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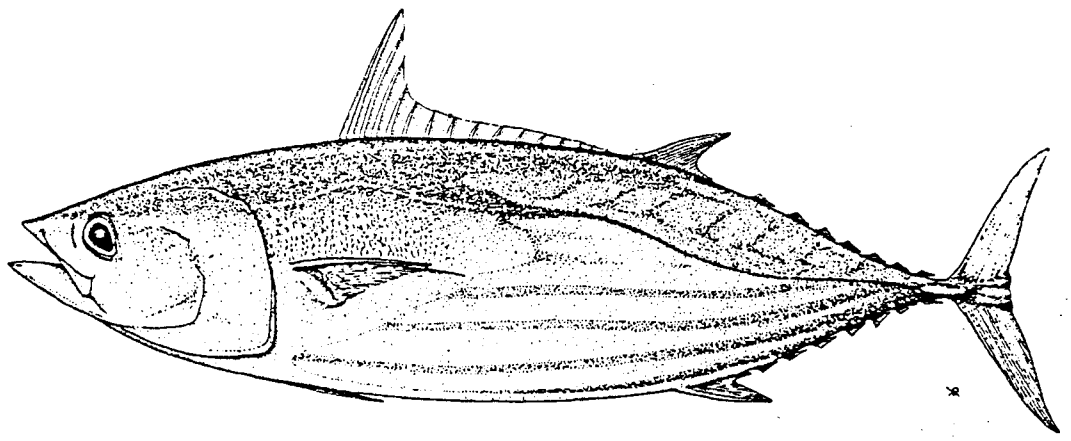
SOUTH PACIFIC REGIONAL TUNA RESEARCH PROJECT



Tuna and Billfish Assessment Programme
South Pacific Commission
June 1992

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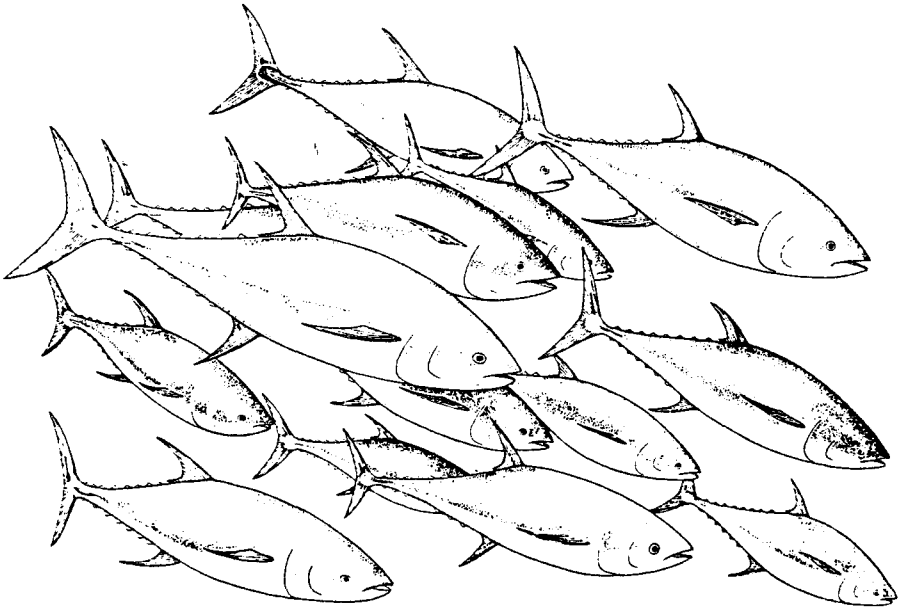

A proposal by the South Pacific Commission, Tuna and Billfish Assessment Programme for funding by the European Community under Lomé IV

February 1992

Chapter I

1. Project Summary

1.1 Background and Purpose of the Project

This South Pacific Regional Tuna Research Project (SPRTRP) will enable the Tuna and Billfish Assessment Programme (TBAP) of the South Pacific Commission (SPC) to implement continuous scientific monitoring of the region's tuna fisheries and to undertake and refine the tuna resource assessment work based on the results of the EC-funded Regional Tuna Tagging Project (RTTP).

The project will thus initiate a second stage in the development of the TBAP. The first stage, the gathering of broad-brush information on the status of rapidly expanding South Pacific tuna fisheries and the stocks that support them, was based on priority applied research projects. In the last three years, the RTTP has been the focal point of this research. Stage 2 adds continuous monitoring of the fishery and research to address the information gaps identified by the first stage. Stage 3 is envisaged to be the eventual implementation of a scientific advisory function to a regional tuna management regime. Such a regime would ensure the formal cooperation of all relevant nations in the development of Pacific Island fisheries, the maintenance of South Pacific tuna stocks at levels of long-term sustainability and would go further towards fulfilling international commitments made under the United Nations Convention on the International Law of the Sea.

The TBAP has completed nearly 10 years of research on a fishery which now supplies the majority of the tuna consumed by the world. Over 1 million tonnes of tuna, worth around US$2 billion, was taken in 1990 from the area to which this project will refer: a fishery which has doubled in volume since 1980, and could increase further in coming years. Despite this being one of the major global fisheries, comparatively little is yet known about the population dynamics of its component species -- even the total catch is not known with any degree of accuracy. At the moment, the vast majority of the regional tuna catch is taken by distant-water fishing Nations (DWFNs), and the Pacific Island States naturally see a great deal of economic development potential in these fisheries. If these States are to plan such development, more detailed information on, and more directed analyses of the extent, resilience, future catch potential and effects of current fishing effort are needed. The previous work of the TBAP has laid the groundwork for such analyses, and has already had a large influence on the economic development of the fishery. This project will enable the SPC to consolidate and extend this scientific work to the stage where rational and biologically sustainable management of regional tuna stocks becomes possible. The activities proposed for SPRTRP support are all within the existing general framework of TBAP objectives. The proposed new activities, categorised by broad TBAP objectives are:

Statistics and Monitoring

- Establishment and operation of a scientific port sampling programme;
- Establishment and operation of a scientific observer programme;

Biological Research

- Regular, but small-scale fieldwork sub-projects, including further tuna tagging to elucidate localised stock assessment or interaction questions. Such sub-projects may be carried out in collaboration with other regional or national research programmes;
- Establishment and operation of a laboratory facility for the processing of samples useful to research on age, growth and reproduction of tuna and billfish;
- Establishment of facilities to enable postgraduate students to pursue research projects of relevance to the objectives of the TBAP;

Assessment and Modelling

- Continuing analysis of the results and information generated by the RTTP, with particular regard to stock assessment and interaction issues;

- Development and application of stock assessment techniques based on size/age composition, catch/effort and supporting biological data;

Reporting and Liaison

- Support for the publication and presentation of project results, both to national and to regional administrations.

In addition, the SPRTRP would provide funding support for the TBAP computer facility, which is central to much of the work of the project. This support would entail mainly the upgrading and maintenance of hardware and software resources, including the TBAP Regional Tuna Fisheries Database.

The member Governments of the SPC include eight ACP member states (Fiji, Kiribati, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa). This project was agreed by those countries as a priority for resource allocation under the Lomé IV Regional Programme. Accordingly the Thirtieth (1990) South Pacific Conference strongly supported the submission of the project for EC funding[1].

1.2 Principal Resources to be Deployed

Over the next 5 years (1992-1996), the project will undertake various analytical work in support of regional, sub-regional and national tuna fisheries management, activate port sampling and scientific observer programmes to continuously collect information needed for stock assessment, carry out several short-term tuna tagging experiments or other research directed at filling informations gaps identified by previous and ongoing work, and will enhance the operation of the TBAP Regional Tuna Fisheries Database and associated computer system.

The project will directly employ 10 staff plus 5 in-country staff and will be fully integrated with existing TBAP projects and facilities. The in-country staff will be placed as scientific samplers at key landing or transhipment points. The project will also add biological sample processing capabilities to the TBAP, in particular for undertaking age determination and reproductive studies, in the first instance by funding such work on a contractual basis to a suitable laboratory, and eventually by providing limited laboratory facilities to the TBAP itself. Training of ACP nationals will be undertaken by way of at least two postgraduate studentships.

1.3 Cost, Method of Financing and Financing Plan

The project will cost ECU 5,532,000 over the 5 years of its operation as follows:

Year:	1992/3	1993/4	1994/5	1995/6	1996/7
ECUx1000:	1,068	903	1,237	1,147	1,177

The project will operate with the support of ongoing SPC core services (administration, staffing, maintenance, library etc. services - estimated to be worth over ECU270,000 per year to the TBAP), and the analytical, management and support services of the TBAP core staff, currently supported by SPC extrabudgetary funding from France, Australia, United States and New Zealand (currently worth ECU378,000 per year).

Financing would be by means of a grant to the South Pacific Commission, with overall project administration undertaken by the Delegation of the Commission of European Communities in Honiara. Contingency funding

[1] Apart from its committment to the ACP countries, the EC also has an interest in these fisheries as a coastal "state" (France and UK have territories in the region), as a potential distant water fishing "nation", and as a major consumer of the tuna caught in the region.

at 5% is included in the financing plan to account for possible future fluctuation in exchange rates, and unforeseen expenditure.

1.4 Implementing Details

The TBAP core programme of analytical, management and support staff has been operating for nearly 10 years; research and monitoring methodology has been extensively tested and refined by the tuna tagging and albacore fishery observer projects (described at length by those previous EC project proposals), and there should be little delay in implementation of this project beyond the time needed for essential staff recruitment.

Staff recruitment and tendering for services will be according to the procedures followed by those previous projects, and compatible with both SPC and EC procedures.

1.5 Timetable

The project has a target starting date of 1 October 1992, and will therefore dovetail with the RTTP, which is scheduled for completion (in terms of EC funding support) on 30 September 1992. The project will run for 5 years (60 months) and is therefore scheduled to conclude on 30 September 1997.

1.6 Main Results Expected

The main results expected from this project, with the support of the TBAP, are:

- the preparation and publication of indicative stock assessments for the four commercial tuna species of the region (including bigeye, about which little is currently known), and specific studies on aspects of the biology and fisheries for these species;

- the operation and consolidation of a continuous scientific tuna fisheries monitoring programme, providing fisheries catch/effort and biological data for the above analyses through scientific observers and port-samplers;

- an indicative assessment of the scope and biological consequences of possible interactions between, and bycatches of, certain major fisheries of current regional interest;

- the provision of periodic status reports on national tuna and billfish fisheries to Pacific ACP states, as requested;

- key scientific input to the production, if not the initial implementation, of an internationally-agreeable plan for the operation of a scientific advisory function to a future regional tuna management body.

Chapter II

2. Description of the Sector

2.1 Summary of Grounds for Selecting the Fisheries Sector

The fisheries sector is the most important primary production sector for the islands of the South Pacific region. This is particularly true of the smaller and less-developed island nations, where fisheries are of prime importance both socio-culturally and economically, but all South Pacific Commission island members place great reliance on the harvest of marine resources.

For the subsistence economy, to which most Pacific islanders still subscribe, fishing provides the bulk of protein intake and contributes greatly to the comparatively high standard of nutrition in the developing countries of the region. Average fish consumption per head can be over 250kg per annum in atoll populations[2], and the larger, more agricultural, island populations have a fish consumption much higher than the global average.

Fisheries, particularly the pelagic fisheries for tuna, are considered in many cases to provide these nations' most immediate and viable prospect for development and economic self-sufficiency. While many national inshore fisheries are approaching optimal exploitation and entering a consolidation phase, the oceanic fishery for highly migratory tuna species is much wider in extent and, so far, little exploited on a commercial basis by Pacific islanders.

2.2 The Sector in Regional Plans

Although most fisheries sector planning in the region is done at the national level, particularly for reef and lagoon resources, planning for the acquisition of maximum economic benefits from highly-mobile oceanic tuna stocks has logically taken a more regional approach.

The region has two major organisations concerned with the development of fisheries in the South Pacific island region:

- The Forum Fisheries Agency[3] of the South Pacific Forum, with membership by all independent states in the region[4], is concerned with the implementation of inter-Governmental fisheries management and access agreements, and maximising the economic benefit to island states from the tuna fisheries within, and adjacent to, their 200-mile zones;

- The South Pacific Commission[5], with membership drawn from the South Pacific territories of certain metropolitan states (France, UK, USA) as well as the Forum states and the metropolitan states themselves, through its Fisheries Programme provides advice to island members on the development of their fisheries. The TBAP, as the largest of SPC's Fisheries Programmes is particularly concerned with undertaking scientific research and providing advice on the biological status of regional tuna resources.

These two major organisations have a complementary role. On the tuna fisheries which are the target of this project dossier, the FFA handles the political and economic aspects, and the SPC TBAP handles the scientific aspects.

This regional approach to certain aspects of fisheries development has been initiated by member countries for several reasons:

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[2] Coyne, T., J.Badcock and R.Taylor (1984). The effect of urbanisation and western diet on the health of Pacific Island populations. *Technical Paper No.186, South Pacific Commission, Noumea, New Caledonia.*

[3] Established by Convention in 1979.

[4] Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, Western Samoa.

[5] Established by Charter in 1947

- Many SPC member countries are very small, with little hope of maintaining comprehensive fisheries research and management capabilities of their own. Regional organisations provide them with both a service they could not otherwise obtain, and fora for drawing on the experience of other countries in the region;

- The western Pacific tuna fishery is now the largest and most productive tuna fishery in the world, and attracts distant-water fishing fleets from many nations outside the region. Individual South Pacific states lack economic and political influence but, through regional cooperation, they are asserting firmer control over the exploitation of fisheries within their 200-mile zones. Because their own tuna fisheries capability is not yet highly developed, they are not significantly hampered by intra-regional competition;

- The main fisheries resource of the region, the tropical tunas, is highly migratory and fisheries cannot be managed at optimum and sustainable levels by each country working in isolation.

Because of these issues, the fisheries sector has fostered frequent dialogue and close co-operation between South Pacific island administrations. This was nowhere evinced more clearly than in the regional solidarity shown in face of the recent massive increase in distant-water driftnet fishing effort on South Pacific albacore tuna. The tuna fisheries are a common factor that might possibly promote a future regional economic community of the South Pacific.

While there is not yet a definite regional plan for South Pacific regional development in the fisheries field, there is clearly a growing need to establish an effective and internationally-cooperative management regime for stocks of highly migratory species within the next 5-10 years. In recent dialogue between the South Pacific and DWFNs, the South Pacific parties stated that such management must be based on the existing South Pacific regional fisheries organisations.

A two-tier management plan is envisaged by South Pacific countries, with SPC providing a scientific secretariat and FFA initiating the legal and executive functions. However, a great deal of applied research still needs to be done before a management regime based on the principles of maintaining long-term optimum sustainable yields and maximising the economic benefits for the resource custodians, can be effectively implemented.

This project aims to provide the TBAP of the South Pacific Commission with the basic capability to continue the research work it has performed so successfully over the 10 years since its inception, and to further develop its role towards fulfilling a scientific secretariat function in a future international management regime for South Pacific stocks of highly migratory fishes.

