Annex C) the ROP became operational on 31 December 2008;
- Centralised Vessel Monitoring System (Commission VMS) activated on 1 April 2009 (CMM 2011-02, which replaced CMM 2007-02);
- WCPFC IUU List (CMM 2010-06, which replaced CMM 2007-03);
- Prohibition on use of large-scale driftnets (CMM 2008-04);
- Regulation on Transshipment (CMM 2009-06);
- Rules for FAD and purse seine catch retention in high seas (CMM 2009-02);
- Charter Notification Scheme (CMM 2012-05);
- Compliance Monitoring Scheme (CMM 2013-02, which replaced CMM 2010-03, CMM 2011-06 and CMM 2012-02);

- Standards, Specifications and Procedures for the Record of Fishing Vessels (CMM 2013-03); and
- Conservation and Management Measure for WCPFC Implementation of a Unique Vessel Identifier (UVI) (CMM 2013-04)

In 2017-18, MacKay, et al. submitted a Review of the Commission's Compliance Monitoring Scheme at WCPFC14 accompanied by a short paper by the Secretariat. The final Report was submitted in 2018. The report noted that the current system is fundamentally sound, and achieves its overall objectives, as well as stacking up well against other compliance monitoring systems, including those of other RFMOs. It is robust and comprehensive. It appears to be having positive effects upon overall compliance. However due to its comprehensive nature and its (still increasing) size and scope, as well as the demands it places on participants, it is at risk of collapsing under its own weight unless those demands can be reduced. The Panel therefore identified several recommendations to make the system less onerous for CCMs and the Secretariat. These included making it easier for CCMs at the initial information-providing stage, including inputting information into the online CMS Information Management System (IMS) which itself sets an international standard in this area. These recommendations include removing the need to provide duplicative and unnecessary information, and ways to make information requirements more manageable overall.

Furthermore, the findings of the Report also considered it essential to reduce the volume of material that is considered by the TCC, a meeting of all of the Parties that spans seven days and also deals with other matters additional to the CMS. The impression gained by the review panel creating the report was that participants in the TCC are often overwhelmed by the volume of minutiae it deals with, particularly at the level of individual vessel infractions, and the TCC then lacks the time to get to grips with the bigger picture, including systemic non-compliance issues. In this context, the Report recommended the creation of a Friends of the Chair Group which would meet before the TCC to identify priorities, resolve those less important issues that can readily be disposed of, and thereby reduce the volume of material that has to go to the full TCC (while retaining the right of any CCM to raise concerns in the TCC).

The Report also provided recommendations for clearer drafting of the CMMs to ensure easier and more accurate interpretation and to avoid inconsistency and ambiguity. Should CCMs feel that the CMMs are unclear or even unfair in their requirements, there should be recourse to some form of appeal or review process.

The Report also noted that CMS's focus on the purse seine fishery, much of which is already well monitored within EEZs, as compared with the lesser scrutiny accorded longline and long-distance pole and line fleets operating solely on the high seas in the Convention Area. It further noted that this is partly a result of the situation where the scrutiny reflects the availability of data, and that that appropriate CMMs need to be adopted to ensure that compliance monitoring can be effectively undertaken for all fleets operating in the Convention Area. The Report also recommended the establishment of a targeted Quality Assurance Review (QAR) system to assist a CCM where there is repeated non-compliance, apparently due to a systemic reason. Such a QAR would be for the purpose of assisting the CCM, and making recommendations, not for any punitive purpose.

The Report contained a large number of recommendations which can be prioritised into the following seven principal recommendations:

1. Reducing the burden placed on CCMs, particularly small administrations, with respect to data provision, duplication and repetition;
2. Reducing the volume of material going to TCC, by introducing pre-screening in a "Friends of the Chair" Group;
3. Include 'audit points' that reflect critical obligations in each CMM prior to adoption
4. Improving the process for development and refinement of CMMs;
5. Improving capacity building;
6. Improving the Review Process to better reflect the requirements of procedural fairness;
7. As an interim measure, introducing a Quality Assurance Review (QAR) system to assist CCMs where there is a pattern of serious non-compliance and possibly systemic issues.

The Commission and its members have adopted a number of monitoring based CMM's (Conservation and Management Measures) since its formation. The following are some of the more pertinent CMMs related to regulatory compliance and monitoring.



### **The Commission Vessel Monitoring System**

In 2006 the WCPF Commission and the CMMs adopted and implemented the WCPFC Vessel Monitoring System (Commission VMS). This Commission VMS shall apply to all fishing vessels that fish for highly migratory fish stocks on the high seas within the Convention Area (applying to all vessels in excess of 24 metres in length with an activation date of 1 January 2008, and it shall apply to all vessels 24 metres in length or less with an activation date of 1 January 2009). All CCM fishing vessels are thereby required to report VMS data to the Commission by way of a functioning 'stand-alone' Automatic Location Communicator (ALC) that complies with the Commission's minimum standards for such ALCs. Each flag CCM shall ensure that fishing vessels on the high seas in the Convention Area comply with the requirements established by the Commission for the purposes of the Commission VMS and are equipped with ALCs that shall communicate such data as determined by the Commission.



### **Boarding and Inspection Procedures**

In December 2006, the Commission adopted CMM 2006-08 which authorised boarding and inspection on the high seas of fishing vessels engaged in or reported to have engaged in a fishery regulated pursuant to the Convention and related activities. These procedures were adopted for the purpose of ensuring compliance with the provisions of the Convention and conservation and management measures adopted by the Commission and in force. The CMM provides specific details regarding boarding and inspection including defining the circumstances for such boarding and inspection and the rights of vessels and contracting parties. The Procedures requires the Commission to "maintain a register of all authorized inspection vessels and authorities or inspectors" (the WCPFC High Seas Boarding and Inspection Register). This paragraph also stipulates that, "only vessels and authorities or inspectors listed on the Commission's Register are authorized under the Procedures to board and inspect foreign flagged fishing vessels on the high seas within the Convention Area".



### **Port State Measures**

The **Agreement on Port State Measures (PSMA)** was the first binding international agreement to specifically target illegal, unreported and unregulated (IUU) fishing. Its objective is to prevent, deter and eliminate IUU fishing by preventing vessels engaged in IUU fishing from using ports and landing their catches. In this way, the PSMA reduces the incentive of such vessels to continue to operate while it also blocks fishery products derived from IUU fishing from reaching national and international markets. The effective implementation of the PSMA will hopefully contribute to the long-term conservation and sustainable use of living marine resources and marine ecosystems. The provisions of the PSMA apply to fishing vessels seeking entry into a designated port of a State which is different to their flag State.

The PSMA entered into force in June 2016. By the first year and a half, more than a third of world countries were Parties to it. It is estimated that one in every five fish caught around the world every year is thought to originate from IUU fishing, valued at \$10 - \$23 billion annually<sup>17</sup>.

Implementing the PSMA has been suggested as one of the most cost-effective means to close in on IUU fishing. Mindful of the fact that effective implementation of the Agreement requires sound policy, legal and institutional frameworks, as well as robust operational mechanisms sustained by sufficient human and financial resources, the PSMA provides for the requirements of developing States, including the establishment of funding mechanisms.

<sup>17</sup> <http://www.fao.org/port-state-measures/en/>

In 2017 at its Fourteenth Regular Session, the Commission and its member adopted Conservation and Management Measure on Minimum Standards for Port State Measures (Conservation and Management Measure 2017-02). The purpose of this measure was to establish processes and procedures for CCMs to request that port inspections be undertaken on fishing vessels suspected of engaging in IUU fishing or fishing related activities in support of IUU fishing. The CMM defines authorized inspectors, identifies inspection requirements, clarifies the designation of ports for the purpose of inspection, and lays out the inspection procedures.

The CMM specifies that, when a CCM has reasonable grounds to believe that a vessel has engaged in IUU fishing or fishing related activities in support of IUU fishing, and is seeking entry in to, or is in the designated port of another CCM, it may request that CCM to inspect the vessel or to take other measures consistent with that CCM's Port State measures.

It further states that CCMs shall ensure that requests for inspections, as per paragraph 11, include information on the nature and grounds for suspicion of IUU fishing or fishing related activities in support of IUU fishing. Port CCMs shall acknowledge the receipt of the request for an inspection and advise whether an inspection will be undertaken based on an assessment of the information provided, availability of resources, and their capacity to do so at the time of the request. The CMM also includes detailed Guidelines for Port State Inspection, reporting formats, and guidelines for training of port inspectors as Annexes to the CMM.



### **Conservation and Management Obligations – FAD Management Plans**

Fish aggregating devices, more commonly called FADs, can be defined as all floating objects, man-made and natural that attract fish and thus included such objects as floating logs and even large organisms such as whale sharks and true whales. Tuna and other pelagic fish gather around these FADs, which makes it easier to find and catch them.

There are two main types of artificially-placed FADs in use in the Pacific Ocean i) nearshore anchored FADs deployed and maintained by fisheries department usually and used by artisanal fishermen trolling a few fish a day around FADs with small boats, mainly for subsistence fishing or very small-scale business (e.g. selling to restaurants) which SPC is promoting to move the fishing effort from the overexploited reefs to nearshore fishing and ii) offshore FADs (anchored in Papua New Guinea and Solomon Islands and drifting everywhere in the Pacific) which are deployed by the fishing companies and used by those industrial purse seine fisheries to catch several tonnes of fish in one set. This TDA focuses on the industrial FADs.

Industrial FADs improve the catch rate of purse seine and pole-and-line vessels that target large schools of tuna. These are commonly drifting rafts, with an electronic beacon so the fishing boat can find the FAD. Sonar equipment can then provide information regarding the amount of fish aggregated around and under it. Anchored buoys are also used in the western Pacific. FADs play an important economic role for industrial fishing fleets and their use has increased greatly in recent years. Most fishing around FADs is done by purse seine, which is a non-selective method which catches all the fish around the FAD.

The number of FADs in the western and Central Pacific Ocean is unknown but estimated between 30,000 and 50,000 active FADs per year deployed in EEZ and high seas. In 2015 the tuna catch in the western and central Pacific region was 2.6 million tonnes (which represents 56% of the global tuna catch), of which 1.8 million tonnes were caught by purse seine of which 40% was caught under FADs.

The main problem with the offshore FADs is that they attract juvenile yellowfin and bigeye tuna, two species which are heavily exploited (particularly bigeye). Catching the juvenile fish before they had a chance to reproduce is obviously problematic for the renewal of the populations. Furthermore, purse seine fishing on FAD catches much more bycatch (marlins, wahoo, sharks, turtle, rainbow runner, etc.) than purse seine fishing on free schools.

Lost FADs can be a significant problem also. They are made of metallic drums, bamboo raft, hanging fishing nets (nylon, plastic), buoys (polystyrene foam) and a diversity of materials which may be more or less biodegradable, and for drifting FADs they are equipped with radio buoys to locate them and sometimes sonars.

However, they have a short life span and anchored FADs can be a particular concern as they eventually break their anchors and go drifting (and have no radio buoys for location). Drifting FADs are also lost or abandoned once they drift outside productive areas and they end up stranding on land or reefs, damaging the corals and creating pollution, or they disintegrate at sea creating plastic pollution. They can also potentially keep ghost fishing, especially when they are made of hanging fishing nets.

New technology on the FADs may see the inclusion of acoustic doppler devices which can inform vessels not only about which FADs have fish under/around them, but also which type of fish are congregating there.

### **Benefits of industrial FADs**

Reasons industrial FADs are deployed in the Pacific include:

- I. Food security (global): increased catch rate in the biggest tuna fishery in the world;
- II. Efficiency: improved economic viability and fuel efficiency of fishing vessels;
- III. Domestic development: small, locally based vessels that supply domestic tuna canneries are dependent on FADs; and
- IV. Increased revenue and broadened distribution of effort and license revenue: the use of FADs substantially increases the economic rents in the purse seine fishery and the capacity of the fleets to pay for vessel days. It also broadens the benefits to some EEZs where fishing on non-FAD schools is inefficient.

### **Problems with industrial FAD fishing (associated sets)**

There is a need to manage FAD usage in industrial tuna fisheries due to some adverse impacts, including:

- i. Increased catch of juvenile bigeye tuna: reducing the productivity of this stock and in particular reducing catch rates of adult bigeye in the longline fishery;
- ii. Catch of small tuna: purse seine nets set around FADs catch more small tuna than unassociated sets. These are worth less and catching juvenile tuna increases the impact of fishing on the stock; and
- iii. By-catch: purse seine by-catch is lower than in many other fisheries (e.g. longlining, prawn trawling). However, there is more by-catch in FAD sets than in non-FAD sets. Turtles and silky sharks are of particular concern.

Existing management measures in the Western and Central Pacific Ocean include<sup>18</sup>:

A FAD closure has been implemented since 2009, with, every year, a 3-4 month (July-Sept/October) prohibition of setting on FADs in the 20° S-20° N area in the EEZ and high seas, however it is not required to remove the FADs prior to the closure. It is quite possible then that there are still sets and deployments of FADs during the closure (<https://www.wcpfc.int/doc/cmm-2009-02/conservation-and-management-measure-application-high-seas-fad-closures-and-catch>). A full 12-month FAD closure was applied in the high seas in 2017,

Last year, the closure was reduced to 3 months in EEZs and 5 months in the high seas as a result of the improvement in bigeye stock status (<https://www.wcpfc.int/doc/cmm-2017-01/conservation-and-management-measure-bigeye-yellowfin-and-skipjack-tuna-western-and>).

Also, in principle, the number of FADs deployed per purse seine vessel is limited to 350. (<https://www.wcpfc.int/doc/cmm-2017-01/conservation-and-management-measure-bigeye-yellowfin-and-skipjack-tuna-western-and>)

The use of biodegradable materials and the reduction in designs that can cause entanglement is being further encouraged (<https://www.wcpfc.int/doc/cmm-2017-01/conservation-and-management-measure-bigeye-yellowfin-and-skipjack-tuna-western-and>)

<sup>18</sup> Text and Linkages provided by SPC

100% observer coverage is being maintained on board purse seine vessels, which allows closer monitoring of activities related to FADs

The Parties of Nauru Agreement (<http://pnatuna.com/>) are trialling registration and tracking of FADs to have better understanding control of the use and impacts of FADs in the region;

In 2014, the Commission adopted Conservation and Management Measure 2014-01, the objective of which was to ensure that compatible measures for the high seas and exclusive economic zones (EEZs) are implemented so that bigeye, yellowfin and skipjack tuna stocks are, at a minimum, maintained at levels capable of producing their maximum sustainable yield as qualified by relevant environmental and economic factors including the special requirements of developing States in the Convention Area as expressed by Article 5 of the Convention

Under this CMM, the Commission adopted a requirement (under Paragraph 3) that, by 1 July 2014, CCMs fishing on the high seas shall submit to the Commission Management Plans for the use of FADs by their vessels on the high seas, if they have not already done so. These Plans shall include strategies to limit the capture of small bigeye and yellowfin tuna associated with fishing on FADs, including implementation of the FAD closure pursuant to that same CMM. The Plans shall at a minimum meet the Suggested Guidelines for Preparation for FAD Management Plans for each CCM which was provided as an attachment to the CCM document.



### **Prohibition of Large Scale Driftnets**

WCPFC 5 adopted CMM 2008-04 (25.13 KB) prohibiting the use of large-scale driftnets, greater than 2.5km in length, on the high seas within the Convention Area. WCPFC5 also encouraged the Fifth Regular Session of the Northern Committee (NC5) to begin establishing a cooperative framework with the North Pacific Anadromous Fish Commission (NPAFC) and initiate, as soon as possible, a process to exchange information on North Pacific large-scale driftnet fishing activities between NPAFC and WCPFC members.



### **The Regional Observer Programme**

In 2007, the Commission adopted the Conservation and Management Measure for the Regional Observer Programme (Conservation and Management Measure 2007-01) referred to as the Commission ROP. The overall objectives of the Commission ROP shall be to collect verified catch data, other scientific data, and additional information related to the fishery from the Convention Area and to monitor the implementation of the conservation and management measures adopted by the Commission. More specifically:

1. The objectives of the Commission ROP shall be to collect verified catch data, other scientific data, and additional information related to the fishery from the Convention Area and to monitor the implementation of the Conservation and Management Measures adopted by the Commission.
2. The Regional Observer Programme (ROP) is based on the use of existing regional, sub-regional and national observer programmes already in place amongst many of its members. A 'Conservation and Management Measure for the Regional Observer Programme (CMM 2007-01) entered into force on 15 February 2008 and provides the basis of the rules and development of the Commission ROP.
3. To be part of the WCPFC ROP a programme requires to be authorised and an audit will be carried out by the Secretariat to ensure the programme is in compliance of the Commission Minimum Standards for observer programmes. All providers are fully audited before full authorisation to take part in the ROP is granted. Contact [karl.staisch@wcpfc.int](mailto:karl.staisch@wcpfc.int) for more details.
4. Before boarding a vessel, a Vessel Safety Check (VSC) should be carried out. The Commission has developed a guideline and format for a (VSC). If member countries observer programmes have their own formats they should continue to use these formats. However, the WCPFC VSC format could be adopted by member countries to suit observer programmes that currently do not have a VSC format in place.

5. The WCPFC have developed basic standards for the formation and operation of observer programmes that wish to be part of the Regional Observer Programme (ROP).
6. The Secretariat has developed a set of forms for ROP Observers carrying out observations on carriers transshipping fish from long liners on the high seas. These three forms FC-1 FC-2 & FC-3 are developed as a guide and can be used as they are presented or can be changed to suit your particular observer programme needs.
7. Established minimum data fields that ROP observers need to collect on long liners and purse seiners. The format of collection of these data fields is up to the observer providers, however a useful guide for a format are the SPC/FFA harmonised format, which is used by a number of programmes; this is available on the SPC Website under their Oceanic Fisheries Programme

Other pertinent Conservation and Management Measures (that can be found on the WCPF Commission website) include the WCPFC Conservation and Management Measures (CMMs) relating to fishing vessels that operate in the WCPFC Convention Area.<sup>19</sup> These include:

- Conservation and Management Measure for WCPFC Record of Fishing Vessels and Authorizations to Fish (CMM 2013-10 (307.48 KB));
- Conservation and Management Measure for Specifications for the Marking and Identification of Fishing Vessels (CMM 2004-03 (24.13 KB));
- Conservation and Management Measure for the Unique Vessel Identifier (CMM 2013-04 (201.44 KB)); and
- Conservation and Management Measure for Standards, Specifications and Procedures for the Record of Fishing Vessels (CMM 2014-03 (430.5 KB)).



## Transshipment Regulation and Verification

CMM 2009-06 says ***“There shall be no transshipment on the high seas except where a CCM has determined, in accordance with the guidelines described in paragraph 37 below, that it is impracticable for certain vessels that it is responsible for to operate without being able to tranship on the high seas and has advised the Commission of such.”*** It is notable that several practitioners have suggested that there is some doubt as the rigour of the exemption process and that the exemption on the basis of economic hardship has become the norm. It has further been urged by many practitioners that stronger measures are developed and applied. Information related to the carrier and offloading vessels that are authorised by their flag CCM to tranship in the high seas are displayed as part of the WCPFC Record of Fishing Vessels”. It further states that “ In accordance with Article 29 (5) of the Convention, transshipment at sea by purse seine vessels shall be prohibited except in respect of exemptions granted by the Commission...” Information about the purse seine vessels that are authorised to tranship at sea are displayed as part of the WCPFC Record of Fishing Vessels.

In 2017, the Pew Charitable Trust published some ‘proposed’ best practices (‘Best Practices for Transshipment’) which have not been agreed and/or adopted as yet and do not necessarily reflect the opinions of the other stakeholders and managers within the fishery. These include:

To make reporting more complete and uniform, the relevant authorities should:

- Require all transshipment events to be reported to the relevant flag State, coastal State, port State, and RFMO Secretariat, regardless of the transshipment event location or origin of catch being transhipped.
- Update all transshipment reporting notifications, declarations, and reporting forms to include the type and format of data set out in standards to be developed by the United Nations Food and Agriculture Organization (FAO). Information specified in Annexes A and C of the FAO’s Port State Measures Agreement should be the minimum required to be collected, and reporting should include details on the amount and type of bycatch transhipped.

<sup>19</sup> <https://www.wcpfc.int/vessels>

- Mandate that all authorized vessels intending to tranship within a specific RFMO convention area provide electronic notification of their entry into those waters to the relevant flag State and RFMO Secretariat. That notification should include confirmation of the vessel's compliance with near real-time vessel monitoring system (VMS) reporting and observer coverage requirements.
- Require that all authorized vessels intending to tranship submit electronic pre-notifications at least 24 hours beforehand and that they post declarations within 24 hours after the event to the relevant flag State, port State, coastal State, and RFMO Secretariat for every transshipment that occurs before the first point of landing for the catch, regardless of the location of transshipment.
- Mandate that observers submit electronic reporting forms to the relevant flag State, coastal State, port State, and RFMO Secretariat within 24 hours after each transshipping event as an independent means to verify the vessel's reporting.

To make monitoring most effective, RFMOs and other relevant authorities should:

- Require 100 percent observer coverage (human, electronic, or a combination) on board both the fishing vessel and the carrier vessel for all transshipping events, regardless of whether they occur in a national or regional area of competence. Minimum standards must also be set for all processes and procedures put in place for collection of observer information.
- Ensure that all vessels authorized to engage in transshipping activities have access to an independent system of fully staffed, trained, and certified observers from national or regional observer programs certified by the relevant RFMO and with a clear mandate to collect information and data for both scientific and compliance purposes.
- Require all vessels authorized to engage in transshipping activities to have an operational VMS unit on board that can help relevant authorities monitor and track these vessels port-to-port with stringent near real-time reporting requirements.
- Mandate that any manual reporting arrangements in case of a VMS unit malfunction or failure include requirements for secondary/backup reporting units for all carrier vessels and a requirement that vessels return to port immediately if the VMS unit continues to malfunction or fail.

To ensure effective sharing of data, relevant authorities should:

- Establish and harmonize transshipping data-sharing procedures among relevant flag State, coastal State, port State authorities, and RFMO Secretariats
- Establishing clear rules for transshipment is essential to ensure a strong, legal, and verifiable seafood supply chain and to reduce the likelihood that illicit activities will occur. If all parties involved in regulating global transshipment implement these best practices, then industry players, consumers, and governments can be assured that adequate guidelines are in place to make transshipment a more effective and secure method for transferring fish from the sea to land—and one that will not significantly contribute to IUU fishing.

In 2018, the Pew Charitable Trust further published 'Transshipment Reform Needed to Ensure Legal, Verifiable Transfer of Catch' which lists what they consider to be some of the essential components of transshipment reform. The report proposes that Transshipment can be an effective and efficient way to quickly get fish products, especially sashimi-grade tuna, to market. However, when these activities are not properly monitored or regulated, bad actors can misreport or launder illegal catches or undertake other illicit activities while engaged in transshipment. According to the Pew Foundation, oversight of transshipment needs to be improved in three main areas:

- **Reporting.** Paper-based reporting of transshipment activity is still the norm. Because of the time it takes those reports to reach authorities, they may not be able to act on the information for months. The time needed can make it difficult to identify or deter potential problems.
- **Monitoring.** The tuna RFMOs have no requirements to verify the accuracy of transshipment reports. Vessel reports do not have to be compared with independently collected sources of data, such as vessel monitoring system position reports, electronic monitoring images or human observer logs.

- **Data sharing.** Reports and other information on transshipment are often not shared among the relevant authorities (national, sub-regional, regional) or scientific bodies. This hampers proper tracking and auditing of transshipment activities and prevents scientists from making full use of the data.

The Foundation maintains that monitoring of transshipment and interactions between fishing vessels and carriers is still weak. Furthermore, some carriers make cash transactions with small fishing vessels. This means that it is difficult to monitor unlicensed and unregistered vessels even if they are interacting with the carriers. As an example, it was noted that shark fins could be transferred to banana boats rather than recognised transshipment carriers, and this would not then be effectively monitored either (despite the fact that it can create a supply market worth thousands of US dollars)



## Harvest Strategies

Harvest strategies, also known as Management Procedures (MP) are pre-agreed frameworks that specify the pre-determined management actions in a fishery for defined species (at the stock or management unit level) necessary to achieve agreed biological, ecological, economic and/or social management objectives. They assist in setting quotas and have a set of basic elements namely, a monitoring program; indicators of the fishery's status and health (with associated reference points); a method to assess the value of the chosen indicators; and harvest control rules (HCR) that trigger automatic management actions depending on whether key indicators are close to or surpass the reference points.

WCPFC<sup>11</sup> adopted the **Conservation and Management Measure on Establishing a Harvest Strategy for Key Fisheries and Stocks in The Western and Central Pacific Ocean** (Conservation and Management Measure 2014-06). This CMM agreed to develop and implement a harvest strategy approach for each of the key fisheries or stocks under the purview of the Commission according to the process set out in CMM 2014-06.”

*‘Harvest strategies are considered to represent a best-practice approach to fisheries management decision making. Harvest strategies are proactive, adaptive and provide a framework for taking the best available information about a stock or fishery and applying an evidence and risk-based approach to setting harvest levels. They provide a more certain operating environment where management decisions relating to the fishery or stocks are more consistent, predictable and transparent’* and further states that *‘Harvest strategies developed in accordance with this CMM shall set out the management actions necessary to achieve defined and agreed biological, ecological, economic and/or social objectives in the fisheries. Each harvest strategy shall contain a tailored process for conducting assessments of the biological, economic and social conditions of the fisheries and pre-defined rules that manage the fishery or stock in order to attain the objectives’*.

The WCPFC discussed and adopted the pertinent reference points for this harvest strategy (see definition/description of Reference Points below)

The following description of Reference Points for Harvest Strategies is taken from a Brief published by the Pew Charitable Trust, 2016 entitled ‘Reference Points - Measuring success in fisheries management’.

Setting reference points is a critical step in the development of harvest strategies because reference points are closely tied to several other strategy components. Reference points are the benchmarks that scientists and managers use to compare the current status of a stock or fishery to a desirable (or undesirable) state, and hence help to determine the success of the harvest strategy. For fisheries with clear management objectives, reference points can be used to assess progress toward meeting those objectives. Ideally, the reference points are set at the beginning of the harvest strategy process, functioning as de facto management objectives. In fisheries management, there are three main types of reference points: limit reference points, target reference points and trigger reference points.

Limit reference points should define the danger zone, the point beyond which fishing is no longer considered sustainable. In a well-managed fishery, managers avoid this zone with a very high degree of certainty and, if it is inadvertently violated, take immediate action to return the stock or fishing pressure to the target level. Importantly, LRPs should be based exclusively on the biology of the stock and its resilience to fishing pressure. LRPs should not consider economic factors because the LRP defines the point that the stock should never hit due to threat from a biological perspective. For example, limit reference points can be set to avoid recruitment overfishing, the undesirable state in which adults of a species are so overfished that they cannot reproduce fast enough to replenish the stock.

Target reference points define the ideal fishery state. In a well-managed fishery, management measures should therefore be designed to consistently achieve this state with a high degree of certainty. Given all of the unknowns and uncertainty in stock assessments, and in fisheries management in general, one of the benefits of the TRP is that it can create a sufficient buffer zone to help managers ensure that the limit reference point is not breached. The fishery is likely to fluctuate around the target due to natural variability and uncertainty but should not systematically deviate from it (e.g., consistently be below a biomass target or above a fishing mortality target). Unlike when setting a limit reference point, managers and scientists can base the TRP on one or more ecological, social, economic, and/or biological considerations.

Trigger reference points are typically set between the TRP and LRP to prompt additional management response in order to help ensure that the fishery remains close to the target or avoids breaching the limit. It is increasingly common for fisheries managers to formally adopt HCRs (Harvest Control Rules) that specify a trigger reference point and the resulting management action. Some rules adjust the catch limit in relation to the estimated current stock status and, in effect, give a continuous set of trigger reference points and adjustments. For example, a harvest control rule might continuously decrease allowable fishing mortality as stock status departs from the TRP and moves toward the LRP. However, sometimes the LRP and TRP serve as the only triggers for management action.

## **NEW OR AVAILABLE TECHNOLOGIES FOR BETTER MANAGEMENT AND COMPLIANCE**

Much of the information covered in this section is taken from the various presentations and discussions at the E-Monitoring and E-Reporting Workshop held by the WCPFC Commission in the Solomon Islands in March 2014 and from the reports of the Electronic Reporting and Electronic Monitoring Intersessional Working Group.



### **E-Monitoring and E-Reporting**

E-Reporting provides 'open-system' (i.e. accessible for entry) hardware and software for manual recording of fisheries data which can be transmitted to a database at the end of a trip over a mobile network or daily from a fishing vessel using a satellite data connection. The information saved and transmitted can include catch and effort log-sheets, observer reports, transshipment reports, and port sampling records.

E-reporting provides improvements at two stages, 1. In near real-time (zone entry / exit, species of interest, prior notification of port arrival, bunkering and transshipping, catch reports to company, catch and effort reports to agency, observer setting on FADs -which allows for rapid response from aerial surveillance and vessel boarding parties) and 2. At the end of a trip (port sampling, vessel log-sheets, observer reports, unloading report, catch documentation, marketing).

E-reporting is being used for transmitting daily logsheet reports from both purse seine and longline vessels. However, the proportion of e-logsheet reporting is much higher in the purse seine fishery with all vessels required to submit electronic reports daily through the PNA Fisheries Information Management System (FIMS). In this fishery, e-reporting is fundamentally important for managing allowable effort, and in particular for determining fishing and non-fishing days. E-logsheet reports for longline vessels are also available through FIMS and are being used by some PNA members. SPC has also developed a free to use e-logsheet software called Onboard which was initially developed as an android application and will also be available for use as on laptop computers.

