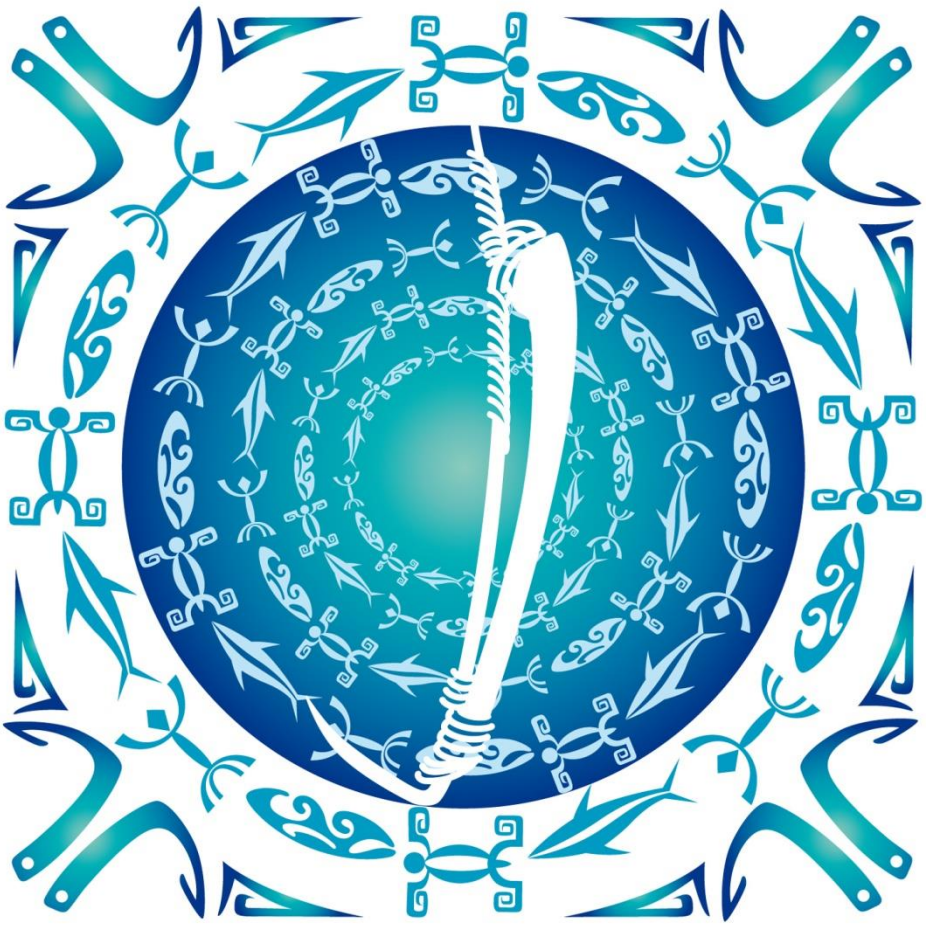
SciCOFish

SCIENTIFIC SUPPORT FOR THE MANAGEMENT OF COASTAL AND OCEANIC FISHERIES IN THE PACIFIC ISLANDS REGION

Final report 2010-2015



DECEMBER 2015

This project is funded by

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Signature page:

On behalf of the implementing agency, I have the pleasure in providing herewith the 2015 final project report:

Signed: Date: 24 February 2016

Cameron Diver
Deputy Director General
The Pacific Community

Seen and noted on behalf of the European Union:

Signed: Date:

Mr Andrew Jacobs
Ambassador
Delegation of the European Union for the Pacific

Contents

List of abbreviations

ACP	African, Caribbean and Pacific
CITES	Convention on International Trade in Endangered Species
CMM	Conservation and Management Measure
E-monitoring	Electronic Monitoring
EU	European Union
FAD	Fish Aggregating Device
FAME	Fisheries, Aquaculture, and Marine Ecosystems
FFA	Forum Fisheries Agency
Fmsy	Fishing Mortality associated with Maximum Sustainable Yield
FSM	Federated States of Micronesia
GIS	Geographic Information Systems
ID guide	Identification guide
ISNR	Issue Specific National Report
MSG	Melanesian Spearhead Group
MSY	Maximum Sustainable Yield
N-Pacific	North Pacific
P-ACP	Pacific-African, Caribbean and Pacific
PNA	Parties to the Nauru Agreement
PNG	Papua New Guinea
REPICOR	Resilience of Pacific Islands coral reef social-ecological systems in times of global change
ROCW	Regional Observer Coordinators Workshop
RWSA	Region-Wide Stock Assessment
SBmsy	Spawning biomass associated with maximum sustainable yield
SC	Scientific Committee
SciCOFish	Scientific support for the management of coastal and oceanic fisheries in the Pacific Islands region
SPC	The Pacific Community
TUBS	Observer data management system
TUFMAN	Tuna fishery data management system
WCPFC	Western and Central Pacific Fisheries Commission

1. Overview

1.1. Project overview

The SciCOFish project, *Scientific support, for the management of coastal and oceanic fisheries in the Pacific Islands region*, was implemented through the Contribution Agreement between the Pacific Community (SPC) and European Union (EU) from 17 April 2010 to 3 September 2015, with a budget of € 9,478,000.[1]

Overall project objective

Conservation and sustainable use of coastal and oceanic fisheries resources in the P-ACP region.

Project purpose

To provide a reliable and improved scientific basis for management and decision making in oceanic and coastal fisheries.

Result area 1

P-ACP governments, the FFA and the WCPFC are provided with scientific data, modelling, and advice to underpin their management decision making and strategic positioning.

Result area 2

P-ACP governments, private sector and communities are equipped to monitor coastal fisheries to provide scientific advice in support of sustainable management of these resources P-ACP governments, private sector and communities will be provided with technical methods and training to monitor coastal fisheries, scientific advice to inform management decisions, and development of in-country capacity to evaluate their effectiveness.

In summary, the project aimed to provide the 15 P-ACP countries with the means to develop evidence-informed management measures, along with skills and tools to monitor their effectiveness.[2] The project objective addresses a key aspect of the Regional Indicative Programme, namely, the development of cost-effective solutions for the sustainable management of marine and land-based resources.

This report summarises the key activities and achievements against the stated objectives and results across the 5.5 year project period. This final report has been prepared with the collaboration of section managers and key staff within the SPC Fisheries, Aquaculture and Marine Ecosystems (FAME) Programme involved in the implementation of the SciCOFish project.

[1] Two addendums extended the implementation phase of the project from the original end-date of 3rd of March 2014. These addenda also increased targets for some performance indicators in response to the time extension and additional funds provided.

[2] The PACP countries are: the Cook Islands, Fiji, FSM, Kiribati, the Marshall Islands, Nauru, Niue, Palau, Papua New Guinea (PNG), Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu and Vanuatu.

1.2.Background

The SciCOFish project was designed in direct response to sector needs and contexts as outlined in the 2010 FFA/SPC study "Future of Pacific Fisheries". This study highlighted evidence of offshore resources being overfished, with stocks of bigeye tuna being harvested at dangerous levels. Coupled with this were increasing pressures from foreign fishing fleets seeking access to the waters of Pacific Island countries and territories and some coastal fisheries also being overexploited, specifically reef fish around major settlements and invertebrates harvested for export. The study provided clear evidence that fisheries agencies at national and regional levels needed to adapt in the face of the growing complexity of fisheries management. It was also clear that key gaps existed in relation to capacity and coordination of policies to ensure the development of sustainable fisheries to feed and support future generations.

2. Project achievements and results

This section provides a description of the project achievements and results for the full project implementation period against the indicators outlined in the project Agreement. See Annex 1 for a full overview of the activities carried out during the project period by year.

2.1. Overall objective

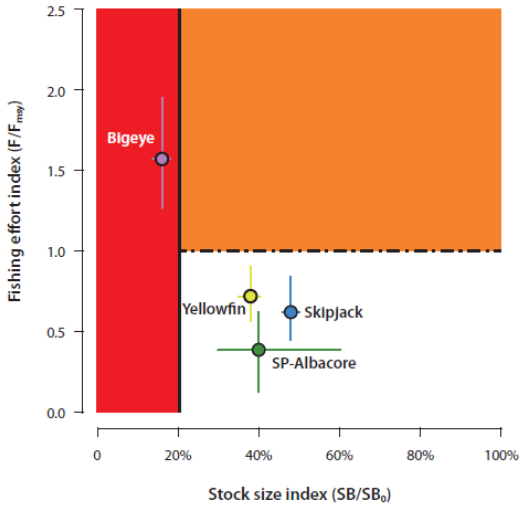
Conservation and sustainable use of coastal and oceanic fisheries resources in the Pacific Islands region

Oceanic fisheries

For oceanic fisheries, the key aspects of conservation and sustainability targeted through the SciCOFish project were reducing effort on yellowfin and bigeye to the level required to reach maximum sustainable yield, along with reducing tuna discards on purse seine vessels. The SciCOFish project contributed to the former through the provision of stock assessments and scientific advice to inform management measures in the region, including those by WCPFC, and the latter through monitoring and reporting on tuna discards from purse seiners and longline vessels.

Progress towards the overall objective has been mixed. In 2014, the estimated total catch of the main target tuna species (yellowfin, skipjack, bigeye and South Pacific albacore) was approximately 2.8 million tonnes. Bigeye tuna continues to experience overfishing with the most recent (2008-2011) estimates of fishing mortality estimated to be around 30% in excess of the level supporting the maximum sustainable yield (MSY). Three of the region's main tuna stocks (skipjack, yellowfin and South Pacific albacore) are estimated to be on the healthy side of routinely-used overfishing benchmarks. However, while skipjack, yellowfin and South Pacific albacore continue to be assessed as not overfished, there are signs in the fishery that all three of these stocks may have reached the limit of their exploitation potential. For yellowfin also, in the equatorial Pacific where around 90% of the catch occurs, the stock is estimated to be fully exploited.

Figure 1: 2014 status of key tuna stocks



Specifically, as shown in Figure 1, the most recent stock assessments estimate the following:

- Bigeye tuna spawning biomass is estimated to have declined to 16% of the average 2002-2011 unexploited level, which is below the agreed limit reference point of 20% and fishing mortality remains well above the MSY level (2014 stock assessment)
- Yellowfin spawning biomass has declined to 38% of the average 2002-2011 unexploited level, which is above the limit reference point of 20%, with fishing mortality below the MSY level (2014 stock assessment)
- Skipjack spawning biomass has reached approximately 50% of the average 2001-2011 unexploited level, which is above the limit reference point of 20%, with fishing mortality below the MSY level (2014 stock assessment)
- South Pacific albacore spawning biomass is estimated to have declined to 40% of the average 2003-2012 unexploited level, which is above the limit reference point of 20%, with fishing mortality below the MSY level (2015 stock assessment).

Continued upwards pressure on fishing mortality rates for the above three tropical species and South Pacific albacore is expected due to continued increases in fishing effort, and in the effectiveness of fishing effort, in both the purse seine and longline fisheries. Further, some 80 new purse seiners are currently being built, the combined tonnage of which is in excess of the tonnage of vessels to be replaced. This excess is estimated to be equivalent to approximately 40 new vessels.

Despite continued pressure on the region's main tuna stocks, the project period saw an increase in the implementation of evidence-informed management measures, where advice provided by SPC was utilised. Throughout the project, SPC has provided advice to members individually, to the Forum Fisheries Agency (FFA) and its sub-regional groups, as well as to the Western and Central Pacific Fisheries Commission (WCPFC). Examples of management measures underpinned by SPC advice and for which the SciCOFish project has contributed through its various activities:

- Refinement of the management measure for tropical tunas in the WCPFC intended to reduce purse seine fishing on FADs (including reducing juvenile bigeye and yellowfin mortality through seasonal FAD closures) and cap tuna longline catch

- Agreement by the PNA to enforce limits on the number of fishing days by purse seine vessels more rigorously
- The certification by the Marine Stewardship Council of a large part of the purse seine fishery for Skipjack tuna (and with the recent addition of Yellowfin tuna) and the Fiji longline fishery for Albacore as 'sustainable fisheries'
- The adoption of a limit reference point for tropical tuna and South Pacific albacore (20% of unfished spawning biomass) and a target reference point for skipjack of 50% of unfished spawning biomass.

These measures have had some impact in constraining mortality. SPC assessments have provided evidence on the type of harvest regime for bigeye tuna that would be required to achieve long-term sustainability. The WCPFC Conservation and Management Measures (CMM) have been partly effective in constraining fishing mortality of bigeye tuna. However, while fishing levels approximately align with those allowed by the WCPFC Conservation and Management Measure (CMM) 2014-01, the continuation of these measures is unlikely to reduce bigeye tuna fishing mortality to a level consistent with maximum sustainable yield (MSY), or to recover the spawning biomass to a level sufficiently in excess of the limit reference point. While the SPC scientific advice has provided information on the sorts of reductions required to achieve these objectives, the highly political process of WCPFC decision making has thus far not resulted in agreement to implement this advice.

Progress towards the target proportion of tuna discards was not achieved in the final year of the project, with this varying throughout the project. Specifically, the target of 1% of tuna discard on purse seine vessels was achieved in 2013 following declines in each of the first 4 years of the project, however, discards then increased to 3% in 2014. Reasons for this increase may in some ways relate to the increase in catch sizes in 2014 (due to good fishing conditions), i.e. there was an increase in large set catches which may have presented additional challenges to vessels in some instances.[3] In contrast, the rate of longline discards was 0.4% in 2014, the lowest level since 1995.

