

Oceanic Fisheries Programme

**2003-2005
Triennial Progress Report**

1 Overview and Highlights

The Oceanic Fisheries Programme (OFP) is part of the Marine Resources Division of the Secretariat of the Pacific Community (SPC) and is based in Noumea, New Caledonia. It contributes to the Division's aim of helping achieve the vision of the Pacific Islands Regional Ocean Policy: "*A healthy ocean that sustains the livelihoods and aspirations of Pacific Island communities*". This vision is shared by all of the CROP agencies working towards the achievement of ocean-related objectives in the region.

The OFP is made up of three sections: Stock Assessment & Modelling, Statistics & Monitoring, and Biology & Ecology. The Programme currently consists of 16 professional and 10 support staff and has an annual budget in the region of CFP 300 million (approximately AUD4,000,000).

The OFP provides scientific services relating to oceanic (primarily tuna) fisheries management to its membership. These services include fishery monitoring and data management, ecosystem and biological research relevant to the fisheries, and stock assessment and evaluation of management options. The most important programme outputs are information (e.g., reports on the status of fisheries, stocks and ecosystems), infrastructure (e.g., databases, monitoring programmes), advice (e.g., regarding appropriate levels of fishing), and national capacity building in Pacific Island Countries and Territories (PICTs).

These services are provided at both the national and regional levels. At the national level, the OFP provides scientific support to national Tuna Management Plans (TMPs) primarily through support of national fishery monitoring and database systems, provision of advice on appropriate levels of catch or effort, and associated human resource development. At the regional level, the OFP provides scientific services (data summaries and analyses, stock assessments and management advice) to the Forum Fisheries Agency (FFA) for its various regional tuna fisheries management initiatives, including the US Tuna Treaty, the Palau Arrangement and coordination of FFA inputs into the Western and Central Pacific Fisheries Commission (WCPFC). The OFP also provides services directly to the WCPFC in the areas of data management and stock assessment. Service provision to both the FFA and WCPFC is governed by inter-organisational memoranda of understanding.

During 2003–2005, highlights of the programme included:

- The coverage of tuna fisheries by logsheet catch and effort data compiled by the OFP continued at a high level (averaging 91% since 1997 for PICT EEZs) and coverage by port sampling data and observer data continued to increase. To accommodate the increasing quantity of data, and in anticipation of data management services to be provided to the WCPFC, components of the OFP database system were updated extensively and new components added.

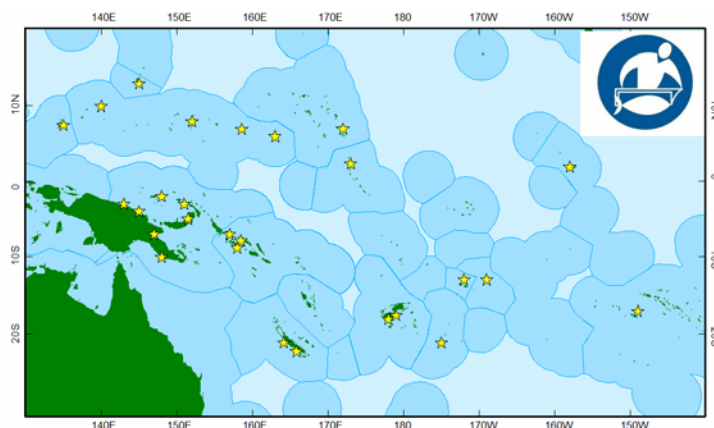


Figure 1. Port sampling locations in PICTs.

- Support for national capacity building in fishery monitoring, including port sampling programmes and observer programmes, was provided to twelve PICTs. Capacity building was delivered through in-country training and attachments at SPC headquarters. These efforts have seen coverage of the tuna fishery by monitoring programmes and the resulting volume of data collected increase.
- Analysis of electronic tagging data has provided new and detailed information on the behaviour of bigeye tuna, and how it is influenced by the environment. The analysis was based on 17 recoveries of 166 archival tags deployed in the Coral Sea between 1999 and 2001 (providing detailed temperature, depth and location data for 8,379 fish-days) during a joint CSIRO (Australia) – SPC project and from 27 “pop-up” archival tags deployed by SPC in the waters surrounding Papua New Guinea, New Caledonia and Tonga between 2002 and 2005 (providing data for 992 fish-days). The analysis of these data has shown that bigeye tuna remained in the Coral Sea between New Caledonia and Australia for the period of observation and that their horizontal and vertical movements were strongly related to the availability of food. This information will ultimately be incorporated into population models of bigeye tuna.
- The spatial ecosystem and population dynamics model known as SEAPODYM, developed by the OFP, provides a general framework for the integration of information on the biology and ecology of tuna species within a comprehensive description of the pelagic ecosystem. The model is now fully operational for running multi-species, multi-fisheries simulations and has been recently applied to skipjack, yellowfin and bigeye tuna for the period 1950–2004, based on predicted environment (temperature, currents, and primary production) from an ocean-biogeochemical model developed by collaborating scientists. The model and extensive documentation has recently been released on a dedicated web site (www.seapodym.org) maintained by the OFP.

- National Tuna Fisheries Status Reports (NTFSRs) are a key vehicle for the delivery of scientific advice at the national level. These reports are comprehensive reviews of oceanic fisheries in PICT EEZs and provide a solid basis for national oceanic fisheries management decision making in the context of the regional status of stocks and the local fisheries and economic environment. During 2003–2005, NTFSRs were produced for Fiji, French Polynesia, Kiribati, Marshall Islands, New Caledonia, Papua New Guinea, Pitcairn Islands, Solomon Islands, Tokelau and Tonga. Reports were presented at in-country workshops. For several countries, status report updates have been provided specifically to feed into TMP consultative processes.

