

PACIFIC ISLANDS



OCEANIC FISHERIES MANAGEMENT

Baseline Study

& Performance Indicators for the Pacific Islands Oceanic Fisheries Management Project (OFMP)

A Report Prepared for the
Pacific Islands Forum Fisheries Agency (FFA)

by **Ian Cartwright, Thalassa Consulting Pty Ltd**

21 NOVEMBER 2008

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FFA



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The World Conservation Union

PUBLISHED BY

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Abbreviations

APR	Annual Performance Report
CES	catch and effort query system
CFP	Coastal Fisheries Programme
CMM	conservation and management measure
CPUE	catch per unit of fishing effort
DWFN	distant water fishing nation
EAFM	ecological approach to fisheries management
ECOPATH/ECOSIM	an ecological/ecosystem modelling software suite; ECOPATH is a static, mass-balanced snapshot of the system and ECOSIM time dynamic simulation module for policy exploration
EEZ	exclusive economic zone
ENSO	El Nino / Southern Oscillation
EPO	eastern Pacific Ocean
ETP	eastern tropical Pacific
EU	European Union
FAD	fish aggregating device
FAO	Food and Agriculture Organisation of the United Nations
FFA	Forum Fisheries Agency
FFC	Forum Fisheries Committee
GEF	Global Environment Facility
GLOBEC	global ocean ecosystem dynamics
IBM	individual based modelling
IUCN	International Union for the Conservation of Nature
IUU	illegal, unregulated and unreported (fishing)
IW	International Waters
LFA	logical framework analysis
LL	longline
LME	large marine ecosystem
LOSC	UN Law of the Sea Convention, 1982
MCS	monitoring, control and surveillance
ME	monitoring and evaluation
MHLC	Multilateral High Level Conference on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific
MSY	maximum sustainable yield
MULTIFAN-CL	a length-based age-structured computer model used for fish stock assessment
NFA	National Fisheries Assessment

NMFS	National Marine Fisheries Service
NPOA	National Plan of Action
OFCCP	Ocean Fisheries and Climate Change Project
OFM	oceanic fisheries management
OFMP	Oceanic Fisheries Management Project
OFF	Oceanic Fisheries Programme of the Secretariat to the Pacific Community
OP	Operational Programme
PacSIDS	Pacific Small Island Developing States
PCU	Project Coordination Unit
PDO	Pacific Decadal Oscillation
PFRP/UH	Pelagic Fisheries Research Programme/University of Hawaii
PIR	Project Implementation Review
PPR	Project Performance Results
ProDOC	Project Document
PS	purse seine
RFMO	regional fisheries management organisation
RTTP	Regional Tuna Tagging Programme
SAP	Strategic Action Programme
SCTB	Standing Committee on Tuna and Billfish
SEPODYM	spatial environmental population dynamic model
SP	Strategic Programme
SPC	Secretariat to the Pacific Community
SPRTRAMP	South Pacific Regional Tuna Research and Monitoring Programme
SSAP	Skipjack Survey and Assessment Programme
STAP	Scientific and Technical Advisory Panel
TFA	Tuna Fisheries Assessment
TMP	Tuna Management Plan
TUFMAN	Tuna Fisheries Management Database
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFSA	United Nations Implementing Agreement on Highly Migratory Fish Stocks and Straddling Fish Stocks 1995 (short title)
VDS	Vessel Days Scheme
VMS	vessel monitoring system, based on satellite-based tracking
WCP-CA	Western and Central Pacific – Commission Area
WCPF	Western and Central Pacific Fisheries
WCPO	western and central Pacific Ocean
WTP	Western Tropical Pacific

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Project background, purposes and approach

Introduction

THE UNDP/GEF-supported International Waters Project (IW-Project) for the Pacific Small Island Developing States (PacSIDS) has had a significant input into oceanic fisheries management and research in the Pacific Islands region. This input commenced with a Pacific SAP (Strategic Action Programme) Project (RAS/98/G32), implemented between 1999 and 2004. This project had two components: i) oceanic fisheries management and ii) integrated coastal and watershed management. The three-year oceanic fisheries management element was considered a pilot, and underpinned the successful conclusion and entry into force of the Western and Central Pacific Fisheries (WCPF) Convention.

In 2004 the GEF PDF-B fund supported the design of a second SAP project, the Pacific Islands Oceanic Fisheries Management Project (OFMP), which commenced in late 2005. This five-year project is designed to assist Pacific island countries as they reform, realign and restructure their national fisheries laws, policies, institutions and programmes to take up the new opportunities which the WCPF Convention creates, and discharge the responsibilities which the Convention requires.

Purpose of the Report

The purpose of this Report is to:

- i review the applicable GEF international Waters Operational Strategy, describe the GEF International Waters process, stress-reduction and environmental status indicators framework at a project level¹ and suggest any appropriate revisions;
- ii describe the baseline situation, in mid-2005 before OFMP implementation in relation to:
 - a. measures in place at national, sub-regional and regional level for the conservation and management of the oceanic fish stocks of the WCPO and the protection of the WTP LME (Western Tropical Pacific Large Marine Ecosystem) from fisheries impacts;
 - b. the status of the fisheries, the target stocks and the ecosystem including trophic status and status of key non-target species; and
 - c. initial measures of the GEF monitoring and evaluation indicators outlined in the project Logframe Matrix (Annex L).

A terms of reference is provided as Attachment 1.

¹ In the context of the project logframe matrix (Annex L) of the OFMP Project Document (ProDoc), for the three Project components

Study approach

The work was undertaken largely as a desk study using information available from the Pacific Islands Forum Fisheries Agency (FFA), the Secretariat of the Pacific Community Pacific Oceanic Fisheries Programme (SPC/OFP) and the websites of the Global Environment Facility (GEF) and United Nations Development Programme (UNDP).

To promote continuity, the Study draws from, and builds on:

- the Baseline and Progress Studies undertaken for the Pilot Phase of the Oceanic Fisheries Management Component of the GEF IW SAP Project;
- the Terminal Evaluation for the OFM component of the SAP Programme for International Waters;
- the OFMP project document and the resulting country reports and analysis; and
- Visits were made to the two implementing regional organisations:
 - the Secretariat to the Pacific Commission (SPC) 20-25 July 2008; and
 - the Pacific Islands Forum Fisheries Agency (FFA) 31 July – 6 September 2008.

The Report

The report is provided in two parts:

Part One: A review of the GEF IW indicators framework and its application to the OFMP.

Part Two: A Baseline Study of the Oceanic Fisheries of WCPFO.

Outcomes and benefits

The anticipated outcomes and benefits of this study are:

- identification of a set of indicators for the OFM Project using the GEF IW approach to indicators; and
- a baseline study, including assessment of project indicators providing a basis for assessing progress by the OFM Project against a set of indicators.

A review of the GEF IW indicators framework and its application to the OFMP

1. Introduction

Effective monitoring and evaluation (ME) is an essential part of project management and is a requirement of most, if not all agencies that implement development projects in the Pacific. While at one level ME is conceptually simple, the range of approaches adopted across different agencies, and within agencies for differing categories of project, is wide-ranging and complex.

Central to all ME processes are indicators which are used to assess performance towards stated objectives, outcomes or targets, usually from some agreed baseline level at the commencement of the project activity. Since reporting for the OFMP deals incorporates both UNDP and GEF requirements, the work undertaken by the consultant was, by agreement, expanded to give some consideration to the baseline and reporting requirements associated with UNDP as the implementing agency, as well as the GEF.

The aim of this section of the report is to look at the basis for ME strategies in IW projects by drawing on various GEF and UNDP papers, review the current ME requirements for the OFMP and make some suggestions that will inform the identification of a set of indicators for the OFM Project, using the GEF IW approach to indicators.

2. GEF International Waters Operational Strategy

The Oceanic Fisheries Management (OFMP) ME framework and associated indicators is considered in the context of the appropriate GEF Focal Area (International Waters – IW) and the Operational Programme (OP) in place at the time of commencement of the project. These provide the planning framework for the design, implementation and coordination of the GEF IW projects to achieve particular global environmental benefits. GEF advice on logframes and indicators has been frequently IW specific.

At the time of inception and commencement, the OFMP fell primarily under OP9, Integrated Land and Water Multiple Focal Area, Small Island Developing State (SIDS) Component. The following issues contained in the OP9 Guidance Document² are of significance:

- partnerships between representative regional organisations and the capacity and institution- building necessary for each island state to more comprehensively address environmental problems;
- stocks of fish being depleted by foreign fishing fleets that can be addressed through the GEF in the context of altering sectoral activities on each island state to meet sustainable development goals; and
- the importance of stakeholder involvement and the participation of different sectoral ministries in each recipient country.

There are also elements of OP8 (Waterbody-based Operation Programme), contained in the OFMP, particularly in relation to large marine ecosystems, although OP8 deals with 'damaged and seriously threatened waterbodies and the most immediate transboundary threats to their ecosystems'.³ It is unlikely, by most measures, that the WCPO would be considered to be in a damaged or seriously threatened state at the time of the commencement of the OFMP.

² See the GEF website http://www.gefweb.org/Operational_Policies/Operational_Programs/OP_9
³ Operational Policies in International Waters. http://gefweb.org/Projects/Focal_Areas/iw/iw_ops.html.

The OFMP now falls under the 2007 – 2010 International Waters Focal Area Strategy and strategic programming for GEF-4. In the new IW strategy, the OPs have been replaced with four Strategic Programmes (SPs). The most relevant SP for the OFMP is 'Restoring and sustaining coastal and marine fish stocks and associated biological diversity'. The objectives and the relevant SP are provided below (Table 1).

Table 1: Long term objectives and strategic programs for International Waters in GEF-4

Long-term Objectives	Strategic Programs for GEF-4 (relevant to OFMP)
1: To foster international, multi-state cooperation on priority transboundary water concerns	Restoring and sustaining coastal and marine fish stocks and associated biological diversity
2: To catalyse transboundary action addressing water concerns	

3. Implementing GEF IW Projects

GEF partners with three implementing agencies (IAs) which manage GEF projects on the ground. These are: i) the United Nations Development Programme (UNDP) ii) the United Nations Environment Programme (UNEP), and iii) the World Bank. UNDP is the IA for the OFMP.

Both GEF and UNDP have reporting requirements, which, at times, result in some confusion and duplication, particularly in relation to the plethora of associated terms and definitions. The two organisations are also interested in measuring project progress and outcomes in different ways, in line with their various mandates and priorities.

This section of the study was originally intended to focus on the GEF approach to ME, including performance indicators. However, given that a baseline study is to be done, it seems advantageous to give some consideration to the more 'mechanistic' implementation indicators used by UNDP. In this context, some consideration is given to indicators of relevance to UNDP and project outputs.

4. Monitoring and Evaluation Approaches

4.1 The Logical Framework Approach (LFA)

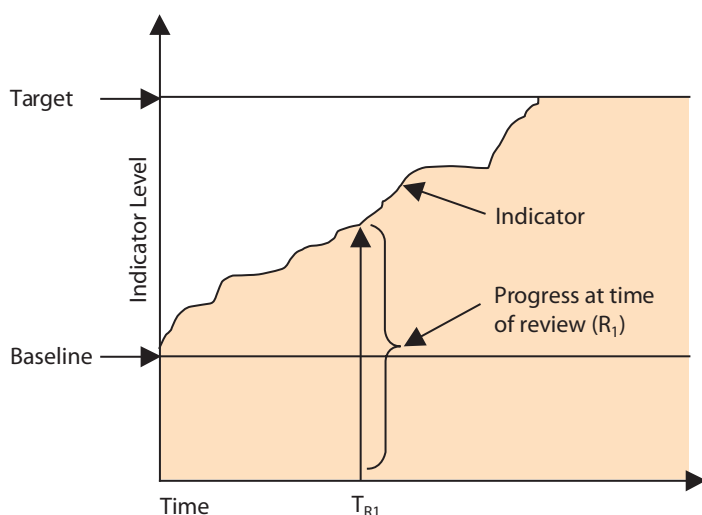
The LFA has been adopted by all GEF projects since July 1997, following a decision by the GEF Council. Various forms of logframe form the core of the ME strategy for the OFMP. UNDP and GEF provide further guidance on adjustment to the LFA & the appropriate indicators with which to monitor progress of outputs & activities and how they link to measurement of project outcomes/results and impacts from time to time.

Logframes were first used by the US to improve planning by making objectives and activities clearer and better aligned, clarify management responsibilities and to develop clear evaluation measures and targets. It was originally a 'standardising' process for making decisions on and documenting projects and their progress against stated goals and objectives. Over time, the LFA has become more analytical and has been adapted to

suit the needs of specific organisations and funding/implementation bodies, including GEF and UNDP.

4.2 Performance Measures

Figure 1 below shows, in a generic sense, the relationship between a target, a baseline and a performance indicator. Performance indicators (or measures) should provide a simple and reliable basis for assessing change, performance or achievement towards objectives. They should reduce data and information on a particular



phenomenon to its simplest form while retaining their essential meaning (DSE 2000).

FIGURE 1: Relationship between performance indicators, baselines & targets

Performance indicators/measures are commonly required at each level of project hierarchy (outputs, outcomes, objectives and goals).

Note that the GEF requires only project outcomes (not outputs or activities) and their associated indicators, which are to be reported in the GEF International Waters

Results Template⁴.

Indicators are generally used according to the following process:

- **establishing a baseline level for each indicator** at the commencement of the project;
- **establishing a target** for each indicator relating to project outputs, outcomes and objectives: and
- **reporting against the indicators** through the life of the project (Annual Performance Report (APR)/ Project Implementation Review (PIR) Project Performance Results (PPR), annual and mid-term reports).

The term 'indicator' seems to be used differently between the APR and the Process indicators section of the PPR. The indicators associated with the APR, and of primary interest to UNDP, are more of the type outlined in Figure 1 and as described above. The GEF PRR reporting framework uses a different approach, based on Process, Stress Reduction and Environmental/Waters Resources Status indicators.

See Section 5.2 below for further discussion of IW indicators.

The UNDP APR/PIR uses indicators of a more standard form and requires the use of baselines, targets and estimates of progress.

5. Monitoring and Evaluation for the OFMP

Section 3 of the OFMP project document refers to monitoring and evaluation requirements. It states that UNDP and GEF procedures will be followed by the project team, and points to two separate LFA matrices.

5.1 Annex B indicators

The UNDP-focused LFA (Annex B of the project document) takes a more traditional approach to performance and impact indicators by:

- describing how project goals feed into objectives; and
- describing how project activities/outputs⁵ feed up into outcomes.

Both have descriptions of objectively viable indicators, means of verification and critical assumptions and risks, an example of which is provided in Table 2 below:

Table 2: Annex B Logframe extract

Summary	Objectively verifiable indicators	Means of verification	Critical assumptions and Risks
COMPONENT OUTCOME: Improved quality, compatibility and availability of scientific information and knowledge on the oceanic transboundary fish stocks and related ecosystem aspects of the WTP warm pool LME, etc	Substantial, relevant and reliable information collected and shared between stakeholders with respect to transboundary oceanic fish stocks and related ecosystem aspects, (particularly for seamounts). etc	Commission Reports, especially from the Scientific Committee show that the Commission has access to, and is using, on-going reliable statistics and scientific advice/evidence by end of project to formulate and amend policy on oceanic fisheries management etc	Commission membership prepared to accept scientific findings and statistical evidence in formulating what may be difficult policy decisions on management of the fisheries, and difficult management proposals for the ecosystems. etc
1.1 Fishery Monitoring, Coordination and Enhancement			
A template for national integrated monitoring programmes and provision of data to the Commission	Database and associated software developed. Reporting modules available for Commission data.	Project documentation shows software and training to implement regional template made available to all PacSIDS by end of 3rd year.	—
National monitoring systems based on the regional template for integrated monitoring, customised to meet national needs	National monitoring systems, including port sampling and observer programmes in place. All PacSIDS reporting regularly to Commission	Commission compliance reports show all PacSIDS meeting Commission standards for provision of monitoring data within 2 years of the standards being adopted by the Commission.	National commitment sufficiently strong to ensure allocation of staff

These indicators were used in the OFP Annual Review, and will presumably be carried over into subsequent annual reviews of the project.

⁵ The OFMP logframe appears to mix activities, outputs and outcomes under the various components and sub-components. For instance, 'Training of national monitoring staff...' is an activity, while 'A regional monitoring coordination capacity' is an output and 'National oceanic fisheries status reports prepared collaboratively with national scientific staff' seems to be an outcome.

5.2 GEF/IW Indicators

The GEF-based PPR indicator framework uses three types of indicator as laid out in Annex L of the project document (see Table 3 for an extract). These are:

- **Process** outcomes and indicators which are related to the establishment of regional or national frameworks/conditions for improving transboundary environmental/water resources quality. As such GEF are explicit that baselines are not required, and the indicators simply reflect establishment of various institutions and agreements and their operation, rather than the downstream effects on the aquatic resources/waterbodies that are measured by Stress Reduction and Environmental indicators.
- **Stress Reduction** outcomes (which infer a level of reduction, e.g. fewer fishing vessels) for which measurable indicators and baselines are required.
- **Environmental/Water Resources Status** outcomes and indicators, where indicators tend to be of the annual 'snapshot' type (e.g. stock assessments/status of stocks, level of bycatch, fishing mortality, fisheries profitability/rent); measurable indicators and again, baselines are required.

These three forms of indicators were developed by GEF in response to the requirement for an ME framework that acknowledges step-by-step progress towards the adoption of joint management regimes, country based reforms and the priority investments that are necessary to support, in the OFMP case, the conservation and management of marine resources in the WCPO.

Table 3: Annex L GEF Indicators extract

Outline of the Structure of Monitoring and Evaluation Indicators			
Outcomes	Process Indicators	Stress Reduction Indicators	Environmental Status Indicators
Component 1 Outcomes			
Improved quality, compatibility and availability of scientific information and knowledge on the oceanic transboundary fish stocks and related ecosystem aspects of the WTP warm pool LME, with a particular focus on the ecology of seamounts in relation to pelagic fisheries and the impacts of fishing upon them This information being used by the Commission and SIDS to adopt and apply measures for the conservation and management of transboundary oceanic fishery resources and protection of the WTP LME. etc	Establishment of Scientific Committee and subsidiary bodies including bodies for statistics and Ecosystem/ Bycatch work; binding agreement on protocols for fisheries data collection and provision, including catch and effort logs, and port and onboard sampling; establishment of Commission data management structure and, databases appointment of science staff and/or contracting of experts for the provision of scientific services; etc	Measures of target stock status in relation to agreed management reference points; measures of status of ecosystem including trophic status and status of key non-target species; provision of scientific advice to the Commission including information and recommendations on TACs and other management measures from the Scientific Committee to the Commission: measures of the impact of environmental variability on target species abundance and distribution; etc.	None provided for this outcome.

This approach to ME is considered highly appropriate for IW projects, given the need to reflect the time frames necessary to detect change in large waterbodies following management action, particularly at the ecosystem level. In many instances, meaningful reporting against final outcomes of GEF projects will not be achieved until well after the completion of the projects. By monitoring and reporting against these indicators during GEF's annual project implementation review (PIR), project progress is measured. The ultimate achievement of the indicators would enable an objective assessment of the GEF intervention. In this sense it is important to have indicators that are capable of representing progress from a baseline level, through project implementation and eventually to reach targets and achieve outcomes.

GEF expects each GEF international waters project to have its own discrete set of indicators and that these will be developed by participating countries, the project executing and implementing agencies and the broad range of stakeholders in each project area (Duda 2002). At the Program level, however there is also an expectation that a system of program performance indicators will be developed, with a degree of uniformity which can then be both aggregated and compared across all relevant projects (GEF 2003). This approach is represented in the PPR template which provides 'standard' examples of process, stress reduction and environmental outcomes and indicators.

It is intended that indicators should be used for the full life of the project and many, especially in the case of environmental indicators, to stay in use beyond the timeframe of GEF funded interventions.

5.3 Annual Reporting

There are currently two main reporting lines required: the PIR/APR and the PPR. To some extent there is duplication, but both have distinct roles in the ME for the OFMP.

The 2008 IW reporting template incorporates two reports:

- i **The UNDP-based Annual Project Report (APR) and Project Implementation Report (PIR)** which are combined into a single UNDP /GEF report. This report focuses on project implementation, through activities, objectives and to the extent that is possible, outcomes.
- ii **The Annual Project Performance Results (PPR)** provided to the GEF and which focuses on higher level outputs in an IW context, using comparable indicators across IW projects, and focusing on incremental improvement.

These reports are intended to provide the required information for the donors and countries to assess the progress of the OFMP. There are also annual evaluations in years 2, 3 and 4 of projects.

5.3.1 The APR/PIR

a) *APR Section 4 - Progress towards achieving project objectives.* Section 4 of the 2008 APR/PIR report uses a logframe approach to meet this requirement. The logframe is of the form shown in Table 4:

Table 4: APR/PIR Reporting Template

Project Objective & Outcomes	Description of Indicator	Baseline Level	Target Level	Level at 30 June 2008
Objective:	1.			
	2.			
	3.			
	4.			
Outcome 1:	5.			
	6.			
	7.			
	8.			
Outcome 2:	9. etc			

The OFMP Annex B was not prepared in this way and baselines and targets were not specified in the Project Document on advice from the GEF/UNDP expert who assisted with the Project Document (ProDoc) preparation. Apparently no issue was raised when the ProDoc was reviewed by the Scientific and Technical Advisor Panel (STAP). The Project Coordination Unit (PCU) took the information in the ProDoc LFA, the details of which were fitted to the APR table on progress towards objectives, and then added baselines, targets and progress towards the target to date. The two overarching objectives of the project used in the above are taken directly from the Annex B logframe⁶, i.e.

- i Information and Knowledge; and
- ii Governance.

The two high level Component outcomes in the Annex B logframe above are then broken down into three project outcomes and reported against. Sub-component outcomes are covered under the section headed 'Progress in Project implementation' (see next section).

The format of the logframe under Section 4 of the 2008 PIR/APR report is in accordance with the UNDP APR/PIR requirements and includes baseline and target levels.

The following changes to the current PIR/APR Section 4 report are recommended:

- clarify the indicators and remove references to outputs and outcomes; and
- add additional indicators, as suggested as a result of the baseline study.

Using the current Section 4 of the 2008 annual report as a basis, Attachment 2 provides a set of suggested indicators and baselines for Section 4 reporting under the PIR/APR.

⁶ GEF projects usually only have one overarching objective

The indicators and baselines for much of the above are, of necessity regional. Many of the in country activities, especially those relating to the delivery of national assistance in Pacific SIDs as identified in the 2007 annual review, are best reported on through comparative tables of the sort used in previous GEF Baseline studies. This would be useful for both tracking project progress, as well as reporting through FFC and other regional fora to FFA member countries. It would also highlight areas where the targeting support is needed, especially to small FFA members and in the area of capacity building, referred to in the mid-term review. The same review indicated that a training inventory – especially in OFM – is required, underscoring the lack of baseline information in this area and a means to measure progress.

b) APR Section 5 - Progress in Project Implementation. Section 5 of the 2008 APR/PIR report relates to project implementation in terms of outputs achieved, and is based on the sub-component outcomes and outputs from the Project Document. Under each key output, activities are listed, again generally in accordance with the Project Document (Table 5).

Table 5: Extract from Section 5 APR/PIR Report

Project Outcomes	Key Outputs
Fisheries Monitoring Coordination and Enhancement. OUTCOME: Integrated and economically sustainable national monitoring programmes in place including catch and effort etc	1. A template for national integrated monitoring programmes etc Activity 1,2,3 etc
	2. National monitoring systems etc Activity 1,2,3 etc
	3. etc

This approach does not:

- provide indicators as per the logframe in the pro doc;
- have baseline status or targets; or
- report against indicators as laid out in the Annex B.

Subsequent clarification provided by UNDP/GEF indicates that it is not necessary or appropriate to relate project activities to baselines and targets, as activities are normally revisited and adjusted each year before the annual work plan is approved by the Regional Steering Committee (RSC). Also, it is considered important that the project maintains sufficient flexibility to adapt to new developments and changing circumstances, which should happen at activity level. UNDP uses Section 5 of the PIR/APR to see if the project is on track with implementation of activities under each project outcome/ component.

If a project was to undertake a wide range of activities and deliver a large number of outputs without achieving its objectives and expected outcomes, then the information in Section 5 could be used to identify necessary changes to the project strategy.

Restricting performance measurement to component level rather than sub-component outcomes as originally suggested in the original Annex B logframe makes the reporting process simpler.

There are no suggested changes to the current PIR/APR Section 5.

5.3.2 GEF Project Performance Results Report

The separate GEF annual PPR report template uses the GEF Process, Stress Reduction and Environmental indicators, and considers outcomes and indicators. These are arranged by Project type (Foundational/Capacity Building, SAP implementation etc), and allow comparison between IW projects within the same Operational Programme.

The GEF Guidelines are very specific about what is to be considered under the outcomes section of the template. The outcomes should describe the intended change in development conditions between the completion of outputs and the achievement of impact and include key results (GEF 2006).

The original indicators laid out in Annex L of the OFMP ProDoc have been modified heavily in the current PPR, noting that many are somewhat ambitious and are not easily measurable or available.

The template provided in May 2008 by UNDP/GEF requires that:

- the GEF IW Project reports deliver one or more of the three types of GEF IW Results/Outcomes and associated indicators;
- where available, baseline (pre-intervention) data should be used for Stress reduction and Environmental indicators;
- reports should cover cumulative project outcomes realised as of the PIR reporting period; and
- responses to the required (specified in template) Outcomes/Indicators, with the addition of any others considered appropriate

In addition, it has been clarified that the rating for likelihood of project achievement is for the Process indicator alone, i.e. GEF only requires a rating of the Outcomes that the project has supported and impacted, not the Catalytic outcomes, which in many cases may have manifested with or without the GEF intervention.