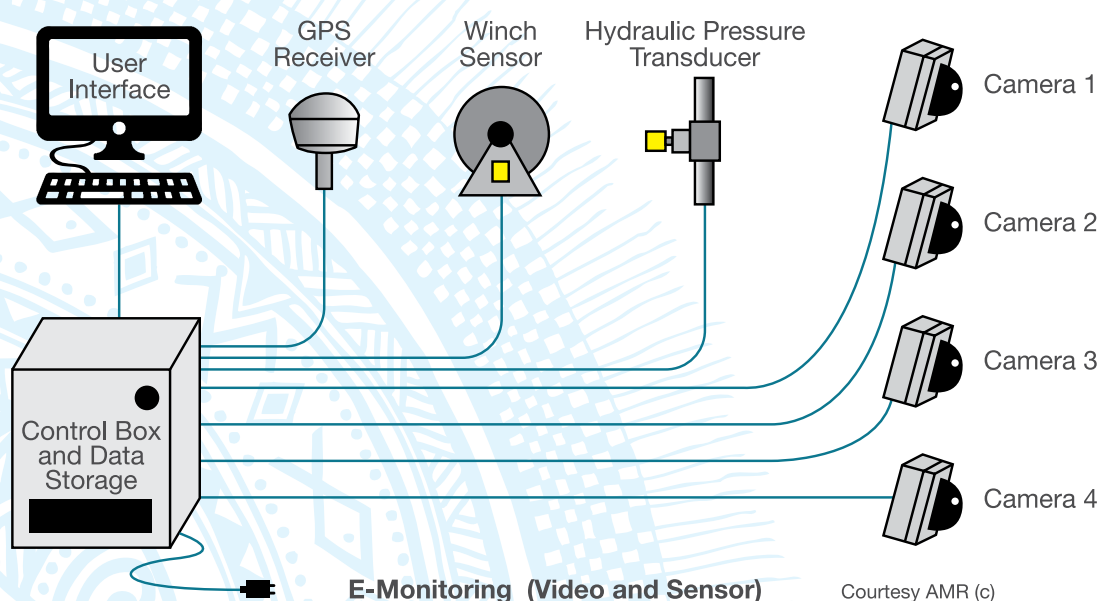
The initial versions of Onboard were setup to transmit the logsheet at the end of the trip over mobile network. However, SPC is expanding the capability to enable daily transmission from the vessel through connection to compatible mobile transceiver units (MTUs) that are on the vessel. FFA members have committed over the coming years to move to full e-reporting for daily fishing logsheets on all longline and purse vessels that they licence. One of the major benefits of e-reporting is that it allows the expansion of data to be provided by vessel operators beyond what is possible with paper-based systems, including the transfer of some data recording and reporting tasks from observers to vessel operators.

Electronic observer reports are also being adopted by PNA members with all purse seine observer data workbooks to be submitted electronically by the end of 2018. Work is underway by both PNAO and SPC to develop implement electronic observer reporting for longline.

E-Monitoring refers to hardware and software which automatically collects and transmits fisheries information from a vessel. It is a closed system (black box) that does not accept manual input or any other input external to the system. It is tamper-proof and automatic and there is no opportunity to manipulate data being transmitted. The information captured and transmitted include that from the onboard video, winch and engine sensors, vessel VMS/AIS, satellite tracking of FADS and fish tagging program monitoring.

The primary e-monitoring system now in place is VMS which is applied to all vessels in FFA waters and to all vessels in the high seas of the WCPO. In particular, VMS is the primary management tool for the purse seine and longline VDSs, backed up by e-reporting. The primary focus for additional e-monitoring has been on the longline fisheries where coverage with observers is 5% or less. These systems enable near real-time verification of fishing activity (location and gear use), and identification of species caught and detection of compliance breaches through reviewing imagery after the trip has concluded. In the purse seine fishery, the primary focus of additional e-monitoring is on FAD tracking. Other priorities in the purse seine fishery include monitoring onboard machinery to gather information on setting and on video for observer safety.

At the WCPFC level there is a mandatory requirement of 5% observer coverage in longline fisheries through the regional observer program. The scientific committee has previously recommended 20% observer coverage; however, this was considering observers only and based on coverage level required to have reasonable probability of detecting bycatch events. To accurately and reliably estimate all catch sea turtles and other species of special interest, SPC has indicated 100% coverage is appropriate (Lawson 2005). With the introduction of e-monitoring, coverage levels need to be reviewed based on data needs and how all monitoring and data collection sources (observers, port sampling and e-monitoring) can be used together to provide the data needed in a cost-effective way.



The data collected by observers is critical and for many countries, 5% observer coverage plus e-monitoring on all vessels will be the most cost-effective way to meet the data needs for longline fisheries. However, in some cases increased port sampling along with e-monitoring may be an effective way to collect the required data. Observer presence on longliners is critically low. Scientific assessment suggest that 20% observer coverage is required on longliners as a minimum for adequate catch data for management purposes. E-Monitoring could help to resolve this shortfall in monitoring and data collection and improve compliance.

One concern with E-Monitoring is that it would replace the role of the physical observers however, it can only replace certain functions and observers would still be necessary for other functions and recording/reporting such as monitoring nearby vessels, monitoring purse seine catch composition, collecting length-frequency data and biological information, etc.). Furthermore, E-Monitoring can alleviate some of the demands on observers including the time demands and tiredness (from long shifts), can potentially cover a greater area on the ship and can be used to enhance observer safety. It provides real options for covering activities on longline vessels or in situations or conditions which may be unsuitable for observers. E-monitoring also allows for multiple 'observers' to review the data which helps to remove uncertainties in species identification. However, this detailed analysis of many E-Monitoring records is very demanding and there is discussion about having 'hubs' in the region where trained/experienced observers can work through the data.

It is fair to say that the use of e-monitoring is complementary to observers and port samplers and it is crucial to note both the limitations and capabilities of e-monitoring. The greatest strength of e-monitoring in longline fisheries is the ability to safely and efficiently increase monitoring coverage to provide reliable data and detect misreporting and non-compliance. However, it cannot collect all the data that is needed to support fishery management objectives and e-monitoring is used alongside observers and port samplers to ensure all data needs are met.

In February 2018, the Regional Observer Coordinators Workshop recommended that all members review their data needs and have a clear plan on how all sources of data collection are used together to support management and compliance objectives. SPC noted in particular that biological data collection has been decreasing over recent years and targets are not being met in the longline fishery. This is a major issue as the biological data inputs are critical for stock assessments and SPC committed at the ROCW to ensure that data needs and biological sampling targets are clearly defined for members. Biological data includes otoliths, sex and gonad stage which can only be collected by observers and port samplers. As e-monitoring is adopted and rolled out, it is important to ensure that observers and port samplers are collecting biological data and meeting targets. In this regard, it is important to be clear on the role and data needs for each of the monitoring tools.

Another concern is the need for standardisation (hardware and software) to ensure fairness and equity in monitoring and compliance. Ideally, this should not just relate to standardisation within the WCPFC region but should, where possible, be standardised across similar fisheries in other parts of the world for comparative purposes.

Furthermore, there is currently no legal framework supporting a formal requirement for E-monitoring on vessels, although this is currently under negotiation. Implementation is at the national level

The implementation of e-monitoring programs represents a major change in the monitoring approach and requires a lot of staff resources and changes to the organisational structures and procedures. There are challenges in how national programs introduce e-monitoring through regulation and provide suitable incentives that ensure it is cost effective and viable. Several members have committed to full implementation of e-monitoring across all vessels in their fleet and this ensures that all vessels can be held to the same standards. However, there are risks with this approach as vessels may opt to fish in other waters that have lower standards. Regional collaboration and collective action is the best approach to manage this risk with compulsory e-monitoring across multiple EEZs.

The combination of e-Reporting and e-Monitoring will make compliance monitoring and enforcement a faster and easier job. Effective compliance operations require multiple parallel information sources. E-reporting and e-monitoring will provide simultaneous access to multiple sources of information (log-sheets, observer, port,

CMM) at end of trip or in near real time. There will be the potential to access to real time onboard catch data, incident reporting and response; to develop a more valuable Compliance Index; and to undertake more targeted compliance operations. The E Information will also be very valuable for research purposes. Potentially providing high quality information on a number of technical and scientific issues (particularly bycatch).

Some of the recommendations arising from the many discussions and reports produced related to e-Monitoring include:

- The focus of e-monitoring administration be through national fishery agencies and existing sub-regional observer programs.
- Hardware and software be purchased, installed, and maintained by vessel owners
- Procedures be developed to facilitate all options for data retrieval, based upon a risk assessment of the circumstances of each type and variation of data retrieval. (Fisheries regulatory officer, other authorised officer, observer, or vessel master)
- National fishery agencies, and existing sub-regional observer programs be responsible for analysis of video and sensor data.
- All of these matters be referred to the e-working group tasked with progressing e-monitoring for resolution.
- The Commission Secretariat should facilitate e-monitoring demonstration trials and develop a broad, associated communication strategy.
- The Commission should adopt an approach of developing standards, specifications, and certification procedures for both e-Reporting and e-Monitoring, against which any provider can seek to be certified, in preference to seeking a single provider.

Some of the challenges that have been identified in relation to e-Reporting and e-Monitoring include:

- Political resistance
- Other stakeholder resistance
- Use of e-monitoring to undermine onboard observer programme
- The need for capacity building and training
- Data management, storage and confidentiality
- Logistical issues (installation, maintenance, swapping out of hard drives)
- Cost (which would have to be covered by vessel owners)
- Analysis of video footage (effort and time)
- Standard certification

Reviewing footage and managing the data are challenging aspects of e-monitoring programs and members need sufficient staffing, resources, procedures and standards to ensure information needs are met. Nationally, key actions include updating legislation, ensuring data review centres are fully resourced and supporting cost recovery.

As the use of e-monitoring increases, multiple national programs are emerging and longline vessels with e-monitoring onboard are fishing in different countries and on the high seas during the same trip. This poses challenges as members consider how to handle footage from these vessels and ensure that there is compatibility between programs. Regionally, standards need to be developed to enable port-to-port monitoring for vessels fishing across multiple member zones and to provide consistent training and analysis procedures.

The key need identified by members is support for port-to-port e-monitoring based on common standards. The Pacific Islands Regional Fisheries Observer program (PIRFO) provides a good example of how this works well now with observers covering trips across multiple zones and collecting the same data that can be provided to the respective countries where the vessel fished. All of the observers are trained according to the PIRFO standard and record data in a common way.

Nevertheless, there are many additional benefits arising from the use of e-reporting and e-monitoring other than the obvious ones. These include i) improved data quality and timeliness, ii) faster and more effective management response, iii) more diverse employment opportunities, iv) an initial reduction in personnel required for data entry but offset by increased opportunities for data analysis, IT skills and technical expertise, v) reduction in 'Observer' effect (no-one knows when they are being watched and less susceptibility to corruption).

The Commission set up a Working Group (Electronic Reporting and Electronic Monitoring Intersessional Working Group - ER and EMWG) to review and discuss issues and concerns related to electronic reporting and monitoring. This working group has met twice so far and is scheduled to meet again in 2018. At its last meeting in 2016, the participants were presented with the Draft Standards, Specifications and Procedures (SSP) for Electronic Reporting in The Western and Central Pacific Fisheries Commission area.



## **Integrated Fisheries Information Management System**

IMS will continue to play an integral role in some of the major fisheries initiatives in the region, including Electronic Reporting (EM), Electronic Monitoring (EM), and Catch Documentation Scheme (CDS).

### **1. Key FFA updates include:**

- Migration of National Information Management Systems (NIMS) and the FFA Regional Information Management System (RIMF) to the more robust and secure RIMF2 platform;
- RIMF2 will be operational by June 2018 in eight FFA member countries.
- The continued collaboration with SPC, PNAO, WCPFC, and other organisations on IMS developments and compatibility with SPC databases;
- Between March 2017 and July 2017, 10 visits were made to 6 FFA members and it is anticipated that 15 national visits to 11 FFA members would be completed by June 2018.
- The Boarding Officer's Job ID Kit (BOJAK) is currently being comprehensively tested to ensure alignment with the new RIMF2 platform and is being trialled in Vanuatu and Solomon Islands for full implementation in 2018.
- As the utilisation of available data tools, including IMS, remains a challenge, a number of initiatives will be implemented this year to address this issue.
- The Secretariat will continue to explore the possibility of FFA and SPC staff being cross-trained on the products of both agencies.
- A greater number of in-country visits for RIMF2 work and training is envisaged, as well as a pursuit of strong collaboration with partners, especially SPC, on integration, technology, and training.

Some of the major IMS developments over the last year include:

1. All 17 Members have access to a national IMS portal. With the exception of one IMS portal, which is locally hosted, all portals are hosted on the Secretariat's cloud servers.
2. Twenty-two modules are available to all Members. The Secretariat is in the process of rationalising all the internal modules, making them available across the RIMF2 platform.
3. The Boarding Officer's Job Aid Kit (BOJAK) application is currently undergoing extensive testing to align it with the new RIMF2 platform. It is also being trialled under the RIMF2 platform in Vanuatu and the Solomon Islands.

The major information management system in place is the PNA FIMS which is used for detailed management of major elements of the purse seine and longline fisheries in PNA waters, so it covers most of the WCPO tuna catch. The PNA FIMS now:

- Monitors and manages Vessel days using satellite feeds and electronically transferred information from industry iFIMS, and provides a facility for industry, Parties and flag states to monitor and manage effort
- Monitors vessel positions using the Asset Tracking System
- Provides an e-registration and licensing process for all vessels
- Facilitates the recording of e-reports
- Transfers the system of observer reporting to near real time
- Provides for port-to-port monitoring for those Parties agreeing to share data
- Provides information/ reports for overall management of the PNA purse seine and longline fishery

PNA FIMS is now being upgraded to include:

- FAD tracking
- Catch and unloading Documentation
- Compliance Applications; and
- Linking factory inflow and outflow data to the Catch Documentation process.

The Papua New Guinea National Fisheries Authority and the PNAO have already successfully implemented the use of electronic FIMS through Android Tablets for their Tuna Port Sampling Unit with over 1,000,000 PNG samples taken using EForms between March and November 2013.

There is an Electronic Catch Reporting system already in place and being used by Purse Seine Vessels fishing in the Pacific. This is part of the Information and Management system used by Industry called iFIMS. PNA FIMS is system-ready to receive Electronic Catch Reporting for Purse Seine Vessels from iFIMS and have this data displayed under the Trip Menu. The Trip Menu forms an integrated part of FIMS, and there are no extra costs to PNA Office, PNA or Non-PNA parties to use this feature. Electronic Catch Reporting data can flow from PNA FIMS to SPC and National Systems in NAF format to improve quality and timeliness of data

Electronic Catch Reporting can be used for:

- VDS validation
- Catch Documentation Scheme (CDS) verification
- Marine Stewardship Council (MSC) verification
- Fisheries Management and MCS Purposes

Electronic Reporting data can flow from FIMS to SPC in NAF format to improve quality and timeliness of data. It has the advantages that it is near real time reporting with error checking at the point of data entry. It also does not need connectivity during use as the Eforms are stored and sent when a connection becomes available. Connectivity can be accessed via WiFi, 3G/4G or satellite.



## The Regional Fisheries Surveillance Centre (RFSC)

When established in 1997, the primary roles of the RFSC was to administer the FFA Vessel Register and manage the FFA VMS on behalf of FFA member countries. The development of the Operations Room in 2009 added a new dimension to the role and functions of the RFSC which now includes the collection, analysis and dissemination of a range of fisheries information. The Operations Room depends on the ongoing development of the Regional Information Management Facility (RIMF), which is an adjunct to the RFSC and allows for fisheries information collected by FFA to be stored in secure databases and easily accessed for analysis using a compliance analysis system to support the Regional Surveillance Picture (RSP).

The overarching functions of the RFSC include:

- Providing MCS services that are best delivered at a regional level;
- Identifying and facilitating opportunities to strengthen MCS arrangements across the region through enhanced cooperation; and
- Strengthening regional MCS arrangements by assisting members to optimize MCS arrangements at the national level; and
- Provision of air surveillance services to members.

Specific roles of the RFSC include:

- Collection, analysis and dissemination of fisheries Information - The RFSC uses the Regional Information Management Facility (RIMF) to collect fisheries information, store it in secure databases and provide easy access for analysis in developing the Regional Surveillance Picture (RSP).
- Support to regional and national MCS effort - Each FFA member country is ultimately responsible for the conduct of national MCS in its EEZ and in some cases adjacent high seas areas. However, these efforts are supported by the RFSC on an ongoing basis through the development and dissemination of the RSP which allows individual MCS entities access not only positional VMS data on vessels in their EEZ and in some cases vessels approaching their areas, but also access to analyzed fisheries information which identifies the level of risk each vessel poses in conducting IUU fishing. This allows for the prioritization and efficient use of limited surveillance and patrol assets.
- Planning and coordination of annual regional multilateral MCS Operations - The RFSC plans and coordinates the four regional multilateral MCS operations conducted annually in the region. The aim of these Operations is to foster regional MCS coordination and cooperation and national self-sufficiency, and to continue to improve the MCS tools and communications to support the regional and national effort. These are Operations Kurukuru, Island Chief, Tui Moana and Rai Balang. The RFSC also supports other Operations run throughout the region by other FFA members and by the Quadrilateral Defense Coordination Group countries.
- Liaison with Quadrilateral Defense Coordination Operational Working Group (OWG) - OWG is made up of Defense representatives from Australia, France, New Zealand and the United States. The role of this group is to share joint and combined operational plans for the SW Pacific region. The RFSC has a strong liaison relationship with the OWG and is involved in the allocation of aerial surveillance assets to support regional MCS operations, and the coordination of the surveillance assets provided by the Quadrilateral member nations in support of national and regional MCS activities.
- Liaison and relationship with WCPFC Secretariat and Compliance Officers - Whilst no formal arrangement exists between the FFA and WCPFC Compliance officers, there is good professional relationship between the RFSC and the WCPFC Secretariat in the coordination of regional MCS effort, especially with regards to the high seas areas.
- Regional law enforcement agencies and other regional organizations - FFA member countries may decide on a national basis to use fisheries information provided by the RFSC in MCS operations, for broader law enforcement activities. The provisions of the multilateral Niue Treaty Subsidiary Agreement (NTSA)

will enhance the opportunities for using fisheries information to identify other threats to national security. Where data sharing rules allows, the RFSC may provide fisheries information and the RSP to regional law enforcement agencies and other organisations which have a key role in regional enforcement.

- Support the Implementation of the NTSA – RFSC has current capacity to support FFA Members role as Coordinating Party of a multilateral/bilateral cooperative surveillance activity under the NTSA to effectively undertake that coordination role.
- Operational control of Pacific Maritime Security Program (PMSP) Aerial Surveillance Program – Manage, schedule and prioritise aerial surveillance aircrafts under the PMSP in support of regional, sub-regional and national surveillance and enforcement activities.



### **Cooperation in Compliance and Enforcement**

The newly-evolving Pacific Maritime Domain Awareness Programme recognises that the threat to the ocean environment is challenging, complex and evolving which makes the need for collaboration among fisheries, international customs and border protection agencies more important than ever. Effective awareness is seen as the most crucial step towards combatting serious threats, most specifically being transnational organised crime, successful response can only be achieved as a shared challenge among the nations. Agreements between countries in the Pacific region are recognised as needing to go beyond just fisheries enforcement and compliance but to embrace all aspects of policing in an area where criminal activities can be broad and difficult to contain.

## **E. CAPACITY BUILDING AND TRAINING**

One of the primary sources of support to the Pacific SIDS and to the WCPF Commission Members generally in relation to capacity building and training has been the various GEF projects implemented by UNDP and FAO. These include:

1. Implementation of the Strategic Action Programme (SAP) of the Pacific Small Island
2. Pacific Islands Oceanic Fisheries Management Project (PIOFMP-1)
3. Implementation of Global and Regional Oceanic Fisheries Conventions and Related Instruments in the Pacific Small Island Developing States (PIOFMP-2)

The PIOFMP-I was designed to support the foundational institutional and capacity building at the regional and national levels necessary to address the concerns, threats and root causes identified in the SAP. One of its outputs was that annual OFM capacity building workshops would be held prior to the annual Commission meetings to strengthen Pacific SIDS capacities to participate in the Commission and to implement the Convention, with planned support from the New Zealand Agency for International Development.

The Terminal Evaluation for PIOFMP-1 noted that one of the greatest achievements of this project has been the capacity building elements of the project which have helped to give Pacific SIDS' fishery representatives the enhanced confidence to present and negotiate their positions at Commission meetings, to be actively involved in the technical meetings of the Commission, and to sit as equals at the same table as Distant Water Fishing Nations (DWFNs). This was specifically noted by the evaluators to be a major project benefit. At the field level, the TE noted that the training of all national monitoring staff via attachments and national observers training workshops for coordinators, observers and port samplers were excellent.

Part of the justification for the PIOFMP 2 project was the recognition of weaknesses in scientific information and understanding and the need for improvements in capacity and training. The project document noted that there was an increasing need for the growing understanding of regional stocks and ecosystem processes to be translated into information and advice at national level, for national decision-making. The scientific training in stock assessment and other scientific areas under PIOFMP-I was highly valued and missed, and needs to be carried forward, with a particular interest in oceanography and ecosystem-level processes to provide a better basis for national policy-making.

Under the PIOFMP 2 Project, capacity building for Pacific Island SIDS has been an underpinning theme reflected in the project document with a focus on legislative weakness, policy development and analysis challenges, effective fisheries management strategies, weaknesses in overall MCS strategies and in the understanding and application of scientific information. Output 3.2.2 National scientific analysis and support for ecosystem-based management of oceanic fisheries by Pacific SIDS states that "Training will be provided to around 120 national scientific and technical staff in stock assessment and ecosystem analysis, including through GEF-funded capacity building workshops to enhance SPC members understanding and use of stock assessment information, and online stock assessment training revision exercises to consolidate participants understanding of regional stock assessments. The workshops will be supplemented by attachments of national fishery scientific and technical staff to SPC Headquarters to enhance capacity to interpret and analyse national fisheries data and information. Advice will be provided on scientific aspects of WCPFC issues, including within briefs, preparatory sessions for Pacific SIDS for WCPFC Scientific committee meetings, and regional management consultations organised by the FFA".

Furthermore, another of the project Outputs is aimed at having effective national fisheries monitoring programmes and data and information management systems developed for all Pacific SIDS. This includes training being provided to around 350 national monitoring & data personnel.

The PIOFMP 2 project also provides support to the PNA office in assisting Pacific SIDS PNA members to meet the MSC conditions for certification of the sustainability of the PNA free school skipjack fishery, including the annual auditing of PNA compliance with the certification conditions and chain of custody requirements and providing training on MCS certification chain of custody requirements.

While progress has been made to address all these shortfall areas, the nature of capacity building in the SIDS context in regard to fisheries management and MCS within WCPFC processes is such that it is ever evolving.

As a consequence of the interventions and support given by both the PIOFMP 1 and 2 projects, Pacific SIDS have been able to make a major contribution at the WCPFC with FFA, PNAO and SPC support, but the increasingly large and complex agendas at WCPFC sessions make it difficult for small administrations and small delegations to participate effectively, and continuing support and capacity building in these areas is needed if Pacific SIDS, especially smaller SIDS are to continue to participate effectively in the WCPFC. This is a particularly important need which threatens the overall effectiveness of regional conservation and management efforts. Without effective participation by SIDS in WCPFC processes, and effective domestic implementation of regional, sub-regional and national conservation and management measures by SIDS, overall objectives for sustainable use of regional oceanic fisheries resources cannot be achieved.

In addition, a major new area of need for capacity development is the expanding flag state roles of Pacific SIDSs. Historically, most of the focus of technical assistance and capacity building for Pacific SIDS has been on their role as coastal states to ensure the effective conservation and management of tropical tuna stocks and sustainable tuna fisheries in their waters. But as they increase control over fishing in their waters, foreign fleets are being replaced by Pacific Island fleets fishing not only in their own waters but in the waters of other Pacific SIDS and the high seas, and this calls for new and expanded capacities in management Pacific SIDS fleets and new processes of collaboration especially for addressing compliance issues between Pacific SIDS for which the Commission is not the appropriate forum.

Many SIDS are therefore constrained by the increasing demands of WCPFC processes against having small operational teams. A number of administrations have recruited new personnel which require training and there is also generally a fairly constant staff turnover. In addition, many administrations are unable to cover the skill set in key technical areas such as law and regulation and must rely on broader support from the office of the attorney general or from FFA.

The Mid-Term Review of the PIOFMP 2 project further identifies Observer and Observer Safety as two elements of training that need more future focus.

FAO has long been involved in oceanic fisheries activities in the Pacific Islands region, offering support and advice in a variety of areas including providing direct secretariat and technical support to the negotiation and implementation of the WCPFC Convention. It has delivered in its key focus areas of training and capacity building often in collaboration with FFA and SPC particularly on: the implementation of the Code of Conduct for Responsible Fisheries; implementation of the Model Scheme on Port State Measures; the development and implementation of national plans of action to combat IUU fishing; the development of the regional plan on sharks; the preparation of negotiation positions for the SP-RFMO; the implementation of the FAO Port State Measures Agreement; addressing fisheries statistics in support of fisheries management and the ecosystem approach to fisheries; legal assistance to review and strengthen fisheries and aquaculture legislation; conducting tuna studies; and, the implementation of the precautionary approach.

Clearly, much has been achieved already over the past 20 years in the context of training and capacity building but there are still areas of weakness and the need to recognise that such capacity building and training is an on-going process in order to develop the skills and expertise of new scientists, technicians, managers and, indeed policy-makers as they progress 'up-the-ladder'.

Current key challenges in MCS include:

- Responding to new technology (electronic reporting and monitoring) by adapting the MCS focus away from data entry to data analysis and associated reporting. This includes capacity in inspection, investigation, evidence collection and prosecution.
- Information management skills development suited to evolving Information Management Systems.
- The application of effective port state measures and associated inspection, reporting and information management.
- Effective monitoring of IUU risk areas
- Effective and timely reporting against the WCPFC Compliance Monitoring Scheme (CMS)
- Developing effective in country inter-government processes – Fisheries, Maritime Policy, Customs, Ports authorities

In the wider fisheries management context, key challenges include:

- Improving understanding within fisheries administrations of key fisheries management principles in regard to reference points and harvest controls and general management principles. A fisheries management 101 approach has been suggested.
- Skill development to support improved and integrated processes in fisheries management planning. Note – OFMP 2 had an activity area on NPOAs for Sharks, ETP, seabirds. This is seen as inefficient against simply having an effective and concise Oceanic Fisheries Management Plan.
- The challenge of enhancing members understanding of climate change impacts and mitigation strategies.
- There is a need for an effective negotiations workshop program
- The challenge of effectively managing Pacific SIDSs own fleets as they expand and replace foreign fleets

# CONCLUSIONS FROM THE TRANSBOUNDARY DIAGNOSTIC ANALYSIS AND POTENTIAL WAYS FORWARD FOR IMPROVING MANAGEMENT

## 5

### A. OUTSTANDING AREAS OF CONCERN

The detailed background information on oceanic fisheries within the WCPF Convention Area (and the Western Pacific Warm Pool LME) as outlined above help to define the outstanding areas of concern and to extrapolate their causes. These concerns and their causes will need to be addressed in order to achieve an effective ecosystem-based management regime for oceanic fisheries in the region.

#### **FISHERIES ADMINISTRATION AND MANAGEMENT**

1. While all target stocks are currently being fished sustainably, the existing management frameworks are still considered to be somewhat ad hoc in certain areas, requiring almost annual renegotiations and vulnerable to failure to reach agreement, and there are continuing weaknesses in control of fishing in the high seas. Fisheries management in the WCPFC area is in need of substantial more development and implementation of the precautionary approach. This includes the adoption of harvest strategies based on reference points and harvest control rules as discussed in the section of this TDA on Regulatory Compliance, Monitoring and Management and as set out in Annex II of the UN Fish Stocks Agreement. More timely data availability and improved monitoring should be key elements of ensuring the effectiveness of innovative harvest strategies. One overarching concern related to all of this remains the disproportionate burden of management and sustainability – and ensuring SIDS are well versed and resourced to influence WCPFC processes in the face of potential ‘conflicts of interests’ between the coastal state members and some of the larger fishing states.
2. Improvements needed at port level (harbour strategies?) to avoid under-reporting (trip reports versus landing report discrepancies on catch size and species) and needs to be streamlined and standardised with effective guidelines for Fisheries Officers to act on (already part of OFM II?). Countries need help in implementing this. Capacity (human resources and training/expertise) requires further development. There needs to be a stronger focus on catch documentation and traceability to support the move toward greater eco-labelling, consumer awareness and consequent market influences on better management
3. Inadequate information from longline fishing boats. This represents over 4000 vessels but with very limited observer presence on either the longliners or the transshipment carriers (with much of the catch going to transshipment). CMM 2009-06 requires 100% coverage on carriers receiving fish from large longliners in the high seas and fish may only be received from one longliner at a time, yet it is still unclear if these measures are being complied with. The purse seiners fishery also relies on transshipment but has 100% Observer coverage and is limited to transshipment only in designated ports.
4. Longline management reform is a key priority, and this is more difficult to achieve than in the purse seine fishery because longline fishing can exist in the high seas while purse seine vessels are more dependent on access to EEZs. Applying catch limits to multi-zone longline trips is difficult or impossible to enforce and manage. PNA members are in various stages of adoption of a long line Vessel Day Scheme and the further implementation of this is a current PNA and OFMP 2 focus area. Meanwhile, there is still limited information/data capture and analysis for the development of an effective mechanism for long-line fishery

management or for high seas management of stocks and catch generally. Fundamentally, the key to realising effective longline management is improved monitoring. The other way to have better monitoring and control of long-liners would be to ban transshipment on high seas and only allow it in ports.