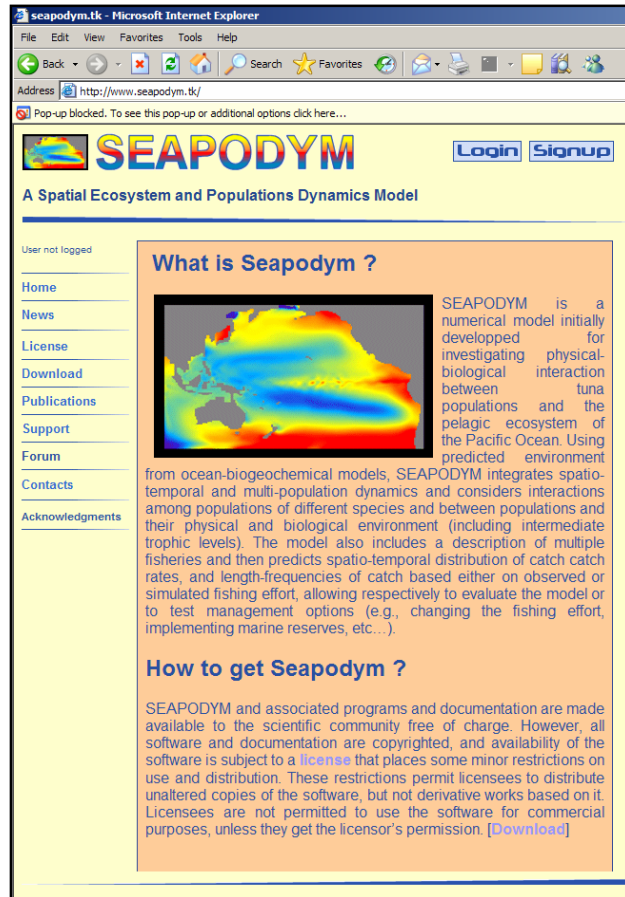


Figure 2. SEAPODYM home page.

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- The OFP has continued to develop its size-based, spatially-structured, statistical stock assessment model, MULTIFAN-CL. The model is now used routinely by the OFP (and by other organisations) for oceanic species assessments in the western and central Pacific Ocean. Regular assessments of skipjack, yellowfin, bigeye and South Pacific albacore tuna have been undertaken over the past three years, with the most recent work presented to the inaugural meeting of the WCPFC Scientific Committee. The 2005 assessments indicated that skipjack and South Pacific albacore resources remained in good condition, while bigeye and yellowfin tuna stocks are likely to be approaching an overfished state.

2 The Sector

2.1 Oceanic fisheries in the region

Tuna fishing in the Pacific Islands region has a rich history. For centuries, tuna have provided an important source of food for Pacific Island peoples and the traditional fishing techniques and equipment involved are part of their cultural heritage. Today, tuna are an important source of income and employment for PICTs. For many, the tuna

resources within their EEZs represent their only significant renewable resource and their best opportunity for economic development. Currently, the catch of tuna in the region is about ten times all other types of fish combined. In terms of value, the tuna catch is worth over seven times the value of all other Pacific Island fish catches combined. PICTs have two main avenues to derive economic benefits from their tuna resources:

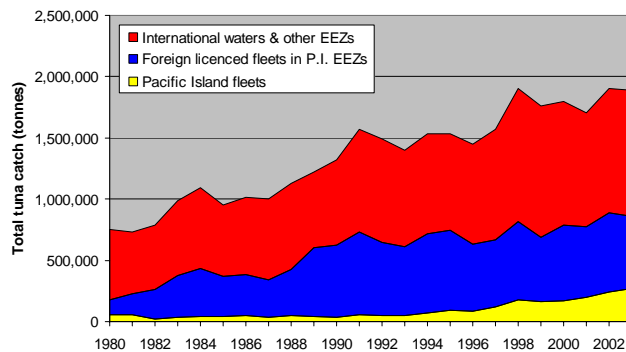


Figure 3. Tuna catches in the western and central Pacific

- Licensing of foreign-based fleets to fish in their EEZs in return for payment of access fees; and
- The development of locally-based fishing fleets, in some cases accompanied by on-shore processing facilities, to exploit the tuna resources of their EEZs.

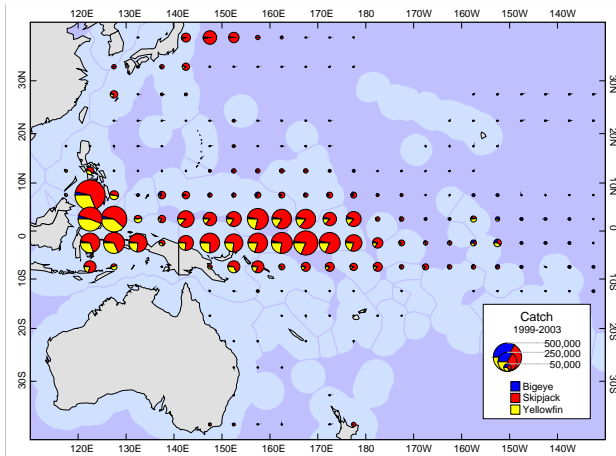


Figure 4. Purse seine and pole-and-line catches, 1999–2003.

Licensing of foreign fleets has occurred in many countries ever since the declaration of EEZs in the late 1970s. Domestic fleet development is a more recent, but increasingly important part of the regional tuna fisheries landscape.

The fisheries target four main species – skipjack, yellowfin, bigeye and albacore tuna. The total annual catch in the western and central Pacific (west of 150°W) in recent years is approaching 2 million tonnes, approximately half of the total world tuna production, with a total catch value of around US\$2 billion. More than half of the catch is from the purse seine fishery, which provides tuna for canning in regional and Southeast

Asian canneries. While the longline catch is smaller in total weight, its catch value is similar to that of the purse seine fishery – bigeye and yellowfin tuna are exported either fresh or frozen to lucrative *sashimi* markets in Japan and the US, while albacore are a premium “white meat” canned tuna product.

The purse seine fishery targets skipjack and yellowfin tuna, but records a small but important by-catch of bigeye tuna. The pole-and-line fishery targets mainly skipjack tuna with smaller catches of yellowfin tuna. Catches of these surface fisheries are concentrated in the equatorial Pacific, with small seasonal catches in sub-tropical waters. The longline fishery targets deeper-swimming adult bigeye and yellowfin tuna in the tropical Pacific and albacore in the sub-tropical South Pacific.

Large catches of skipjack, yellowfin and bigeye tuna also occur in domestic fisheries of Philippines, Indonesia and Vietnam. The main gear types used are longline, purse seine and a range of small-scale fisheries catching mainly small, juvenile tuna.