[3] The main reason for discards in the past few years has been 'gear damage', 'vessel fully loaded' and 'fish too small' in that order. This order did not change for 2014, however, there was an increase in volume in the first two categories. As such, it is suspected that the increase in the proportion of discards may in some way be related to dealing with larger set catches than previous years. Specifically, there was a clear increase in the number of sets with catches greater than 200 MT in 2014 compared to 2013 (25% increase according to observer data and ~40% increase according to logsheet data).

Photo 1: SPC presentation at WPFC SC10, Marshall Islands, August 2014. Credit: Steven Hare

Coastal fisheries

For coastal fisheries, the area of conservation and sustainability targeted through the SciCOFish project was in relation to the development of management measures and resulting signs of recovery. New management measures were adopted in 8 countries due to advice provided through the SciCOFish project. Specifically:

- Sea cucumber management plans / regulations adopted in Marshall Islands, Vanuatu, Solomon Islands, FSM (Pohnpei), and Samoa; advice acted on in Tonga
- Coconut crab management measures adopted in Niue
- Recreational bone fish management plan adopted in Cook Islands
- Overall coastal fishery management plans adopted in Samoa.

The uptake of management advice from SPC has been mixed across the countries. In Kiribati, and most recently in Tonga, the sea cucumber fishery has closed following the project's advice, and in PNG closure of the fishery has been maintained. Unfortunately, political decisions in the Solomon Islands and Vanuatu have resulted in the sea cucumber fisheries being reopened in 2013, contrary to the scientific advice provided by SPC through the project and the respective Fisheries Departments to maintain closures in these countries. The resulting management measures being that Solomon Islands closed their fishery again after a short season in 2013, and in the same year Vanuatu implemented quotas by area and species, which then trigger a closure once quotas have been reached.

Along with the abovementioned list of management measures that have actually been adopted, considerable work has gone into developing other management plans and provide advice that have not yet been adopted, with this also being mixed across the countries and fisheries. Advice provided to Fiji in 2013 to close the sea cucumber fishery and ban the use of underwater breathing apparatus, is still being progressed. The Fisheries Department has put forward cabinet submissions to ban underwater breathing apparatus in 2013 and again in 2015, and after several years of assistance, a sea cucumber management plan was finalised for Fiji in 2014 and awaits Cabinet's decision in 2015. For Kiribati, the overall coastal fisheries management plan that has been developed is still being finalised as implementation of the plan requires the inclusion of

island councils. Conversely, in the case of Samoa, the government approved the coastal fisheries management plan, along with a 5-year implementation strategy with timelines being approved for developing management arrangements for specific fisheries, such as trochus, sea cucumber and aquarium fish.

In relation to monitoring, the project provided considerable capacity building support to equip local counterparts in the countries to undertake monitoring of coastal resources (survey methodology, analysis, etc). In-country surveys and capacity building training in survey methodologies were undertaken in 13 countries for invertebrate monitoring, 8 countries for biological sampling and 6 countries for market and creel surveys. Table 1 below indicates the countries included in monitoring and capacity building. In all instances, practical capacity building training was linked with conducting fieldwork, thus providing local counterparts with the skills to undertake monitoring themselves. In each location 5-10 staff were trained in survey methodologies to support sustainability and manage the risk of staff turnover.

Table 1: Monitoring and capacity building undertaken by survey type

Invertebrate monitoring [1]	Biological sampling	Creel & market survey	Finfish inwater assessment
Tonga (2010, 2014)	FSM (2012)	Nauru (2012)	FSM (2010) [2]
Vanuatu (2011, 2013)	Marshalls (2012)	FSM (2012)	Kiribati (2011) [2]
Solomon Islands (2011)	Kiribati (2012)	Tonga (2012)	Tuvalu (2011) [2]
Marshall Islands (2011)	Nauru (2012)	Fiji (2012)	Marshalls (2011) [2]
Kiribati (2011, 2014)	Fiji (2013)	Palau (2014)	
Tuvalu (2011)	Tonga (2014)	PNG (2014)	
Samoa (2012, 2014)	Palau (2014)		
Fiji (2012)	PNG (2014)		
Palau (2012)			
FSM (2012, 2013)			
Cook Islands (2012)			
Niue (2014)			
Nauru (2015)			

1. Mostly sea cucumber, however, includes Trochus monitoring in Samoa, Green snail monitoring in Vanuatu and Coconut crab monitoring in Niue
2. For finfish inwater assessments the time (salary) of the trainer was funded by the SciCOFish project. The additional costs of training (e.g. travel) were covered under the DFAT funded climate change monitoring program.

To further assist countries with monitoring invertebrate resources a invertebrate survey methodologies manual was developed and published in 2014; '[Assessing Tropical Marine Invertebrates: a Manual for Pacific Island Resource Managers]'. To progress monitoring and sustainable management of finfish resources, standardised survey methodologies were developed for both market and creel surveys, with these being outlined in a manual to be published in 2016 entitled 'Creel and Market Survey: a Manual for Pacific Island Fisheries Officers'. The manual was drafted and then refined following trials undertaken in Tonga, Nauru, Pohnpei (FSM) and Fiji in 2012.

Despite monitoring being implemented, it has been too early to observe impact of measures on recovery by the project end. This will be an area of ongoing work, funded through a DFAT and SPC programme funding.

Photo 2: Creel and market surveys in Tongatapu, Tonga, July 2014. Credit: Brad Moore

Photo 3: Underwater surveys during green snail training, Aneityum, Vanuatu, October 2013. Credit: Kalo Pakoa

To provide a reliable and improved scientific basis for management advice and decision making in oceanic and coastal fisheries

2.2.Project purpose

Oceanic fisheries

Overall, the SciCOFish project was seen to meet the project purpose of providing reliable and improved scientific information to inform management advice and decision making. In oceanic fisheries, all tuna stock assessments presented to annual WCPFC Scientific Committees throughout the project period were accepted and forwarded to the full Commission for decision-making, with no decrease in data quality. In relation to observer coverage, limitations in the monitoring of observer deployment mean that the target of 100% of observer coverage on purse seine vessels by 2012 is difficult to confirm. In 2012, coverage of 84% is confirmed through observer data provided, rather than actual observer placements which is expected to be at 100%. While there is reasonable confidence that coverage is at 100%, this level of uncertainty highlights the need for improved monitoring of observer placements.[4]

Specifically, across the project period contributions to the project purpose included:

- Regional stock assessments conducted for skipjack (2010, 2011, 2014), yellowfin (2011, 2014), bigeye (2010, 2011, 2014) and South Pacific albacore (2011, 2012, 2015) and presented to the WCPFC Scientific Committee each year. All assessments were accepted and used in the formulation of the Committee's scientific advice to WCPF Commission

[4] SPC member countries (where purse seine vessels land/tranship their catch) monitor vessel departures and one aspect of this compliance process is to ensure they have an observer on-board. This is why there is a reasonable level of confidence that compliance with observer coverage is at, or very close to, 100%. Coordinating compliance with ensuring observers are on-board is with the jurisdiction of the WCPFC Secretariat and FFA.

- In addition, stock assessments were presented and accepted for oceanic whitetip shark (2012), South Pacific swordfish (2013), South Pacific striped marlin (2013), silky shark (2013) and blue shark in the north Pacific (2014) to advise fishing nations and authorities on the conservation status of these stocks
- These assessments incorporated improved bioeconomic and ecosystems modelling, and data from the fisheries, including high coverage observer data, facilitated by the SciCOFish project which have substantially improved reliability[5]
- As at December 2015, purse seine observer data received and processed by SPC for 2011, 2012, 2013 and 2014 represents 82%, 75%, 76% and 73% coverage, respectively, of all trips. More data are expected to be received
- E-monitoring trials started in 2014 and continued in 2015 as an approach to assist with reaching observer coverage targets, particularly for longline vessels where observer placement is logistically difficult.

Coastal fisheries

In total, 8 P-ACP countries have adopted coastal fisheries management measures recommended by the project, with these being Marshall Islands, Vanuatu, Samoa, Solomon Islands, Cook Islands, Pohnpei FSM, Niue, and Tonga.[6] Key contributions of the SciCOFish project to the stated project purpose include the following:

- The scientific knowledge for sea cucumber stocks continues to expand with the survey work being undertaken, with this being used to provide the best possible management advice
- Countries are now looking to better understand the stocks of other invertebrate species, with the project training local staff in survey methodologies for trochus in Samoa, anadara in Kiribati and coconut crabs in Niue, with the science being used in management advice for these fisheries
- The interest in finfish science has also increased as fisheries departments require more fishery dependent data on which to base management decisions. In this regard creel and market surveys have been undertaken in Kiribati, Tuvalu, PNG, FSM and Marshall Islands, and the collection of biological samples has been undertaken in Tonga, Palau and PNG. Some of the biological sampling will allow growth and mortality estimates of some species to be made and compared across the region to better understand the status of stocks. Genetic work will also allow a better understanding of connectivity between species of fish in different locations as to whether they are the same stock, sub-stocks or have no connection at all.

[5] Note that while performance of the stock assessments themselves is not part of the SciCOFish project (as tuna stock assessment staff are funded by the WCPFC) they represent the final outcome of much of the research and analysis, including bioeconomic and ecosystems modelling work, supported by the project and their quality is thus a good measure of project success. The peer review of the 2011 Bigeye tuna assessment completed in 2012, concluded that the assessment 'is based on state of the art methods and is analytically very thorough'.

[6] This is as a result of assessments and recommended management measures being provided to 4 countries for finfish (Kiribati, Cook Islands, Marshall Islands and Fiji) and to 10 countries for invertebrates (Tonga, Vanuatu, Kiribati, Solomon Islands, Marshall Islands, Fiji, PNG, Solomon Islands, Samoa, and Niue) through the SciCOFish project (see Section 2.3 on further details at the output level).

While the mid-term project evaluation indicated that the project was well on its way to fulfilling all result areas in coastal fisheries, some concerns were raised about the scientific analysis and management advice and recommendations being too informal. This was subsequently rectified in 2013-2015 with reports on the results and recommendations from in-country monitoring and assessments being published through the SciCOFish project for:

- Invertebrate work in Vanuatu, Solomon Islands, Fiji, Palau, Cook Islands and Niue, with drafts either completed or currently in progress for Tonga, Samoa, Kiribati and Nauru
- Biological sampling work in Palau, with a draft completed for Tonga
- Creel and market survey work in Palau.

Results from an additional 8 in-country assessments were presented in reports published through the Australian Government DFAT funded Climate Change project.

Further, in late 2014 the coastal component of the project hired a consultant to conduct an assessment of the development effectiveness of training and management advice provided under the project to Vanuatu and the Cook Islands. The evaluation found evidence of capacity development and progressively more sustainable management of invertebrate resources, as well as some challenges in relation to increasing capabilities among the fisheries departments in Vanuatu and the Cook Islands and a resulting desire to want to lead in the development of management of their resources. This evaluation is available online.

Photo 4: Training participants checking data for baseline assessment of invertebrates and reef habitats, Majuro, Marshall Islands, 4-16 April 2011. Credit: Maria Sapatu

Photo 5: Biological sampling training in Koror, Palau, September 2014. Credit: Brad Moore

Photo 6: On the boat training on invertebrates, Aitutaki, Cook Islands, October 2012. Credit: Kalo Pakoa

2.3.Project results

In working towards the above-mentioned overall object and project purpose, the SciCOFish

Result 1: P-ACP governments, the FFA and the WCPFC are provided with scientific data, modelling, and advice to underpin their management decision making and strategic positioning.

Result 2: P-ACP governments, private sector and communities are equipped to monitor coastal fisheries to provide scientific advice in support of sustainable management of these resources P-ACP governments, private sector and communities will be provided with technical methods and training to monitor coastal fisheries, scientific advice to inform management decisions, and development of in-country capacity to evaluate their effectiveness.

project had two key results areas. These were:

The table below summarises the overall results achieved against the performance indicators for each result area. As indicated by in 'status' column, the targets set for all performance indicators were met or exceeded during the project period.