2.3 The Fisheries Sector in the Regional Economy and its Performance

The economy of the South Pacific region, particularly the domestic food economy and the subsistence "economy", is often dominated by fishing. Foreign exchange earnings from fisheries have increased dramatically over the past decade from two major developments:

- The assumption of control over the resources of 200-mile zones has enabled many South Pacific nations to increase economic benefit from increased tuna fleet operations in those zones, through access fees, the operation of canneries, transhipment or re-supply points and, for a few, the operation of national tuna fishing fleets;

- The rapidly increasing demand from the rest of the world for seafood commodities, to the extent where many Pacific Island inshore fisheries (such as lobster, crab, trochus, beche-de-mer), are dominated by export-market-driven exploitation.

Many contributions to island economies from the fisheries sector are difficult to quantify in a meaningful way. For example, several SPC members have little visible trade in fish products but hundreds of thousands of tonnes of tuna are fished within their exclusive economic zones, bringing in revenue from access fees, fleet resupply and transhipment facilities, and employment.

Because these countries are small, both in population and economy, sources of error in published statistical compendia become very significant, particularly when quantifying the total contribution of fisheries to domestic island economies in the absence of comprehensive market survey, or catch-recording mechanisms.

Figures for external trade are somewhat more reliable. Without being authoritative, the following tables are indicative of the relative contribution of fisheries to the external trade of Pacific ACP countries.

Table 1a.[6] Some demographic, economic and geographic features of Pacific ACP countries.

(1985) Country	Pop'n (x 1000)	GNP per head (US$)	Land area (sq. km.)	EEZ area (sq. km.)
Fiji	715	1,660	18,200	1,293,100
Kiribati	61	460	690	3,558,200
PNG	3,253	700	462,243	3,127,000
Solomon Is.	286	470	28,530	1,343,200
Tonga	101	780	699	701,500
Tuvalu	8	570	26	902,000
Vanuatu	145	530	12,189	681,600
W. Samoa	163	570	2,935	120,200

Table 1b.[7] Some import/export statistics for Pacific ACP countries.

(1984) Country	Total export value (US$/head)	Food import value (US$/head)	Percent fish in total export	Percent fish in food import
Fiji	253	97	* 7.62	13.94
Kiribati	388	86	0.71	4.71
PNG	243	58	1.45	15.61
Solomon Is.	323	31	* 24.63	6.49
Tonga	43	90	0.66	6.98
Tuvalu	9	92	0.00	1.63
Vanuatu	123	71	1.46	9.66
W. Samoa	114	66	0.00	9.94

* Note: Fiji and Solomons are the only two South Pacific ACP states possessing tuna canneries.

Domestic fish catches are an important component of all domestic economies, whether cash or subsistence, but reliable quantification is not available for most countries. Fiji has one of the most comprehensive fisheries market survey capabilities and the Fiji Fisheries Division estimated that US$9,851,000[8] of fin-fish and

[6] Source: Forum Secretariat

[7] Source: United Nations International Trade Statistics Yearbook. Note that fish imports for all countries are mainly canned mackerel, although the figures for Fiji "import" of fish includes a large proportion of fish caught in Fiji waters by chartered foreign longliners and landed at the Fiji cannery.

[8] Using a 1989 exchange rate of F$1.4049 = US$1.00

US$1,857,000 of other seafood were sold in Fiji by domestic commercial fishermen in 1989. An additional US$25,000,000 (assuming values equivalent to commercial prices) worth of fish is broadly estimated to have entered the Fiji subsistence economy in 1989.

Fiji and the Solomon Islands are exceptional amongst Pacific ACP States in that they have small to medium scale industrial tuna fisheries supplying domestic canneries. The domestic raw tuna catch landed in Fiji in 1989 was worth US$9,900,000 and contributed approximately 70% to the US$26,400,000 worth of canned tuna exported from Fiji in that year. The Solomon Islands exported US$31,900,000 worth of canned tuna from domestic catches made in 1988, as well as a considerable amount of raw tuna (some to the Fiji cannery). At least one other Pacific ACP state (Papua New Guinea) has recently made a commitment to cannery establishment.

The fisheries sector is generally unevenly developed in the Pacific islands. While a large percentage of the population of the islands is engaged in part-time fishing activity, this activity does not normally contribute to the cash economy. The estimates given above for Fiji, where around 50% of the total value of fish caught enters the subsistence economy, represents a comparatively high level of commercial activity for the region.

Commercial fisheries are often most highly developed relative to the export trade. The export of certain high-value fisheries products requires little capital investment and all Pacific ACP countries receive considerable "help" from foreign entrepreneurs in developing these fisheries. Most of these fisheries involve the harvesting of limited-yield sedentary species of shellfish, crustaceans and holothurians and are usually incapable of yielding a large and sustainable return.

2.4 Description of the Fisheries Ssector and its Component Parts

The fisheries sector in the South Pacific region has several major components, as outlined earlier. These can be classified as follows:

- **Subsistence fisheries**

  These are well developed throughout the region and usually involve women to a large extent. In many Pacific societies, women are the gatherers, or reef-gleaners for sedentary species, while men are the hunters, or fin-fishermen. These fisheries are normally managed through traditional administration and reef-ownership although national authorities exert increasing control in some countries. Traditional tuna fisheries exist in many small islands of Polynesia and Micronesia, but large-island traditional fishermen do not generally venture beyond the limits of the barrier reef.

- **Commercial reef and lagoon fisheries**

  Commercial inshore fisheries are best developed in the more urbanised countries of the region and, in some islands of high population density, are considerably overfished. In all countries the national administration has considerable powers of fisheries management, but generally lacks the manpower and expertise to put this into effective practice. In many countries the state plays an important role in developing fisheries and marketing products through statutory bodies and direct intervention. In most, the private sector is geared primarily towards export and often financed by offshore capital.

- **National offshore fisheries**

  Many of the resources available to national administrations are put into developing infrastructure in pursuit of the offshore fisheries for pelagic (tuna and billfish) or demersal (deepwater snapper) species, since these are the fisheries most capable of producing high, sustained yields for export.

  The outer reef slope resource of deepwater snappers is comparatively limited, but high-value for export as fresh fish, and is generally pursued by small to medium sized vessels.

The skipjack tuna fishery was entered by several island nations in the late 1970's with Government-sponsored pole-and-line vessels, usually in joint-venture arrangements, or under foreign aid support. The Solomon Islands and Fiji have developed this concept the furthest[9] with the emplacement of tuna canneries to handle the output of their fleets, but Kiribati and Tuvalu also have small pole-and-line fleets. For over a decade, Papua New Guinea had the largest pole-and-line fishery in the region, but this has not been operative since 1982. The position of these enterprises is still fragile and will continue to be so while the vast majority of fishing in the region is carried out by distant-water fishing fleets in the absence of an internationally-accepted regional regulatory authority.

Other tuna fisheries are as yet of minor significance at the national level, although the potential of coastal longlining for yellowfin and bigeye tuna is developing rapidly in certain countries, largely driven by the private sector and the prospect of high value exports of fresh sashimi-grade tuna. Another development prospect for the more southerly island nations is the recently-developed troll fishery for southern albacore tuna, which Fiji and French Polynesia are now entering.

- **Distant-water fisheries**

By far the largest volume of fish produced by the South Pacific region (around 1,200,000 tonnes of tuna in 1990) is taken by distant-water tuna fishing vessels. Japan, USA, Korea, Taiwan, the Philippines and Indonesia are currently most important, but this relative ranking is likely to change as South East Asian purse-seine fleets become larger and possibly more competitive with Japan and USA.

These fleets, where not fishing on the high seas[10], are generally regulated by bilateral access agreements between the coastal State and the industry or the government of the DWFNs. However, the US purse-seine fleet is regulated by a multilateral access agreement with South Pacific Forum members in addition to bilateral agreements with French territories, and the Forum States are pursuing multilateral agreements with other DWFNs. Such multilateral agreements are seen as desirable by island states to improve management and control of the fishery, but also have considerable advantages for distant-water fleets by streamlining and ensuring access to a wider area.

2.5 Scope for Developing the Sector

Not every country is devoid of prospects for further developing reef and lagoon fisheries for export. Papua New Guinea, for example, is considered to have considerable inshore resources yet untapped by its largely agricultural population. However, in general, the best prospects for commercial development in most Pacific island countries involve tuna fishing.

The tuna fishery is on a different scale to reef and lagoon fisheries. The 1977-1981 Skipjack Survey and Assessment Programme of the South Pacific Commission broadly estimated the skipjack resource alone within the SPC statistical area to be capable of sustaining an annual catch of 3 million tonnes. By comparison, this is equivalent to around half the estimated annual fishery potential of the combined coral reefs communities of the entire planet. At current exploitation rates, which are less than 30% of the estimated potential in the case of skipjack, the fishery within the western tropical Pacific produces nearly half the global catch of the primary market species of tuna.

But tuna fisheries also require a much higher level of investment than can be matched by inshore artisanal fishermen. Few Pacific island nations have developed the necessary infrastructure to exploit tuna fisheries on a commercial scale, and this investment is much below that needed to optimally exploit the tuna resources even within their own Economic Exclusion Zones.

For many countries, the best immediate prospect of gaining financial benefit from tuna lies in access fees from distant-water fishing fleets, and ultimately in regional management of the fishery. For some, there are benefits

[9] The Solomon Islands has developed further into purse-seining.

[10] The SPC statistical area is 35% high seas.

to be gained from the operation of port and transhipment facilities or canneries. But most countries hope to develop their own commercial tuna fishing capability to the greatest extent possible and thus retain maximum financial benefit from the fishery within their own waters.

For any of these prospects to be developed and sustained, a knowledge of the extent and carrying capacity of the stocks available is essential.

Through the work of the South Pacific Commission's tuna programmes over the past 14 years, the region has developed an understanding of the extent of the skipjack tuna resource, and continuing work is focused on yellowfin and albacore tuna, as well as skipjack. Future work must also concentrate on the population dynamics of bigeye tuna, about which little is known, and several commercially important billfish species.

But a knowledge of the extent of the resource is only a first step towards fisheries development. Regional resource managers will also need to know whether the resource is underfished or overfished and how much is available for harvest. There is considerable work to be done even in compiling full records of existing fishing effort -- the catch/effort logsheets returned by fleets to the SPC tuna database probably still cover less than 50% of the regional tuna catch.

Of more immediate concern to the region is the possible effect of interactions between fleets and between fisheries. For example, although the total resource may not be in danger of overfishing, an increase in surface fisheries for one particular species could cause a reduction in longline fisheries for the same species. Or an increase in fishing effort for one species, without endangering that target species, could lead to overfishing of an incidentally-caught species. Local depletion may also occur, impacting local fisheries and economies.

While the tuna tagging work accomplished so far by the SPC has elucidated some of the migratory movements and population dynamics of skipjack tuna, these results are benchmarks, and will need to be continually updated and refined if they are to be of practical use to resource managers. A great deal of basic biological work still needs to be done on all tuna species to enable better predictions of how stocks will respond to fishing pressure.

The most fundamental underpinning of any mechanism for rational management of these highly migratory tuna species must be international co-operation, both at the scientific, and at the political level. The TBAP has long-established fora for international scientific co-operation on pelagic fisheries and, in addition to its ongoing role in the development of regional tuna fisheries, will play a critical future role in the rational management of these resources.

2.6 Measures Adopted Within and Outside the Sector

The purpose of this project is to foster a scientific context for the rational management of regional tuna fisheries.

Several more developed nations both within the region (Australia, France, New Zealand, USA) and with distant-water fleets fishing for tuna within the region (Japan, Taiwan, USA[11]) have undertaken research programmes on aspects of South Pacific tuna fisheries. But, at the national level, the island nations of the South Pacific generally lack this sophisticated capability and have pooled their resources in the South Pacific Commission towards this end.

The TBAP maintains a centralised processing facility for island nations' input of tuna fisheries catch and landing information, as well as undertaking research and providing tuna stock assessments and reviews at both the national and regional level. The TBAP also provides a forum for the more narrowly-focussed research by individual nations to be integrated into the regional overview.

[11] Note that the USA is an SPC member by virtue of its South Pacific territories, but that its tuna fleet is composed of distant water vessels.

This devolution of tuna research to the regional level, as well as working with a view to fulfilling the spirit of Article 64 of the Law of the Sea, has enabled island nations to concentrate their research capabilities and financial resources on pressing problems of national scope. This strategy is also implicit in the activities of funding agencies who generally apply national funding in support of research projects on inshore fisheries, while applying tuna research funding to the regional bodies.

The SPC extrabudgetary funding support for the TBAP has come from four major donors: France, USA, Australia and New Zealand, while support for specific projects has recently come from EC (RTTP and Albacore Research Project) and Canada (Coordination of albacore data).

All measures taken at both the national level (island country's tuna data-collection and developed countries research on aspects of tuna of significance to the fishing effort of those nations) and at the regional level (Forum ACP state initiatives towards regional management of tuna) are compatible with the aims of this integrative project.

This South Pacific Region Tuna Research Project is intended to provide many of the extended core functions of the SPC's TBAP over the next five years, and will provide the means for continuing the elucidation of the biology and population dynamics of tuna stocks in the South Pacific Region, and providing the scientific basis for their future international management.

Chapter III

3. Background and Purpose of the Project

3.1 Grounds for Choosing the Project for Sectoral Support in the Light of the Problems to be Resolved and the Needs to be Satisfied.

The broad grounds for choosing this project for sectoral support are outlined in **Chapter II**, and are defined by the regional need to intensify and coordinate research on the most economically potent fisheries of the South Pacific. Western Tropical Pacific tuna catches have doubled over the past decade but stock assessment, biological research and understanding of the dynamics of the resource have shown less than commensurate increases.

This chapter will consider the background and purpose of the project in the context of the tuna fisheries of the South Pacific region.

3.1.1 Choice of Type of Operation

The broad structure of the South Pacific region fisheries sector is outlined in **Chapter II**. This project is directed at the oceanic tuna fishery sub-sector.

This sub-sector covers a range of scales at present, from small-island traditional tuna fisheries, through SPC member country domestic commercial tuna fisheries, up to large distant-water tuna fishing fleets. The distant-water fishery is by far the most significant, in terms of total biomass of tuna taken.

The distant-water fishing fleets are very heterogeneous both in types of vessel and in target species. Four main stocks are exploited: skipjack tuna, yellowfin tuna, albacore tuna and bigeye tuna; by a variety of fishing methods: purse-seining, longlining, pole-and-lining and trolling; and by a variety of fleets, ranging from American super-seiners to small Taiwanese sashimi longliners. Smaller quantities of billfish and tuna-like species are also taken by a variety of gears, including recreational.

Reliable statistics on the volume and area of catch are difficult to obtain, indeed, one of the main purposes of this project is to improve the collection of such data for the purpose of stock assessment. The commercial catch of tuna from the Western Tropical Pacific is broadly estimated at 1,200,000 tonnes for 1990. Around 5% of this total was caught by Pacific Island States (mainly Solomons) with the remaining 95% caught by fleets from outside the region. The small island subsistence tuna catch is negligible in the context of the overall fishery.

Table 2 contains a summary of the 1990 catch estimates in the SPC statistical area, by fleet nationality and gear type, compiled from a variety of sources, including logsheets supplied to the SPC tuna database.