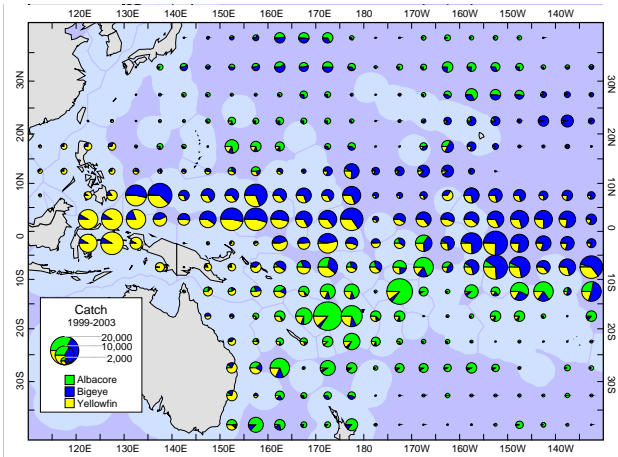


Figure 5. Longline catches, 1999–2003.

would not normally cause concerns for biological sustainability (but may, however, have significant economic consequences). The most recent assessments show that:

Skipjack tuna has high resilience to fishing and can easily withstand catches at the current level (around 1.2 million tonnes per year). The majority of exploitation occurs on fish that have already reached reproductive maturity (at around age 1). Most skipjack therefore have the opportunity to reproduce before they are exposed to fishing. This provides a measure of protection to the reproductive capacity of the stock. The current impact of the fishery represents a depletion of adult biomass of ~30% from unexploited levels (Figure 6)

Yellowfin tuna begin spawning at around 1.5–2 years of age (about 100 cm fork length or 20kg). However, a large amount of exploitation of juveniles occurs, primarily in the purse seine fishery setting on floating objects (logs and Fish Aggregation Devices, or FADs) and in the domestic fisheries of Philippines and Indonesia. These juvenile catches have high impact on the subsequent adult population. Recent biomass levels have declined sharply over the past ten years and are now estimated to be approaching overfishing benchmarks. Continuation of recent annual catch levels of 450,000–500,000 tonnes may result in further stock declines. The WCPFC Scientific Committee has recommended that fishing mortality be reduced below 2001–2003 average levels. The current impact of the fishery represents a depletion of adult biomass of ~75% from unexploited levels (Figure 6). The majority of this impact is attributable to the Indonesian/Philippines domestic fisheries and the purse seine fishery. The longline fishery has relatively low impact on the yellowfin stock.

2.2 Current status of tuna stocks and impacts of fishing

The OFP routinely conducts stock assessments for the four tuna species. These assessments utilise all available information from the fishery, including catch, effort and size composition data for the main fisheries, as well as tagging data where available. A feature of the assessments is the estimation of the impact of the fisheries on the adult portion of the stock. This is estimated by comparing the estimated adult biomass with the biomass that would have occurred in the absence of fishing. Depletion levels of less than 50% from the unexploited condition

Bigeye tuna begin spawning at around 3–4 years of age (about 110 cm fork length or 30kg). However, as with yellowfin, significant exploitation of juveniles occurs in the purse seine fishery setting on floating objects and in the domestic fisheries of Philippines and Indonesia. These juvenile catches have high impact on the subsequent adult population. While recent biomass levels are estimated to be above overfishing benchmarks (due to recent above-average recruitment), the current catch and effort levels probably represent overfishing. The WCPFC Scientific Committee has recommended that fishing mortality be reduced below 2001–2003 average levels. The current impact of the fishery represents a depletion of adult biomass of ~84% from unexploited levels (Figure 6). This impact is roughly equally shared by the longline fishery and those remaining fisheries targeting juvenile bigeye tuna.

Albacore tuna begin spawning at around 5 years of age (about 80 cm fork length or 10kg). Apart from a minor troll fishery targeting juvenile albacore, most of the catch is by longline, which catches few juvenile albacore. As is the case with skipjack, most albacore have the opportunity to reproduce before they are exposed to significant fishing pressure. This provides a measure of protection to the reproductive capacity of the stock. The current impact of the fishery represents a depletion of adult biomass of ~16% from unexploited levels (Figure 6). However, because the longline fishery targets the oldest albacore in the population, the fishery impact on this older and less abundant segment of the population is larger, possibly now approaching 30%. While this does not pose any concerns for biological sustainability, it does have economic implications for the longline fishery, because average catch-per-unit-effort will have been reduced by a similar amount. In areas of locally intense fishing activity, depletion may be significantly higher.

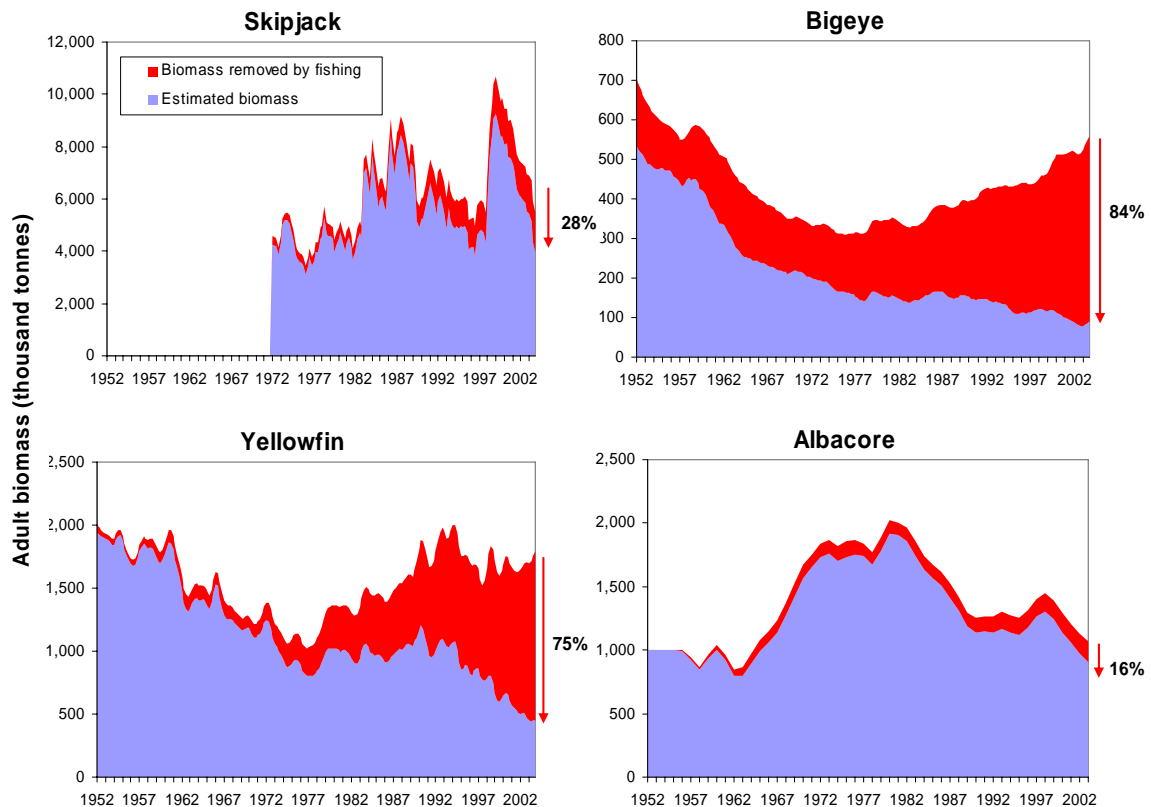


Figure 6. Unexploited (red+blue) and exploited (blue) adult biomass of regional tuna stocks. The red area represents the impact of the fishery on the adult biomass. The arrows and percentages on the right of each figure indicate the extent of adult biomass reduction in the most recent year.