Most of the current indicators in the PPR are not indicators in the usual sense and are more akin to outputs and project sub-component outcomes. This form of reporting is assumed acceptable to GEF/UNDP and is complemented by the reporting in section 4 of the APR/PIR, which includes information on indicators, baselines, targets and current levels of performance against project objectives and outcomes.

As of 2008, the indicators are presented in a different colour, to enable progress by years to be monitored.

The Guidance Information for the Annual Project Performance Results Template (GEF 2006) requires that projects report against certain core Process (5) and Stress Reduction (1) Indicators. The requirement for the Process Indicators has been fulfilled under the current (2008) report, although the Stress Reduction outcome (Pilot/demo projects demonstrate stress reduction measures on priority concerns) is not reported against since there are no pilot or demonstration projects associated with the OFMP. The same GEF guidance information requires that the contribution of GEF projects towards the Millennium Development Goals and World Summit on Sustainable Development Plan of Implementation be reported. To date this has not occurred.

i) Process Outcomes and Indicators

For the OFMP, Process indicators characterise the completion of institutional process at both regional and national levels that will result in i) joint actions to reduce environmental stress on transboundary oceanic fisheries resources and ii) the protection of biodiversity in the WCP LME. These indicators should assist in the tracking of domestic and regional institutional, policy, legislative, and regulatory reforms necessary to bring about change (GEF 2002). In addition and as projects develop, national Process indicators, such as counties enacting legal reforms of instituting regulatory programmes, tend to become more important.

Given the length of time that is generally required before attributable changes can be detected in the transboundary water Environment, Process indicators are likely to be the most important indicator of success of an initial GEF International waters intervention (GEF 2002).

The indicators listed in the Guidance information (Table 6) are references to examples of appropriate documentation which would provide an indication of the progress the project is making towards achieving the Process Outcomes.

The current reporting for the OFMP goes beyond naming the documentation and includes details on the nature of the process developments.

Table 6: Extract from the Process Outcomes and Indicators Results template

Process OUTCOMES			Process INDICATORS
Project	Rating	Catalytic	Project
Effective national inter-ministry coordination			Documentation of functioning national inter-ministry committees
Stakeholder involvement in SAP implementation			Stakeholder involvement plan, progress reports
Adoption of national and regional legal, policy and institutional reforms that address priority transboundary concerns etc			New policy. Legislative, etc. documents

ii) Stress Reduction Outcomes and Indicators

While process indicators relate to the needed institutional and other reforms of programmes. Stress reduction indicators represent documentation that on-the-ground actions have occurred. It is noted that they are usually measurable and quantifiable.

The 2006 PPR Template Guidance document (GEF 2006) uses the examples shown in Table 7 for Stress Reduction Outcomes and Indicators

Table 7: Extract from the Stress Reduction Outcomes and Indicators Results template

Outcome	Indicator(s)
Reduced fisheries by-catch of non-target species	Policies/regulations on improved fishing gear and methods enforced (% using gear, % compliance, % reduction in by-catch)
Reduced harvest of fish from overfished stocks etc	Year on year change in annual harvest (mt); Proportion of fisheries under controlled access (%)

What is not clear, particularly for the Stress Reduction and Environmental Outcomes, is the reason for the lack of targets for indicators.

For both the example outcomes above, the lack of a target would seem to indicate that just about any positive incremental change in the indicator is acceptable. This makes the assessment of the level of progress towards meeting an outcome (which, using this logic should have an associated target level) at a given point of time somewhat difficult. However, this approach appears acceptable to GEF.

iii) Environmental Status Outcomes and Indicators

The time necessary to implement stress reduction measures and then estimate detectable and attributable changes is likely to be beyond the life of many GEF IW projects. Following GEF guidelines, these indicators should demonstrate improvements in the status of oceanic fisheries resources and the protection of biodiversity in the WTP LME.

Establishing indicators and targets in relation to environmental status is no easy task, and in the case of the WCPFC, a number of these (e.g. reference points for target species/acceptable by-catch mortality rates/catch levels) have yet to be set.

The 2006 PPR Template Guidance document (GEF 2006) uses the following examples (Table 8) for Environmental/Water Resources (and Socioeconomic) Status Outcomes and Indicators.

Table 8: Extract from the Environmental Outcomes and Indicators Results template

Outcome	Indicator(s)
Recovery of depleted fishery species	Year on year change in population/biomass of target species (#, mt)
Recovery of aquatic species previously impacted by introduced species	Biomass or population of affected species (mt, #); biomass or population of introduced species (mt, #)
Increased fisheries profitability from sustainable fisheries applying best practices	Year on year change in fisheries profitability (%) or net profit (\$)

The suggested way of dealing with indicators in relation to performance against the key regionally developed management measures in the WCPO is to:

- i adopt the outcomes of Commission Conservation and Management Measures (CMMs) as targets (e.g. purse seine effort at 2004 levels or an average of 2001-2004);
- ii develop an appropriate indicator (e.g. purse seine effort in days); and
- iii measure progress against the indicator (reporting the % reduction annually in the PPR).

In summary, and as directed under the TORs for this review, the PPR requires revision. For the most part, the process indicators seem well-constructed and comprehensive. Further stress reduction and Environmental/Water Resources (and Socioeconomic) Status Outcomes and Indicators are required. Where possible, and in accordance with GEF requirements, baselines for indicators should be included. The use of targets for stress reduction and Environmental/Water Resources (and Socioeconomic) Status indicators should be investigated.

It is proposed by GEF that in the longer term, country-agreed outcome and indicator frameworks should be adopted and tracked by the responsible joint institutions in the post GEF period.

Using the current (2008) Annual Report as a basis, Attachment 3 provides a set of suggested indicators and baselines for Section III of the PPR.

1. Introduction

1.1 Overview of the OFMP

Following an extensive project development phase funded under a GEF PDF-B grant, a second SAP (SAP II) project was approved by the GEF in May 2005 - the Pacific Islands Oceanic Fisheries Management Project (OFMP). The OFMP commenced implementation in May 2005. The project has two goals:

- i global environmental benefits by enhanced conservation and management of transboundary oceanic fishery resources in the Pacific Islands region and the protection of the biodiversity of the Western Tropical Pacific Warm Pool Large Marine Ecosystem; and
- ii enhanced contribution to Pacific SIDS sustainable development from improved management of transboundary oceanic fishery resources and from the conservation of oceanic marine biodiversity generally.

The OFMP has two operational objectives⁷ and associated technical components, which address the two major deficiencies in management that were identified by the IW Pacific Islands SAP as the ultimate root cause underlying the concerns about, and threats to, International Waters in the region. They are:

- i ***The 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.

This objective will be addressed by the Scientific Assessment and Monitoring Enhancement Component of the OFMP which is aimed at providing improved scientific information and knowledge on the oceanic transboundary fish stocks and related ecosystem aspects of the Western Tropical Pacific Warm Pool Large Marine Ecosystem (WTP LME) and at strengthening the national capacities of Pacific SIDS in these areas.

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

This objective will be addressed by the Law, Policy and Institutional Reform, Realignment and Strengthening Component of the OFMP which is aimed at assisting Pacific SIDS as they participate in the earliest stages of the work of the new WCPF Commission and at the same time reform, realign and strengthen their national laws, policies, institutions and programmes relating to management of transboundary oceanic fisheries and protection of marine biodiversity.

There is also a **Coordination, Participation and Information Services Component**; aimed at effective project management, complemented by mechanisms to increase participation and raise awareness of the conservation and management of oceanic resources and the oceanic environment.

⁷ Most GEF projects have a single objective

1.2 The Baseline Study

This study was commissioned by FFA in collaboration with SPC. The Study reviews the situation of the oceanic fisheries resources and associated fisheries in around mid 2005 and the status of:

- a. measures in place at national, sub-regional and regional level for the conservation and management of the oceanic fish stocks of the WCPO and the protection of the WTP LME from fisheries impacts; and
- b. the status of the fisheries, the target stocks and the ecosystem including trophic status and status of key non-target species.

In addition to the references provided, much of the information for the report was gathered directly from discussions and contributions from the staff of the FFA Secretariat and the SPC.

2. Biology and Status of Key Tuna Stocks

This section considers the general biology and the current status of the four key tuna species targeted by the industrial fishery, namely skipjack, yellowfin, bigeye and albacore tuna.

Figure 8. below shows the areas referred to in this paper as the WCPO and the Western and Central Pacific Commission Area or WCP-CA.

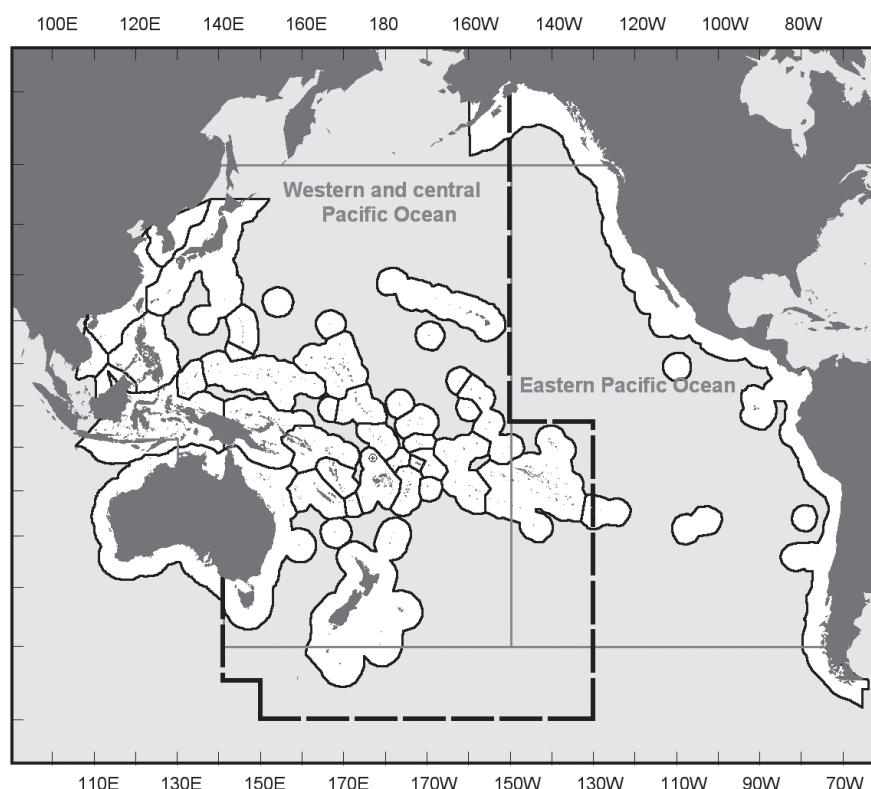


Figure 8. The western and central Pacific Ocean (WCPO), the eastern Pacific Ocean (EPO) and the WCPFC Convention Area (WCP-CA in dashed lines).

2.1 General biology

The tuna fisheries of the WCPO are based on four key species of tuna – skipjack, yellowfin, bigeye and albacore. The most productive area for tuna lies in the equatorial zone (10°N – 10°S) where around 80% of all tuna landed in 2004 from the WCPO were caught (SPC data).

Skipjack and small 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 seine⁸ and to a much lesser extent, pole and line. Larger yellowfin and bigeye are generally found in deeper water, where they are more widespread and are caught using longlines⁹. Some larger yellowfin (2-3 years) are also caught in free-swimming¹⁰ schools.

⁸ Purse seines consist of a wall of net that is used to surround schooling tuna and is then closed off by a wire to form a purse, holding up to more than 100 tonnes in a single set of the gear. Pole and line vessels catch surface fish from schools one by one, using a pole and lure.

⁹ An extensive method of fishing using a mainline frequently over 100 kms in length, from which baited hooks are suspended at regular intervals. The line and hooks are suspended from the surface by floats, which are also attached to the mainline.

¹⁰ Purse seines are usually set around the following: i) natural floating objects (logs and floating debris), ii) specifically deployed objects called fish aggregating devices or FADs, which can be anchored or free floating, or iii) free-swimming fish in schools that are not associated with an object. i) and ii) are sometimes known as associated sets. For reasons that are not well understood, tuna tend to aggregate around floating objects and fishing on these tends to increase the effectiveness of purse seines as well as catches of small bigeye.

In contrast to skipjack and yellowfin tuna, albacore concentrate in temperate areas where food is abundant. Small albacore are particularly common at the ocean surface where different water masses converge, while larger albacore are found in deeper waters (around the thermocline) and are caught on longlines.

Yellowfin and skipjack tuna spawn year round within 10 degrees of the equator and in waters in higher latitudes when the water is warm enough (>23-24°C). Bigeye tuna spawn to slightly higher latitudes but the duration of the spawning season is not known.

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 are sexually mature at age of one year or less, while yellowfin achieve maturity in probably 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. The climatic and oceanographic effects associated with the El Niño/La Niña (or ENSO¹¹) 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 (see Lehodey, 2001).

Sections 2.2 to 2.6 below provide an overview of the status of stocks of the four key tuna species and additional information concerning bycatch.

2.2 Status of key stocks and impacts of fishing

2.2.1 Skipjack

Skipjack tuna is the dominant species in the WCPO tuna catch, accounting for almost two-thirds of the target tuna species catch over the last decade. Skipjack tuna catches in the WCPO have more than doubled in the 1980s and have continued to increase at a slower rate since. The WCPO catch in 2004 was the highest on record at 1.41 million tonnes, being driven by the purse seine fishery which accounts for more than 85% of the skipjack catch.

Catches of skipjack tuna (and associated small bigeye and yellowfin tuna) show considerable interannual variation and are strongly influenced by ENSO effects. The trend in CPUE (catch per unit effort¹², expressed as metric tonnes of tuna caught per day) for the purse seine fleet has been increasing since 1980, related to increased abundance and/or increases in fishing effort and strategy (proportion of FAD fishing).

Other than a shift to larger size classes in the Indonesian/Philippine fisheries due to a change from pole and line to purse seine, the overall size of and age structure of skipjack tuna taken in the purse seine fishery has not changed significantly, indicating that there has been no significant change in the size or age structure of the skipjack tuna population that could be attributed to fishing¹³.

¹¹ El Niño / Southern Oscillation.

¹² Catch taken by a given unit of effort (e.g. a fishing day) is a reasonable proxy for abundance – i.e. as a stock becomes less abundant, then less catch is taken for the same level of fishing effort.

¹³ As fisheries become heavily exploited the average size of fish caught often declines. Monitoring of fish size over time can potentially provide one of a number of possible indicators of the impact of fishing.

An integrated length-based age- and spatially structured model known as MULTIFAN- CL is now routinely applied to the tuna stock assessment in the WCPO. A number of alternative model options, considering various assumptions, including estimates of catchability and the spawning stock/recruitment relations, are conducted.

Interpretations of the stock assessment indicate that there is little biological concern for skipjack, although previous bio-economic studies have suggested that economic overfishing is probably occurring and improved economic yields might be possible by reducing purse seine effort (Bertignac, 2000). It is also likely that there is some economic overfishing on a localised basis.

The overall conclusions drawn below are comparable for the range of models investigated by OFP, and presented in the 2005 Overview and Status of Stocks (Langley, Williams and Hampton 2005) and the 2004 stock assessment report presented to the 1st Meeting of the Scientific Committee of the Western and Central Pacific Fisheries Commission (Langley et al 2005).

- **average annual mortality rates**¹⁴ while remaining relatively low have increased steadily over time and were approximately 0.24 in 2004 for juvenile and adult skipjack tuna;
- **recruitment**¹⁵ is highly variable, with an overall increase in the level of recruitment during the model period¹⁶, and is generally higher following El Nino events;
- **population biomass trends** are driven by recruitment, as expected in a short-lived species such as skipjack tuna. Recent total biomass levels of skipjack tuna are above long-term average levels; and
- **the impact of the fishery** on the stock is estimated to be low throughout the model period and in recent years it is estimated that biomass was reduced by approximately 15% of the level it would have attained in the absence of fishing (Figure 9). Fishery impacts are generally higher (around 0.25%) in the western equatorial region, where most of the skipjack is taken, using purse seines.

Baseline status of skipjack tuna: The results of the MULTIFAN-CL analysis are generally consistent with the results of the fishery indicators and previous tag-based assessments – that is that the fisheries have had little measurable impact on the stock of skipjack tuna, as shown in Figure 2. Fishing as at mid 2004 was within fishing mortality and biomass (MSY) reference points.

¹⁴ Annual mortality rate is the proportion of the population (as measured at the beginning of the year) that dies during the year. Total mortality is divided into two components, those that die naturally (e.g. by predation) or through fishing activity (e.g. being captured in purse seines).

¹⁵ Recruitment refers to the addition of tuna to the total stock.

¹⁶ 1970 – 2005.

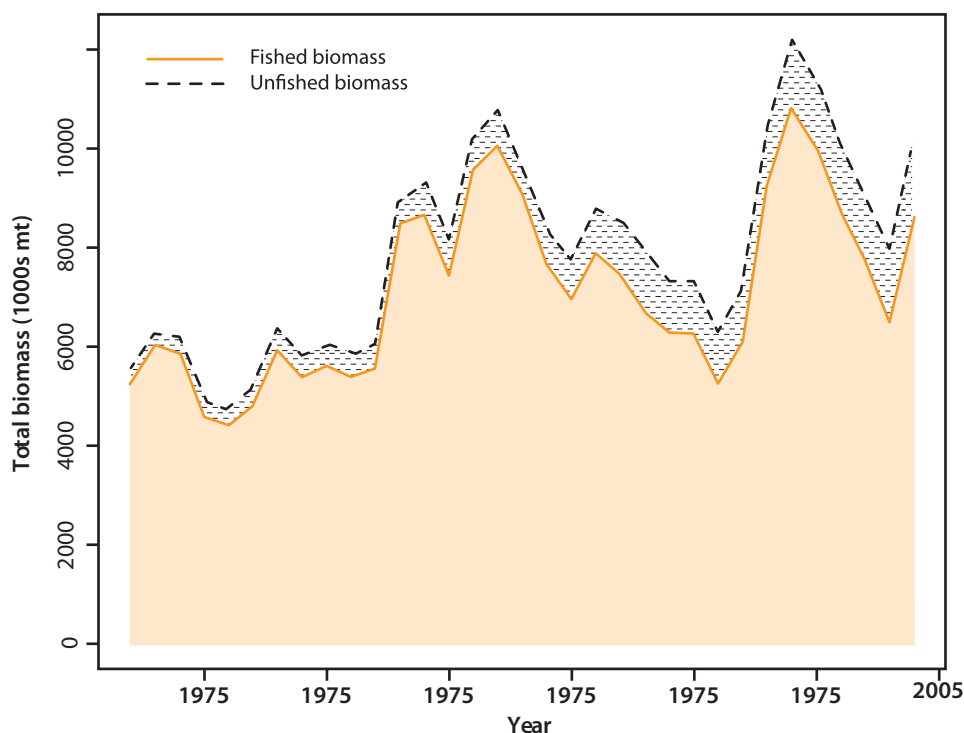


Figure 9. The estimated impact of fishing on WCPO skipjack tuna biomass. The lower biomass trajectory (darker line) represents the model estimates of total biomass. The upper trajectory is the estimated biomass that would have occurred in the absence of fishing, assuming that recruitment was unaffected by fishing. (Source: SPC)

2.2.2 Yellowfin

Unlike skipjack tuna, yellowfin tuna are targeted both by surface fishing methods, principally using purse seines, as well as deeper-set longlines. As with skipjack tuna, the WCPO yellowfin tuna stock is considered to be distinct from that of the EPO, with catches strongly influenced by ENSO conditions. Since 1997, the yellowfin tuna catch in the WCPO has varied between 380,000 and 470,000 tonnes.

The east-west distribution of yellowfin tuna and purse seine CPUE (which accounts for around 50-55% of the yellowfin catch) is strongly influenced by ENSO events, which appear to affect the vulnerability of yellowfin tuna to different methods of purse seining¹⁷ (associated vs. non-associated sets).

The interpretation of distant-water longline CPUE is complex due to changes in fishing patterns and targeting¹⁸. Most of the longline-caught yellowfin is taken in the western equatorial region, where the standardised CPUE has declined steadily since the 1950s to around one third of the initial CPUE. There is considerable variation in CPUE from other regions, with most displaying strong declines.

Yellowfin tuna are most heavily impacted by purse seine fishing and the fishing that occurs in the Philippines and Indonesia (Figure 10).

¹⁷ For example, oceanographic influences can result in a change in depth of the thermocline and the depth at which the fish are found, which in turn can increase or reduce the effectiveness of purse seines, which are depth-limited.

¹⁸ To allow for different methods of longline fishing, and specifically those targeting deeper-swimming bigeye tuna, nominal CPUE information is adjusted using different statistical techniques. For example, deeper-set lines tend to catch more bigeye and less yellowfin tuna, lowering the CPUE for yellowfin.

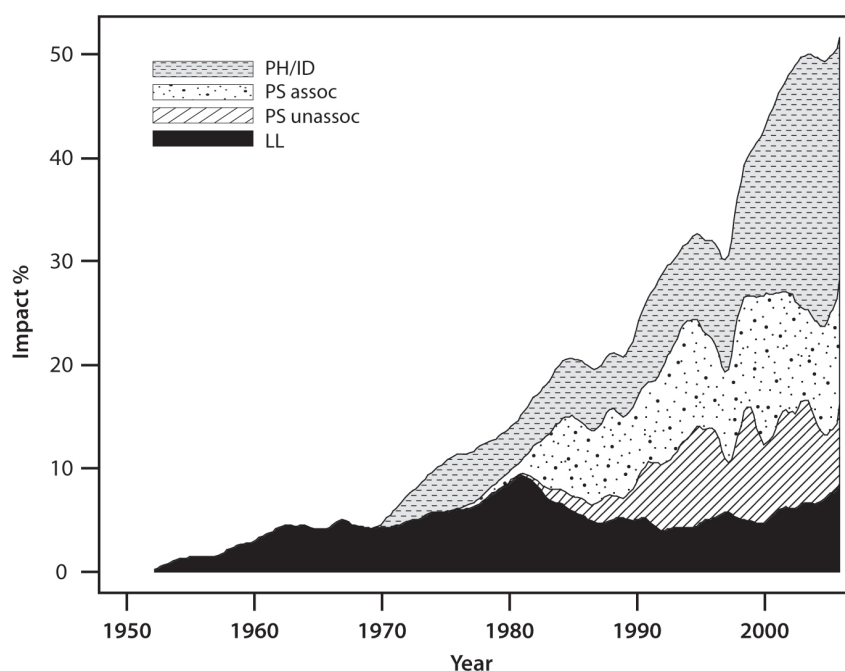


Figure 10. The estimated impact of each fishery on the yellowfin tuna biomass in the WCPO. Impact is expressed as the proportional reduction in biomass attributed to fishing.

The same integrated, length-based, age-structured model, MULTIFAN-CL used for skipjack (and albacore) tuna has been applied to yellowfin stock assessment. The key conclusions below are taken from the 2005 Overview and Status of Stocks (Langley, Williams and Hampton 2005) and the 2004 stock assessment report presented to the 1st Meeting of the Scientific Committee of the Western and Central Pacific Fisheries Commission (Hampton et al 2005):

- **average annual fishing mortality** rates increased continuously from 1970 until recent years, with juvenile fishing mortality rates increasing sharply during the 1990s - a recent and poorly estimated slight decrease in adult fishing mortality of large yellowfin has been suggested;
- **recruitment** estimates display considerable variation – high in the initial model period (1950-1960), low between the mid 1960s and mid 1970s and relatively high high thereafter, with some evidence of decline in the last few years;
- **biomass** estimates are comparable with those for recruitment, with an initial decline, a plateau around 1980-1990 and steady decline from 1990 onwards. and biomass has been trending downwards since that time – current biomass estimates are however estimated to be around 35-40% of those at the beginning of the time series (1962); and
- **the impact of fishing** has strongly increased over time. In the early 1990's the biomass is estimated to have been reduced by about 20% compared with the level it would have been in the absence of fishing. Fishing is estimated to have reduced the overall stock biomass by about 50% in recent years (see Figure 11). Fishing impacts vary considerably between regions, and is high in tropical regions (about 70%) compared with subtropical regions.