While a great deal of tuna is caught in the region (the Western Tropical Pacific produces around 50% of the total volume of primary market species of tuna consumed by the world), the majority of processing and almost all the consumption of product takes place outside the region. Within the SPC region, there is one cannery in the Solomons (processing domestic catches of tuna under joint ventures) and one in Fiji (now fully Fiji-owned and processing domestic tuna catches with supplements from the Solomons and Kiribati). American Samoa is the site of 2 tuna canneries, processing mainly US purse-seine (and latterly albacore troll fleet) output, as well as the catch from some Taiwanese and Korean longliners. Papua New Guinea has plans to construct a cannery in the near future, and other nations have expressed strong interest in doing so.

The rest of the catch is landed for processing outside the region, mainly in Thailand or Japan, but also Taiwan, Korea, Puerto Rico and increasingly Indonesia. Tinian and Guam (in US Micronesian territories) are significant transhipment points for South Pacific catches en route to Asia, but other island nations are increasingly likely to act as transhipment points under the terms of bilateral access agreements between coastal states and DWFNs.

Table 2. Summary of 1990 estimated tuna catches in the SPC statistical area.

Country	Gear	Vessels	SKJ	YFT	BET	ALB	OTH	Total
Australia	LL	67		236	5	18	31	290
Fiji	PL	9	3507	516			6	4029
Indonesia	PS	3	10790	2210				13000
	Various		101115	57995				159110
	Total		111905	60295				172110
Japan	LL	520		32612	28383	5102	3435	69532
	PS	39	157823	43575				202672
	PL	61	76193	1000				77193
	DN	20				5567		5567
	Total	640	234016	77187	28383	10669	3435	354964
Kiribati	PL	5	421	142			6	569
Korea	LL	72		6199	6467	4340	1398	18404
	PS	38	112480	39520				152000
	Total	120	112480	45719	6467	4340	1398	170404
New Caledonia	LL	4		248	24	566	310	1148
New Zealand	PS	?	4750					4750
	TR	125				3341		3341
	Total	?	4750			3341		8091
Philippines	PS	11	18880	8026				26906
	Various	?	64654	62146				126800
	Total	?	83534	70172				153706
Solomon Is.	PL	33	19166	2309			82	21558
	PS	4	4418	3662			98	8178
	Total	37	23584	5971			180	29736
Tonga	LL	1		36	13	191	48	288
Taiwan	LL	?		4925	3782	9680	1195	19582
	PS	32	104960	23040				128000
	DN	11				2710		2710
	Total	?	104960	27965	3782	12390	1195	150292
USA	PS	38	105660	56670				162230
	TR	49				5102		5102
	Total	87	105660	56670		5102		167332
Total	LL	?		44256	38674	19897	6417	109244
	PS	165+	519761	176703			98	696562
	PL	108	99287	3967			94	103348
	TR	174				8443		8443
	DN	31				8277		8277
	Various	?	165769	120141				285937
Grand total		?	784817	345067	38674	36617	6609	1211784

Codes: LL: longline; PS: purse seine; PL: pole-and-line; DN: driftnet; TR: troll; SKJ: skipjack; YFT: yellowfin; BET: bigeye; ALB: albacore; OTH: other tuna or billfish

The main consumers of canned tuna are North America and the EC. Canned tuna has not found widespread acceptance amongst Pacific islanders when canned mackerel is cheaply imported from temperate countries[12].

While skipjack, albacore and yellowfin tuna for canning account for the vast majority of the biomass taken, landings of deep-frozen or fresh high quality tuna (largely yellowfin and bigeye) have a much higher unit value. Such "sashimi-grade" fish is taken by longliners of many nations, with a recent large influx of small Asian vessels in the western part of the region. However this fishery is also the focus of considerable private sector development effort in several Pacific ACP states.

The prospects for the sashimi fishery are essentially tied to consumption and economic trends in the main market: Japan. Unless other markets develop (Korea and Taiwan are consumers) the increasing supply of sashimi tuna from small Asian vessels is likely to provide stiff competition for Pacific island longline fisheries.

The canned tuna market remains the mainstay of the fishery, and global consumption is steadily increasing with Western Tropical Pacific tuna taking a rapidly increasing share of the market following static catches, or downturns, in other regions. Consumer pressure on canneries to avoid processing tuna caught in association with dolphins will cause a continuing influx of purse-seine fleets from other areas, particularly the Eastern Tropical Pacific. The recent influx of driftnet vessels to the South Pacific from other regions (and the eventual cessation of this activity) is well-documented.

Pacific ACP state canneries have a slight advantage in the marketplace because of the premium paid for the higher quality skipjack and yellowfin resulting from pole-and-line fishing, the method still favoured by most island fleets[13]. Purse-seining produces a lower-quality product because of net-damage and compression effects, but it is increasingly unlikely that this price differential will be able to compensate for the higher operational costs and lower efficiency of current methods of pole-and-lining[14].

It is difficult to quantify the employment resulting from tuna fishing in South Pacific island countries. Around 1,200 Fijians are directly employed in the Fiji tuna industry (many as vessel crew, but mostly in canning and processing), and around twice that number in the Solomons. Tuna canning is the major industry in American Samoa. Many Pacific Islanders (particularly ni-Vanuatu, Kiribati and Tuvaluans) are employed on distant-water fishing vessels, and such employment will continue to increase as wage standards rise for Japanese, US, Korean and Taiwanese nationals.

In the Solomons, tuna drives the export economy, and is a very significant factor in Fiji's export earnings. In both countries, tuna canning shapes the economy of some entire islands, or even provinces. In Fiji, the Minister for Finance's 1991 budget speech singled out the expanding "sashimi" tuna longline industry as a prime example of private-sector driven development requiring minimal Governmental intervention.

Other Pacific ACP states, particularly Papua New Guinea and Kiribati, derive more indirect benefit from their tuna resources by selling access to DWFN's. Such benefits have few industrial multiplier and job-creation benefits, but incur no investment risk and generally improve prospects for DWFN aid.

Because of the great economic potential of the regional tuna fishery (the current catch is worth approximately US$ 2 billion C.I.F. per year and several times that as retail product -- equivalent to around 50% of the combined gross national products of the Pacific ACP States), there is a will to improve international management measures. The traditional DWFNs wish to consolidate their positions in the face of increasing competition from newly expanding DWFNs and maintain access to productive fishing grounds. On the other hand, the coastal States wish to ensure, through cooperation, that maximum economic benefits are obtained from

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[12] It should be noted that canned mackerel is a commodity in its own right in most Pacific Islands and is not interchangeable with fresh fish. Fresh fish is perishable and increasingly expensive. Canned fish is used for convenience or when fresh fish cannot be obtained.

[13] Fiji, Kiribati, Tuvalu and the Solomon Islands have small pole and line fleets, although the Solomons now has several purse-seiners. Pole-and-lining requires a lower capital outlay and creates more employment than purse-seining, and pole-and-lining can be carried out in the rougher seas that are more common at higher latitudes.

[14] The increasingly high quality of output from Indonesian canneries is a competitive factor also.

access and, for those with domestic tuna industries, that those industries are not adversely affected by DWFN interaction or overfishing.

A political solution has not proven easy to define, but it is generally accepted that rational international tuna fishery management must be based on sound biological and economic principles, and that a regional tuna research effort is the first step towards the introduction of such management.

The TBAP, which is completing its second 5-year cycle, is the only agency regionally mandated to coordinate and undertake biological research of regional scope on tuna and highly migratory species and, with its broad affiliations, will continue to play an increasingly important role in both the economic development and the management of tuna in the western tropical Pacific.

3.1.2 Choice of Region

This project covers the entire geographical scope of the Pacific ACP funding allocated under Lomé IV, and has been proposed by the region as a priority area for the use of funds for marine resource research and development.

This project initiative was endorsed by the 30th (1990) South Pacific Conference (attended by Ministerial representatives from all Pacific ACP states), which recommended that the project be strongly supported for EC funding support and that the final proposal be submitted to the ACP/EC Ministerial meeting for consideration in March, 1992.

3.2 Description of Region Chosen

The South Pacific region, in the context of the present proposal, is most appropriately defined by the South Pacific Commission Statistical Area (see Figure 1), and the marine areas and nations or territories contained therein.

This region encompasses the 8 Pacific ACP states (Fiji, Kiribati, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa) and territories of 2 EC members (Polynésie Française, Nouvelle-Calédonie, Wallis et Futuna (France) and Pitcairn Island (UK)). All of these states and territories are members of the South Pacific Commission: the implementing agency for this project.

Other SPC members are: (Developing island nations:) Cook Islands, Federated States of Micronesia, Marshall Islands, Nauru, Niue, Palau; (Developed nations:) Australia, New Zealand, USA; (Island territories or administrations:) Tokelau (New Zealand), American Samoa, Commonwealth of the Northern Marianas, and Guam (USA).

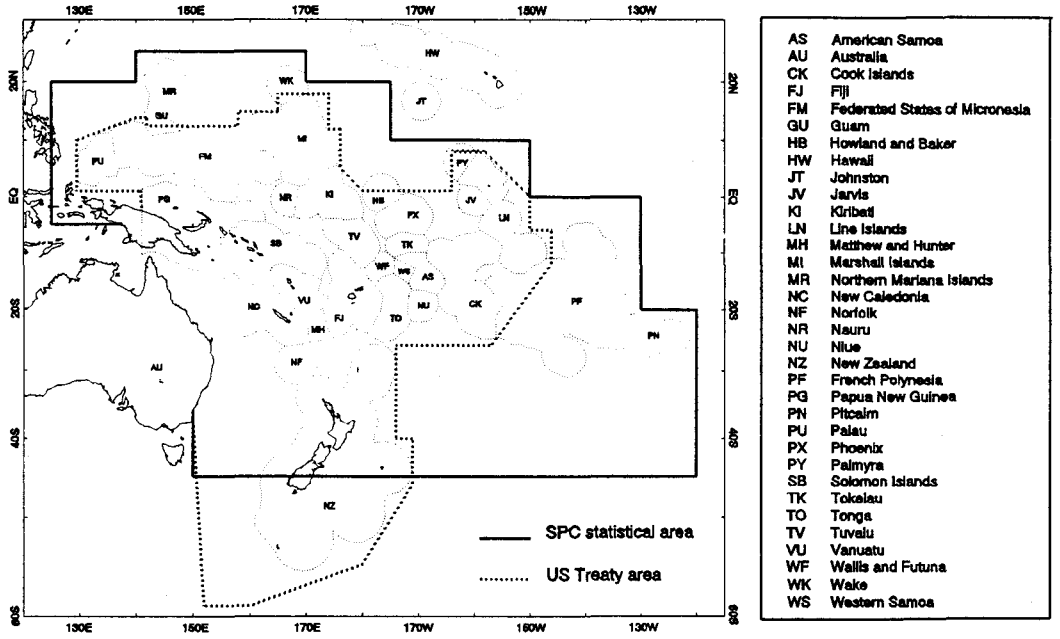
3.2.1 General Criteria

The SPC statistical area, of which 35% is high seas, covers nearly 50 million square kilometres of the western and central Pacific Ocean. The ACP states' Exclusive Economic Zones cover a total area of 11,700,000 square kilometres while their combined land areas are a meagre 524,930 square kilometres (462,243 of which belong to Papua New Guinea).

Nutrition and health standards are high compared to other developing regions. Isolation is an effective barrier to disease communication (although an increasingly eroded benefit) and an equitable oceanic climate provides regular rainfall (although tropical cyclones are common in parts of Melanesia and Polynesia). Atolls suffer from a lack of fertile soil and are prone to overpopulation. Because Pacific islands generally lack autochthonous terrestrial mammals, a large proportion of the protein nutrition comes from the sea.

Most of the problems of the region stem from the small size and isolation of the islands, making economic self sufficiency a difficult goal to achieve. Some nations have mineral, timber or phosphate resources, but most future hopes lie in the development of their marine spaces. Unfortunately, the development of marine resources such as tuna fisheries and seabed minerals requires a high level of technology or investment.

Figure 1. The SPC Statistical Area



High communication and transport costs are a major factor, even within nations, where inter-island shipping services are often less comprehensive than international services. Coupled with a shortage of agricultural land, pressures for urban drift and emigration are consequently strong. Small-scale commercial fishing and mariculture is often seen by Government planners as a way of mitigating this trend, generating income in the outer islands and sitting comparatively well with traditional lifestyles.

3.2.2 Physical Situation

The islands of the region cover a wide range of types, from larger, volcanic landmasses in the west (Melanesia), to small limestone (usually atolls originating from coral reefs) in the east (Polynesia) and north (Micronesia). All Pacific ACP States are in the tropics, with at least part of their area South of the equator, and all except Papua New Guinea are completely influenced by the ocean with a large proportion of their populations living on the coast.

All except Papua New Guinea lack continental shelf areas, and the outer reef slopes plunge sheer to the ocean floor at 2-5,000 metres depth. Consequently, almost all these countries lack the productive shelf fisheries available to most continental coastal States.

3.2.3 Economic Situation

All Pacific ACP States are classed as developing nations and several have the status of Least Developed Countries (LDCs).

Fiji has the highest per-capita gross national product, followed by Tonga and Papua New Guinea (see Table 1). All sustain high levels of imports because their small size does not permit the establishment of a complete range of industry or agriculture in each country. Consequently, not many strive for self sufficiency, but seek to balance high import volumes by increasing exports of high-value natural resources, or by promoting tourism. The tuna fishery has an important present and future role in balancing external trade and this is illustrated in Table 1 by the contribution of fish to total exports for those countries with significant domestic tuna fisheries and canneries (Solomons and Fiji).

Compared to other developing nations in Africa and Asia, the Pacific islands are relatively favoured economically. But, unlike those continental nations, they lack the potential for sustained growth and self-sufficiency because of their limited areas and human resources. To hold their niche in the global economy they must capitalise on the unique features of their environment. For most, this means tourism development and oceanic resources.

3.2.4 Sociocultural Situation

The region covers a wide range of cultures and languages: differences promoted by the isolation experienced until recently. Indeed, many of the Melanesian nations have several hundred separate languages spoken within their borders. Perhaps because of this, Pidgin English has developed as the *lingua franca* over much of Melanesia, but the language of government and commerce for all Pacific ACP States is English. Literacy rates are comparatively high (eg. 86% in Fiji).

Traditional culture is still strong, despite the inevitable mixing caused by improved communications, and traditional knowledge of reef-fish biology and behaviour is often more extensive than that possessed by western research biologists.

In most Pacific ACP States, traditional systems of reef tenure are upheld. It is a point not often appreciated, but the assumption of sovereignty over 200-mile economic exclusion zones under the Law of the Sea in the late 1970s would be seen as a natural extension of the traditional marine tenure concept[15] by Pacific Islanders. For the rest of the world, the decision to adopt 200-mile zones was not so easy since, in the Western world, marine spaces are traditionally held in common[16]. This coincidence of tradition and international law may be one reason why the South Pacific has made such great progress recently in setting innovative legal precedents for defining regional access by distant-water fleets and working towards coastal State-oriented international management systems.

3.2.5 Situation of Fisheries in the Region

The current situation of fisheries in the region has been outlined previously (see section 2.4. on general fisheries and 3.1.1. on tuna fisheries), but some additional points on the tuna fisheries are amplified here.