2.3 Fisheries management

Coastal States in the region have a duty to conserve the tuna resources that occur in their EEZs. There is thus an obligation under international law to manage the fisheries in their EEZs, be they domestic or foreign licensed operations, to avoid overexploitation of the resources. Management attention must be given both to target species, such as the tunas, and to non-target species. The latter potentially includes a wide range of species, including billfish and other piscivorous fishes, sharks, turtles, seabirds and marine mammals. Because these species have distributions spanning most of the tropical and subtropical Pacific, and have the capability to undertake large-scale movements within and beyond the region (as implied by the classification *highly migratory species*), Coastal States are also required to cooperate amongst themselves and with States fishing on the high seas in the management and conservation of these resources. Members of the FFA cooperate with each other through the various management initiatives of that organisation. They have established minimum terms and conditions of access for foreign fleets seeking to fish in the region, which include *inter alia* obligations for data provision and observer coverage. They cooperate in the licensing of selected fishing fleets through multilateral treaties or agreements, e.g. the *US Treaty* (which involves multilateral licensing of US purse seiners) and the *FSM Arrangement* (which provides for preferential conditions of access for the national fleets of participating countries). They have also attempted to regulate fishing effort in the purse seine fishery through the *Palau Arrangement*, which first imposed a cap on the number of vessels allowed to fish, and more recently has implemented a vessel days scheme, whereby a total allowable level of purse seine effort and a scheme for allocating the effort to the EEZs of participating Coastal States has been agreed. These management initiatives require scientific support by way of data processing and management, data summaries and analyses, stock assessments and advice on the effectiveness of potential management measures. The OFP provides this support, working in close collaboration with the FFA Secretariat.

In June 2004, the *Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean* (hereinafter referred to as the Tuna Convention) came into force. At the time of writing, all SPC members, with the exception of Palau, United States (and its territories) and Vanuatu had ratified the Convention. China, Chinese Taipei, the European Community, Japan, Korea and Philippines have also ratified or acceded to the Convention. The Convention has established the Western and Central Pacific Fisheries Commission as its implementing organ. The Commission, based in Pohnpei, Federated States of Micronesia, held its first meeting in December 2004. Its Scientific Committee met at SPC Headquarters in Noumea, New Caledonia in August 2005.

The WCPFC is the principal vehicle through which Coastal States and Fishing States are to cooperate in fisheries management. Currently, it is not planned to develop a comprehensive scientific capability within the WCPFC Secretariat. Consequently, the WCPFC has requested, and SPC has agreed, that the OFP provide scientific services to the WCPFC in the areas of data management and stock assessment. The relationship between the OFP and the WCPFC and its impact on the strategic directions of the OFP are discussed further in the following sections of this report.

3 Narrative Report

3.1 Programme priorities

The priorities of the OFP over this Strategic Plan cycle have been “tuna management support”, “data and scientific monitoring improvement” and “improving pelagic ecosystem understanding”. As noted above, a key regional development that occurred during the course of this Strategic Plan was the ratification of the Tuna Convention and the formation of the WCPFC. As this process evolved, its impact on both the OFP and SPC members in a number of important areas began to take shape. It became clear that a new emphasis on capacity building was required to assist PICT’s to discharge their new responsibilities to, and enhance their participation in, the WCPFC. There was also a realisation that the emphasis placed in the Tuna Convention on the incorporation of ecosystem considerations into fisheries management required enhanced understanding of the pelagic ecosystem that supports the regional tuna fishery. The OFP, in partnership with FFA and SPREP, had been preparing for these additional demands through the implementation of the Oceanic Fisheries Management Component of the International Waters Project, funded by the Global Environment Facility (GEF). With the resources provided by this project, and the European Commission funded PROCFish project, the OFP began to focus all of its priorities to some extent towards supporting PICT participation in the WCPFC. Following the recent completion of the OFM component of the IW Project and the imminent completion of the PROCFish/Oceanic project, and building on the gains that both projects have made in capacity building and ecosystem research, the OFP joined FFA in developing a new GEF-funded project, the Pacific Oceanic Fisheries Management Project (POFMP). This project, with more than USD 10 million in funding over a five-year period, was launched towards the end of 2005 and will form a central component of the OFP work programme over the next Strategic Plan cycle.

Priority 1: Tuna management support

The provision of scientific support for tuna fisheries management is the programme priority that is in effect the end result of much of the OFP work programme. Tuna management support takes the form of:

- provision of data, data summaries and analyses
- provision of formal assessments of the status of fisheries, stocks and the ecosystem
- provision of advice on specific fisheries management options

This support provides the scientific basis for fisheries management decision-making at the national level through PICT fishery departments in the administration of their TMPs, at the sub-regional level through the FFA and, now, at the regional level through the WCPFC. We expect this to continue as a key programme priority in the next OFP Strategic Plan, with (i) the WCPFC providing a more formal context for regional stock assessment work and the OFP providing such assessments under terms established in an inter-organisational memorandum of understanding; and (ii) a new emphasis on capacity building in PICTs to assist them to participate fully in WCPFC processes through enhanced understanding of regional assessments.

Priority 2: Data and scientific monitoring improvement

The provision and improvement of data and tuna fishery monitoring services has been core business for the OFP and its predecessor programmes since the late 1970s. There are two complementary aspects to this priority – providing services in fishery data management and enhancing capacity in fishery data collection.