5. More timely reporting and more effective monitoring are required to enable the application of modern harvest strategies. E-Monitoring and E-Reporting technologies are critically important for the application of improved management strategies. E-reporting is being established successfully in the purse seine fishery but is only in a trial stage in the longline fishery. E-monitoring has the potential to greatly improve monitoring and compliance especially on long-liners where observer coverage is very low and practically difficult. In the purse seine fishery, the key EM and ER issue is electronic tracking of FADs. Main challenges will be integrating EM and ER reporting into administrations, developing a more enhanced analytical capacity and developing standardised formats for exchanging electronic data. VMS and GPS tools exist to monitor transshipment and can check to see if that vessel has an observer on-board.
6. There are some concerns that there could be socioeconomic implications if there is a replacement of observers on vessels with e-monitoring (income goes back to communities). Encroachment on employment of observers (800 at present) has been identified as a possible 'Alternative Livelihoods' issue. However, the intention is not to remove or replace observers – but to enhance monitoring – the key issue is integrating EM and ER reporting into administrations – and developing a more enhanced analytical capacity.
7. Generally, effective management in the longline fishery needs trip-by-trip and vessel-specific data on species and size in catches. In the purse seine fishery there is already set-by-set (not just trip-by-trip) data collected by observers on species and size composition, and some similar strategy is needed for the longline fishery. The main problem is designing and implementing an appropriate strategy/methodology, and this is a key objective of e-monitoring.

## **CLIMATE CHANGE**

1. Long-term patterns for ENSO suggest that Warm Pool is extending eastward and that tuna stocks will follow and spread. Socioeconomic concerns are that there may be more stocks associated with eastern PICS (e.g. Kiribati) and less with western PICs (e.g. PNG).
2. Also, there is a real possibility that there could be a fall in productivity generally and therefore tuna forage as biochemical changes occur (e.g. temperature and ocean acidification) in the Warm Pool along with 'collapse' of upwelling on eastern side of Pacific and from central equatorial Pacific upwelling. This upwelling provides important productivity which is then carried westwards. The equatorial current is weakening so there is a strong likelihood of a reduction in the infusion of such productivity into the Warm Pool.
3. Effects of climate change on coastal areas could have 'knock-on' effects via changes in food-chain (reduction in planktonic larvae and tuna forage originating from coastal areas. There is clear evidence that tuna are feeding on coastal larvae that drift offshore (Allain et al., 2012)
4. Current international law does not adequately protect the rights of coastal states faced with inundation of some islands by rising sea levels, and there is a need for changes to protect the use of existing baselines for EEZs.

## **ECOSYSTEM HEALTH**

1. Fishery management is primarily still undertaken on a single-species basis even if data are compared on various species and even in institutions like SPC are assessing and 'managing' all of the target species. Catch limits tend to be set individually without sufficient knowledge of how the species interact

2. By-catch of non-target species is still a concern, especially for vulnerable species of sharks, seabirds and turtles and for stocks that are potentially important for food security. There have been recent improvements in data on numbers of non-target species in by-catch (purse seiners but hardly at all for long-liners) but there is very limited research on the overall effects of this by-catch on the species and on the overall interactive ecosystem.
3. The effects of the removal of apex predators from isolated and unique ecosystems like seamounts are unknown
4. Limited availability/access to oceanographic data or results of analysis of same for trends. Data not being translated into adaptive management options and guidance at the ecosystem level so impossible to manage as an ecosystem-based approach.
5. Poor coordination (if any) between different oceanographic exercises and research by different countries. SPC is looking into setting up PCCOS but this will need support to be effective

### **COASTAL TO OFFSHORE INTERACTIONS AND IMPACTS (CONNECTIVITY)**

1. Land-based pollution and habitat degradation may have 'knock-on' effects on target species and other important ecosystem links as a result of negative impacts on coastal origin food-chain. Reef organisms are a frequent prey of oceanic predators. Predator species such as albacore (*Thunnus alalunga*) and yellowfin tuna (*Thunnus albacares*) frequently consume reef prey with higher probability of consumption closer to land and in the western part of the Pacific Ocean. Coastal Degradation and other impacts on reefs and associated biological systems can therefore have a deleterious knock-on effect on tuna stocks (Allain et al., 2012)
2. Loss of coastal/traditional food security as reefs and associated areas reduced/lost. This may require coastal and island communities to become more reliant on offshore fisheries (n.b. nearshore FADS set for tuna)

### **IMPACTS FROM WASTE MATERIALS**

1. Micro-plastic in the food-chain (including possible nanoplastics) which have no nutritional/energy value as well as carrying POPs and other toxins such as methylmercury; Levels of methylmercury measured in women from Pacific island communities is high, 7-10 times the allowable levels in the United States.
2. FADs, Ghost Fishing Gear, Bait Packaging
3. Bilge discharges and other ship-based pollutants and wastes; washing of fuel stored in fish-wells

These main areas of concern can then be addressed through a Causal Chain Analysis. The Causal Chain Analysis confirms the impacts/threats to the ecosystem and the associated environmental and socioeconomic consequences. It then traces the linkages or 'chain' back up from these through the obvious direct or Immediate Causes of pressure, through the Underlying Causes (e.g. detrimental human activities) to the Root Causes, which are frequently linked in to management, policy, fiscal or social weaknesses or shortfalls.

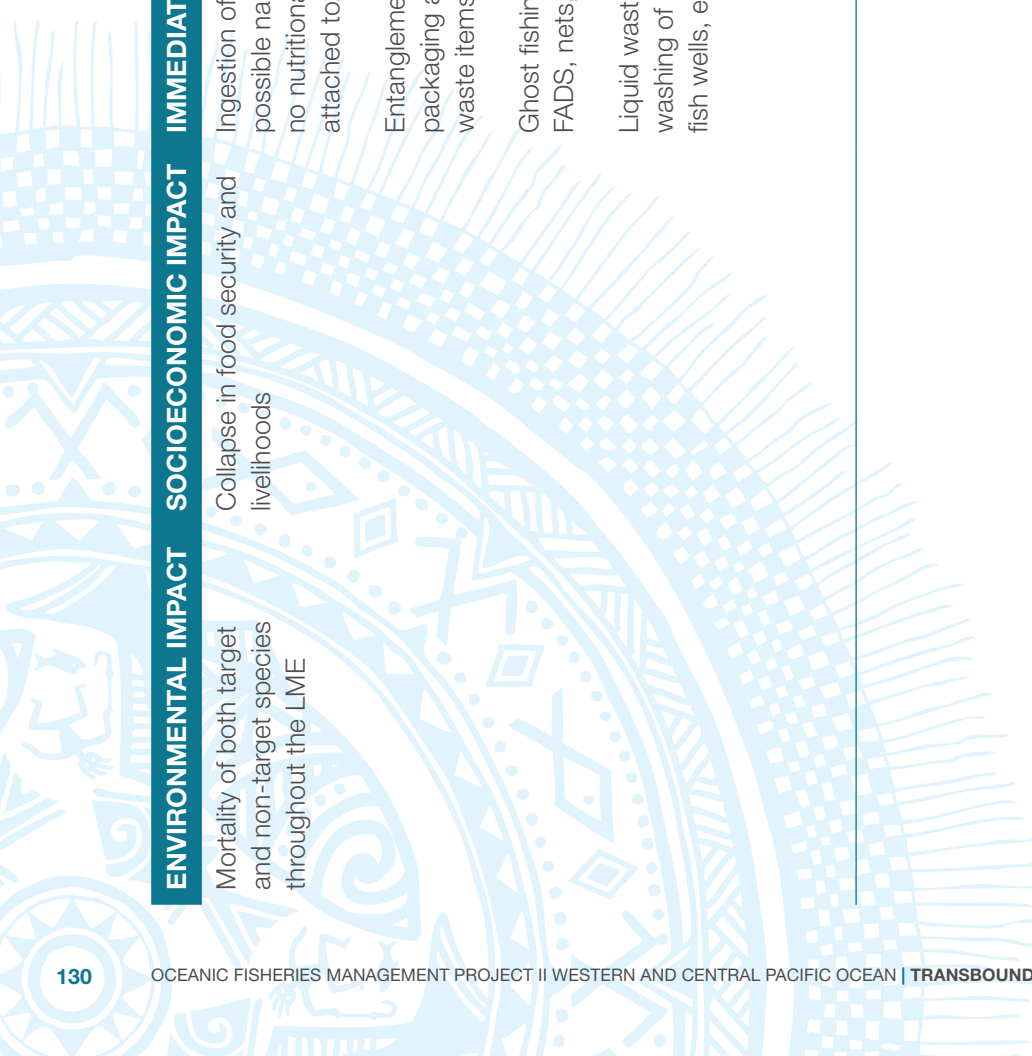
The aim of the TDA process then is to trace back and identify the root cause to the problem; find the potential solutions; and determine why these are not being already being applied (i.e. identify the barriers to resolving the issues). This information then provides the foundation for the development and negotiation of a Strategic Action Programme for sustainable management of the LME and its goods and services.

## B. CAUSAL CHAIN ANALYSIS

ENVIRONMENTAL IMPACT	SOCIOECONOMIC IMPACT	IMMEDIATE CAUSE	UNDERLYING CAUSE	ROOT CAUSE
Bycatch of non-target species either unknown or too high	Potential loss of food sources from by-catch	Insufficient observer information from longliners	Inadequate monitoring (human or automated) particularly of longliners and carrier vessels	WEAKNESSES IN (AND LACK OF CAPACITY FOR) MANAGEMENT AND COMPLIANCE, ESPECIALLY ON HIGH SEAS
Balance of Species numbers for target species not accurately known (inaccurate or absent catch returns and poor reporting)	Potential for overfishing of some stocks if catch returns and reporting are NOT accurate leading to collapse in fisheries revenues and livelihoods	No information feedback from transshipments	Ineffective port state measures and harbour strategies	
Potential overfishing of stocks (unknown at what level)	Revenues from fisheries not been captured by countries	Continuing IUU fishing activities, especially in High Seas	Disproportionate burden of management and associated sustainability placed on SIDS	
			Inadequate monitoring of all fisheries activities in high seas areas	
			Inadequate management strategies for high seas allocations	
			Need to resolve conflicts of interest between coastal states (SIDS) and fishing states	

ENVIRONMENTAL IMPACT	SOCIOECONOMIC IMPACT	IMMEDIATE CAUSE	UNDERLYING CAUSE	ROOT CAUSE
Tuna stock ranges altering, expanding and probably moving eastwards	Increased access to stocks in eastern area of WCPFC (e.g. Kiribati)	Changes in sea temperatures and currents	Long-Term effects of changes in ENSO	<b>IMPACTS FROM CLIMATE CHANGE AND ASSOCIATED CONCERNS DUE TO EXCESSIVE CARBON EMISSIONS AND LACK OF ADOPTED GLOBAL MITIGATION PROCEDURES</b>
	Decrease in Access to stocks in western area of WCPFC (e.g. PNG)		Expansion of Western Pacific Warm Pool (SPWP) LME	
General decrease in productivity and tuna forage	Potential fall in income due to lower CPYE and general decline in market supply of tuna stocks	Changing sea temperatures and increasing acidification (falling pH)	Alteration in biochemical and physical parameters in WPWP LME and across southern Pacific Ocean	
		Collapses of upwelling on eastern side of Pacific and from central equatorial pacific upwelling	Climate change effects in coastal areas (Sea level rise, reduction in cover of coral reefs, seagrass beds, mangroves)	
		Reduction in coastal productivity and tuna forage with knock-on effects on oceanic seas food chains		

ENVIRONMENTAL IMPACT	SOCIOECONOMIC IMPACT	IMMEDIATE CAUSE	UNDERLYING CAUSE	ROOT CAUSE
Potential overfishing of stocks (unknown at what level)	Potential for overfishing of some stocks if catch returns and reporting are NOT accurate leading to collapse in fisheries revenues and livelihoods	Balance of target Species numbers taken from fishery not accurately known  Insufficient knowledge of how species interact	Tuna and other target species still managed on a single-species basis	INADEQUATE APPLICATION OF PRECAUTIONARY APPROACH AND ECOSYSTEM-BASED MANAGEMENT
Potential damage to ecosystem balance due to excessive bycatch	Loss of ecosystem services to Pacific SIDS	Limited information on bycatch species interaction with ecosystem and with target species	Poor data (particularly from longliners) and uncertainties in accuracy of existing data	
Potential damage to unique ecosystems and species within the WPWP LME	Loss of ecosystem services and unique biodiversity to Pacific SIDS	The effects of the removal of apex predators from isolated and unique ecosystems like seamounts are unknown	Insufficient knowledge of unique habitat types and associated biodiversity	
Potential for overall disruption and deterioration of the WCWP Large Marine Ecosystem and its services	Loss of ecosystem services and unique biodiversity to Pacific SIDS with associated threats to food security and livelihoods as well as national and regional economies	Adaptive management of the overall ecosystem not practised by countries within and adjacent to the LME	Limited availability of or access to oceanographic data or results of analysis of same for trends  Poor coordination or interactions between institutions undertaking scientific research within the WCPFC region	
Detrimental impacts on coastal species that form part of oceanic food chain and particularly reef larvae that are young tuna forage	Fall in revenues from oceanic fisheries	Land -based Pollution  Coastal habitat degradation  Sea level rise	Poor coastal management and planning as part of an overall ecosystem-based management approach	EFFECTS OF COASTAL IMPACTS ON THE OFFSHORE OCEANIC ECOSYSTEM
Detrimental impacts on coastal species that provide subsistence or form part of small scale artisanal fishery	Loss of coastal food security			



ENVIRONMENTAL IMPACT	SOCIOECONOMIC IMPACT	IMMEDIATE CAUSE	UNDERLYING CAUSE	ROOT CAUSE
Mortality of both target and non-target species throughout the LME	Collapse in food security and livelihoods	Ingestion of micro- and possible nanoplastics with no nutritional value and attached toxins  Entanglement with packaging and other large waste items  Ghost fishing gear (lost FADS, nets, etc)  Liquid wastes from bilges, washing of fuel stored in fish wells, etc	Poor management of waste material onshore and at seas  Loss of fishing gear  Lack of compliance with the international conventions on pollution at seas and lack of associated enforcement and surveillance	DISCHARGES AND WASTE DISPOSAL AT SEA AND FROM LAND-BASED SOURCES

## **C. THE FUTURE FOR OCEANIC FISHERIES IN THE WCPF REGION – THE REGIONAL ROAD-MAP AND A STRATEGIC WAY FORWARD**

The Causal Chain Analysis above has highlighted the primary causes of transboundary environmental and socioeconomic concerns in relation to Oceanic Fisheries and the impacts and threats thereon.

The next step is to highlight those priority areas that need to be addressed within the WCPF Convention Area in order to mitigate or adapt to these concerns and impacts and in order to ensure a sustainably managed ecosystem and associated fishery.

These can be best presented under the each of the Root Cause headings.

### **PRIORITY ACTIONS TO ADDRESS THE CAUSES OF THREATS AND IMPACTS ON THE TRANSBOUNDARY OCEANIC FISHERIES IN THE WESTERN PACIFIC WARM POOL LME**

#### **1. WEAKNESSES IN MANAGEMENT AND COMPLIANCE, BOTH 'IN-ZONE' AND ON THE HIGH SEAS**

##### **Actions:**

- a. Stronger emphasis on the precautionary approach and stronger long-term management strategies and objectives (including the adoption of harvest strategies based on reference points and harvest control rules as detailed in Annex II of the UN Fish Stocks Agreement)
- b. Reform longline management including enhancing zone-based management arrangements in Pacific SIDS waters and improving the effectiveness of management systems and control of longline fishing in the high seas
- c. Strengthen purse seine management with a focus on improved FAD management and improved control of purse seine effort in the high seas
- d. Support the move toward adoption and/or improvement in ecolabelling, consumer awareness and consequent market influences on better management, including through identifying and adopting improvements to catch documentation and traceability
- e. Improvements and expansion in information on catch, effort, bycatch, unloading and transshipping etc. through better coverage and technology (particularly on the high seas with longline activity). Ideally aiming for trip-by-trip and vessel-specific data on species and sizes, fishing gear, etc.
- f. Improvements (and standardisation) in guidelines for national fisheries officers and staff along with expanded training and capacity building with an emphasis on preventing under-reporting and discrepancies between trip and landing reports.
- g. Strengthen the capacity of SIDS to address and improve their compliance as flag states. This is of increasing importance and need as the SIDS fleets grow and replace the 'distant-water' fleets.
- h. Better integration of E-Monitoring and E-Reporting into national administrative processes and port state practices.
- i. Coordination between regional and sub-regional management strategies, agreements and administrative bodies to address any 'conflicts of interest' between smaller coastal states and larger fishing states
- j. Strengthening of capacity in SIDS to effectively address increases in administrative and institutional burden
- k. Strengthening of Observer Programmes (at both national and regional levels), including in areas such as observer health and safety, improved coverage of the longline fishery and transshipment, especially in the high seas, shifting of some reporting responsibilities to vessel operators to enable observers to undertake higher priority activities

## **2. IMPACTS FROM CLIMATE CHANGE AND ASSOCIATED CONCERNS DUE TO EXCESSIVE CARBON EMISSIONS AND LACK OF ADOPTED GLOBAL MITIGATION PROCEDURES**

### **Actions:**

- a. Continuing and expanding data capture and modelling related to climate change and especially i) predictions for the size and extent of the Warm Pool, ii) predicted temperature and pH changes, iii) the consequent change in distribution and access to tuna target species
- b. improved responsiveness to climate-induced changes in stock distribution through zone-based adaptive management arrangements and procedures.
- c. pursuing legal recognition of the defined baselines established under UNCLOS to remain in perpetuity
- d. More focus on capture of productivity data (both primary and secondary) and specific tuna forage availability
- e. Inclusion of studies to ascertain the interconnectivity between coastal changes and impacts related to climate change and offshore effects and impacts on the oceanic fisheries (e.g. larval tuna/top predator forage and larval tuna)
- f. Improved and continuous assessments of the likely socioeconomic effects from these impacts from climate change
- g. Regular input from the above modelling and predictions into adaptive management guidelines and policy briefs for CCM (WCPFC Members)

## **3. INADEQUATE APPLICATION OF ECOSYSTEM-BASED MANAGEMENT**

### **Actions:**

- a. Capture of pertinent data and development of modelling to deal with species management (target and non-target) on an interactive basis rather than single-species management decisions (such as catch limits)
- b. Scientific assessment on the role and impact of bycatch within the ecosystem including the interactive function with the target species
- c. Studies on the effects of the removal of apex predators from isolated and unique ecosystems like seamounts on which information is currently very limited or unknown
- d. Improvements in data capture, analysis and management application at the regional and ecosystem level through more effective 'translation' of results and 'trends' into management processes and policy guidance (N.B support for), including optimisation of ecosystem values

## **4. EFFECTS OF COASTAL IMPACTS ON THE OFFSHORE OCEANIC ECOSYSTEM**

### **Actions:**

- a. Assessment of the effects of land-based impacts on habitats and species with interconnectivity into the oceanic ecosystem, particularly large predators (tuna and others) and their prey
- b. Provide support to island communities and subsistence/artisanal fishermen related to growing dependence on offshore fisheries as coastal fisheries decline

## 5. DISCHARGES AND WASTE DISPOSAL AT SEA AND FROM LAND-BASED SOURCES

### **Actions:**

- a. Assessment of the impacts from waste material and discharges on the oceanic ecosystem and recommendations for mitigation
- b. Strategy for preventing the loss of FADs and other fishing gear and mitigating/reducing the impacts where such losses may occur.
- c. Improvements in compliance with international, legally-binding agreements to prevent pollution in the oceans that can impact on the WPWP LME and its fisheries

The actions proposed above could provide part of the framework for an on-going Strategic Action Programme for Sustainable Management of Oceanic Fisheries and related species within the Western Pacific Warm Pool LME.

A Regional Road Map for Sustainable Pacific Fisheries already exists and was endorsed by Pacific Leaders and published by FFA and SPC in July 2015. It sets out 4 overarching goals for oceanic tuna fisheries as:

- A. Sustainability of the fishery resource
- B. Increased value and profitability
- C. Increased employment in the fishery
- D. Food security (Increased tuna supply reducing pressure on inshore resources)

The Road Map then defines 6 associated Strategies to deliver on these goals:

1. More effective Zone-Based Management
2. Great effort to reduce IUU fishing
3. Restriction of foreign fleets fishing on high seas
4. Ensure/prioritize supply of raw fishery resources to processors in the region
5. Promote better standards for employment in the fishing and processing industry
6. Establish regional processing hubs in partnership between countries

In this context, such a SAP would not re-invent this Regional Road Map but would complement, update and expand on it with more specific Actions, associated responsibilities and partners and identification of potential for supportive funding.

# REFERENCES

Most of the following references were used throughout the development of this Transboundary Diagnostic Analysis and are not necessarily specific to particular sections. Where appropriate, the specific reference is cited by name and date directly in the main text.

- Allain, V., Fernandez, E., Hoyle, S. D., Caillot, S., Jurado-Molina, J., Andréfouët, S., & Nicol, S. J. (2012). **Interaction between coastal and oceanic ecosystems of the Western and Central Pacific Ocean through predator-prey relationship studies.** PLoS ONE, 7(5), e36701.)
- Allain, V., Griffiths, S., Bell, J. and S. Nicol. 2015. **Monitoring the pelagic ecosystem effects of different levels of fishing effort on the western Pacific Ocean warm pool.** Issue-specific national report. Oceanic Fisheries Programme, Secretariat of the Pacific Community, Nouméa, New Caledonia.
- Asch, R.G., Cheung, W.L., Reygondeauc, G. Marine Policy (2017). **Future marine ecosystem drivers, biodiversity, and fisheries maximum catch potential in Pacific Island countries and territories under climate change.** <http://dx.doi.org/10.1016/j.marpol.2017.08.015>
- Bell, J.D., Allain, V., Allison, E. H., Andréfouët, S., Andrew, N. L., Batty, M. J., Blanc, M., Dambacher, J.M., Hampton, J., Hanich, Q., & Harley, S. 2015. **“Diversifying the use of tuna to improve food security and public health in Pacific Island countries and territories,”** Marine Policy, Elsevier, vol. 51(C), pages 584-591.
- Boehlert G.W. and Mundy, B. C. 1994. **Vertical and onshore-offshore distributional pattern of tuna larvae in relation to physical habitat features.** Mar. Ecol. Prog. Ser. 107: 1-13pp
- Bopp, L., Resplandy, L., Orr, J.C., Doney, S.C., Dunne, J.P., Gehlen, M., Halloran, P., Heinze, C., Ilyina, T., Séférian, R., Tjiputra, J., Vichi, M., 2013. **Multiple stressors of ocean ecosystems in the 21st century: projections with CMIP5 models.** Biogeosciences 10, 6225–6245
- Brill, R. 1994. A review of temperature and oxygen tolerance studies of tunas pertinent to fisheries oceanography, movement models and stock assessments. Fisheries Oceanography 3:3, 204-216.
- Brill, R. W., Bigelow, K. A., Musyl, M. K., Fritches, K. A., & Warrant, E. J. (2005). **Bigeye Tuna (*Thunnus obesus*) behavior and physiology and their relevance to stock assessments and fishery biology,** 57(2), 142–161.
- Brouwer, S., Pilling, G., Hampton, J., Williams, P., McKechnie, S. and Tremblay-Boyer, L. 2017. **The western and central Pacific tuna fishery: 2016 overview and status of stocks.** Tuna Fisheries Assessment Report, no. 17 / Pacific Community VIII. ISSN:1562-5206.
- Campling, L. 2013. **FFA Fisheries Trade News.** Volume 6: Issue 2, March–April 2013. Forum Fisheries Agency, Honiara, Solomon Islands.
- Cartwright, S., **‘Baseline study and performance indicators for the Pacific Islands Oceanic Fisheries Management Project’.** A Report prepared for the Pacific Islands Forum Fisheries Agency (FFA) by Thalassa Consulting Pty Ltd. February 2017
- Domokos, R., Seki, M.P., Polovina, J.J., Hawn, D.R., 2007. **Oceanographic investigation of the American Samoa albacore (*Thunnus alalunga*) habitat and longline fishing grounds.** Fish. Oceanogr. 16, 555–572.
- Ganachaud, A., Sen Gupta, A., Brown, J., Evans, K., Maes, C., Muir, L. C., & Graham, F. S. (2013). **Projected changes in the tropical Pacific Ocean of importance to tuna fisheries.** Climatic Change, 119, 163-179

- Gillett, R. & Cartwright, I. 2010. **The future of Pacific Island fisheries.** Secretariat of the Pacific Community and Forum Fisheries Agency. (ISBN: 978-982-00-0422-1.) Noumea, New Caledonia. 139 pp.
- Gillett, R. (2009). **The ADB Benefish Study.** Fisheries Newsletter, Number 129, Secretariat of the Pacific Community, Noumea.
- Gillett, R. (2011). **Fisheries of the Pacific Islands: Regional and national information.** FAO Regional Office for Asia and the Pacific, Bangkok, Thailand. RAP Publication 2011/03, 279 pages.
- Gillett, R. 2009b. **Tuna management plans in the Pacific Ocean - Lessons learned in plan formulation and implementation.** Forum Fisheries Agency, Honiara, Solomon Islands. 45 pp.
- Gillett, R. D. **Fisheries in the Economies of Pacific Island Countries and Territories** (2016). Pacific Community Cataloguing-in-publication data. Second Edition. Pp. 688.
- Gillett, R., & Tauati, M. I. 2018. **Fisheries in the Pacific. Regional and national information.** FAO Fisheries and Aquaculture Technical Paper No. 625. Apia, FAO.
- Grewe, P., Feutry, P., Hill, P., Gunasekera, R., Schaefer, K., Itano, D., Fuller, D., Foster, S., and Davies, C. (2015). **Evidence of discrete yellowfin tuna (*thunnus albacares*) populations demands rethink of management for this globally important resource.** Nature Science Reports, 5(16915).
- Harley, S.J., Davies, N., Tremblay-Boyer, L., Hampton, J. and McKechnie, S. **Stock assessment for south Pacific albacore tuna.** (WCPFC-SC11-2015/SA-WP-06). WCPFC Scientific Committee Eleventh Regular Session, Pohnpei, Federated States of Micronesia. 5–13 August 2015
- Hoskin, M., Williams, P., and Smith, N. 2017. **A brief update on ER and EM progress in the region.** WCPFC Scientific Committee Thirteenth Regular Session, Cook Islands. 9-17 August 2017.
- Itano, D. (2000). **The reproductive biology of yellowfin tuna (*Thunnus albacares*) in Hawaiian waters and the western tropical Pacific Ocean: Project summary.** JIMAR Contribution 00-328 SOEST 00-01.
- Jin, F. F. **Tropical ocean–atmosphere interaction, the Pacific cold tongue, and the El Niño–Southern Oscillation.** Science 274, 76–78 (1996).
- Johnson, J., Bell, J., and Gupta, A. S. 2016. **Pacific islands ocean acidification vulnerability assessment.** Apia, Samoa: SPREP, 2016. 40 p.
- Kirby, D.S. **Ecological risk assessment (era) progress report (2007/8) & work plan (2008/9)** (WCPFC-SC4-2008/EBSWG-WP-1). WCPFC Scientific Committee Fourth Regular Session. 11-22 August 2008, Port Moresby, Papua New Guinea
- Langley, A. (2004). **An examination of the influence of recent oceanographic conditions on the catch rate of albacore in the main domestic longline Fisheries.** Technical Report Working Paper SA-4., 17th Standing Committee on Tuna and Billfish. 9{18 August 2004. Majuro, Republic of Marshall Islands.
- Langley, A., Briand, K., Sean, K. D., & Murtugudde, R. (2009). **Influence of oceanographic variability on recruitment of yellowfin tuna (*thunnus albacares*) in the western and central Pacific Ocean.** *Canadian Journal of Fisheries and Aquatic Sciences*, 66, 1462-1477.
- Lehodey P., Senina I., Sibert J., Bopp L., Calmettes B., Hampton J., Murtugudde R. (2010). **Preliminary forecasts of population trends for Pacific bigeye tuna under the A2 IPCC scenario.** Progress in Oceanography. 86: 302–315.
- Lehodey, P. **The impacts of the El Niño Southern Oscillation on tuna populations and fisheries in the tropical Pacific Ocean.** SCTB13 Working Paper RG-1. 13<sup>th</sup> Meeting of the Standing Committee on Tuna and Billfish. Noumea. New Caledonia. 5-12 July 2000. Pp. 32
- Lehodey, P., Bertignac, M., Hampton, J., Lewis, A., and Picaut, J. (1997). **El Niño Southern Oscillation and tuna in the western Pacific.** Nature, 389:715(718).