The existing infrastructure for the prosecution of tuna industries is generally adequate for the current scale but, as in any rapidly-expanding sector, will require continuous additional investment. As mentioned, the vast majority of regional tuna fishing effort is carried out by distant-water fleets and in many of these fleets, modernisation and the construction of new vessels (particularly purse-seiners) is proceeding apace. Other fleets (eg, albacore longliners) are declining in importance as markets and relative fishing efficiencies change and may be able to refit to other gear types[17].

Pacific ACP States' limited tuna fishing fleets generally lack the resources to adapt quickly to changes in the fishery, and are generally Government, or Government joint venture, owned. The private sector is more innovative, although usually heavily influenced by offshore capital, and the prosecution of tuna fisheries with their high startup capital costs holds little attraction for investors when compared with the fishery for high-value inshore species (eg. giant clam and lobster). As has already been pointed out, such inshore species are limited in scope and already overexploited in many places.

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[15] Some islands, particularly those atolls where tuna fishing is a way of life, claim traditional exclusive tenure to as far as 150 miles from the reef-edge. On larger islands, where reef and lagoon fisheries are the norm, exclusive access by each community is usually claimed as far as the drop-off on the outer barrier reef. Although these marine spaces are owned, in the same way as land, access privileges are often granted to other communities in return for future favours.

[16] The concept of marine tenure, with limited access, is now being accepted by most fisheries managers as being the most effective way of ensuring effective fisheries management and conservation (thus avoiding the oft-quoted "tragedy of the commons"). New Zealand and Australia, for example, are adopting individual transferrable quota systems for many inshore commercial fisheries, and there is increasing study of the systems that have operated for centuries in the Pacific Islands.

[17] Driftnetting was one option pursued by some albacore longliners recently.

With regional moves to limit transhipments at sea by distant-water vessels, some Pacific Island countries are considering installing facilities for port-based transhipment. Others are expanding their tuna canneries, although they will face rapidly-increasing competition from Southeast Asia (particularly Indonesia). For all Pacific ACP States, the best prospects for developing domestic capabilities in the tuna industry probably lie in co-operation, particularly joint-ventures[18], with other nations rather than self-sufficiency. It is possible that the existence of Pacific Island Government incentives for foreign investment will be more influential in developing domestic tuna industries than any other factor.

With the urgent need to concentrate on inter-island shipping problems, fishing fleet infrastructure development has tended to be of secondary importance in many Pacific Government development plans. In part, this is due to the fact that the regional tuna fishery is expanding so rapidly that its scale is not broadly appreciated. The regional coordination of catch statistics by the TBAP has been the single most important factor in bringing this development to the attention of both regional and national administrations.

As well as development in fleets, processing facilities and port infrastructure, the increasing demand for Pacific island seamen by distant-water fishing fleets will also develop an increasing pool of skilled manpower, and has already encouraged the development of practical fishermen's training institutions within the region. National fishermen's training has generally concentrated on reef and lagoon fisheries, (although off-reef demersal fisheries are entering curricula), and training in tuna industries has previously been handled by industry.

3.2.6 Problems Arising and Needs

When discussing tuna fisheries on a regional scale, problems are not easy to define. Due to the heterogeneous nature of the fishery, the problems of one subsector may be advantages to another. In the context of this project the factors to be considered are the general problems of the Pacific Islands in developing their tuna industries and the problems in managing the resource for long-term sustainable benefit (the resolution of which are in the ultimate interests of both Pacific Island Nations and DWFNs).

The main need that this project will address is the basic need to research and gather information on regional tuna resources and fisheries, to analyse and present that information to the beneficiaries, and to use the resulting stock and fishery interaction assessments as the basis for, and in continuing support of, an international management regime for Pacific tuna and billfish resources.

3.2.6.1 Problems with Catches

In the context of this project, a major problem is in accurately quantifying the level of catch of different species in different areas of the region by different fleets. For the purpose of stock assessment, this can be done most effectively by compiling catch/effort logsheets which specify position, the catch (weight and/or number) of each species and the fishing method each day for every vessel.

SPC member countries have long undertaken to supply the TBAP with logsheet data for each domestic tuna fishing vessel, and such data are generally supplied in a timely fashion. Any problems in SPC member data-provision reflect a general lack of in-country fisheries administration manpower or training rather than a desire to maintain confidentiality or to mislead. The TBAP assists island members to develop their own fisheries statistical systems and maintains strict confidentiality standards on any raw data supplied.

All SPC member countries also undertake to supply catch/effort logsheets resulting from distant-water fleets fishing in their zones. The Forum States (including all Pacific ACP States) include such data provision as one of the minimum terms and conditions (MTCs) of access, and EC territories have similar provisions (although not yet unified with the Forum MTCs). Unfortunately, compliance with this measure by DWFNs is less than complete and some fleets are notorious for providing dubious information. A major incentive for this practice

[18] This route has its pitfalls. It is perhaps notable that the Pacific Fishing Company (PAFCO) cannery in Fiji, set up as a Fiji government-Japan industry joint venture, never registered a profit until transferred entirely to Fiji ownership in 1986. On the other hand, PAFCO developed the Fiji tuna industry into its 3rd largest commodity export earner, and is by far the largest employer in the province of Lomaiviti.

exists where access fees are tied to effort, or catch levels. The solution is either to improve surveillance and observer coverage (an expensive task, but the subject of a forthcoming treaty for cooperation in surveillance between Forum member States) or to determine access fees on a lump-sum basis.

The main gap in data coverage is for high-seas areas. These are not covered by access agreements, but are obviously significant to the stock assessment of highly migratory species. New Forum/DWFN access agreements include a requirement to report on catches in adjacent high seas areas but, even with these legal measures evolving, compliance is still poor by many fleets and has been a contributing factor in the break-off in access agreements by certain Pacific Islands.

The TBAP approach to the problem is to explore ways of crosschecking and verifying the catch/effort data received and the derivation of raising factors for the estimation of total catches. This is being accomplished by improving links with tuna fleet associations and DWFN cooperatives, with canneries, and with importers and, for those administrations which lack the capability to collect full data, assisting with the implementation of systems and protocols. The TBAP has the considerable advantage in this effort of having a broad base of membership, and working groups which include DWFN scientists, as well as maintaining the respect of the tuna industry as an objective research agency.

The extensive base of catch/effort data that have been compiled by the TBAP so far, combined with original research on the population dynamics and structure of tuna stocks (largely through tagging) has shown that overexploitation is not yet a problem in Western Tropical Pacific tuna fisheries. Although catches of skipjack quadrupled in the 1970s, and doubled again in the 1980s, further increases in catch could be sustained by the skipjack fisheries.

However, projections for other fisheries are less optimistic.

- The status of yellowfin remains uncertain, and maximum sustainable levels of exploitation may soon be reached. Since this species is mainly caught by purse seiners in association with skipjack, any increases in the skipjack fishery may need to be accompanied by mechanisms which limit the associated yellowfin catch.

- There appears to be little scope for significant expansion in albacore catches. Longlining has been close to maximum sustainable levels for some years and any substantial increases in surface (troll) albacore fisheries may have to be at the expense of a reduction in longline catch. Note that the longline catch is mainly taken in Pacific Island 200-mile zones, while the surface catch is taken on the high seas.

- Very little is known about the stock status and biology of bigeye tuna. This species is very significant for the development of small-scale sashimi longlining and is increasingly taken as a bycatch by purse-seiners.

- Billfish stocks and those of other tuna-like species are poorly understood, and the impact of any increased catch of these species cannot be assessed at present.

Although the possible effects of an increase in fishing effort on the status of individual stocks is a long term concern, a more immediate concern is the absence of a reliable judgement on the interaction between fisheries. Such interactions might become significant at an earlier stage of fishery expansion than the possible overfishing of individual stocks. Possible interactions include:

- The interaction between fisheries in different areas can be a problem with highly migratory species, as illustrated by the albacore example above, where surface catches south of 35° could reduce longline catches further north;

- The interaction between distant-water and domestic fisheries, where localised target or bycatch stock depletion by intensive distant-water fishing might reduce coastal State catches;

- The interaction between different species taken by the same fishery (ie. the "bycatch effect"), illustrated by the yellowfin purse-seine example above;

- The interaction between commercial fisheries and sport fisheries where, for example, a large catch of billfish by sashimi longliners might adversely affect tourism development through gamefishing.

Interaction effects are more difficult to assess than single-species, single-gear fisheries, but is nonetheless a pressing task. This project is directly aimed at providing such assessments, by providing analyses based on both the large body of data and original research results accumulated over the past 13 years, and on original research to be undertaken by the project itself.

Another "problem with catches" that arises out of the preamble to section 3.2.6. is the problem of increasing the Pacific Islands' share of the total tuna catch. While an immediate massive investment in developing commercial tuna fleets is not necessarily a desirable option at this stage -- it is possibly a better strategy for some countries to continue selling access, develop transhipment or port facilities, or develop processing -- however, it will eventually be necessary if Pacific nations are to gain maximum benefit from the resource.

Such questions are imponderable in the context of this present discussion but it is worthwhile noting that this project, which is proposed as the core of a TBAP intended to provide the scientific secretariat to a future regional tuna fisheries management regime, will have considerable influence in calibrating the parameters within which any future dialogue towards the partitioning of fishing effort must work.

3.2.6.2 Problems with Processing

Most of the tuna catch is canned and most is processed outside the region. Within the region, American Samoa is the major processing point, particularly for the US fleet, but appears to be declining in importance as more US purse-seiners fishing further west tranship to Thailand.

The Pacific ACP canneries (Solomons and Fiji) are considered to produce a comparatively high quality product since they (particularly Fiji) use mainly hook-caught fish, which is an additional advantage in the increasingly "dolphin-friendly" consumer market. The main problems facing these canneries are increasing competition from Southeast Asian nations (with their lower labour costs), and (at least for Fiji) the limited domestic supply of tuna.

This project has no direct implications for tuna processing in Pacific ACP states, but the stock assessments and fisheries projections arising will be an essential factor in deciding the future status of, and national or regional plans for, tuna processing in the Pacific.

3.2.6.3 Problems with Marketing

The marketing of canned tuna from Pacific ACP states is not a particular problem at present. A large percentage of the output of both the Solomons and Fiji goes to Europe with the benefit of Lomé access, (virtually all of the canned skipjack produced by Fiji is marketed in the UK) and the USA and Canada are also large consumers. However, the market for international canned tuna is volatile and competitive; changes in EC access in the near future may impact European sales of canned tuna.

The markets for raw tuna produced by Pacific ACP tuna fishing vessels are more diverse: Vanuatu technically has several purse-seiners but these are vessels under flag of convenience and work alongside DWFN fleets; the Solomon Islands' 33 pole and line boats and 4 purse-seiners land fish either in Solomons or tranship to the Philippines; Tuvalu's one pole-and-line vessel normally fishes in Fiji or the Solomons but is presently chartered to SPC (under the EC-funded Regional Tuna Tagging Project); Tonga's one albacore longliner lands fish either in Fiji or in American Samoa; Papua New Guinea currently has no industrial tuna fishing capability (despite past involvement) but is discussing joint venture possibilities with an EC partner; the 4 Kiribati pole-and-line vessels fish, and land fish, either in Fiji or Solomons; the 11 Fiji pole-and-line vessels and 15 chartered albacore longliners land fish in Fiji and Fiji's 15 small sashimi longliners airfreight direct to Japan or USA; several purse seine joint ventures are in development in FSM, and will supply normal purse seine markets.

Marketing high quality fresh tuna (yellowfin and bigeye are preferred) is currently a problem for Pacific Island nations[19]. Access to the main market, Japan, is limited unless a Japanese business partner is procured. Airfreight overheads are often prohibitive or airfreight space unavailable, and extremely high (often obscure) quality standards difficult to develop. The continued impetus for development is sustained by the occasional very high prices that can be obtained through Japanese auction. Increasing quantities of fresh tuna are being marketed in the USA and the industry is very interested in exploring Korean and EC markets.

This project has no direct involement with marketing but, as with processing, the planning of market development will be affected by authoritative statements on the state of the fisheries arising out of the work of the SPC TBAP. The project must also liaise directly with markets and track "product flows" for the purpose of cross-checking data on catches from the region, and this information may be of additional benefit to the region.

3.3 General Design of the Project

3.3.1 General and Intersectoral Objectives

The draft 1991-1996 TBAP Strategic Research Plan[20] defines the Mission Statement of the TBAP as follows:

> "To provide member countries with the scientific information and advice necessary to rationally manage fisheries exploiting the region's resources of tuna, billfish and related species."

This Mission Statement provides a general framework to guide the TBAP during the next 5-year cycle (October 1991-1996). The project under consideration here, the South Pacific Regional Tuna Research Project, will form the core of TBAP activity over this period and will cover all aspects of the Mission Statement to some extent.

However, the Mission Statement is a definition of the ongoing research direction for an open-ended regional support programme. Some of the basic functions of the TBAP will need to be continued indefinitely if the objective of providing stock and interaction assessments of a complex and constantly-changing fishery is to be of any use to fishery planners and managers. In the context of an international tuna management regime this indefinite status would be further formalised.

The more definite aim of this project will be to enable the TBAP to produce the preliminary stock and fishery assessments necessary to both advise Pacific ACP Nations on the state of the tuna fisheries within their influence, and to support and guide the establishment (and initial operation, if implemented during the tenure of the project) of an international management regime for tuna within the SPC statistical area.

3.2.2 Specific Objectives

The **draft** Strategic Research Plan defines the Obectives of the TBAP as follows:

Statistics and Monitoring:

Maintenance and further development of a comprehensive statistical database covering all oceanic fisheries in the SPC statistical area, encompassing catch/effort, size-composition, tag and other data necessary for support of stock assessment, interaction and biological studies.

Monitoring any aspect of the development and operation of significant oceanic fisheries within the SPC statistical area and adjacent areas that may be needed to further the objectives of the Programme.

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[19] Although Fiji has the most developed "sashimi" longline capability, Tonga, Tuvalu and Kiribati are in the process of developing, and others are looking very closely at small scale longlining.

[20] Compiled by the 1991 Chairman of the Standing Committee on Tuna and Billfish, together with TBAP staff and a drafting group drawn from member countries. Revised and approved by the 1991 Standing Committee, and approved by the SPC Regional Technical Meeting on Fisheries in August 1991.

Biological Research

Development of a better understanding of the biology of tuna and other highly migratory species, including studies on ageing, growth, natural mortality, reproduction, vulnerability to capture, recruitment, stock structure and any spatial, environmental or temporal variability in those factors, to promote further understanding of the population dynamics of the various species.

Stock Assessment and Modelling

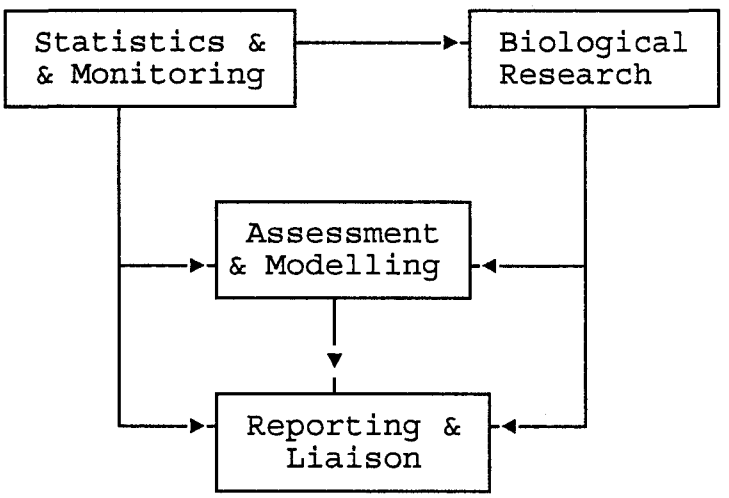
Drawing on the results of the previous two objectives, develop and implement population models and stock assessments in support of national and international fisheries management initiatives.