Regarding data management, the OFP is the regional tuna fishery data centre, where a range of fishery data – operational level (logsheet) catch and effort data, size and species composition data from observer and port sampling programmes, by-catch data from observer programmes, landings and transshipment data, and others – are integrated into the “Regional Tuna Fishery Database”. Data are provided by SPC members and by non-member fishing nations. The data are processed by the OFP, integrated into the database and provided back to PICTs in a usable form. The OFP maintains both a secure internet-based access to data and has implemented customised in-country databases in many PICTs. These databases are regularly updated and periodically serviced by OFP staff in-country. Training in database use is also provided. Data summaries are available to the public in various forms on the SPC website. Release of detailed data beyond the sources that provided the data is governed by strict procedures relating to data confidentiality. The OFP will soon receive data on behalf of the WCPFC and will provide data management services to it under terms established in an inter-organisational memorandum of understanding.

Regarding data collection, the OFP has continued to assist PICTs to develop national tuna fisheries monitoring programmes both for their domestic fleets and for licensed foreign fishing in their EEZs. These programmes cover diverse forms of data collection, including unloadings and vessel activity data provided by fishing companies, operational-level logsheet data, observer data and port sampling data. The demand for such programmes has increased as many PICTs have expanded their domestic tuna fishing capability (e.g. see Figure 3). This trend is expected to continue over the period of the next Strategic Plan. OFP assistance in developing fishery monitoring programmes has to date focused on building the necessary infrastructure, providing training and in some cases providing direct financial support for fishery monitoring operations. Over the next Strategic Plan cycle, it is expected that similar types of support will be provided to new monitoring programmes in several PICTs where new locally-based fishing operations are developing. For those countries with established monitoring programmes, the emphasis will be on establishing data quality control systems and producing information in a form that satisfies their reporting obligations to the WCPFC. The OFP will continue to facilitate regional coordination and information sharing in fishery monitoring programmes under this priority.

Priority 3: Improving pelagic fishery ecosystem understanding

In developing the current Strategic Plan, we recognised that, while the target tuna species would probably continue to be the focus of management attention for some time, there is a need to improve our understanding of the structure and dynamics of the pelagic ecosystem, including the impacts of fisheries and the environment. The need for this information is particularly important in the equatorial western and central Pacific where the majority of fishing activity occurs. The focus on ecosystem-level variability and fishing impacts arises both from commitments made by countries (including PICTs) at the World Summit on Sustainable Development (Johannesburg 2002) to implement an “ecosystem approach to fisheries” by 2010, and more specifically to language throughout the Tuna Convention requiring consideration of the effects of fishing on “non-target, associated or dependent species” and the ecosystem as a whole, the protection of biodiversity and protection of habitats of special concern.

During 2003–2005, the OFP has vigorously pursued this priority on several related fronts: (i) the development of a large-scale model (called SEAPODYM) that integrates ocean dynamics and productivity with biological information on multiple tuna species and their prey; (ii) the collection of biological data, such as electronic tagging data, to validate the model; and (iii) collection and analysis of data that define the main trophic relationships of the tropical Pacific pelagic ecosystem. SEAPODYM is a modelling framework that has the potential to provide advice on the ecosystem impacts of fishing and environmentally-driven variability from spatial scales ranging from the Pacific basin to individual EEZs. Its uses include estimating the effects of climate change on tuna stocks and fisheries and estimating the spatial distribution of tuna stocks and their variability over time. Considerable progress has been made in developing the model and collecting supporting data, and it is anticipated that this work will continue through the next Strategic Plan cycle. Likewise, understanding the trophic relationships of the pelagic ecosystem is fundamental to estimating the impacts of commercial fishing, which generally target the larger predators, on the overall ecosystem. This work will also continue through the next Strategic Plan cycle as part of the POFMP.

3.2 Progress against performance indicators

The priorities of the programme as described above are embodied in the three corresponding objectives of the programme. These are discussed below.

3.2.1 Objective 1: Comprehensive regular assessments of the status and prospects of oceanic fisheries for PICT fisheries departments and regional processes

Output 1.1 Overviews, reports and assessments leading to advice on the status and prospects of tuna fisheries and associated species at the regional level

Objective 1 has been pursued at the regional level primarily through the production of regular (usually annual) stock assessments for skipjack, yellowfin, bigeye and South Pacific albacore tuna. These assessments inform the advice provided regarding appropriate levels of catch or effort across the western and central Pacific region. During 2003–2005, ten regional assessments were produced. Assessment summaries for all species were produced annually and published in the OFP's *Tuna Fisheries Assessment Report* series. The assessments continue to be regarded as high quality, based on review by the Standing Committee on Tuna and Billfish meeting (convened annually by the OFP from 1988 to 2004) and more recently the Scientific Committee of the WCPFC (August 2005). Tangible evidence of the quality of this work is the request by the WCPFC for the OFP to continue to provide these regional assessments as part of a package of scientific services.

Output 1.2 Overviews, reports and assessments leading to advice on the status and prospects of tuna fisheries and associated species at the national level

At the national level, scientific advice is provided in several forms, but is focussed on National Tuna Fishery Status Reports. These reports are comprehensive reviews that provide a range of information to support the implementation of national Tuna Management Plans. Several reports have contributed directly to the text of the TMPs. During the period of the Strategic Plan, nine NTFSRs have been produced, and two are currently underway. There is evidence that NTRSRs and associated interventions by the OFP have improved the quality of fisheries management in several PICTs, notably Fiji.

Output 1.3 Scientific support to, or on behalf of, PICTs during regional and international meetings and negotiations

Ad hoc support is also provided to PICTs during regional and international meetings and negotiations. The OFP has routinely produced stock status and fishery summaries for meetings of the Forum Fisheries Committee and the annual US Treaty Consultation. A range of working papers have been produced to support PICTs in meetings related to the Preparatory Conference and now the WCPFC. The demand for scientific support at WCPFC-related meetings is expected to increase as PICTs prepare to participate in important discussions on management options for the fishery.

Output 1.4 Development of practical scientific methodologies and models to help address output 1.1, to help develop the capacity of PICTs to carry out scientific assessments and to promote the use of comparable methodologies by all States exploiting regional migratory resources

The methodology used by the OFP for regional stock assessment (the MULTIFAN-CL model) is a cutting edge tool that is becoming more widely used throughout the world. The OFP has been a prime mover in the development of this methodology and it is expected to continue to be the methodology of choice for regional assessments presented to the WCPFC. During this Strategic Plan cycle, the OFP acquired the rights to distribute and licence the software, and a website (www.multifan-cl.org) has been created for this purpose.

The capacity of PICTs to carry out assessments of their tuna fisheries remains limited. Attempts have been made to involve national fisheries staff in the production of NTFSRs but this has met with mixed success. In many cases, limited manpower resources in PICT fishery departments make even short-term attachments difficult to organise.