Table 2: Overall results achieved for each result area

Performance indicator	Result achieved	Status
1.1 Observer training		
350 observers trained, 10 observer trainers and 70 observer debriefers operational[1]	• 670 observers trained, and 13 operational observer trainers and 52 operational observer debriefers from P-ACP countries.	✓
1.2 Integrated tuna fisheries databases		
National tuna fisheries databases operational in 15 P-ACPs	• Tuna Fisheries Data Management System (TUFMAN or TUFMAN 2) installed in all P-ACP countries	✓
Tuna data audits conducted for at least 10 P-ACPs	• Data audits completed for 10 countries (22 total audits)	✓
14 P-ACP's report data to WCPFC as per their obligations	• 13 out of 14 P-ACP countries met WCPFC reporting deadlines in 2015 • Web-based reporting tool 'Dorado' developed and used by countries for WCPFC reporting obligations.	✓
1.3 Bioeconomic modeling and national advice		
10 region-wide stock assessments (RWSA) for key tuna species, using the latest updated data, provided to decision-makers during 2010-2013	• 10 region-wide stock assessments completed for key tuna species between 2010-2013	✓
1 regional and 10 national reports providing bioeconomic modelling advice	• Regional bioeconomic developed and updated • Multiple sets of Issue Specific National Reports (INSRs) completed for all countries (42 reports total) • 2 scientific papers written using bioeconomic modelling.	✓
1.4 Ecosystem modeling of management and climate change		
1 regional and 10 national reports (including Timor Leste) providing advice on tuna resource vulnerability to environmental variability including climate change	• 1 regional report and national reports completed for all P-ACP countries providing advice on tuna resource vulnerability to environmental variability including climate change.	✓
1.5 Validate key model parameters through tagging[4]		
5,000 tuna tagged of which 80% are bigeye	• Tagging targets exceeded (10,103 tuna tagged, 97% bigeye) and tagging data successfully incorporated into SEAPODYM modelling.[5]	✓
2.1 Conduct stakeholder consultation		
Country specific needs	• Monitoring and management needs assessed and prioritised for	✓

prioritised for all P-ACPs	P-ACP countries.	
2.2 Develop local capacity to implement field monitoring protocols		
Standard monitoring protocols implemented and sustained in at least 6 P-ACPs[2]	• Monitoring protocols implemented and sustained in 10 P-ACP countries, these being for; marine invertebrates in Vanuatu, Solomon Islands, Marshall Islands, Kiribati, Samoa and Cook Islands; finfish in Tuvalu and Marshall Islands; biological sampling in Marshall Islands, Tonga and Palau; and, creel and market surveys in Tonga, Palau and PNG	✓
Creel and market survey data collected in 4 countries and staff trained to conduct these surveys[3]	• Training activities undertaken in all P-ACP countries except East Timor: - Invertebrate assessment training in 13 countries (all except PNG and East Timor) - Creel and market survey training in 6 countries (PNG, Nauru, Tonga, Kiribati, Tuvalu and Fiji) - Finfish in-water assessment and biological sampling training in 4 countries (Tonga, Nauru, PNG and Kiribati) • The development of a Creel and Market Survey Manual, along with identification guide for 300 species was begun under this project. Currently with editors, it will be printed in 2016[1].	✓
2.3 Develop and implement secondary data collection protocols		
Regional data repository maintained and national data provided for backup from at least 6 countries / fisheries[2]	• Database training undertaken with all P-ACP countries • National data provided by 8 countries • CITES export database developed and installed in 9 P-ACPs • Market and creel database established in 3 countries. • Digital library implemented for online document management • Servers installed in all P-ACP countries for meet data storage. • GIS training undertaken with 8 countries • Prototype of water quality database for Cook Islands has been installed. To be finalised • An e-learning app for tablets is currently in development for commercial and aquarium fish species.	✓
2.4 Develop management advice		
Assessments and management recommendations given for at least 6 major coastal fisheries, focusing on commercial invertebrates[2]	• Assessments and management advice provided to 4 countries for finfish (Kiribati, Cook Islands, Marshall Islands and Fiji) and to 10 countries for invertebrates (Tonga, Vanuatu, Kiribati, Solomon Islands, Marshall Islands, Fiji, PNG, Solomon Islands, Samoa, and Niue) • Attachment training provided to 10 countries on using data to develop management arrangements (Tonga, Vanuatu, Solomon Islands, Samoa, Palau, Fiji, Cook Islands, Kiribati, Pohnpei FSM, and Nauru) • Information materials produced on management measures (29 information sheets, 6 posters, 3 brochures and 1 guidebooklet).	✓

Table notes:

1. Indicator amended in 2014 Amendment 1 to increase the target number of people trained
2. Indicator amended in 2014 Amendment 1 to increase the target from 5 to 6
3. Indicator added in 2014 Amendment 1
4. While this indicator was not included in the project contribution agreement, it has been added as 6% of Component 1 was allocated to contribute to this tagging work undertaken by SPC
5. A second Central Pacific Tagging Cruise was also undertaken in 2011 (CP7) manned by IATTC. This is not included in the totals reported here as the SciCOFish contribution did not go towards this cruise, however, through CP7 an additional 4509 fish were tagged with 93% being bigeye.

Photo 7: Observer subregional training in Nadi, Fiji, September 2014. Credit: Manoi Kutan

Photo 8: Samoan trainees, Longline observer training, Apia, Samoa, February 2011 (image: Siosifa Fukofuka, SPC observer training and support Officer)

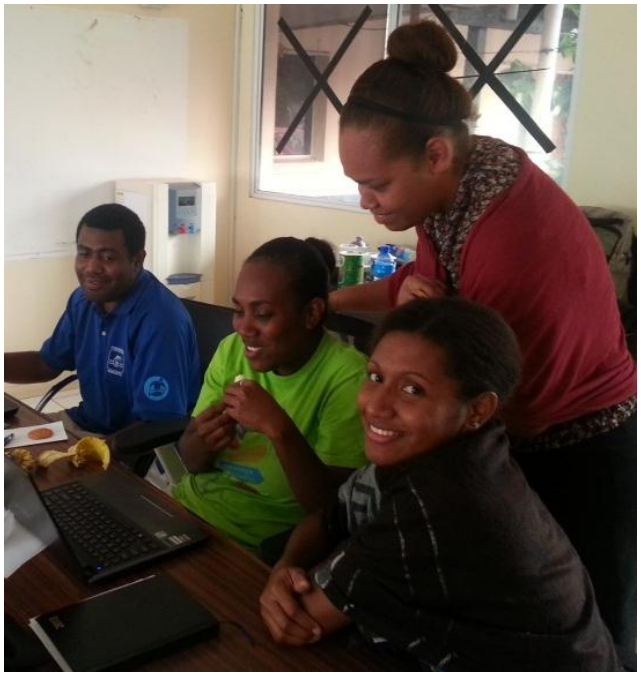


Photo 9: Data quality training, Port Vila, Vanuatu, October 2014. Credit: Andrew Hunt

3. Difficulties encountered and changes made

3.1. Project challenges and changes implemented

Challenges	Response / changes implemented
Project delays, staff recruitment and administrative challenges	
While the project agreement began in April 2010, project activities really commenced in July 2010 due to time spent on project start-up, including securing the first transfer of funds and staff recruitment. As such, the estimated expenditure of the year 1 budget used was only 34% (not including December expenditure).	Given this delay, planned activities not completed in 2010 were deferred to 2011, with the project progressing well in subsequent years. The end of the project was initially planned for 3/03/2014. An extension of the implementation period to the 3/09/2015 was approved by the EU with an additional budget of €578,000 for the Year 5 work plan. Amendments also increased targets for project outputs.
Difficulties filling the positions of bioeconomic modellers, both at SPC and FFA caused delays for the national tuna fishery status reports in the second year of the project (2011).	Subsequent advances implemented for streamlining and automating national reports through statistics programming and country specific webpages meant that project still exceeded expectations in this area.
In early 2012 the Fisheries Scientist (National Scientific Support) resigned and the position was vacant for five months due to difficulties in recruiting staff for a very specific technical position.	A consultant was engaged to ensure that all of the national-level technical work was undertaken, however, it was not possible to complete all the planned capacity building activities (e.g. attachments), with the remainder being deferred to 2013.
In 2013, delays in receiving notification of the project extension caused considerable uncertainty for project staff and three staff members resigned to take new roles (two within SPC and one with another regional agency). Delays in recruiting replacement Scientists meant that activities were delayed, and additional recruitment costs and pressures placed on remaining project staff and project management.	As a consequence SPC needed to recruit three new staff mid-way through the project. No stock assessment and training workshop was conducted in 2014 due to staff positions being vacant. A new Finfish Scientist was recruited in 2014, with delayed market and creel survey work subsequently completed, or continued with DFAT funding in the case of the survey manual.
A change in the EU financial requirements late in the project in 2014 affected the drawdown of funding, as this now can only be done based on having audit reports to show threshold expenditure has been reached. This has created a cash-flow problem and the need for additional audits to be undertaken.	Given the new requirements an audit was scheduled once the threshold percentages of expenditure were reached. The audit report was provided to the EU and this allowed the release of funding for the final year.
Staff resource allocation	
Resources allocated through the project for the provision of training and other technical support for sub-regional and national observer programmes were insufficient for the planned workload. Throughout the project, staff working in this area were significantly stretched.	In 2011, three additional staff were recruited through funded by the New Zealand Aid Programme. The schedule for training and other technical support fully utilised all human resources, including these three additional staff. One of the observer trainers funded through the

Challenges	Response / changes implemented
	New Zealand Aid Programme also assisted to complete 14 observer training courses after the Observer Training and Support Officer (North Pacific) completed his contract in September 2013.
In 2014 the EU Delegation in Suva expressed concerns about the sustainability of activities and services provided under the project following the project conclusion, as all coastal fisheries scientists and information managers were project funded.	This has now been rectified with the reallocation of Australian project funding to "core" funding arrangements through DFAT allowing the positions of a coastal fisheries scientist and information and database manager, to continue the work started under the SciCOFish project.
Resources and infrastructure in member countries	
In some of the countries where capacity development has taken place, especially for sea cucumber surveys, the countries themselves lacked the human and financial resources, to carry on the work. This hindered the progression from training, to ongoing data collection, to management measures.	In order to minimise the impact of capacity, in-country training targeted 5-10 staff to share the load and capacity of data collection. Bringing staff on attachment training to SPC in Noumea, also provided the space and time for these staff to focus on analysis and translating scientific evidence into management measures. Staff resources continues to be a challenge in some countries.
Micro-servers were installed in all 15 ACPs to address data storage needs. Lack of bandwidth for internet access has restricted the project's ability to maintain these remotely in many of the countries.	Additional in-country visits were required to support server maintenance. Internet connectivity continues to improve, further enabling remote maintenance. The mini-servers seem to work better in those countries where an IT technician is available. Ongoing server support will be provided through DFAT funding.
Technology is evolving quickly and will make data acquisition and management more efficient via "E-Reporting". While the technology currently exists to implement "E-Reporting" on a broad scale, progress is hindered by uncertainty in areas such as capacity development and resource needs, fundamental legislation updates and political will.	SPC continued to support traditional data management and reporting, as well as exploring the application of new technologies. E-monitoring and e-reporting trials will continue following the conclusion of the project.
Adoption of scientific advice provided	
The adoption of scientific advice provided through the project varied. There were key instances where SPC advice was not adopted, or not adopted in full, limiting the extent to which the project could contribute to the overall objective of conservation and sustainable use of coastal and oceanic fisheries resources in the P-ACP region. These included the WCPFC Conservation and Management Measures for bigeye and yellowfin tuna, and sea cucumber management measures in the Solomon Islands and Vanuatu.	This is an ongoing challenge at regional, national and sub-national levels. Through the project SPC has increased effort spent on engaging decision-makers and managers throughout the process of translating scientific advice to management measures. In addition, in response to delays in enacting management measures at the country level, timeframes were adjusted to allow flexibility in timing and processes for countries to adopt coastal fisheries management measures. The continuation of staff positions through DFAT funding further enables ongoing follow-up.

Challenges	Response / changes implemented
Responding to member requests	
The need to be more adaptive to respond to countries' requests as their needs continue to evolve was identified as a challenge early in the project, particularly with respect to data obligations as members to the WCPFC.	The development of a web reporting tool 'Dorado' in 2014-2015 enables countries to generate their own reports wherever they have internet access. This new web-based reporting tool provides a comprehensive suite of reports that covers both national and regional reporting requirements and further enabled member countries to meet ever-expanding WCPFC reporting requirements prior in 2015.
SPC received many requests for assistance with sea cucumber surveys and management advice through the project.	Given limited staff resources this meant the project had to ask some countries to wait for assistance due to limited capacity within the project. Most of the backlog of formal reports to countries with the analysis of data, results and management advice was cleared in 2014 and all reports (except one) were completed by end 2015.
In 2010 and 2011 there were very few requests for finfish underwater visual census (UVC) training as many countries are moving to other, less expensive and less time consuming survey methods.	Given the lack of interest from countries for finfish UVC (underwater visual census) surveys the project changed focus to creel surveys in 2012, and in 2013 it was decided to cancel the production of a revised UVC manual. In 2012, biological sampling protocols were added to data collection activities for coastal finfish species with growing interest within countries for assistance and training in biological sampling.
Prioritisation	
Over commitment of project staff time to in-country activities and capacity building has not allowed time for the progression of manuals of survey methodologies, particularly given the time required to write, test methods and complete the publication process for manuals.	In-country work was prioritised, with the work on the manuals deferred. The invertebrates manual was published in 2014, and the market and creel survey manual was drafted and trialled in 2012 and scheduled for publication in 2016.
During the trialling of the market and creel survey in 2012, it was identified that member country counterparts had some difficulty in species identification, thus limiting capacity for survey work.	The field testing of the market and creel survey manual was completed in 2012, with some modifications needed to the draft manual as well as the decision to develop species identification sheets to complement the manual. With the added resource of identification sheets for about 300 species, the manual will now be published in 2016 (with co-funding from Australia DFAT).
Regional collaboration with WCPFC	
In 2013, the WCPFC reduced the frequency of the main tuna stock assessments and replaced some of these assessments with work on important billfish and shark species (Southwest Pacific Ocean striped marlin and swordfish, and oceanic whitetip and silky sharks).	SPC uses existing tuna assessments in the evaluation of management options to support the WCPFC's consideration of conservation and management measures in years where assessments are not completed.
The decision by WCPFC to delay the tropical tuna	This work was consequently deferred to 2014 with

Challenges	Response / changes implemented
stock assessments until 2014 delayed the completion of a regional bioeconomic model for the tropical longline and purse seine fisheries.	completion 2015. In the interim SPC established relationships with others in the region to share economic information for the key fleets. This delay provided time for the development of a southern longline bioeconomic model based on the 2012 South Pacific albacore assessment.