- Lehodey, P., Senina, I., Calmettes, B., Dessert, M., Nicol, S., Hampton, J., Smith, N., Gorgues, T., Aumont, O., Lengaigne, M., Menkes, C. and Gehlen, M. **Modelling the impact of climate change including ocean acidification on Pacific yellowfin tuna.** (WCPFC-SC13-2017/EB-WP-01). WCPFC Scientific Committee Thirteenth Regular Session. Rarotonga, Cook Islands, 9–17 August 2017
- Lehodey, P., Senina, I., Nicol, S. and Hampton, J. **Modelling the impact of climate change on South Pacific albacore tuna.** Deep-Sea Research II 113 (2015) 246–259
- MacKay, D., Wright, A., and Rogers, C. 2018. **Review of the Commission's Compliance Monitoring Scheme (Rev.1\*)**. The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean.
- McKechnie, S., Hampton, J., Pilling, G.M. and Davies, N. **Stock assessment of skipjack tuna in the western and central Pacific Ocean.** (WCPFC-SC12-2016/SA-WP-04.). WCPFC Scientific Committee Twelfth Regular Session Bali, Indonesia, 3-11 August 2016
- McKechnie, S., Pilling, G. and Hampton, J. 2017. **Stock assessment of bigeye tuna in the western and central Pacific Ocean.** (WCPFC-SC13-2017/SA-WP-05). WCPFC Scientific Committee Thirteenth Regular Session. Rarotonga, Cook Islands, 9–17 August 2017
- McPhaden, M. J. & Picaut, J. **El Niño-Southern Oscillation displacements of the Western Equatorial Pacific warm pool.** Science 50, 1385–1388 (1990).
- Murray, T. (1994). **A review of the biology and Fisheries for albacore, Thunnus alalunga, in the South Pacific Ocean.** In Shomura, R. S., Majkowski, J., and Langi, S., editors, Interactions of Pacific tuna fisheries, FAO Fish. Tech. Pap, pages 188-206.
- Oliver, S., Braccini, M., Newman, S.J., & Harvey, E.S. (2015). **Global patterns in the bycatch of sharks and rays.** Marine Policy 54:86-97.
- Passfield, K. 1999. **Review of living marine resources and related issues in the Cook Islands.** World Wide Fund for Nature.
- Peatman, T., Allain, V., Caillot, S., Williams, P. and Smith, N. **Summary of purse seine fishery bycatch at a regional scale, 2003-2016.** (WCPFC-SC13-2017/ST-WP-05). WCPFC Scientific Committee Thirteenth Regular Session. Rarotonga, Cook Islands, 9–17 August 2017
- Picaut, J. & Delcroix, T. **Equatorial wave sequence associated with warm pool displacement during the 1986–1989 El Niño–La Nina.** J. Geophys. Res. 100, 18393–18408 (1995).
- Picaut, J., Ioualalen, M., Menkes, C., Delcroix, T. & McPhaden, M. J. **Mechanism of the zonal displacement of the Pacific warm pool: implications for ENSO.** Science 274, 1486–1489 (1996).
- Pilling, G.M., Harley, S.J., Nicol, S. et al. **Can the tropical Western and Central Pacific tuna purse seine fishery contribute to Pacific Island population food security?** Food Sec. (2015) 7: 67. <https://doi.org/10.1007/s12571-014-0407-8>.
- Pollard, S. 1995. **Tuna industry development study – Regional report.** Report 95/66. Forum Fisheries Agency, Honiara, Solomon Islands.
- Pörtner, H.O., Knust, R., 2007. **Climate change affects marine fishes through the oxygen limitation of thermal tolerance.** Science 315, 95–97.
- Rice J, and Harley S (2013) **Updated stock assessment of silky sharks in the western and central Pacific Ocean.** (SA-WP-03). Ninth Regular Session of the Scientific Committee of the Western Central Pacific Fisheries Commission. Pohnpei, Federated States of Micronesia.
- Rice J, Harley S (2012) **Stock assessment of oceanic whitetip sharks in the western and central Pacific Ocean.** (SA-WP-06) Eighth Regular Session of the Scientific Committee of the Western Central Pacific Fisheries Commission. Busan, Korea.
- Rice, J., Tremblay-Boyer, L., Scott, R., Hare, S., and A. Tidd. 2015. **Analysis of stock status and related indicators for key shark species of the Western Central Pacific Fisheries Commission.**

(SC11 EBWP-04-Rev1). Eleventh Regular Session of the Scientific Committee of the WCPFC. Pohnpei, Federated States Micronesia. 5–13 August 2015.

- Secretariat of the Pacific Community, Noumea, New Caledonia. Oceanic Fisheries Programme. **Non-Target Species Interactions with the Tuna Fisheries of the Western and Central Pacific Ocean** (WCPFC-SC6-2010/EB-IP-8). WCPFC Scientific Committee Sixth Regular Session, Nuku'alofa, Tonga, 10-19 August 2010
- Senina, I., Lehodey, P., Calmettesa, B., Nicol, S., Caillot, S., Hampton, J. and Williams, P. **Predicting skipjack tuna dynamics and effects of climate change using SEAPODYM with fishing and tagging data.** (WCPFC-SC12-2016/EB WP-01). WCPFC Scientific Committee Twelfth Regular Session Bali, Indonesia, 3-11 August 2016
- Sibert, J. R., Hampton, J., Fournier, D., and Bills, P. J. (1999). **An advection-diffusion-reaction model for the estimation of fish movement parameters from tagging data, with application to skip-jack tuna (*Katsuwonus pelamis*).** Canadian Journal of Fisheries and Aquatic Sciences, 56:925-938.
- Sibert, J., Senina, I., Lehodey, P. and Hampton, J. **Shifting from marine reserves to maritime zoning for conservation of Pacific bigeye tuna (*Thunnus obesus*).** PNAS October 30, 2012. 109 (44) 18221-18225; <https://doi.org/10.1073/pnas.1209468109>
- Smith, N., Allain, V. and Pilling, G. 2016. **Ecosystem indicators: moving forward to design and testing.** (WCPFC-SC12-2016/EB WP-02). WCPFC Scientific Committee Twelfth Regular Session Bali, Indonesia, 3-11 August 2016
- SPC. 2014. **Pacific Island fisheries and climate change.** Policy brief 24/2014. Secretariat of the Pacific Community, Noumea, New Caledonia. (also available at [https://www.spc.int/DigitalLibrary/Doc/FAME/Brochures/Anon\\_14\\_PolicyBrief24\\_FisheriesAndClimate.html](https://www.spc.int/DigitalLibrary/Doc/FAME/Brochures/Anon_14_PolicyBrief24_FisheriesAndClimate.html)). 4 pp.
- Stramma, L., Prince, E.D., Schmidtke, S., Luo, J., Hoolihan, J.P., Visbeck, M., Wallace, D.W. R., Brandt, P., Körtzinger, A., 2012. **Expansion of oxygen minimum zones may reduce available habitat for tropical pelagic fishes.** Nat. Clim. Change 2, 33–37.
- Terawasi, P. and Reid, C. Economic and Development Indicators and Statistics: Tuna Fisheries of the Western and Central Pacific Ocean. 2017. Forum Fisheries Agency, Honiara, Solomon Islands.
- Tremblay-Boyer, L., McKechnie, S., Pilling, G. and Hampton, J. **Stock assessment of yellowfin tuna in the western and central Pacific Ocean.** (WCPFC-SC13-2017/SA-WP-06). WCPFC Scientific Committee Thirteenth Regular Session. Rarotonga, Cook Islands, 9–17 August 2017
- Ward, R., Elliott, N., and Grewe, P. (1994). **Allozyme and mitochondrial DNA variation in yellowfin tuna (*thunnus albacares*) from the Pacific Ocean.** Marine Biology, 118:531–539.
- Williams, A.J., Allain, V., Nicol, S.J., Evans, K.J., Hoyle, S.D., Dupoux, C., Vourey, E., Dubosc, J., 2015. **Vertical behavior and diet of albacore tuna (*Thunnus alalunga*) vary with latitude in the South Pacific Ocean.** Deep-Sea Res. II 113, 154–169.
- Williams, P. and Terawasi, P. (2016). **Overview of tuna fisheries in the Western and Central Pacific Ocean, including economic conditions.** 2015. (WCPFC-SC12- 2016/GN-WP-01), WCPFC Scientific Committee Twelfth Regular Session Bali, Indonesia, 3-11 August 2016.

# ANNEXES

## 7

### A. LIST OF CURRENT CONSERVATION AND MANAGEMENT MEASURES AND RESOLUTIONS OF THE WESTERN AND CENTRAL PACIFIC FISHERIES COMMISSION

(Go to <https://www.wcpfc.int/conservation-and-management-measures> for full details and downloads of each CMM and Resolution. This list was up-to-date as of 6<sup>th</sup> February 2018)

REFERENCE	TITLE
2011-03	Conservation and Management Measure to address impact of purse seine fishing activity on cetaceans
2011-04	Conservation and Management Measure for Oceanic Whitetip Sharks
2012-03	Conservation and Management Measure for implementation of the ROP by vessels fishing north of 20N
2012-04	Conservation and Management Measure on the protection of whale sharks from purse seine operations
Res. 2012-01	Resolution on the best available science
2013-04	Conservation and Management Measure for WCPFC Implementation of a Unique Vessel Identifier (UVI)
2013-05	Conservation and Management Measure on daily catch and effort reporting
2013-06	Conservation and Management Measure on the criteria for the consideration of conservation and management proposals
2013-07	Conservation and Management Measure on the special requirements of Small Island Developing States and Territories
2013-08	Conservation and Management Measure for Silky Sharks
2014-02	Conservation and Management Measure Commission VMS <i>(Replaced CMM 2011-02 (2012-2014), which replaced CMM 2007-02 (2008 – 2011))</i>
2014-03	Standards, specifications and procedures for the Western and Central Pacific Fisheries Commission Record of Fishing Vessels <i>(Replaced CMM 2013-03 (June 2014 – June 2015))</i>
2014-05	Conservation and Management Measures for Sharks <i>(This CMM does not replace or prejudice any other existing shark CMM)</i>
2014-06	Conservation and Management Measures to develop and implement a harvest strategy approach for key fisheries and stocks in the WCPO
2015-02	Conservation and Management Measure for South Pacific Albacore <i>Replaced CMM 2010-05 (2015-2011), CMM 2005-02 (2006 - 2010)</i>
2015-06	Conservation and Management Measure on target reference point for skipjack tuna
2016-02	Conservation and Management Measure for the Eastern High Seas Pocket Special Management Area <i>Replaced CMM 2010-02 (2011-2016)</i>

REFERENCE	TITLE
2016-05	Conservation and Management Measure for Charter Notification Scheme ( <i>Replaced CMM 2015-05 (2016), CMM 2012-05 (2013- 2015), CMM 201105 (2012), which replaced CMM 09-08 (exp 31 Dec 2011))</i> )
Res. 2017-01	Resolution on Provisional Application of CMM 2017-01
2017-01	Conservation and Management Measure for bigeye, yellowfin and skipjack tuna in the Western and Central Pacific Ocean ( <i>Replaced CMM 2016-01 (2017), CMM 2015-01 (2016), CMM 2014-01 (2015), CMM 2013-01 (2014), CMM 2012-01 (2013), replaced CMM 2008-01/CMM 2011-01 (2009-2012), which replaced and CMM 2005-01, and CMM 2006-01.)</i> )
2017-02	Conservation and Management Measure on Minimum standards for Port State Measures
2017-03	Conservation and Management Measure for the protection of WCPFC Regional Observer Programme Observers ( <i>(Replaced CMM 2016-03 (2017))</i> )
2017-04	Conservation and Management Measure on Marine Pollution (effective 1 Jan 2019)
2017-05	WCPFC Record of Fishing Vessels and Authorization to Fish ( <i>Replaced CMM 2013-10, CMM 2004-01, and CMM 2009-01</i> )
2017-06	Conservation and Management Measure for Mitigating Impacts of Fishing on Seabirds ( <i>replaced CMM 2015-03 (effective 1 Jan 2017), and CMM 2012-07, which replaced CMM 2007-04 on 1 July 2014</i> )
2017-07	Conservation and Management Measure on Compliance Monitoring Scheme ( <i>Replaced CMM 2015-07 (2016), CMM 2014-07 (2015), CMM 2013-02 (2014), CMM 2010-03 (2011), CMM 11-06 (2012), CMM 12-02 (2013)</i> )
2017-08	Conservation and Management Measure to establish a multi-annual rebuilding plan for Pacific bluefin tuna ( <i>Replaced CMM 2016-04 (2017), CMM 2015-04 (2016), CMM 2014-04 (2015), CMM 2013-09 (2014), which replaced CMM 2012-06 (2013), which replaced CMM 2010-04, which replaced CMM 2009-07</i> )

## B. MOU BETWEEN WCPFC AND SPC

### **MEMORANDUM OF UNDERSTANDING BETWEEN THE COMMISSION FOR THE CONSERVATION AND MANAGEMENT OF HIGHLY MIGRATORY FISH STOCKS IN THE WESTERN AND CENTRAL PACIFIC OCEAN AND THE PACIFIC COMMUNITY**

The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (hereinafter referred to as “the WCPFC” or “the Commission”) and the Pacific Community (hereinafter referred to as “the SPC”):

**Recognizing** that the Commission is required to, *inter alia*:

- adopt measures to ensure long-term sustainability of highly migratory fish stocks in its Convention Area and promote the objective of their optimum utilization;
- ensure that such measures are based on the best scientific evidence available and are designed to maintain or restore stocks at levels capable of producing maximum sustainable yield, as qualified by relevant environmental and economic factors, including the special requirements of developing States in the Convention Area, particularly small island developing States, and taking into account fishing patterns, the interdependence of stocks and any generally recommended international minimum standards, whether sub-regional, regional, or global;
- assess the impacts of fishing, other human activities and environmental factors on target stocks, non-target species, and species belonging to the same ecosystem or dependent upon or associated with the target stocks;
- 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;
- protect biodiversity in the marine environment;
- take measures to prevent or eliminate over-fishing and excess fishing capacity and to ensure that levels of fishing effort do not exceed those commensurate with the sustainable use of fishery resources;
- collect and share, in a timely manner, complete and accurate data concerning fishing activities on, *inter alia*, vessel position, catch of target and non-target species and fishing effort, as well as information from national and international research programs;
- obtain for its consideration the best scientific information available from the Scientific Committee through review of research results, encouraging and promoting cooperation in scientific research and assessing status of target or non-target stocks of interest;
- obtain advice and recommendations on conservation and management measures from the Technical and Compliance Committee, in collaboration with the Scientific Committee; and
- obtain recommendations from the Northern Committee on the formulation of such conservation and management measures as may be adopted by the Commission in respect of stocks which occur mostly in the area north of 20° north parallel and on the implementation of such measures for the area north of 20° north parallel;

**Noting** also that the Commission:

- may engage the services of scientific experts to provide information and advice on the fishery resources covered by its Convention and related matters that may be relevant to the conservation and management of those resources;
- may enter into administrative and financial arrangements to utilise scientific services for this purpose; and
- in order to carry out its functions in a cost-effective manner, shall, to the greatest extent possible, utilise the services of existing regional organizations and shall consult, as appropriate, with any other fisheries management, technical or scientific organizations with expertise in matters related to the work of the Commission;

**Recognizing** that the SPC, through the work of its Oceanic Fisheries Programme (hereinafter referred to as “the OFP”), seeks to:

- ensure that regional and national fisheries management authorities in its region of competence have access to high-quality scientific information and advice on the status of, and fishery impacts on, stocks targeted or otherwise impacted by regional oceanic fisheries;
- ensure that regional and national fisheries management authorities within its region of competence have access to accurate and comprehensive scientific data on fisheries targeting the region’s resources of tuna, billfish and other oceanic species including non-target species; and
- improve the understanding of pelagic ecosystems in the western and central Pacific Ocean, with a focus on the western tropical Pacific;

**Noting** also that the OFP, in pursuing these objectives, has, over a long period of time:

- developed and maintained a comprehensive database of catch, effort, size composition and other biological data from the oceanic fisheries of the western and central Pacific Ocean;
- conducted biological and ecological research on the target and non-target species impacted by the fisheries and their ecosystem;
- conducted regular stock assessments and associated analyses for highly migratory stocks of interest;
- provided a forum for the exchange of knowledge of oceanic fisheries in the western and central Pacific Ocean through the precursor to the Scientific Committee, the Standing Committee on Tuna and Billfish, and thus has an established international and regional network of scientific collaborators; and
- assisted SPC Member countries that are also Members of the Commission in the management of oceanic fisheries through the implementation of fishery monitoring and data management systems, the provision of scientific advice and the provision of national capacity building;



## **Have agreed as follows**

### **1. General cooperation**

The Commission and the SPC shall establish and maintain cooperation in respect of matters of common interest to the two organizations. In particular, the Commission and the SPC will:

- i. encourage reciprocal participation in relevant meetings of each organization;
- ii. encourage the collaboration of national scientists in the scientific work undertaken by, or on behalf of, the Commission;
- iii. actively and regularly exchange relevant meeting reports, information, project plans, documents, and publications regarding matters of mutual interest, up to the limits allowed by the information-sharing policies agreed by each organization’s members; and
- iv. consult on a regular basis to enhance cooperation and minimize duplication

## 2. Provision of Scientific Services to the Commission by the SPC OFP

The SPC OFP, in cooperation with other scientists, as appropriate, including those from Members of the Commission, will provide specific scientific services, as annually reviewed and agreed by both parties in Annex

1. Such services may include, *inter alia*, the following:

- i. data management services, including, as appropriate, the collection, compilation and dissemination of fisheries data according to agreed principles and procedures established by the Commission, data processing, and database development and maintenance, taking full account of the procedures and policies of both organizations relating to the confidentiality, disclosure and publication of data;
- ii. data summaries, identification of data gaps and analyses that the Commission may routinely require to carry out its functions;
- iii. other data summaries and analyses that the Commission may require from time to time;
- iv. Advice on the implementation of e-reporting and e-monitoring;
- v. regional stock assessments, CPUE standardization, sensitivity analysis and model refinement for key target and non-target species;
- vi. ecosystem analyses, including developing ecosystem modelling and application to management, ecological risk assessment and related work;
- vii. implementation of the approved Shark Research Plan, including stock assessment of key shark species, and refinement of the Shark Research Plan as needed;
- viii. scientific evaluation of potential management options, agreed conservation and management measures and related work;
- ix. development of management strategy evaluation to support the implementation of the harvest strategy framework;
- x. scientific advice in relation to the implementation of the Commission's vessel monitoring system, regional observer programme or other initiatives relating to fishing gear and technology, as appropriate;
- xi. design and implementation of biological, ecological or stock assessment research programmes requested by the Commission, including collaborative research programmes with other regional fishery management organizations; and
- xii. other advisory and technical services.

## 3. Provision of Assistance to Commission Members

In support of Article 30 of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean, the SPC will provide assistance to its Pacific Island Members to enhance their participation in the work of the Commission. Assistance may include, *inter alia*:

- i. assistance in monitoring the fishing activities of national fleets and foreign fleets fishing within Pacific Island exclusive economic zones;
- ii. assistance in data management, and in particular in satisfying the data reporting obligations to the Commission;
- iii. auditing of national fishery monitoring and data management systems;
- iv. assistance in the interpretation of scientific information being provided to the Commission;
- v. scientific advice for the management of national fisheries consistent with the objectives of the Commission; and
- vi. assistance in the implementation of management measures adopted by the Commission.

#### 4. Financial Support

The Commission will provide financial support for the provision of scientific services and for the provision of assistance to Commission Members as agreed in Annex 1.

In respect of assistance to Pacific Island Commission Members, such assistance will normally be provided by SPC funding sources, or from the Commission's Special Requirements Fund, subject to procedures agreed by the Commission governing the use of that Fund and to the Commission's strategy for capacity building and operationalizing Article 30 of the Convention. Where assistance is to be funded from the Commission's Special Requirements Fund, this shall be included in the Service Agreement. In special circumstances, assistance may also be requested for non-Pacific Island Commission Members. Such assistance will be funded by the Commission (in which case it will be detailed in the Service Agreement) or directly by the countries concerned.

#### 5. General Administrative Arrangements

- i. This MOU becomes effective upon the date of signature of the responsible representatives of both Parties.
- ii. This MOU may be modified by written consent of the responsible representatives of both Parties. The modified MOU becomes effective upon the date of signature of such consent.
- iii. If any dispute should arise between the Parties on the operation of this MOU, the Parties will make every effort to resolve the dispute themselves, or if necessary, by utilizing a mutually-acceptable arbiter.
- iv. Either Party may terminate this MOU by providing written notice to the other of its intention to withdraw from the MOU. Termination shall be effective on 31 December of the year in which such notice is given, or 90 days following such notice, whichever is later. Upon termination of the MOU, any uncommitted funds provided for scientific services and assistance shall be refunded to the Commission.
- v. A full review of the terms and operation of this MOU and its Annexes will be conducted in concert with any review of the scientific structure and functions of the Commission.

#### 6. Signature

Signed on behalf of the Western and Central Pacific Fisheries Commission and the Secretariat of the Pacific Community:

## C. MOU BETWEEN WCPFC AND FFA

### **MEMORANDUM OF UNDERSTANDING**

#### **Between the Secretariat of the Pacific Islands Forum Fisheries Agency and the Secretariat of the Western and Central Pacific Fisheries Commission**

The Secretariats of both the Pacific Islands Forum Fisheries Agency (FFA) and the Western and Central Pacific Fisheries Commission (WCPFC);

**Recognising** the need to establish a complementary relationship between the two organizations to promote the sustainable use, conservation and management of highly migratory fish stocks in the Western and Central Pacific Ocean;

**Recalling** that the function of the FFA as provided for in Article VII of the South Pacific Forum Fisheries Agency Convention is, inter alia, to seek to establish working arrangements with relevant regional and international organisations;

**Further recalling** the FFA mission as defined by its Strategic Plan 2005-2020 is to support and enable its members to achieve sustainable fisheries and the highest levels of social and economic benefits in harmony with the broader environment;

**Acknowledging** that the objective of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC Convention) is to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the western and central Pacific Ocean;

**Acknowledging** the requirement in Article 5 of the WCPFC Convention to conserve and manage highly migratory fish stocks in the Convention Area in their entirety;

**Acknowledging further** the role of the WCPFC Commission under Article 10 of the WCPFC Convention in establishing conservation and management measures for highly migratory fish stocks in the Convention Area as a whole;

**Noting** that Article 8.1 of the WCPFC Convention requires that conservation and management measures established for the high seas and in areas under national jurisdiction shall be compatible in order to ensure conservation and management of highly migratory fish stocks in their entirety;

**Recognising** the important role the FFA Secretariat plays in assisting its members to participate effectively in the work of the WCPFC Commission, in implementing the obligations of the WCPFC Convention and decisions of the WCPFC Commission; and in implementing compatible conservation and management measures in the areas under their national jurisdiction as required under Article 8.1 of the WCPFC Convention;

**Noting** Article 22.5 of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean which provides for the Commission to enter into relationship agreements with other organizations, including the FFA, with a view to obtaining the best available scientific and other fisheries-related information to further the attainment of the objectives of the WCPFC Convention and to minimise duplication with respect to their work;

**Desiring** to put in place an arrangement to support the implementation of Article VII(e) of the FFA Convention and Article 22 of the WCPFC Convention, the FFA and the WCPFC Secretariat record the following understandings:

1. In order to maximise the effectiveness of their scientific, compliance and other activities, the FFA Secretariat and the WCPFC Secretariat agree, within the scope of Article 22.5 of the WCPFC Convention and Article VI of the FFA Convention, to exchange information relating to their activities and programmes of work on highly migratory fish stocks and associated and dependent species in the Pacific Islands region, subject to arrangements concerning the confidentiality of information held by each organisation on behalf of its members.
2. The WCPFC and the FFA agree to hold a meeting between the two Secretariats at least once annually at a venue and time that minimises the cost of participation, for the purpose of exchanging information on activities of mutual interest, and to explore ways of minimising duplication of their work.
3. Where necessary, and at the request of either Secretariat, this Memorandum of Understanding may be reviewed and amended. Any such amendment shall take effect upon signature by the Director-General of the FFA and the Executive Director of the WCPFC.
4. Either party may terminate this MOU by giving twelve (12) months' notice in writing.
5. This MOU is effective upon signature by both parties.

## **D. NATIONAL INSTITUTIONAL AND MANAGEMENT ARRANGEMENTS FOR OFFSHORE FISHERIES IN THE INDEPENDENT PACIFIC ISLAND COUNTRIES**

The following section briefly summarises and describes the national management arrangements for each of the 14 independent PICs. The information provided in this section is extracted from Gillett, R and Tauati, M. (2018) Fisheries of the Pacific Islands – Regional and National Information, FAO Fisheries and Aquaculture Technical Paper 625. Further detail and description of national legislation and management strategies related to fisheries can be found within that publication.



### **COOK ISLANDS**



#### **Fisheries Management Objectives**

In general, all fisheries management objectives in the Cook Islands must conform to the Marine Resources Act 2005. The act states: “The principal objective of this Act and the Ministry of Marine Resources is to provide for the sustainable use of the living and non-living marine resources for the benefit of the people of the Cook Islands.” The “primary management objectives” of the Large Pelagic Longline Fishery Plan (2014) and the Purse Seine Fishery Plan (2013) are essentially the same:

- a) To provide for the sustainable use of large pelagic fish resources for the benefit of the people of the Cook Islands.
- b) To ensure the long-term sustainability of the fishery.
- c) To mitigate the impact of fishing on non-target species.
- d) To develop and maintain the economic viability of the fishery and associated fishing industry, including the development of the Cook Islands’ domestic fleet and onshore processing in the Cook Islands.
- e) To ensure that the revenue and domestic benefits derived from the fishery are aligned with the value of the catch of albacore and bigeye tuna in the Cook Islands EEZ.
- f) To ensure that Cook Islands meets its international environmental and fisheries obligations. g) To strengthen the exercise of Cook Islands’ sovereign rights and ensure that its special requirements as a Small Island Developing State are appropriately taken into account in regional tuna management and position Cook Islands for equitable participation in the regional tuna fisheries.
- h) To protect traditional and small-scale commercial inshore fishers.
- i) To protect the integrity of government revenue.
- j) To fulfil the purposes and principles in the Marine Resources Act 2005.

The objectives of coastal fisheries management in the country vary considerably between the various fisheries. In general, most fisheries are managed for the sustainability of the target resources and the viability of the fishery for food and income. The management objectives of some fisheries include the equitable distribution of benefits to the community.



#### **Oceanic Fisheries Management**

Tuna fisheries in the Cook Islands are managed on regional and national levels. On the regional level, the Cook Islands is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and

Central Pacific Ocean. The Cook Islands and the other 26 members of the commission enact tuna management measures at the annual WCPFC meeting. From the Cook Islands' perspective, the two most important recent measures are: (1) the Conservation and Management Measure for South Pacific Albacore, and (2) the Conservation and Management Measure for Bigeye, Yellowfin and Skipjack Tuna in The Western and Central Pacific Ocean. On the national level, the longline fishery is managed by the Large Pelagic Longline Fishery Plan (2014) and the Marine Resources (Large Pelagic Longline Fishery and Quota Management System) Regulations 2016, in which the total allowable catch for albacore has been set at 9 750 tonnes and for bigeye tuna at 3 500 tonnes. There is also a maximum limit of 50 longline vessels licensed to fish within the Cook Islands EEZ at any one time. Furthermore, on the national level, the purse-seine fishery is managed by the Purse Seine Fishery Plan (2013). The major features of the plan are:

- (1) establishment of licensing arrangements that encourage fishing operations to provide greater benefits to the Cook Islands, particularly through the landing, value-adding and processing of fish in the Cook Islands;
- (2) a limit on the size of the purse-seine fleet in the fishery waters to avoid local depletion, particularly of skipjack tuna and yellowfin tuna; and
- (3) a requirement to use fishing gear and methods that reduce the impacts of fishing on non-target species.

In accordance with the Marine Resources Act 2005, a fishery can be declared a designated fishery if it is important to the national interest and requires management measures to ensure sustainable use of the fishery resource. In practice, the island councils manage the fisheries inside 12 nautical miles, with the Ministry of Marine Resources assisting the councils in formulating and implementing fisheries management plans.



## **Fisheries Policy Framework**

The major policies and strategies<sup>14</sup> of the Government of the Cook Islands' Ministry of Marine Resources in the various fisheries sub-sectors include:

- offshore fisheries development – expanded income earning opportunities from sustainably managed offshore fisheries through capacity building, and infrastructure and market development;
- pearl industry rejuvenation – a profitable and sustainable pearl industry through improved productivity and environmental management;
- inshore fisheries and aquaculture development – improving income-generating opportunities for the private sector, particularly in the outer islands, through increased provision of technical and scientific assistance;
- food security and subsistence fisheries – ensuring sustainable fishing and conservation practices, resulting in long-term food security and traditional subsistence practices;
- marine conservation, biodiversity and eco-tourism – supporting the protection and conservation of natural marine biodiversity and its affiliated customary practices and knowledge, and potential commercialisation, such as marine eco-tourism.



## **Institutional arrangements**

Successive Cook Islands Governments have long considered the country's marine resources to be a priority for development. This was demonstrated by the formation of the Ministry of Marine Resources in 1984. It was the first government ministry in the Pacific Islands region dedicated to the fisheries sector, with fisheries in most other countries coming under the control of the ministry responsible for agriculture. The Ministry of Marine Resources was formed, in part, as a response to the United Nations Convention on the Law of the Sea (1982) from which the Cook Islands anticipated substantial development opportunities (Passfield, 1999).

The current Ministry of Marine Resources is responsible for the conservation, management and development of marine resources, both living and non-living, for the benefit of the people of the Cook Islands.

According to its website (<http://www.mmr.gov.ck>), the ministry is managed by a Secretary. It is headquartered at Rarotonga but also maintains fisheries officers on the islands of Aitutaki, Atiu, Mangaia, Manihiki, Mauke, Mitiaro, Nassau, Palmerston, Penrhyn, Pukapuka and Rakahanga. It employs observers based in Apia, Samoa, and New Zealand, and two staff at a field office in Pago Pago, American Samoa. As at 30 June 2016, the ministry employed 61 staff in total, made up of 49 full-time and 5 part-time staff and 7 service providers, and had an annual appropriation of USD 1.1 million.



## Legal Framework

The main fisheries law of the Cook Islands is the Marine Resources Act 2005. This 56-page document has 10 parts:

- Part 1: fisheries conservation, management and development
- Part 2: fishing and related activities
- Part 3: conservation measures
- Part 4: licensing
- Part 5: monitoring, control and surveillance
- Part 6: jurisdiction and evidence
- Part 7: sale, release and forfeiture of retained property
- Part 8: miscellaneous
- Part 9: regulations
- Part 10: general

Among the important and distinguishing features of the Act are the following provisions:

**Authority:** The Ministry of Marine Resources has the principal function of, and authority for the conservation, management and development of the living and non-living resources.

**Designated fisheries and management plans:** The Executive Council can declare a fishery as a designated fishery where, having regard to scientific, social, economic, environmental and other relevant considerations, it is determined that the fishery: (a) is important to the national interest; and (b) requires management measures for ensuring sustainable use of the fishery resource.