3.2.2 Objective 2: Oceanic fishery data collection and analytical support to PICT fisheries departments and regional processes

This objective is pursued through a series of outputs related to maintenance and enhancement of national and regional databases, dissemination of data and data products, enhancement of national observer and port sampling programmes and the conduct of analyses of statistical data as required.

Output 2.1 Regional tuna fishery and related databases maintained and improved in content and functionality

In PICT EEZs, coverage of tuna catches by logsheet data continued to exceed 90% (which it has done since 1997). Overall, logsheet data covers approximately 50% of the total tuna catch in the western and central Pacific. The main fishing activities not covered by logsheet data continue to be Japanese vessels fishing on the high seas and in their home EEZ, Korean and Taiwanese longliners fishing on the high seas and the domestic fisheries of Philippines and Indonesia. It is expected that logsheet coverage for at least some of these fishing activities will improve when the WCPFC implements its data provision measures. Coverage of tuna catches by observer and port sampling data continued to increase. A positive development during the period was the installation of data form scanning systems in four PICTs. These systems allow scanned data forms to be transmitted electronically to the OFP for processing, resulting in considerable savings in costs and processing time.

Output 2.2 Data disseminated at appropriate levels of resolution to other OFP sections, fishery departments and research agencies of SPC members, regional and global fisheries agencies, and the general public

Data dissemination schedules have been consistently met throughout the period. Routine data dissemination includes: quarterly or more frequent updates of national and regional (OFP and FFA) databases, annual publication of the Tuna Fishery Yearbook, biannual publication of the Tuna Bulletin, maintenance of OFP-owned content in the Fisheries Global Information System managed by FAO, maintenance of public-domain catch and effort data through the SPC/OFP website and dissemination of tuna fisheries data and other information on a request basis to individuals external to the OFP, subject to restrictions related to data confidentiality.

Output 2.3 Statistical analyses of tuna fishery data conducted as required

Analyses have been undertaken as requested by the SCTB Statistics Working Group and the WCPFC Scientific Committee Statistics Specialist Working Group. Requested analyses have included the estimation of the species composition of bigeye tuna in purse seine sets, the estimation of appropriate observer coverage rates in small-scale longline fisheries, and review of observer data relevant to purse seine and longline gear and vessel attributes. Work has been reviewed favourably by the requesting bodies.

Under this output, the OFP has provided statistical and analytical support to the FFA in its development of a Vessel Days Scheme for the purse seine fishery under the Palau Arrangement. This work was ongoing throughout the cycle and is expected to continue.

Output 2.4 National oceanic fisheries databases and statistical capability enhanced and linkages to regional databases maintained or enhanced

All PICTs with significant tuna fishing activities in their EEZs now have in place active national tuna databases. All databases are maintained by OFP staff with training provided where required. Databases are in routine use for the day-to-day management of domestic and licensed foreign fishing.

Output 2.5 Enhanced information resulting from tuna fishery port samplers and observers as a result of improved national and regional capacity

Considerable progress has been made with the implementation of observer and port sampling programmes in PICTs with significant domestic or foreign licensed fishing activity in their EEZs. Good progress has been made in Fiji, Marshall Islands, Tonga, Samoa and New Caledonia to name a few. However, with the exception of Papua New Guinea and purse seine vessels fishing under the FSM Arrangement, observer coverage of domestic fleets remains inadequate. Likewise, observer coverage of foreign licensed fleets with the exception of the US purse seine fleet remains inadequate. The OFP will continue to assist PICTs to raise observer coverage to regionally accepted standards.

Considerable efforts have also been made during the cycle to establish observer debriefing procedures as observer coverage increases. Debriefing is essential to enhance and document data quality. While some progress has been made, it has been difficult in most countries to retain experienced observers in debriefing roles because of high observer turnover. Observer debriefing will be an important feature of the integrated fishery monitoring systems that the POFMP will be attempting to implement.

3.2.3 Objective 3: Understanding pelagic ecosystems in relation to tuna and associated species stocks

Output 3.1 Enhanced models of regional pelagic ecosystem processes that promote progressively better prediction of tuna stock distribution, abundance and availability to fisheries

The SEAPODYM model is the programme’s “flagship” ecosystem model that has been under development since 1995. During this Strategic Plan cycle, important developments to the model included: increasing the time horizon of the simulations (now 1948–2004), incorporating model outputs from an improved ocean-biogeochemical model to estimate primary productivity, the implementation of a multi-species structure for tuna stocks, and the implementation of vertical partitioning in tuna prey abundance. Developments currently in progress are the implementation of a “mixed resolution” scheme that will allow areas of special interest to be subject to enhanced spatial resolution, and a formal non-linear parameter estimation procedure to be used in fitting the model to observations. Thus far, the model has been used primarily as a research tool to enhance our understanding of some of the dynamic processes underlying tuna distribution and abundance and its environmentally-driven variability. Model development and validation is now reaching a point where there will be significant “pay offs” in terms of its utility in providing practical guidance in fisheries management. Collaborative work is underway to use the model to test the effectiveness of marine protected areas as a management tool for tuna fisheries. The model also has considerable potential for use in predicting the effects of climate change on tuna stocks and fisheries, because the model can be easily interfaced with climate-prediction models to test various hypotheses. Collaborative work in these areas has been developed and will continue through the next Strategic Plan cycle.

Output 3.2 Better knowledge of tuna biological processes important to stock assessment and ecosystem assessment, including tuna movement, habitat utilisation, age structure, growth, feeding ecology, recruitment, and reproduction

Work has concentrated on tuna ageing, tuna movement and vertical habitat utilisation, and the trophic structure of the pelagic ecosystem in the tropical Pacific. Tuna ageing using otolith microstructure is an established technique in fisheries science and we have applied it to several tuna species in this region. The information on age and growth that these studies have generated are used directly in tuna stock assessment models. Likewise, tuna movement and vertical habitat utilisation have been estimated using electronic tagging, and the information used in the interpretation of longline fishery catch and effort, an important source of information on relative abundance used in tuna stock assessment. It is anticipated that both conventional and electronic tuna tagging will be a feature of future work plans, with support from the POFMP and other funding sources.

Understanding the trophic relationships of the pelagic ecosystem is fundamental to estimating the impacts of commercial fishing, which generally target the larger predators, on the overall ecosystem. Sampling conducted over the past three years has provided new information on dietary relationships and trophic levels. This next phase of this work will see continued sampling and the incorporation of this information into SEAPODYM and energy flux models.