3.2.Additional changes implemented following mid-term evaluation

Mid-term eval. recommendations for SPC	Response / changes implemented
All efforts should be made to extend the key staff positions until the formal term of the project. This concerns especially the staff positions for which funding is to run out in their respective budget lines before the end of the project, namely the observer programme coordinator (Component 1) and the chief scientist (Component 2).	This has since been addressed through a new partnership agreement between SPC and the Australian Government (DFAT) to reallocate project funding to 'core' programme funding arrangements. Positions from the SciCOFish project which are now funded through DFAT core programme funding are: • Observer Support and Development Coordinator • Observer Training and Support Officer • Fisheries Information Technology Officer • Coastal Fisheries Scientist (Finfish) • Reef Fisheries Information Manager Positions continued under alternative project funding (via either World Bank or GEF) are: • Fisheries Scientist (Bioeconomic Modeling) • Fisheries Data Audit Officer • Fisheries Scientist (National Scientific Support).
Funds and EDF rules permitting, Component 2 should assess the possibility of hiring short-term TA under a long-term contract (from as soon as possible until the end of the project) in order to boost the staff resources available to the secondary data collection activity that is falling behind schedule.	The granting of the project extension with over-run funding allowed a coastal fisheries finfish scientist to be recruited in the second quarter of 2014 for the last 12 months of the project, which negated the need for short term TA. Through this work, along with contract extension of this position through DFAT funding, activities under delayed activities under Component 2 were undertaken. These included capacity development in covering creel survey methodologies, data entry and analysis, and biological sampling for both aging of some fish species and connectivity of fish stocks.
From a perspective of the EU moving to programme support, should the Final Evaluation of SCICOFISH not only look at SCICOFISH achievements, but the Final Evaluation should then become an expanded EDF/SPC final evaluation of the entire family of EDF-funded projects that have provided the SPC with support in related fisheries domains since 2002. That FE should cover the PROCFISH , SCIFISH, both DEVFISH and the SCICOFISH initiatives – and provide an	This is planned to occur in 2016.

Mid-term eval. recommendations for SPC	Response / changes implemented
encompassing closing picture of what these often overlapping projects have achieved overall. A relevant point in time to conduct such an encompassing FE would be 2015.	
As observer numbers start to reach levels sufficient to respond to the requirements of the WCPFC, observer work should start to focus more on the training of trainers, on facilitating the accreditation of national training centres (working for the region), and in assisting countries in the management (logistics) of running observer programmes – hand in hand with its FFA partner programmes.	With 586 newly trained and certified observers during 2000–2013, the need for the scale of observer training was revisited. In 2014, observer training was scaled back with 62 newly trained and certified observers, compared to an average of 146 per annum in previous years. The on-the-job training of trainee debriefers was hampered by the lack of certified debriefers, therefore SPC took a more active role in on-the-job training and 7 trainees were recommended for certification by the end of the year.
Bio-economic analysis is highly appreciated by countries. The MTE feels that its impact would be further increased if the economic aspects inherent to the modelling would expand beyond value aspects of the resources caught, and factor in revenue streams to governments (licensing and agreements) and benefits accruing to national economies (port services, observer programmes, employment, processing and exports, etc.) – as well as operational costs of fleets. This would greatly enhance the strategic value of the modelling outcomes for national decision-making.	Work in bio-economic analysis has been further progressed through collaboration with FFA to include fishing costs, fish prices and other parameters so as to estimate total resource rent (fishery profitability), which is the main metric that controls the level of access fees that can be charged by coastal states. However, it is beyond the scope of SPC to investigate economic benefits such as employment and exports in relation to oceanic fisheries as this is work that is carried out by FFA and published annually in their Economic Indicators Report.

4. Project support

4.1. Information and communications

The visibility of the project has been supported through a number of communications and information activities. These include designated SciCOFish webpages, 46 media articles, the publication of national monitoring reports, contributions to 11 editions SPC Fisheries Newsletter, and the development of information resources (information sheets, posters, brochures, manuals, guidebooklets and videos), with the European Union being identified as the project funder. Key links:

- Project information - http://www.spc.int/fame/en/projects/scicofish/results
- Project documents - http://www.spc.int/fame/en/projects/scicofish/documents
- Media coverage - http://www.spc.int/fame/en/projects/scicofish/about-scicofish/in-the-news

The meeting of the Project Steering Committee was held annually throughout the project to give an overview of the SciCOFish Project and its expected results, to advise members on the activities for the follow year, and to receive guidance from countries to identify the priorities for the work programme. Steering committee meeting reports are available on the SciCoFish documents webpage (http://www.spc.int/fame/en/projects/scicofish/documents).

The images below provide some examples of the information products and written outputs produced through the SciCOFish project.

Image 1: Selection of finfish and invertebrate information sheets published. Available in English and translated into Portuguese for Timor Leste.

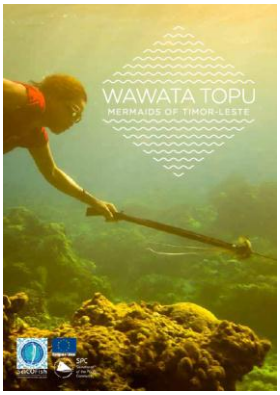


Image 2: Video documentary produced "Mermaids of Timor Leste", 2013

Image 3: Promotion of fisheries observer as a career for men and women, 2013

Image 4: Promotion of careers in the tuna industry for men and women, 2014

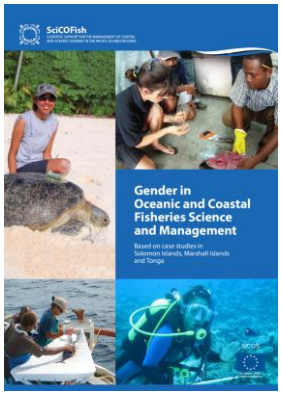


Image 5: Results of gender analysis published, 2011

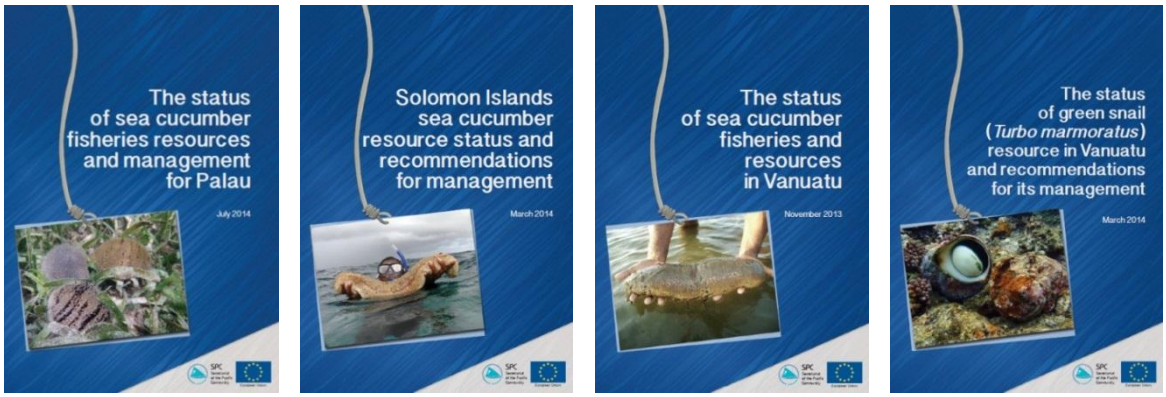


Image 6: Selection of marine invertebrate reports

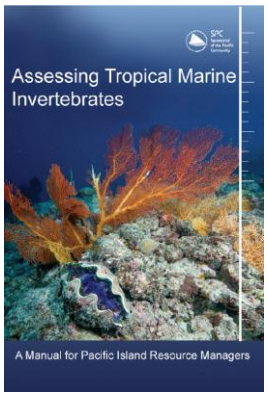


Image 7: Manual for assessing tropical marine invertebrates, 2014

Image 8: Mangrove community information sheet, 2014

Image 9: Purse Seine observer training videos produced, 2014

Image 10: Banner from the launch of information sheets in Timor Leste, 2012. Image: European Union Delegation in Timor Leste

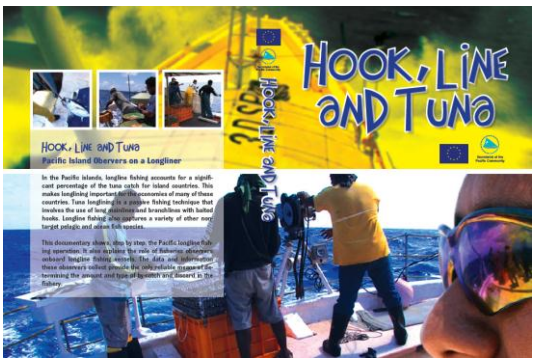


Image 11: Video produced 'Hook, Line and Tuna' showing Pacific Island Observers on a longline vessel, 2012

4.2.Human resources

The project involved the recruitment of 13 positions to implement project activities, with these positions fully funded by the project. The SciCOFish project also covered 50% of a Project Administrator position in the Coastal Fisheries Science and Management Section. Of these 14 positions, nine experienced no staff turnover for the duration of the project. As identified in Section 3.1 on project challenges, some positions were difficult to recruit, and staff turnover was experienced in others due to funding uncertainty. The table below identifies the human resources involved in SciCOFish.

Table 3: Human resources across the SciCOFish project by position

	2010			2011				2012				2013				2014				2015			
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Fisheries Information Technology Officer						Fabrice Bouyé (start 01.06.2011)																	
Fisheries Scientist (bioeconomic modeling							Aaron Berger (start 18.10.11)										Alex Tidd (start 07.04.14)						
Fisheries Economist (bioeconomic modeling) at FFA						Roseti Imo (start 01.07.2011)																	
Fisheries Scientist (national scientific support)				Ashley Williams (start 13.09.10)						Tim Adams (start 01.08.2012)						Steven Hare (start 15.03.14)							
Fisheries Scientist (ecosystem modeling)					Jesus Jurado Molina (start 06.02.11)																		
Fisheries Data Audit Officer				Bruno Deprez (02.12.10)												Andrew Hunt (start 01.03.14)							
Observer Support and Development Coordinator					Peter Sharples (01.01.11)												Timothy Park (sta						
Observer Training and Support Officer (Nth Pac)				Manasseh Avicks (start 13.09.10)																			
Observer Training and Support Officer						Siosifa Fukofuka (start 01.07.11)																	
Reef Fisheries Information Manager		Franck Magron (start 16.08.10)																					
Fisheries Scientist (finfish)		Being Yeeting (start 01.07.10)															Bradley Moore (14.04.14)						
Fisheries Scientist (invertebrates)		Kalo Pakoa (start 27.08.10)																					
Project Admin. & Communications Officer		Anne Lefeuvre (start 01.07.10)																					
Project Administrator (CF Sci & Man) – 0.5FTE	Marie-Therese Bui																						

Key: Position filled and funded under SciCOFish Contract completed Position continued under alternative funding

5. Review of progress and performance by year

The following description of activities presents the overall results of SciCOFish project, against the performance indicators for the overall objective, project purpose, and activities. The second column summarises the overall results, with a status assessment of whether the performance indicator was achieved or not achieved, as well as whether ongoing work towards the result area was being continued under alternative project funding following the closure of the SciCOFish project. The remaining columns show the progress against the performance indicator for each year of the project. Progress for 2010-2014 were included in previous annual reporting, with 2015 progress being added for this terminal report.