Reporting and Liaison

Advising member Government and international fisheries administrations on relevant matters arising out of the previous three objectives, including advice on the historical or current status of fisheries for tuna and other highly migratory species, on the likely effects of different harvest strategies on fisheries, on optimum sustainable yields for fisheries, on the biology of individual species, and on the implementation of appropriate scientific data collection activities.

Liaison with national and international fisheries agencies for the promotion of collaborative research to achieve these and other objectives.

The dependency of these four objectives could be considered as follows:



Within these broad TBAP objectives, the more specific objectives of this project will be aimed towards biological research and the collection of fisheries and biological data necessary to support the eventual establishment and consolidation of an international management regime for South Pacific tuna fisheries.

The TBAP is a well-established programme, with nearly 10 years (1981-1991) of work already accomplished building on the previous (1977-1981) SPC Skipjack Survey and Assessment Programme. Certain ongoing activities will continue under current funding arrangements and this project will concentrate mainly on new activities identified by the 1991 Strategic Research Plan while taking over the support of certain essential core activities that have reached the end of their funding cycles.

The activities to be implemented by the SPRTRP in support of the general TBAP objectives will be described in greater detail in **Chapter IV** but, briefly, they are:

Statistics and Monitoring

- Establishment and operation of a scientific port sampling programme$_1$;
- Establishment and operation of a scientific observer programme$_1$.

Biological Research

- Regular, but small-scale[21] fieldwork sub-projects, including further tuna tagging to elucidate localised stock assessment or interaction questions$_2$. Such sub-projects may be carried out in collaboration with other regional or national research programmes;
- Establishment and operation of a laboratory facility for the processing of samples useful to research on age, growth and reproduction of tuna and billfish$_1$;
- Establishment of facilities to enable postgraduate students to pursue research projects of relevance to the objectives of the TBAP$_1$.

Assessment and Modelling

- Continuing analysis of the results and information generated by the RTTP, with particular regard to stock assessment and interaction issues;
- Development and application of stock assessment techniques based on size composition, catch/effort and supporting biological data.

Reporting and Liaison

- Support for the publication and presentation of project results, both to national and to regional administrations$_3$.

In addition, the SPRTRP would support the TBAP computer facility, which is central to much of the work of the project. This support would entail mainly the upgrading and maintenance of hardware and software resources, including the TBAP Regional Tuna Fisheries Database$_3$.

Note: New activities for the TBAP are subscripted as $_1$. Activities that are newly established as core activities following previous ad-hoc, or limited-term project support are subscripted as $_2$. Established core activities that are in need of replacement, or additional funding support in order for the project to accomplish its aims within its timeframe are subscripted as $_3$.

In terms of basic benchmarks, the specific aims of the SPRTRP can be summarised as follows:

- Reassessment, based on additional tagging and historical catch/effort data, of the preliminary stock assessment for western Pacific skipjack tuna that was produced by the analysis of data resulting from the Skipjack Survey and Assessment Programme;
- Production of a comprehensive stock assessment for South Pacific albacore tuna;
- Production of a comprehensive stock assessment for western Pacific yellowfin tuna;
- Production of a comprehensive stock assessment for western Pacific bigeye tuna;

[21] Small-scale compared with the regional scope and length of the current RTTP. Of short duration and confined to a limited area.

- Production of a comprehensive assessment of the interaction between skipjack/yellowfin purse-seine and yellowfin/bigeye longline fisheries;

- Production of a comprehensive assessment of the interaction between albacore surface and albacore longline fisheries;

- Estimation of the extent of the bycatch of other species resulting from the tuna fisheries, including billfish and marine mammals;

- Implementation of arrangements enabling comprehensive and timely monitoring of catch and effort by every vessel fishing for tuna in the SPC statistical area (this is unlikely to be completely achieved in the lifetime of the project, but the progressive improvement in coverage is easily quantified);

- Production of increasingly authoritative yearly status reports for each major tuna fishery of the region;

- Production, as requested, of authoritative status reports on the tuna and billfish fisheries of Pacific ACP countries;

These "benchmarkable" objectives, which are achievable by the SPRTRP within the next 5 years, comprise most of the medium term outputs of the ongoing TBAP and inevitably build on other research already accomplished, or in progress. Given implementation, as planned, for other sub-projects and support it is likely that much more will be achieved, particularly in the "firming up" and finer detailing of assessments by the TBAP. However, if the objectives outlined above are achieved, then the SPRTRP will have achieved its goals.

In a heterogeneous and rapidly-changing fishery covering a substantial proportion of the Earth's surface, a 5-year project plan cannot take account of all future changes in fishing effort. The recent rapid increase in driftnetting and the recent influx of purse seiners forced out of the Eastern Pacific dolphin-associated tuna fishery provide examples of the sort of unforeseen changes that might occur in future to complicate the assessment work of the project.

However, one of the main aims of the project is to emplace mechanisms whereby future changes can be quantified, studied, and accounted for. The improvement of fleet and industry contacts, the formalisation of data-acquisition protocols with DWFNs, and the compilation of a comprehensive catch/effort dataset are all mechanisms that will enable the fisheries sectors of project beneficiaries to respond to future changes.

3.3.3. Operational Methodology

3.3.3.1 Human Level

The South Pacific Commission's tuna research programmes (SSAP 1977-1981 and TBAP 1981-present) have always had to rely to a large extent on obtaining their most specialised staff from the more developed nations. Island States of the region, as with most developing countries, lack a large base of scientific expertise, and those national scientists that are trained to adequate levels are often promoted to administrative management or seek better-paid employment in larger countries. With progressive decolonialisation, the opportunities for island states to obtain expatriate technical assistance are decreasing[22].

All Pacific ACP States recognise that a regional research programme must draw on a large international pool of scientific expertise if it to provide them with an adequate service. Regional agencies are faced with the dilemma of needing enough regional staff to adequately represent member country goals, but wanting not to deplete member countries' already-inadequate national pools of expertise.

The staffing methodology used by the TBAP, and enhanced by this SPRTRP is to recruit highly specialised positions, on merit, from as large a pool as possible (including island member countries). An additional source

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[22] Adams, T.J.H. and A.Wata (1991) *Review of the FFA/ICOD Research Coordination Unit.* Forum Fisheries Agency Report 91/4.

of technical assistance that has so far been untapped by the TBAP is to use postgraduate research students to undertake projects of well-defined scope. Altough medium-term high level training is the primary objective of this activity, the work undertaken would be consistent with TBAP objectives, and therefore result in direct benefits to the region.

3.3.3.2 Technical Level

This project will place less emphasis on large, region-wide tagging cruises, with more attention given to short-term investigations to address localised problems, as well as additional fieldwork to clarify certain biological parameters essential to the understanding of regional tuna stock dynamics.

Priority will continue to be placed on the development and validation of "state of the art" fisheries analyses and population models, of direct application to the problems at hand. Such original research will be particularly necessary to study the little-understood complications of fishery interactions.

The continued evolution of statistical and database functions will require a high level of originality in developing statistical data input systems, analyses and ways of presenting large amounts of data in an easily-understandable form. The development of graphical interfaces to the database will be a particular priority.

3.3.3.3 Collaborative Level

For a problem requiring an internationally cooperative approach, good linkages will be essential to the success of this project. The linkage of SPC member countries, both ACP/EC and others, to the project is automatic, and coordinated at several levels:

- The annual South Pacific Conference, attended by Ministerial-level delegations from all SPC members and, through discussing recommendations formulated by the Committee of Representatives of Governments and Administrations (CRGA), providing broad-scale policy guidance to all SPC programmes;

- The annual SPC Regional Technical Meeting on Fisheries (RTMF), attended by all SPC member fisheries administrations and providing executive guidance to the whole SPC Fisheries Programme;

- Liaison through TBAP-organised meetings such as the Standing Committee on Tuna and Billfish, the South Pacific Albacore Research Group, and the recently established Western Pacific Yellowfin Research Group;

- Ad-hoc liaison with SPC member countries arising out of in-country visits (during the course of research, or to present results), and working groups under other regional meetings (eg. Forum Fisheries Committee).

- Occasional programme reviews, such as the 1987 review which visited every SPC member country.

Linkages with scientists of DWFNs or other regional agencies have improved through the following channels:

- The annual Standing Committee on Tuna and Billfish (SCTB), initiated in 1988 and attended by all interested SPC member tuna researchers, and scientists from other nations and agencies, provides a peer-review of TBAP projects, and policy suggestions for consideration by RTMF as well as providing a forum for dialogue and data exchange.

- Ad-hoc working groups on tuna fisheries of particular interest, such as the South Pacific Albacore Research Group (SPAR) and Western Pacific Yellowfin Research Group (WPYRG), which now meet yearly to coordinate national and regional research on that species and provide a forum for Pacific Island and other scientists to discuss problems of mutual concern.

- Specific visits to extra-regional countries for the purpose of improving linkages and dialogue, particularly with DWFN industry contacts, in order to improve access to data and promote grounds for future cooperation (eg. in the placement of scientific observers or port-samplers, or the return of tuna tags from catches).

- It is possible that formal cooperative linkages could be established with other tuna research agencies, eg. I-ATTC, NMFS (USA), NRIFSF (Japan). Informal but very useful exchanges already occur with these agencies.

The improvement of these DWFN linkages is particularly important to the future success of the project. At the moment, there are no formal linkages between the SPC members and other nations for the provision of data, beyond the logsheets supplied (sometimes reluctantly, sometimes not at all) under member/DWFN access agreements. The existing TBAP informal linkages with DWFN scientists are thus extremely advantageous, and it is envisaged that this cooperation may develop in future.

Linkages with other international agencies, both within and adjacent to the region, are adequate but will need to be maintained. A good working relationship and a clear understanding of each others' goals and work-programmes is essential if the economic and legal (FFA) and biological (SPC TBAP) branches of the regional fisheries effort are to be effective. A regular and uninterrupted meeting between the staff of both agencies is advisable, particularly in coordinating the maintenance and security of shared catch/effort data. It is beyond the scope of this single-agency project to promote, but some regional travel and meeting funds under this project might be laid aside if such formal meetings can be implemented.

The importance of linkages to this project cannot be underestimated, and a considerable amount of funding will be allocated to extra-regional and regional travel.

3.3.3.4 Financial Level

The SPC tuna research programmes have always been entirely funded from SPC extrabudgetary sources, and have been implemented at essentially no cost to SPC island members, apart from the provision of office space, administrative services, and the some of the time of the Fisheries Programme Coordinator on core funding.

TBAP "core" funding has come from four major donors over the past 10 years: USA, France, Australia and New Zealand, who are all SPC member nations themselves. More recently, Lomé III funding under the three-agency "Pacific Regional Marine Resources Development Programme", has supported the RTTP implementated by the TBAP (1989-1992) (ECU 3.5 million) and ECU 0.5 million from EC has supported the 1990-1991 albacore tagging project with additional assistance from Canada.

This reliance on extrabudgetary funding has made the TBAP somewhat vulnerable to changing donor priorities[23] and exchange rate fluctuations. It is likely that the future incorporation of the TBAP into a regional tuna management regime might lead to the provision of regular core support funding in support of that function but until that indefinite prospect is fulfilled, the TBAP will benefit from the sort of longer term "core" support that only the EC can provide.

Certain future activities would be essentially self-supporting, such as research student projects but, until the prospect of a regional tuna management regime is fulfilled, the TBAP has little real prospect of significant "income-earning". It is possible that the TBAP could charge island member countries for resource assessments of relevance to their waters but, at this stage of both island development and research development, such a path would be counter-productive[24].

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[23] The USA has indicated that its support for the TBAP (25% of the total TBAP funding) may not be extended beyond the 1986-91 project cycle.

[24] If island members were to include a charge for resource assessment by the TBAP into the fees paid under access agreements with DWFN's this mechanism might prove workable, but is extremely unlikely to prove agreeable to DWFN's. An additional "Minimum Term or Condition" would take some time to set up through the South Pacific Forum and, even if implemented, the financial value placed on the report generated would make it difficult to pool such national data in support of the regional research effort.

3.3.4 Beneficiaries

3.3.4.1 Population

The project will significantly impact the whole of the Pacific Region in the long term, by providing a knowledge of the biological parameters within which the region can both conserve, and improve economic benefits from the exploitation of tuna resources. It is worth noting , however, that at least four Pacific ACP countries might be considered to lie in the resource-rich zone stradling the equator, while the others have either domestic fisheries or an interest in the processing sector. Therefore, a substantial amount of the regional benefit of the project would acrue to Pacific ACP countries. In addition to this regional benefit, specific activities of the project (postgraduate training, national resource assessments, etc.) will be targeted directly at ACP countries.

It should be also noted that recent Forum decisions have endorsed negotiations for multilateral access agreement with EC to proceed. EC fleets which subsequently fish in the region may thus derive benefit from the project.

3.3.4.2 Institutions

Various institutions will be direct beneficiaries of this project. All institutions working in support of fisheries research, management, and economic development will benefit from the results, from the national (fisheries administrations and governments), through the regional (adjacent regional fisheries agencies such as IATTC, IPFC, WPFCC, but particularly South Pacific agencies such as FFA, Forum Secretariat, USP and other SPC programmes), to the international (FAO etc). The most important eventual institutional beneficiary would be any future regional tuna fisheries management body.

3.3.5 Project Bases

The TBAP has been in operation for nearly 10 years and, as such, has been the subject of numerous reviews, as well as subject to the continuous scrutiny and guidance of an extensive series of annual SPC member-country meetings. This member country guidance has continuously directed the implementation of the various TBAP sub-projects and has ensured that the programme is responsive to the needs of the region.

The South Pacific Regional Tuna Research Project, as a core activity of the TBAP, works within the same aims and objectives as that programme and is thus extensively accepted by the countries of the region. The mandate and support for this project provided by the Thirtieth (1990) South Pacific Conference has already been mentioned, and the contextual presentation of this project dossier has drawn on the extensive knowledge of the region compiled by SPC staff.

3.3.6 Results of Ex-post Evaluations Dealing with Exploitation of the Same Fish Stock

Projects evaluating the status of tuna stocks on a regional basis have only been carried out by the South Pacific Commission (see 3.3.7). Although some individual countries (notably Japan and USA) have analysed information resulting from the activities of their own fleets, in support of future activities by those fleets, the SPC TBAP is the only organisation which has had the ability to mount a regional evaluation effort covering all possible sources of data. This work is internationally recognised as being of high standard.

3.3.7 Previous or Current Research and Studies

The 1977-1981 SPC Skipjack Survey and Assessment Programme included the first large-scale tagging experiment on Western Tropical Pacific tuna as well as the first attempt to make an integrated assessment of the regional skipjack fishery and its interactions. The results of this survey, which were completed by the TBAP, included preliminary assessments for each SPC member of the status of the tuna and baitfish resources within their Exclusive Economic Zones. The tag-recapture results are of cumulative benefit and will be periodically re-analysed with the inclusion of data resulting from later tagging studies.