4 Matrix Summary

Objective or Output	Progress Against Performance Indicators 2003–2005
<p>Objective 1: Comprehensive regular assessments of status and prospects of oceanic fisheries for PICT fisheries departments and regional processes</p>	
<p><i>Output 1.1: Overviews, reports and assessments leading to advice on the status and prospects of tuna fisheries and associated species at the regional level</i></p> <p><i>Generic performance indicator: Assessments over various scales and time-periods continue to be regarded by PICTs as useful in helping them achieve their fishery management goals, and by eminent peers as being scientifically excellent (as evidenced by review, by requests for assessments, and publication in peer-reviewed journals)</i></p>	<ul style="list-style-type: none"> • 10 full regional assessments produced • Regional assessments accepted and scientific advice based on the assessments produced by Scientific Committee • Management action as a result of the assessments currently being formulated • OFP requested to provide regional stock assessments to WCPFC over the next 3–5 years
<p><i>Output 1.2: Overviews, reports and assessments leading to advice on the status and prospects of tuna fisheries and associated species at the national level</i></p> <p><i>Generic performance indicator: NTFSRs and TMP inputs continue to be regarded by PICTs as useful in helping them achieve their national fishery management goals, as evidenced by requests for such services by PICTs; NTFSRs and TMP inputs inform and impact management decision making at the national level.</i></p>	<ul style="list-style-type: none"> • 9 comprehensive NTFSRs produced • NTFSRs contribute to TMPs • In some cases, NTFSRs have clear impact on management policy • However, effectiveness limited in some cases by slow implementation of TMPs • NTFSRs continue to be highly sought after by PICTs

<p><i>Output 1.3: Scientific support to, or on behalf of, PICTs during regional and international meetings and negotiations</i></p> <p><u>Generic performance indicator:</u> Advice continues to be regarded by member countries as useful in helping them achieve their goals, and by eminent peers as being scientifically excellent and persuasive</p>	<ul style="list-style-type: none"> • OFP support to FFC caucus during PrepCon, WCPFC, US Treaty • Provided scientific inputs to design of Palau Arrangement Vessel Days Scheme
<p><i>Output 1.4: Development of practical scientific methodologies and models to help address output 1.1, to help develop the capacity of PICTs to carry out scientific assessments and to promote the use of comparable methodologies by all States exploiting regional migratory resources.</i></p> <p><u>Generic performance indicator:</u> Methodologies developed result in progressively more comprehensive assessments, and are more widely used at the national and international level</p>	<ul style="list-style-type: none"> • Rights procured to allow distribution of MULTIFAN-CL software • Numerous software developments that allowed enhancement of assessments • Greater international use of methodology (USA NMFS, IATTC, ICCAT, Japan) • MULTIFAN-CL website established but uptake limited due to limited resources for maintenance
<p>Objective 2: Oceanic fishery data collection and analytical support to PICT fisheries departments and regional processes</p>	
<p><i>Output 2.1: Regional tuna fishery and related databases maintained and improved in content and functionality</i></p> <p><u>Generic performance indicators:</u> Annual logsheet data holdings increase towards 100% of the estimated annual amount of tuna fishing in the SPC member EEZs; coverage of aggregated catch and effort data bases approaches 100% of fishing activity in the western and central Pacific Ocean.</p>	<ul style="list-style-type: none"> • Coverage of total EEZ catches by logsheet data >90% for each year since 1997 • Aggregated catch and effort data provided by major distant-water fishing nations at ~100% coverage • Major gap continues to be lack of detailed data for domestic fisheries in Indonesia and Philippines

<p><i>Output 2.2: Data disseminated at appropriate levels of resolution to other OFP sections, fishery departments and research agencies of SPC members, regional and global fisheries agencies, and the general public</i></p> <p><u>Generic performance indicator:</u> <i>PICTs and other clients continue to regard OFP data products as the authoritative source of information on tuna fisheries in the western and central Pacific Ocean.</i></p>	<ul style="list-style-type: none"> • All data dissemination schedules met, annual <i>Tuna Yearbook</i> and biannual <i>Tuna Bulletin</i> published on schedule • OFP is authoritative and sole source of composite tuna fishery data for western and central Pacific • OFP requested to provide data management services to WCPFC
<p><i>Output 2.3: Statistical analyses of tuna fishery data conducted as required.</i></p> <p><u>Generic performance indicator:</u> <i>Analyses are based scientifically sound, as indicated by peer review by SCTB and/or publication in the scientific literature.</i></p>	<ul style="list-style-type: none"> • Requests continue to be received by FFA, WCPFC
<p><i>Output 2.4: National oceanic fisheries databases and statistical capability enhanced and linkages to regional databases maintained or enhanced</i></p> <p><u>Generic performance indicator:</u> <i>All PICTs with significant tuna fishing activities in their EEZs have in place active national tuna databases and data maintenance and reporting capacity.</i></p>	<ul style="list-style-type: none"> • All PICTs with significant fishing activity in their EEZs have national tuna databases customised to their needs • All databases updated regularly (at least quarterly), all countries visited at least once during 2003–2005 for system maintenance/enhancement and staff training • Data systems used by PICTs in day-to-day management of tuna fisheries
<p><i>Output 2.5: Enhanced information resulting from tuna fishery port samplers and observers as a result of improved national and regional capacity</i></p> <p><u>Generic performance indicator:</u> <i>Coverage rates of national port sampling and observer programmes approach regionally agreed standards and PICTs develop capacity to sustain programmes at the required levels.</i></p>	<ul style="list-style-type: none"> • Observer programmes developing gradually as resources allow • Observer and port sampling coverage generally do not meet accepted standards in most countries (some notable exceptions such as PNG) • Difficulties in retaining good observers result in limited human resources for debriefing and data quality control

<p>Objective 3: Understanding pelagic ecosystems in relation to tuna and associated species stocks</p>	
<p><i>Output 3.1: Enhanced models of regional pelagic ecosystem processes that promote progressively better prediction of tuna stock distribution, abundance and availability to fisheries</i></p> <p><u>Generic performance indicator:</u> <i>Progressively more accurate predictive models of WCTP pelagic fisheries ecosystems</i></p>	<ul style="list-style-type: none"> • SEAPODYM model extensively enhanced and provides generally consistent hindcasting of fishery data and consistency with MULTI-FAN-CL outputs • The benefits of the model in a management context are yet to be realised, requiring a formal parameter estimation component, which is currently under development • Demonstrable benefits of the model in ecosystem analysis evident through international interest in using it to forecast large-scale effects of climate change and test the utility of certain management approaches, such as MPAs • The quality of the work has been verified by publication in the peer-reviewed international scientific literature
<p><i>Section objective 3.2: Better knowledge of tuna biological processes important to stock assessment and ecosystem assessment, including tuna movement, habitat utilisation, age structure, growth, feeding ecology, recruitment, and reproduction</i></p> <p><u>Generic performance indicator:</u> <i>Output contributes to progressively more rigorous stock assessments by the OFP</i></p>	<ul style="list-style-type: none"> • Age and growth, habitat utilisation data used in assessments to validate model results and enhance interpretation of longline catch per unit effort • Trophic ecology data incorporated into SEAPODYM and other modelling approaches to indicate state of pelagic ecosystem • The quality of this work is largely yet to be tested by peer-reviewed publication