A fishery plan for the management of each designated fishery in the fishery waters is to be prepared by the Secretary and kept under review. Each fishery plan shall:

- identify the fishery;
- describe the status of the fishery;
- specify management measures to be applied to the fishery;
- specify the process for the allocation of any fishing rights provided for in the fishery plan;
- make provision in relation to any other matter necessary for sustainable use of fishery resources. The management measures in such plans have the full force and effect of regulations.



## FEDERATED STATES OF MICRONESIA



### Fisheries Management Objectives

The objectives of offshore fisheries management are set out in two locations:

1. Title 24 of the Federated States of Micronesia Code, also known as the Marine Resources Act of 2002, states that management measures should be adopted that promote the objectives of:
  - (a) utilizing the fishery resources of the Federated States of Micronesia in a sustainable way;
  - (b) obtaining maximum, sustainable economic benefits from these resources; and
  - (c) promoting national economic security through optimum utilization of resources.
2. The Management Plan on Tuna Fisheries for the Federated States of Micronesia 2015 contains the long-term objectives for the purse-seine and longline fisheries:
  - Harvest at the optimum sustainable level, including all WCPFC management limits and measures covering target species, time and area closures, and FAD closures and all PNA hard limits.
  - Further increase industry's level of participation in the management of tuna resources to benefit citizens.
  - Maintain the long-term viability of domestic fleets.
  - Minimize any adverse environmental effects of the fishing methods and gear used on the marine environment.
  - Promote effective management, conservation and sustainability of fish stocks and the marine environment. -- Ensure best value is gained from tuna fisheries under sub-regional, regional and international conventions, treaties and declarations of which the Federated States of Micronesia is a signatory.
  - Consider support for an endowment fund so as to transfer a portion of licensing fees to support coastal fisheries initiatives, recognizing alternative funding is already available under other sources.



### Oceanic Fisheries Management

Tuna fisheries in FSM are managed on regional and national levels. On the regional level, FSM is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. FSM and the other 26 members of the commission enact tuna management measures at the annual WCPFC meeting. In FSM, there are three levels of government which have special significance for fisheries management:

- National government – has jurisdiction over fisheries management in the zone outside 12 miles from islands up to the outermost limits of the EEZ. Fisheries management by the national government follows the Management Plan on Tuna Fisheries for the Federated States of Micronesia 2015.
- State governments – the four states (Chuuk, Kosrae, Pohnpei and Yap) have jurisdiction over fisheries management in the waters in their respective 12-mile zones. Each state has its own administrative organizations, several agencies involved in fisheries, and its own plans for fisheries development and management.
- Local governments – in some of the states, local communities have a high degree of autonomy in the management of nearshore fisheries resources.

In terms of supra-national cooperation in the management of offshore fisheries, the Federated States of Micronesia works at the sub-regional level with the other countries that are members of the Parties to the Nauru Agreement (PNA). In the management of offshore fisheries, the main management measures are the PNA Vessel Day Scheme and various technical limits, which are detailed in the Management Plan on Tuna Fisheries for the Federated States of Micronesia 2015 'Technical limits for purposes of managing tuna fisheries', which include, *inter alia*:

- (a) commercial tuna fishing is prohibited in territorial areas unless States indicate otherwise.
- (b) other prohibited areas declared by States and Federal governments; and
- (c) full compliance of all measures specified under PNA requirements and related initiatives including time and area closures, catch retention and FAD closures.

On the regional level, as a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean.

The Management Plan on Tuna Fisheries for the Federated States of Micronesia 2015 states that it is the country's high-level fisheries policy. It is a "living document" that contains the mandate for NORMA to deliver services with regard to the effective and sustainable conservation, management, exploitation and development of tuna fisheries in the country. It also ensures the necessary monitoring, control, surveillance and enforcement measures to support domestic development aspirations and deter IUU activities in the Federated States of Micronesia's fisheries waters. The plan, which is part of the overall Federated States of Micronesia fisheries policy, focuses on all fishing activities in the EEZ and by locally-flagged vessels fishing in the high seas and other EEZs. This includes longline, purse-seine and pole-and-line fisheries. The plan specifically focuses on the tuna species of skipjack, yellowfin, bigeye, albacore and billfish, recognizing the last two are not targeted by any gear or specific fisheries.

The impacts of fishing on target tunas, bycatch and dependent species, as well as the general marine environment, are also covered under the plan. As indicated above, the four states of the Federated States of Micronesia (Chuuk, Kosrae, Pohnpei and Yap) have jurisdiction over fisheries management in the waters of their respective 12-mile zones. GPA (2001) indicated that coastal fisheries in the four states were very different with respect to fishery management arrangements, and that in some respects, the management regimes were so dissimilar that the situation resembled four different countries. This statement remains valid today.



## **Fisheries Policy Framework**

During the 1990s, no less than nine policy studies, initiatives, workshops, consultations or summits were aimed all or in part at defining the Federated States of Micronesia fisheries policy. A policy emerged in 1997 that was subsequently adopted with some changes by the Federated States of Micronesia Congress. The elements of the policy contained a mixed bag of strategies for fisheries development, strategies for fisheries management, and a goal of fisheries management. Much of this "policy" consisted of an incomplete list of strategies to support unspecified objectives. A more comprehensive two-volume planning document was produced and approved in 2003, 'The Federated States of Micronesia's Strategic Development Plan 2004–2013'. It contains policy statements and related actions critical to achieving development in oceanic (i.e. tuna) fisheries that are still relevant 10+ years after its adoption. These policy statements were enhanced somewhat by the results of a National Tuna Management and Development Workshop in 2011. Consultations with government officials and others from the four states took place during October–November 2013 to discuss tuna industry development, the desires of the four states in furthering that development, and their understanding of how such development could be realized. The results of those state consultations along with previously identified policy statements formed the basis of a policy options document discussed in depth at a National Tuna Fisheries Development Policy Workshop held in 2014. That workshop deliberated on a range of policy options and agreed on a draft policy. The Management Plan on Tuna Fisheries for the Federated States of Micronesia 2015 states: "The plan is part of the overall the Federated States of Micronesia Fisheries Policy". In this regard, the following "guiding principles" of the plan could be considered indicative of the tuna fisheries policy:

- The tuna resource is shared with other countries in the region and is finite.
- The precautionary approach to fisheries management is most appropriate.
- Management measures will promote the objective of optimum utilization.
- Effective management requires participation in, and compliance with, regional and international measures.
- Surveillance and enforcement are important tools of management.
- Surveillance of state waters is important to resource management and should be supported.
- Tuna stock assessment is not exact and there may be differing scientific opinions on the status of resources.
- Special attention should be given to bigeye resources.
- Principles guiding tuna fisheries management are generally applicable to nontarget species affected by tuna fishing.



## Institutional Arrangements

The National Oceanic Resources Management Authority (NORMA) is the government's regulatory and management arm within the Federated States of Micronesia 200-mile EEZ. NORMA began operation on 1<sup>st</sup> January 1979 at the same time as legislation entered into force establishing the 200-Mile Extended Fishery Zone. The mission of the Authority is to be "an effective guardian and manager of the marine resources in the Exclusive Economic Zone of the Federated States of Micronesia for people living today and for generations of citizens to come". The Authority works to:

- (a) ensure that these resources are used in a sustainable way
- (b) obtain the maximum sustainable economic benefits from the resources; and
- (c) promote economic security for the nation through their use.

The Authority consists of five members/Directors, appointed by the President subject to the advice and consent of Congress. Four of the five are appointed after consultations with the four states and one is appointed at-large. The Executive Director of NORMA has full responsibility for the operation of the office and is assisted by the Deputy Director in meeting his/her obligations. The position is appointed by the Authority and serves under the conditions it sets. The Executive Director and Deputy Director together form the Executive Management of NORMA, which has broad responsibility for (a) providing information, advice and, where appropriate, recommendations to the NORMA Board for decisions on policy, management and financial matters; (b) implementing the decisions of the Authority and reporting to the President and Congress on the affairs of NORMA; and (c) formulating, reviewing and promoting fisheries management measures within the EEZ.

According to the latest, publicly available NORMA annual report, NORMA has three functional divisions:

1. The Management and Development Division (MDD) is tasked with a range of duties and responsibilities varying from day-to-day administrative office matters to implementation of the fishing agreements that the Authority has with its fishing partners. MDD is responsible, among other things, for receiving applications for and issuing fishing permits pursuant to fishing access agreements entered into by NORMA.
2. The Research Division (RD) is the largest of NORMA's divisions and carries out some of its most significant programme activities. RD's core function is management of NORMA's National Fisheries Observer Programme (NFOP), which is the second largest NFOP in the Pacific Islands region. NFOP has trained and employed over 60 observers from throughout the country to collect and verify key scientific data while on board fishing vessels.
3. The Statistics, Compliance and Technical Projects Division (SCTD) supports a number of NORMA's programme activities, from data collection and management to monitoring, control and surveillance. SCTD also engages in national and regional trade-related discussions where fisheries are concerned. A key component of SCTD is the national Vessel Monitoring System (VMS). The VMS is an important tool for fisheries management as it allows the Authority to see vessels wherever they operate. NORMA's VMS is supported by a mirror system housed at the Maritime Surveillance Wing of the National Police.

Other national government agencies with fishery responsibilities are:

- The National Fisheries Corporation (NFC) – a public corporation established by the Government in 1984. The aim of the corporation is to develop and promote a profitable and long-term commercial fishery in the country. In addition to NFC's own industry development programmes, the corporation works closely with the individual states in joint fishery projects;
- The Fisheries Section of the National Government Department of Economic Affairs, which provides national and state governments with technical services and support for development and management of marine resources, including non-living resources. The section is also responsible for administration of the National Aquaculture Centre in Kosrae;
- Government agencies with a range of roles in fisheries, including the:
  - Congress, for approval of access agreements involving 10 or more vessels;
  - Justice Department, for coordination of surveillance and enforcement activities;
  - Foreign Affairs Department, for fisheries aspects of bilateral and multilateral treaties, and attendance at regional fisheries management meetings;
  - Office of the President, for Cabinet meetings (NORMA's Executive Director is a Cabinet member);
  - Finance Department, for NORMA budget matters and all disbursements except for fishery observer activities.

At the state level, various government agencies are involved in marine resource use and management, including the:

- Pohnpei Marine Resources Division
- Pohnpei Economic Development Authority
- Kosrae Marine Resources Division
- Chuuk Department of Marine Resources
- Yap Marine Resources Management Division
- Yap Fishing Authority



## Legal Framework

The Federated States of Micronesia is a confederation of four states. Distribution of powers between the central and state level of government is dealt with in the Constitution. With regard to fisheries, the distribution of power is largely determined on a geographical basis. Article IX, section 2(m), of the Constitution stipulates that the National Government is empowered "...to regulate the ownership, exploration, and exploitation of natural resources within the marine space of the Federated States of Micronesia beyond 12 miles from island baselines." Conversely, state governments have jurisdiction over fisheries in the territorial sea and internal waters.

Fisheries laws and regulations reviewed in this section are those adopted by the central level of government and thus apply to fisheries in the EEZ. Laws and regulations governing fishing activities in the territorial sea and internal waters are found in the code of each state. With respect to national legislation, the country enacted the Marine Resources Act of 2002 (Public Law 12-34). The major features of the 122-page document are as follows:

1. No domestic fishing, commercial pilot fishing, foreign fishing or such other fishing or related activity is allowed in the exclusive economic zone unless it is in accordance with: (a) a valid and applicable permit issued under authority conferred by this subtitle; or (b) a valid and applicable licence issued by an administrator pursuant to a multilateral access agreement.
2. The Authority is authorized to enter into fisheries management agreements for cooperation in, or coordination of, fisheries management measures in all or part of the region, or for the implementation of a multilateral access agreement. Such agreements may, among other things, at the Authority's discretion, include provisions for the following:

- authorization of a person, body or organization to perform functions required by a multilateral access agreement, including, but not limited to, the allocation, issuance and denial of fishing licences valid in the region or part thereof, including the exclusive economic zone;
- an observer programme;
- a port sampling programme;
- fisheries monitoring and control;
- any other matter relating to fisheries management.

The Marine Resources Act of 2002 has been amended several times in recent years, including in 2005 (to enable the waiver of permit fees in certain circumstances), 2007 (to establish a two-term limit for members of NORMA), 2014 (to require that all vessels land their bycatch), 2015 (to restrict shark finning) and 2015 (to allow the disposal at sea of bycatch after recording).

Subsidiary legislation implementing the previous Title 24 of the Federated States of Micronesia Code, particularly the Reefers and Fuel Tankers Licensing Regulations of 1990 and the Domestic Fishing and Local Fishing Vessel Licensing Regulations of 1991, remains in force. National conservation and management measures relevant to fisheries are in Title 23 of the Federated States of Micronesia Code. Chapter One addresses conservation of marine species. It prohibits fishing using destructive methods, including the use of explosives, poisons or chemicals. It also sets limits on the taking or killing of hawksbill sea turtles and regulates the taking of sponges. Penalties for violation of its provisions are inadequate, with a fine up to USD 100 and/or six months imprisonment. Chapter Two provides for the protection of endangered species of fish, shellfish and game, but there is a provision for taking of these species for subsistence food or traditional uses, provided such taking does not further endanger the species involved. Each of the states has its own legislation dealing with fisheries management and development. These include:

- Chuuk State: Fisheries Act
- Kosrae State: Marine Resources Act of 2000
- Pohnpei State: Marine Resources Conservation Act 1981 and Fisheries Protection Act 1995
- Yap State: Public Law 06-01-07



FIJI



## Fisheries Management Objectives

In general, all fisheries management measures of the national government must conform to the Fisheries Act and other legislation. The Fisheries Act (more formally known as “an act to make provision for the regulation of fishing”) is, however, silent on the objectives of the regulation. In practice, the objectives of fisheries management in Fiji have historically been resource protection, extraction of economic benefits and safeguarding of the flow of food to communities. For coastal commercial fisheries, there are no formal objectives in the legislation. However, judging from the past activities of the Fisheries Department, the management objectives are to promote sustainability of resources, maximize economic returns, and assure that these commercial fisheries do not negatively interact with subsistence fisheries.



## Oceanic Fisheries Management

Fiji's tuna fisheries are managed on regional and national levels.

On the **regional** level, Fiji is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Fiji and the other 26 members of the commission enact tuna management measures at the annual WCPFC meeting. From Fiji's perspective, the two most important measures are: (1) the Conservation and Management Measure for South Pacific Albacore, and (2) the Conservation and Management Measure for Bigeye, Yellowfin and Skipjack Tuna in the Western and Central Pacific Ocean.

On the **national** level, the tuna fisheries are managed by the Fiji Tuna Management and Development Plan (2012–2016). The plan's two most important management tools for the longline fishery in Fiji fishery waters are: (1) a total allowable catch for all tuna species, and (2) a restriction on the number of vessels.

For offshore fisheries, the Offshore Fisheries Management Decree 2012 states “The objective of this Decree shall be to conserve, manage and develop Fiji fisheries to ensure long-term sustainable use for the benefit of the people of Fiji”. The Fiji Tuna Management and Development Plan (2012–2016) lists the high-level goals of the management of offshore fisheries:

1. To contribute to Fiji's GDP through promotion of economic development growth in onshore and offshore tuna fisheries.
2. To increase investment and employment opportunities in tuna fisheries.
3. To promote resilience of tuna fisheries against climate change risks, thereby protecting fisheries investments and ensuring food security.
4. To maintain ecosystem health (including addressing bycatch) and to exercise the precautionary principle and integrated fisheries management.
5. To manage Fiji's tuna fisheries under rights-based and integrated fisheries management frameworks, thereby ensuring conservation and management of tuna resources.
6. To maintain stock sustainability to support economic growth in tuna fisheries.
7. To encourage institutional strengthening that promotes transparency, accountability and efficiency in delivery of services by the Fisheries Department, including supporting growth in the domestic fishing industry.



## Fisheries Policy Framework

The Fiji Government has recognized for some time the need for a fisheries policy to guide the work of the Fisheries Department and other government agencies involved in the fisheries sector. Planning for such a policy started in early 2014. In 2015, FAO, SPC and FFA worked with the Fisheries Department and other fishery stakeholders in the country to formulate a fisheries policy. Two national workshops were held and a draft Fiji National Fisheries Policy 2017–2037 was produced in late 2016. That draft policy contains principles, key policy goals, and cross-cutting issues and strategies. Until the national fisheries policy is finalized and released, indications of the government's fishery policies are obtainable from various documents. The Fiji Government's offshore fisheries policies are implied in the text of the "principles and approaches" section of the Fiji Tuna Management and Development Plan. The plan states that the work of the Fisheries Department in the offshore fisheries is to feature:

- rights-based and integrated fisheries management systems
- an ecosystem and integrated-based approach
- the precautionary principle
- participatory and co-management approaches
- equal and fair distribution of wealth
- trans-boundary and bycatch management
- robust monitoring, control and surveillance.



## Institutional arrangements

The Fisheries Department is the government agency with primary responsibility for the fisheries sector. In practice, the main office of the Fisheries Department in Toorak, Suva, deals with offshore fisheries management, while much of the management of coastal fisheries is handled by the four divisional offices: Northern, Central, Eastern and Western. The Offshore Fisheries Management Decree specifies the fisheries management responsibilities of the Minister, Permanent Secretary and Director of Fisheries, and establishes the Offshore Fisheries Advisory Council. According to the Decree, the function of the Council is to advise the Minister on policy matters relating to offshore fisheries conservation, management, development and sustainable use. With respect to coastal fisheries, the Fisheries Department has a role in advising traditional authorities and is responsible for legislation and enforcement and provision of support regarding commercial viability. The Department issues and regulates licences to fish in customary fishing areas upon receiving prior approval from the head of the designated ownership unit.

According to the Department of Fisheries Annual Business Plan 2016, the Fisheries Department is responsible for:

- administering and enforcing fisheries legislation;
- ensuring conservation, sustainable utilization and management of fisheries resources;
- approving and issuing fisheries-related licenses and permits;
- providing training (staff and stakeholders), extension services and research;
- coordinating with key stakeholders including fisheries resource owners;
- aligning fisheries-related activities to international and regional commitments;
- implementing related regulations/legislation administered by other government agencies.

The Fisheries Department is organized into several divisions. There is one division for each of the four geographical divisions of Fiji, and a division each for aquaculture, fleet and offshore. The Department maintains four divisional offices: Eastern (located in Lami), Central (Nausori), Western (Lautoka) and Northern (Labasa), plus several smaller offices around the country. There are a total of 23 fisheries stations nationwide. There is presently considerable discussion about the need for a coastal fisheries management division



## Legal Framework

The legal framework for the fisheries sector is articulated in the Fisheries Act (Cap 158), Marine Spaces Act (Cap 158 A), Fisheries Regulations (in various legal notices), Offshore Fisheries Management Decree 2012, Offshore Fisheries Management Regulations 2014, Related legislation and regulations include the Environment Management Act 2005, the Endangered Protected Species Act 2002, the Fiji Maritime Transport Decree, and the Surfing Decree.

The main features of the Fisheries Act are that the law:

- defines Fiji's fisheries waters as all internal waters, archipelagic waters, territorial seas and all waters within the exclusive economic zone;
- establishes a Native Fisheries Commission charged with the duty of ascertaining the customary fishing rights in each province of Fiji;
- prohibits the taking of fish in Fiji's fisheries waters by way of trade or business without a licence;
- states that every licence granted under the Act terminates on 31 December next after the day of issue; licences are personal to the holder and not transferable;
- empowers any licensing officer, police officer, customs officer, honorary fish warden and any other officer empowered by the Minister to enforce the Act;
- empowers the Minister to appoint honorary fish wardens whose duties shall be the prevention and detection of offences.

The Fisheries Act also empowers the Minister to make regulations:

- (a) prohibiting any practices or methods, or employment of equipment or devices or materials, which are likely to be injurious to the maintenance and development of a stock of fish;
- (b) prescribing areas and seasons within which the taking of fish is prohibited or restricted, either entirely or with reference to a named species;
- (c) prescribing limits to the size and weight of fish of named species which may be taken;
- (d) prescribing limits to the size of nets or the mesh of nets which may be employed in taking fish either in Fiji's fisheries waters or in any specified part thereof;
- (e) regulating the procedure relating to the issue of and cancellation of licences and the registration of fishing boats, and prescribing the forms of applications and licences and the conditions to be attached;
- (f) prescribing "the fees to be charged upon the issue of licences, and the registration of fishing vessels which fees may differ as between British subjects and others";
- (g) regulating any other matter relating to the conservation, protection and maintenance of a stock of fish which may be deemed requisite.

The Offshore Fisheries Management Decree was promulgated in 2012, with the subsidiary regulations coming into force in 2014. The decree covers:

- functions of the Minister, Permanent Secretary, Director of Fisheries and the Offshore Fisheries Advisory Council;
- fisheries conservation, management and development;
- licences and authorizations;
- monitoring, control, surveillance and enforcement;
- port measures, transshipment and other services;
- jurisdiction and evidence

In late 2016, a comprehensive aquaculture bill was being considered by parliament. The bill is expected to be enacted in 2017.



## KIRIBATI



### Fisheries Management Objectives

Kiribati's Fisheries Act 2010 provides general guidelines for fisheries management through the development of fisheries management plans with management objectives. However, it does not identify any specific management objectives. Kiribati's National Fisheries Policy covers five overarching goals and strategic objectives:

1. Contribute to economic growth and employment through sustainable fisheries, aquaculture and marine resources development.
2. Protect and secure food security and sustainable livelihoods for I-Kiribati.
3. Ensure long-term conservation of fisheries and marine ecosystems.
4. Strengthen good governance, with a particular focus on building the capacity of the Ministry of Fisheries and Marine Resources Development and relevant sectors to implement and support fisheries management, development and monitoring, control and surveillance.
5. Build climate change resilience for fisheries and marine resources in Kiribati.

An integrated fisheries master plan for Christmas Island was also developed with the assistance of SPC for the period 2014–2017 to improve management and sustainable development of the island's fisheries. Its five main priority areas are coastal fisheries, offshore fisheries, aquaculture, tourism and environment.

In Kiribati, the main institution involved with fishery management is the Ministry of Fisheries and Marine Resources Development (MFMRD). The Outer islands have Island Councils, which are composed of elected representatives from the islands' villages.



### Oceanic Fisheries Management

At the regional level, there has been, and continues to be, a large amount of regional cooperation in the management of Kiribati's offshore fisheries. Kiribati is a member of the WCPFC, which was established by the 2004 Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. As a member of the Commission, Kiribati is obligated to comply with its conservation and management measures (CMMs). A management plan for fish aggregation devices (FADs) was also developed in 2014 under these measures to ensure sustainable FAD use by offshore fishing fleets.

Kiribati participates at meetings of the Inter-American Tropical Tuna Commission, which manages and controls tuna fisheries in the eastern Pacific (MFMRD, 2013). At the national level, the management measures for offshore fisheries fall within the mandate of the Kiribati National Tuna Development and Management Plan (2014–2017). Two out of the three goals of the plan have a direct focus on offshore tuna fisheries, i.e. to provide opportunities to harvest and process tuna, and to ensure proper conservation and protection of tuna resources.

A Kiribati Shark Sanctuary was also established under the Shark Sanctuary Regulations 2015. It prohibits commercial fishing and finning of five species of shark within all Kiribati waters. At the sub-regional level, Kiribati cooperates with other member countries of the Parties to the Nauru Agreement (PNA).



## Fisheries Policy Framework

Kiribati's National Fisheries Policy has five overarching goals and strategic objectives:

1. Contribute to economic growth and employment through sustainable fisheries, aquaculture and marine resources development.
2. Protect and secure food security and sustainable livelihoods for I-Kiribati.
3. Ensure long-term conservation of fisheries and marine ecosystems.
4. Strengthen good governance, with a particular focus on building the capacity of the Ministry of Fisheries and Marine Resources Development and relevant sectors to implement and support fisheries management, development and monitoring, control and surveillance.
5. Build climate change resilience for fisheries and marine resources in Kiribati.



## Institutional Arrangements

The Ministry of Fisheries and Marine Resources Development (MFMRD) is the Kiribati Government agency responsible for developing and managing the nation's fisheries as well as other marine resources (marine aggregates, deep-sea minerals). The ministry comprises Administration and Finance sections as well as the two main technical divisions, the Fisheries Division and Mineral Resources Division. The Fisheries Division comprises three technical branches:

- The Oceanic Fisheries Branch, which deals with tuna fishery licensing and access arrangements, operation of the vessel monitoring system, deployment of observers and other relevant activities.
- The Coastal Fisheries Branch, which deals with development and management of coastal and inshore fishery resources.
- The Aquaculture Research and Development Branch. This was previously a section of the Coastal Fisheries Branch but is now separate under the current organizational structure.

Each branch is managed by a Principal Fisheries Officer, under the overall supervision of the Director of Fisheries. A separate unit of the division exists to deal with fishery issues in Christmas Island and the Line Islands, which administratively falls under the Aquaculture Research and Development Branch, along with the division's extension and research vessel.

Eight government ministries have direct involvement in fisheries:

- The Ministry of the Environment, Lands and Agriculture Development (MELAD) is responsible for evaluating the environmental impacts of marine resource export developments and is also concerned with the protection of subsistence fisheries, and the protection of marine habitats and marine life.
- The Ministry of Communications, Transport and Tourism Development (MCTTD) maintains the register of the operators of vessels flying the Kiribati flag, including their nationality, and clearance of vessels entering port.
- The Ministry of Commerce, Industry and Cooperatives (MCIC) is charged with evaluating foreign investment in the marine resources sector and local companies involved in marine product export, and with supporting private sector development.
- The Ministry of Health regulates food safety and food imports, including fish.
- The Ministry of Line and Phoenix Islands Development (MLPID) coordinates fishing activities in these islands.
- The Ministry of Justice (MOJ), which houses the police and maritime services, plays an important role in fisheries compliance and enforcement.

- The Ministry of Finance and Economic Development (MFED) houses fisheries statistics data, such as from the household income and expenditure survey and fisheries exports. It is also the recipient agency of the foreign fishing access fees.
- The Ministry of Internal Affairs (MIA) liaises with Island Councils on local fisheries bylaws and outer-island development activities.



## Legal Framework

The main fisheries law of Kiribati is the Fisheries Act. The current (2010) Act's purpose is to make provision for the promotion and regulation of fishing and fishing industries in Kiribati and its fishery limits. The Minister is empowered to appoint a Director of Fisheries and any other fisheries officers and licensing officers the Minister considers necessary for the Act. The President, acting in accordance with the advice of the Cabinet, has wide powers to make regulations relating, inter alia, to the licensing of foreign fishing vessels, the conditions to be observed by foreign fishing vessels, the conservation and protection of all species of fish, prohibited fishing gear and methods, and the organization and regulation of marketing, distribution and export from Kiribati of fish and fish products. There is provision for fishery management plans and a regulatory framework for the operation of fish processing establishments. There is also provision for prohibiting the taking of fish in any sea or lagoon area or on any reef forming part of the ancient customary fishing ground of the people, except by members of the concerned group or under a licence granted at the discretion of the Minister. The Act has been amended several times. The most recent amendment was made in 2009 to take away the discretionary power of the Court to forfeit a vessel or its catch, gear, instruments or appliances, equipment, stores and cargo when found guilty of breaching the provisions of the Fisheries Ordinance.

Other legal instruments relevant to fisheries include the Marine Zones (Declaration) Act 2011, which defines and establishes internal waters, the archipelagic waters, the contiguous zone, the territorial sea, the 200-nautical mile EEZ and the continental shelf of Kiribati; the Fisheries (Pacific Island Parties' Treaty with the United States of America) Act 1988, which implements the Treaty on Fisheries between the Governments of Certain Pacific Island States and the Government of the United States of America. the Native Lands Code, which gives legal recognition to ownership of fish traps, reefs and fish ponds; rules concerning fishery practices declared by many of the Island Councils throughout Kiribati.

Several fisheries regulations have been promulgated under the Fisheries Act, although the majority are long-standing, e.g. the Prohibited Fishing Areas (Designation) Regulations 1978, Fisheries Conservation and Protection (Rock Lobsters – *Panulirus* species) Regulations 1979, Fisheries (Processing and Export) Regulations 1981, Fisheries (Vessel Licences) Regulation 1982, and the Shark Sanctuary Regulations 2015.



## MARSHALL ISLANDS



### Fisheries Management Objectives

The Marshall Islands Tuna Management and Development Plan states that the national goals are to improve economic benefit from the fisheries sector within sustainable limits; to promote responsible and sustainable private-sector-led fisheries developments; and to strengthen institutional capacity to facilitate the responsible development and management of the nation's fisheries resources. Although MIMRA responsibilities include coastal fisheries management, the Authority's current interventions in coastal fisheries are largely oriented to assisting with developing resource management institutional arrangements in the outer atolls, and fish transporting and marketing arrangements. In practice, the authority for fisheries management is devolved to local island governments. Management objectives and measures vary considerably between islands, ranging from virtually no measures to various types of bans.



### Oceanic Fisheries Management

The offshore fisheries in the Marshall Islands are managed on regional, sub-regional, and national levels.

On the regional level, the Marshall Islands is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. The Marshall Islands and the other 26 members of the commission enact tuna management measures at the annual WCPFC meeting. From the Marshall Islands perspective, the most important recent measure is the Conservation and Management Measure for Bigeye, Yellowfin and Skipjack Tuna in the Western and Central Pacific Ocean.

On the sub-regional level, the Marshall Islands cooperates with the other countries that are members of the Parties to the Nauru Agreement (PNA) and its Vessel Day Scheme.

On the national level, the management measures for the offshore fisheries of the Marshall Islands are detailed in the Marshall Islands Tuna Management and Development Plan. The plan was prepared pursuant to Section 25 of the Marine Resources Act 1997.