Baseline status of yellowfin tuna: The biomass of yellowfin has steadily declined since 1990 and the fishing mortality rate in mid 2005 exceeds the F_{msy} ¹⁹ reference point and overfishing is occurring. The stock (total biomass) is not yet in an overfished state.²⁰

¹⁹ That is, the current level of fishing mortality (F) greater than that required for the stock to produce maximum sustainable yield (MSY) or $F_{CURRENT} > F_{MSY}$

²⁰ That is, the current biomass (B) is greater than the Biomass that would produce MSY, i.e. $B_{CURRENT} > B_{MSY}$

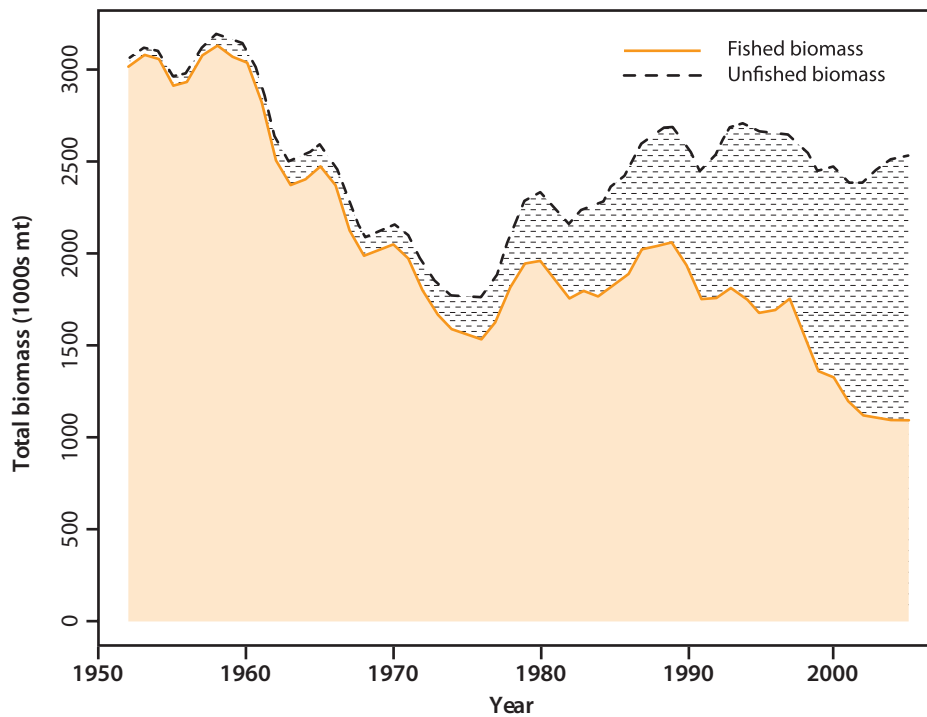


Figure 11. The estimated impact of fishing on yellowfin tuna biomass. The lower biomass trajectory (darker line) represents the model estimates of total biomass. The upper trajectory is the estimated biomass that would have occurred in the absence of fishing, assuming that recruitment was unaffected by fishing.

2.2.3 Bigeye

As with yellowfin, bigeye tuna is taken both by surface (purse seine and pole and line) and longline gears.

The major longline fishery for bigeye tuna is in the EPO, east of 150° W. Since 1980, the longline catch of bigeye tuna in the WCPO has varied between about 40,000 and 98,000t (tonnes), with the record high catches (88-98,000t) being taken in the three years 2002-2004.

Since about 1994, there has been a rapid increase in purse-seine catches of juvenile bigeye tuna, first in the eastern Pacific Ocean (EPO) and since 1996, to a lesser extent, in the WCPO. In the WCPO, purse-seine catches of bigeye tuna are estimated to have been less than 20,000 tonnes per year up to 1996. In 1997, the catch increased to 35,000 t, primarily as a result of increased use of fish aggregation devices (FADs). High purse seine catches were also recorded in 1999 (38,000t) and 2000 (33,000t). The purse seine catch of bigeye in 2004 was 29,368t.

Standardised estimates of effective bigeye tuna effort (i.e. hooks set at depths preferred by bigeye) show that there is a long-term declining trend in longline CPUE in all regions of the WCPO. There are considerable differences in CPUE declines between regions.

Bigeye tuna are most heavily impacted by longline fishing (Figure 12).

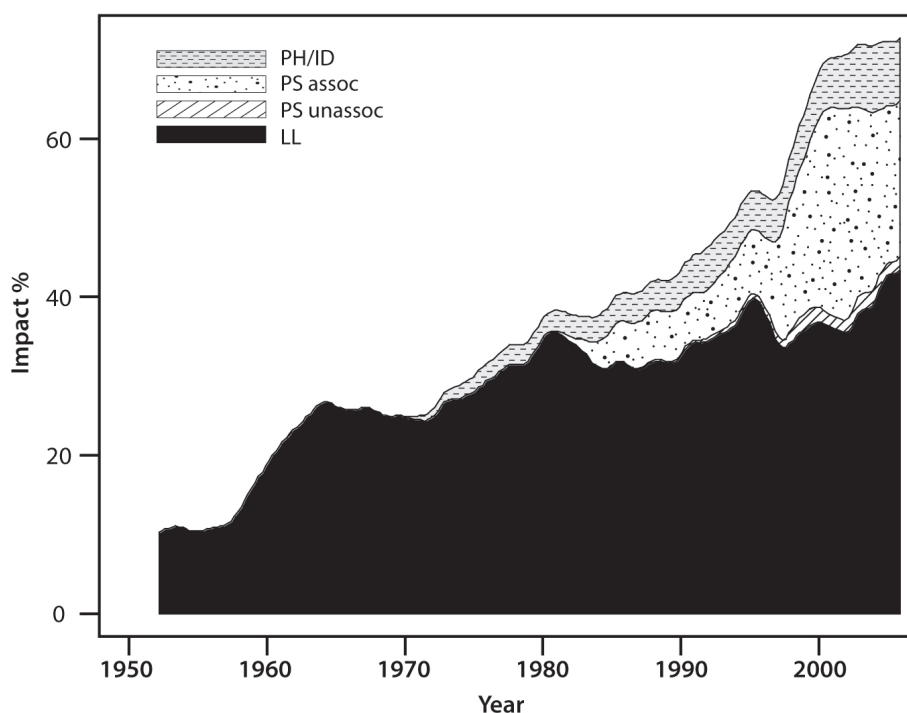


Figure 12. The estimated impact of each fishery on the bigeye tuna biomass in the WCPO. Impact is expressed as the proportional reduction in biomass attributed to fishing.

A six-region MULTIFAN-CL assessment is used to explore a range of alternative model options, for bigeye for the WCPO.

The overall conclusions drawn below are comparable for the range of models investigated by OFP, and presented in the 2005 Overview and Status of Stocks (Langley, Williams and Hampton 2005) and the 2004 stock assessment report presented to the 1st Meeting of the Scientific Committee of the Western and Central Pacific Fisheries Commission (Hampton et al 2005):

- **average annual fishing mortality rates** for both juvenile (<100cm) and adult bigeye tuna in the WCPO increased gradually from 1950 to 1990 and then increased rapidly due to maintenance of longline catches in the face of a decline in adult biomass, and increased catches of juvenile bigeye from purse seine associated sets and the Philippines and Indonesia surface fisheries;
- **estimates of annual recruitment** for bigeye have been fairly constant from the mid 1960s to the early 1990s – since 1990, bigeye recruitment has been well above the long term average, driven by the trends in the two equatorial regions of the WCPO²¹;
- The total bigeye **biomass** is estimated to have declined by about 60% in the 1950s and 1960s mainly due to recruitment declines. Since then, total biomass is estimated to have remained relatively stable with increased fishing mortality being countered by increasing annual recruitment; and
- The **impact of fishing** on the total biomass has increased over time as catches and fishing mortality have increased. The current level of catch is having a large impact in the biomass level (Figure 13), especially in the equatorial region, where the biomass has been reduced by 70-80%.

²¹ Bigeye recruitment estimates are considered to be sensitive to estimated and assumed levels of catch of juvenile bigeye from the purse seine and Philippines/Indonesia fisheries, future work is required to refine estimates.

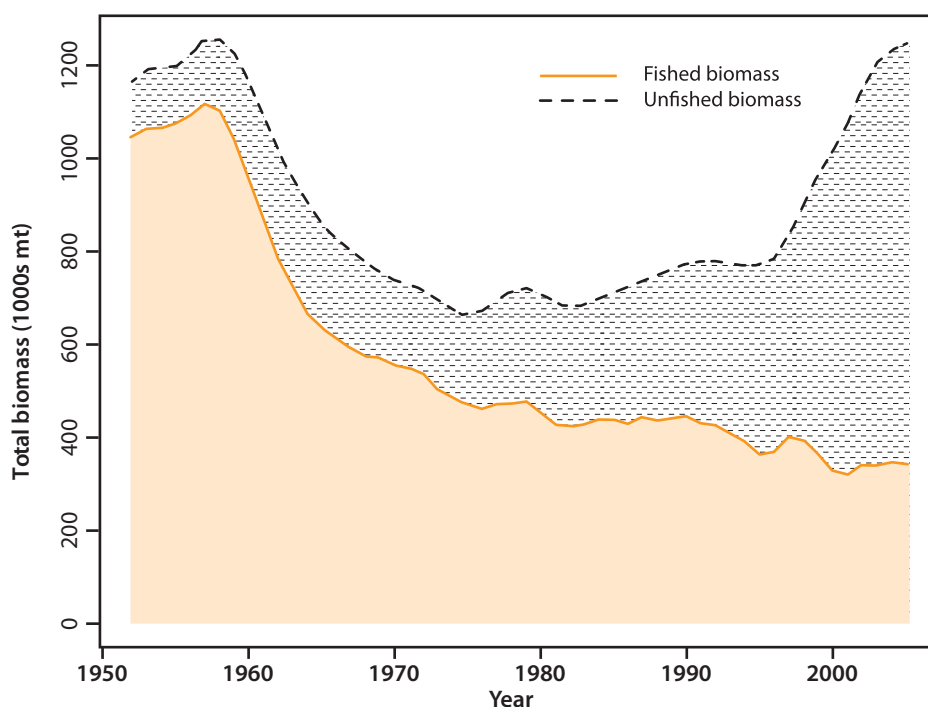


Figure 13. The estimated impact of fishing on bigeye tuna biomass in the WCPO. The lower biomass trajectory (darker line) represents the model estimates of total biomass in each area. The upper trajectory is the estimated biomass that would have occurred in the absence of fishing, assuming that recruitment was unaffected by fishing.

Baseline status of bigeye tuna. The assessment in mid 2005 indicates that the bigeye stock is not in an overfished state, although overfishing is occurring, which unless addressed, will result in an overfished stock. An additional reduction in fishing mortality will be required if future recruitment levels return to the long term average. The spatial nature of the stock shows that greater pressure is being exerted in equatorial regions and that management effort should be concentrated there.

2.2.4 South Pacific Albacore

The most significant fishing method for albacore tuna is longline, with a minor seasonal troll (surface) fishery. Prior to 2000 albacore catches in the WCPO were between 25-40,000 mt (metric tonnes) per annum. Since 2000 there has been a considerable expansion in Pacific Island-based fishing effort on albacore, with historically high catches being taken between 2001-2004 (55-65,000mt).

Albacore CPUE from the Taiwanese longline fleet has been used as a fishery indicator. CPUE for this fleet in all areas has declined, by about 50% between the late 1960s-early 1970s and recent years. This has been partly caused by longliners in the northeast of the fishery switching effort to bigeye and yellowfin.

Catch rates in the Pacific Island domestic longline fleet have been relatively low in a number of countries in recent years (2003-2004). This is believed to have been driven by changes in oceanographic conditions. Figure 14. shows the differential impact of the longline fishery on that portion of the albacore population that is vulnerable to longline fishing. Langley (2006) notes that at a regional level, increases in fishing effort in the Pacific island country tuna domestic longline fisheries will result in declines in CPUE due to a decline in exploitable biomass, an impact that will be exacerbated during periods of adverse environmental conditions. Fiji and French Polynesia are two countries where CPUE declines have been attributed to high levels of localised fishing effort.

The impact of domestic longline fishing through the region is considered to be greater than the impact of increases in the level of fishing effort by the distant-water fleet in the south-eastern area of the fishery.

The assessment for South Pacific albacore is based on MULTIFAN-CL. The following observations are taken from the 2005 Overview and Status of Stocks (Langley, Williams and Hampton 2005) and the 2004 stock assessment report presented to the 1st Meeting of the Scientific Committee of the Western and Central Pacific Fisheries Commission (Langley et al 2005):

- average **annual fishing mortality rates** for adult and, particularly, juvenile (<100cm) albacore tuna has remained low throughout the history of the fishery, although there is a marginally higher mortality rate for the component of the adult stock vulnerable to longline fishing²²;
- **recruitment** has been highly variable since the start of the time series (1950s) and has been relatively low after the early 1980s;
- **biomass** estimate trends in adult biomass are consistent with recruitment trends and have declined since the early 1980s; and
- the **impact of the fishery** on the South Pacific albacore stock has been small, but increasing in recent years to around a 15 percentage reduction in biomass due to fishing (Figure 15.). The impact on the juvenile part of the stock is negligible (around 1%) while the impact of fishing on the stock vulnerable to longlines is much higher at around 30%

Baseline status of albacore tuna. The current level of exploitation of albacore from a biological perspective is very low, and the fishery remains well within fishing mortality and biomass reference points. The age-specific catch of the longline fishery has resulted in significant impacts on that part of the stock which is vulnerable (larger adults).

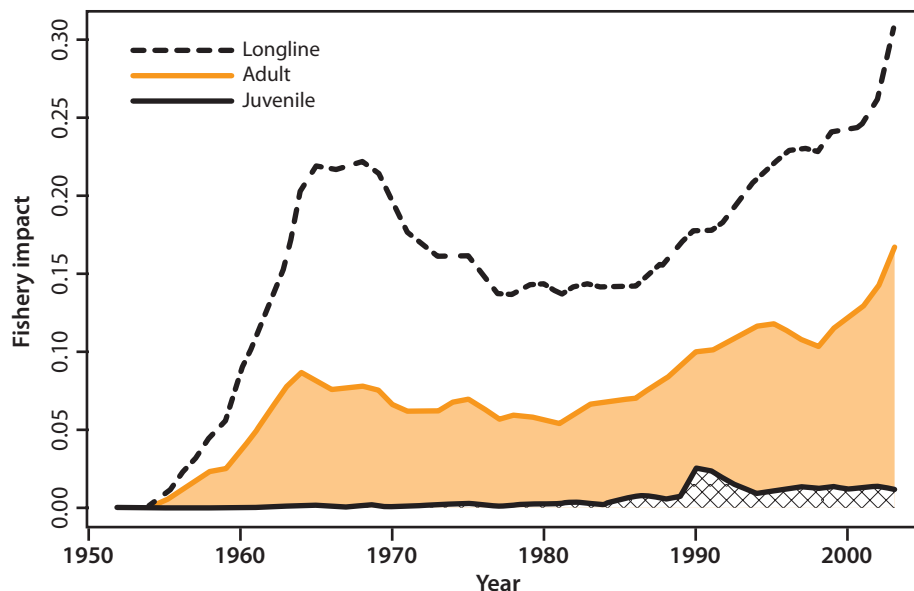


Figure 14. The estimated fishery impact on juvenile and adult biomass of South Pacific albacore and the component of the stock vulnerable to the longline fishery.

²² Albacore tuna mature (become adults) at around 5 - 6 years old and become vulnerable to (are able to be caught by) tuna longlines at more than 7 years of age. The proportion of the population >7 years old is relatively small, and, as shown above has been significantly reduced by longline fishing.

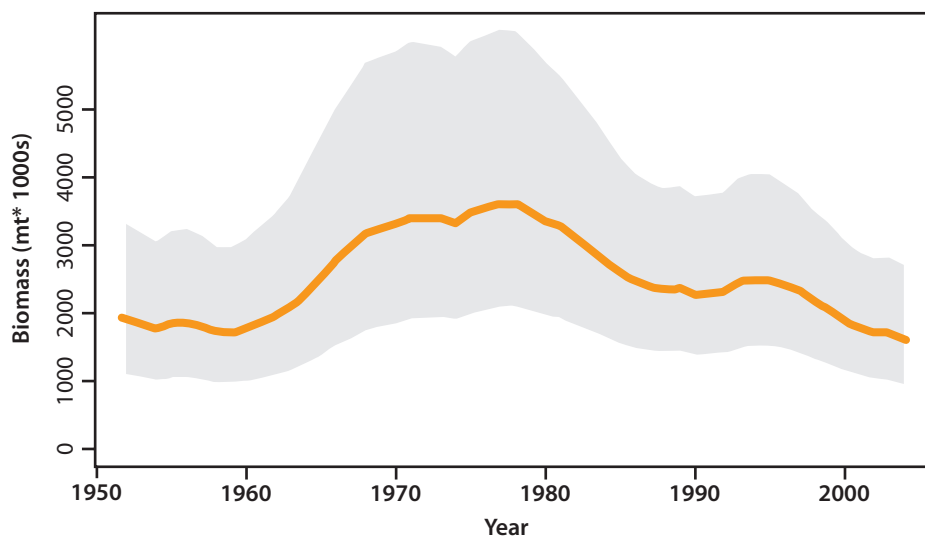


Figure 15. Estimated annual total biomass (thousand mt) of South Pacific albacore. The shaded area indicates the approximate 95% confidence intervals.

Baseline level summary for target species. The status of target species in the WCPO are relatively (in comparison with other tuna RFMOs) well understood, with full stock assessments in place for all species. As at mid 2005, the pressure created by expanding fishing effort on bigeye and yellowfin tuna requires management action, and some preliminary recommendations have been made. Skipjack stocks remain healthy and underexploited, while albacore will require management action focused on economic (catch rates and input costs) rather than biological considerations.

Table 9: Baseline stock status of key tuna species and associated issues

Species	Stock status at mid 2005	Reference points/projections	Critical issues/ data and research requirements
Skipjack	Stock healthy, with exploitation modest relative to the stock's biological potential. Biomass is currently around 85% of unexploited levels.	Estimates of $F_{CURRENT}/F_{MSY}$ and $B_{CURRENT}/B_{MSY}$ indicate overfishing of skipjack is not occurring and the stock is not in an overfished state. Current levels of fishing mortality sustainable, some potential for increased yields.	Better data generally required for the Philippines and Indonesian fisheries. Refined catch and effort data standardisation from the key fisheries. New conventional tagging experiments required to improve knowledge of recent levels of fishing mortality, estimates of natural mortality and movement behaviour. Further research on environmental influences on skipjack tuna recruitment and movement.
Yellowfin	Overfishing likely to be occurring. Biomass is currently 37 - 41% of unexploited levels. Stock not yet over fished, Equatorial area stock more heavily impacted, with relatively low exploitation rates in subtropical regions.	Estimate of $F_{CURRENT}/F_{MSY}$ indicates that overfishing of yellowfin is now likely to be occurring while, the stock is not yet in an overfished state ($B_{CURRENT}/B_{MSY} > 1$). Further biomass decline is likely to occur at 2001_2003 levels of fishing mortality which, unless addressed, will move the stock into an overfished state.	Surface fisheries. Purse seine and Philippines/Indonesian fisheries have the greatest impact. Longline fishing has the lowest impact. Improved catch and length frequency data required from Philippines and Indonesian fisheries, noting some improvement in data from Philippines. Improved parameterisation of the model to explain inter-regional effects/impacts of fishing required. Also understanding of fleet operating dynamics to better inform impacts on stocks of various management options (same applies to bigeye tuna).
Bigeye	Over fishing is occurring, but stock not yet in an overfished state. Biomass is currently 35 - 51% of unexploited levels. Equatorial area stock more heavily impacted.	$F_{CURRENT}/F_{MSY}$ and reference points indicate that recent fishing mortality is near to or above the MSY level. $B_{CURRENT}/B_{MSY}$ was substantially >1 for most analyses. At current levels of exploitation, biomass is forecast to drop below BMSY, if current high levels of recruitment return to long term average levels.	Longline fishing has the highest overall impact, but surface fisheries also have a high impact in tropical regions. The model (recruitment inputs) is very sensitive to estimated and assumed levels of catch of juvenile bigeye from purse seining and Philippines/Indonesia surface fisheries. More information is required to reduce uncertainty – this is a priority given that the biomass estimates have assumed larger-than –average levels of recruitment since 1990.
Albacore	Overall stock is healthy with current level of exploitation low. Increase in impact of longline fishing on longline-available biomass has increased sharply,	The current assessment indicates that the current levels of exploitation of the total biomass are low ($B_{CURRENT}/B_{CURRENT} F=0 = 0.91$ and $F_{CURRENT}/F_{MSY} = 0.05$). The current level of longline catch is estimated to be having a measurable impact on the portion of the stock vulnerable to longlines. While uncertain, the estimated magnitude of this impact the current level of impact is about 30% and has increased sharply in recent years.	Refinement of stock assessment data required, including additional tagging experiments - conventional and archival (latter to improve understanding of depth distribution/vulnerability to longlines).

3 Ecosystem Considerations

In keeping with international developments in integrated fisheries management, the WCPF Convention has identified ecosystem issues as a significant component of the management of tuna fisheries in the WCPO. Clear responsibilities are laid out in the Convention which includes the need to take into account the impacts of fishing on target stocks, non target species, species belonging to the same ecosystem, or dependent on or associated with target stocks. There is also a requirement to protect biodiversity in the marine environment.

3.1 Impacts of fishing

3.1.1 Target species

The status of key target stocks (Skipjack, yellowfin, bigeye and albacore tuna) has already been dealt with in Section 2.2 above.

3.1.2 Bycatch and by-product²³ species

Although albacore, bigeye, skipjack and yellowfin tunas have dominated annual catches from the WCPO, the fisheries also interact with, and capture, a large range of other species. Some non tuna taxa, such as billfishes and sharks, are important components of the retained catches of industrialised fisheries in the region, especially in the longline fisheries (Molony 2005). The fisheries also interact with a range of other species with no commercial value or species with non-commercial values (e.g. turtles and birds). The region will be required to deal effectively with bycatch as required under the WCPFC²⁴, various FAO International Plans of Action (IPOAs) and other international agreements.

Levels and species of bycatch vary with fishing method. Due to the relatively small numbers of some species and high degree of catch variability it is difficult to provide accurate total bycatch estimates, or detect the impact of tuna fishing on these species. The biology and population dynamics of nearly all bycatch species are also poorly known²⁵.

In the **purse seine** fishery the level of bycatch is less than 1% (by weight) of the total catch. Bycatch from free-swimming sets are much lower on average (0.5%) than those from associated sets (0.9%). In addition to bycatch, there is some discarding of target species, of up to 5.7% for associated sets, and less (1.2%) for free sets (Lawson 1997). There are no dolphins taken in association with purse seining in the WCPO. The most important bycatch species are the shark species group and rainbow runners. Others include mackerels, ocean triggerfish, mahi mahi and marlin (blue and black).

Rates of bycatch in the **longline fishery** are considerably higher, at around 40% of the total catch. Much of this is however retained bycatch (by-product), which has some commercial value. Seabird mortality due to longlines is almost non-existent in the tropical WCPO compared with higher latitudes where problems have been experienced with albatross and other vulnerable species. Less than 100 mortalities per year have been recorded since 1998. Tuna fishing is considered to be a low risk to seabirds within the WCPO (Moloney 2005). Sharks, billfish and turtles are key bycatch species taken by longlines. Sharks are relatively long-lived, have low fecundity and a low natural mortality, making them particularly vulnerable to fishing pressure.

²³ Bycatch species are considered to have no commercial value or are prohibited from landing and are discarded, while by-product species have some commercial value and are retained.

²⁴ At the inaugural meeting of the Western and Central Pacific Fisheries Commission (WCPFC), issues of non-target catches in the WCPFC area were discussed and scientific advice on the mortality of non-target species, with an initial focus on seabirds, turtles and sharks, non-target catches was requested.

²⁵ Reviews of bycatch have been undertaken by Bailey et al, (1996) and Lawson, (1997 and 2001).

Some billfish (notably swordfish and blue marlin) are secondary and even primary target species in some areas. In early 2000 the overall catch of billfish in the WCPO was estimated to be in excess of 32,000 tonnes (SPC data).

Small numbers of turtles are taken on longlines, particularly in shallow sets for swordfish and near known nesting areas. Given that most species of marine turtles are either threatened or endangered, longline mortality of turtles is of concern. A baseline summary of the status of bycatch is provided in Table 10.

As a consequence of regional agreements and increasing activity by environmental non-governmental organisations (ENGOS) the issue of bycatch in the WCPO has gained prominence and is being dealt with on a number of fronts. While this section focuses on OFP activity, it should be noted that other steps are being taken in the WCPO by agencies such as the National Marine Fisheries Services (NMFS) which is doing turtle interaction training in Pacific Island countries for industry and observers, and the South Pacific Regional Environment Programme (SPREP).

Since early 2000, OFP has improved its statistical database of by-catch data, primarily as a result of:

- the activities of observers, particularly with respect to species of interest including sharks and turtles;
- improved data collection and quality arising from the above activities of the OFP Fishery Monitoring Supervisor and national observer coordinators, including the development of a new 'Species of Special Interest' form; and
- a new page-per-day logbook form which is now being trailed, which aims to make bycatch recording a daily activity.

Billfish continue to form a significant proportion of the non-target catch, although in most WCPO fisheries of interest, these species are considered by-product and are of commercial value. Catch estimates are now regularly produced and a stock assessment for blue marlin, showing that effort on the Pacific Ocean Blue marlin stock is close to that required to produce MSY, was conducted in 2003. A preliminary stock assessment for striped marlin was conducted in 2005, with a similar result. A number of billfish species are of interest to the recreational fishing sector.

Of growing interest in Polynesian States is the potential for a broadbill fishery, as is currently occurring off the east coast of Australia. With catch rates and fish size declining in the core area of the fishery, the south west Pacific swordfish stock is considered to be in danger of becoming over fished, with the possibility that overfishing is occurring. Experience with this species is that they are prone to local depletion, particularly of the larger, more valuable size classes (Ward and Elscot, 2000).

Based on the use of individual based modelling (IBM) techniques a pilot model has been developed by SPC staff to study the endangered species of turtle, the loggerhead (*Caretta caretta*). The model will be adapted from an existing model for Pacific skipjack tuna. (Kirby et al, 2003).

Since 2000, considerable effort has been expended by OFP on ecosystem based modelling and research. This modelling includes a number of important species of bycatch within the context of the overall tuna fishery and the WTP Warm Pool LME, including shark and billfish as top predators. Stomach contents of bycatch have been examined, as have those of bycatch predators.