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
OVERALL OBJECTIVE: CONSERVATION AND SUSTAINABLE USE OF COASTAL AND OCEANIC FISHERIES RESOURCES IN THE PACIFIC ISLANDS REGION							
Effort on yellowfin and bigeye tuna reduced to at least the level required to reach Fmsy (the fishing mortality associate with the maximum sustainable yield) or lower, for both species	**NOT ACHIEVED** **While fishing levels approximately align with that allowed by the WCPFC Conservation and Management Measure (CMM) 2014-01, the continuation of these measures are unlikely to reduce bigeye tuna fishing mortality to a**	Yellowfin tuna in the overall WCPFC area is currently estimated to be fished at levels less than MSY. However, there are concerns that exploitation rates may be too high in the equatorial zone, where most of the catch is taken. For bigeye tuna, fishing mortality continues to exceed MSY levels by approximately 50%, and reductions have been recommended on the basis of the assessment. New	Overall, effort on yellowfin tuna remains within overfishing benchmarks (related to the achievement of MSY). However, in the western equatorial region where the majority of exploitation occurs, the stock is considered to be fully exploited. For bigeye tuna, overfishing continues to occur, with the average fishing mortality in recent years (2006-2009) being about 40% above MSY levels. In 2010, there was a	While no new assessments were undertaken for bigeye and yellowfin tuna in 2012, there were some concerning fishery developments. Purse seine effort continues to increase – especially in the waters of SPC members, and longline effort is increasing through the entry of new vessels (mostly targeting albacore at this stage). A new conservation and management measure The new	Purse seine fishing effort continues to increase and 2013 is shaping as a record high. The 2012 purse seine catch was a record, with a large increase in the catch of yellowfin tuna in particular. Efforts to develop a new Conservation and Management Measure (CMM) for tropical tunas within WCPFC have proved difficult, with the measure agreed in Dec 2013 unlikely to effectively address the issue of	The estimated total catch of the four main target tuna species was approximately 2.6 million mt in 2013. New stock assessments for yellowfin and bigeye tuna estimate: yellowfin spawning biomass has declined to 38% of the average 2002-2011 unexploited level, which is above the limit reference point of 20% and fishing mortality remains beneath the level providing the maximum sustainable yield; and bigeye tuna spawning biomass is estimated to have declined to 16% of	The total tuna catch in 2014 increased to an estimated 2.8 million mt, with record high catches of skipjack and for the purse seine fishery. A new stock assessment for South Pacific albacore was conducted, incorporating new information on age and growth. The assessment indicates that the current spawning biomass has been reduced to about 40% of the unexploited level, and that fishing at

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
	level consistent with MSY. [7]	yellowfin and bigeye assessments will be undertaken by SPC in 2011.	considerable reduction in fishing mortality, but it remains to be seen if this reduction will be sustained. Skipjack and South Pacific albacore remain in good condition, however recent increases in catch have results in catches now being close to MSY levels, and therefore restraint is now required in the fisheries for these stocks as well.	assessment for south Pacific albacore indicated that catches are close to the MSY level and projections indicated that these higher catches could have negative impacts on domestic longline fisheries that are dependent on albacore tuna. The Pacific Island countries and Territories were unable to agree on a proposal for improved management of south pacific albacore to bring to WCPFC in 2012.	bigeye tuna overfishing. While FFA members proposed a new CMM for the management of the South Pacific albacore fishery, WCPFC was unable to adopt a CMM largely because one member does not want their current effort expansion to be curtailed.	the average 2002-2011 unexploited level, and has breached the agreed limit reference point of 20% and fishing mortality remains well above the MSY level. Conservation and Management Measure (CMM2013-01) is predicted to result in reduced fishing mortality for bigeye tuna to around Fmsy by 2017. This expectation may be compromised by the increasing number of purse seine vessels operating in the fishery (~300, excluding domestic vessels in Philippines and Indonesia). Moreover the tonnage of 80 new purse seiners currently being	current levels will have a 20% chance of breaching the limit reference point (20% of unfished spawning biomass). A new evaluation was conducted on CMM 2014-01 (Tropical Tunas), which has concluded that while levels of fishing have occurred approximately as allowed by the CMM, the continuation of the measures is unlikely to achieve the objectives of the CMM, to reduce bigeye tuna fishing mortality to a level consistent with MSY and to rebuild the stock to a safe level above the limit reference

[7] The overall objective is a long-term regional impact that the work of SPC FAME is contributing to. As identified, the project purpose was to provide a reliable and improved scientific basis for management and decision-making in oceanic and coastal fisheries. The uptake of this advice, and the resulting impact on reducing the gap between fishing mortality and MSY levels, is certainly a long-term endeavour well beyond the 5 year project period.

The close involvement of FFA throughout the SciCOFish project has assisted FFA members to be in a better position to understand and utilise the scientific information provided to inform regional discussions and decision making. It was felt that this close involvement was a positive lesson from the SciCOFish project. The bioeconomic modelling and resulting national advice provided through the project was another positive development, with countries now better able to make informed decisions on optimal economic return versus sustainable management, with two instances where this advice has resulted in countries reducing the number of licences permitted (Fiji and Solomon Islands).

Management action is largely subject to agreement at WCPFC, and is not something that SPC controls directly. WCPFC was not able to reach agreement on strengthening the tropical tuna measure at WCPFC 12, but efforts will continue through 2016. Given the challenges in relation to the utilising of scientific advice in management decisions, FAME continues to explore how the uptake of scientific analysis and resulting advice can be further facilitated in decision-making across the region. This may also be an area that could be further explored through the final project evaluation.

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
						built is in excess of the tonnage of vessels to be replaced. This excess is equivalent to approximately 40 new vessels.	point.
Tuna discards by purse seiners reduced to less than 1% of catch (<12,000 t) confirmed by 100% observer coverage	**NOT ACHIEVED** **Estimated tuna discard of purse seine vessels varied during the project. The target of 1% was achieved in 2013, however, this increased to 3% in 2014. In contrast, the rate of longline discards was 0.4% in 2014, the lowest level since 1995.**	Observer coverage for 2010 is believed to be close to 100%; however, data flows to SPC and data processing have been slowed by lack of resources both in-country and at SPC. This has largely been rectified by the 2011 WCPFC budget and rapid data assimilation in 2011 is expected. Estimates of by-catch and discards will be produced for SC7 in August 2011.	Estimates of tuna discards by purse seiners were reported to the WCPFC Scientific Committee in 2011. For 2010, the tuna discard rate was 1.6%, a record low and significant reduction of the historical average of 3.2%. This reduction was achieved because of new WCPFC and PNA regulations regarding tuna discarding, which became effective in January 2010.	The discards of small tuna by purse seine vessels fell to 1.3% of total catch, nearly reaching the 1% target.	Estimated tuna discards by purse seiners in 2012 is estimated to have been 1.3% of the total tuna catch, equivalent to the 2011 estimate and the lowest level recorded.	During 2013, the estimated tuna discard on purse seine vessels was 1%, the lowest rate since 1995. The average tuna discard rate for 1995-2015 was 2.6%.	During 2014, the estimated tuna discard on purse seine vessels was 3%, compared to the average tuna discard rate for 1995-2014 of 2.5%. This was the highest discard rate estimated since 2005. For longline, the estimated discard rate was 0.4% (1995-2014 average 2.1%), the lowest level seen since 1995
At least some management measures adopted in each of 6 coastal areas with measureable signs of recovery observed in	**ACHIEVED** **New management measures were adopted in 8 countries due to advice provided through the SciCOFish project.**	Baseline data being collected in Tonga for trochus and beche-de-mer	Ongoing monitoring activities for sea cucumber resources in Solomon Islands, Vanuatu and Marshall islands, with locally trained staff undertaking the monitoring. Monitoring in Vanuatu and Solomon Islands is	Monitoring has commenced for sea cucumbers in Cook Islands, Palau, Samoa and Fiji and it is expected that sufficient data will be collected by early 2014 to allow an assessment to be undertaken and	Management advice provided to several countries, however, both Solomon Islands and Vanuatu have opened their sea cucumber fisheries with some management in place, however, it is believed that stocks are too low	Through the project, management advice continues to be given to countries for sea cucumber fisheries, yet some of this advice is ignored as a result of political pressure to open or not close the fishery even when stocks are severely depleted. Other	Sea cucumber fishery management plan was completed for Samoa and endorsed by Minister of Agriculture and Fisheries Aquarium Fishery management regulations was approved by the Marshall Islands Marine

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
baseline monitoring (indicators to be established under this project)[3]	**Specifically:** **• Sea cucumber management measures in Marshall Islands, Vanuatu, Solomon Islands, FSM (Pohnpei), and Samoa, with advice acted on in Tonga** **• Coconut crab management measures in Niue** **• Recreational bone fish management plan in Cook Islands** **• Overall coastal fishery management plans adopted in Samoa.** **ONGOING** **While monitoring has been established it is too early to observe impact of measures on**		to assess if the current moratorium in these two countries for sea cucumbers can be lifted once suitable management arrangements are in place.	appropriate management arrangements to be developed. Data collection and monitoring has commenced in Tonga, Nauru, Pohnpei FSM and Fiji for finfish through a creel survey, interviewing fishers at the port when they return from fishing. In early 2014 the first of this data will be analysed for management purposes.	to sustain fishing pressure for any length of time.	countries are following the advice to allow stocks to rebuild, although this will be a long (3 to 10 year) process in some countries. A coastal fishery management plan was developed for Kiribati as well as a sea cucumber management plan for Fiji. In the Fiji case, there was extensive stakeholder consultations held as well. Indicators or regional reference densities for healthy sea cucumber stocks have been established as well as for several other invertebrate species. These have been published in the "Assessing Tropical Marine Invertebrates – a manual for Pacific Island resource managers" survey manual, page 41 for sea cucumbers and in Appendix 4 for other selected invertebrate species.	Resources Authority board Solomon Islands sea cucumber plan was approved early 2015 Compliance with Marshall Islands sea cucumber regulations 2012, needs improvement. MCS training workshop was conducted in July 2015 Kiribati coastal fisheries management plan and draft regulation was presented by MFMRD to several islands councils in Kiribati Management measure (ban of exports) for coconut crab passed by Cabinet in Niue in 2015

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
	recovery[1]						
<u>PROJECT PURPOSE:</u> TO PROVIDE A RELIABLE AND IMPROVED SCIENTIFIC BASIS FOR MANAGEMENT ADVICE AND DECISION MAKING IN OCEANIC AND COASTAL FISHERIES							
100% of project stock assessment results for 4 main tuna species accepted by WCPFC Scientific Committee and forwarded to full Commission for decision-making	**ACHIEVED** **All tuna stock assessments presented to annual WCPFC Scientific Committees were accepted and forwarded to the full Commission for decision-making.**	Skipjack and bigeye stock assessments presented in 2010 were accepted by SC6 and subsequently by the WCPFC. A peer review of the 2009 yellowfin assessment found that assessment to be at the leading edge of international best practice.	Regional assessments were conducted for skipjack, yellowfin, bigeye and South Pacific albacore in 2011 and presented to the WCPFC SC8 meeting in August. SC8 used the results of all assessments in formulating its scientific advice to WCPFC.	At the request of WCPFC, regional stock assessments were completed for south Pacific albacore, southwest Pacific striped marlin, oceanic whitetip shark, and silky sharks. The first three were accepted by WCPFC, while further work was requested on silky sharks and this has been completed and will be presented in 2013. Work commenced on an assessment for southwest Pacific swordfish and this will be completed in 2013.	No new tuna stock assessments were presented to the 2013 WCPFC Scientific Committee. However, final assessments for South Pacific swordfish, South Pacific striped marlin and silky shark were presented and accepted. An assessment for North Pacific blue shark is being updated with new catch-per-unit-effort information and will be re-presented to the Scientific Committee in 2014.	Stock assessments for bigeye, yellowfin and skipjack tuna were accepted by the WCPF Commission and used as the basis for forming management advice for these three tuna species. In addition a stock assessment for blue shark in the north Pacific was completed to advise fishing nations and authorities on the conservation status of this stock. A trend analyses for the south Pacific albacore longline fishery was used to assist with management advice in the absence of a stock assessment for this species in 2014. An evaluation was undertaken to estimate the risks of exceeding limit reference points for south Pacific albacore. The results of this work have implications for the setting of target reference points with fishing	A new assessment of South Pacific albacore was presented to the WCPFC Scientific Committee in 2015. The assessment was accepted and formed the basis of management advice provided to the Commission by the SC.

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
						mortality rates well below Fmsy and spawning biomass levels over double those at SBmsy needed to satisfy industry standard risk profiles.	
Observer coverage rates reach regionally-agreed levels by 2012 (100% for purse seine vessels) and 5% on domestic long-line fleets by 2013 with no decrease in data quality	**UNCLEAR** **Observer coverage of purse seine vessels was 75% in 2012. However, this figure is based on observer data provided and not actual observer placements which is expected to be 100%; improving the monitoring of observer placements coverage is required.** **ACHIEVED** **No decrease in data quality.** **E-monitoring trials began through this**	Purse seine observer coverage in 2009 was currently 13.4%, similar to previous years. This is likely to further increase as data back logs are cleared, and will of course increase greatly in 2010 when the 100% coverage becomes a full-time measure.	Observer coverage of purse seiners in 2010 is believed to have been close to 100%; however, delays in data transmission and limited resources for data processing have meant that the coverage of processed data available at SPC is in the region of 50% as of December 2011. This is considerably higher than coverage rates (around 10%) prior to 2010, and is expected to increase as further observer reports are submitted.	Focus on data processing in order to assess rates of observer coverage.	Purse seine observer coverage rates in 2010, 2011 and 2012 were 84%, 79% and 88%, respectively. Observer data currently received by SPC represents 80%, 71% and 61%, respectively, of all trips. More data are expected to be received, particularly for 2012.	From available information, purse seine observer coverage rates in 2010, 2011, 2012 and 2013 were 84%, 78%, 84% and 76%, respectively. Observer data currently received by SPC represents 92%, 82%, 75% and 63%, respectively, of all trips. More data are expected to be received. E-monitoring trials have started as an approach to assist with reaching observer coverage targets (particularly for long-line vessels where observer placement is logistically difficult).	Purse seine observer data received and processed by SPC for 2011, 2012, 2013 and 2014 represents 82%, 75%, 76% and 73% coverage, respectively, of all trips. More data are expected to be received. E-Reporting and E-monitoring trials continued and are expected to assist with reaching observer coverage targets.