While the PNA's minimum price for a fishing day is USD 8 000, about one-third of MIMRA's fishing days are being sold in 2017 at prices ranging from USD 10 000 to USD 12 500 per day. The Marshall Islands share of the 45 000 total allowable fishing days is somewhat less than 3 000 days. Although oceanic fishery management tends to dominate MIMRA's agenda, the Authority encourages the development of coastal management plans for outer islands.



### Fisheries Policy Framework

The Marshall Islands fisheries policy is based on the interrelated needs to (a) improve economic benefits within sustainable limits; (b) promote responsible, private-sector led developments; and (c) strengthen institutional capacities within the country for responsible fisheries development and management.

The main strategy for fisheries development is based on the interventions of an enhanced fisheries agency. Accordingly, the government approved a policy for the development of fisheries about a decade ago and directed a restructuring of the Marshall Islands Marine Resource Authority into a more autonomous and self-funding authority. The objective was to release MIMRA from the standard civil service restraints that

regulate most public services to enable a more corporate and commercial orientation (Stanley, 2005). MIMRA's current – and continuing – goal is to raise the bar for fisheries management in the Marshall Islands. Key to this are its four areas of focus:

1. Fisheries observer programme – MIMRA, in cooperation with SPC and PNA, conducts regular fisheries observer training programmes to bring in new observers. The goal is to increase the number of Marshall Islands fisheries observers to 100, which means the training initiative will be ongoing to expand capacity to provide observers for both purse-seine and longline fishing vessels.
2. Collaboration with Sea Patrol – MIMRA continues to partner with the Marshall Islands Sea Patrol by providing fuel and other resources, and working together at the enforcement level, to improve monitoring, control and surveillance of the fishery. Sea Patrol provides essential enforcement capacity and MIMRA will continue the collaboration.
3. Participation in the Shiprider Program – The Marshall Islands now has “shiprider” agreements with both the United States Coast Guard and United States Navy that allow Marshall Islands marine enforcement personnel to ride on the United States of America-flagged vessels in the Marshall Islands EEZ to enforce the nation's sovereign fishing rights. This resulted in multiple boardings for compliance verification of vessels fishing in the EEZ during 2014, significantly expanding surveillance activities beyond those that can be accomplished by Sea Patrol's lone patrol vessel. MIMRA aims to expand its participation in the Shiprider Program in future years.
4. Participation in regional and international fisheries forums and agreements – MIMRA staff played an active role during 2014 in WCPFC and in annual meetings and various technical committees that oversee fishing on the high seas and stock assessments. Similarly, staff engaged with FFA and PNA, among others, to ensure that the Marshall Islands meets its obligations to regional fisheries conventions and agreements, including the provision of required fishing catch data that scientists need to produce accurate stock assessments. Participation in these regional and international organizations allows MIMRA to engage with the fisheries management programmes and initiatives of other nations, and to ensure that it is implementing “best practice” policies for managing Marshall Islands fisheries (**Source: [www.mimra.com](http://www.mimra.com)**).

The Marshall Islands has a Tuna Development Strategy, the objective of which is to maximize economic benefits flowing to the country from the sustainable utilization of its tuna resources, including harvesting and processing. The components of the strategy include:

- an investment strategy that provides a framework on which investors can base their decision making;
- licensing fees – the government should initiate and/or support any move to increase access fees;
- increasing fishing effort in the EEZ to utilise fishing days allocated to the Marshall Islands. The government should promote domestic fisheries operations that propose to fish in its EEZ;
- institutional arrangements – strengthening the capacity of MIMRA, particularly in the area of market access.



## **Institutional Arrangements**

The Marshall Islands Marine Resources Authority was established under the MIMRA Act 1988. MIMRA is the primary agency responsible for exploration, exploitation, regulation and management of living and non-living marine resources in the Marshall Islands. From the perspective of fisheries management in more developed countries, MIMRA may be unique in that the law requires it to be responsible for both the conservation and management of marine resources, as well as their sustainable development. With respect to its responsibilities, the act specifies that MIMRA has the exclusive power and functions to:

- conserve, manage and sustainably develop all resources in the fishery waters and seabed and subsoil thereunder, in accordance with the principles and provisions in the Act and in sub-regional, regional and international instruments to which the Republic of the Marshall Islands is party;

- establish management plans and programmes to manage the resources in the fishery waters;
- issue licences in accordance with the Act;
- issue licences for the exploration and exploitation of the seabed and subsoil of the fishery waters;
- negotiate and conclude access agreements and fisheries management agreements;
- implement by regulation or otherwise, as appropriate, access agreements or fisheries management agreements to which the Republic of the Marshall Islands is party;
- coordinate and manage fisheries monitoring, control and surveillance and, in consultation with the Attorney General, enforcement of the Act;
- appoint authorized officers and observers in accordance with the Act;
- cooperate in the conservation and management of highly migratory fish stocks as appropriate with other coastal states in the region and states fishing in the region and high seas area and participate in appropriate sub-regional, regional and international organizations or arrangements relating to fisheries;
- participate in the planning and execution of projects, programmes or other activities.

MIMRA is responsible to a board of directors, which is chaired by the Minister of Resources and Development. In 1997 it was decided that the activities of MIMRA would henceforth be funded from fishing access fee revenues and that the Authority should have more autonomy from the public service structure. The reconstituted board of directors is made up of the Minister of Resources and Development (Chair), the Attorney General, the Secretary for Foreign Affairs, two fisheries sector representatives (appointed by the President) and the Director of MIMRA (ex officio and secretary to the board).

The Executive Director of MIMRA is responsible to the board and (according to the latest MIMRA annual report) supervises the operations of the various MIMRA divisions including:

- Oceanic and Industrial Affairs,
- Coastal and Community Services (with sections responsible for policy/planning/ statistics, aquaculture and repairs/maintenance),
- Corporate Services and Finance,
- Fisheries and Nautical Training Center,
- Legal Affairs.

Other Marshall Islands institutions with involvement in fisheries include the Office of Environmental Policy and Planning Coordination, Environmental Protection Agency, College of the Marshall Islands and the Marshall Islands Conservation Society.



## Legal Framework

The MIMRA Act 1988 was replaced by the Marshall Islands Marine Resources Act 1997. This act deals with MIMRA affairs, fisheries conservation, management and development issues, management and development of local fisheries, trade, foreign/ domestic-based fishing, licensing, and monitoring, control and surveillance (MCS). The section on conservation, management and development covers the following topics:

- MIMRA's responsibilities with respect to conservation, management and sustainable use of the fishery resource;
- Objectives and purposes for fisheries management and development;
- Determining total level of fishing and allocations of fishing rights;
- Determining participatory rights in fishery;
- Designated fisheries – fishery management and development plans;
- Conservation and management measures • Protection of certain species;
- Protection and promotion of artisanal fisheries;

- The Fisheries Exclusion Zone;
- Cooperation on high seas fishing for highly migratory fish stocks;
- Consultation on international fisheries management;
- Fishing with poisons or explosives;
- Limitations on taking turtles;
- Control of sponges and of black-lip mother-of-pearl oyster shell;
- Prohibition of harvesting trochus except during open season;
- Introduction of fish into fishery waters;
- Prohibition of removal of fish from nets, traps, etc.;
- Protection of fish aggregating devices, artificial reefs, mooring buoys, floats, trays;
- Protection of fishing vessels or gear;
- Use or possession of prohibited fishing gear;
- Prohibition of driftnet fishing activities.

There have been only two minor amendments to the act since 1997. The first amendment, which was in 2001, increased the number of board members from five to seven, and the quorum from three to four. The second amendment in 2006 deals with tax exemption ([www.mimra.com](http://www.mimra.com)).

Other legislation relevant to fisheries includes the:

- Fishing Access and Licensing Act, which vests in MIMRA powers to regulate the fishing activities of both foreign and domestic fishing vessels in the fishery waters of the Marshall Islands;
- Fisheries Enforcement Act, which vests responsibility for the enforcement of the fisheries laws of the Marshall Islands in MIMRA;
- Maritime Administrations Act, which provides Marshall Islands with the necessary legal framework to discharge flag state duties;
- Documentation and Identification of Vessels Act, which regulates the registration of vessels;
- Republic of the Marshall Islands Ports Authority Act 2003, which established the Republic of the Marshall Islands Ports Authority;
- Ports of Entry Act, which regulates the entry of vessels into the country.



## NAURU



### Fisheries Management Objectives

Nauru's National Tuna Fishery Strategy and National Tuna Management and Development Plan were never officially adopted (Gillett, 2009b), they provide some insight into the objectives of Nauru's management of its tuna fisheries. The objectives in the draft plan are:

- strengthening the exercise of sovereign rights by Nauru over the tuna resource;
- increasing the economic gains received by Nauru from the exercise of its rights over the tuna resource;
- ensuring effective participation by Nauru in regional tuna management activities;
- minimizing any adverse impacts of tuna fishing and related activities on non-tuna species and the marine environment;
- eliminating illegal fishing activity in the fisheries waters of Nauru;
- protecting the interests of small-scale tuna fishers, noting their contribution to food security;
- improving the nutritional standards of the Nauruan people through increased availability of fish, including tuna and bycatch species taken during tuna fishing, as a source of food in Nauru.

In terms of the objective of “increasing economic gains”, from a historical perspective, national offshore fishery management efforts have been focused on generating revenue for the Nauru Government through licensing foreign fishing vessels. These efforts have been quite successful: access fees represented 9 percent of government revenue/grants in financial year 2013 and 13.7 percent in FY 2014 (Gillett, 2016).



### Oceanic Fisheries Management

The offshore fisheries in Nauru are managed on regional, sub-regional, and national levels.

On the regional level, Nauru is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Nauru and the other 26 members of the commission enact tuna management measures at the annual WCPFC meeting. From the Nauru perspective, the most important recent measure is the Conservation and Management Measure for Bigeye, Yellowfin and Skipjack Tuna in the Western and Central Pacific Ocean.

On the sub-regional level, Nauru cooperates with the other countries that are members of the Parties to the Nauru Agreement and its Vessel Day Scheme.

At the national level a Tuna Fishery Strategy was prepared, and in 2005, the Nauru National Tuna Management and Development Plan was prepared but as noted above, neither document was officially adopted. Although the strategy and plans cannot be relied on to provide accurate information on national management arrangements, they provide some insight. The plan has two major overall goals: (a) to promote the effective management and conservation of the tuna resources; and (b) to maximize the long-term economic and social benefits for the people of Nauru from the development of tuna resources.



## Fisheries Policy Framework

As stated in NFMRA's 2014/2015 Annual Report, its goal is to enhance development and sustainable management of marine and fisheries resources to provide sustainable economic returns. To do this, there are eight strategies, each with milestones:

1. Strengthen institutional capacity:
  - *Corporate Plan 2009–2012 implemented*
  - *Fisheries Act updated*
  - *NFMRA effectively providing leadership, guidance and assistance on developing and managing fisheries resources*
  - *NFMRA infrastructure improved and consolidated in one site*
2. Maximize sustainable economic returns:
  - *Foreign licensing revenue per fishing day increased in real terms by 2012 from 2008 levels*
  - *Maximized sustainable economic yield from marine and fisheries resources*
3. Promote private-sector led development of commercial fisheries:
  - *Potential niche, small-scale, high-quality fishing and processing export enterprises identified*
  - *Recreational use of marine resources (e.g. game fishing) investigated*
  - *Business profiles for establishing commercial fishing enterprises developed, and potential joint-venture partnerships with investors explored*
4. Promote development of aquaculture:
  - *Current 5-year national aquaculture plan reviewed and implemented*
  - *Legislative and regulatory framework for aquaculture development scoped and developed*
  - *Legislative and regulatory framework for aquaculture development adopted and implemented*
5. Sustainably utilize marine resources to increase food security and alternative livelihoods:
  - *Feasibility study conducted on new fisheries and fishing techniques, including traditional fishing methods*
  - *Business profiles/plans for development of new fisheries and fishing techniques completed and implementation started*
6. Ensure sustainable practices are implemented to safeguard marine biodiversity and ecosystems:
  - *Design, through participatory consultation, development of marine-protected area (MPA) networks*
  - *Capacity development and training on use of ecosystem approach and other conservation planning tools conducted*
  - *Develop legal and regulatory framework to support MPA*
  - *Implement ecosystem approach to coastal fisheries management*
7. Minimize illegal, unregulated and unreported (IUU) fishing:
  - *Implement national plan of action for combating IUU fishing*
  - *Implement national observer programme*
  - *Substantial reduction in IUU*
  - *At least 20 observer trips conducted per annum*
8. Develop sound scientific information on coastal marine resources:
  - *Research capacity of NFMRA strengthened through partnerships with regional and international research institutions*
  - *Research plans for resources assessment capacity developed and training conducted for NFMRA*



## Institutional Framework

In 1997, the Nauru Fisheries and Marine Resources Authority Act established NFMRA as an entity with the powers and functions to regulate and develop activities relating to Nauru's fisheries and marine resources. It is responsible for the management of offshore fisheries, coastal fisheries and aquaculture, and also owns the Nauru Fisheries Corporation, which acts as the Authority's commercial arm (FFA, 2007). The 2014/2015 NFMRA Annual Report, presents the objectives and functions of the NFMRA as:

- To manage, develop, conserve and protect the fisheries and marine resources of Nauru in such a way as to conserve and replenish them as a sustainable asset for future generations.
- To promote the sustainable utilization of the fisheries and marine resources of Nauru to achieve economic growth, improved social standards, improved nutritional standards, human resource development, increased employment and a sound ecological balance.
- To pursue effective strategies for managing the fisheries and marine resources of Nauru so as to maintain the integrity of marine ecosystems, to preserve biodiversity, to avoid adverse impacts on the marine environment and to minimize the risk of long-term or irreversible effects of resource extraction operations.
- To enhance the administrative, legal, surveillance and enforcement capacities of the Republic for the management, development, conservation and protection of the fisheries and marine resources of Nauru.

The functions of the NFMRA as required by the Nauru Fisheries and Marine Resources Authority Act 1997 are given as:

- carry out and give effect to any policy directions of the Minister and the Cabinet on the utilization, management, development, conservation and protection of fisheries and marine resources;
- make recommendations and give advice to the Minister on matters connected with the Authority's objectives;
- administer and enforce the NFMRA 1997 and any other law relating to fisheries or marine resources, to the extent required or permitted by that law and any related policy approved by Cabinet;
- advise and make recommendations to the Minister on the operation of the NFMRA Act 1997 and any other law which relates to its objectives and on changes and amendments the Authority considers necessary or desirable to be made to any law in order to promote and further the Authority's objectives;
- to the greatest extent possible, consistent with the performance of the Authority's functions under the NFMRA Act 1997 or any other law, consult and cooperate with other government departments, branches and agencies, with non-governmental bodies and with international, regional and sub-regional organizations on matters connected with the Authority's objectives;
- secure, authorize and provide attendance and representation of the Republic at international, regional and sub-regional meetings, conferences, workshops and similar gatherings concerned with the development, management, conservation and protection of fisheries or marine resources;
- to the extent provided by the NFMRA Act 1997 and any other law, and with the approval of the Minister, represent the Republic in the conduct of negotiations in respect of any international convention, treaty, agreement or similar arrangement, or any agreement with a foreign state or body representative of the interests of a foreign state, relating to fisheries or marine resources;
- establish, initiate, maintain and engage in such other activities pertaining to the Authority's objectives as are determined by the Board from time to time, in accordance with any policy directions of the Minister; and
- carry out such other functions as are necessary to achieve the Authority's objectives, or as given to it under the NFMRA Act 1997 or any other law.

In terms of day-to-day activities, the NFMRA provides various goods and services to the local communities. According to the latest NFMRA Annual Report, these include 1) ice sales; 2) outboard motor, boat and trailer repair and maintenance; 3) rigging, deployment, repair and maintenance of anchored FADs; 4) search and rescue operations; 5) technical assistance to aquaculturists, either directly or through the Nauru Aquaculture Association; 6) technical assistance to district communities on the community-based ecosystem approach to fisheries management; 7) technical assistance to artisanal fishers, either directly or through the Nauru Fishers Association; and 8) collection of data from communities, fishers and aquaculturists to keep abreast of the situation on the ground and to intervene when required. NFMRA is governed by the NFMRA Board of Directors, who are responsible to the Minister of Fisheries. Under the board is a Chief Executive Officer who oversees the work of the three functional units of NFMRA: Oceanic, Coastal, and Support.



## Legal Framework

The most important laws relating to fisheries in Nauru are the Nauru Fisheries and Marine Resources Authority Act 1997 and the Fisheries Act 1997. The NFMRA Act describes the Authority's objects and functions:

- Objects of NFMRA -- to manage, develop, conserve and protect the fisheries and marine resources of Nauru in such a way as to conserve and replenish them as a sustainable asset for future generations; -- to promote the sustainable utilisation of the fisheries and marine resources of Nauru to achieve economic growth, improved social standards, improved nutritional standards, human resource development, increased employment and a sound ecological balance; -- to pursue effective strategies for managing the fisheries and marine resources of Nauru so as to maintain the integrity of marine ecosystems, to preserve biodiversity, to avoid adverse impacts on the marine environment, and to minimize the risk of long-term or irreversible effects of resource extraction operations; and -- to enhance the administrative, legal, surveillance and enforcement capacities of the Republic for the management, development, conservation and protection of the fisheries and marine resources of Nauru, in accordance with any law relating to fisheries or marine resources.
- Functions of NFMRA -- to carry out and give effect to any policy directions of the Minister and the Cabinet on the utilisation, management, development, conservation and protection of fisheries and marine resources; -- to make recommendations and give advice to the Minister on matters connected with its objects; -- to administer and enforce this Act and any other law relating to fisheries or marine resources, to the extent required or permitted by that law, and any related policy approved by the Cabinet; and to advise and make recommendations to the Minister on the operation of the Act and of any other law which relates to its objects, and on needed changes and amendments.

The NFMRA Act also includes provisions for a board of directors, funds and powers of the Authority, limitations on its powers, liability of directors, and exercise of the powers of the board. The Fisheries Act 1997 is concerned with the management, development, protection and conservation of the fisheries and living marine resources of Nauru. The act has provisions to:

- exercise the sovereign rights of the Republic to explore, exploit, conserve and manage those resources within the fisheries waters of Nauru in accordance with the relevant rules of international law;
- utilise, manage, develop, protect and conserve those resources in such a way as to conserve and replenish them as a sustainable asset for future generations, and to achieve economic growth, improved social standards, improved nutritional standards, human resource development, increased employment and a sound ecological balance;
- pursue effective strategies for managing the fisheries and marine resources of Nauru, including the registration of fishing boats and the licensing of fishing and fishing activities; and
- repeal the Marine Resources Act 1978.

Other laws and regulations important to Nauru fisheries are:

- NFMRA Amendment Act 2004 – transfers the receipt of NFMRA revenue from NFMRA to the Treasury.
- Fisheries Regulations 1998 – describe requirements for vessel registration and licensing, and specific measures for protection of certain resources.
- Nauru Fisheries (PNA Third Implementing Arrangement) Regulations 2009 – give legal expression in Nauru waters to the Third Implementing Arrangement of the Nauru Agreement.
- Sea Boundaries Act 1997 – sets out the scope of Nauru’s marine jurisdiction.
- Sea Boundaries Proclamation 1997 – declares the coordinates of the Nauru EEZ.



NIUE



## Fisheries Management Objectives

An indication of fisheries management objectives for Niue is given in the National Strategic Plan 2009–2013. According to that plan's environment pillar, the goal is to maximize benefits from Niue's resources in a sustainable manner focusing on private sector development, targeting tourism, agriculture and fisheries supported by safe, reliable, affordable, healthy infrastructure.

For offshore fisheries, the objectives of management are given in the National Pelagic Management and Development Plan as to:

- Ensure that the utilization of the tuna, billfish and wahoo stocks in the waters of Niue is consistent with the sustainable utilization of these stocks in their entirety.
- Eliminate illegal fishing activity in the waters of Niue.
- Maximize benefits to Niue, including economic and social, from the long-term sustainable utilization of its tuna and billfish resources.
- Minimize any adverse interactions between fisheries, in particular, between the large-scale commercial industry and the small-scale commercial, subsistence, charter or recreational fishers.
- Minimize the impact of target fishing on both the marine environment and bycatch species.
- Identify and secure funding to support the development and implementation of management measures to pursue the objectives of the Plan.
- Assist to fulfil regional and international obligations regarding the conservation and management of highly migratory fish stocks in Niue's waters.
- Ensure that all activities undertaken as part of this Tuna and Billfish Fishery Plan are implemented and administered efficiently and cost-effectively.

With respect to coastal fisheries, the latest available Niuean National Management Plan for the Coastal Fishery states the goal is to maintain the productivity and maximize the overall sustainable benefit to Niue of coastal fisheries in all areas permitted to fishing. The objectives of the Plan are to:

- ensure that the utilisation of coastal fishery resources is consistent with obtaining the maximum long-term benefit for the people of Niue, according to social development goals defined by the Government and/or Village Councils from time to time;
- ensure that the utilization of coastal fishery resources is consistent with maintaining the integrity of coastal marine ecosystems, particularly coral reef ecosystems, taking into account seasonal, annual, decadal, and other natural environmental cycles;
- effectively integrate national and village coastal fisheries governance systems;
- ensure that there is a balance in perceived equity in the right to use or enjoy coastal fishery resources by all relevant groups and stakeholders, in each Village Council area across the nation as a whole;
- provide early warnings for potential or actual crises in coastal fisheries and their supporting ecosystems;
- contribute to minimizing the impact of non-fishing human impacts on coastal fishery resources;
- assist in fulfilling any regional and international obligations of Niue regarding the identification, conservation and management of coastal fishery species and their habitats;

- ensure that all activities undertaken as part of this plan are implemented and administered efficiently and cost effectively;
- ensure that Niue has sufficient capacity to implement the plan; and
- review the progress of this Plan against objectives 1 to 7 after a period not exceeding five years from each implementation and make any amendments necessary to better achieve the overarching goal of the plan or of its parent legislation.



## Oceanic Fisheries Management

Niue's offshore fishery is managed on regional and national levels.

On the regional level, Niue is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Niue and the other 26 members of the commission enact tuna management measures at the annual WCPFC meeting. From Niue's perspective, the two most important measures are: (1) the Conservation and Management Measure for South Pacific Albacore, and (2) the Conservation and Management Measure for Bigeye, Yellowfin and Skipjack Tuna in the Western and Central Pacific Ocean.

On the national level, the tuna fisheries are managed by the National Pelagic Management and Development Plan. According to the Fisheries Division (2016a), that plan (a) sets limits on the main tuna species targeted, based on the best catch rates and those neighbouring countries' catches that are similar in size; (b) contains the provision that sharks caught in Niue's waters must be discarded; and (c) specifies the requirements for research involving offshore target and nontarget species.

According to the DAFF Corporate Plan 2015–2019, the core fisheries management functions of the department in the near future will be as follows:

- Fisheries Management Advisory Committee (FMAC) is established and functioning by June 2017.
- Management Committee provides recommendations to the Minister and cabinet on key fisheries management and development matters. At least two meetings of the FMAC annually from 2017 onwards.
- Niue Pelagic Fisheries Management and Development Plan is reviewed in 2018.
- Coastal Fisheries Management Plan endorsed by cabinet by December 2016.
- At least two village community-based fisheries management plans are completed annually from 2017 onwards.
- Marine spatial plan is completed by 2019 including zoning for key fisheries related activities.

The main management measure for the offshore fishery is a limit on the catches of the main tuna species. There is also a prohibition on the discarding of sharks caught in Niue waters.



## Fisheries Policy Framework

Niue has a National Strategic Plan (NNSP). The Department of Agriculture, Forestry and Fisheries has the "DAFF Corporate Plan 2015–2019", which lists its activities supporting the NNSP. The corporate plan gives the fisheries and marine objective as: "To actively facilitate the utilization of Niue's marine resources through sustainable and environmentally sound fisheries development strategies at all levels aimed at increasing economic development opportunities and enhancing food security". It specifies the major activities including that "All FADs are replaced following cyclone losses, offshore fisheries licensing revenue secured, fishery limits utilized, and coastal fisheries managed at community level". It further states that fisheries work will focus on the implementation of the pelagic and coastal fisheries management and development plans, and it indicates that the public-private sector partnership project, Niue Ocean Wide (NOW), will resource and drive key fisheries management and planning.



## Institutional Arrangements

Responsibility for fisheries and marine resource matters is vested in the Department of Agriculture, Forests and Fisheries (DAFF). DAFF is one of three components of the Ministry of Natural Resources, the other two being the Department of Environment and Meteorological Services. According to the DAFF Corporate Plan 2015–2019, the core functions of DAFF are grouped into five categories:

- **Management:** to implement the Fisheries Management Plans that ensure sustainability and ecosystems are managed well and enable Niue to sustainably develop marine resources and provide food security from healthy stocks.
- **Research and Development:** to develop key areas in fisheries, allowing for resource sustainability and economic opportunities via research.
- **Monitoring, Control and Surveillance and Compliance:** to monitor, control and police measures adopted and ensure illegal activities are reduced.
- **Licensing:** to produce competitive licences that will maximize returns to Niue.
- **Data Collection and Data Management:** to maintain a comprehensive fisheries database that will aide in informing decision makers of management options.



## Legal Framework

The domestic fisheries legislation of Niue was reviewed in 1995, which resulted in the combining of the Niue Island Fish-Protection Act 1991, the Sunday Fishing Prohibition Act 1980, the Niue Island Fish-Protection Ordinances 1965, and the Safety at Sea Act 1980, into the Domestic Fishing Act 1995 (DAFF, 1999). The Domestic Fishing Act 1995 covers three main areas:

1. Protection of fish: marine reserves, restriction on taking of certain species, prohibited use of illegal fishing means, prohibited exports, and catch/size limits.
2. Sunday fishing ban: Sunday fishing prohibited between certain hours.
3. Safety at sea: all vessels, including fishing vessels propelled by oars or otherwise, but excluding canoes, must be licensed by the fisheries officer and must carry certain safety equipment.

Cabinet is empowered to make regulations for the purpose of giving full effect to the provisions of the act and has done so through the Domestic Fishing Regulations 1996. The Domestic Fishing Regulations 1996 give specifics on prohibited fish exports, fish size limits, fish quota limits, destructive organisms, protected fish species, vessel safety equipment, annual licence fee for vessels, requirements for vessels fishing inside Niue's territorial sea zone, requirements for vessels fishing outside Niue's territorial sea zone, and measurement of crustaceans for size limits. The Territorial Sea and Exclusive Economic Zone Act 1996 establishes a territorial sea of 12 nautical miles and a 200-nautical mile EEZ of approximately 390,000 km<sup>2</sup> in size. In addition, the act covers fisheries management and development (designated fisheries, management/development plans), unauthorized fishing, prohibited fishing methods, access agreements and licensing.



## PALAU



### Fisheries Management Objectives

Palau's Medium-Term Development Strategy states that the goal for aquaculture and fisheries is to achieve sustainable economic development and management of the marine and coastal resources of Palau. The expected outcomes of the Aquaculture and Fisheries Action Plan are:

- development of marine resource income opportunities in a sustainable manner;
- a greater role for the private sector in aquaculture;
- improved returns from offshore fishing;
- increased opportunities from the use of marine resources for tourism.

For the offshore fisheries, the latest, formally adopted tuna management plan has the following objectives:

- Conserve fishery resources by controlling harvesting within international and regional recognized sustainable limits;
- Establish an efficient government framework to harmonize application of fisheries management policies and practices.
- Minimize detrimental impacts of fishing on coastal and inshore environment.
- Attain an optimum balance in relation to access to the resource between all stakeholders.
- Enhance the overall economic balance between: the necessity for government to generate revenue, financial expectations of the commercial tuna fishery interests, and the interests of other users of the resource.
- Promote Palauans in professional, administrative, research and development positions in the fishery and related industries and government agencies.
- Adhere to Palau's regional and international marine resources agreements.



### Oceanic Fisheries Management

The offshore fisheries in Palau are managed on national, sub-regional, and regional levels.

On the national level, the management measures for the offshore fisheries of Palau are in the Palau National Tuna Fisheries Management Plan (described below).

On the sub-regional level, Palau cooperates with the other countries that are members of the Parties to the Nauru Agreement.

On the regional level, Palau is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Palau and the other 26 members of the commission enact tuna management measures at the annual WCPFC meeting. From the Palau perspective, the most important recent measure is the Conservation and Management Measure for Bigeye, Yellowfin and Skipjack Tuna in the Western and Central Pacific Ocean.

The most recent, formally adopted tuna management plan is the Palau National Tuna Fisheries Management Plan 2001. The substantive elements of this consist of the aims of the plan, its scope and seven main objectives. A major feature of the plan is the establishment of the Palau Fisheries Policy Advisory Committee with responsibility for the formation, coordination and implementation of the plan.

A major change in the management of Palau's offshore fisheries occurred in October 2015 when the Palau Congress approved the Palau National Marine Sanctuary Act, establishing a large marine protected area (MPA). The legislation creating the sanctuary designates 80 percent of Palau's territory as a fully protected marine reserve in which no extractive activities, such as fishing or mining, can take place. At 500 000 km<sup>2</sup>, the sanctuary becomes the sixth-largest, fully protected marine area in the world. About 20 percent of Palau's waters will become a domestic fishing zone reserved for local fishers and small-scale commercial fisheries with limited exports. This transformation of Palau's EEZ will take place over a five-year period, during which the number of licences sold to foreign commercial vessels will be decreased annually ([www.pewtrusts.org](http://www.pewtrusts.org)).

The main management measure for the offshore fisheries (as stipulated in the Palau National Tuna Fisheries Management Plan) is a requirement for a fishing licence and conditions associated with that licence (i.e. payment of fees, pollution controls). These measures are supplemented by a number of regional measures, such as the PNA Purse- Seine Vessel Day Scheme and FFA's Vessel Monitoring System. Another management measure for offshore fisheries was introduced when the Palau Congress approved the Palau National Marine Sanctuary Act. The actual management measure is the exclusion of extractive activities (including fishing) in 80 percent of Palau's waters.