At an industry level, the coastal fisheries programme (CFP) launched an awareness campaign in 2002 on the bycatch issue in pelagic longlining. A wide range of information on the bycatch issue including posters, stickers and laminated cards providing information on the steps to be taken to mitigate bycatch and to promote the survival of turtles continue to be provided. Training materials for regional training institutions on bycatch are under development by the SPC and will be available by the end of 2003. A species identification guide for industry and observers is planned, and will include information on target species, fish bycatch, sharks, marine mammals and turtles.

Table 10: Baseline status of bycatch (and by-product) species, and associated critical issues/requirements (from Malony 2005, 2005a)

Species	Overall status	Critical issues/requirements
All	Data on overall bycatch species limited; observer reports have considerable information that is currently not utilized.	Need for review of data currently held, including observer data, and provision of updated estimates of bycatch levels, using observer reports.
Billfish	Details of biology and ecology of all six species of billfish are limited and stock assessments of billfishes from the Pacific Ocean are rare. A MULTIFAN-CL assessment of the Pacific wide blue marlin stock indicated that the stock was not overfished but was likely to be approaching full exploitation. Assessments for western Pacific swordfish and northern and south western Pacific striped marlin are underway, but assessments for other species are not currently planned.	Catches of billfishes by longline are dominated by blue marlin and swordfish, with lesser amounts of striped marlin. Recently, fisheries specifically targeting swordfish and striped marlin have developed in several countries within the WCPF Convention area. Sport fisheries also rely heavily on most billfish species. Research/data collection needs include: Improved understanding of the sustainability current harvest as a continuous incidental catch by the large, widely distributed longline fleet; role of billfish in the pelagic ecosystem; interaction with sport fisheries; and assessment of other species of billfish and the re-evaluation of the blue marlin assessment. Need for better estimates of catches from data correspondents, reporting on logsheets and by observers.
Sharks	Catches average approximately 500,000 sharks per year. Sharks are often targeted/ retained and are dominated by blue sharks in the longline fishery. While sharks represent the most significant bycatch species group, formal stock assessments for species of sharks, other than blue sharks, in the Pacific Ocean are currently limited. The total catches of the three species of shark taken by longline and listed by the International Union for the Conservation of Nature (IUCN) as vulnerable, are 'very low'. Falling CPUE for some species and baskets of species are of concern.	While the rate of shark-finning and/or retention is considered to be relatively high throughout the region the precise level is uncertain. The increasing value of fins will continue to place pressure on stocks. Industrialised longline fisheries and dedicated fisheries have been established in some EEZs in contrast with other bycatch species. Current data is inadequate for stock assessment or to assess impact of fishing. There is a need to generate of more robust estimates of mortality and stock status. This would be, assisted by an increased level of observer coverage and increased rates of identification of sharks to species level. Information on the condition and fate of sharks would also benefit the generation of more accurate estimates, especially for sharks captured within the purse-seine fishery.
Turtles	All species of marine turtles are listed as 'endangered' or 'critically endangered' by the IUCN (www.redlist.org). The highest estimated total catches taken in the tropical shallow (<100m) longline fishery, with the highest mortality rates occurring for deeper set logline gear, probably due to drowning. There are relatively low purse seine mortalities, more than 70% of which were from associated sets. Most turtles caught by purse seines are released alive.	Current data on turtle interactions and mortalities are sparse due to poor longline observer coverage and are inadequate for stock assessment or to assess impact of fishing. More than 50% of all turtle records by observers were not identified to the species level. Need to extend mitigation strategies to commercial fleet and raise awareness of release techniques to decrease post-capture mortality. Research/data collection needs include: more detailed analyses of turtle-fishery interactions; dividing the longline and purse-seine fisheries within the tropical regions of the WCPFO into fisheries east and west of 170°E, in order to better estimate turtle-fishery interactions; and increased species identification rates by observers in all fisheries to permit a better assessment of the impacts of fishing on turtles stocks.

Species	Overall status	Critical issues/requirements
Seabirds	Catches of seabirds on longlines in the tropical waters of the Pacific islands region are very rare in comparison with temperate waters and the risk of industrialised fishing to the sustainability of bird populations in the WCPFO is considered low. The interaction of the industrialised fleets with birds between 15°N and 31°S is too low to generate reliable estimates of catches and mortalities.	Many resident and transient seabirds in the tropical Pacific are listed as threatened by the IUCN (Watling 2002) and reducing seabird-fishery interactions in the region may improve the status of these bird stocks. Research and data needs to include improved identification of birds by observers. Improved reporting of condition and fate of captured seabirds would improve the understanding of the interactions between birds and industrialised fisheries in the region.
Mammals	Very few mammal interactions have been reported by observers within the longline fisheries and the overall impact of longline fisheries with marine mammals appears very low. Some interactions with whales in the western tropical Pacific as a result of purse seine sets being made on tuna schools associated with whales and interactions during FAD purse seine sets.	Future, more detailed analyses of mammal-fishery interactions are required. Division of the purse-seine fishery of the WCPFO into at least two separate fisheries, with division between the two fisheries set at 180°E should be considered. Better species identification of the few recorded interactions would permit a more thorough understanding of the impacts of fishing on mammals stocks of the WCPFO.
Other species	Over 50 fish species are taken by longlines and purse seines, some of which are of commercial value or of interest to the artisanal or recreational sectors.	No known significant sustainability issues, however little information exists on which to base such assumptions for most species. A better understanding of species composition through observer data collection is required and will be an ongoing task.

3.2 The Western Tropical Pacific Warm Pool LME

3.2.1 Physical environment

The Western Tropical Pacific (WTP) Warm Pool Large Marine Ecosystem (LME) is considered part of the larger Pacific-wide tropical oceanic environment known as the cold tongue-warm pool system. This system consists of a cold tongue of nutrient rich water generated by equatorial upwelling, and extends from the eastern to central equatorial Pacific. The cold tongue eventually encounters a large pool of very warm water in the west (the WTP Warm Pool LME). Productivity in the WCPO is largely influenced by the upwelling intensity and zonal extension that fluctuates in relation to the interannual variability linked to the El Niño Southern Oscillation (ENSO), and the more recently identified Pacific Decadal Oscillation (PDO). A correlation between ENSO and PDO signals is evident for the last 50 years, although whether ENSO fluctuations are influenced by, or are the cause of, the PDO is still unclear.

3.2.2 Ecosystem dynamics

There is an increasing trend in fisheries management to develop ecological approaches that take into account species interactions and underlying ecosystem dynamics. To assess the impact of fisheries and environmental effects on the ecosystem requires a good understanding of the marine ecosystem.

At a physical level, ENSO events have a direct effect on the productivity of the ocean and tuna fishing operations and there is an increased understanding of these effects. For example, during El Niño events, when trade winds decline and the cold tongue retreats eastwards and warmer (less productive) waters extend to the central Pacific, higher purse seine catches of skipjack are found in the eastern part of the WCPO. El Niño conditions also result in a vertical change in the thermal structure of the ocean resulting in the rising and vertical extension of yellowfin and bigeye temperature habitats, which in turn increase purse seine catch rates of yellowfin and longline catch rates of bigeye.

Predation induces an important mortality in the ecosystem that is often higher than fishery mortality, at least in the juvenile stages, and determining trophic interactions between species is a major step towards a better understanding and modelling of ecosystem dynamics.

3.2.3 Trophic structure

To understand of the effect of environmental conditions (such as El Niño) 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 feedback 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. Diet information of the main predators will be compiled into a diet matrix describing the prey-predator interactions. It is planned to incorporate this information into an ecosystem model of the western and central Pacific using the Ecopath with Ecosim software (<http://www.ecopath.org/>). This will allow the testing of different scenarios of environmental forcing (ENSO effects) and impacts of fishing. A preliminary Ecopath/Ecosim model has been developed for the three species of tropical tuna (Godinot and Allain 2003). The outputs of this model are questionable due to a major weakness, being the uncertainty in the estimation of the data input values, as biological factors and abundance, which can vary strongly with area. A lack of data also restricted the inclusion of many functional groups of species and these were either not included or were over exaggerated.

3.2.4 Ecosystem monitoring

A spatial ecosystem and population dynamics model (SEAPODYM) has been developed (Lehodey 2004a, 2004b) to explore the underlying mechanisms by which the climate and environmental variability affect the pelagic ecosystem and tuna populations. The model uses:

- An input data set describing the oceanic environment with the variables temperature, currents and oxygen concentration over three vertical layers. Primary production is integrated over all three layers. From this input, the transfer in the food chain is simulated with six different kinds of forage (prey) organisms living at different depths and having one of two vertical migration behaviours (migrating or not, during the night to the upper layer);
- The populations of tuna species, which evolve according to their own preferences for temperature and oxygen conditions and their ability to access these different prey components; and
- The observed fishing effort, applied in space and time and the catch predicted from the state of the populations simulated by the model at the corresponding time and place of fishing. A comparison of observed and predicted catch is applied to evaluate whether the model produces realistic simulations.

A comparison of observed and predicted catch is applied to evaluate if the model produces realistic simulations. Early runs of the model have been applied to skipjack and have provided encouraging results. The model predicted large interannual variations in the recruitment, increasing during El Niño events (1972, 1982-83, 1987, 1990) and decreasing during La Niña events (1988-89), as observed from the statistical estimates (MULTIFAN-CL). An exceptional catch record of skipjack at the end of 1998 seems to support this mechanism.

Once the SEAPODYM model has been parameterised for an individual tuna species, the model can be applied to investigate trends in abundance and spatial distribution of the species under different environmental conditions.

The ultimate goal of this work is to provide ecosystem models with the capacity for testing different fishing policies and environmental change scenarios to assist managers with identifying robust and reliable management options that will achieve their fisheries management objectives.

3.3 Ecology of seamounts and associated effects of fishing

There are a large number of seamounts in the WTP LME. The impact of fishing on and around seamounts is a major current global environmental concern, based primarily on the destructive effects of deep sea bottom trawling on vulnerable, benthic species, many of which are endemic. These species include corals and sponges and long-lived, slow-growing fish species.

There is currently no known deep sea bottom trawling in the WTP LME but the potential exists. Since tuna fishing, by definition is a pelagic (carried out in the water column) activity which takes place high in the water column removed from the seamounts, it is a lesser concern than trawling.

However, seamounts are known to aggregate pelagic species and are targeted using certain methods of pelagic fishing (especially tuna longlining). They are also known to support a mix of pelagic species that differs considerably in species composition compared to the open ocean. As a result, some concerns exist about the impact of pelagic fishing around seamounts. These include:

- the possibility of higher proportions of juvenile fish in catches;
- likely higher levels of catches of some bycatch species of special interest such as sharks and billfish, and including some species such as wahoo which are locally important for food security;
- possibly a higher mortality of turtles, seabirds and marine mammals; and
- the possible sharing of prey between pelagic and demersal species due to vertical migration of some prey species.

The relationships between seamounts, pelagic fishing and the dynamics of tunas and exploitation generally of pelagic species in the WTP LME are not well understood. Analysis of historical data and the collection of additional data will be necessary to assess in a scientifically rigorous way if, and what, management measures may be required.

4. WCPO Tuna Fisheries

This section will deal with tuna fisheries in the WCPF Commission Area (WCP-CA) (Figure 8)²⁶. As Figures 16. and 17. below show, the WCPO tuna fishery is dominated by skipjack tuna, which is primarily taken by purse seining.

Annual total catches of the four main tuna species (skipjack, yellowfin, bigeye and albacore) in the WCP-CA increased steadily during the 1980s as the purse seine fleet expanded, remained relatively stable during most of the 1990s, increased sharply in 1998 and has remained at this elevated level since (Figure 16. and Figure 17.). The provisional total WCP-CA catch of tunas during 2004 was estimated at 2,021,773 mt, the highest annual catch recorded (the previous record was in 1998 – 2,009,546 mt). During 2004, the purse seine fishery accounted for an estimated 1,263,161 mt (62% of the total catch—the highest catch ever for this fishery), with pole-and-line taking an estimated 297,515 mt (15%), the longline fishery an estimated 225,786 mt (11%), and the remainder (11%) taken by troll gear and a variety of artisanal gears, mostly in eastern Indonesia and the Philippines.

The WCP-CA tuna catch (2,021,773 mt) for 2004 represented 78% of the total Pacific Ocean catch of 2,582,774 mt, and 51% of the global tuna catch (the provisional estimate for 2004 is just under 4,000,000 mt).

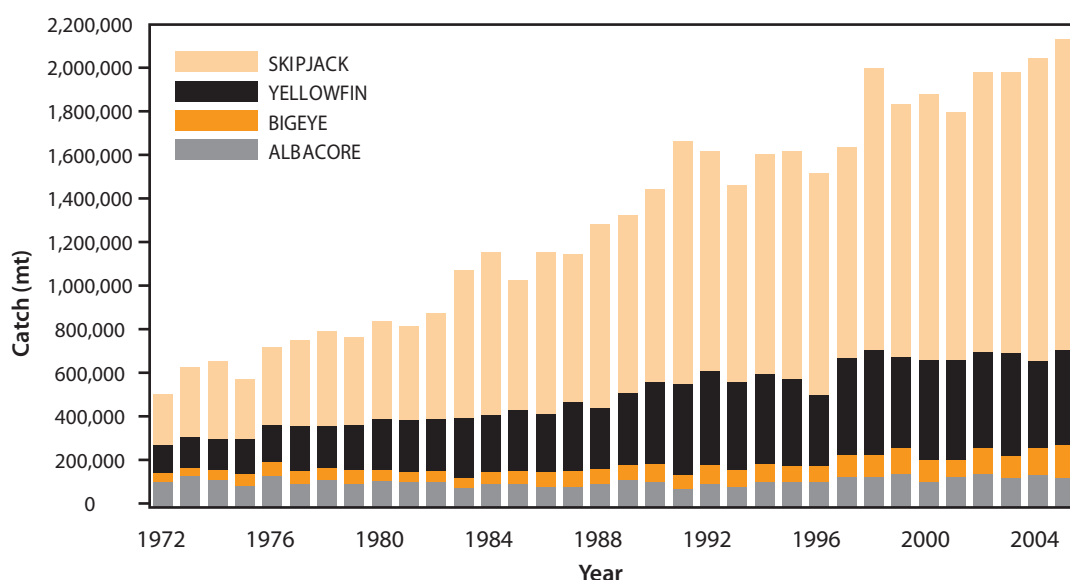


Figure 16. Annual total catch, by species, in the WCP-CA

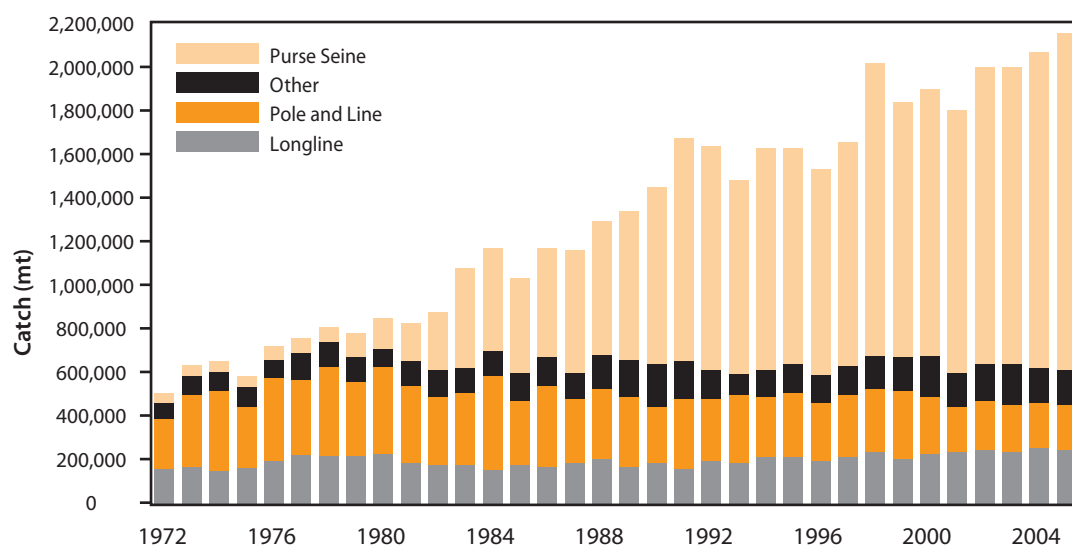


Figure 17. Annual total catch of skipjack, yellowfin, bigeye and albacore tuna, by fishing method, in the WCP-CA.

4.1 Purse seine

The purse seine fishery is technology intensive and uses large highly mechanised and expensive vessels to catch surface swimming, schooling tunas (skipjack and small yellowfin and bigeye tuna) using surrounding nets.

Since the early 1990s the purse seine fishery has accounted for around 55 – 60% of the WCP-CA total catch by volume, with annual catches in the range 790,000 – 1,260,000 mt. The majority of the WCP-CA purse seine catch is taken by the four main distant water fishing nations (DWFN) fleets – Japan, Korea, Chinese-Taipei and USA, which currently number around 120 vessels (Figure 18.), although there has been an increasing contribution from the growing number of Pacific islands fleets (60 vessels in 2004), with the balance from the Philippines and a variety of other fleets, including several new distant-water entrants into the tropical fishery (e.g. China and New Zealand).

The WCP-CA purse-seine fishery is essentially a skipjack fishery, unlike those of other ocean areas. Skipjack regularly account for 70 – 75% of the purse seine catch, yellowfin 20 –25% and with bigeye accounting for only a small proportion. Yellowfin catches tend to be generally higher during El Niño years and lower during La Niña years. Catches of juvenile bigeye by purse seine have been an issue given the status of the bigeye resource, although in recent years, there has been a gradual decline in both the use of drifting FADs and consequently, the catch of bigeye.

The provisional 2004 purse-seine catch of 1,263,161 mt was the highest on record and maintained a catch in excess of 1,200,000 mt for the past three years. 84% of this catch was skipjack, 24% yellowfin and 2% bigeye. Taiwan has been the highest producer in the tropical purse seine fishery since 1996 producing around 200,000 tonnes per annum for the last two years. Catches by the Japanese and Korean purse seine fleets have been largely stable. The number of Pacific island domestic vessels continued to grow in 2004 and is now at its highest level ever (Figure 18.). This category is made up of vessels fishing under the FSM Arrangement²⁷ and domestically-based purse seine vessels operating in PNG and Solomon Islands waters.

²⁷ The FSM Arrangement fleet comprises vessels managed by the Pacific Island "Home Parties" of PNG (17 vessels), the Marshall Islands (6 vessels), FSM (6 vessels), Kiribati (1 vessel) and the Solomon Islands (2 vessels) which fish over a broad area of the tropical WCP-CA.

Other major fleets are:

- The distant-water Philippine fleet, which operates almost exclusively in PNG waters, comprises 11 vessels and accounted for close to 35,000 t. during 2004;
- The domestic Philippine purse-seine and ring-net fleets operate in Philippine and northern Indonesian waters, and continued to take in excess of 100,000 t;
- The recently-established New Zealand (4 vessels in the tropical fishery) and Chinese (6 vessels) purse seine fleets; and
- the Spanish fleet which was active in the eastern regions of the tropical WCP–CA during 2004, with a provisional catch estimate of around 5,517 mt.

Purse seine set types (either *associated* with drifting logs or fish aggregating devices (FADs) or unassociated (free schools) vary with oceanographic (ENSO) changes. For the last 3 - 5 years to 2005, there has been an increase in *unassociated* sets, which is typical of El Nino years, when natural floating objects (i.e. logs) are more prevalent and tuna schools associated to floating objects appear to be more available to the purse seine gear. Different fleets tend to have differing fishing strategies, with Korean vessels favouring unassociated sets.

There is very limited published data on the profitability of the purse seine fleets and most economic analysis is limited to price data. These prices, particularly for skipjack tuna, are highly volatile and are related to supply factors. After reaching a peak of US\$1,000 - 1,100 per tonne²⁸ for skipjack in the late 1990s, prices collapsed to below US\$600 between 2001 and 2002. Since then, prices have steadily increased to approach US\$1,000 per tonne in 2005. Prices for yellow fin tuna for canning prices have tended to be less volatile, and have also increased since lows around 2000 of US\$800-900 per tonne²⁹ to around US\$1,250 in 2005.

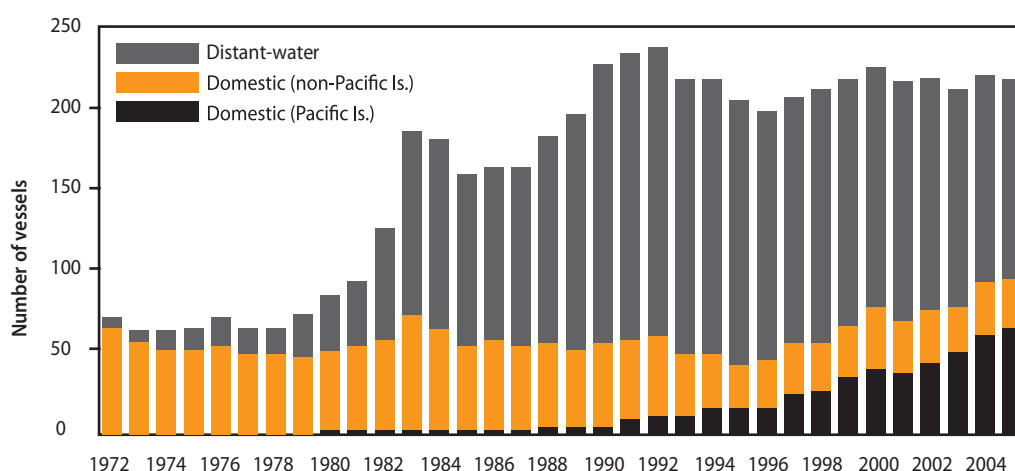


Figure18. Number of purse-seine vessels operating in the WCP–CA. Domestic (non-Pacific Is.) includes vessels based in Australia, Japan and New Zealand, but not Philippine domestic vessels.

²⁸ Bangkok monthly skipjack price (4-7.5lbs, c&f)

²⁹ Bangkok monthly yellowfin price (20lbs and up, c&f)

4.2 Longline

Longline fishing for tuna is less technically demanding and requires less capital than purse seining. Accordingly, it is of major and increasing significance to Pacific island nations and territories. There are considerably fewer barriers to entry to this fishery, the major constraint being the availability of air transport for the shipment of highly valuable fresh sashimi-grade tuna.

The longline fishery continues to account for around 10 – 12% of the total WCP–CA catch but rivals the much larger purse seine catch in landed value. It provides the longest time series of catch estimates for the WCP–CA, with estimates available since the early 1950s (Lawson & Williams, 2005). The total number of vessels involved in the fishery has fluctuated between 4,000 and 5,000 for much of this period (Figure 19.).

The fishery involves two main types of operation:

- large (typically >250 GRT) **distant-water** freezer vessels which undertake long voyages (months) and operate over large areas of the region. These vessels may target either tropical (yellowfin, bigeye tuna) or subtropical (albacore tuna) species; and
- smaller (typically <100 GRT) **offshore** vessels which are usually **domestically-based**, with ice or chilling capacity, and serving fresh or air-freight sashimi markets. These vessels operate mostly in tropical areas.

Additionally, small vessels in Indonesia and Philippines (not included in Figure 19.) target yellowfin and bigeye by handlining and small vertical longlines, usually around the numerous arrays of anchored FADs in these waters. These fisheries have similar species composition as longliners operating in the same area.

There have been significant changes in fleet operations during the past two decades, including: an increase in depth deployment of the longline gear to target higher-valued bigeye in preference to yellowfin in the 1980s;

- a gradual increase in the number of Pacific islands domestic vessels during the 1990s, especially in Polynesian nations with albacore the main species;
- entrance into the fishery and subsequent decline of the smaller “offshore” sashimi longliners of Chinese-Taipei and mainland-China, based in Micronesia; and
- a trend towards flexibility in species targeting in some fleets, notably those with ultra-low temperature freezing capacity, creating an ability to move between albacore and bigeye and yellowfin.

The WCP–CA longline tuna catch steadily increased from the early years of the fishery (i.e. the early 1950s) to 1980 (227,212 mt), but declined in the five years after this to 156,608 mt in 1984 (Figure 32.). Since 1984, catches steadily increased over the next 15 years until the late 1990s, when catch levels were again similar to 1980.

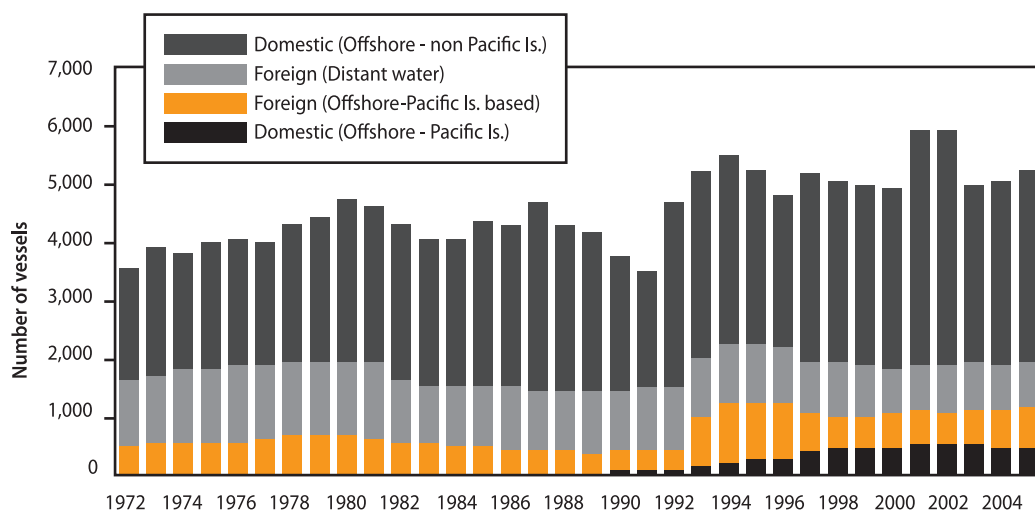


Figure 19. Longline vessels operating in the WCP-CA.