Subsequent research has concentrated on refining the estimates resulting from the SSAP results, most importantly by compiling as much catch/effort data as possible from the fisheries, and initiating basic research

on other species apart from skipjack. Major new studies have been started on yellowfin and albacore tuna, but have some way to go before the TBAP can produce authoritative stock assessments for those species. The work is however proceeding extremely well and appears likely to meet its stated scientific objectives. As mentioned previously, very little is known about the population dynamics and biology of the other important species caught in the region -- bigeye tuna.

The main conclusions drawn from this work are that regionally, skipjack tuna stocks could support a substantial increase in fishing effort, but that steps may need to be taken in the future to limit the catch of other species, particularly yellowfin. The increasing linkages with Southeast Asian agencies, and the work of the RTTP is revealing the significance of the Southeast Asian fishery to the tuna stocks of western tropical Pacific.

Although the significance of the conclusion has been largely overtaken by subsequent economic developments, the SSAP also showed that most small-island countries do not have enough naturally-occurring baitfish to support large domestic pole-and-line fisheries, and this was a significant factor in encouraging the Kiribati Government to develop artificial baitfish culture methods.

Concurrently, the Forum Fisheries Agency has been researching economic, political and legal aspects of the regional tuna fisheries, mainly in support of access agreements between Island States and DWFNs. The results of this research are generally confidential to Forum member countries.

Oceanographical studies specifically directed at elucidating parameters of tuna biology are not currently coordinated at the regional level[25], but a great deal of useful research in the Pacific is being carried out by national programmes, particularly ORSTOM (France), NMFS (USA), CSIRO (Australia) and NRISFSF (Japan). This work has been particularly useful in defining the ecological and geographical ranges of tuna stocks, and working towards predicting where and when the best catches might be made. However, such work is expensive and must cover broad areas of ocean to be useful. In order to predict catches it is first necessary to know much more about the basic population dynamics and biology of tuna.

Anthropological studies on traditional Pacific Island tuna fisheries have been carried out on a small scale under several agencies. Such traditional tuna fisheries are generally prosecuted by small atoll populations where reef and lagoon resources are limited and are still significant on some isolated islands of Polynesia and Micronesia. The results of such studies often reveal a deep local awareness of tuna movements, and local knowledge of the seasonality of floating log abundance and current patterns, for example, has been of direct assistance to commercial tuna fishermen.

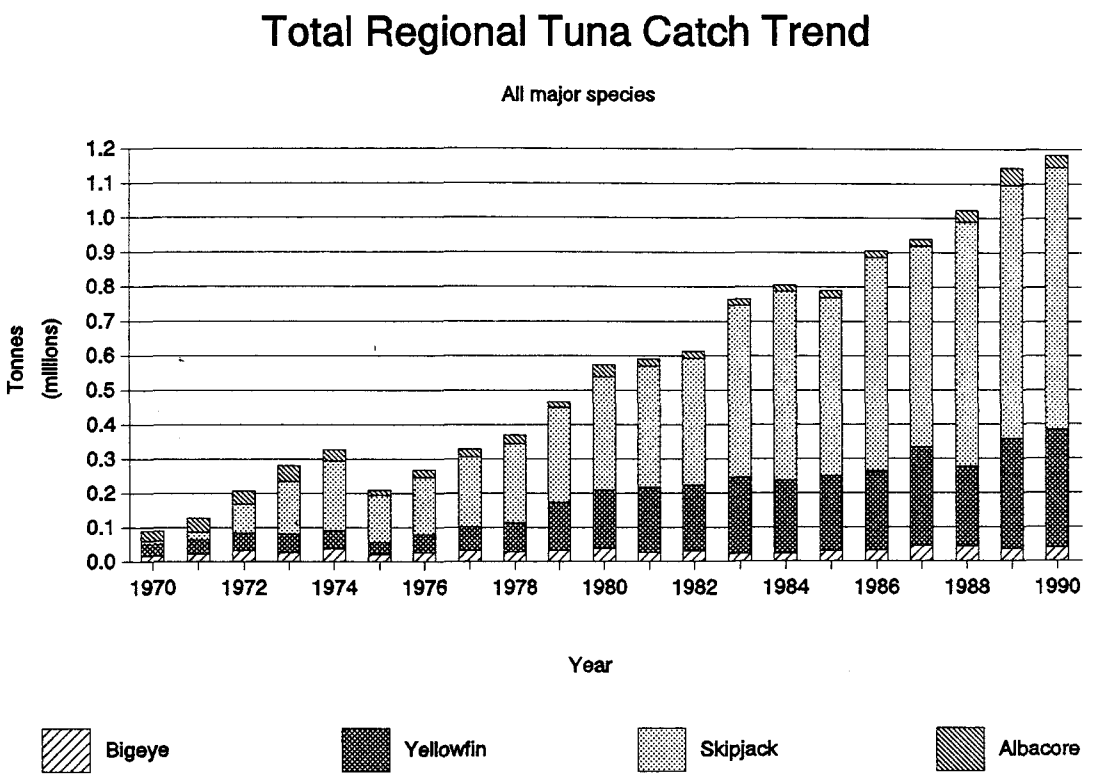
Research efforts by individual Pacific ACP States on tuna have, almost without exception, been devolved to the regional level and SPC, leaving those nations to concentrate their research resources on more local fisheries. However, these States maintain national fisheries data collection programmes of varying degrees of effectiveness, and contribute data directly to SPC for analysis. ACP States also collaborate with the SPC TBAP on in-country research programmes, such as local tuna tagging experiments. Any ACP national tuna research programmes will continue to be assisted by the TBAP.

3.3.8 Statistics and Market Surveys

One of the main functions of this project is to enhance the statistical coverage of regional tuna fisheries. A summary of statistics pertaining to the estimated total catches by various fleets is contained in Table 2. Time series of estimated total catches, by species, are shown in Figure 2.

[25] SOPAC, the South Pacific Geosciences Commission, works specifically on nonliving, or completely sedentary, marine resources, although certain results are occasionally of relevance to tuna research.

Figure 2.



3.3.9 Role of the State

For those countries with a large demand for access by DWFNs, the information and advice given by the TBAP over the past decade has had a large influence on national (and regional - through FFA) fisheries policy aimed towards determining the optimum level of fishing effort under various agreements. For those countries with domestic tuna fleets, TBAP information and advice has had a large bearing on decisions to develop and regulate domestic industry. Almost all States have some legal mechanism which requires an assessment of the "total allowable catch" for each highly migratory species, together with an assessment of the portion of that catch that domestic industry is capable of harvesting, and the SPC TBAP is the only body capable of eventually supplying this information.

Correlative measures by all SPC states and territories towards the implementation of this research project are already in place, arising out of ongoing cooperation, domestic legislation, or the terms and conditions of Pacific Island Nation/DWFN access agreements.

3.3.10 Variants Studied and Reasons for the Choice of the Solution Proposed

There are many possible variations of detail that could be suggested to this project approach. Indeed, the variations that are expected in this heterogeneous, large-scale fishery over the next 5 years dictate that a certain amount of flexibility be built into the project itself.

However, this project approach has been defined by more than 12 years of experience, and consultation at both the regional and national levels, of the research needs of the fishery, and previous research has clearly defined the greatest needs for the foreseeable future and the most appropriate methodology to tackle them.

One major variant that has been suggested (for example, during the South Pacific Albacore Consultations by a major DWFN) is the choice of implementing agency for regional tuna research. South Pacific nations have considered this matter in great depth at various times (for example, during the setting-up of the Forum Fisheries Agency in 1979) and have concluded that the SPC, with its accumulation of technical experience and expertise, and its proven ability to perform applied biological research of internationally-accepted excellence, should continue to be the focus of regional biological research on tuna.The Pacific Island States, during consultations with DWFNs, have made it clear that they will not support any future regional tuna management body unless it is based on existing South Pacific regional organisations.

The possibility of carrying out all tuna research at the national level has been discussed, and is ruled out if only because of the Law of the Sea directive to cooperate towards the regional management of highly migratory species.

Methodological variants are possible. Indeed, many such are used by other fisheries research programmes. This project will continue to accord some priority to tag-recapture studies, because other reliable methods of evaluating fisheries are dependent either on a stable fishery or a long time-series of catch and effort, size-frequency and biological data. As has already been pointed out, the Western Pacific tuna fishery has doubled in the past decade, and there have been major evolutions in, and changes in the balance, of fishing gear[26]. However, great emphasis will also be placed on the acquisition of fisheries and biological data, in order to continue building the time-series necessary for ongoing and future stock assessments.

[26] Pole-and-lining was the surface fishing method of choice at the start of the decade, but has now been almost completely replaced by purse-seining. The commercial surface fishery for southern albacore did not even exist in 1980.

Chapter IV

4. Project Details

The work of the SPC's Tuna and Billfish Assessment Programme might be considered, over the past decade, to have formed a "Stage 1" regional tuna research effort: fundamentally an analytical function performed by a basic corps of specialists with *ad hoc* research projects to help cover large gaps in regional, and even global, knowledge of the parameters defining major fisheries.

This South Pacific Regional Tuna Research Project will enable the TBAP to expand into a "Stage 2" research organisation, which will encompass continuous scientific fisheries monitoring functions, establishing a comprehensive baseline of essential information as well as continuing to perform analytical functions and urgently-needed "tactical" research projects. This "Stage 2" may be seen as an intermediate step to defining an ultimate "Stage 3" organisation which will perform the full functions of a scientific secretariat in support of a regional tuna fisheries management regime.

4.1 Project Description

The SPRTRP will initiate specific new activities within the Statistics and Monitoring Project of the TBAP, will enable the creation of a Biological Research Project, will enhance the analytical work of the Assessment and Modelling Project, will provide essential computer support to the TBAP over the five-year period and will provide support for the TBAP's Reporting and Liaison function.

4.1.1 Statistics and Monitoring Project

The new activities planned under this project are scientific port sampling and observer components.

4.1.1.1 Scientific Port Sampling Component

A corps of dedicated Port Sampling Officers will be recruited under national terms of employment and based in-country (normally by attachment to the government fisheries administration in the country of deployment). These officers would be managed by a Port Sampling and Observer Manager, recruited by the project to coordinate all aspects of the port sampling and observer components.

Port Sampling Officers will be stationed at strategic transhipment and unloading points in the region, will be Pacific ACP nationals where possible, and will be responsible for documenting landings data, collecting logsheets (where authorised by member countries), checking for and collecting tags resulting from the SPC Regional Tuna Tagging Project and other experiments, collecting size-frequency and species composition samples and samples for biological analysis.

As with all TBAP activities, any raw data collected would be held by SPC in strict confidence, and used only for the purpose of scientific analysis. Copies of all data collected in individual countries would be made available to the Fisheries Departments of those countries.

While the first stage of the port sampling programme will be confined to regional ports, samplers may also be placed at major extra-regional landing points where western Pacific tuna are processed or transhipped.

The number of port samplers to be employed by the project will be approximately five, but the total number will be dependent on national pay-scales (normally less than regional rates). It is envisaged that office space would be provided by the government of the country where the officer is stationed[27] and, beyond some basic items of equipment, the major expense of the sub-project will be salary and travel costs.

[27] This has already been agreed by at least one potential placement government.

4.1.1.2 Scientific Observer Component

The Forum Fisheries Agency maintains an observer programme on US purse seine vessels, using short-term placements of regional fisheries staff for the purpose of surveillance, compliance monitoring and biological sampling. The purpose of this component is to extend observer coverage to other fleets and gear types not monitored by the FFA programme and to enable more detailed biological data to be collected. Four full-time scientific observers will be recruited (from ACP states if possible) and trained for this purpose. It is stressed that these observers would not carry out a surveilance or compliance monitoring function. The TBAP would, of course, maintain its involvement in the FFA observer programme through the training of observers and analysis of data.

The Scientific Observers would be based at SPC headquarters, under SPC conditions of employment, but would spend the majority of their time aboard selected fishing vessels. They would be under the general supervision of the Port Sampling and Observer Manager.

Expense will be incurred in staff costs (salary and seagoing allowance), travel to and from embarkation and disembarkation points, and some sampling equipment. Where fish are tagged, or samples taken, project funding would be available to compensate vessel owners for the loss of those fish.

Scientific Observers may also participate in research cruises (which would not cover more than 3 months of each year) where necessary.

4.1.2 Biological Research Project

The new Biological Research Project will undertake most of the field-based and laboratory-based research of the TBAP. The project will be supervised by a Principal Fisheries Scientist to be recruited from TBAP core funds. All other staff will be recruited from SPRTRP funds. It is intended that all of the activities of this project be funded through the SPRTRP. The project will consist of three components: a field component, a laboratory component and a training component.

4.1.2.1 Field Component

The objective of the Field Component is to undertake field experiments to investigate specific stock assessment and tuna fishery interaction problems. It is likely that such experiments, in contrast to the RTTP, would concentrate on small-scale problems of national interest. Studies would be designed by senior TBAP staff in close consultation and collaboration with national counterparts.

The Field Component would be manned by two senior biologists, recruited by the SPRTRP, who would jointly supervise field experiments, assist in the design and planning of experiments and undertake detailed analyses of the data in collaboration with other TBAP staff. They will be assisted in the field by two biological technicians, and at headquarters by a research officer (data), who will be recruited from EC/APC countries if possible.

It is planned that actual field work would commence in year 3 of the project, continuing for years 4 and 5. Therefore the biological technicians would not be recruited until year 3. Similarly, operational funding for the field component is only requested for years 3, 4 and 5. In years 1 and 2, the Biological Research Project would concentrate on working up the massive amount of biological data collected by the RTTP, defining specific problems to be investigated during years 3-5 (including extensive consultation with national Fisheries Departments) and preliminary planning of the work to be undertaken.

It is anticipated that the major research technique to be used would be tagging; however other research techniqes might also be used as the problem and situation warrants. Tagging would be carried out from commercial vessels, paying for the fish tagged and released. Alternatively, charters of commercial ACP/EC vessels or appropriate national ACP/EC government research vessels might be undertaken. The exact methodology to be used will depend on the circumstances of the project and vessel availability -- factors which cannot realistically be predicted.

4.1.2.2 Laboratory Component

The project will support the construction, equipping and operation of a basic laboratory facility for the analysis of biological sampling resulting from the observer and port-sampling components of the Statistics and Monitoring Project, the Biological Research Project and, in the first instance, the RTTP. This work is likely to encompass ageing of otoliths or other hard parts, stomach contents analysis, larval tow sample analysis, histological preparation and analysis of reproductive material and perhaps electrophoretic methods of population differentiation. The equipment needed for such work is, by and large, not sophisticated.

Until laboratory construction is completed, any essential analyses would be contracted to outside research agencies. Some contracting of the more complex laboratory work may still be necessary from time to time after completion of the facility.

4.1.2.3 Training Component

Numerous short-term training opportunities in a variety of fisheries-related areas are regularly available to Pacific Islanders. In the areas of fisheries biology and assessment, it is not clear that such short-term training has been particularly effective. With the expansion and re-structuring of the TBAP that the SPRTRP will facilitate, advantage should be taken of the TBAP facilities and expertise to offer longer-term training opportunities to ACP Pacific Islanders.