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
	project, with this having the potential to further increase observer coverage.						
At least 6 P-ACP countries adopt coastal fisheries management measures in line with project recommendations [3]	**ACHIEVED** **8 P-ACP countries have adopted coastal fisheries management measures recommended by the project. These being Marshall Islands, Vanuatu, Samoa, Solomon Islands, Cook Islands, Pohnpei FSM, Niue and Tonga.**	Working with both Tonga (inverts) and Pohnpei, FSM (finfish) on management advice	Management advice to close the sea cucumber fishery in Tonga turned down by Minister with a reduced quota implemented, although government is reconsidering the advice and may close the fishery in 2012 given the current quota is not catchable. Management plan for sea cucumber fishery in Marshall Islands being finalised as part of a fisheries bill with the projects providing assistance and advice. Management advice and recommendations to be provided to Vanuatu and Solomon Islands once sufficient data is collected and analysed.	Management advice for Solomons and Vanuatu accepted by governments and each country has retained their moratorium for another 3 years. The sea cucumber management plan for the Marshall Islands has finally passed through all process and has become law. Management advice and recommendations will be provided to Cooks, Palau, Samoa and Fiji once sufficient data has been collected in-country ready for analysis.	Management advice for Samoa, Cook Islands and Pohnpei, FSM has been accepted by government and appropriate management measures are now being put in place. Roadmap for inshore fisheries management and sustainable development produced for the Melanesian Spearhead Group with national implementation plans being developed for action in 2014. Niue National coastal fisheries management and development plan (2014–2018) developed with stakeholder participation.	Sea cucumbers fisheries remain a focal area for management in the region; however, countries are now looking at other invertebrate species as well. Management advice was provided to Samoa for their Trochus fishery, Kiribati for their anadara fishery at Abaiang, and Niue for their coconut crab fishery. There is a growing interest in data collection using creels surveys and biological sampling to get more fishery dependent data on finfish stocks on which to base management measures. In 2014, Tonga, Palau and PNG received training in these methodologies using the manual (in final draft form at present) developed by the project.	Sea cucumber plans approved for Samoa and Solomon Islands Aquarium fish management plan approved for Marshall Islands.
RESULT 1: P-ACP GOVERNMENTS, THE FFA AND THE WCPFC ARE PROVIDED WITH SCIENTIFIC DATA, MODELLING, AND ADVICE TO UNDERPIN THEIR							

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
MANAGEMENT DECISION MAKING AND STRATEGIC POSITIONING							
1.1. OBSERVER TRAINING							
350 observers trained, 10 observer trainers and 70 observer debriefers operational[4]	**ACHIEVED** **670 observers trained** **13 operational observer trainers** **52 operational observer debriefers from P-ACP countries.** **BROADER CONTEXT** **Among all SPC members there are now approx. 800 active observers, 41 certified debriefers, 93 trainee debriefers, and 13 national observer trainers**	Basic observer course for all gears in FSM (11/10 to 12/11) for FSM; Marshall Islands, Mauru and Palau: **14 observers** and 2 observer trainers trained Assistance for basic observer course for all gears in PNG (1/11 to 26/11) "Mini" ROCW in Cairns (22-24/07) Footage for production of training tool, a purse-seine observer training video.	Ten observer courses in Samoa (Feb), FSM (Mar), Fiji (Apr), FSM (Apr-May), Solomon Islands (Jun), Kiribati (Aug), Kiribati (Aug-Sep), Kiribati (Sep), Marshall Islands (Oct-Nov), Vanuatu (Nov). A total of **139 observers** were trained from the countries listed above and from Cook Islands, Nauru, Palau, Tonga and Tuvalu. Assistance was also provided for two nationally-run observer courses in PNG (Apr and Oct-Nov) and one course in Kiribati (May-Jun). **Eight observer trainers** were trained, from FSM, Kiribati, Marshall Islands, PNG and Solomon Islands. An observer trainers workshop was held in Noumea in Jul-Aug; seven trainee trainers from these countries attended.	Fourteen observer courses in Cook Islands (Jan), PNG (Mar-Apr), FSM (Apr), Fiji (May-Jun), Solomons (Jun), Solomons (Jul), Vanuatu (Jul-Aug), PNG (Jul), Fiji (Sep-Oct), Marshalls (Sep-Oct), Kiribati (Oct-Nov), PNG (Nov), Kiribati (Nov), Vanuatu (Nov-Dec). A total of **198 observers** were trained from the countries listed above and from Cook Islands, Nauru, Palau, Tokelau, Tonga and Tuvalu. **Six observer trainers** were trained, from FSM, Kiribati, Marshalls, PNG and Solomons. An observer trainers workshop was held in Noumea in August; eight trainers and trainee trainers from these countries attended.	Twelve observer courses in PNG (Mar), Tuvalu (Mar), Kiribati (Apr), Marshalls (Apr, Aug), Fiji (May, Sep), Tonga (Jun), FSM (Jul, Nov), Solomons (Aug), Vanuatu (Aug). A total of **154 observers** were trained from the countries listed above and from Cook Islands, Nauru, Palau, Tokelau and Tuvalu. **Ten observer trainers** progressed in their training, from FSM, Fiji, Kiribati, Marshalls, Nauru, PNG and Solomons. Observer trainers workshops were held in Pohnpei in March and Noumea in July. Four debriefer workshops in FSM (May), PNG (Jun), and the Solomons (Aug, Oct); 42 debriefers were trained from FSM, Fiji, Kiribati, Marshalls, Nauru, PNG, Solomons,	Six observer training courses were held in Marshall Islands (May), Nauru (Jun), Solomon Islands (Jun-Jul), Tonga (Jul), Vanuatu (Aug-Sep) and Tuvalu (Nov-Dec). A total of **67 observers** were trained for the national observer programmes of the countries listed above and for Cook Islands, Fiji and Samoa, of which 62 were certified. **There are now eleven certified trainers**, from FSM (1), Kiribati (1), Nauru (1), PNG (5) and Solomon Islands (3). During 2014, two trainee trainers from FSM and Fiji did attachment training during four courses. Eleven trainers and trainee trainers from FSM, Fiji, Kiribati, Marshall Islands, Nauru, PNG and Solomon Islands attended the Regional Observer Trainers Workshop in Noumea in November. Five debriefer workshops were held in PNG (Feb,	Continuation of observer training for all P-ACP countries, coordinated by SPC, but with the training increasingly done by the newly-certified trainers. Organisation of 2015 ROCW. Production of training tools. Eight basic observer courses held in Marshall Islands (Feb), Tuvalu (April- May), Fiji, (June-July), Tonga (July), Solomon Islands (2 courses, June - August), Vanuatu (August- Sept.) and Kiribati (Nov.-Dec.). Two observer refresher training held in Vanuatu and Tarawa. A total of **98 observers** were trained for the national observer programmes of the countries listed above and for Cook Islands, Tokelau and Samoa, of which 93 were certified. Two observer trainee

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
			Two regional debriefer workshops were in Noumea (Mar) and FSM (Oct); 20 trainee debriefers attended from Cook Islands, FSM, Fiji, Kiribati, Marshall Islands, Nauru, Palau and PNG. Two "recognition of prior learning" work-shops were held in PNG (Aug and Dec); 24 trainee debriefers attended from PNG, FSM, Fiji, Solomon Islands and Tonga. A workshop on the training of debriefers was held in PNG (Nov). ROCW in Honiara (Jun). Work on a longline observer training video was initiated in Fiji (Oct); a longline trip was organised and shooting conducted.	Six debriefer workshops in PNG (Jan), PNG (Mar), Noumea (May), Solomons (Jun), Kiribati (Oct), PNG (Nov); 90 debriefers were trained from Cook Islands, Fiji, Kiribati, Marshalls, Nauru, PNG, Solomons, Tonga, Tuvalu and Vanuatu. ROCW in Tonga, Feb 13-17. A longline observer training video was completed. The first draft of a purse-seine observer guide was completed.	Tonga, Tuvalu and Vanuatu. ROCW in Cook Islands, Feb 11-15	Apr, May, Aug) and Fiji (Sep); 87 trainees from Fiji, Kiribati, Marshalls, PNG, Samoa, Solomon Islands, Tonga and Vanuatu received introductory training. Following on-the-job training of debriefer trainees, seven trainees from FSM, PNG, Solomon Islands and Tuvalu were recommended for certification. The Regional Observer Coordinators Workshop was held in Noumea, Mar 10-14. A species ID guide for use by observers on purse seiners was completed. A purse-seine observer training video was completed.	trainers from Fiji and Nauru completed 6 attachments and are now certified PIRFO Observer trainers. Two Introduction to Debriefing Part A trainings were held in Honiara (June) and in Tarawa (Sept-October) - trainees from Tuvalu, Nauru, French Polynesia, Solomon Islands, Fiji, Kiribati and American Samoa, total of 23 trainee debriefers completed part A training. 18 debriefers certified in Kiribati, PNG and Tonga during 2015. The Regional Observer Coordinators Workshop was held in Noumea, Feb, 11-14. First draft of Species of Special Interest Identification cards completed.
1.2. INTEGRATED TUNA FISHERIES DATABASES							
National tuna fisheries databases operational in 15 P-ACPs	**ACHIEVED** **Tuna Fisheries Data Management System (TUFMAN**	Presentation of dataaudit workbooks for logsheet and port sampling systems Recruitment of the	The national Tuna Fisheries Data Management System (TUFMAN) was updated to version 6.13 by the end of the	The national Tuna Fisheries Data Management System (TUFMAN) was updated to version 6.22 by the end of the	The online, web-based VMS/Logsheet reconciliation system is fully operational and used daily by our	Latest version of the TUFMAN system (v6.40) has been installed in P-ACP countries. The TUFMAN web-based	The TUFMAN2 system is a complete redevelopment of the TUFMAN system and was deployed to four countries during the

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
Tuna data audits conducted for at least 10 P-ACPs **14 P-ACP's report data to WCPFC as per their obligations**	**or TUFMAN 2) installed in all P-ACP countries** **Data audits completed for 10 countries (22 total audits)** **13 out of 14 P-ACP countries met WCPFC reporting deadlines in 2015** **Web-based reporting tool 'Dorado' developed and used by countries for WCPFC reporting obligations**	data audit officer (December 2010) 4 national tuna data officers, from Kiribati, Tuvalu and Vanuatu attached to SPC HQ for training	year, with several new features implemented such as the VDS Management system. The latest version was distributed to all P-ACPs. Comprehensive Data audit tools developed including VMS-Logsheet coverage reporting. Two in-country audits conducted (FSM – March and Fiji – October), and one informal audit of TUFMAN data conducted at SPC/OFP (Solomon Islands TUFMAN). All P-ACPs submitted their 2010 data to the WCPFC before the 30th April 2011 deadline (see http://www.wcpfc.int/statprov).	year. Data audit tools developed including VMS-Logsheet coverage enhanced and well established. Initial work on data coverage though web-based version of the VMS-logsheet reconciliation. Initial work on electronic reporting which improves data quality by removing a s step in the data entry process. Five in-country audits conducted (Cook Islands, RMI, Palau, Solomon Islands, and Vanuatu). All but one of the P-ACPs submitted their 2011 data to the WCPFC before the 30th April 2012 deadline (see http://www.wcpfc.int/statprov).	member countries. Several new tests have been added to the regular audit process. 5 member countries visited this year (FSM, Palau, Fiji, Tuvalu, Kiribati) Support has been provided, especially in the generation of annual catch estimates.	reporting is fully operational and has been used by P-ACP's to produce the WCFPC Part 1 reports for the SC10 meeting (August 2014). The TUBS (Observer) web-based reporting tool is fully operational and was used by P-ACP's to respond to obligations for flag state WCPFC CMM reports and WCPFC Part 1 reports during 2014. All countries trained in using these new products during the Eighth Regional Tuna Data Workshop (April 2014), SPC attachments and in-country visits. Three in-country audits conducted during visits by SPC staff (FSM, Solomon Islands and RMI). Remote audits of 2013 data at SPC of the data from the TUFMAN databases of 8 countries. (Cook Islands, FSM, Fiji, Kiribati, Palau, RMI, Samoa, Vanuatu)	second half of 2015. This new system is cloud-based and allows for efficient data sharing amongst member countries (based on data-sharing rules). Development of data loaders to receive E-Reporting data from two independent systems. E-Reporting data from trials now regularly received and automatically loaded into regional tuna fisheries databases. Development of five new data loaders to import non-standard observer data from WCPFC member countries that do not use the SPC/FFA standard data collection forms, into the regional observer database. The Dorado web-based reporting is fully operational and covers reporting of logsheet, port sampling, unloadings and observer data. This reporting system was used by P-ACP's to