4.3 Pole and Line

The pole and line fishery is of decreasing significance to the Pacific islands due to economic factors and technological advances in the purse seine fishery. These advances have drastically reduced the costs of production of the purse seine sector, which targets the same species (skipjack tuna).

There remains a low level of distant-water pole and line activity by Japanese vessels in the Pacific islands region, with the bulk of the catch being taken by Japanese and Indonesian coastal fleets.

5.0 Management Issues

5.1 WCPF Convention and Commission

The Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPF Convention) was opened for signature in Honolulu on 5 September 2000 and came into force on 19 June 2004. As at mid 2005, the WCPF Convention had been signed by 19 countries (12 PacSIDS) and ratified or acceded to by 18 countries (15 PacSIDs, including NZ on behalf of Tokelau) and the European Union.

The WCPF Convention gives effect to the UN Fish Stocks Agreement in so far as the Western and Central Pacific Ocean is concerned. The primary objective of the WCPF 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 (LOSC) and the 1995 UN Fish Stocks Agreement. For this purpose, the WCPF Convention establishes a Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean to oversee the implementation of the obligations under the Convention and requires members of the Commission to implement a number of conservation measures, both in zone and on the high seas.

The WCPF Convention imposes obligations on each member of the Commission to promptly implement the provisions of the Convention and any conservation, management and other measures or matters which may be agreed to from time to time. Beyond the specific requirements of the WCPF Convention, it is necessary for members of the Commission to review their legislation to align their laws and policies more closely with the Convention and the decisions of the WCPF Commission.

The inaugural meeting of the Commission was held in December 2004 and a number of decisions and (non-binding) resolutions were made, with implementation issues for PacSIDs. Many of the procedures, specifications and other actions agreed had been developed during the period of the preparatory conference (Prepcon) phase and through its three working groups.

The key outcomes of the first Commission meeting were:

- A decision relating to the budget of the Commission and related matters, including a scale of contribution by members;
- Adoption of a Rules of Procedure for the Commission (and subsidiary bodies until they develop their own): and
- Adoption of a Prepcon recommendation to base that the headquarters of the Commission in Pohnpei, Federated States of Micronesia;

The establishment of a secretariat;

- Adoption of procedures for a Commission record of fishing vessels and authorizations to fish;
- Adoption of specifications for the marking and identification of fishing vessels;
- Adoption of procedures for Cooperating Non-Members;
- Adoption of a resolution on conservation and management relating to work by the Scientific, and Technical and Compliance Committees on estimates of sustainable catch levels, biomass projections etc; advice on the effective implementation of possible conservation and management measures including time/area closures and FAD measures; and

- Agreement to carry over the provisions of previous MHLC and Prepcon resolutions calling for measures including reasonable restraint in the expansion of fishing effort and capacity in the convention area.

It is clear from the list above that in mid 2005 PacSIDs were under considerable pressure to ensure their legislation and fisheries management and policy frameworks were in accordance with these decisions arising from the first session of the WCPF Commission.

6. Scientific Assessment and Monitoring Arrangements

The key provider of oceanic fisheries assessment and monitoring services in the WCPO is the Oceanic Fisheries Programme (OFP) based in Noumea, New Caledonia. The OFP is part of the Marine Resources Division of the Secretariat of the Pacific Community (SPC). These services include fishery monitoring and data management, ecosystem and biological research relevant to the fisheries, and stock assessment and evaluation of species- and ecosystem-based management options.

The OFP will be responsible for delivery of Component 1 of the OFMP - Scientific Assessment and Monitoring Enhancement.

These services are provided at both the national and regional levels.

The most important programme outputs are information (e.g., reports on the status of fisheries, stocks and ecosystems), infrastructure (e.g., databases, monitoring programmes) and advice (e.g., regarding appropriate levels of fishing).

- At the **national level**, the OFP provides scientific support to national Tuna Management Plans (TMPs) in Pacific island countries and territories (PICTs), primarily through support of information (including the status of fisheries, stocks and ecosystems) national fishery monitoring and database systems, provision of advice on appropriate levels of catch or effort, and associated national capacity building.
- At the **regional level**, the OFP provides scientific services (data summaries and analyses, stock assessments and management advice) to two key agencies:
 - *the Forum Fisheries Agency (FFA)* for its various regional tuna fisheries management initiatives, including the US Tuna Treaty, the Palau Arrangement and coordination of FFA inputs into the Western and Central Pacific Fisheries Commission (WCPFC); and
 - *the WCPFC* in the areas of data management and stock assessment. Service provision to both the FFA and WCPFC is governed by inter-organisational memorandum of understanding.

The OFP has three research areas and their current research focus on oceanic fisheries resources and the related environment are provided in the following sections. This division of activities is broadly in line with the activities of the OFMP. At the end of each section key activities for the next 5 years relevant to the OFMP are identified. The four provides baseline of national monitoring and stock assessment activities in OFMP beneficiary countries.

6.1 Statistics and monitoring

6.1.1 Current status

A regional catch and effort database of industrial tuna fisheries has been established. Catch and effort data is provided by two main sources – from coastal states in the form of logsheets and in an aggregated form from flag states. Table 11. provides estimates of the total coverage of logsheet, landing, port inspection and observer data.

Table 11. Data coverage (% of total) for purse seine and longline fisheries in the WCPO as at mid 2005 (SPC data)

Gear Type	Logsheet	Landings	Port inspection	Observers
Purse seine	8.4	7.0	3.9	14.1
Longline	2.3	7.4	1.8	0.3

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 and the Philippines and Vietnam. Other tuna fisheries data includes annual catch estimates, unloadings 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.

Observer programmes provide a wide range of data for research purposes from most of the major industrial fleets of the region. This includes data for primary target species, non-target species (including bycatch) and length data. Coverage is uneven and while gradually increasing, is generally low, the exception being the US purse seine fleet, which under an FFA-run observer programme has achieved a 20% coverage for three of the last 4 years. Coverage of the rest of the fleet is considerably lower and is achieved by both national and regional (SPC) programmes. An observer programme operated under the South Pacific Regional Tuna Research and Monitoring Programme (SPRTRAMP) between early 1995 and 2000, with OFP observers gathering baseline data from most of the major industrial fleets of the region. The OFP has also played a significant role in assisting member countries to establish national observer programmes, through the provision of observer training, design of data collection forms, processing of observer data and data quality assessment.

Port sampling is conducted to collect data on the species composition and the length-frequency of the landed catch. OFP continued 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 provision of sampling equipment such as calipers.

Fisheries database systems have been established in several countries. The OFP processes data received from SPC members and, at the beginning of each quarter, returns the data to the SPC members for incorporation into databases that are maintained on computers within each country or territory.

Data are disseminated through the publications mentioned above and authorised (by relevant countries/ other sources) releases of data to scientists outside the OFP. Public domain catch and effort data, grouped by gear type, 5° squares and month, for all fishing nations combined are available on the SPC website.

SPC has developed and installed fishery databases on computers in the fisheries departments of FFA member countries. The systems are customised according to the needs of the member country but typically allow the production of data summaries and maps of fishing activity within their EEZ.

With FFA, OFP continues to assist FFA member countries to establish national observer programmes, through the provision of observer training, design of data collection forms, processing of observer data and data quality assessment. As the proposed regional observer programme to be established under new Commission (and UNFSA), substantial strengthening of observer and port sampling programmes will occur.

As at mid 2005, the ability of PacSIDs to fully met WCPFC-related reporting requirements in respect of annual catch estimates, aggregate and operational catch/effort data and size data was limited by a general lack of resources (human, computers and database systems) and capacity to (i) ensure that appropriate target coverage in the data collection were achieved, (ii) process and manage their fishery data and (iii) produce summary reports to forward to the WCPFC (i.e. meet their WCPFC data reporting obligations).

A basic text version of the Tuna Fisheries Management Database- TUFMAN, which will form the basis of data collection, analysis and submission to the Commission was installed in Fiji Fisheries Division offices only, and the reporting of 2004 annual catch estimates by PacSIDs to the WCPFC was in most cases well after the deadline for the provision required by the WCPFC (30th April 2005). In a number of cases, assistance by SPC was necessary/requested to complete the task. This situation was understood to be due to the lack of capacity and resources in PacSIDs to undertake the work in preparing estimates for their fleets.

Attachment 4 provides an estimate of baseline status (mid 2005) for national monitoring activities in OFMP beneficiary countries.

Key future activities related to the OFMP

- Continue coordination of the collection and compilation and of tuna fisheries data, including data on/ from: annual catch estimates; catch and effort log sheets; aggregated catch and effort, unloadings, port sampling, and observers.
- Provide technical support to FFA (SPC) members for data collection, including the installation, maintenance and updating of in-country Tuna Fishery Data Management Systems (TUFMAN) and the Catch and Effort Query System (CES).
- Improve observer and national port sampling coverage and efficiency through the provision of training and advice to national observer programmes and the establishment and support of National Tuna Data Coordinators (NTDCs).
- Provide tools, develop standardized procedures and build capacity to improve the timeliness and quality of tuna fisheries data provided to the Commission for regional stock assessments which are fundamental to the conservation and management of the tuna resource in the western and central Pacific Ocean.
- Training of national monitoring staff, particularly monitoring coordinators, observers and port samplers through attachments to SPC and in-country training courses.

6.2. Tuna ecology and biology

6.2.1 Current research

The Tuna Biology and Ecology Section of the OFP undertakes analyses to understand the biological parameters and the environmental processes that influence the productivity of tuna stocks, which in turn are fundamental for stock assessment. Biological investigations focus on tuna age and growth, tuna movement and behaviour, diet and feeding behaviour as observed using conventional and electronic data archiving tags, and field sampling and laboratory analyses. Mathematical models are developed to identify the major environmental determinants of tuna fishery production, including impacts of climate fluctuation (ENSO, PDO, and global warming), and to improve the prediction of tuna stock distribution, abundance and availability to fisheries.

Building on previous work with yellowfin and bigeye tuna, growth estimates based on otolith increment counts combined with tagging data are being developed for other species (skipjack, billfish, albacore, wahoo, kawakawa). Growth estimates for these and a range of other species will gradually become available in the future.

The stock structure of yellowfin, skipjack and albacore tuna has been available from conventional tagging experiments, leading to general acceptance of an east-west population structure for skipjack and hemispheric structure for albacore in the Pacific. Much less information has been available for bigeye tuna, although a single Pacific-wide stock is now assumed following a genetic study. In 2005 the need for a major (and repeatable) conventional tuna tagging study was confirmed, and funds were being sought. Results of this work, if funded, will provide better estimates of exploitation rates and population dynamics.

Analysis of the occurrence of non-target, associated and dependent species, more commonly known as bycatch, in WCPO tuna fisheries is an ongoing function. Observer data has been the major source of such information and has enabled the WCPO bycatch to be characterised and preliminary estimates of the catch by species to be obtained. As discussed earlier, coverage rates are acceptable in the US purse seine fishery (20%), are lower in the Taiwanese, Korean and Japanese purse seine fleets (<4%) and are less than 1% in the longline fishery.

There is growing interest at the international level to address marine exploitation issues from an ecosystem perspective using SEPODYM and Ecopath with Ecosim (see also Sections 3.2.3 and 3.2.4 above).

SEPODYM has now been applied to skipjack, yellowfin and bigeye tuna, and captures important changes in their population dynamics (including recruitment) which explain 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.

Ecopath provides a framework for the construction of mass-balance models of ecosystems based on estimates of how abundant the resources are (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. The Ecopath model includes 20 functional groups up the food chain, including detritus, plankton, cephalopods, pelagic fish, small top predators and adult top predators.

Given the description of the ecosystem in Ecopath, Ecosim provides a tool to explore hypothesized changes in production by means of dynamic simulations. Since the energy inputs and outputs of all model components must balance, Ecopath will help translate the diet and stable-isotope data into estimates of trophic level for the system components.

Simulations using the biodynamic models that are under development should allow exploration of the impact of environmental changes such as ENSO, as well as fishery exploitation variations, on the different components of the ecosystem.

A food web study of the western and central Pacific Ocean tuna ecosystem was completed by the first GEF project and provides an initial characterization of the Western Pacific Warm Pool Large Marine Ecosystem. In particular, trophic relationships among major components have been determined by conducting biological sampling, and databases to support detailed ecosystem modelling in the future have been established. This work is ongoing and supports work on the two biodynamic models described above.

Much of the OFP work on biology and ecology is integrated into wider regional projects including i) The Pacific Fisheries Research Programme (PFRP) project: Trophic structure and tuna movement in the cold tongue-warm pool pelagic ecosystem of the equatorial Pacific and ii) the Oceanic Fisheries and Climate Change project (OFCCP). The OFCCP will investigate the effect of climate change on the productivity and distribution of oceanic tuna stocks and fisheries in the Pacific Ocean with the goal of predicting short- to long-term changes and impacts related to climate variability and global warming.

In addition to more ‘traditional’ research areas (upper trophic levels of the pelagic ecosystem, food web structure in pelagic ecosystems and modelling from ocean basin to individual scale) the OFCCP will also consider socio-economical impacts. This area of work acknowledges that ENSO events have important socio-economic impacts on tuna fishery and industry at the global scale that in turn may affect the tuna populations (e.g., higher/lower catch) and the pelagic ecosystem (by-catch, interaction between species, top-down effects). Using ecosystems models, it is hoped that various management options can be exploited that account for climate change and spatial and temporal distribution of target species and fleets. Eventually the project could help to assess the vulnerability and impacts in a scenario of global warming, and to eventually propose adaptations and/or mitigation measures for the future.

Key future activities related to the OFMP

- Continue sampling and comparative analysis of stomach content found in pelagic species, including the main bycatch species to inform trophic relationships.
- Further development and refinement of the SEPODYM and ECOPATH/ECOSIM models, including consideration of MPA (high seas closure) establishment.
- Continue work on collaborative projects including the PFRP ‘Trophic Structure’ project.
- Explore interactions between tuna fisheries and seamount ecosystems.
- Improve estimates of bycatch by reviewing use of historical and contemporary observer data.
- Assess the impacts of the global climate change on tuna stocks (further development of the Oceanic Fisheries and Climate Change Project, OFCCP GLOBEC³⁰).

6.3 Stock Assessment and modelling

6.3.1 Current research activity

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 at both national and regional levels. MULTIFAN-CL, a length-based, spatially-explicit, age-structured model, has been under development 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 can be made available for independent review or analysis by interested scientists.

Tuna movement is recognised as playing a major role in population dynamics and in determining the extent of actual and potential interaction between fisheries. By using tagging data and information from the ecological models, the simulation of skipjack populations and catch under climatological (average) conditions has been achieved and comparison of CPUE estimated by the simulations with observed average CPUEs have been very promising.

Estimating (and managing towards) some optimum level of catch or effort (including MEY concepts) is gaining prominence. In collaboration with the University of Queensland and FFA information on the population biology of major tuna species and been integrated with economic information to provide advice to FFA member countries on optimal (from a bioeconomic point of view) levels of fishing effort. This work will be extended through the incorporation of economic data into the ecosystem models.

³⁰ *The Ocean Fisheries and Climate Change Project (OFCCP), conducted as part of the Global Ecosystem Dynamics (GLOBEC) programme.*

National Fisheries Assessments (NFAs) are produced by the OFP to inform member countries of the status of their tuna fisheries and the stocks that support them. Reports include sections on the biology of the major tuna species, oceanographic influences in the EEZ, reviews of the fisheries and analyses of data, assessment of stocks and management recommendations, where requested. In some cases, the reports have included analyses of regional tuna tagging project and/or in-country tagging project data, enabling more quantitative assessments and management advice. Scientific input has also been provided in the development of tuna management plans. The baseline status of NFAs and related national assessments are included in Attachment 4.

The OFP's tagging databases consist of more than 300,000 releases and approximately 26,000 recoveries. This large amount of data continues to be supplemented by long-term tag recoveries, some now nearly eight years at liberty, and represents a valuable source of information for stock assessment and tuna research. A large amount of historical Japanese tagging data is also being prepared for use in an integrated skipjack tuna model.

Most fisheries administrations, and where they exist fisheries researchers, in PacSIDs have little in-depth knowledge of stock assessment models, indicators and reference points. While it is unrealistic to plan or support in-country tuna stock assessments, it is increasingly important that island nationals engaged in managing fisheries have a sound understanding of, and an ability to interpret and question, the results of stock assessments.

In 2005 the Standing Committee on Tuna and Billfish provided the key forum for the presentation (by OFP) and discussion of stock assessments, the status of target resources and by catch and impacts of fishing and environmental change.

Key future activities related to the OFMP

- Continue predation of National Oceanic Fisheries Status Reports and support of National Tuna Management Plans.
- Continue development of MULTIFAN-CL, including graphical interfaces.
- Undertake five and 10 year projections of total and spawning stock biomass for bigeye and yellowfin, including incorporation of management options including area closures and gear (FAD) restrictions.
- Develop estimates of mortalities of non-target species with an emphasis on seabirds, turtles and sharks.

7. Fisheries Management, Including Fisheries law, Policy and Compliance

Each sovereign FFA member is responsible for its own fisheries policies, laws and regulations as they relate to the sustainable management of oceanic fisheries. The capacity of FFA members to develop and implement of fisheries policy and fisheries management arrangements varies greatly and all rely, to a greater or lesser extent, on services provided by the FFA.

These services fall into three major areas and have both a national and regional focus and include:

- The provision of, and support for, various forums including the Forum Fisheries Committee and the Parties to the Nauru Agreement. These forums consider and cooperate to achieve common positions and agreed initiatives to take forward at the Commission;
- Capacity building through a range of training initiatives including attachments, workshops and study visits to other RFMOs; and
- The delivery of technical advisory services in areas including compliance, legal services and fisheries management.

The FFA is responsible for the delivery of Components 2 (Law, Policy and Institutional Reform Realignment and Strengthening and 3 (Coordination, Participation and Information Services) of the OFMP.

Of particular note is the initiative by those FFA members who are parties to the *Palau Arrangement on the Management of the Purse Seine Fishery*, to develop a Vessel Day Scheme (VDS). The proposed scheme was in the final stages of development prior to mid 2005. A memorandum of understanding to facilitate the adoption of the scheme was opened for signature by the PNA ministers in 2005. The scheme will replace the current vessel number limit under the Palau Arrangement and is expected to be launched at the annual meeting of the members of the PNA in 2006. The scheme was acknowledged and approved by the WCPF Commission as a management and conservation measure for the management of the purse seine fishery in its management and conservation measures for bigeye and yellowfin tuna.

In recognition of the worldwide shift to incorporate more holistic forms of management for natural resources, FFA has commenced a project to introduce an Ecosystem Approach to Fisheries Management (EAFM) as the key approach to tuna fisheries management amongst FFA members. The general knowledge of the complex marine ecosystem in this region is limited, and the ways in which tuna fisheries affect it is poorly understood, and the EAFM approach is seen as a long-term undertaking for FFA member countries to reduce uncertainty in the fisheries management decision making process for the sustainable developments of the regions tuna resources. Links between this process and the current national fisheries management and development plans are unclear.

7.1 Fisheries Legislation

Pacific SIDS have made substantial progress in implementing UNCLOS through both national and regional (including the establishment of Regional and VMS registers and standardised data collection) initiatives. All states have now ratified UNCLOS and implemented its requirements in their national laws.

With GEF and other assistance Pacific SIDS were at the forefront of the development of the WCPF Convention text and the Preparatory Conference and as at mid 2005 had also contributed significantly to the development of the first round of resolutions and measures at the Commission.

As discussed earlier, The WCPF Convention imposes additional and substantial obligations on each member of the Commission to implement the Convention provisions and any conservation, management and other measures (CMMs) or matters which may be agreed to from time to time. Beyond the specific requirements of the WCPF Convention, it is necessary for members of the Commission to review their legislation to align their laws more closely with the principles of international fisheries agreements (including the UN Fish Stocks Agreement and FAO Code of Conduct), the WCPF Convention and the decisions of the WCPF Commission. Undertaking these actions should not be seen as simply meeting the requirements of the Commission; sound national fisheries legislation is the cornerstone of effective fisheries management and the implementation of tighter controls on national flag vessels in home waters, other EEZs and on the high seas.

Legal reforms should also provide a statutory basis for fisheries management plans, including consultative and transparent decision-making frameworks.

Pacific SIDS are faced with the substantial task of making revisions to national laws that go well beyond that which has occurred to meet the requirements of UNCLOS. These revisions mark a major change in fisheries management and governance and will need to give practical effect to the principles of biodiversity, EBFM and the precautionary approach.

Attachment 5 provides a baseline of National legislation and policies relating to the WCPF Convention and Commission.

Key future activities related to the OFMP

- Identifying and assisting with meeting the obligations arising from the Convention text and the decisions of the Commission.
- Developing and running national and regional workshops on international fisheries law generally, and regional fisheries instruments and the WCPFC legal framework specifically, including developing proposals for legal arrangements to implement the Convention.
- Providing national policy advice on the implementation of the WCPF Convention.
- Advising on necessary legislative changes required to implement the Convention and the decisions of the Commission.

7.2 Fisheries policy³¹

Fisheries and associated policy development is occurring at a range of levels relevant to Pacific SIDS. At a global level, Agenda 21 and subsequent policy framework declarations³² have emphasised the importance of marine resources to the sustainable development of SIDS and in so doing have recognised that much fisheries development activity, especially on the high seas, has generally been non-sustainable. The need to balance fisheries development and the generation of sustainable, improved returns from fisheries with effective fisheries management, including under UN Fish Stock Agreement (e.g. the WCPF Convention) is a central theme in this thread.

Also at the global level, a range of technical policy instruments have been agreed and are in the process of being implanted in Pacific SIDS. These include the FAO Technical Guidelines for Responsible Fisheries and national plans of action (NPOAs) on fishing capacity, sharks, seabirds and IUU fishing.

³¹ Includes fisheries management

³² E.g. The Barbados Plan of Action and the UN Millennium Declaration.

In the region, Pacific SIDS have adopted a Pacific Islands Regional Ocean Policy which seeks to represent “a regional effort to achieve responsible ocean governance” and achieve “healthy ocean that sustains the livelihoods and aspirations of Pacific island communities” (CROP, 2004). The Policy’s goal is to ensure the future sustainable use of the ocean and its resources by both Pacific island communities and their external partners. The use of partnerships is emphasised in this policy, both in terms of development and the political and financial support to develop programmes and initiatives to support the efficient and sustainable use of marine resources, including capacity building.

At the WCPF Commission, Pacific SIDS have the opportunity to develop and promote policy and management initiatives that best meet their specific needs, and, while meeting conservation and management initiatives, do not unduly restrict key development policy objectives.

The global and regional policy initiatives outlined above need to be operationalised through national fisheries policy that will be based more on gaining maximum benefits from current catches, rather than seeking to substantially increase catch volumes. Much of this policy work will be done through legislative reform (see previous section) and through national fisheries management plans and associated measures. Substantial progress on these activities was initiated under previous GEF funding. Coordinating and, where appropriate, harmonising these national approaches will be a major challenge.

The current fisheries policy scene is characterised by complexity and diversity, and the necessary improvements outlined above will require considerable expertise and human capacity. Increasing the understanding and capacity of the regions’ policy makers, fisheries managers and decision makers in the area of sustainable fisheries management is a fundamental need facing Pacific SIDS.

Key future activities related to the OFMP

- Assist with the continued development of fisheries management plans, policies and strategies.
- Develop preferred (by Pacific SIDS) proposals for the Commission, including those on conservation and management measures.
- Build fisheries policy-making capacity of nationals through a range of training initiatives including workshops, short courses, seminars, emphasising the value of cross-agency cooperation (fisheries, environment economic development etc).

7.3 National Fisheries Institutions

It has been long recognised that most Pacific island SIDS require institutional strengthening if they are going to realise the promise and deal with the challenges offered by the sustainable development of oceanic fisheries resources. Many fisheries administrations operate in silo-like conditions, with ineffective communications and inputs from other government agencies and from non-governmental players, including environmental NGOs and industry. Some fisheries administrations have moved to various improved governance models that allow for more transparent, adaptive and responsible approaches, particularly in relation to private sector development. Cost recovery and adequate resourcing of fisheries management agencies will also be of growing significance as the requirements to report and demonstrate implementation of the Convention and Commission measures increase. Some useful examples of arms-length (from Government) authority models exist in the region (e.g. the National Fisheries Authority in Papua New Guinea) and others are like to be developed in the future.

Key future activities related to the OFMP

- Development of new, alternative or improved models of fisheries administration to strengthen national oceanic fisheries management.
- Establishment of improved consultative processes and exchange of knowledge/views with the community and industry/environmental NGOs and other non-state stakeholders.
- Capacity building of non-state stakeholders to enable more effective input into fisheries management decision making.

7.4 Fisheries Compliance

Fisheries compliance, encompassing monitoring, control and surveillance (MCS), remains a critical issue of Pacific SIDS. Through FFA and PNA initiatives, considerable progress has been made in developing national compliance programmes, particularly through the use of VMS, a regional register of fishing vessels and coordinated compliance operations between FFA members using combined assets and third party (e.g. Australian and New Zealand Royal Air Force Surveillance) assistance. While these initiatives are acknowledged, most Pacific SIDS will require strengthened in-zone compliance capacity to adequately apply the more rigorous conservation and management measures that will arise from Commission agreements and to ensure that their own EEZs have sufficient safeguards against IUU fishing. As regulations on the high seas and in neighbouring EEZs are increasingly applied effectively, the pressure on individual states' EEZ compliance arrangements will increase as a result of displaced IUU fishing.