It is proposed that funding be made available through the SPRTRP to support longer-term (up to two years) attachments of ACP nationals undertaking a postgraduate degree in fisheries assessment or biology. Such students would be affiliated with a recognised university and obtain the agreement of the university to undertake all or part of the research component of their degree while based at the TBAP. The intention is that such students would undertake field, laboratory or computer-based work for their degree, drawing on TBAP facilities and expertise for support. Ideally, such work would be of relevence to tuna fisheries problems in the student's own country. With the agreement of the university concerned, a suitably qualified TBAP staff member would be appoined as the student's co-supervisor. While this component is placed within the Biological Research Component, attached students would have access to the full range of TBAP facilities and expertise.

It is proposed that at least two such postgraduate studentships be offered during the course of the SPRTRP, one in years 2 and 3 and one in years 4 and 5. As the exact period of attachment will depend on each individual student's degree programme, a third studentship might be available in years 4 or 5.

4.1.3 Assessment and Modelling Project

The objective of the Assessment and Modelling Project is to develop and apply tuna population dynamics models for the analysis of stock condition and fisheries interaction in support of national and regional fisheries management initiatives.

This project will be funded largely from TBAP core sources; however funding is sought through the SPRTRP for short-term contracts that will be necessary from time to time to undertake detailed and specialised analyses of SPRTRP data. This facility will enhance the capability of the TBAP to fully address important research questions that arise during the course of the project and assist in the timely dissemination of results.

4.1.4 Reporting and Liaison

Administrative support is required for communication and publication costs associated with the project. These costs will be charged to the project in line with standard SPC practice.

4.1.5 Computer Support

The Regional Tuna Fisheries Database held by the TBAP is one of the most fundamental activities of the programme, and will be the repository for all new information that results from the activities proposed under the SPRTRP. In addition, the database is used to process the large amounts of data currently being generated

by the RTTP and fisheries catch and effort data received from a variety of sources. The database is currently implemented on a HP9000 series minicomputer, which will soon be the focal point of a computer network that also includes IBM-compatible and Macintosh microcomputers and a SUN sparc-station. All analyses of data resulting from the SPRTRP will be undertaken on this computer system.

The further development and maintenance of the database and associated computer hardware is crucial to the success of this project, and the project will thus provide funding for TBAP computer support. This will provide for hardware and software maintenance for existing installations, operating consumables, and provision for the purchase of specific items of hardware and software needed by project staff.

4.2 Execution

4.2.1 Works

The only works to be carried out under this project involve the construction of a small building on the SPC compound to house a basic laboratory facility. Construction and tendering would be coordinated by SPC, and would use local materials and labour.

4.2.2 Equipment and Supplies

The equipment needed by this project falls into 3 categories:

- Port sampling, observer and fieldwork equipment and supplies, e.g. weighing scales, measuring boards, biological sampling kits, stationery, cameras, tagging kits, protective clothing, SSB radios, plankton nets, glassware, preservatives, portable echo sounder, charts, fishing gear etc.

- Laboratory equipment would comprise basic fittings, office furniture, microscopes, chemicals, glassware, storage equipment, a refrigerator and freezer, dissection equipment, scales and sundry small items.

- Computer equipment and supplies would comprise ongoing hardware maintenance and software support for the existing computer system and additional software and hardware needed to support the activities of the project.

Equipment would be purchased, and supplies obtained, following established procedures.

4.2.3 Personnel

All project personnel, apart from in-country port sampling staff to be sponsored by the project through national fisheries administrations, would be recruited under SPC terms and conditions of service.

APC nationals will be given preference for all biological technician positions (observers, port samplers and field biologists), however previous experience suggests that derogations may be necessary for the positions of Port Sampling and Observer Manager and Senior Fisheries Scientists (Biological Research) (2 positions) and for short-term contracts for analytical work. It will be essential for the sucess of the project that these specialised positions be filled by the best people available, and restrictive nationality constraints would not be in the best interests of the project.

Salary costs shown in section 4.3.1 have been based on the existing RTTP Technical Assistance Agreement, with those costs inflated by 10% to cover future SPC salary increases and inflation of living costs.

The project will sponsor the following staff:

- Port Sampling and Observer Manager (SPC P2 level)
  Responsible for organising and supervising work and placement of observers and port samplers, and for ensuring that the highest quality of data possible results from these components. The position would entail

considerable travel within the region and continuous contact with both national administrations, DWFN fleets and component staff members.

- Scientific Observers (SPC P5 level) 4 positions
  Responsible for biological sampling of catches on board commercial tuna fishing vessels operating in the western Pacific. Also assisting, where necessary, with the on-board implementation of the short-term tagging or other experiments under the Biological Research Project. These observers are likely to spend at least 75% of their time at sea.

- Scientific Port Samplers (Local conditions) 5 or more positions
  Resident at key unloading or transhipment points in the region or, if necessary, beyond, and responsible for documenting landings data, collecting logsheets (where authorised by member countries), checking for and collecting tags resulting from the RTTP and other experiments, collecting size-frequency and species composition samples and samples for biological analysis. Such staff might be nationals employed on a contract basis, or attached to national fisheries administrations.

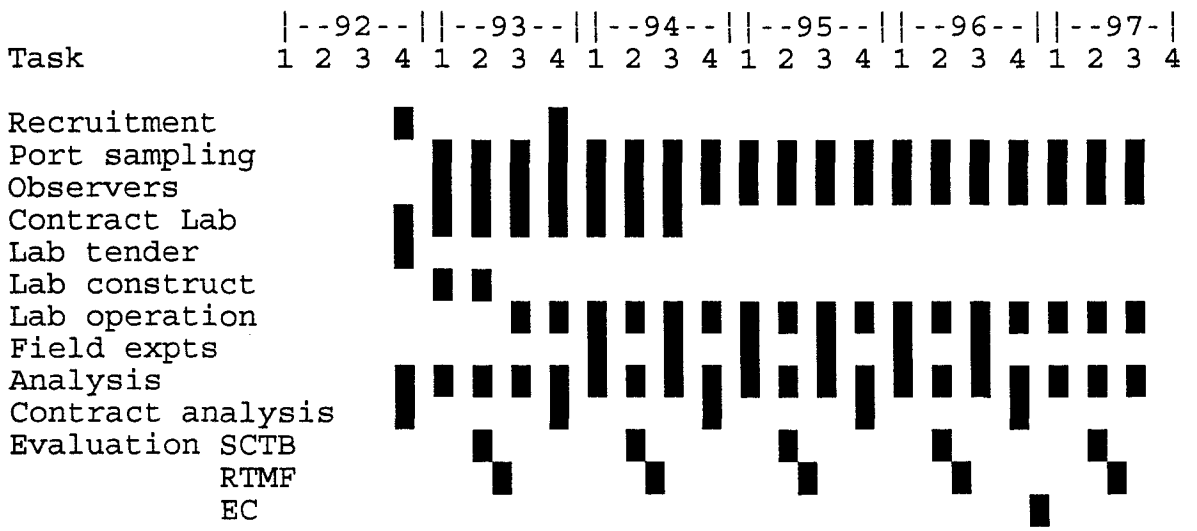
- Senior Fisheries Scientist (Biological Research) (SPC P2 level) 2 positions
  (Duties to be shared according to interests and expertise)
  Responsible for the direction of the laboratory facility and coordinating contract work to other laboratories. Together with other senior TBAP staff, responsible for the planning and implementation of field experiments, the analysis of results from those experiments and of biological data collected by the RTTP and by the port sampling and observer components of the Statistics and Monitoring Project.

- Biological Technicians (Field) (SPC P5 level) 2 positions
  Undertake, under direction, technical work associated with tagging, biological sampling and other field-based activities of the project. It is expected that up to 50% of time would be spent at sea, and the remainder spent in assisting with the processing and analysis of data and samples collected.

- Research Officer (Data) (SPC P4 level)
  This position is equivalent to the existing Research Officer position in the RTTP, and the duties would similarly involve processing of biological and tagging data and developing and implementing procedures to maintain the highest standards of data quality control.

4.2.4 Implementing Details, Deadlines, Timetables

The target startup date for the project is 1 October 1992, thus dovetailing with the RTTP, which is scheduled for completion on 30 September 1992. This timing will maintain the research impetus developed by the RTTP and allow specific reseach to be continued or initiated at a time when the tuna fisheries of the western Pacific are still developing rapidly. The implementation schedule for the specific project components is:



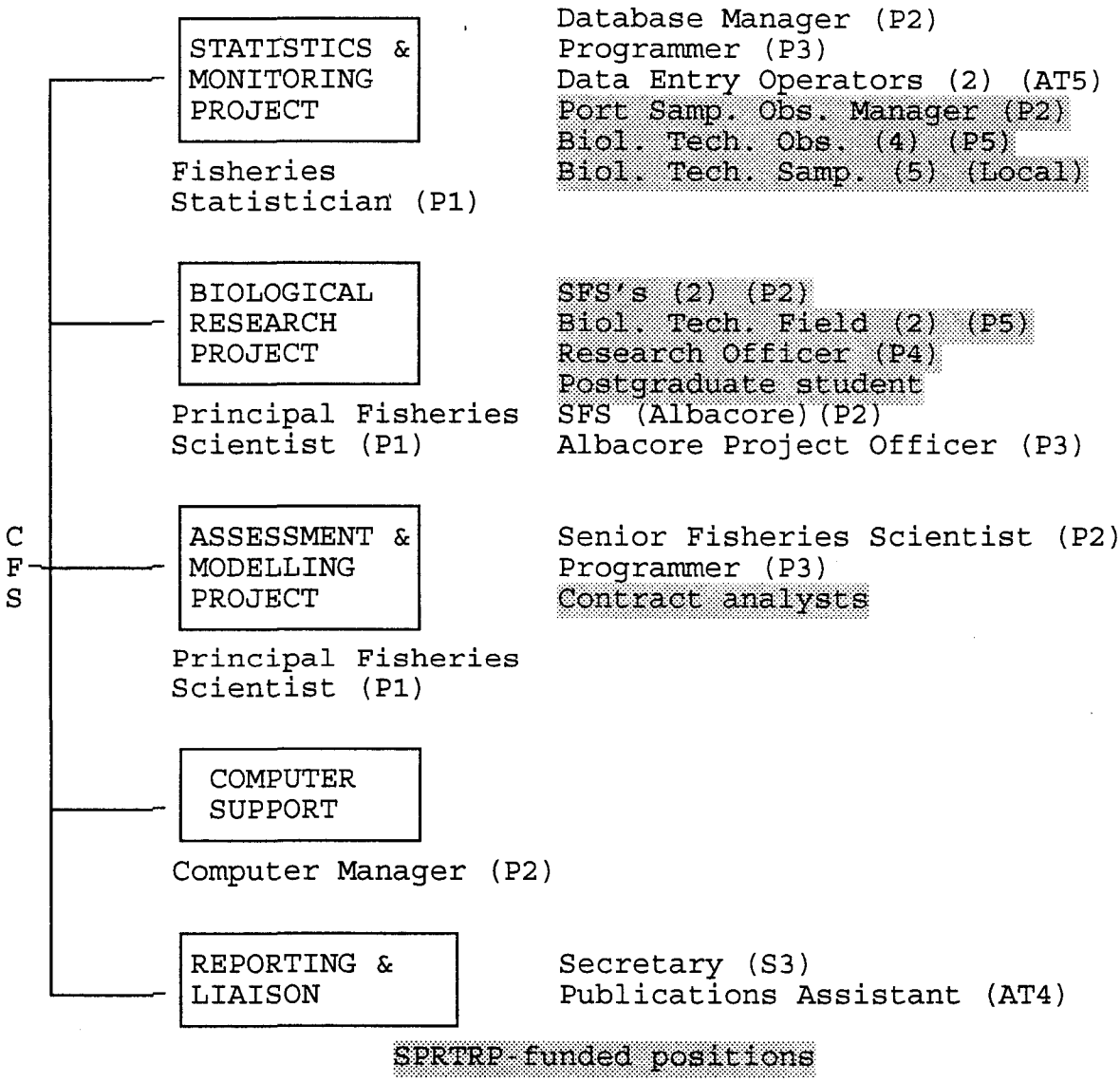
4.3 Plan for Implementation

4.3.1 Internal Provisions

4.3.1.1 Organisation and Management

This project will be an integral part of the work of the TBAP, which is administered under the Fisheries Programmes of the South Pacific Commission. The SPC Secretary-General and Director of Programmes supervise 6 major regional development programmes in addition to support and administrative services. Under the Fisheries Programmes, the Fisheries Coordinator supervises both the Coastal Fisheries Programme and the TBAP.

The TBAP is directed by the Chief Fisheries Scientist and has a proposed structure as follows:



4.3.1.2 Operation and Maintenance

The South Pacific Commission provides a full range of administrative services to its programmes. These services include utilities, building maintenance, communications, staffing and accounting functions. Project auditing would be through the normal SPC system, possibly with the assistance of a recently approved EC financial coordinator based at SPC, accountable to the South Pacific Conference of members as well as EC. The TBAP is also likely to be the subject of at least one comprehensive, member-funded, programme review within the life-cycle of this project.

Linkages between the TBAP and relevant external authorities are already good, and little problem is envisaged in the implementation of the Port Sampling Component through in-country project staff placements, building on the experience gained during the RTTP.

This project will institute and test certain new functions for the TBAP, which will remain as part of the core programme for the foreseeable future. Any equipment purchased by the project will thus be fully utilised beyond the end of the project. Conversely, it is expected that "core" funding will be found to take over the maintenance of these functions after the project finishes, possibly through the provision of services to a regional tuna management regime. The establishment of the TBAP's role in any regime (Stage III of the development suggested in the preamble to Chapter IV) may, however, require additional external funding.

To some extent, research programmes of this nature can never become strictly self-supporting unless there is a definite short-term monetary value attached to the results of research, and unless those results are reported only to the agency which commissioned and paid for them. Such a limited approach would not be in the interests of the long-term sustainability of the resource through international collaboration and certainly discriminate against the limited capabilities of ACP countries. In the strictest sense, the work of the TBAP throughout its entire history has been supported entirely by non-ACP countries (apart from a percentage of the SPC administration services provided in kind), and this situation is likely to continue.

All agencies which contribute to the funding of the TBAP have a legitimate interest in the fishery, either as (actual or potential) fishing nations or as resource custodians and, in this broader sense, the TBAP is already self-supporting. However, the sense of "self-support" would become stronger if certain activities were funded by membership payments under a management regime. The activities most likely to be supported by such arrangements are precisely the direct fisheries scientific monitoring functions that are initiated by this project.

4.3.2 Back-up Provisions

4.3.2.1 Legal Measures or Regulations, Including the System for Managing Resources

This project does not require the implementation of any legal fisheries management measures to safeguard or promote its operation. One of the main aims of the project itself is to provide a biological basis for regional fisheries managers to decide what legal measures might be most appropriate for management.

4.3.2.2 Environmental Measures

Again, one of the main outputs of the project is to gauge the potential impact of tuna fisheries on the regional oceanic environment, and provide a basis for implementing any measures necessary to control those impacts.

4.3.2.3 Marketing, Prices, Tariffs: Measures to be Taken

This project does not directly promote or control commercial fisheries, and back-up measures are not needed in this field. Where appropriate, advice resulting from information generated by this project may be used by ACP national administrations or through the Forum Fisheries Agency to modify marketing or tariff strategies.