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
							produce the WCFPC Part 1 reports for the SC11 meeting (August 2015), and respond to flag-state CMM Reporting obligations which were evaluated in the lead-up to the TCC11 meeting (September 2015). All countries trained in using these new products during the Ninth Regional Tuna Data Workshop (TDW-9 - April 2015), SPC attachments and in-country visits. Remote audits of 2014 data at SPC of the data from the TUFMAN databases of 6 countries. (Cook Islands, FSM, Fiji, Kiribati, Samoa, Vanuatu)
1.3. BIOECONOMIC MODELING AND NATIONAL ADVICE							
10 region-wide stock assessments (RWSA) for key tuna species, using the latest updated data, provided to	**ACHIEVED** **10 region-wide stock assessments completed for key tuna species.** **Regional**	Samoan NTFSR completed, with national advice on stock assessment NTFSR in progress for 4 other ACP countries (Cook Islands, Solomon Islands, Kiribati and	4 stock assessments produced covering big eye, yellow fin, skipjack and south pacific albacore tunas. 1 regional tuna fishery status report produced. NTSFR done for	Four stock assessments were undertaken on for south Pacific albacore, southwest Pacific striped marlin, oceanic whitetip shark, and silky sharks. The first three were accepted	Revised stock assessment for silky shark completed, plus assessments for southwest Pacific swordfish, and north Pacific blue shark. WCPFC has delayed an assessment for	Eight ISNRs on the economic impacts of FAD closures on foreign and domestic purse seine fleets; and five ISNRs on oceanographic and climate impacts on longline catch rates of albacore, bigeye, and	The regional bioeconomic model has been updated and a comprehensive report on the application to the purse seine fishery is being prepared.[5]

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
decision-makers during 2010-2013 **1 regional and 10 national reports providing bioeconomic modelling advice**	**bioeconomic developed and updated.** **Multiple sets of Issue Specific National Reports (INSRs) completed for all countries (42 reports total).** **2 scientific papers written using bioeconomic modelling** **ONGOING** **Continued funding for bioeconomic modelling funded under World Bank**	Marshall Islands) 2 RWSA completed for bigeye and skipjack tuna A regional paper produced with FFA, with bioeconomic modelling advice for bigeye, yellowfin and skipjack tuna)	Solomon Islands, Cook Islands and initiated for Fiji including bio-economic modelling of long line fishery. 1 report late compared to the work plan due to late arrival of bioeconomic modeller and cut of fundings of another position planned to work also on NTSFR. Inventory of fishing cost information to be used for input in the regional model completed. Small database developed to provide a historical overview of changes in fishing costs from all sources cited. Development of a draft economic data form for purse seiners in the WCPFC completed. When the form is finalised it will be distributed to countries in the region that have domestic based purse seine fleets. For distant water fishing fleets, the form will be distributed based on contact information recorded	by WCPFC, while further work was requested on silky sharks and this has been completed and will be presented in 2013. One set of ISNRs on FAD closure impacts were completed for seven countries in early 2012 and then updated in the fourth quarter. Three other ISNR reports were initiated for completion in late 2012/early 2013 and all include socio-economic considerations. Economic data collection forms were disseminated through large industry stakeholder groups but yielded very poor responses. Given the poor responses of the data collection form – no progress was made on a database. Small capacity building workshops were held in four countries and also in	blue shark in the south Pacific until further notice. Completed 3 sets of ISNRs on 1) interactions between industrial and artisanal fishing (seven completed in early 2013 and a further eight sent out for country review in late 2013), 2) potential impacts of catch retention in industrial purse seine fisheries on food security (seven), and 3) Impacts of FAD closures at the EEZ and fleet levels (seven completed). A regional bioeconomic model for the southern longline fishery was developed building on the 2012 stock assessment for south Pacific albacore and economic data collected from regional fleets. This work was presented to the FFA Sub-Committee for south Pacific Tuna and	yellowfin tuna – including economic considerations. Further development of two potential bioeconomic models for the southern longline fishery – applied to define several potential economic target reference points for the South Pacific albacore stock. A fully integrated bioeconomic model including the four main tuna species in the tropical and south Pacific fisheries was developed for SC10 and is currently undergoing testing. No stock assessment training course was possible in 2014 due to turnover of key staff.	

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
			on the Regional Register. Attachment trainings at SPC HQ for Cook Islands and Solomon Islands.	association with regional meetings.	Billfish (SC-SPTBF) and WCPFC Management Objectives Workshop. A collaboration was developed with a regional consultant working for the PNAO who has been collecting economic information for tropical purse seine and longline fleets. Country visits were made to Samoa, Tonga, and Vanuatu to collect economic data from vessel operators and fish processing plants. 2 attachment trainings were held at SPC HQ for fishery officers from Tuvalu and Papua New Guinea and a Stock Assessment training workshop was delivered at SPC HQ in July with 12 beneficiary countries present with at least one participant (participant costs funded from outside the project).		
1.4. ECOSYSTEM MODELING OF MANAGEMENT AND CLIMATE CHANGE							

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
1 regional and 10 national reports (including Timor Leste) providing advice on tuna resource vulnerability to environmental variability including climate change	**ACHIEVED** **1 regional report and national reports completed for all P-ACP countries providing advice on tuna resource vulnerability to environmental variability including climate change**	First experiment using high resolution oceanographic and fishing data for skipjack completed under CLS contract (SEAPODYM development) Ecosystem modeller recruited to prepare outcomes for regional and national advice from 6 February 2011	Skipjack, Albacore and Bigeye models validations completed; and yellowfin model validation partially completed. Regional and national reports are drafted.	Reports drafted and waiting for comment from National and Regional counterparts. No suitable optimisation of the SEAPODYM model has been obtained and reports will exclude information on this species.	Activity completed	NA (completed)	NA (completed)
1.5. VALIDATE KEY MODEL PARAMETERS THROUGH TAGGING							
5,000 tuna tagged of which 80% are bigeye[8]	**ACHIEVED** **Tagging targets exceeded (10,103 tuna tagged, 97% bigeye) and tagging data successfully incorporated into SEAPODYM modelling**	Not started	Data incorporated in 2011 WCPFC stock assessments (Bigeye, Yellowfin and Skipjack tuna). 4 papers provided to WCPFC documenting stock assessments and tuna tagging cruise achievements. 3929 fish (97% bigeye) tagged during the 6th Central Pacific tagging cruise[6]	Tagging data successfully incorporated into the SEAPODYM model Eighth central Pacific tagging cruise completed. 6174 fish tagged (97% bigeye)	NA (completed)	NA (completed)	NA (completed)
<u>RESULT 2</u>: P-ACP GOVERNMENTS, PRIVATE SECTOR AND COMMUNITIES ARE EQUIPPED TO MONITOR COASTAL FISHERIES TO PROVIDE SCIENTIFIC ADVICE IN SUPPORT OF SUSTAINABLE MANAGEMENT OF THESE RESOURCES. P-ACP GOVERNMENTS, PRIVATE SECTOR AND COMMUNITIES WILL BE PROVIDED WITH							

[8] Suggested indicator: non provided in Contribution Agreement

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
TECHNICAL METHODS AND TRAINING TO MONITOR COASTAL FISHERIES, SCIENTIFIC ADVICE TO INFORM MANAGEMENT DECISIONS, AND DEVELOPMENT OF IN-COUNTRY CAPACITY TO EVALUATE THEIR EFFECTIVENESS.							
2.1. CONDUCT STAKEHOLDER CONSULTATION							
Country specific needs prioritised for all P-ACPs	**ACHIEVED** **Monitoring and management needs assessed and prioritised for P-ACP countries**	8 of 17 current JCS documents have monitoring identified as a priority area, mainly for invertebrates. Corresponded with Niue, Samoa and Kiribati to prioritise monitoring needs, plus visits to Vanuatu and Tonga	Seven countries were present at monitoring workshop to set national priorities. Management and monitoring priorities incorporated into draft PNG JCS document.	Five countries have had management and monitoring needs assessed and prioritised with some implementation of activities to meet needs. No JCS documents reviewed or updated in 2012, however, discussions on priorities made in 4 countries.	1 JCS document developed in 2013 (Kiribati), with management and monitoring included. Activity completed in 2013 for all countries.	NA (completed)	NA (completed)
2.2. DEVELOP LOCAL CAPACITY TO IMPLEMENT FIELD MONITORING PROTOCOLS							
Standard monitoring protocols implemented and sustained in at least 6 P-ACPs[3] **Creel and market survey data collected in 4 countries and staff trained to conduct these surveys[2]**	**ACHIEVED** **Monitoring protocols implemented and sustained in 10 P-ACP countries: marine invertebrates in Vanuatu, Solomon Islands, Marshall Islands, Kiribati, Samoa and Cook Islands; finfish in Tuvalu and Marshall**	Surveys and monitoring of invertebrates identified for Tonga, Vanuatu and for finfish (including aquariums fish) in FSM Training provided in Tonga for trochus and Beche-de-mer surveys, and in Pohnpei for finfish survey methodologies Workshop undertaken in Noumea (29 November to 3 December), with good	Finfish training conducted in Kiribati (9 trainees) as well as assisting with training in Tuvalu (4 trainees) and Marshall Islands (5 trainees). Invertebrate training undertaken in Vanuatu (5 trainees), Solomon Islands (8 trainees), Marshall Islands (6 trainees) Kiribati (9 trainees) and Tuvalu (5 trainees). Workshop held in Nadi Fiji in May 2011with a	UVC training undertaken in FSM with biological sampling training in FSM, Marshall Islands, Kiribati and Nauru National workshops and training for invertebrates undertaken in Samoa, Fiji, Palau, FSM and Cook Islands. Invertebrate survey methodology manual in a final draft stage for review before publishing in early	UVC and biological sampling training undertaken in Fiji plus an otolith workshop undertaken in Noumea. Invertebrate survey methodologies training undertaken in Pohnpei, FSM (sea cucumbers) and Vanuatu (green snail). Survey manual completed and published in late 2013. Mentoring of the	Biological sampling training undertaken in Tonga (13 people), Palau (9 people) and PNG (8 people), with growing interest in this area by other countries. Invertebrate survey training undertaken in Kiribati for anadara (6 people), Samoa for trochus (11 people) and Tonga for sea cucumbers (6 people). Training undertaken in Palau (9 people) and PNG (8 people) with growing	Invertebrate field assessment training (9 people) and attachment training (2 people) completed for Nauru. Draft report has been sent to Nauru for comment and clearance Attachment training (2 people) to analyse trochus field assessment data completed for Samoa. Report currently in publication. Samoa, Palau, PNG

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
	Islands; biological sampling in Marshall Islands, Tonga and Palau; and, creel and market surveys in Tonga, Palau and PNG. **Training activities undertaken in all P-ACP countries except East Timor.** **ONGOING** **A creel and market survey manual, along with identification guide for 300 species was begun under this project. Currently with editors, it will be printed in 2016**[1]	progress, especially in forming new partnerships 2 week workshops held in both Tonga (inverts) and FSM (finfish) as part of introducing survey methodologies.	list of priorities made for methodologies. Assessment and training undertaken in Tuvalu (5 trainees) following an algal bloom outbreak. Assessment of marine resources as part of Environmental Impact Assessment in proposed sand mining site in Kiribati and training of 9 counterparts in survey methodologies. Assessment and training provided in Samoa (7 trainees) on survey methods for spawning aggregations. Training of two Pacific Islander young professionals in finfish and invertebrate survey methodologies.	2013. Survey manual for market and creel surveys drafted and ready for review before publishing in early 2013. Successful trialling of the creel survey manual and methodologies undertaken in Nauru, FSM, Tonga and Fiji with local capacity developed in each country. Mentoring undertaken with 2 Pacific Islander young professionals with biological sampling, invertebrate surveys and some ciguatera assessments. Training, sampling and sending samples for analysis in Hong Kong undertaken for Tuvalu after an increase in the number of ciguatera cases being reported.	Pacific Island Junior Professionals undertaken, activity coming to a close.	interest in creel survey work by countries. Coconut crab training undertaken and survey in Niue (8 people) as an urgent request from the fisheries department. Market and creel survey manual in final draft form with database queries to develop. Invertebrate survey report completed for Solomon Islands (sea cucumber), Vanuatu (green snail) and Palau (sea cucumber).	survey reports completed; Tonga to the sent to editors early Dec 2015; Kiribati report to be completed early 2016 The Creel and Market manual was a significant undertaking taking longer to complete due to the inclusion of an accompanying species identification guide, with around 300 species, after this need was identified during the project. It has now been submitted for editing and will be printed in 2016.
2.3. DEVELOP AND IMPLEMENT SECONDARY DATA COLLECTION PROTOCOLS							
Regional data repository	**ACHIEVED** **Database**	Progress made on developing a database module for export	Regional database for exports developed for	Regional database module for export	Export databases installed in FSM, Tonga, Niue, PNG,	CITES export database being field tested at present and will be	System in place and in use in Marshall Islands.