As MCS efforts are ramped up in an effort to reduce IUU, the significance of port state control and effective dockside boarding and prosecution has been acknowledged and capacity building of nationals through a series of workshops is planned.

High seas compliance remains an area of concern and was a key area targeted by the provisions of UN Fish Stocks Agreement and the WCPF Convention. While FFA members are keen to ensure that high seas compliance standards in the WCPO compatible in in-zone measures, there has been, and is likely to continue to be, some resistance from major fishing nations. The Preparatory Conference developed a draft MCS scheme for the Commission which will provide a platform for future negotiations, via proposals that will need to come from, and be driven by, Pacific SIDS. These will include provisions relating to at sea and port inspections, observers, transshipment controls, infringements and deterring non-contracting party IUU vessels.

Compliance training, particularly in the area of VMS systems and port inspection remain a key priority. Attachment 6 provides baseline information on compliance issues relating to the WCPF Convention and Commission

Key future activities related to the OFMP

- Identification of Convention implications and compliance gaps.
- Improved regional coordination, building on current Niue Treaty-based initiatives.
- As with management/policy initiatives, the development of detailed compliance proposals for discussion and prospective adoption at the Commission.
- Compliance training.

8. Information Dissemination and Stakeholder Engagement

8.1 Information dissemination and awareness raising

The extent and level of complexity of oceanic fisheries management, including stock assessment, ecosystem, legal and compliance considerations, has resulted in many thousands of pages of technical papers, many of which are unintelligible to civil society and, frequently to government departments. While the WCPF Commission has a comprehensive website, the publications listed are highly technical and are written for an informed audience of fisheries specialists.

Many FFA papers and reports are confidential in nature and/or are not widely available, particularly to the private sector³³. Gillett (2003) noted that much of the future regional support of relevance to the private sector was likely to be in the form of analyses, studies, and reviews on important topics – which will need to include oceanic fisheries management. He also noted that many countries do not have a system of fisheries information distribution to the private sector.

The issues faced by Pacific SIDS are not unique. Other regions are dealing with national and regional oceanic fisheries resource issues and there are significant lessons to be learnt which could utilise best practice and help avoid fisheries management failures.

Reports and outcomes of projects are, however starting to become more widely available and this should increase as more use is made of the internet facilities and the widening accessibility and affordability of broadband access in Pacific SIDS.

Key future activities related to the OFMP

- Preparation and implementation of an information strategy tailored to the needs and of all non-state stakeholders.
- Providing widely available and easily accessible information on oceanic fisheries management issues and options.

8.2 Stakeholder engagement

The terminal evaluation of the previous GEF oceanic fisheries project (Tortell and Tarte, 2004) noted that public participation and stakeholder engagement had been ‘weak in most aspects of the project’ with ‘the almost total absence of participation by the public, NGOs and the private sector’.

Effectively disseminating information on oceanic fisheries to the lay community and gaining effective stakeholder engagement is frequently not a priority for Pacific SIDS’s governments or fisheries departments. In contrast, most DWFNs have significant industry input and attendance at RFMO meetings, and in many cases they drive government policy and negotiating stances. This situation is changing, with some Pacific island delegations to the MHLCC and Preparatory Conference meetings including industry representatives. Given the stated development objectives of the region with respect to domestic industry development, it is considered essential that industry is party and has input into the management measures that will, in many cases, have a significant bearing on operations and profitability. A Regional Tuna Industry Association was established in September 2004 as the first regional industry NGO (INGO) and offers an opportunity for engagement at a regional level. Some countries have industry associations for local based fleets, but most are not well resourced and meet only sporadically.

³³ Out of a total 78 tuna industry people contacted during a study by Gillett only two individuals were aware of the report of an airfreight study by FFA which had been commissioned primarily to assist industry.

Large, global reach environmental NGOs (ENGOS) such as WWF and Greenpeace have extensive and active fisheries programmes, but are largely unconnected with the formal fisheries management process, both at national and regional/Commission levels. These ENGOS often have valuable in-country programmes which offer a ready conduit for information dissemination and engagement by civil society.

Key future activities related to the OFMP

- Provide opportunities for industry, NGOs and other relevant non-state parties to gain a better understanding of oceanic fisheries management through interactive processes (e.g. workshops) and support with relevant, accessible information and updates on Commission and other relevant initiatives.
- Promote greater engagement and input by industry, INGOS and ENGOS in oceanic fisheries management decision-making at national and regional level.

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Terms of reference

Background

The goals of the Pacific Islands Management Project (OFMP) PIMS No. 2992 are to combine the interests of the global community in the conservation of a marine ecosystem covering a large area of the globe's surface, with the interests of some of the world's smallest nations in the responsible and sustainable management of resources that are crucial for their sustainable development.

The project is designed to assist Pacific island countries with efforts as they participate in the setting up and initial period of operation of the new Tuna Commission³⁴ established by the WCPF Convention, in which they are expected to reform, realign, restructure and strengthen their national fisheries laws, policies, institutions and programmes to take up the new opportunities which the WCPF Convention creates and discharge the new responsibilities which the Convention requires.

The pilot phase of the full project was completed in 2004 under the framework of the Strategic Action Programme (SAP) of the Pacific Small Island Developing States (Project Number RAS/98/G32/A/1G/99) which was designed to assist Pacific island countries improve regional capacity for management of transboundary water resources and create improved management structures to address environmental degradation and ensure the long term sustainability of ocean fisheries in the Western Tropical Pacific large marine ecosystem (WTP LME).

The IW Pacific Islands 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 – lack of understanding and weaknesses in governance.

The Project will support the development of a fuller and more detailed set of indicators than is possible to include in the Logical Framework applying the structure of GEF IW indicators, based on process, stress reduction and environmental status indicators. These will be designed not only for use within the Project but more broadly for use by stakeholders including the Pacific SIDS and other WCPF Commission members to measure progress over the longer term towards sustainable use of the oceanic fishery resources of the region and protection of biodiversity in the WTP LME.

Purpose

To describe the baseline situation, in mid-2005 before OFMP implementation in relation to:

- measures in place at national, sub-regional and regional level for the conservation and management of the oceanic fish stocks of the Western & Central Pacific Ocean (WCPO) and the protection of the WTP LME from fisheries impacts; and
- the status of the fisheries, the target stocks and the ecosystem including trophic status and status of key non-target species.

³⁴ Western and Central Pacific Fisheries Commission

The Study will provide initial measures of the indicators outlined in the Logframe Matrix but more specifically those detailed in Annex L (Optional Annexes) of the project document which is appended. These indicators apply the structure of process, stress-reduction and environmental status indicators set down by the GEF International Waters Operational Strategy.³⁵

Scope of Work

The Consultant shall:

1. briefly summarise the applicable GEF international Waters Operational Strategy and describe the GEF International Waters process, stress-reduction and environmental status³⁶ indicators framework at a project level;
2. review the indicators described in the Logframe matrix and Annex L for the three Project components, and suggest any appropriate revisions;
3. within the limits of the information available, assess and briefly describe the status of each of the indicators, where appropriate, at mid-2005 (using for example the information reported to the 1st meeting of the WCPFC Scientific Committee in August 2005); and
4. prepare a report that can be used as a baseline to assess progress in the indicators during, and at the conclusion of, the Project.

Implementation

The Study will be undertaken largely as a desk study using information available from the Pacific Islands Forum Fisheries Agency (FFA) and the Secretariat of the Pacific Community Pacific Oceanic Fisheries Programme (SPC/OFP).

The Study will draw from and build on the Baseline and Progress Studies undertaken for the Pilot Phase of the Oceanic Fisheries Management Component of the GEF IW SAP Project³⁷.

The consultant shall:

- visit Honiara and Noumea for consultation with FFA and SPC/OFP;
- review relevant available GEF IW and OFMP documents on indicators, and monitoring and evaluation more generally;
- prepare a draft report; and
- prepare a final study report taking into account comments on the draft by FFA and SPC/OFP.

³⁵ As defined in the GEF IW Monitoring and Evaluation Working Paper 10: Monitoring and Evaluation Indicators for GEF International Waters Projects.

³⁶ Measures actual changes and long-term improvements in the water environment.

³⁷ Cartwright, I. (2002). *The Oceanic Fisheries of the Western and Central Pacific: A Baseline Study. Strategic Action Programme (SAP) of the Pacific Small Islands Developing States. Project N0:RAS/98/G32/A/1G/99.*

Expected Outcome

The anticipated outcomes and benefits of this study are:

- identification of a set of measurable indicators for the OFM Project using the GEF IW approach to indicators; and
- a baseline assessment of project indicators providing a basis for assessing progress by the OFM Project against a set of project indicators.

Time Schedule and Reporting Requirements

A first draft report should be submitted to FFA before the first week in August 2008. The report will be subjected to review for comments and sent back to consultant to incorporate comments into final report. The final report should be submitted to the Agency before the close of business Friday 22 August 2008.

This assignment is to be implemented for a period of twenty (20) working days.

The work of the Consultant will be monitored by the Project Coordinator at the Forum Fisheries Agency. The consultant will report directly to the FFA. The reports and all materials produced by the Consultant will be submitted to the Agency upon completion of assignment.

Suggested indicators and baselines for Section 4 reporting under the PIR/APR - Progress towards achieving project objectives

Project Objectives ³⁸ & Outcomes	Description of Indicators	Baseline Level
Information & Knowledge Objective To improve understanding of the transboundary oceanic fish resources & related features of the Western & Central Pacific Warm Pool Large Marine Ecosystem.	Knowledge of the dynamics of target fish stocks, including their exploitation characteristics & fishery impacts, at appropriate spatial scales.	Understanding of fleet operating dynamics and links to EEZ catch/effort inadequate and requirement to better inform impacts on stocks of various management options.
	Flow of fisheries data in standardised formats, including estimates of catch, effort and catch composition.	National databases being established and some data flow occurring; inadequate to meet WCPFC reporting requirements.
	Knowledge of fishery impacts on non-target, dependent & associated species, including key byproduct species (sharks and billfish).	Current levels of observer data require enhancement (detail and coverage) to improve estimates of size/species composition and by-catch estimates.
	Understanding of the pelagic ecosystem as a whole, including foodwebs, the effects of environmental change and productivity.	Limited consideration given to ecosystem effects and limited availability of fisheries information on the environmental impacts, including impacts of regime shifts on recruitment. Work on enhanced modelling of regional pelagic ecosystem processes to better predict tuna stock distribution and abundance commenced.
	Use of above information and knowledge to inform and improve assessments.	MULITFAN-CL modelling applied to four key species on a regional basis (spatially structured), but improved parameterisation of the stock assessment model required to explain inter-regional effects/impacts of fishing.
	Understanding of Seamount ecosystems, especially their relation to migratory pelagic fisheries.	Little knowledge of confirmed seamount occurrence in the region or their significance to the pelagic ecosystem.

Project Objectives & Outcomes	Description of Indicators	Baseline Level
Governance Objective To create new regional institutional arrangements, & reform, realign & strengthen national arrangements for conservation & management of transboundary oceanic fishery resources.	Function of the WCPFC, including its subsidiary bodies.	WCPFC had preliminary meeting in December 2004 to adopt some Rules & Regs, establish the SC & TCC & elect officers of commission & subsidiary bodies.
	Number of binding conservation & management measures for target stocks & the WTP LME adopted and implemented.	No binding regional stock conservation & management measures in place for the WCPO.
	Amendments to domestic laws and wider legal reforms.	Legislation in PacSIDS is inadequate to enable the full implementation of international fisheries agreements, including the WCPF Convention and Commission programmes, regional agreements and national management plans.
	Management plans and strengthened policies and strategies nationally and at the Commission.	Some management planning and policies in place, but most require strengthening and/or development.
	Function of national fisheries management institutions.	Most fisheries departments running on traditional government department models, reliant on government funding and with limited capacity.
	Level of compliance activity and effectiveness.	Limited national capabilities and IUU pressure building as fishing opportunities reduce with the introduction of management measures.

Project Objectives & Outcomes	Description of Indicators	Baseline Level
OUTCOME 1: a) Improved quality, compatibility & availability of scientific information & knowledge on the oceanic transboundary fish stocks & related ecosystem aspects of the WTP warm pool LME, with a particular focus on the ecology of seamounts in relation to pelagic fisheries, & the fishing impacts upon them.	Collection of consistent, compatible, relevant & reliable information by national administrations.	Data collection occurring in all PacSIDS with gaps in the quality of data from domestic fleets. Data forms/formats not fully consistent.
	Data handling and management capability.	Wide variability in performance, with some PacSIDS having well-developed data management systems, while others require assistance. Limited data processing/query capability.
	Availability of fisheries status/stock assessment information to assist fisheries development and management arrangements nationally and at the Commission.	Increasing emphasis on national management approaches through plans, based on stock status information. Most need updating. Some availability of model and other fisheries assessment outputs to inform national and Commission strategies/approaches.
	Reach (sharing) of information and analysis between stakeholders with respect to transboundary oceanic fish stocks & related ecosystem aspects.	Scientific information & knowledge is shared among countries voluntarily, primarily through SPC/OFP & the SCTB. Regional scientific work carried out by SPC with donor funding.
	Number of biological samples collected and analysed to inform trophic relationships.	Stomach samples collected – 2,754. Stomach samples examined – 1,914.
	Understanding of fisheries and ecosystem role of seamounts in WCPO.	Little knowledge of confirmed seamount occurrence in the region or their significance to the pelagic ecosystem.

Project Objectives & Outcomes	Description of Indicators	Baseline Level
b) This information being used by the WCPFC & PacSIDS to assess measures for the conservation & management of transboundary oceanic fishery resources & protection of the WTP LME.	Conservation and management measures developed and implemented by PacSIDS and WCPFC, based on improved information by PacSIDS, including NTFSRs.	Annual meetings of the SCTB provide a forum to discuss scientific issues related to data, research & stock assessment including providing statements on stock status & opinions on scientific issues. No agreed limit or target reference points.
	Sustainable catch/effort limits set by PacSIDS.	Some PacSIDS, as part of management plans, have implemented limits; most have not.
	Production of management scenarios/ management strategy evaluation based on improved information, including impacts of climate variability.	Limited scenario planning; initial modelling of spatial effects of various management measures commenced.
	Extent of introduction of ecosystem based fisheries management (EBFM) approaches at national level.	Initial EBFM workshop held and commitment to EBFM made by FFC No Baselines for ecosystem monitoring and operation – to be developed under project activities.
	Extent of ecosystem EBFM approach used by the WCPFC Scientific Committee.	EBFM approach outlined in WCPF Convention by not effect given.
c) National capacities in oceanic fishery monitoring & assessment strengthened, with PacSIDS meeting their national & WCPFC-related responsibilities in these areas.	Degree to which PacSIDS meet regional/WCPFC commitments to collect and provide national data.	SPC assessment shows that no PacSIDS have the capacity to fully meet WCPFC-related responsibilities in fishery monitoring & data provision.
	Number of PacSIDS' nationals with capability to understand and use fisheries information, data and stock assessments, to inform national and regional (WCPFC) fisheries management. Clearly identified as a gap in the PDF-B study.	Heavy reliance on SPC for the provision of advice and assistance with data collection, handling and analysis.
	Level of engagement of PacSIDS' nationals in Commission Scientific work, including the Scientific Committee, and in national Tuna Status Report preparation and interpretation.	Limited understanding of stock assessment process and capacity to engage in discussions to interpret and utilise data from stock assessments and other sources to inform management decisions.

Project Objectives & Outcomes	Description of Indicators	Baseline Level
OUTCOME 2: a) The WCPFC established & beginning to function effectively.	Administrative operation of WCPFC with a formally adopted framework of rules & regulations.	Rules of Procedure & Financial Regs adopted at WCPFC1 following inputs from SAPI Project. Staff regs, subsidiary bodies rules needed.
	Budget provisions for PacSIDS, to enable meaningful engagement in the work of the Commission, including provision for PacSIDS to attend WCPFC meetings.	Financial Regulations adopted by WCPFC1 includes requirement that the draft budget has an item specifying the costs required to finance the attendance costs for one representative from each developing State Party to the Convention, and where appropriate territories and possessions, to each meeting of the Commission and to meetings of the subsidiary bodies to the Commission.
	Establishment and operation of WCPFC Secretariat and core science & compliance programmes & Committee structures.	No appointments to the secretariat. WCPFC staff regulations adopted at WCPFC1. No WCPFC compliance programme operational. At WCPFC1 budget adopted which includes a nominal amount for funding provisions of scientific and data services by SPC/ OFP during 2005.
	Adoption & Implementation of Compliance Measures. ³⁹	Authorisation/Notification/Vessel Marking adopted in Dec 2004.
b) Pacific Island nations playing a full role in the functioning & management of the WCPFC, & in the related management of the fisheries & the globally-important LME.	Participation by PacSIDS and their nationals in Commission and associated bodies' meetings.	13 of 15 PacSIDS ratified or been authorised to participate as territories.
	Record of provision of fisheries information to WCPFC by PacSIDS.	Yet to commence.
	Level of engagement by PacSIDS in decision-making & policy adoption processes for WCPFC fisheries management.	At WCPFC1 in December 2004, PACSIDS participated effectively on WCPFC administrative issues, but did not participate effectively on compliance, science & technical issues.

Project Objectives & Outcomes	Description of Indicators	Baseline Level
c) National laws, policies, institutions & programmes relating to management of transboundary oceanic fisheries reformed, realigned & strengthened to implement the WCPF Convention & other applicable global & regional instruments.	Status of laws & policies in relation to their alignment with national commitments to the WCPF Convention, other relevant MEAs, & global treaties & conventions.	Most countries require significant assistance to review and reform their legislation to achieve compliance with Commission obligations. The legislation of nine PacSIDs requires updating through the use of regulation and the remaining six will require a new act and regulations for this purpose.
	Status of national institutions in relation to their ability to support national roles in WCPFC.	Limited capacity and few opportunities, to discuss and develop national and regional positions on WCPF issues.
d) National capacities in oceanic fisheries law, fisheries management & compliance strengthened.	No of national staff with increased technical capacities & knowledge.	Project design work identified lack of capacities in fisheries law and compliance and especially fisheries management as important constraints to achieving Project objectives.
OUTCOME 3: a) Effective project management at the national & regional level.	Progress towards achieving Project objectives.	Not applicable.
	Budgets and reporting schedules.	
	Annual and mid-term reviews.	
b) Major governmental & non-governmental stakeholders participating in project activities & consultative mechanisms at national & regional levels.	Number of participants and spread of regional stakeholder/NGO workshops.	Phase I terminal evaluation noted lack of NGO involvement as a major weakness NGO.
	Website hits.	Website to be established.
	Attendance and activity/input at Commission and associated meetings, and regional (FFA) regional and sub-regional workshops.	The larger regional NGOs and some industry attending Commission and associated meetings. Considerable gap in understanding of WCPFC and fisheries issues among smaller NGOs, communities and other stakeholders.
	Amount of 'plain English' information/promotional information prepared and disseminated to NGOs/stakeholders.	SPC and WCPFC websites have considerable amounts of reports and technical information, most of which is not accessible to, or understandable by, the lay person.

Project Objectives & Outcomes	Description of Indicators	Baseline Level
c) Information on the project & the WCPF process contributing to increased awareness of oceanic fishery resource & ecosystem management.	Feedback from sub-regional management and other workshops.	Design process identifies lack of simple, clear information on the WCPF preparatory process as a problem.
	Availability, transparency & simplicity of information access.	
	Relevance & significance of available information.	
	Public awareness raising at national & regional policy level.	
d) Project evaluations reflecting successful & sustainable project objectives.	Project evaluation ratings.	Not applicable.

Suggested indicators and baselines for Section III of the PRR (GEF).

Process Outcomes and Indicators

Process OUTCOMES			Process INDICATORS
Project	Rating	Catalytic	Project
Effective national inter-ministry coordination.	MU		<p>Information on this issue from the 15 Pacific SIDS not yet available to the Project.</p> <p>Existence of inter-ministry coordination mechanisms. Nos. of meetings/contacts of inter-Ministry coordination. Data yet to be collected. Contacts at the national between relevant national government institutions dealing with fisheries management issues have been enhanced particularly on the WCPFC issues relating to compliance of the Conservation and Management Measure.s</p> <p>Analysis of inter-ministry cooperation still outstanding. Fisheries management processes at national levels are progressively inclusive through processes such as EAFM and Sub-regional WCPFC working group meetings.</p>
<p>Comment on current outcomes and indicators: Core GEF Requirement. Current indicators are logical and in accordance with GEF guidelines. Note data on inter-ministry coordination is being collected and analysed. The outcome of this analysis will be a useful indicator and its value is highlighted in a number of GEF guideline documents as a precursor to effective regional coordination and cooperation. In addition, some view of the success of the coordination, as evidenced from reports from committees etc would be necessary to go beyond the indicator of the formation of a committee (i.e. a measure of its effectiveness). That said, the hypothetical GEF example seems to suggest that the presence of reports of national inter-ministry Committee meetings is an adequate indicator. Suggested new indicators - None</p>			
Stakeholder involvement in SAP implementation.	S	Eight NGOs accorded observer status and participated in the WCPF Commission (WCPFC) meetings in the reporting period.	<p>All Pacific SIDS participated in the meetings of the WCPFC, and its Scientific Committee (SC) and Technical & Compliance Committee (TCC), with 1 participant each financed from the WCPFC budget, additional participants nationally funded – also supported by technical advice from the Project.</p> <p>ENGO & INGO representatives have participated in most national and regional Project activities including pre-WCPFC, SC & TCC meetings and Project National Consultative Committees.</p> <p>High level of participation by PacSIDS in WCPFC (100%), SC & TCC meetings (80%) maintained.</p> <p>ENGOS (WWF) & INGOs (PITIA) involved are involved in Project execution.</p> <p>Pacific fisheries agenda close to saturation but Pac SIDS still maintain high levels of participation at WCPFC4 (100%) SC3 & TCC (90% respectively). ENGO (WWF) & INGO (PITIA) attend WCPFC meetings and undertake awareness raising project activities.</p>

Process OUTCOMES			Process INDICATORS
Project	Rating	Catalytic	Project
<p>Comment on current outcomes and indicators: Core GEF Requirement. Current indicators are logical and in accordance with GEF guidelines. Suggested new indicator: Development of a Stakeholder Involvement Plan (using the ProDoc stakeholder analysis) with specific target groups (private sector ENGOs, broader community), including tailored extension/communication strategies and means of measuring progress (FFA media section have advised that this would be possible). Progress against this plan should then be reported as an indicator.</p>			
<p>Newly established and/or strengthened transboundary waters institutions.</p> <p>(The WCPFC established and beginning to function effectively).</p>	S	<p>WCPFC established and adopted Rules of Procedure and organizational structure at its First Session in December 2004.</p>	<p>SC established & first regular session held in August 2005. The SC;</p> <ul style="list-style-type: none"> established specialist WGs in Fishing Technology, Methods, Statistics, Biology, Stock Assessment and Ecosystem and Bycatch; agreed on the future work programme for the SC and provided advice to the WCPFC on the status of major stocks and impacts of conservation and management measures. <p>TCC established & first regular session held in Dec 2005. The TCC began establishment of: a compliance programme including observer, boarding & inspection, VMS schemes and a process for identifying infringements and applying sanctions.</p> <p>Executive Director and other key WCPFC staff appointed by December 2005.</p> <p>WCPFC & subsidiary bodies operating with a complete set of Rules & Regulations & a Secretariat, with sustainable financial arrangements (by Dec 2007) - Draft Rules for subsidiary bodies being considered by SC & TCC.</p> <p>Staff Regs adopted & Secretariat posts all filled. (by Dec 2007) - Staff Regs adopted. Secretariat posts being filled with some difficulty.</p> <p>TCC operational (by Dec 2007) - Achieved 2005.</p> <p>Most staff positions filled at WCPFC Sec. Subsidiary bodies have yet to adopt individual rules of procedure.</p>
<p>Comment on current outcomes and indicators: Core GEF Requirement. Current indicators are logical and in accordance with GEF guidelines. Suggested new indicator: <i>The degree to which there has been high-level endorsement, multi-ministry support, staff etc devoted to the WCPFC process.</i> This would be a useful indicator of how committed governments are to the process – these could be evidenced from attendance records on an annual basis.</p>			