5 General Comments and Observations

5.1 Programme resources

The OFP is a very long-standing programme within SPC and its work programme has evolved over the years to meet the demands of changes in the fisheries, changes in the apparent status of stocks and the evolution of international best practice in fisheries science and management. The programme has had a reasonably stable funding base and staff complement over the past three years, largely through two large projects, the Oceanic Fisheries Management Component of the International Waters Programme, funded by the GEF, and the PROCFish project, funded by the European Commission. Both of these projects have ended, or will soon end. Both projects have provided significant resources for fishery monitoring, including national capacity building, and ecosystem modelling and research. A new five-year GEF project (POFMP) began in late 2005. This project, coupled with new funding support for work undertaken on behalf of the WCPFC, should see overall programme funding resources remain reasonably stable through the next three years. It is, however, hoped that a new EC-funded project will be developed during this period.

Special mention should be made of the new relationship developing between the OFP and the WCPFC in the context of programme resourcing. The SPC membership has authorised the OFP to provide scientific services to the WCPFC in the areas of data management and stock assessment on the condition that such services be adequately funded and they do not detract from the services provided to PICTs at the national level. With this in mind, it was agreed that services would be initially provided on an incremental funding basis, i.e. that WCPFC would pay for any additional work undertaken by the OFP on its behalf. This effectively means that the WCPFC would obtain that part of the OFP work programme that overlapped with their service needs for free. Thus, SPC would be subsidising WCPFC operations to some extent. It was agreed that this was appropriate at least while a large proportion of WCPFC members were also SPC members. However, there was also an acknowledgement that when the larger fishing nations, such as Japan, Korea, China and Taiwan, who are not SPC members, joined the WCPFC, the case for continuing such subsidisation would be much weaker. At that point, the WCPFC might be expected to bear a greater share of the cost of the overall services, including the area of historical overlap.

The initial annual funding support that was requested from the WCPFC was USD 254,510. This was proposed and accepted on the basis that OFP would need two new scientific positions to cover the incremental increase in work. For the first year (2005), it was agreed that about half of this amount (USD 127,500) would be budgeted for scientific services.

The intention now is to develop a MOU with the WCPFC that would cover these issues. Now that most of the larger fishing nations (Japan, Korea, Taiwan, China, Philippines) are in fact WCPFC members, it might be appropriate to consider re-negotiating the funding basis, or agreeing to a planned increase in support from the WCPFC. This negotiation would need to involve SPC members, and particularly our programme funding donors.

5.2 Programme directions and lessons learnt

Programme directions during the next three years are expected to largely follow and build upon the work undertaken in 2003–2005. Any changes in emphasis or focus are likely to be related to the advent of the WCPFC. The direct service provision role of the OFP to the WCPFC has been discussed above. In addition, and as noted earlier, most of the objectives of the POFMP are geared to assisting PICTs to fulfil their fishery monitoring and fishery management obligations to the WCPFC, and the OFP, in partnership with FFA, will be mobilising resources build national capacity in these areas. An important aspect of this work will continue to be the adoption of new technologies, and in particular use of the internet and related technologies to provide more efficient communication, data management and dissemination.

The next Strategic Plan is also likely to re-emphasise the importance of the ecosystem approach to fisheries. The OFP's contribution to implementation of the EAF at the regional and national levels will be through modelling and field-based research to enhance understanding of the tropical Pacific pelagic ecosystem and the factors, including the fisheries, that affect it.

A succession of regional scientific fora in recent years has noted the need for a new large-scale tagging project for tropical tunas in this region. The importance of this work was again raised at the recent WCPFC Scientific Committee in the context of providing important information on current levels of exploitation, as well as information on stock structure and mixing rates. The OFP has been at the forefront in implementing previous large-scale tagging programmes and is likely to be so again. The proliferation of FADs in the purse seine fishery over the past ten years will likely see FADs receive a special focus in any new tagging project. Renewed attempts will be made during the next three years to secure the necessary funding support for a large-scale tagging project. The funding required will be considerable, in the region of USD 5 million for a full-scale project, largely due to the need to charter a full-time pole-and-line vessel as the principal tagging platform. The effectiveness of this approach, and the failure of its alternative (opportunistic tagging on board commercial vessels), is a key lesson learnt from previous OFP work.

A focus and a challenge of the programme over the next three years will continue to be the implementation integrated fishery monitoring systems in PICTs that allow them to satisfy both their national management needs and their reporting obligations to the WCPFC. This is a challenging task because of the diversity of fisheries and their dynamic nature. A big part of the challenge continues to be to develop, and retain, the human resources in-country to implement and manage these programmes. This problem is even greater in the area of data analysis and stock assessment. Qualified people are difficult to find and even more difficult to retain. The human resource situation will at best improve slowly over time because of inherent structural characteristics, particularly economic and infrastructure, within most PICTs. Because of this, a balance between regional service provision and national capacity building in tuna fisheries science will continue to be needed.

6 Finances

Resources (Income budget)	2003	2004	2005	Total
Core budget	11,050,000	12,632,000	12,820,000	81,480,000
Programme funding				
Australia	52,160,000	52,000,000	52,000,000	97,500,000
France	25,000,000	26,000,000	26,000,000	54,500,000
New Zealand	7,000,000	8,100,000	7,000,000	150,700,000
Project Funding				
EC	185,500,000	117,174,300	135,000,000	5,450,000
GEF	38,590,000	32,486,200	50,160,000	178,547,000
PNG	2,910,000	-	-	26,653,100
Taiwan/ROC	2,500,000	4,993,800	-	21,180,000
Other	22,460,000	4,096,600	2,500,000	15,877,000
Total	347,170,000	257,482,900	285,480,000	631,887,100
in CFP				

Source: Revised budgets 2003 and 2004, Budget 2005