### **Fisheries Policy Framework**

To some degree, the objectives of Palau's tuna management plan can be considered indicative of government policy for the offshore fisheries. These objectives are as follows:

- Conserve fishery resources by controlling harvesting within international and regional recognized sustainable limits.
- Establish an efficient government framework to harmonize application of fisheries management policies and practices.
- Minimize detrimental impacts of fishing on the coastal and inshore environment.
- Attain an optimum balance in relation to access to the resource between all stakeholders.
- Enhance the overall economic balance between the necessity for government to generate revenue, financial expectations of the commercial tuna fishery interests, and the interests of other users of the resource.
- Promote Palauans in professional, administrative, research and development positions in the fishery and related industries and government agencies.

Adherence to Palau's regional and international marine resource agreements. The above policy indications will change considerably with the phased implementation of the Palau National Marine Sanctuary Act establishing a large MPA. The legislation creating the sanctuary designates 80 percent of Palau's territory as a fully protected marine reserve in which no extractive activities, such as fishing or mining, can take place. This represents a major shift in Palau's fishery policies.



## Institutional Arrangements

Following the dissolution of the 1980 Palau Fishing Authority in 1997, the main responsibility for coastal fisheries development and management has been vested in the Bureau of Marine Resources (BMR). The BMR is currently administratively under the Ministry of Natural Resources, Environment and Tourism. The BMR's work programme covers a range of different activities in the field of fisheries and marine conservation. The Bureau is headed by a Director and has a staff of about 35 people. It currently has three divisions:

1. Division of Oceanic Fishery Management
2. Division of Information and Data Management
3. Division of Marine Resources Development

As to actual functions, the BMR implements national-level fisheries management measures. The 16 state governments control all resources from the shoreline up to 12 nautical miles offshore (except for the tuna resources). The Ministry has the duties, functions and authority to: (a) adopt regulations for the conservation, management and exploitation of all living resources in the contiguous zone and EEZ of the Republic of Palau; (b) negotiate and conclude foreign fishing agreements; (c) issue foreign fishing permits; and (d) perform such other duties and functions as may be necessary.

BMR determines the annual total allowable level of foreign fishing permitted with respect to specific fisheries. The regulations establish the total allowable level of foreign fishing, catch limits, and allocation so as to ensure the long-term sustainability and health of fish stocks, populations of living resources and reef fish, and submerged reefs within the territorial sea, internal waters, contiguous zone, and Palau's EEZ. The Bureau generates fisheries data through a robust data collection and verification system. These data come from required information submitted for licensing, fishing conditions, catch and landing data, and the Observer Programme in the form of logsheets, port sampling forms, unloading forms, port visit logs, telex reports and observer reports. Data collection enables Palau to meet its reporting obligations to national and regional fisheries management organizations.

Other agencies with involvement in the Oceanic fisheries sector of Palau include the following:

- The Division of Marine Law Enforcement is the primary enforcement authority for Palau's foreign fishing laws. The division enforces all laws and regulations related to fishing, environmental protection and illicit narcotic trafficking, and is responsible for surveillance of territorial waters and the 200-mile EEZ, including enforcement of national laws and international treaties.
- Law-enforcement and compliance with the coastal fisheries legislation is the responsibility of the Division of Fisheries and Wildlife and state government patrol officers.



## Legal Framework

Under Article I, Section 2 of the Constitution, each state in Palau has exclusive ownership of all living and non-living resources, except highly migratory fish, from the land to 12 nautical miles seaward of the baseline. Article X, Section 5 of the Constitution, states that the national government holds the right to regulate ownership, exploration and exploitation of natural resources and to regulate the use of navigable waters. The main law in Palau for specifically dealing with fisheries is Title 27 of the Palau National Code. Title 27 has several chapters, including Chapter 1 (Fishery Zones and Regulation of Foreign Fishing), Chapter 2 (Monitoring of Foreign Vessels in the Exclusive Economic Zone), and importantly Chapter 12, which is the Marine Protection Act of 1994.

The stated purpose of the Marine Protection Act is to promote sustainable development of the marine resources of the Republic while also preserving the livelihood of the commercial fishers of the Republic. The law defines important terms, specifies certain prohibited acts, gives the requirements for permits for taking aquarium fish, gives the power to the Minister to make regulations to carry out the purposes of the Act, stipulates a requirement and regulations for export labelling/reporting, specifies the enforcement provisions and establishes penalties.

In 2003, the Protected Areas Network Act (PAN Act) was signed into law. The act has several purposes: it allows creation of protected areas to enable resource management and to halt habitat degradation and overfishing; it allows states to exert authority over their respective areas; and it allows the national government, through the Ministry of Natural Resources, Environment and Tourism, to assist the states by providing technical assistance, acting as a conduit for funding, and facilitating cooperation among the states in areas of biodiversity importance that cross state boundaries. In 2008, a new law was passed to clarify the intent of the PAN Act and to create the Green Fee (otherwise known as the Environmental Protection Fee) to provide financial resources for establishment and implementation of protected areas.

Another law that has a major impact on fisheries is the Palau National Marine Sanctuary Act establishing a large MPA. It designates 80 percent of Palau's territory as a fully protected marine reserve in which no extractive activities, such as fishing or mining, can take place.



## PAPUA NEW GUINEA



### Fisheries Management Objectives

The Fisheries Management Act 1998 (as amended in 2012) stipulates that fisheries management plans are to specify management objectives. Accordingly, the National Tuna Fishery Management and Development Plan states: To achieve the aims of this Plan the following objectives have been identified:

- a) Increased domestication of tuna industries.
- b) Building fisheries businesses.
- c) Improved fisheries access agreements.
- d) Enhanced regional cooperative arrangements.
- e) Increased social benefits.
- f) Improved harvest strategies.
- g) Increased market and trade opportunities.
- h) Sustainability certification and price premiums.
- i) Increased control over fishing in the Papua New Guinea fisheries management area.
- j) Increased use of rights-based approaches.
- k) Increased capacity to realize commercial opportunities.
- l) Actively combat IUU activities.
- m) Implement a full and thorough catch documentation regime.
- n) Apply technology and tools for comprehensive near real-time management.
- o) Implement user pays policy to cost recover management.
- p) Provide direct and indirect opportunities to the local population to both participate in, and benefit from, economic development.

In addition to these stated objectives, an important objective of the management of tuna fisheries in the country has been the generation of government revenue.



### Oceanic Fisheries Management

The tuna fisheries in Papua New Guinea are managed on national, sub-regional, and regional levels:

The National Tuna Fishery Management and Development Plan gives some indication of government policies and strategies for the offshore fisheries: To achieve the aims of this Plan the following objectives have been identified:

- a) Increased domestication of tuna industries.
- b) Building fisheries businesses.
- c) Improved fisheries access agreements.
- d) Enhanced regional cooperative arrangements.
- e) Increased social benefits.

- f) Improved harvest strategies.
- g) Increased market and trade opportunities.
- h) Sustainability certification and price premiums.
- i) Increased control over fishing in Papua New Guinea fisheries management area.
- j) Increased use of rights-based approaches.
- k) Increased capacity to realize commercial opportunities.
- l) Actively combatting IUU activities.
- m) Implementing a full and thorough catch documentation regime.
- n) Applying technology and tools for comprehensive near real-time management.
- o) Implementing user-pays policy to cost recover management.
- p) Provide direct and indirect opportunities to the local population to both participate in, and benefit from, economic development.

On the sub-regional level, Papua New Guinea cooperates with the other countries that are members of the Parties to the Nauru Agreement and the associated Vessel Day Scheme (VDS).

On the regional level, Papua New Guinea is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Papua New Guinea and the other 26 members of the commission enact tuna management measures at the annual WCPFC meeting. From the Papua New Guinea perspective, the most important recent measure is the Conservation and Management Measure for Bigeye, Yellowfin and Skipjack Tuna in the Western and Central Pacific Ocean.

The main management measure for the tuna purse-seine fishery is the allocation of a limited number of days in the Vessel Day Scheme. A similar scheme for the longline fishery is being introduced. For both purse-seine and longline fisheries, other management measures operate concurrently with the VDS. These include closed areas (e.g. bans on fishing close to shore), gear restrictions (e.g. seasonal bans on FADs) and vessel restrictions (e.g. purse seiners in archipelagic waters to be less than 80 m in length). Under the Fisheries Management Act, a function of NFA is to “manage the fisheries within the fisheries waters” of Papua New Guinea. Devolution of fisheries management powers from the national level to provincial governments is provided for under the auspices of the 1997 Organic Law on Provincial Governments and Local-level Governments, whereby lower-level governments can make management regulations for natural resources under Sections 42 and 44.



## Policy Framework

Papua New Guinea’s new development policy, as outlined in Vision 2050, is premised on the important and mutually reinforcing roles of economic growth, human development and environmental management, and is based on seven strategic focus areas or ‘pillars of development’. The ‘ideal’ of Vision 2050 is that Papua New Guinea develops and builds a solid and sustainable economic foundation based on renewable sectors. These renewable sectors are agriculture, forestry, ecotourism and fisheries. The most up-to-date source of government policies and development strategies in the fisheries sector is the NFA Corporate Plan 2008–2012. Important points of this plan include i) the Domestication Policy, which encourages the full participation of Papua New Guinea citizens and locally-based companies in the development of commercial fisheries. This policy aspires to have citizens actively participate in all aspects of fishing, from harvesting and post harvesting to downstream processing and value adding; II) the government’s “development framework” for fisheries which promotes:

- preferential – but not necessarily protected – access for national operators dependent on increasing participation by nationals;

- active consultation with industry to consider its interests when developing policy;
- an awareness programme promoting industry activities and potential;
- working with other regulators to remove impediments to efficient operation;
- provision of marketing and resource information;
- training for operators on planning and managing their businesses well;
- provision of a range of practical training programmes to provide skilled labour for the industry through the National Fisheries College;
- increasing restrictions on direct foreign employment where skilled nationals are available.

Another indication of Papua New Guinea's policies and strategies for the offshore fisheries is given in NFA's statement to the WCPFC: Papua New Guinea is focused on building its domestic tuna industry to an extent where the generated revenue can offset that currently obtained from bilateral access fees. The government's main objective is to maximize the benefits from tuna resources to citizens and promote the involvement of nationals in the industry. A growth in the industry would provide an increase in employment opportunities, increased foreign exchange earnings for the country, and direct and indirect spinoff benefits among other benefits of value-adding to tuna resources (NFA, 2016).



## **Institutional Arrangements**

The Fisheries Act provided for the establishment of the National Fisheries Authority (NFA) to replace the former Department of Fisheries and Marine Resources. The NFA, which has a more commercial orientation than its predecessor, began operating in 1995. It was mandated to manage Papua New Guinea's fisheries resources under the Fisheries Management Act (1998). In 2001, NFA was completely reorganized and re-staffed and strengthened, with staff numbers dropping by two thirds. The Fisheries Management (Amendment) Act 2015 changed the composition of the NFA Board. It now has nine members, who represent government, the fishing industry, resource owners and NGOs. The National Executive Council appoints the Chair of the Board, which is required to meet at least once every three months. Access fees from foreign fleets currently form the bulk of the revenues received and managed by NFA. Other income sources include licence fees from other operators, assistance from donors, and penalties arising from prosecutions under the Fisheries Management Act. The functions of NFA, as given in the National Fisheries Authority Corporate Plan 2008–2012, are to:

- manage the fisheries within the fisheries waters in accordance with this Act and taking into account the international obligations of Papua New Guinea in relation to tuna and other highly migratory fish stocks;
- make recommendations to the Board on the granting of licences and implement any licensing scheme in accordance with this Act;
- liaise with other agencies and persons, including regional and international organizations and consultants, whether local or foreign, on matters concerning fisheries;
- operate research facilities aimed at the assessment of fish stocks and their commercial potential for marketing;
- subject to the Pure Foods Act, the Commerce (Trade Descriptions) Act, the Customs Act, the Customs Tariff Act and the Exports (Control and Valuation) Act, control and regulate the storing, processing and export of fish and fish products;
- appraise, develop, implement and manage projects, including trial fishing projects;
- prepare and implement appropriate public investment programmes;
- collect data relevant to aquatic resources;

- act on behalf of the government in relation to any domestic or international agreement relating to fishing or related activities or other related matters to which the independent State of Papua New Guinea is or may become a party;
- make recommendations on policy regarding fishing and related activities;
- establish any procedures necessary for the implementation of this Act, including tender procedures; and
- implement any monitoring, control, and surveillance scheme, including cooperation, agreements with other States or relevant international, regional or sub-regional organizations in accordance with this Act.

NFA has been structured into the following business groups, each under the leadership of an Executive Manager reporting directly to the NFA Managing Director:

1. Directorate
2. Corporate Services
3. Finance and Accounts
4. Fisheries Management
5. Licensing and Data Management
6. Monitoring, Control and Surveillance
7. Provincial Support and Industry Development
8. Project Management
9. Institute of Sustainable Marine Resources (including the National Fisheries College).

Most of the governments of maritime provinces in Papua New Guinea have fisheries offices. Those offices receive funding from both NFA and provincial governments to carry out fisheries development and management. Another institution involved in fisheries is the Fishing Industry Association.



## Legal Framework

The Fisheries Management Act 1998 defines the role and responsibilities of the National Fisheries Authority. The Act essentially empowers NFA to manage, control and regulate all of Papua New Guinea's fishery resources, whether inland, coastal or offshore. Although the Act recognizes and allows for customary uses, rights and traditional resource ownership, it does not in itself empower provincial or lower level governments to manage fisheries in what they may consider to be their areas of jurisdiction. Such powers may be delegated by the Minister for Fisheries through regulation or promulgation, but this is entirely discretionary. The Act is 56 pages in length and has nine parts: Part i Preliminaries Part ii Institutional arrangements Part iii Fisheries management, conservation and development Part iv Licences Part v Enforcement and observer programme Part vi Jurisdiction, procedure, offences, penalties and liability Part vii Administrative proceedings Part viii Evidence Part ix Miscellaneous With respect to the details of the Act, its provisions on the functions of NFA are given in section 10.7 above, and its provisions on the content of fisheries management plans and the objectives of fisheries management in Papua New Guinea are given in section 10.3.2 above.

Many of Papua New Guinea's fishery management plans, including the following, are formulated as regulations under the Fisheries Management Act:

- National Beche-de-mer Fishery Management Plan
- Barramundi Management Plan
- National Lobster Fisheries Management Plan
- National Tuna Fishery Management and Development Plan 2014.

Apart from the Fisheries Act, there are at least 28 other legislative instruments currently in force and relevant to the fisheries sector. Most important of these is the Organic Law on Provincial and Local-level Governments of July 1995, which gives provincial governments responsibility for fisheries and other development activities and the provision of basic services. The Organic Law requires that national bodies devolve as many of their functions as possible to the provincial authorities or carry them out at provincial level. Other relevant legislation includes the environment, maritime zones, shipping and maritime safety acts and regulations, and laws governing business and company management.



## SAMOA



### Fisheries Management Objectives

The Fisheries Management Act 2016 gives fisheries management objectives in only very general terms:

*“Management decisions are based on the best information available and are designed to maintain or restore stocks at levels capable of producing maximum sustainable yield, or any other approved reference points, as qualified by relevant environmental, social and economic factors, and taking into account fishing patterns and the interdependence of stocks.”*

The Samoa Tuna Management and Development Plan 2011–2015 states: “The Plan will pursue the following objectives through the management of tuna fishing: a) Continuing to strengthen the exercise of sovereign rights of Samoans over tuna. b) Increasing the economic gains received by Samoa through exercising its rights over tuna and through optimal management of the fishery. c) Contributing to the sustainable management of tuna resources and the associated ecosystem, including through effective participation by Samoa in regional activities. d) Continual recognition of cultural values in tuna policy and planning, particularly the importance of the contribution of tuna to food security, and protection of the interests of small-scale fishers.”



### Oceanic Fisheries Management

The tuna fishery in Samoa is managed on regional and national levels.

On the regional level, Samoa is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. From Samoa’s perspective, the two most important measures are: (1) the Conservation and Management Measure for South Pacific Albacore, and (2) the Conservation and Management Measure for Bigeye, Yellowfin and Skipjack Tuna in The Western and Central Pacific Ocean.

On the national level, the tuna fishery in Samoa is managed under the Samoa Tuna Management and Development Plan 2011–2015. The plan covers two main areas: management of Samoa’s tuna resources and development of the tuna industry. The plan sets licence caps and licence fees for categories determined by length of vessel. The categories and maximum number of licences allowed are: up to 11 m (100 vessels), over 11 m and up to 12.5 m (10), over 12.5 m and up to 15 m (10), over 15 m and up to 20.5 m (12) and over 20.5 m (5). The plan provides for flexibility in adjustment of the number of licences per category. Similarly, licence fees are set out in the plan but subject to review. The plan formalizes a consultation process, the Commercial Fisheries Management Advisory Committee, requiring regular consultations to be held with domestic fishing industry participants by the Fisheries Division and other relevant government departments. Other notable provisions in the plan include an exclusion zone for larger vessels that reserves fishing within 50 miles from shore for vessels under 12.5 m in length, and a trip limit of five sharks caught incidentally during tuna targeting operations, with an exemption for vessels under 12.5 m in length from the requirement to land carcasses with fins.

The Fisheries Division Annual Report for fiscal year 2014–2015 states that a review of the Tuna Management and Development Plan 2011–2015 was carried out in May 2015 with technical assistance provided by the Forum Fisheries Agency (FFA) and SPC. The review looked at what had been achieved and priorities for a new plan. The discussions during the review mostly focused on how to implement Samoa’s allocation for South Pacific albacore and how to operationalise this allocation in different sectors of the commercial fishing community. Coastal fisheries management in Samoa is largely



## Fisheries Policy Framework

In a general sense, the major government policies in fisheries are to stabilize the harvests in the offshore commercial fishery, and to devolve responsibility for management of inshore fisheries to villages. The Samoa Tuna Management and Development Plan 2011–2015 contains the following policy statements: (a) Continuing to strengthen the exercise of sovereign rights of Samoans over tuna; (b) Increasing the economic gains received by Samoa through exercising its rights over tuna and through optimal management of the fishery; (c) Contributing to the sustainable management of tuna resources and the associated ecosystem, including through effective participation by Samoa in regional activities; (d) Continual recognition of cultural values in tuna policy and planning, particularly the importance of the contribution of tuna to food security, and protection of the interests of small-scale fishers. The development strategies in the plan are to:

- provide an enabling environment that will promote and encourage private sector development in the commercial fishing, processing and support sectors in Samoa;
- maintain and expand the export of tuna and tuna products from Samoa;
- promote the development of new markets for Samoan tuna;
- promote value-adding to tuna catches in Samoa, to maximise local employment, and produce a high-value product for both domestic and export markets;
- encourage the private sector to enter into joint ventures with foreign investors to establish viable fishing operation with shore facilities for processing and exporting fresh or processed tuna based in Samoa;
- increase the catches of the Samoan tuna fleet through the negotiation of access arrangements with neighbouring countries and territories and through the chartering of vessels to fish on the high seas;
- increase the participation of private sector interests in tuna fishing through the provision of infrastructure needed to foster development, such as anchorage for fishing vessels, and constructing support services, such as ice-making machines for processing and/or storage facilities, including in rural locations;
- explore the feasibility of 'super alia' vessels, or other suitable alternatives to improve the economics of the fishery and increase safety at sea;
- strengthen the performance of the Competent Authority on fish and fishery products destined for exports;
- ensure that all developments are sustainable and economically viable, with benefits flowing directly to the local people.



## Institutional Arrangements

Government responsibility for fisheries and marine resource matters is vested in the Fisheries Division of the Ministry of Agriculture and Fisheries. It is headquartered in Apia, on the waterfront near the Apia Fish Market. The Fisheries Division is one of seven divisions of the Ministry of Agriculture and Fisheries. The Division, which is headed by an Assistant Chief Executive Officer, has several components including Coastal Fisheries, Offshore Fisheries, Enforcement, Administration, Aquaculture and Extension.

According to the Ministry's website ([www.maf.gov.ws](http://www.maf.gov.ws)), the Fisheries Division undertakes research, analysis, monitoring and reporting to facilitate the development of fishery resources in Samoa, and promotes the involvement of communities, fishers, private investors and relevant stakeholders in the adoption of sustainable fisheries practices and sustainable development and management of fisheries. Under the Fisheries Management Act 2016, the functions of the Fisheries Division are:

- a) to liaise with international, regional and government agencies and village communities on issues affecting the development and management of fisheries resources and their environment;
- b) to assist government agencies, villages, non-government organizations and stakeholders meet their obligations under this Act;

- c) to advise government agencies, villages and other communities on the management of coastal fisheries resources, aquaculture, environment and the protection and conservation of the fishery resources for the present and future generations of the people of Samoa;
- d) to monitor activities and proposals in other sectors and advise the Minister concerning their effect on fisheries;
- e) to establish, operate, maintain, and administer government facilities for fishing and related activities;
- f) to act in combination or association with any other person whether in Samoa or another country, for the purposes of this Act;
- g) to manage finance incurred for the purposes of this Act and to collect prescribed fees for services rendered under this Act;
- h) to carry out any other function determined by the Chief Executive Officer and to do any other thing to give effect to the objects or for the purposes of the Act.

The Commercial Fisheries Management Advisory Committee (CF-MAC) is the official body that represents the offshore fishing industry. The Committee comprises representatives from the private sector and relevant government departments. It includes two elected representatives from the Upolu Fishermen's Association, Savaii Fishermen's Association, Fish Exporters Association and Boat Builders Association, and one appointed representative from the Treasury Department, Fisheries Division, Ministry of Transport, Port Authority and the Department of Trade, Commerce and Industry.



## Legal Framework

The main legislative instrument relating to fisheries in Samoa is the Fisheries Management Act 2016, more formally known as “An act to regulate and control the conservation, management or development of fisheries and the licensing of Samoan fishing vessels and foreign fishing vessels and for related purposes”. It is a 75-page document, containing nine parts:

1. Preliminary
2. Administration, treaties and fisheries management plans
3. Licences
4. Fishing activities
5. Processing, trading and marketing of fish and fish products
6. Enforcement
7. Evidence, liabilities and offences
8. Village fisheries bylaws
9. Miscellaneous

Notable features of the Act include the following:

- The precautionary approach (as described in the Fish Stocks Agreement) to the conservation and management of fishery resources must be applied.
- The functions of the Fisheries Division (given in Section 11.7 above) are specified.
- The Chief Executive Officer may declare and mark an area as a village fisheries management area.

- The Minister may declare an area to be a designated fishery, if the Minister considers that: (a) it is in the national interest; and (b) management measures are needed to ensure sustainable use of the fishery resource.
- The Chief Executive Officer must prepare, make and review a fishery management plan for the management of a designated fishery.
- Samoan fishing vessels must be licensed.
- Aquaculture operations outside village fisheries management areas must be authorized by the Chief Executive Officer, and the Fisheries Division must manage any aquaculture activity which is not allocated to a village fisheries management area.
- A licence is necessary for the processing, trading and marketing of fish and fish products.
- A village Fono may make village fishery bylaws, consistent with the Act, for the purpose of conserving, protecting, managing, developing and sustaining harvest of fish in the village fisheries management area.



## SOLOMON ISLANDS



### Fisheries Management Objectives

The objectives of fisheries management in the Solomon Islands must be consistent with those of the Fisheries Management Act 2015. The objectives of that act are “to ensure the long-term management, conservation, development and sustainable use of Solomon Islands fisheries and marine ecosystems for the benefit of the people of Solomon Islands”.

The Solomon Islands Tuna Management and Development Plan 2015 states: “In pursuit of the overall objectives of the National Tuna Fisheries Management Plan, six specific goals have been identified. These goals provide the MFMR and allied stakeholders with practical and achievable management targets and represent how all the support institutions may contribute, in whole or in part, to realizing national and municipal expectations of the benefits that the resources can provide. Each specific goal has a clear and deliberate purpose and the achievement of each will contribute directly to the overall objectives of tuna fisheries management as set out in the Plan. The essential purpose of each of these goals is:

- To ensure that fish stocks are maintained at sustainable levels to support profitable fisheries.
- To manage fisheries within recognized principles of the ecosystem approach to fisheries management.
- To maximize employment opportunities for Solomon Islanders.
- To increase investment in fisheries and government income from the tuna fishery sector.
- To ensure good governance, management and compliance systems are in place.
- To enhance Solomon Islands’ influence in regional and international management organizations.
- To endorse the principles of regional cooperation by participating in relevant RFMOs and ensure that required data and information is provided according to requirements of respective RFMOs for the benefit of sound tuna fisheries management.

The Solomon Islands Tuna Management and Development Plan 2015 has several types of management measures. The two main measures are the limiting of fishing days by the Vessel Day Scheme and closing of areas.



### Oceanic Fisheries Management

The offshore fisheries in the Solomon Islands are managed on national, sub-regional, and regional levels.

On the national level, the management measures for the offshore fisheries of the Solomon Islands are detailed in the Solomon Islands Tuna Management and Development Plan 2015, which was prepared pursuant to Section 17 of the Fisheries Management Act 2015.

On the sub-regional level, the Solomon Islands cooperates with the other countries that are members of the Parties to the Nauru Agreement and participate in the Vessel Day Scheme (VDS).

On the regional level, the Solomon Islands is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean.

A crucial aspect of the management of the offshore fisheries in the Solomon Islands is the Parties to the Nauru Agreement (PNA) and its Vessel Day Scheme.

For the inshore fisheries, the Solomon Islands National Development Strategy (NDS) 2011–2020 contains several relevant provisions. Govan et al. (2013) summarized these provisions as

- **Development:** Calls for sustainable enhancement of fisheries productivity to address food security and sustainable economic development of inshore fisheries while reducing reliance on coastal capture fisheries.
- **Resource management:** Calls for effective coordination between national, provincial and community levels to facilitate sustainable development of inshore fisheries and shift from “open access” to “managed” fisheries in partnership with resource owners and fishing communities to improve food security, sustainable marine resource management and economic productivity.
- **Ecosystem and integrated management approaches:** In collaboration with the Ministry of Environment, seeks a sustainable approach to natural resources management addressing biodiversity, forestry, fisheries and marine resources and waste management, including through community governance regimes, and sensitizing the population on the dangers of environmental degradation through awareness campaigns.



## Fisheries Policy Framework

With respect to strategies, the Ministry of Fisheries and Marine Resources Corporate Plan for 2015–2018 articulates four focal areas and related goals for MFMR:

- **Focal area 1:** Resource and ecosystem management. Goal: Sustainable fisheries resource management and promote livelihood opportunities through effective conservation and management of oceanic and coastal ecosystems.
- **Focal area 2:** Private sector development and investment. Goal: Promote private sector development, investment and secure market access to achieve higher economic returns and social benefits from the use of marine resources.
- **Focal area 3:** Fisheries compliance (the operational arm of fisheries management). Goal: The effective management of national and shared fish stocks through a strengthening of fisheries compliance and enforcement.
- **Focal area 4:** Governance and institutional development. Goal: Improved fisheries governance supported by a strengthening of the institutional framework of the sector.

At their summit in March 2012, the leaders of the Melanesian Spearhead Group (MSG) of countries (Fiji, New Caledonia, Papua New Guinea, Solomon Islands and Vanuatu) agreed to develop a roadmap for the protection of inshore fisheries<sup>20</sup>. The roadmap gives some insight into the Solomon Islands’ future policies and strategies in inshore fisheries management. In terms of strategies used by non-government organizations (NGOs) involved in fisheries in the Solomon Islands, NGOs experienced a slow learning curve starting from the conservation and protected area approaches in the 1990s, of which the Arnavons Marine Conservation Area is perhaps the only surviving example (Govan et al., 2013). Early conservation approaches in the Solomon Islands do not seem to have found constructive ground for collaboration between government and civil society, with failures attributed to both government and NGO-only approaches.

<sup>20</sup> [https://spccfpstore1.blob.core.windows.net/digitalibrary-docs/files/fc/fcb90c164f5068fdaccda1698e7a77be.pdf?sv=2015-12-11&sr=b&sig=48a59YWW6D%2BXUt%2BQjh4LKKR%2Bwn9WtagJEJGml6QLZ6c%3D&se=2018-12-21T15%3A57%3A20Z&sp=r&rsc=public%2C%20max-age%3D864000%2C%20max-stale%3D86400&rsc=application%2Fpdf&rscd=inline%3B%20filename%3D%22Anon\\_15\\_MSG\\_Roadmap.pdf%22](https://spccfpstore1.blob.core.windows.net/digitalibrary-docs/files/fc/fcb90c164f5068fdaccda1698e7a77be.pdf?sv=2015-12-11&sr=b&sig=48a59YWW6D%2BXUt%2BQjh4LKKR%2Bwn9WtagJEJGml6QLZ6c%3D&se=2018-12-21T15%3A57%3A20Z&sp=r&rsc=public%2C%20max-age%3D864000%2C%20max-stale%3D86400&rsc=application%2Fpdf&rscd=inline%3B%20filename%3D%22Anon_15_MSG_Roadmap.pdf%22)



## Institutional Arrangements

Under the authority of the Fisheries Management Act 2015, the main government institution in the fisheries sector is the Ministry of Fisheries and Marine Resources (MFMR). According to the Ministry of Fisheries and Marine Resources Corporate Plan for 2015–2018, its role is to regulate the orderly development and quality management of Solomon Islands fisheries and marine resources and to ensure the Solomon Islands receives maximum economic and social benefits from the sustainable use of its fisheries and marine resources. MFMR currently has 157 staff and is organized and managed based on a number of technically focused divisions, each headed by a deputy director. The head of the ministry is the Minister who is mandated by the constitution to oversee all things concerning the fisheries and marine resources of the country.

The Executive Management (the Permanent Secretary, Director of Fisheries, Undersecretary Technical and Undersecretary Corporate Services) are responsible for the administration, human resources and financial matters of the ministry.