Process OUTCOMES			Process INDICATORS
Project	Rating	Catalytic	Project
Adoption of national & regional legal, policy & institutional reforms that address priority transboundary concerns. (The WCPF Convention being implemented).	HS	All major fishing states except the US have ratified the Convention at June 2006.	<p>WCPFC Convention entered into force in June 2004, with 12 of the 13 Convention ratifications to bring the Convention into force from Pacific SIDS, following PDF-B support.</p> <p>WCPFC Convention ratified for 33 of 34 States & Territories participating in WCPFC process. This includes all major coastal & fishing states except Indonesia (Depends on US ratifying as announced by June).</p> <p>Convention entered in force for the USA 27 July 2007. Indonesia was granted a continuance of its status as a Co-operating Non-member at WCPFC4, Dec 2007. Founding members encouraged Indonesia to move quickly towards full membership.</p>
<p>Comment on current outcomes and indicators: Core GEF Requirement. Current indicators are logical and in accordance with GEF guidelines. Suggestions: None.</p>			
Regional institutional arrangements for oceanic fisheries management strengthened.	HS	Pacific Island Forum Heads of State established a Ministerial committee to oversee regional fisheries affairs which met in May 2004 and May 2005.	<p>WCPFC-related legal, policy and institutional reviews under way in many Pacific SIDS, supported from the Project by national fishery status reports (2 in 2005-06) legal reviews (4 in 2005-06) and reviews of management plans based on EAFM, and by regional scientific, legal, compliance and policy workshops and consultations.</p> <p>Fisheries ministers continue to meet annually (Wellington NZ 2006 & Palau 2007) and issues relating to oceanic fisheries are addressed at the Pacific Islands Forum Heads of State meetings.</p> <p>WCPFC related legal, policy & institutional reviews progressed further in Pac SIDS. National fisheries Status reports (5 reports 2007-08), legal reviews (3 in 2006-07) reviews of TMPs & EAFM, & by regional scientific, legal, compliance and policy workshops and consultations.</p>
<p>Comment on current outcomes and indicators: Some of the indicators seem to reflect national arrangements developed by/supported through regional arrangements/ assistance rather than 'regional institutional arrangements' while others (Ministerial meetings, Forum discussions etc) are regional.</p> <p>Suggest either:</p> <ul style="list-style-type: none"> i) focusing indicators more on regional institutional arrangements and shift national indicators to the outcome below (National laws, policies etc); or ii) changing outcome to 'Regional institutional arrangements for improving oceanic fisheries management strengthened'. <p>Under the new outcome in 2 ii) it would then be possible to include the regional meeting/forum indicators as well as the reviews and status reports which are a regional activity, delivered nationally.</p> <p>Suggest include an additional indicator based on OFP- driven outputs in terms of regional workshops to discuss the status of the oceanic fisheries resource and the marine ecosystem.</p>			

Process OUTCOMES			Process INDICATORS
Project	Rating	Catalytic	Project
National laws, policies, institutions and programmes relating to management of transboundary oceanic fisheries reformed, realigned and strengthened to implement the WCPF Convention and other applicable global and regional instruments.	S		<p>PacSIDS are implementing WCPFC measures & national conservation & management measures – Assessment yet to be completed.</p> <p>Status remains unchanged.</p>
<p><u>Comment on current outcomes and indicators:</u> Assessment of progress to be developed.</p> <p><u>Suggested new indicators:</u></p> <p><i>National legislation</i> - Degree to which countries' legislation, meets the requirements of WCPFC and other international fisheries agreements e.g. number of countries with compliant legislation.)</p> <p><i>National management plans and Policies</i> – Degree to which national tuna management plans, Acts etc set policy direction in accordance with the WCPF Convention and support the introduction of WCPFC conservation and management measures.</p>			
Financial sustainability of joint transboundary waters institutions.	HS	<p>WCPFC has begun to finance oceanic SPC fisheries monitoring and science activities previously funded by donors.</p> <p>Japan pledged \$2m over 5 years to the WCPFC for technical assistance (implementation to be coordinated with the GEF PIOFMP).</p> <p>Voluntary extra-budgetary assistance for specific WCPFC activities provided by other Commission Members.</p>	<p>WCPFC adopted Financial Regulations and schedule of financial contributions at its First Session in December 2004, based largely upon the principle of “those who fish should pay” (70% of contributions based on catches with discount for developing countries).</p> <p>Satisfactory level of payment of CCM financial contributions – The failure to pay three consecutive annual contributions results in the withdrawal of voting privileges. Some instances of arrears to date.</p> <p>Financial Regulations include provision for a Special Requirements Fund for SIDS. Permanent HQ jointly donated by FSM and China.</p> <p>WCPFC core programmes not blocked by lack of funding - To date there are no programme implementation demands attributed to lack of funding.</p> <p>Significant contributions by New Zealand (Tagging – NZD5m) and others towards Commission work programmes over and above financial contributions.</p>
<p><u>Comment on current outcomes and indicators:</u> Current indicators are logical and in accordance with GEF guidelines.</p> <p><u>Suggestions:</u> None.</p>			

Process OUTCOMES			Process INDICATORS
Project	Rating	Catalytic	Project
Improved information and knowledge on the oceanic transboundary fish stocks and related ecosystem aspects of the WTP warm pool LME being used by the WCPFC and Pacific SIDS to adopt and apply measures to enhance the conservation and management of transboundary oceanic fishery resources and protection of the biodiversity of the WTP LME.	S	WCPFC has established arrangements with ISC or data services and scientific services related to northern WCPO stocks and with IATTC relating to WCPO/EPO cooperation.	<p>MOU between SPC and the WCPFC provides the basis for provision of data management and scientific services by SPC to the WCPFC.</p> <p>WCPFC adopted standards for provision of WCPFC data.</p> <p>SPC oceanic fisheries data and scientific programmes, including SIDS capacity building, strengthened by resources from the Project, the EU and the WCPFC.</p> <p>Tuna Fishery Data Management System installed & operation in 7 Pacific SIDS, national Observer Programmes established in 10 of the 15 Pacific SIDS.</p> <p>Establishment of SC & subsidiary bodies including bodies for statistics & Ecosystem/Bycatch work (by Dec 2007) - achieved 2005.</p> <p>Binding agreement on protocols for fisheries data collection & provision, including catch & effort logs, & port & onboard sampling (by Dec 2007) - Catch & Effort Protocol in place.</p> <p>Establishment of Commission data management structure and, databases (by Dec 2007) - Port & onboard sampling sampling protocols still under consideration.</p> <p>Appointment of science staff and/or contracting of experts for the provision of scientific services (by Dec 2007) - Interim arrangements in place.</p> <p>Agreement on scientific work programme, including forms of stock assessment analysis (by Dec 2007) – Staff appointed, interim arrangements agreed for scientific experts, subject to review in 2007.</p> <p>(a) seamount occurrence documented using available data.</p> <p>b) Impacts of seamounts on physical/biological oceanography and pelagic fisheries better understood - The occurrence of seamounts has been documented using available data, but further work is required.</p> <p>Establishment of SC & subsidiary bodies including bodies for statistics & Ecosystem/Bycatch work (by Dec 2007) - achieved 2005.</p> <p>Establishment of SC & subsidiary bodies which include Specialist working groups for biology, Ecosystem & By-catch, Fishing Technology, Methods, Statistics and Stock Assessment as at Dec 2007.</p>

Process OUTCOMES			Process INDICATORS
Project	Rating	Catalytic	Project
			<p>Establishment of an Indonesia & Philippines Data Collection Project to address the gaps.</p> <p>MOUs to establish formal relations with IATTC & other organizations drafted & being reviewed by the Commission, SC & TCC.</p> <p>Regional Tagging Programme Phase II – Commission sponsored research project.</p> <p>Commission adopted data submission protocols outlined in “Scientific Data to be Provided to the Commission” (Binding agreement on protocols for fisheries data collection & provision).</p> <p>Port & onboard sampling protocols still under consideration.</p> <p>Agreement on scientific work programme, including Investigation of alternative stock status reference points and the development of a management strategy evaluation:</p> <p>(a) seamount occurrence documented using available data; and</p> <p>(b) impacts of seamounts on physical/biological oceanography and pelagic fisheries better understood - The occurrence of seamounts has been documented using available data, but further work is required</p>
<p><u>Comment on current outcomes and indicators:</u> Current indicators are logical and in accordance with GEF guidelines.</p> <p><u>Suggestions:</u> None.</p>			
Information on the Project and the WCPF process contributing to increased awareness of oceanic fishery resource and ecosystem management;	S		<p>OFM Project webpage established April 2006.</p> <p>IWLEARN participation, publications.</p> <p>Project newsletter published and collaboration with ENGO of lay documentation (awareness raising).</p>
<p><u>Comment on current outcomes and indicators:</u> Current indicators are logical and in accordance with GEF guidelines.</p> <p><u>Suggested new indicator:</u> <i>Stakeholder involvement plan.</i></p>			

Stress Reduction Outcomes and Indicators

Stress Reduction OUTCOMES			Stress Reduction INDICATORS (report vs. baseline if possible)
Project	Rating	Catalytic	Project
Improved information and knowledge on the oceanic transboundary fish stocks and related ecosystem aspects of the WTP warm pool LME being used by the WCPFC and Pacific SIDS to adopt and apply measures to enhance the conservation and management of transboundary oceanic fishery resources and protection of the biodiversity of the WTP LME.	HS		<p>SPC and the SC provided advice to WCPFC1 and 3 identifying stocks requiring management attention and assessing the projected impacts of a range of conservation and management measures.</p> <p>WCPFC1 (Dec 2004) adopted conservation and management measures barring vessels of states that were not WCPFC Members or cooperating non-Members (CCMs) from operating in the region and establishing a record of vessels authorised to operate in the WCPO.</p> <p>WCPFC2 (Dec 2005) adopted conservation and management measures requiring Members to:</p> <ul style="list-style-type: none"> • not increase fishing effort for bigeye & yellowfin beyond current levels; • cap purse seine effort at 2004 levels or an average of 2001 to 2004; • limit the longline catch of bigeye generally to 2001-04 average levels; • not increase numbers of fishing vessels targeting South Pacific albacore; and • keep fishing effort for North Pacific albacore north of the equator not greater than current levels. <p>WCPFC2 also adopted resolutions to apply the FAO International Plan of Action to Reduce the Incidental Catch of Seabirds, and the FAO Guidelines to Reduce Turtle Mortality, reduce incidental catches of other non-fish species and avoid vessel transfers that contribute to over-capacity.</p> <p>Measures of target stock status in relation to agreed management reference points available Stock status measures available, but no agreed reference points.</p> <p>Measures of status of ecosystem including trophic status & status of key non-target species Proposal under consideration.</p> <p>Provision of scientific advice to the Commission including information & recommendations on TACs & other management measures from the Scientific Committee to the Commission - Achieved, ongoing.</p> <p>Measures of the impact of environmental variability on target species abundance & distribution - Achieved, ongoing.</p>

Stress Reduction OUTCOMES			Stress Reduction INDICATORS (report vs. baseline if possible)
Project	Rating	Catalytic	Project
			<p>Assessments available of the impact of fishing on target & non-target species - Achieved & ongoing for target species, less progress for non-target species.</p> <p>Analysis made of impact of possible conservation measures -Achieved & ongoing.</p> <p>Status of stock available but alternative stock status reference points to be investigated.</p> <p>Provision of scientific advice to the Commission for management measures from the Scientific Committee - Achieved, ongoing.</p> <p>Measures of the impact of environmental variability on target species abundance & distribution - Achieved, ongoing.</p> <p>Assessments available of the impact of fishing on target & non-target species - Achieved & ongoing for target species. (Requirements for data collection & reporting of shark catches to the lowest possible taxonomic level now imposed.</p> <p>Analysis made of impact of possible conservation measures -Achieved & ongoing.</p> <p>Development of an Ecological Risk Assessment – on going.</p>

Comment on current outcomes and indicators: The current indicators do not, as suggested in the GEF Guidance information (2006) characterize and quantify specific reductions in environmental/waterbody stress. They do, however provide insight into the information available for assessing environmental stress, and relate to the project outcome as stated. They also provide on-the-ground evidence that action has occurred. GEF (2006) suggests that indicators should establish evidence of stress reduction and thus be measured and reported against a previous baseline/year. The evidence should focus on reducing the human behaviours that are known to contribute to the degradation of the international waters addressed by the GEF project (e.g. level of fishing effort, use of particular fishing gears). For the WCPO, the challenge, in terms of stress reduction, is to address key emerging areas of concern relating to managing and/or reducing fishing pressure, rather than having to rebuild severely depleted fish stocks ('prevention of damage to threatened waters- - GEF OP 9 Guidance). The current indicators do not appear to be the type of year-on-year measurable indicators preferred by GEF. While Environmental Status Outcomes and Indicators include those relating to socio-economic performance, it appears that the GEF interpretation of 'stress' relates to that placed on living and non-living marine resources and their associated ecosystems.

Suggested new indicators:

While no specific outcomes are stipulated, it would be useful to measure the results of on the ground actions to meet agreed WCPFC conservation and management measures – the targets could be updated as measures are agreed, and reported on an annual basis. Currently, these would be:

- Level of fishing effort for bigeye & yellowfin.
- Purse seine effort levels.
- Longline catch of bigeye.
- Numbers of fishing vessels targeting South Pacific albacore.
- Fishing effort for North Pacific albacore north of the equator.
- FAD measures.

Environmental Status Outcomes and Indicators

Environmental & Socioeconomic Status OUTCOMES			Environmental & Socioeconomic Status INDICATORS
Project	Rating	Catalytic	Project
Pacific SIDS improve the contribution to their sustainable development from improved management of transboundary oceanic fishery resources and from the conservation of oceanic marine biodiversity generally.	S		<p>FFA produced a first report to measure indicators of socio-economic contributions of oceanic fisheries.</p> <p>Target stocks within limits agreed by the WCPFC. Limits yet to be agreed.</p> <p>Significant reductions in mortality from fishing on non-target species. High priority being given to improving data on mortality. Impacts not yet measurable.</p> <p>Target stocks within limits agreed by the WCPFC but a reduction in fishing mortality rate for bigeye & yellowfin is proposed. Limits yet to be agreed.</p>
Improved information and knowledge on the oceanic transboundary fish stocks and related ecosystem aspects of the WTP warm pool LME being used by the WCPFC and Pacific SIDS to adopt and apply measures to enhance the conservation and management of transboundary oceanic fishery resources and protection of the biodiversity of the WTP LME.	S		<p>SPC and the SC provided estimates to the Commission of:</p> <ul style="list-style-type: none"> • key indicators of status of four major tuna stocks; and • estimates of mortalities of non-target species from fishing (including sharks, seabirds and turtles) and, inter alia, a proposal for ecosystem monitoring, measuring of ecosystem indicators and ecosystem reference points and ecosystem model development. <p>Positive results for broader ecosystem indicators (yet to be identified). Proposal for monitoring ecosystem indicators presented. Impacts not yet measurable.</p> <p>Positive results for broader ecosystem indicators (yet to be identified). Proposal for monitoring ecosystem indicators presented (Ecological Risk Assessment). Impacts not yet measurable.</p>

Environmental & Socioeconomic Status INDICATORS

Project

Comment on current outcomes and indicators: GEF(2006) suggests these indicators should 'demonstrate improvements in the environmental status of transboundary water resources as well as any socioeconomic improvements' as a result of the activities of the project. The project outcomes as stated make identifying such indicators difficult. In addition, developing meaningful and measurable environmental indicators for this project is challenging due to i), the fact that it is being implemented on a water body the size of the WCPO ii) the highly diverse and complex ecosystem and associated fisheries; and iii) the timeframe within which the project is set, given that it will take several years, and well beyond the duration of the project, before it will be possible to measure the effects of management measures that are only now in the process of being implemented.

The two outcomes lend themselves to two types of indicator. The first type, to measure progress on terms of contribution to sustainable development, would be most appropriately linked to socioeconomic indicators, particularly in terms of measuring the increase in potential benefits to Pacific SIDs of maintaining or improving the sustainability of commercially important fish stocks as a result of project activities. While the current discussion on reference points has been mostly limited to biologically-linked limit reference points, it will be important to develop target reference points that reflect optimal economic benefits, particularly to Pacific SIDs. While no such points or indicators are available at this time, when they are available, indicators to measure progress towards them should be included under this first type of indicator, and progress measured beyond the life of the project.

It is/ will be difficult to isolate out the impacts of project activities on profitability/net profit, given the major fluctuations in costs (esp. fuel prices), fish prices and natural changes to abundance/availability of target species.

In addition to industrialized fisheries, tuna and tuna related species are being seen as being increasingly important to food security for Pacific SIDs, particularly as reef fish and other near-shore species become depleted. An index of the importance of tuna and tuna related species to economies would be a useful socioeconomic indicator. Gillett's studies are likely to be of assistance in this regard.

Suggested new indicators:

- i Value of access. The successful implementation of the Vessel Days Scheme through cooperative management should increase the value of fishing opportunities substantially, especially as trading of Vessel Days commences. Access fees are a similar, coarser-scale indicator.
- ii Catch value. Similarly, through restricting catches in a market that is highly sensitive to supply (canning-based operations), prices are likely to be higher than would be the case where greater access and catch is permitted. Previous successful efforts by DWFNs to restrict the supply of purse seine-caught skipjack have demonstrated this.
- iii Optimal management outcomes. Finally, in the case of multi-gear, multi-species fisheries, the trade-off between management options by the Commission or FFA country groupings (e.g. PNA) needs to be carefully considered in terms of optimal economic, social and environmental outcomes and consideration of 'winners and losers'. Again, some indicators of how management measures are performing towards achieving desired outcomes are necessary. FFA has previously undertaken studies showing the differential impacts of transboundary management decisions.

Environmental & Socioeconomic Status INDICATORS

Project

The second type of indicator could be used to measure conservation and management outcomes, which, as stated above, have been linked more to mitigating impacts on species that are showing signs of stress (yellowfin and bigeye). In addition some efforts have been made to reduce interactions with protected and endangered species and in particular turtles at risk from longline fishing. There are a greater number of indicators available in this category.

It is suggested that the stock indicators used by the Scientific Committee of the WCPFC be used as project indicators pending the development of more formally agreed reference points and indicators.

Suggested new indicators

Year on year estimates of the following indicators for the four key species (yellowfin, bigeye, skipjack and albacore), including assessment of the existence of overfishing or overfished stocks:



- Impact of fishing, expressed as a % of unexploited biomass levels;
- Estimates of annual levels of fishing mortality, expressed as ratio of current fishing mortality relative to the fishing mortality required for the stock to produce maximum sustainable yield ($F_{\text{CURRENT}} > F_{\text{MSY}}$); and
- Estimates of biomass, expressed as a ratio of current biomass relative to the biomass that would produce $\text{MSY}(B_{\text{CURRENT}} > B_{\text{MSY}})$.

Baselines for these indicators can be found in the project baseline study, as abstracted from OFP publications.

Measurable indicators for non-target and dependent species and threatened and protected species are not currently available; with few formal assessments other those for billfish and some (blue) sharks, which are not updated annually.

Similarly, there is a paucity of indicators of ecosystem health, reduction in fishing mortality on non-target species and the broader ecosystem.




Baseline status for national monitoring and stock assessment activities




Country	Most recent National Fisheries Assessment	Logsheet coverage	Observer programmes/ issues	Port inspection/sampling programmes and issues	Data Analysis and support
Cook Islands 	NFA ⁴⁰ in 1997.	Level of logsheet coverage of the longline fleet is close to 100%.	Observer programme established in 2000, achieving very low coverage. Ideally, MMR would like 20% coverage. Patrol boat crew are being trained as longline observers in increase coverage. Lack of observers (and port samplers) a major constraint.	Port sampling: 56% Coverage in 2003 for the southern zone vessels operating in the northern zone and unloading in PagoPago covered by NMFS port sampling staff and efforts are underway to formalise cooperation between NMFS and Cook Islands, for the exchange of data.	CEC ⁴¹ updated six-monthly. National Tuna Fisheries Statistics available via secure country-specific pages accessible via OFP website. The area of data processing is being addressed through the NZAID funded capacity building project constraint. Data summaries provided on an ad hoc (request) basis.
Federated States of Micronesia 	NFA in 1991, recent TFA ⁴² (October 2001).	Logsheet coverage of the locally-based longline fleet is incomplete, and may only be around 50%; current logsheet coverage of purse seine, longline and pole-and-line access vessels is considered high (at least 80%).	NORMA has nine trained observers on staff who have achieved 4 - 5% coverage of purse seine and pole-and-line trips in the EEZ, but low coverage for longline trips. Coverage of FSM Arrangement purse seine vessels is close to 20%. NORMA maintains a target level of 20% coverage of trips in the EEZ (all gears combined).	Unloadings in the FSM ports are covered by NORMA-administered programmes (3 fulltime port samplers). Coverage of locally-based longline landings has been high, but there is no coverage of landings by vessels based in Guam. Coverage of the locally-based purse seine fleet is low. Well-established port sampling in major ports of unloading. Landings data are collected from unloadings by purse seiners and longliners in FSM ports, via the port sampling programme.	A well developed national catch and effort database, but is in need of update.




⁴⁰ National Fisheries Assessment – a comprehensive overview of oceanic fish stocks and issues relating to their harvest and management.





⁴¹ Catch and Effort Query system, which interfaces with MS EXCEL and MAPINFO and allows the production of data summaries and maps of fishing activities in country.

⁴² Tuna Fisheries Assessment – brief assessments of oceanic fisheries resources.

Country	Most recent National Fisheries Assessment	Logsheet coverage	Observer programmes/ issues	Port inspection/sampling programmes and issues	Data Analysis and support
Fiji 	NFA in 1994 (and in 2001); TFAs in 1996 and 1998. NTSFR in 2003 ⁴³	Level of logsheet coverage is around 80% for the domestic longline fleet, but low for vessels not licensed to fish in Fiji waters, but use their port for unloading.	An onboard observer programme aimed at the domestic longline fleet is in place, with approximate observer coverage of 10%.	Port samplers in Levuka and Suva (one in each port). High levels of coverage achieved.	Well developed system of data collection, verification and analysis of catch and effort data. Capability to log and generate data before transmission to SPC for review.
Kiribati 	NFA in 1991; Interaction Study in 1995. NTSFR completed in 2003. Results incorporated in Kiribati Tuna Management Plan.	Level of logsheet coverage of the purse seine and pole-and-line fleets is high (close to 100%), whereas current longline logsheet coverage is unknown for the main fleet fishing in Kiribati waters (Korea).	Around 20 observers trained and employed on a contractual basis, under the supervision of an observer coordinator. The current level of coverage, especially in the longline fishery, remains low.	Some training but sampling irregular. Few port sampling data have been collected to date.	Most data are collected using a well-developed system, managed by a national catch and effort database system, but in need of an update.
Marshall Islands 	NFA in 1997. NTSFR completed in 2004.	There has been no activity by RMI longline fleet for a number of years. Logsheet coverage of the RMI purse seine fleet is close to 100%. Logsheet coverage of foreign fleets is considered to be between 50 - 80%.	Observer programme focusing on the locally based foreign longline vessels, RMI-flagged purse seine vessels, and FSM Arrangement vessels, managed by a full-time Observer and Port Sampling Coordinator. Coverage increasing to 5 - 10% in the short term, and 15 - 20% in the medium term.	Intermittent sampling: elements of a port sampling programme, but establishment of the observer programme has been given priority.	Well-developed system for the collection and analysis of catch and effort data from all vessels licensed under access agreements, flag and locally-based foreign vessels.

Country	Most recent National Fisheries Assessment	Logsheet coverage	Observer programmes/ issues	Port inspection/sampling programmes and issues	Data Analysis and support
Nauru 	NFA in 2000.	Logsheet coverage of the foreign purse seine fleets is considered high (approaching 100%).	Nauru has some trained observers, and an observer fee is levied in access agreements. There has been some coverage of purse seine fleets in the past, including USMLT vessels, but no coverage of FSM Arrangement vessels.	Port sampling training provided, but currently no port sampling activity, as there has been no transhipment for some years.	Basic tuna fishery data collection system but no database.
Niue 	NFA in 2000.	Catch and effort logsheets from vessels fishing in Niue are forwarded to SPC. Target logsheet coverage is 100%.	No observer programme but some training has occurred. Planning to develop one with the assistance of SPC/OFP and FFA in order to develop a capacity to attain 20% coverage of the new joint venture longline fishery.	No port sampling programme but the plan is to develop a capacity to allow 20% coverage for vessels landing fish to the new processing facility.	Procedures for the collection and processing of tuna fisheries data developed for the monitoring of the joint venture longline fishery. Niue does not maintain its own catch and effort database.
Palau 	NFA in 1995, TFA (brief update) in 1999.	Level of logsheet coverage of the locally-based longline fleet is considered to be high (approaching 100%); coverage of the Japanese longline fleet also considered high.	Some training, but no regular observer programme/ placement in place. Interest in re-establishing an observer programme.	Active and effective port sampling programme, now being entered directly into the SPC database. High level of coverage (close to 100%) of tuna landings by the locally-based longline fleet.	Well developed system of data collection of catch and effort data, but in need of an update. No database system to process and store tuna fishery data.

Country	Most recent National Fisheries Assessment	Logsheet coverage	Observer programmes/ issues	Port inspection/sampling programmes and issues	Data Analysis and support
Papua New Guinea 	NFA in 1993; (TFAs - 1996 and Nov 1999) NTFSR in 2002. (provided to assist TMP revision).	Close to 100% coverage for purse seiners and 70% for the domestic longline fleet.	There is a large observer programme in PNG, which is well supported and coordinated by NFA. The programme as at mid 2004 had around 50 active observers, with a target of 80 by end 2005. Target coverage of 20% for purse seiners, 5% for longliners and 100% for mothership operations are reported as currently being achieved.	Around 15% of the purse seine catch is sampled. Intend to increase port sampling coverage of the foreign vessels landing in Wewak and Rabaul. Port sampling of the longline fishery occurs at Port Moresby, Lae, and Rabaul.	Logsheet and landings data are processed by NFA, with data entry verification (quality control) provided by SPC.
Samoa 	TFA 2004.	Small Alias do not provide logsheets. Logsheet coverage for the larger vessels is around 50%.	No on-board observer programme catering for the domestic longline fleet.	A well-established and active port sampling programme.	Well developed system of data collection and analysis of catch and effort data from longliners over 11 metres.
Solomon Islands 	NFA in 1992, with an update (TFA) in 1999.	Levels of logsheet coverage of the domestic longline, purse seine and pole-and-line fleets, and foreign purse seine fishing are relatively high, although there are significant data gaps in the coverage of all components of the foreign longline fleet.	Observer programme restarted in 2001 and ceased in April 2004 due to funding and is fully operational. 20% coverage for domestic vessels has been reached and exceeded, and while the coverage of foreign vessels is uncertain, DFMR estimate that it is of the order of 5 - 10%. Aim to achieve 30% for longline, 40% for pole-and-line, and 100% for purse seine.	Since 2000, there has only been limited port sampling in Honiara during the 2003/4 transhipment season.	Hampered by recent civil unrest. They have few staff to undertake the work required. Needs assistance.