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
maintained and national data provided for backup from at least 6 countries / fisheries[3]	**training undertaken with all P-ACP countries.** **National data provided by 8 countries.** **CITES export database developed and installed in 9 P-ACP countries.** **Market and creel database established in 3 countries.** **Digital library implemented for online document management.** **Servers installed in all P-ACP countries for meet data storage.** **GIS training undertaken with 8 countries.** **ONGOING** **Prototype of**	data, with a focus on aquariums products, with trials to be undertaken in Fiji, Tonga and Vanuatu to refine and finalise More input required for developing secondary monitoring protocols, so this to be included in expert consultations	trialling. Database trialled in Vanuatu with other trials deferred to 2012. Activity merged with the market and creel survey database. Work on the SPC document management system ongoing, so activity started in 2011, to be completed in 2012. Data provided by Palau and Vanuatu to date. Data provided by Tonga for analysis of sea cucumbers surveys. Two sub-regional workshops were conducted on basic database skills. Purchased servers for 8 countries and configuring and software development for the servers for installation in countries in 2012. Development of an on-line training programme for the identification of sea cucumber species.	data completed. National databases developed and established in Marshall Islands and Solomon Islands, with preliminary work in PNG. Basic database developed awaiting feedback from in-country trials so this can be finalised in early 2013. Two sub-regional workshops undertaken with 17 people trained from 14 countries. Installed micro servers and provided training in Palau, Kiribati, Fiji, Tuvalu, Marshall Islands, Samoa, Cook Islands and Timor Leste. Database attachment training provided in Noumea for participants from Fiji and Samoa. Export data provided from Marshall Islands and Solomon Islands. Repeat activity. National monitoring	Solomons and Nauru. Database finalised and Tonga main country using this to date. Also being used in Kiribati, Tuvalu and Marshalls through a complementary climate change project. Database training with attachment from Kiribati. Installed 7 servers: FSM (2) Tonga, Niue, PNG, Solomons and Nauru. All countries now have servers installed. Prepared GIS training materials for sub-regional workshop and conducted in-country GIS training in FSM, Tonga, Niue, PNG, Solomons and Nauru. National data provided from Fiji, Solomons, Palau, and Cooks.	finalised in early 2015. Workshop undertaken in December 2014 with 12 participants from 9 countries (Fiji, Cooks, Tonga, Solomons, RMI, Palau, FSM, Kiribati and Vanuatu). Training completed in 2014. Creel survey database in use in Tonga and Palau. Attachments from PNG and Fiji plus a workshop on database use conducted with 13 countries participating. Servers installed in Chuuk and Yap in FSM. GIS training undertaken in FSM (Chuuk and Yap), Palau and Cook Islands. Some national data provided by Kiribati, Tonga and Fiji, with countries starting to think more about this for back-up of data.	Market and creel survey database installed in Fiji, however, since this time some key staff in Fiji have left / changed positions. The SPC Digital Library was extended to allow fisheries departments to create their own online document libraries. This feature is currently in use by Tonga. Software and database prototype installed for the Cook Islands on their country server. This will be finalised in 2016 once feedback is received.[1] An e-learning system for tablets is currently in development in conjunction with the current development of ID cards for commercial and aquarium fish species.[1]

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
	water quality database for Cook Islands has been installed. To be finalised. **An e-learning app for tablets is currently in development for commercial and aquarium fish species**			data from invertebrate surveys provided from Samoa, Solomons and Kiribati.			
2.4. DEVELOP MANAGEMENT ADVICE							
Assessments and management recommendations given for at least 6 major coastal fisheries, focusing on commercial invertebrates[3]	**ACHIEVED** **Assessments and management advice provided to 4 countries for finfish (Kiribati, Cook Islands, Marshall Islands and Fiji) and to 10 countries for invertebrates (Tonga, Vanuatu, Kiribati, Solomon Islands, Marshall Islands, Fiji, PNG, Solomon Islands, Samoa, and Niue).**	Preliminary management advice provided to Tonga prior to survey work and training being undertaken Attachment trainee from FSM undertaking analysis of finfish survey data for management purposes Attended and participated in IUCN Pomacentridae Red List Workshop- To assess the conservation status of the world's Pomacentridae for inclusion in the Red List of threatened species	Data analysis and management advice provided for Marshall Islands for aquarium fish. Management advice also provided to PNG on aquarium fish management and Kiribati on management of their bonefish fishery. Data analysis and management advice provided to Tonga on their sea cucumber fishery, and preliminary management advice on sea cucumbers provided to Vanuatu, Kiribati, Solomon Islands and Marshall	Creel survey data and training and biological sampling undertaken but no actual assessments undertaken Invertebrate management advice provided to the Marshall Islands, Kiribati and Fiji following initial training and assessment work in-country. Attachments from Vanuatu, Solomon Islands and Samoa trained in analysing their data and turning this into management	Assessment of Fiji finfish data undertaken only as a result of losing finfish scientist in mid-2013. Assessments and management advice provided for Solomons, Vanuatu, and Fiji with review of PNG management plan for sea cucumbers. Attachments from Palau (3), Fiji (4), Cooks (2) and Vanuatu (2) to undertake data analysis and converting this into management advice. Assistance provided to	Management advice for paddle-tail and bonefish in Kiribati, and minimum and maximum sizes for 22 species in the Marshall Islands. Invertebrate management advice provided for trochus in Samoa, coconut crabs in Niue and anadara in Abaiang in Kiribati. Attachments from Kiribati (2), Pohnpei FSM (2) Cook Islands (1) and Samoa deferred their attachments to early 2015. General coastal fisheries management plans develop for Kiribati and Niue.	Advice to be provided to Tonga, and accepted by the Minister, with the result being that the sea cucumber fishery is closed due to heavy overfishing. Samoa Trochus management plan is awaiting national approval process Advice provided to Niue and accepted, implemented. A ban on the export of coconut crabs is now currently in place. Kiribati has done consultation with Island Councils and communities on

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
	Attachment training provided to 10 countries on using data to develop management arrangements (Tonga, Vanuatu, Solomon Islands, Samoa, Palau, Fiji, Cook Islands, Kiribati, Pohnpei FSM, and Nauru) **Information materials produced on management measures (29 information sheets, 6 posters, 3 brochures and 1 guidebooklet).**	Attended and participated in National Integrated Coastal Management Framework Development Consultation in Vanuatu Scoping mission to PNG to assess the aquarium fish trade including the management of this sector	Islands. Attachments from Tonga only (2 trainees) in 2011 as other countries still collecting data for analysis. Staff participated and presented at regional FAO/SPC workshop on the management of sea cucumber fisheries. Input provided to the development of management plans in the Solomon Islands for sea cucumber and Vanuatu of lobsters. Production and publication of information sheets on fisheries management for communities and a guide covering 16 families or species of finfish and invertebrates.	advice. Management advice provided to the Marshall Islands on aquarium fish fishery and to Samoa and Kiribati on national coastal fisheries development and management policy. Several regional meetings attended including Heads of Fisheries meeting in Noumea and sea cucumber workshop in Fiji. 7 new information sheets produced as well as a 4-page brochure on community-managed no-take areas in fisheries management, and a trochus poster.	Samoa with management of coastal resources in general Roadmap for MSG countries developed through a workshop held in Vanuatu with the roadmap covering development as well as management – activity completed. Several regional meetings attended, one covering ciguatera and another covering marine spatial planning for coastal fisheries. Six info sheets, 2 brochures and 3 posters produced	Attended REPICORE workshop in Germany, Ciguatera workshop in Noumea and Sea cucumber summit in Fiji. Poster for Marshall Islands on max and min sizes of 22 species and minimum size of sea cucumbers poster for Vanuatu.	proposed coastal fisheries regulations (including size limits, prohibitions on certain methods). Draft regulations need to be finalised Attachments from Samoa (2 staff) to work on trochus data. Attachments from Nauru (2 staff) to work on invertebrate assessment data.
3. SHARED PROJECT ACTIVITIES[7]							
3.1. CROSS-CUTTING ISSUES							
SciCOFish contribution to environmental sustainability, gender equality, good	**ACHIEVED** **Gender analysis and equity components included in observers**	Gender analysis of the project commenced. First results presented in December.	Edition and printing of the "Women in fisheries" report and brochure, to promote the women's involvement in those careers.	Consultancy done by gender specialist in collaboration with SPC Human development division, to propose training tools, code of conduct and	2 Brochures produced: 1 on Observer's job and 1 on Fisheries industry jobs; to promote those jobs to young public, for both men and women.	2014 activities contribute to environmental sustainability, gender equity, good governance and human rights.	Continuation of activities, contributing to environmental sustainability, gender equality, good governance and human rights.

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
governance and human rights	**training program, code of conduct and information materials** **Activities contributed to environmental sustainability, gender equality, good governance and human rights.**		Environmental sustainability is a central thematic for all SciCOFish activities. In 2011 various monitoring trainings were organised, for example in Marshall Islands, as a mean to reach both the fisheries sustainable management and adaptation to climate change. Good governance is applied when working in coordination between SPC, governments, communities, to develop management plans for marine resources, as done this year for the sea cucumber in the Maskelyne Islands, Vanuatu.	promoting items for observer career, for both men and women. Environmental sustainability is a central thematic for all SciCOFish activities. In 2012 various monitoring trainings were organised, for example in Samoa, as a mean to reach both the fisheries sustainable management and adaptation to climate change. Good governance is applied, working in coordination between SPC, governments, communities, to develop management plans for marine resources.	10,000 copies of each sent to ACP countries and already used for events in universities or others. Observers training tools and code of conduct introducing gender equality still in progress. All activities are related to environmental sustainability by marine resources management; good governance and human rights respect are applied, working in coordination between SPC, governments, communities.		
3.2. COORDINATION							
SciCOFish project run efficiently in terms of time and resources	**ACHIEVED** **Annual SciCOFish steering committee meeting held.** **Project monitoring,**	SciCOFish steering committee meeting moved to February 2011, on the occasion of the SPC Heads of Fisheries meeting Needs and priorities identified with the	First SciCOFish steering committee held on the occasion of the SPC heads of Fisheries meeting: validation of year 1 report and year2 work plan. Timor Leste's	Second SciCOFish steering committee held: validation of year 2 report and year 3 work plan. Translation and distribution of the "Guide and	Third SciCOFish steering committee meeting held with approval of year3 report and year4 work plan. Annual reporting of activities, finance,	Fourth SciCOFish steering committee meeting. Activity monitoring, follow-up and reporting undertaken as planned	Fifth SciCOFish steering committee meeting held. Following-up activities in terms of finances, plan and project closure.

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
	follow-up and reporting undertaken as planned. **Project implemented within budget.**	Fisheries Department from East Timor on the occasion of visit of FAME director (Oct) and visit of Fisheries Officers at SPC HQ (Nov). 2010 annual project report and 2011 annual work plan produced	representatives participated this year to the SPC's Heads of Fisheries meeting and to the other regional workshops funded by SciCOFish. The technical documents produced, eg. the "Guide and information sheets for fishing communities" are being translated and will be sent to Timor Leste. Annual reporting on activities and finance, and planning done. Follow-up throughout the year.	information sheets for fishing communities" and work on coastal data management initiated. Annual reporting on activities and finance, and planning done. Follow-up along the year.	planning and follow-up undertaken as planned.		
3.3. DISSEMINATION OF RESULTS							
Project results presented to ACP as tools – for fisheries management and decision making- and adopted		Publication of 15 articles on SciCOFish activities on the SPC website, SPC fisheries Newsletter, Business Island magazine. Sending of 2 press releases, relayed on press web sites and 2 radios. Production of promotional items for EU visibility.	Update of the SPC media mailing list 15 web articles, 8 articles in the SPC Fisheries Newsletter distributed to all member countries and partners, 1 article in Islands Business Magazine, on SciCOFish activities. Reports and policy briefs produced and distributed, eg. Pacific women's participa-tion	6 web articles, 7 articles in the SPC Fisheries Newsletter distributed to all member countries and partners, 15 articles published in various national newspapers or websites, on SciCOFish activities. Production and distribution of the video "Hook, line and tuna" and the new information sheets of	Update of SciCOFish web pages : 7 web articles, 4 pages on meetings and trainings and 11 SciCOFish productions and contributions. 16 articles or interviews on SciCOFish activities on various national newspapers, websites, radio and television. Production and distribution of 1 video	TUNANOMICS initiative raised awareness and standards of reporting in Pacific media about the scientific and economic dimensions of Fisheries management. Update of SciCOFish webpages: 5 web articles; 6 pages on meetings and trainings and 10 SciCOFish productions and contributions. 21 articles or interviews on SciCOFish activities in	Communication on SciCOFish activities and results. Promotion of EU visibility.

Performance indicator	Overall results	2010 progress	2011 progress	2012 progress	2013 progress	2014 progress	2015 progress
			in fisheries science and management, 2011 Tuna Fisheries Assessment. EU funding mentioned on all materials (videos, training books, posters, guides) published this year. EU funding visible for all regional trainings with banners, and promotional items distributed to countries.	the Guide and information sheets for fishing communities". EU funding mentioned on all materials (videos, training books, posters, guides) published this year. EU funding visible for all regional trainings with banners, and promotional items distributed to countries.	documentary, 5 published reports, 2 brochures, 1 policy brief, invertebrates identification cards and 6 new information sheets, 2 leaflets and 3 posters added to the information kit for fishing communities. EU funding mentioned on all materials published and visible for all regional trainings.	various national newspapers, websites, radio and television. Production and distribution of 1 video for observers training, 4 published reports and a manual. EU funding mentioned on all materials published and visible for all regional trainings.	

Table notes

1. Work continues through funding provided by DFAT
2. Indicator added in 2014 Amendment 1
3. Indicator amended in 2014 Amendment 1 to increase the target from 5 to 6
4. Indicator amended in 2014 Amendment 1 to increase the target number of people trained
5. Work continues through funding provided by the World Bank and GEF projects
6. A second Central Pacific Tagging Cruise was also undertaken in 2011 (CP7) which was manned by IATTC. This is not included in the totals reported here as the SciCOFish contribution did not go towards this cruise, however, through CP7 an additional 4509 fish were tagged with 93% being bigeye
7. Indicators under result area 3 are not part of the contribution agreement.