The Inshore Fisheries Division is responsible for research, marketing and community-based resource management of all inshore and coastal fisheries and marine resources and for the development of aquaculture.

The Provincial Fisheries Division is responsible for development of fisheries in all provinces, providing support to provincial fisheries officers and administration of all fisheries centres in the provinces.

The Policy, Planning and Project Management Division is made up of the policy and planning section and the project management section and is responsible for development of fisheries policy and management and implementation of fisheries investment projects.

The Corporate Services Division includes the accounts and administration sections and is responsible for administration, human resources and financial matters.

The New Zealand Aid-funded programme, Mekem Strong Solomon Islands Fisheries, and the World Bank-funded Pacific Regional Oceanscape Programme are support programmes that sit within the ministry to support targeted activities and capacity development in MFMR.



## Legal Framework

The main law dealing with fisheries in the Solomon Islands is the Fisheries Management Act 2015, which “makes provisions for the conservation, management, development and sustainable use of fisheries and marine resources of Solomon Islands, to monitor and control fishing vessels within and beyond the fisheries waters, to repeal the Fisheries Act 1998 and to make consequential amendments to the Provincial Government Act 1997 and the Town and Country Planning Act”. The 139-page document has 13 parts:

1. Preliminary
2. Objective and principles
3. Administration
4. Fisheries conservation, management and sustainable use
5. Fisheries access and management agreements
6. Licensing
7. Requirements for fishing and other activities
8. Monitoring, control and surveillance
9. Disposal, release and forfeiture of seized items

10. Jurisdiction, procedure, fines and liabilities
11. Summary administrative proceedings
12. Evidence
13. Miscellaneous.

Some of the key provisions in the act are as follows:

- The Director may cause to be prepared Fisheries Management Plans at national, provincial and community levels for any fishery in the fisheries waters and shall undertake consultations set out in the Second Schedule.
- A Fisheries Management Plan (a) at the national level shall be approved by the Minister; (b) at the provincial level shall be approved by the Director and the Provincial Executive; and (c) at the community level shall be approved by the Provincial Executive and a management committee representing the customary rights holders.
- In each Fisheries Management Plan, there are (i) management measures; (ii) licensing, enforcement powers and authorities: and (iii) fines, penalties and sanctions
- The Permanent Secretary shall ensure the development of, for transmission to the Minister, (a) a Fisheries and Marine Resources Management and Development Policy; and (b) a Corporate Plan and Annual Operational Plans.
- A Fisheries Licensing Committee is established to make recommendations to the Director on the grant, renewal, suspension and revocation of licences and authorisations to be issued pursuant to the Act. The Permanent Secretary shall appoint to the Fisheries Licensing Committee such persons within the ministry and, as appropriate, officials from other government ministries with a complementary mandate to cooperate in the management or enforcement of matters within the scope of the act.
- A Fisheries Advisory Council is established whose members shall be appointed by the Minister and whose function shall be to advise the Minister and make recommendations at the request of the Permanent Secretary on matters relating to fisheries conservation, management, development and sustainable use.
- A community fisheries management plan may be drawn up for communities by or on behalf of customary rights holders for a customary rights area or areas in or areas in consultation with the Director and Provincial Executive. Several provinces have fisheries ordinances.

According to Govan et al. (2013), provincial ordinances include the:

- Western Province Resource Management Ordinance 1994
- Western Province Coastal and Lagoon Shipping Ordinance 1991
- Guadalcanal Wildlife Management Area Ordinance 1990
- Isabel Province Wildlife Sanctuary (Amendment) Ordinance 1991
- Isabel Province Resource Management Ordinance
- Temotu Environment Protection Ordinance 1989
- Makira Preservation of Culture and Wildlife Ordinance
- Choiseul Province Resource Management Ordinance 1997
- Makira Ulawa Province Fisheries Ordinance
- Guadalcanal Fisheries Ordinance 2009
- Choiseul Province Fisheries and Marine Environment Ordinance 2011
- Western Province Fisheries Ordinance 2011



## TONGA



### Fisheries Management Objectives

In general, management objectives are required to conform to the Fisheries Management Act 2002. That law requires that measures promote the objectives of optimum utilization and achievement of economic growth, human resource development, employment creation and sound ecological balance. Several of Tonga's fisheries have more specific objectives, as indicated in the respective management plans.

The Tonga National Tuna Fisheries Management and Development Plan lists the following objectives:

- Ensuring that the utilization of Tonga's tuna longline fisheries resources is compatible with the sustainable development measures.
- Maximizing economic benefits, and ensuring ownership of the fisheries resources, to the people of Tonga from optimum utilization of its tuna resources, including fishing, processing and value-adding.
- Ensuring that any tuna legislation facilitates support for national priorities and interests, and all necessary requirements of regional and international binding frameworks and measures.
- Exploring alternative management arrangements that generate economic benefits.
- Providing clear and transparent licensing procedures.
- Ensuring that non-target species are not discarded or dumped.
- Promoting the use of mitigation measures to minimize bycatch of endangered threatened and protected species.
- Contributing to capacity building, technology transfer and the food security of Tongan subjects.



### Oceanic Fisheries Management

Tonga's tuna fisheries are managed on regional and national levels. On the regional level, Tonga is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. For Tonga, key WCPFC management measures are the Conservation and Management Measure for South Pacific Albacore; and the Conservation and Management Measure for Bigeye, Yellowfin and Skipjack Tuna in The Western and Central Pacific Ocean.

On the national level, the tuna fisheries are managed by the Tonga National Tuna Fisheries Management and Development Plan (2015–2017). The stated overall goal of the plan is “to manage Tonga's tuna fisheries resources through an ecosystem based, precautionary and rights-based approach in order to maximize the benefits to Tonga people while ensuring the biological and economic sustainability of the fishery”. The main management measures are (a) a total allowable catch for South Pacific albacore tuna, currently set at 2 500 tonnes in the longline fishery, and (b) a limit on the total number of longline fishing vessel licences (including local, locally based and foreign licences), currently set at 15 vessels.



## Policy Framework

The most recent articulation of the government's policies and development strategies in fisheries is found in the Tonga Fisheries Sector Plan 2016–2024 (Anon., 2016). That document contains a section linking the National Strategic Planning Framework's objectives to the fisheries sector. It gives the policies in four areas:

### ***Sustainable community fisheries:***

- Strong inclusive communities, by engaging districts/villages/communities in meeting their prioritised service needs and ensuring equitable distribution of development benefits.
- Cultural awareness, environmental sustainability, disaster risk management and climate change adaptation, integrated into all planning and implementation of programmes.

### ***Sustainable commercial fisheries:***

- Dynamic public and private sector partnership as the engine of growth, by promoting better collaboration between government and business, appropriate incentives, and streamlining of rules and regulations (through the National Fisheries Council, Special Management Areas, fisher and exporter associations, development of an aquaculture investment policy, adaptive management of fisheries).
- Safe, secure and stable society, by maintaining law and order (activities on compliance, safety at sea).

### ***Public and private investment:***

- Appropriate, well-planned and maintained infrastructure that improves the everyday lives of the people and lowers the cost of business, by the adequate funding and implementation of the National Infrastructure Investment Plan.

### ***Improved fisheries governance:***

- Better governance, by adopting the qualities of good governance, accountability, transparency, anti-corruption and rule of law.



## Institutional arrangements

The main institutions involved with fisheries management are the Ministry of Fisheries and the Fisheries Advisory Committee. The Fisheries Management Act 2002 states that the Fisheries Advisory Committee comprises:

- a) the Secretary of Fisheries as the Chairman
- b) the Secretary for Lands or his nominee
- c) the Secretary for Labour, Commerce and Industries or his nominee
- d) one member representing commercial fisheries interests nominated by the Tongan Fish Exports Association
- e) one member representing women's interests nominated by the Minister
- f) two members representing local fishermen nominated by the Minister
- g) one member representing coastal communities nominated by the Prime Minister
- h) such other persons not exceeding two whom the Secretary may think fit to appoint.

The Fisheries Management Act 2002 specifies that the Minister shall, in consultation with the Fisheries Advisory Committee, determine the total allowable catch or total allowable level of fishing with respect to any stock of fish, subject to the provisions of the act, or as provided in a fisheries management agreement. In practice, the major fisheries (tuna, deep-water bottom fish, beche-de-mer, aquarium fish) have management plans that establish committees dedicated to the specific fishery. For example, the tuna management plan states “stakeholders are to be represented in the Tuna Management Committee, which will advise the Secretary and the Minister on the management of the tuna resources”.

During the past two decades the government fisheries agency has been at different times the Fisheries Division, the Ministry of Fisheries, and the Fisheries Department. In mid-2016, the fisheries sector was separated from the Ministry of Agriculture, Food, Forests and Fisheries to form the current Ministry of Fisheries. The Ministry of Fisheries is headed by the Minister of Fisheries. The senior civil servant in the Ministry is the Chief Executive Officer. The Ministry of Fisheries is currently made up of five divisions:

- 1) Fisheries Science Division (comprising offshore fisheries, coastal fisheries and aquaculture)
- 2) Compliance Division
- 3) Economics and Management Division
- 4) Administration Division
- 5) Chief Executive Officer Division



## Legal Framework

The main laws related to fisheries and aquaculture in Tonga are the Fisheries Management Act 2002 and the Aquaculture Management Act 2003. The main features of the Fisheries Management Act 2002 are as follows:

- The Minister shall, subject to this Act, be responsible for conservation, management, sustainable utilization and development of fisheries resources in the Kingdom and the fisheries waters.
- The Minister shall establish a Fisheries Management Advisory Committee which shall advise him on matters relating to the conservation, management, sustainable utilization and development of fisheries in the Kingdom.
- The Minister shall, in consultation with the Fisheries Advisory Committee, determine the total allowable catch or total allowable level of fishing with respect to any stock of fish subject to the provisions of this Act or as provided in a fisheries management agreement.
- The Secretary shall progressively prepare and keep under review plans for the conservation, management, sustainable utilization and development of fisheries in the fisheries waters and ensure the implementation of such fishery plans.
- The Secretary shall maintain or cause to be maintained a Fishing Vessels Register. No fishing vessel shall be operated in the fisheries waters and no Tongan ship shall be used in or outside the fisheries waters for fishing unless such vessel or ship has been registered on the Fishing Vessels Register.
- The Minister may by Order published in the Gazette, declare any area of the fisheries waters and corresponding subjacent area to be a Special Management Area for purposes of coastal community management, application of certain conservation and management measures, subsistence fishing operations or other specified purpose.
- The Minister may, in consultation with the Committee, designate any local community in Tonga to be a coastal community for the purposes of community-based fisheries management and may prescribe the rights and responsibilities of such coastal community in respect of the Special Management Areas or part thereof.
- No person shall export any fish or fish product without a fish export licence issued in accordance with this Act.



## TUVALU



### Fisheries Management Objectives

The Marine Resources Act 2006 gives “general principles” for fisheries management and states that fisheries management plans must include the objectives of the management, but the Act does not stipulate any specific management objectives. The main objectives in the management of Tuvalu’s offshore fisheries, as stated in the current Fisheries Department Corporate Plan (Fisheries Department, 2016b), are:

- securing and protecting Tuvalu’s national rights and interests within the regional purse-seine and longline Vessel Day Schemes, whose integrity and development have been promoted by Tuvalu through cooperation with other participating coastal States.
- maintaining and improving fisheries revenues to Tuvalu through the optimum allocation and pricing of Tuvalu’s vessel days and associated purse-seine and longline licences.
- increasing, significantly above present levels, at-sea employment for Tuvalu citizens (fishing vessel crew and fishery observers) through the provision of appropriately trained personnel and the fullest application of local crewing licensing conditions.



### Oceanic Fisheries Management

The offshore fisheries in Tuvalu are managed on national, sub-regional, and regional levels.

On the national level, the management measures for the offshore fisheries of Tuvalu are detailed in the Tuvalu Tuna Management and Development Plan.

On the sub-regional level, the Solomon Islands cooperates with the other countries that are members of the Parties to the Nauru Agreement and participate in the Vessel Day Scheme (VDS).

On the regional level, the Solomon Islands is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean.

According to a recent article on Tuvalu fisheries (Preston et al., 2016), the Fisheries Department’s practical interventions in support of sustainable management of the tuna fishery in Tuvalu waters include:

- ensuring compliance with the provisions of international fishery treaties to which Tuvalu is a party;
- actively promoting Tuvalu’s national interests through regional tuna fishery management arrangements, including WCPFC, FFA, PNA and other mechanisms;
- maintaining fishery licensing and data collection systems for vessels fishing in Tuvalu waters, and monitoring their activities through data collection programmes;
- monitoring, control and surveillance of fishing activities in Tuvalu waters to ensure compliance with licence conditions, and to deter, detect and penalise illegal, unregulated and unreported (IUU) fishing;
- responding to the requirements of major market states in regard to IUU fishing and fishery product food safety.



## Fisheries Policy Framework

The major government operational policies in the fisheries sector are given in the Fisheries Department Corporate Plan 2017–2019 (Fisheries Department, 2016b). These include:

### 1. Sustainable management of the tuna fishery in Tuvalu waters, through:

- ensuring compliance with the provisions of international fishery treaties to which Tuvalu is a party;
- actively promoting Tuvalu's national interests through regional tuna fishery management arrangements;
- maintaining fishery licensing and data collection systems for vessels fishing in Tuvalu waters, and monitoring their activities through data collection programmes;
- monitoring, control and surveillance of fishing activities in the Tuvalu waters to ensure compliance with licence conditions, and to deter, detect and penalise illegal, unregulated and unreported (IUU) fishing;
- responding to the requirements of major market states in regard to IUU fishing and fishery product food safety.

### 2. Increasing sustainable economic benefits from the tuna fishery, through:

- effective negotiation of favourable fishery access conditions with foreign interests;
- development of joint-venture arrangements between the Government of Tuvalu and selected foreign fishing companies with emphasis on shore-based development;
- promoting the employment of Tuvaluans as crew on board fishing vessels operating in Tuvalu waters, through training and licence conditions;
- reform of the National Fishing Corporation of Tuvalu as a vehicle for the government's commercial fishery interests.

### 3. Improved management of coastal fisheries in order to maintain livelihoods, food security and dietary health. This involves:

- working closely with the island councils who are responsible for by-laws and other regulations controlling local fishery management;
- strengthening relationships between the Fisheries Department, fishers and other stakeholders;
- fishery resource assessment and monitoring, to provide the information needed for management;
- supporting the establishment and enforcement of local conservation areas and other management mechanisms;
- formulation of management plans for beche-de-mer, sharks and other resources that are prone to extreme overfishing;
- environmental monitoring to assess and mitigate adverse environmental impacts, including waste management, coastal development and ciguatera fish poisoning.

### 4. Supporting the sustainable economic development of Tuvalu's small-scale fisheries, through:

- provision of technical assistance, training and material support to small-scale fishers and fish processors, including for sea safety;
- deployment and maintenance of FADs for all of Tuvalu's islands.



## Institutional Arrangements

The main government fisheries institution is the Fisheries Department of the Ministry of Natural Resources. The Marine Resources Act 2006 gives the Minister responsible for fisheries the power to administer the fisheries and make regulations as he sees fit. According to the Act, the Minister “may appoint in writing a fisheries officer and such other officials to discharge fisheries related functions”. In practice, the Fisheries Director reports to the Chief Executive Officer of the Ministry, who reports to the Minister, who in turn reports to Cabinet.

In 2012, the department was reviewed by a New Zealand-funded project (Preston et al., 2016) The review concluded that:

- In regard to coastal fisheries, the TFD had for too long been focusing on small research and development projects, especially in aquaculture, that had delivered no visible economic or social benefits to Tuvalu;
- In regard to oceanic fisheries, Tuvalu had been a passive player in regional fishery management and access negotiations, ‘standing on the sidelines’ and following the consensus instead of promoting its own national interests for greater economic benefit;
- Organisationally, the department was ‘about the right size, but the wrong shape’, with too many staff focusing on issues that were not very important, and insufficient attention being paid to ‘big-ticket’ items.

The Fisheries Department is organized into three separate divisions (Oceanic, Coastal and Operations and Development) overseen by an Administration group comprising the Director, Deputy Director, and several staff with cross-cutting duties (Legal Officer, Information Officer and Economist). Presently, the main focus of the Fisheries Department is on coastal fisheries development and on management of the activities of the foreign fishing vessels that operate in Tuvalu’s EEZ.

The Fisheries Department Corporate Plan 2016–2019 (Fisheries Department, 2016b) states that the department’s work falls into a broad range of areas:

- Sustainable management of the tuna fishery in Tuvalu waters.
- Increasing sustainable economic benefits from the tuna fishery.
- Improved management of coastal fisheries to maintain livelihoods, food security and dietary health.
- Supporting the sustainable economic development of Tuvalu’s small-scale fisheries, through public awareness and education in all the above areas. Some of the important activities to be carried out by the Fisheries Department in the next few years are (Preston et al., 2016):
- completion of field survey work in each island and use of this information, plus that from the fishery data collection programmes and from other sources, to establish island-by-island fishery management and development plans;
- strengthening the management of the Funafuti lagoon fishery, especially through working with the Funafuti Island Council and Fishermen’s Association to enforce the prohibition on fishing in the Funafuti Conservation Area;
- working through PNA and WCPFC to find alternatives to the current three-month FAD closure for the purse-seine fishery, which places a heavy disproportionate burden on Tuvalu;
- establishing IUU and Fishery Product Food Safety Competent Authorities, to satisfy the requirements of the EU and other key market states;
- reforming the National Fishing Corporation of Tuvalu to comply with the requirements of the Public Enterprises (Accountability) Act and to act as an effective vehicle for joint ventures or other fishing enterprises in which the Government of Tuvalu has an interest;
- fulfilling Tuvalu’s commitment to implement the PNA Longline Vessel-Day Scheme.



## Legal Framework

The Fisheries Department Corporate Plan 2016–2019 (Fisheries Department, 2016b) summarizes the fisheries legislation of Tuvalu. The main law dealing with fisheries in Tuvalu is the Marine Resources Act 2006 (MRA), amended in 2012. Key features of the MRA include the following:

- Establishing the objective of ensuring the long-term conservation and sustainable use of the living marine resources for the benefit of the people of Tuvalu.
- The Minister for Fisheries has the authority for the conservation, management, development and sustainable use of the living marine resources in the EEZ of Tuvalu.
- The Minister must take into account 15 stated principles and measures in the conservation, management and development of fisheries.
- The Minister has the power to administer fisheries, make regulations as needed, and appoint a Fisheries Officer and other officials to discharge fisheries related functions.
- The Minister may declare that a fishery important to the national interest is a “designated fishery” with its own management plan.
- All vessels engaged in fishing in Tuvalu must have a valid/applicable permit or a licence under a multilateral access agreement in accordance with the Act.
- The transshipment of fish in the Tuvalu EEZ is regulated.
- Requirements for a Tuvalu fishing vessel operating outside Tuvalu waters are given.

The Marine Resources (Amendment) Act 2012 implements a number of changes to the principal act to accommodate Tuvalu’s international, regional and national rights and responsibilities in fisheries conservation, management and development. The Amendment significantly increased the level of penalties for various types of offences under the Act. The MRA was further revised in 2016, partly to respond to issues raised by the European Commission in regard to Tuvalu’s control of foreign fishing vessels operating in its waters. The revised Act was being finalised for submission to the Tuvalu Parliament at the time this publication was prepared. Two regulations have been promulgated under the Marine Resources Act: the Fisheries (Vessel Monitoring System) Regulations (2000), which require the use of automatic location communicators by commercial fishing vessels operating in Tuvalu waters; and the Conservation and Management Measures (PNA Third Implementing Arrangement) Regulations 2009, which contain provisions for implementation of a number of measures agreed by PNA.



## VANUATU



### Fisheries Management Objectives

The Tuna Fishery Management Plan (VFD and FFA, 2014) has been developed to meet four key objectives:

1. To ensure that the exploitation of the tuna resources that are found in and pass through Vanuatu waters is compatible with the sustainability of the stocks throughout their range.
2. Within the limits of the sustainability objective, to ensure the harvest is taken in a way that maximizes the long-term economic and social benefits received by the people of Vanuatu.
3. To contribute to the food security of ni-Vanuatu.
4. To meet regional and international responsibilities for tuna management.



### Oceanic Fisheries Management

Sections 10 and 11 of the Fisheries Act 2014 state that the Minister responsible for fisheries may determine that a fishery is a designated fishery if it (a) is important to the national interest; and (b) requires management and development measures for its effective conservation and optimum utilization. The Director of Fisheries is required to prepare a plan for the management and development of each designated fishery. Each plan must:

- identify each fishery and its characteristics, including the present state of its exploitation; and
- specify the objectives to be achieved in the management of the fishery to which it relates; and
- specify the management and development strategies to be adopted for the fishery to which it relates; and
- provide for a scheme of licensing, if necessary, or other appropriate management measure; and
- specify, if applicable, the licensing regime to be applied, including the limitations, if any, to be applied to local fishing operations and the amount of fishing, if any, to be allocated to foreign fishing vessels; and
- specify the information and other data required to be provided by persons licensed to fish for that fishery; and
- take into account any relevant traditional fishing methods and practices including traditional management systems and strategies.

Tuna fisheries in Vanuatu are managed on regional and national levels.

On the regional level, Vanuatu is a member of the Western and Central Pacific Fisheries Commission (WCPFC) that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. From the Vanuatu perspective, the two most important recent measures are: (1) the Conservation and Management Measure for South Pacific Albacore, and (2) the Conservation and Management Measure for Bigeye, Yellowfin and Skipjack Tuna in the Western and Central Pacific Ocean.

On the national level, the tuna fisheries are managed by the Tuna Fishery Management Plan (VFD and FFA, 2014). Key features of that plan are: restrictions on the total number of licenses, closed areas to fishing, and a total allowable catch for each of the four major species of tuna.



## Fisheries Policy Framework

In December 2016, the Vanuatu National Fisheries Sector Policy 2016–2031 (MALFFB, 2016) was signed by the Minister of Agriculture, Livestock, Forestry, Fisheries and Biosecurity. The 39-page document includes a vision, mission, guiding principles, strategic policy objectives, and the details of strategic action in eight areas. The document states that the policy focuses on improving fisheries governance, sustainable and economically viable fisheries and aquaculture, improved access to finance, improved infrastructure, market access, seafood safety and value-adding, sustainable growth, employment, food security and livelihoods.

Related to the Fisheries Policy is the mission statement of the Fisheries Department: “The mission of the Fisheries Department of Vanuatu is to ensure sustainable management, development and conservation of fish resources in order to achieve maximum social and economic benefits to Vanuatu for the present and future generations.”



## Institutional Arrangements

The Vanuatu Fisheries Department (VFD) is the government body charged with the implementation and enforcement of fisheries management laws, policies, regulations and principles. It is part of the Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity (MALFFB). The VFD has six divisions: Administration, Management & Policies, Development & Capture, Research & Aquaculture, Seafood Verification, and Licencing & Compliance. The latest annual report of the Fisheries Department (VFD, 2013) indicates that, as of 2012, there were 57 positions in the department.

Other government agencies in Vanuatu have some involvement in fisheries. Pascal et al. (2015) summarizes the fisheries-related involvement of those agencies:

- **Prime Minister's Office:** The Office is responsible for the national development plan which sets the tone for and priority of natural resource management, including marine resource management. The office also gathers data on major sectors (i.e. agriculture) but not subsistence values.
- **Department of Environment Protection and Conservation:** Environmental impact assessment is used in Vanuatu to put monetary values on damage to ecosystems, but not to put a value on healthy ecosystems. The department has studied wetland ecosystem services and made lists of the services they provide and has also done limited biodiversity assessments in protected areas.
- **Department of Forestry:** The department's jurisdiction includes mangroves. The department has conducted some carbon accounting exercises, putting financial values on ecosystems (including mangroves), but on a very small scale.



## Legal Framework

The Fisheries Act No. 10 of 2014 states that it is a law to repeal the Fisheries Act (CAP 315) and to make provision for the management, development and regulation of fisheries within Vanuatu waters, and for the control of fishing vessels entitled to fly the flag of Vanuatu outside of Vanuatu waters in a manner consistent with Vanuatu's international obligations, and for related matters. The Act is a 135-page document containing 23 parts:

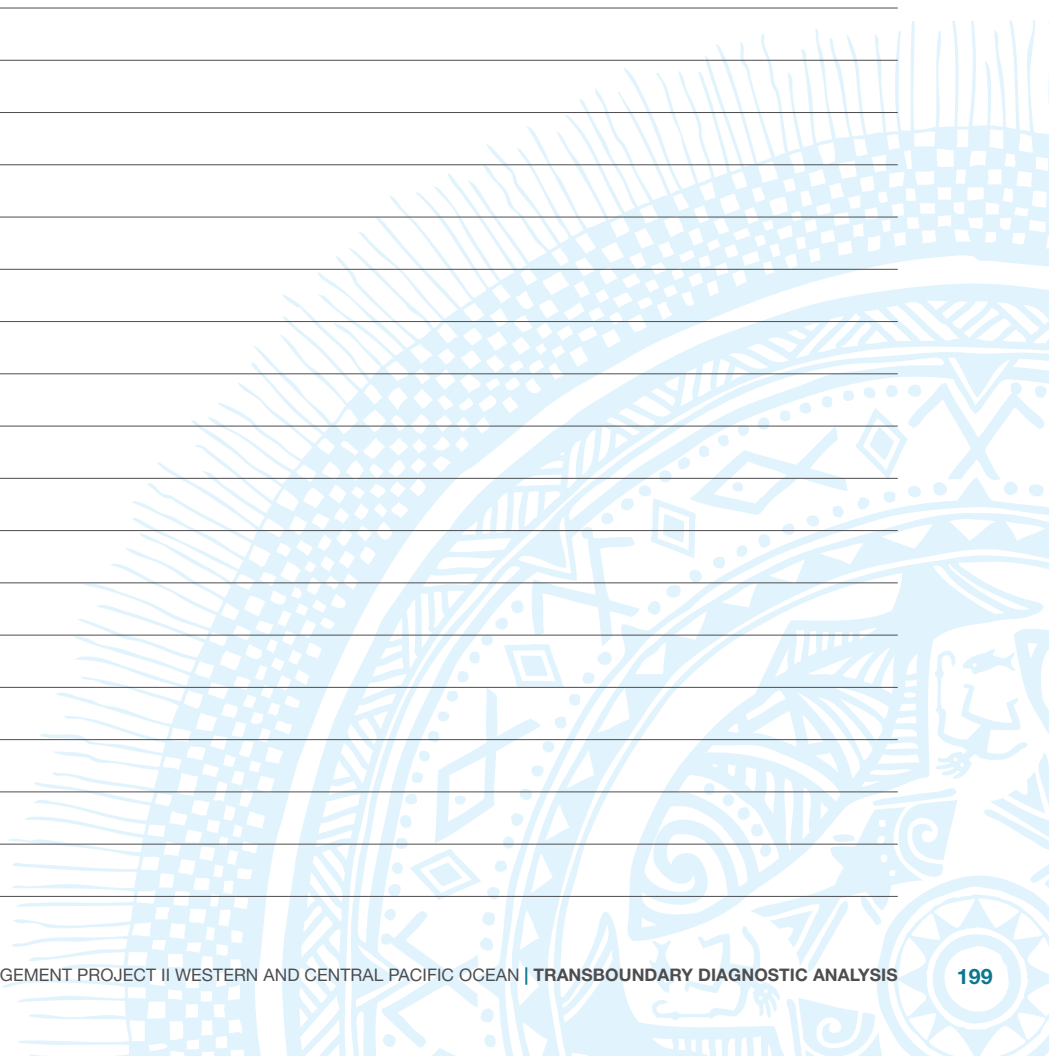
1. Preliminary matters
2. Purpose and principles
3. Administration
4. Fisheries management, development and conservation
5. Aquaculture management and development
6. Seafood verification agency

7. Vanuatu fishing vessels and local fishing vessels in Vanuatu waters
8. Registration of fishing vessels on the international shipping registry
9. Requirements for charter of fishing vessels
10. Foreign fishing vessels
11. Compliance with international obligations
12. Fishing by Vanuatu vessels beyond Vanuatu waters
13. General licensing provisions
14. Ban on driftnet fishing
15. Vanuatu marine mammals sanctuary
16. Other prohibited activities
17. Other approvals
18. Authorized officers, observers and port samplers
19. Monitoring, control and surveillance
20. Sale, release and forfeiture of seized property
21. Jurisdiction and evidence
22. Regulations and penalty notices
23. Miscellaneous

The notable provisions of the Act are as follows:

- The Fisheries Management Advisory Council is established. The function of the Council is to provide recommendations to the Director on policy matters relating to fisheries conservation and management.
- The Minister may determine that a fishery is a designated fishery if, having regard to scientific, economic, environmental and other relevant considerations, the Minister considers that the fishery is important to the national interest, and requires management and development measures for its effective conservation and optimum utilization. The Director of Fisheries is to prepare, and review where necessary, a plan for the management and development of each designated fishery.
- A person must not carry out aquaculture unless the person complies with the applicable laws, pays the prescribed licence fee, and is granted an aquaculture licence granted by the Director of Fisheries.
- The Vanuatu Seafood Verification Agency is established. The Agency has the following objectives: (a) to verify and certify the import and export of seafood; and (b) to ensure the application of appropriate quality control measures and seafood production industry standards; and (c) to ensure the facilitation of exports from Vanuatu of all categories of seafood for human consumption.
- A person must not use a fishing vessel for commercial fishing or related activities in Vanuatu waters unless he or she has been issued with a local or foreign fishing licence.
- Requirements are given for registration of fishing vessels on the Vanuatu International Shipping Registry.

## NOTES



## NOTES





**FFA**

**STRENGTH THROUGH COOPERATION**



[www.ffa.int](http://www.ffa.int)



[@TunaFFA](https://twitter.com/TunaFFA)



[FFATuna](https://www.facebook.com/FFATuna)