Country	Most recent National Fisheries Assessment	Logsheet coverage	Observer programmes/ issues	Port inspection/sampling programmes and issues	Data Analysis and support
Tokelau 	NTFSR 2005.	No data provided. Understood to be no commercial fisheries in their waters.	No observer programme.	No port sampling.	Intend to develop a system for collection and analysis of fishery data using recently established a statistics section, which is planned to jointly develop with fisheries personnel.
Tonga 	NFA in 1997; NTSFR 2004.	Level of logsheet coverage of the longline fleet improving and now considered high (80% - 90%).	Recently commencement of a national observer programme aimed at monitoring the operations of the locally-based foreign vessels. Level of coverage is around 20 - 30%.	Port sampling: there is a high level of coverage (70 - 100%) of the longline fleet by the port sampling programme. Landings data are collected via the port sampling programme, although coverage is less than 100%.	National catch and effort database, established and data collected but not processed. Data are sent to SPC on an annual basis for processing.
Tuvalu 	NFA in 2001.	Logsheet coverage approaches 100% for most purse seine fleets. No data provided for their artisanal fishery.	No observer programme, but plan to commence one.	No port sampling due to almost total absence of port calls and transshipment.	Data are collected but not processed. Data are sent to SPC on an annual basis for processing.
Vanuatu 	NFA in 2001.	Limited logsheet and landings data provided to the Vanuatu Fisheries Department and level of reporting currently unknown.	No observer programme other than the occasional provision of observers under US Treaty arrangements.	Around 50% of the limited transshipments of from transshipments are locally based foreign fishing vessels sampled.	Data are collected but not processed. Some data are sent to SPC on an annual basis for processing.

National legislation and policies in OFMP Beneficiary Countries⁴⁴


Country	Legal	Policy
Cook Islands 	<p>Marine Resources Act, updated (2005) with powers to implement the Core Conservation and Management Principles and Measures required under the Convention. International. Legal Division in place, but inadequate capacity to support drafting of additional legislation to meet all Convention requirements and recently agreed (December 2004) Commission measures. Legislation requires updating.</p>	<p>In the initial stages of realigning its offshore fisheries management policy framework to be consistent with the WCPF convention and updating it to provide a more effective basis for the development and management locally-based industry. Completion of a draft Tuna Management Plan (imminent) will provide a key instrument of oceanic fisheries policy.</p>
Federated States of Micronesia 	<p>Chapter 24 of the Code of FSM Marine Resources Act requires updating⁴⁵ to enable the implementation of some WCPFC measures to meet all Convention requirements and recently agreed (December 2004) Commission measures. Substantial legal capacity in its government legal offices (Attorney General), however need assistance for major technical initiatives in fisheries law.</p>	<p>Clear objectives of tuna management and development policy set out in the FSM Tuna Management and Development Plan including six specific goals for tuna fisheries management.</p>
Fiji 	<p>Fisheries Act 1942, last amended in 1992. Marine Species Act 1978. Requires new legislation. Need to improve flag state control, including the establishment of a process to authorise Fijian flagged vessels fishing on the high seas, and to better control Fiji flagged vessels fishing in the EEZs of other FFA states. No one legal specialist is assigned to fisheries and assistance needed to support Commission participation and implement Commission decisions.</p>	<p>Fiji Tuna Development and Management Plan in place, including strong polices aimed at management arrangements that maximise the benefits flowing to Fijians, and in the case of licensing arrangements, indigenous Fijians. Need to review regional and national policy vision for future management arrangements and approach at the Commission. Intended establishment of the Fiji Islands National Fisheries Authority (FINFA) with expanded OFM functions financed by new cost recovery arrangement should assist in this regard.</p>
Kiribati 	<p>The Kiribati <i>Fisheries Ordinance</i> makes provision for the promotion and regulation of fishing and fisheries industries in Kiribati, whilst the <i>Marine Zones (Declaration) Act 1983</i> deals with internal waters, the archipelagic waters, the territorial sea and the EEZ of Kiribati. The <i>Fisheries Ordinance</i> is not consistent with the UN Fish Stocks Agreement and the WCPF Convention in many respects and new legislation is required. Legal support for Commission participation also needed.</p>	<p>Policy goals not clear due to Fisheries Management Plan (developed 1999-2003) has yet to be adopted. There is a need for capacity building in fisheries management and policy making, particularly in areas related to the work of the WCPF Commission to enable Kiribati to: identify appropriate strategies and options, participate effectively and build support among stakeholders for decisions of the Commission.</p>

⁴⁴ The legal section of this table was based on information provided to the Secretariat by FFA Members. This information is not always up to date. Other information is drawn from PDF-B study and interviews with FFA Staff. Not also that FFA has undertaken a comprehensive gap analysis (relating to the commission/Convention) for all FFA members – these should be referred to for additional detail relating to legal baselines.

⁴⁵ **Updating** refers to the use of regulations to achieve compliance with Commission obligations, while **new legislation** infers that a new act and regulations will be required for this purpose.

Country	Legal	Policy
Marshall Islands 	<p>The Marine Resources Act 1997 is still in effect and the provisions of the Act are adequate to implement conservation and international obligations under UNIA and the Convention. Requires updating to cover some obligations, including flag state responsibility, inspecting state obligations and port state enforcement measures. Need to enhance prosecution capability and support legislation for recently agreed (December 2004) Commission measures.</p>	<p>RMI has a well-developed oceanic fisheries policy/management framework but needs further reform and strengthening to take account of the development that has taken place, and to meet the additional responsibilities associated with the WCPF Commission.</p>
Nauru 	<p>Fisheries Act 1997. Appears to be capable of meeting most general obligations of the Convention, but check of compatibility of Act and Regulations with Convention needed, and will require updating to enable the implementation of some WCPFC measures. Legal advice and training in selected areas, including in the area of regulations and licensing.</p>	<p>Major policy objectives of tuna management and development policy set out in the Nauru Fisheries and Marine Resources Authority Act (1997) and the Fisheries Act (1997). Policy in regard to approaches at the Commission and desired outcomes from measures not well articulated. Assistance to support policy stances at the Commission required.</p>
Niue 	<p>Territorial Sea and Exclusive Economic Zone Act 1997. Includes sufficient powers to make regulations to implement WCPF Commission decisions. However, Niue wishes to move away from access agreements towards more direct control of fishing vessels through regulations and licence conditions. Requires assistance with a review of existing/new legislation and drafting of regulations and licence conditions, and to support Commission engagement and support development of new measures in support of Commission decisions.</p>	<p>Tuna Management and Development Plan in place, but key policy decisions on oceanic fisheries issues are made by Cabinet on the basis of ad hoc consultations with stakeholders in the often with substantial advice from regional organizations. Need for assistance to strengthen its institutional capacity in oceanic fisheries policy-making.</p>
Palau 	<p>Title 27, last amended in 2004. Unclear if existing legislation is compatible with UNFSA and the Convention. Requires new legislation. Legal support required for Commission participation and to implement Commission decisions.</p>	<p>The major policy objectives of tuna management and development are set out in the National Tuna Fishery Management Plan (NTFMP) but the Plan is not implemented. Urgent support needed for policy development, particularly in areas related to the work of the WCPF Commission to ensure that Palau's interests are taken into account.</p>
Papua New Guinea 	<p>Fisheries Management Act 1998 general provisions believed compatible with the requirements of the Convention, but that assistance with updated legislation will be required in the medium term (2 - 3 years), Uniquely among FFA Island member states, PNG has a statutory management plan which, like the Act, may require support to assist with minor changes.</p>	<p>Well developed policy and management framework with clear policy towards domestic industry development as articulated in the Tuna Management Plan. Overall policy for Papua New Guinea's engagement at the Commission requires development.</p>

Country	Legal	Policy
Samoa 	<p>Fisheries Act 1988, last amended in 2002. There is a need to make sure that the legal provisions can be interpreted by stakeholders, which could be done through national workshops. Support required to for Commission participation and to Implement Commission decisions. Requires new legislation to ensure all the necessary provisions for implementation of the WCPF Convention, and support for drafting of additional legislation recently agreed (December 2004) Commission measures.</p>	<p>Samoa has a well-developed oceanic fisheries policy framework but it needs further reform to take account of the development that has taken place and to play a role in, and meet the additional responsibilities associated with the WCPF Commission. This will be assisted by the proposed implementation of a new structure for the Fisheries Division and support from FFA.</p>
Solomon Islands 	<p>Fisheries Act 1998. The Fisheries Act 1998 has not been revised to reflect and implement the requirements of the WCPF Convention and assistance is need to update legislation to enable this, and the implementation of recently agreed (December 2004) Commission. Support also needed to get full benefits from Commission participation and to implement Commission decisions.</p>	<p>The oceanic fisheries policy framework in Solomon Islands is in limbo, awaiting reviews of the Fisheries Act and Management Plan, and the financial resources and staff to give effect to them. Considerable support for tuna fisheries policy development will be required, and a donor funded (external to FFA) should assist in this regard.</p>
Tokelau 	<p>The Tokelau (Territorial Sea and EEZ) Act 1977 and Tokelau (EEZ) Fishing Regulations 1988. No specific provision in the Tokelau legislation to meet Convention and CMM requirements. Requires new legislation.</p>	<p>Draft management plan lays out key policies and ambitious objectives for Tokelau's Oceanic fisheries, including the exercise of competence by Tokelau over the waters of its EEZ, which is the basis for Tokelau's participation in the new Commission. Will be highly reliant on external assistance to maintain engagement and compliance with the Commission and agreed measures.</p>
Tonga 	<p>Fisheries Management Act 2002 includes the necessary powers for implementation of the UN Fish stocks Agreement and the WCPF Convention, and regulations are in the process of being promulgated. This will complete the immediate legal needs by Tonga. However, the there will be a need to update the Act to enable implementation of recently agreed (December 2004) Commission measures. Support also needed to get full benefits from Commission participation and to implement Commission decisions.</p>	<p>A Tuna Management Plan is in place, consistent with the UN Fish Stocks Agreement, as the key instrument of oceanic fisheries policy. The Plan is to be reviewed, taking into account the coming into force of the WCPF convention. Major external (not FFA) intervention assisting with tuna and WCPFC policy development.</p>
Tuvalu 	<p>New Marine Resources Act drafted and is ready to be enacted by Parliament. The Act is fully compatible with the requirements of WCPF Convention and is among the most up to date in the region. Likely to require updating to enable implementation of recently agreed (December 2004) Commission measures. Support also needed to get full benefits from Commission participation and to implement Commission decisions.</p>	<p>Tuvalu does not have an effective oceanic fisheries management policy framework. There is, however, a strong intention to implement the national tuna management plan, once it has been reviewed and amended as necessary. Will be highly reliant on external assistance to maintain engagement and compliance with the Commission and agreed measures.</p>

Country	Legal	Policy
Vanuatu 	<p>Fisheries Act 2005 provides a good framework for Vanuatu's participation in the WCPFC or other RFMOs to which Vanuatu has acceded. The new Act now covers Vanuatu's substantial flag state responsibilities. Regulations will require updating over time to enable the implementation of WCPFC measures.</p>	<p>The major policy objectives of tuna management and development policy are set out in the Republic of Vanuatu Tuna Management Plan. The Plan includes policies on licensing, TAC setting and closed areas.</p>

Baseline Status of Compliance in OFMP Beneficiary countries

Cook Islands 	<p>A national VMS is being established and it is intended that all Cook Islands flagged vessels will need to be VMS compliant. One Pacific Patrol Boat (PPB). Good level of coordination between Fisheries (MMR) and Maritime Division both in undertaking patrols (and VMS monitoring). Cooperation with US Navy, French Navy, RNZAF and RAAF on aerial surveillance.</p>
Federated States of Micronesia 	<p>The Maritime Wing operates the regional VMS but lacks back-up capacity, especially if additional duties are anticipated in conjunction with a Commission VMS programme. Three PPBs are assisted by regular surveillance flights by Australia and New Zealand, with some ad hoc support for the USCG. Since 2002 and under a multilateral agreement under the Niue Treaty, FSM has participated in joint surveillance (training and patrols) with its neighbours Palau, and the Marshall Islands. Intention to expand these operations. Need for improve coordination between states. The locally-based longline vessels may need to be subject to a wider range of compliance requirements e.g. VMS, and regional registration.</p>
Fiji 	<p>The FFA VMS facility is managed by the Naval Division. While it is operational regular technical problems have been experienced. Three PPBs operated by Naval Division. Recognition of the increasing mobility of fishing fleets and collaborative compliance arrangements with Vanuatu and Tuvalu in place (not under the Niue Treaty). The capacity of Navy staff in relation to understanding and implementation of fisheries-associated legal instruments requires strengthening.</p>
Kiribati 	<p>The regional VMS is generally operational in Kiribati, with foreign vessels required to comply with regional VMS requirements. There is also a national VMS system (Argos) providing coverage of Korean longliners. Compliance activities are carried out by the Maritime Police within the Kiribati Police Force, utilising one PPB (10 patrols p.a.). Extensive IUU fishing both within the three Kiribati EEZ components and in adjacent high seas areas is suspected, and there is a desire to undertake increased surveillance activity. Australia, New Zealand, USA and France provide some aerial surveillance flights under regional programmes. No current mechanism for the coordination of MCS activities. There are no inspection programmes in place for transshipment and landings in Kiribati. This capacity may need to be developed to meet Convention requirements.</p>
Marshall Islands 	<p>The FFA VMS is under the control of the Police and is operational, although there is limited capacity within RMI to maintain and service VMS operations. Compliance activities are carried out by the Police Sea Patrol Division, with assistance from MIMRA. One PPB and ongoing technical support from the RAN. Sea Patrol operates one Australian-provided patrol vessel, the Lomor, with an annual target of 120 days of seagoing patrols. Vessels are currently licensed annually by MIMRA. There is a good database of vessel and gear characteristics. Surveillance of RMI vessels fishing outside RMI waters is required and a formal process for authorisation of high seas operations needs to be developed, Almost complete inspection of landings and transshipments, but unloadings data are not available. RMI is involved in collaborative surveillance operations with its neighbours to the west- FSM and Palau.</p>
Nauru 	<p>The FFA Regional VMS appears not to be functional all of the time, and there is a need to develop capacity in this area as a priority. MCS activities in general Nauru are limited. Apart from some aerial surveillance flights carried out intermittently by Australia and NZ as part of regional coverage, little else is in place, involving either the Police or NFMRA. There are ongoing discussions with adjacent FSM, RMI and Kiribati concerning the possibility of utilizing their patrol vessels for surveillance in the Nauru EEZ and adjacent waters. No transshipment and landing/offloading in Nauru and thus there are no inspection programmes in place.</p>

Niue 	<p>VMS not fully operational and assistance required with the VMS system to ensure it is fully operational. Niue's MCS capacity is limited due to resource constraints. There is no patrol boat in Niue and no prospect of one. IUU fishing in Niue waters is an issue because Niue does not have its own sea or air patrol capacity. It is, however assisted by overflight patrols by New Zealand and the United States. Niue sees regional cooperation in MCS as important, and has authorised Fiji and New Zealand Navy's to undertake MCS operations in Niuean waters; this initiative is likely to expand.</p>
Palau 	<p>The FFA regional VMS, hosted by the LED, while operational, appears to be utilized at less than full capacity. There is no national MCS Committee which would seek to improve coordination of MCS activities between BOFM and other agencies. Some capacity to enforce its fisheries laws, using one PPB. Suspected very high incidence of IUU fishing within the zone and probably also in adjacent high seas areas accessed by Indonesian and Philippines vessels, Surveillance is also assisted by occasional surveillance flights by Australia and New Zealand. There are no inspection programmes in place for landings in Palau, although there is port sampling Customs and MLED cooperate in in-port vessel inspections and clearances.</p>
Papua New Guinea 	<p>The FFA VMS facility is located with the NFA and is operational at around 80% efficiency. PNG also manages its own domestic VMS. PNG also operates its own national VMS Compliance, monitoring, licensing and enforcement activities are carried out by the NFA, in a unique collaboration with the naval arm (Marine Element) of the PNGDF and Royal PNG Police. PNG has four PPBs that are currently underutilised. Efforts under way to improve links between NFA and the Navy to improve data and information flow. NFA has its own enforcement section, dealing primarily with compliance with licence conditions and cooperating with the Navy during surveillance operations. Expanded subregional cooperation in surveillance (currently with Palau and Marshall Islands and FSM) is considered important to PNG. Considerable cooperation in surveillance and enforcement with Australia.</p>
Samoa 	<p>The FFA VMS is under the control of the Police and is operational Compliance activities are carried out by the new Regulations and Enforcement Section of the Fisheries Division and the Maritime Police Wing, which operates one PPB, assisted by periodic air patrols by New Zealand. There is almost complete inspection of landings. There is not considered to be any systematic problem with IUU fishing in Samoan waters. Samoa is interested in collaborative surveillance operations with neighbours including Cook Islands.</p>
Solomon Islands 	<p>The FFA VMS facility is managed and operated by the DFMR, with a DRS being available to Royal Solomon Island Maritime Police. The consistency of application to foreign fishing vessels requiring a licence is uncertain. Compliance activities are carried out by the Solomon Islands Police (Maritime Division) that operates two PPBs in collaboration with DFMR. DFMR observers carry out compliance and monitoring activities. Lack of capacity and other priorities related to land-based police activities are constraining operations. While there is no collaborative compliance arrangement in place, there is an intention to explore this, probably under Niue Treaty arrangements. Overall there are substantial challenges facing Solomon Islands in meeting the compliance responsibilities under the Convention.</p>
Tokelau 	<p>Tokelau is installing the FFA VMS and is looking to arrange some sea patrol operations through arrangements under the Niue Treaty. Tokelau has no dedicated compliance operations, and has depended in the past on regional instruments such as the FFA Regional Register, and on ad hoc activities and information from inter-island vessels, supplemented by air patrols by New Zealand aircraft.</p>

Tonga 	<p>The start-up of the FFA Regional VMS has occurred, as well as the establishment of new national VMS, and a new VMS section within the Access & Compliance Division financed by a new cost recovery scheme, substantial progress has been made in strengthening compliance activities, as part of an institutional strengthening programme, including the establishment of a National MCS Coordinating Committee. Tonga has a strong capacity to enforce its fisheries laws, using 3 PPBs and a patrol aircraft operated by the Tonga Defence Services. It is also assisted by regular surveillance flights by Australia, France and New Zealand (more regularly), and Germany has also recently indicated that it will provide air surveillance flights. There are inspection programmes in place for transshipment and landings in Tonga. Further training of inspectors is important.</p>
Tuvalu 	<p>The Fisheries Information and Licensing Unit of the Fisheries Department manages the FFA VMS. Compliance activities within the MNRL are the responsibility of the Fisheries Information and Licensing of the Fisheries Department. The Police Maritime Wing operates one PPB, which, in common with other PacSIDS is severely funds-limited. Coordination between Police and MNRL is excellent. Tuvalu, Kiribati, Nauru, and possibly the Marshall Islands, are in the process of forming a sub-regional group to deal with matters of common interest in tuna fisheries including MCS.</p>
Vanuatu 	<p>The hardware for the FFA VMS system is housed at the Joint Police Operation Centre and is operated by the Police Maritime Wing. Training and operational difficulties have occurred; efforts are being made to better coordination of operations between Fisheries and the Maritime Wing. Compliance activities in Vanuatu are handled by the Compliance and Licensing Section of Fisheries, in collaboration with the Police Maritime Wing. The Police Maritime Wing operates one PPB. Currently, with only two surveillance officers, Fisheries are unable to place staff on the Patrol Boat. This surface activity is supported by aerial surveillance by New Zealand, Australia and France, and surface patrols by the French Navy. A Maritime Surveillance Planning Group is scheduled to meet monthly to coordinate surveillance activities between responsible authorities. Cooperative surveillance agreements with Fiji, Solomon Islands and New Caledonia are being considered. Vanuatu also operates a National VMS system, contracted to Tuna Fishing (Vanuatu) Ltd, to monitor Vanuatu flag vessels operating throughout the world. Data downloaded are passed to the relevant RFMOs as part of the reporting and monitoring process.</p>

Socio-economic indicators

FFA members have also expressed a desire to be better informed about the economic and social benefits arising from the development of their tuna fisheries; Outcome 3 of the FFA Strategic Plan 2005-2020 (Tuna fisheries are developed to maximise social and economic benefits to members) has the following performance indicator - 'specified social and economic benefits are effectively measured and achieved'. A number of initiatives to develop economic indicators were underway in 2005.

Socioeconomic indicators are required to report against Environmental Status Outcomes under the GEF reporting framework.

van Santen, 2005 in considering an appropriate set of economic indicators for the tuna fisheries suggests the following:

- a) access Fees for longliners and purse seiners;
- b) exports (fresh and frozen);
- c) annual aid commitment by DWFNs;
- d) employment on shore and on vessels;
- e) CPUE by gear type and target species;
- f) total value of catch;
- g) percentage of total tuna fleet registered in FFA member countries;
- h) fuel costs/catch value ratio for longliners and purse seiners;
- i) CPUE Ratio inside and Outside EEZ: longliners; and
- j) CPUE Ratio inside EEZ and Indian Ocean: purse seiners.

Indicators e - j are concerned with monitoring the 'economic health' of various fishing operations.

In considering baselines van Santen, drew on a number of reports by Gillett and others (including Gillett, R. and C. Lightfoot 2001 and Gillett, R. 2003) which had been commissioned by FFA and came to the following conclusion:

As these data appear to have been collected with particular care, it would be desirable to use them as baseline data, despite their relative age, and compare data from future years initially with these data. Baseline data for CPUE, Total Value of Catch and Fuel cost are available from 2002 and 2005.

The FFA Secretariat in giving effect to the Strategic Plan, was tasked by the FFC to prepare a limited number of economic indicators, that would illustrate – in a simple, concise and brief document – annual changes in the impact of the tuna industry on PIC economies. A paper to FFC 61 (FFA 2006) reports on a range of data that had been collected using the van Santen report recommended indices as a guide. These were:

- a) Delivered value⁴⁶ (purse seine and longline, by flag and EEZ);
- b) Revenue per day (purse seine vessels, based heavily on fuel prices and estimated fuel usage);
- c) Access fees; and
- d) Exports (based on Japanese and US import data).

⁴⁶ the value of the catch at the point at which it is unloaded at its final market destination whether it is delivered by the fishing vessel or transhipped

Data on employment was not included in this report.

After FFA 61, The FFA Secretariat received informal feedback from a number of sources and further refined its identification of areas for which additional or improved data collection and analysis is required. A further study on economic indicators was commissioned in 2007 (Econsearch, 2007). The Econsearch report reviewed the indicators in the FFC report and recommended a number of additional indicators, grouping them into three sections:

i) financial indicators

- Product prices
- Operating costs
- Vessel profitability

ii) fishery indicators

- Gross value of production
- Economic rent
- Access fees
- Cost of management
- Number of concession holders/ number of vessels
- Strength of property rights

iii) community indicators

- Employment – direct and indirect
- Provision of services to the tuna fishing industry
- Contribution of the fishery to gross domestic product
- Exports
- Domestic licence fees
- Taxation and other revenues collected from the fishing industry

Socio-economic indicators for the OFMP

Oceanic (tuna) fisheries offer one of the few development opportunities for PacSIDs. These opportunities in turn are clearly linked to effective management measures that maintain stocks of target and by-product species at levels that allow profitable fisheries. This is especially the case for some relatively high-cost domestically based fisheries. As such, indicators that measure the social and economic benefits arising from fisheries in the waters of PacSIDs, and particularly those arising as a result of improved management decisions on transboundary oceanic fisheries resources, are important.

Economic data/indicators should be selected from the available categories of data which best demonstrate improvements in the status of oceanic fisheries resources and the protection of biodiversity in the WTP LME from improved management arrangements.

Most management measures are about constraining fishing effort/catches and, though cooperative, transboundary management, seek to achieve some form of optimal level of fishing/catch that balances social, economic and, most significantly, environmental (sustainability) objectives. In this context three types of indicator would be useful:

- i Value of access. The successful implementation of the Vessel Days Scheme through cooperative management should increase the value of fishing opportunities substantially, especially as trading of Vessel Days commences. Access fees are a similar, coarser-scale indicator;
- ii Catch value. Similarly, through restricting catches in a market that is highly sensitive to supply (canning-based operations), prices are likely to be higher than would be the case where greater access and catch is permitted. Previous successful efforts by DWFNs to restrict the supply of purse seine-caught skipjack have demonstrated this; and
- iii Optimal management outcomes. Finally, in the case of multi-gear, multi-species fisheries, the trade-off between management options by the Commission or FFA country groupings (e.g. PNA) needs to be carefully considered in terms of optimal economic, social and environmental outcomes and consideration of 'winners and losers'. Again, some indicators of how management measures are performing towards achieving desired outcomes are necessary. FFA has previously undertaken studies showing the differential impacts of transboundary management decisions.

Deriving baselines for these indicators is not possible at present but as FFA's efforts to develop ongoing monitoring continue, they should become available during the life of the project, as indicated in the 2007 OFMP PPR.