4.3.2.4 Forecasts for the Post-project Period

This project builds on the lessons learned, and the needs identified by its fore-runners under the TBAP, and will provide similar guidance to its successors. The ongoing results of this project will be input to a range of other initiatives spanning the whole tuna fisheries sector of the entire region, through reports, meetings and direct participation by regional scientists.

The TBAP is essentially an open-ended programme, and research and statistical monitoring will be necessary as long as the regional tuna fishery exists. Continuity in the work of the TBAP is assured by the maintenance of a constant core of managerial and technical staff, and by the implementation of overlapping projects such as the RTTP and SPRTRP.

The post-project period is likely to see either the implementation, or the firm prospect, of a "stage 3" research programme in support of a regional tuna management regime, with a basis in international law and formal linkages with all relevant fishing nations. The setting-up of stage 3 is likely to require further extrabudgetary funding, but it is expected that some form of national membership payment will eventually support core TBAP functions (see **Chapter VI**).

As with all regional organisations, staff are likely to continue to be employed on a contract basis, with a comparatively high turnover. Although this project will have a significant impact in improving the research skills of Pacific Island fisheries research staff, the overall level of postgraduate-level fisheries research staff in the SPC region is unlikely to increase substantially in the next 5 years, owing to the generally large demand for trained manpower at all levels. Consquently, extra-regional staff and technical assistance will be needed for some time to come. Continued "cross-fertilisation" between regions is essential for efficient research on subjects of global applicability.

4.3.2.5 Other Components

This project will maintain extensive linkages with other organisations, and initiatives by those organisations will have back-up effects on this project. Of particular note is the international coordination of national and regional research efforts supported by working groups and committees under the TBAP. Some of the results arising from research apportioned to other groups may have an impact on the fine direction of research under this project.

In a more general way this project influences, and is influenced by, the Forum Fisheries Agency. For example, the strengthening of Minimum Terms and Conditions for access to Pacific ACP states by DWFN's, will have great significance for the TBAP Statistics and Monitoring Project by promoting better standards of data provision.

4.3.3 Monitoring and Follow-up

4.3.3.1 Monitoring

One of the major functions of the project itself is monitoring the fishery, particularly the effects of catches on stocks.

The effectiveness of project administration is constantly monitored at several levels, from the day-to-day activity of the SPC Fisheries Coordinator, monthly regional reporting on the progress of tagging fieldwork, quarterly regional reporting through the statistical bulletin, yearly reporting to the SPC Standing Committee on Tuna and Billfish (SCTB), the SPC Regional Technical Meeting on Fisheries (RTMF) and the South Pacific Conference, quarterly financial reports to EC, six-monthly progress reports to EC, yearly work-programmes to EC, SCTB and RTMF, reporting to the ACP Council of Ministers, and occasional in-depth programme reviews for SPC members. The project is accountable to the TBAP management, to the SPC management, to SPC member countries and to the EC.

4.3.3.2 Concurrent Evaluation

Evaluation of project progress, and determination of whether the project is meeting the identified needs effectively, is inherent in the functions of the annual (June) SCTB. The annual (August) RTMF, as well as acting on recommendations originating from the SCTB, undertakes some direct evaluation of TBAP projects.

The discussions of these committees are based either on members' direct experience of working with, or services provided by, the project; by reports and assessments compiled by project staff or SPC management; and on reports commissioned from external consultants.

Evaluation of all SPC functions is very comprehensive, and carried out largely by persons external to the Commission (particularly SPC member countries), and thus no need is seen for a regular specific evaluation to be carried out by EC consultants.

4.3.3.3 Ex-post Evaluation

An independent evaluation in the final year of the project will be commissioned. It is suggested that the evaluation team should consist of a fisheries officer from a Pacific ACP country and a fisheries scientist working for a tuna fisheries research body from outside the region.

4.3.4 Risks and Uncertainties

There are no major risks associated with this type of project. The project will be continually guided by annual peer-review as to methodology and direction, and there is no reason to suppose that the previous high standard of research by the TBAP will decline.

Uncertainties abound, but their effects are minimised by the project methodology. For example:

- There is no certainty that catch/effort data coverage of certain distant-water fishing fleets for the purpose of stock assessment will improve dramatically in the near future, and this is accounted for by the project placing emphasis on alternative (such as tagging or size-frequency) and corroborative (such as port sampling) methodologies.

- There is no certainty that future political expediency will not dictate the setting up of a separate and independent regional tuna research body to support a future regional tuna management regime, leaving the TBAP without a major long-term role. In the unlikely event of such an independent body being set up, it would certainly not become fully effective within the lifetime of this project and would have to rely on TBAP support for some considerable time.

- There is no certainty that the TBAP, and the project, will retain the confidence of all potential partners (particularly data-sources) if linkages to a management regime are made in such a way that it appears that the scientific secretariat is liable to be less than impartial. This possibility cannot be accounted for by this project, which will have to rely on a cautious approach being adopted at all stages of negotiation, and the active maintenance of linkages both within and outside the region. The TBAP currently appears to be highly regarded by coastal States and DWFNs alike and no major problems are anticipated, particularly if regular personal contacts are maintained.

- There is no certainty that vessels engaged on fieldwork will not break down. This has not been a major problem in the past, and most problems can be avoided by careful selection of vessels. The splitting up of fieldwork into a number of small, discrete components minimises problems of this nature.

4.4 Financial Aspects

4.4.1 Costs

Table 3. Breakdown of Project costs (in ECU x 1000).

PROJECT	1992/93	1993/94	1994/95	1995/96	1996/97	TOTAL
Statistics & Monitoring						
Salaries	375	375	375	375	375	1875
Travel	105	105	105	105	105	525
Equipment	10	10	10	10	10	50
Subtotal	490	490	490	490	490	2450
Biological Research						
Salaries	188	188	292	292	292	1252
Travel	25	25	55	55	55	215
Field Op.	0	0	100	100	100	300
Equipment	0	0	100	10	10	120
Tag Rewards	20	20	20	20	20	100
Laboratory	115	10	10	10	10	155
Postgrad.	0	20	20	20	20	80
Sub-total	348	263	597	507	507	2222
Assessment & Modelling						
Contracts	30	30	30	30	30	150
Computer Support						
Hardware	50	10	10	10	10	90
Software	50	10	10	10	10	90
Support	15	15	15	15	15	75
Supplies	5	5	5	5	5	25
Sub-total	120	40	40	40	40	280
Reporting & Liaison						
Publication	10	10	10	10	10	50
Communication	20	20	20	20	20	100
Sub-total	30	30	30	30	30	150
Evaluation						
Consultant & travel					30	30
Contingency	50	50	50	50	50	250
TOTAL	1068	903	1237	1147	1177	5532

The costs directly allocated to the SPRTRP must be considered in the context of the overall TBAP work programme, which relies on several other sources of funding. This project could not function in isolation from the analytical, statistical, management and administrative support services provided by the SPC or TBAP and, in the case of the port-sampling programme, by various Pacific Island countries. The relative contributions of these other activities to the project cannot be absolutely quantified, but the current sources of total TBAP support are outlined in Table 4.

Table 4. Indicative total TBAP funding sources for 1990/91.

Source	Approximate (CFP units)
Australia	170,000
France	240,000
New Zealand	50,000
United States	130,000
EC (RTTP and Albacore)	2,130,000
Canada (Albacore)	150,000
TOTAL	2,870,000

This total income for 1990/91 is equivalent to approximately 2.25 MECU. Note however that extrabudgetary contributions are fixed in the currency of the donor, and thus fluctuations in the real value (usually French Pacific Francs) of these donations are to be expected.

The SPRTRP will add approximately 1.0 MECU of yearly support to the TBAP which, as shorter-term fieldwork (largely EC-funded) projects draw to a close, will come to assume approximately 50% of the total programme support.

The combined population of the Pacific ACP states is 4,732,000. The cost of this project per head is thus approximately 1.06 ECU per person spread over the 5 year duration of the project. Per year, this is about 0.03% of the combined gross national products of the Pacific ACP states (see Table 1), or about 0.05% of the value of the fishery. Since the fishery itself is worth around 50% of the combined gross national products of the Pacific ACP states, any development resulting from this project (such as the introduction of regional tuna management), will have have implications for the whole regional economy.

4.4.2 Financing Plan

SPC core funding is determined annually by the South Pacific Conference, and support is expected to remain at, or above, current levels.

TBAP extrabudgetary funding from SPC members is determined through periodic consultation. All contributors, apart from USA[28], have indicated their strong intention to continue their contributions at current levels.

Extrabudgetary project funding, under EC, is obtained on a year-to-year grant basis in the context of the agreed project plan. Under Canadian aid, it is largely in the form of technical assistance.

Funding under this project would be disbursed in line with established practice, according to the totals under Table 3, and accounted, both to SPC members and to EC, through normal SPC mechanisms.

4.4.3 Method of Financing

A grant under Lomé IV is requested, as recommended by the 30th South Pacific Conference and supported by Ministerial level delegations from all Pacific ACP states. The chosen method of financing is constrained by the fact that the South Pacific Commission is a regional agency, that the project is a long-term research and regional support project, and that

[28] The recent restructuring of the USAID Pacific fisheries programme has dictated a more project-oriented approach, with direct assistance to a few individual countries rather than to regional institutions.

any financial benefits that may indirectly result from the operation of the project will not accrue to SPC, but to individual nations.

Funding for large capital items would be disbursed on the basis of supply contracts, subject to international tender procedures, and staff would be recruited under SPC terms and conditions. The project funding will be co-ordinated by the Delegation of the Commission of European Communities in Honiara.

Chapter V

5. Expected Results

Almost all of the broader expected results of this project fall into the "non-quantifiable" category. The project has little directly active effect on the region, but is rather a means of improving the quantity and quality of information available to enable action to be taken by other agencies at both the regional and the national level.

Because of this indirect linkage, the quantification of expected benefits, particularly at the economic level, would not be meaningful. Sensitivity analyses contain too many wide-ranging variables; indeed, one of the major aims of the project is to reduce the sources of error in the basic parameters of such analyses. How does one plan for the economic future of a national sashimi longline fleet when the size and resilience of the resource is unknown, and when the amount and effect of fishing taking place on the same stock in another area is unknown?

Quantification can be attempted at the more direct level of "knowledge accumulated", and the expected specific results of the project are the specific aims, or basic benchmarks, outlined towards the end of section 3.3.2. It is reasonable to expect, for example, that the TBAP database will improve its coverage of tuna fleet effort to 75%, or even 95%, within the tenure of the project; that 20,000 fish will have been tagged during the course of the several short research cruises; that port samplers will have monitored the throughput of 200,000 tonnes of tuna and taken biological or length-frequency samples from at least 5% of that total; that scientific observers will have covered up to 100 vessel-months of fishing; or that 100 new reports and papers will have been published.

The expected broader results of the project are described, qualitatively, as follows:

5.1 Physical

The main physical result will be the implementation, for the first time, of a scientific monitoring regime for regional tuna fisheries. Until now, regional tuna research has been largely *ad hoc*, apart from the sustained effort to improve catch/effort data holdings, and the implementation of monitoring functions (biological (spawning, ageing etc.), port-sampling and observer programmes) will be the essential first step if the TBAP is to provide the basis for the scientific component of any future regional tuna management regime.

Such a management regime may be implemented within the lifetime of this project. Indeed, the improvement of TBAP capabilities is likely to be one of the most significant catalysts towards that implementation. International agreement has already been reached mandating the South Pacific Albacore Research (SPAR) group (a broadly-based group of scientists organised by the TBAP) to act as the Scientific Advisory Group on Albacore (SAGA) in support of continuing negotiations towards an international management regime for South Pacific albacore tuna. While a management regime arising out of international agreement on albacore is not considered to be the most appropriate precedent for comprehensive regional tuna management, this development has already defined the important role that the TBAP will play in future management initiatives.

5.2 Social and Cultural

While this project has no direct impact on the social life of the region, the provision of information necessary to rationally and sustainably utilise the living oceanic resources of the region will inevitably have far-reaching effects.

As well as providing Pacific island states with the information necessary to make decisions about the exploitation and disposition of Pacific island tuna resources, the project will establish a lasting role for the TBAP and a basis for future endogenous implementation of research.

In terms of employment; directly, the project will employ at least 10 full-time staff over its 5 year span, many from island states, and these positions will continue under the TBAP beyond the life of the project. Indirectly, ensuring the long-term sustainability of tuna exploitation will ensure substantial employment for Pacific island peoples.

The traditional status of tuna fishing and marine spaces tenure in most cultures of the region has been outlined. This project must assess the importance of traditional and subsistence tuna fisheries, as well as commercial fisheries and, while not directly charged with the documentation of traditional fishing methods, the information compiled will be of great utility to future studies.

5.3 Non-quantifiable Effects

Apart from the obvious result of improving cooperation on fisheries matters within the region, and between the region and DWFNs, the results of the project also have considerable environmental implications.

Fisheries normally do not receive concentrated research attention (beyond initial exploration) until they are in crisis, either biologically or through allocation conflicts. As a consequence, the information essential to good fisheries management is often not available until the fishery itself is endangered. This project will enable the South Pacific Commission to make increasing amounts of vital information available for a series of fisheries which are not yet overstressed (although some of which appear to be approaching a critical phase). This research will support management aimed at preventing future resource crises rather than having to correct existing crises.

Chapter VI

6. Conclusion:

(Viability of the project when the external financing comes to an end)

Provided that fisheries for tuna and billfish continue to exist in the region, and provided that there is a continued regional will to manage those fisheries on a long-term sustainable basis, there will be a need for the type of work to be performed by this project throughout the foreseeable future.

While original research, and specific investigative projects, may eventually improve our knowledge of the biology and population dynamics of tuna (and thus how different stocks will repond to different kinds of fishing pressure) to the point where further such research would not be needed for applied purposes, there will always be a need to monitor the continually-changing balance of fisheries and to provide an opinion on the status, or likely future, of different stocks of fish.

This project, while supporting and refining much-needed basic biological research on tuna stocks, provides for the first time a regional facility to monitor South Pacific tuna fisheries for continuous stock assessment purposes.

Whether or not that nucleus facility becomes financially self-supporting by the time this project funding closes depends largely on whether or not a comprehensive regional tuna management regime is in place. Such scientific monitoring is an essential part of such regimes, and participants to the regime would normally support its operations. Even without the implementation of a full-scale management regime, there are promising signs that cooperation under bilateral or multilateral access agreements may eventually provide some support for such scientific monitoring.

It is desirable for such a regime, as well as scientific monitoring, to also support basic research into the stocks under its control. However, such research is likely to be extremely constrained in its direction, since a large part of its funding will originate from the fishing industry. If research into the broader issues, particularly conservation-oriented issues, is to be continued, there is likely to be a need for externally, or independently, funded research for some time to come.

Pacific ACP states are unlikely to be at a stage of economic development in five years' time where they can support such large-scale research, particularly when the results of that research appear to most immediately benefit industrial rather than community development. However, the recent publicity on driftnet fishing in the South Pacific has brought the conservation, management, and regional development aspects of tuna fisheries to the fore and, through regional collaboration under the South Pacific Commission, there is hope that state funding may be allocated for such research in future.