

The Role of Tuna Fisheries in the National Economies

General

The Pacific Islands countries, in many cases, do not have the necessary statistics for gauging the importance of tuna to their national economies. Moreover, aggregate indicators for all the countries are too few and inconsistent to allow a comparison across the region. And even if such information were available, the rudimentary conceptual framework for quantifying fishery benefits could lead to widely divergent estimates. Studies that attempted to put a value on the ocean-related GDP of the United States, for example, produced estimates ranging from 2.6 percent to 35 percent of the total economy (Kildow et al. 2000). Yet, the importance of tuna to the Pacific Islands economies is undeniable.

Currently valued at \$1.9 billion, the annual tuna harvest (see the section “Regional Tuna Catch” above) indeed looms large in the Pacific Islands economies. According to SPC (1998b), the countries and territories in the region have a combined gross domestic product of about \$17 billion. The annual tuna catch is therefore about 11 percent of the region’s GDP.

The value of tuna exports relative to total exports would provide another gross indicator of the economic importance of the tuna resource to the region. Since most of the tuna catch is exported, tuna exports make up almost half of the roughly \$4.0 billion in annual exports (including mining exports) from the Pacific Islands countries (SPC 1998b).

The tuna resources of the area are enormous in relation to the national economies. A purse seine vessel, in a single haul, can capture enough tuna to match the value of a year’s exports from one of the smaller countries.

Fish in general are very significant in the Pacific Islands. FAO (1995b) states:

Fish and fishing are tremendously important to the people of the Pacific Islands. Much of the nutrition, welfare, culture, recreation, government revenue, and employment are based on the region’s living marine resources.

Table 2 compares the annual tuna catch with the other fish catch of the region in terms of volume and value.

Table 2: Annual Volume and Value of Catch of Pacific Islands Fisheries

Type	Volume (MT)	Value (US\$)
Industrial tuna fishery ^a	1,074,113	1,900,000,000
Industrial prawn fishery ^b	946	9,043,618
Subsistence fishery ^c	83,914	179,914,623
Small-scale commercial fishery ^d	24,327	81,800,664
Total	1,183,300	2,170,758,905

^a SPC (2000, unpublished data); Van Santen and Muller (2000)

^b NFA (1988)

^c Dalzell et al. (1996)

^d Dalzell et al. (1996)

As the table shows, not only is tuna fishery the most important of the four categories, it produces almost ten times the total amount of fish produced by all the other types of fisheries in the region and over seven times the value of all other fish catch.

FAO (1996) underlines the overall importance of tuna to the region:

For many South Pacific Island states and territories their social and economic development is closely tied to the fortunes of the region's fisheries sector. Indeed, in this connection, the importance of fish, and in particular tuna, in the South Pacific, has been likened to the importance of petroleum for the States in the Near East. This situation is especially true for those South Pacific States and territories that are composed largely of clusters of atolls and which, as a result, are severely limited in terms of land-based development.

Access Fees

A major financial benefit from these extensive tuna resources comes in the form of access fees paid by foreign fishing vessels that fish for tuna in the EEZs of FFA member countries. With very few

exceptions (e.g., for live-fish collection), all licenses issued to foreign fishing vessels plying the territorial waters of the Pacific Islands are for tuna fishing.

To qualify for such a license, a foreign vessel must be listed in the FFA Regional Register. Table 3 lists the numbers of vessels that were registered in 1999/2000.

Table 3: Tuna Fishing Vessels in the FFA Regional Register, as of August 2000

Country	Type of Vessel			Total
	Longline	Purse Seine	Pole/Line	
China	97	0	0	97
Japan	255	36	39	330
Korea	144	26	0	170
Pacific Island countries	9	21	0	30
Philippines	0	15	0	15
Taipei, China	184	42	0	226
US	1	35	0	36
Other	26	19	0	45
Total	716	194	39	949

The table shows that 949 longliners, purse seiners, and pole/line vessels were eligible for licensing in the region as of August 2000. The license fees paid by foreign fishing vessels arise mostly from bilateral licensing arrangements, the details of which are not always readily available. Therefore, information from FFA staff and direct contacts with FFA member countries were used to construct Table 4, which gives estimates of the access fees paid to Pacific Islands FFA member countries in 1999.

The \$60.3 million received for fishing licenses in 1999 marked a significant increase over the access fee revenues of earlier years.³ Compared with the \$15 million in fees reported by Clark (1983), the 1999 fees represented a 402 percent increase.

³ Gillett (1997) estimates \$66.3 million in access fees for 1996. But the Project Development fund contributions under the US tuna treaty were considered part of US purse seine fees in the estimation.

**Table 4: Access Fees Paid to Pacific Islands
FFA Member Countries, 1999 (US\$)**

Country	Type of Vessel			Total
	Longline	Purse Seine	Pole/Line	
Japan	5,128,000	9,199,000	1,405,000	15,732,000
US	0	16,693,026	0	16,693,026
Korea	3,492,000	6,250,000	0	9,742,000
Taipei, China	2,099,000	10,642,000	0	12,741,000
China, People's Republic of	500,000	0	0	500,000
FSM arrangement ^a	0	579,357	0	579,357
Others	90,000	4,200,000	0	4,290,000
Total	11,309,000	47,563,383	1,405,000	60,277,383

^a Preferential access to purse seine vessels of Pacific Islands countries that are parties to the arrangement

This revenue is substantial considering the small size of most of the economies in the region. The countries, however, differ substantially in the amount of licensing money they receive, with FSM, PNG, Kiribati, Tuvalu, and the Marshall Islands receiving the most.

For many countries in the region access fees make up a sizable portion of government revenue. Because of confidentiality and other reasons, this type of information is often difficult to obtain. Moreover, even where such information is readily available, varying methods of revenue recognition between countries hinder comparison. Available data show:

- Access fees in the Marshall Islands amounted to about 25 percent of Government revenue in fiscal year 1992/1993 (World Bank 1995) and are believed to have been partly responsible for the country's recovery in the late 1990s from three years of economic recession (ADB 2000).
- FSM has collected almost \$200 million in access fees since it declared its sovereignty over EEZ resources (MMA 2000b). In fiscal year 1999/2000 access fees composed about 39 percent of nontax revenue and 22 percent of the total domestic revenue of the national Government (FSM and MMA records).
- License fees contributed 45 percent of the total Government revenue of Kiribati in 1991 (Fairbairn 1992). A doubling of the fees in 1998 caused a 16 percent jump in GNP (ADB 2000).

- License fees in Tuvalu composed 10 percent of recurrent Government revenue in 1988, 7 percent in 1989, and 11 percent in 1990 (Fairbairn 1993). By 1999, the portion of license fees had grown to 40 percent (ADB 2000).
- In Palau in the mid-1990s, access fees accounted for about 10 percent of Government revenue, half of this from the locally based foreign fleet and the other half from the distant water fishing nation (DWFN) fleet (PCS 1999).
- Recent access fees in Tokelau have brought in almost twice the revenue from local duties, registrations, and taxes.
- In Vanuatu, the US tuna treaty alone generates over 62 percent of the revenue earned by the Government from fisheries.

The foregoing data show that licensing fees are an important revenue source for smaller countries with no abundant natural resources other than tuna. On the other hand, even Papua New Guinea, with its large mining, petroleum, and agriculture sectors, also derives a significant part of its income from license fees. According to the National Fisheries Authority and AusAID (2000):

- Access fees represent about 2 percent of total Government revenue and 33 percent of the nontax revenue of PNG.
- The PNG Government earns more from fishing access fees and charges than the amount it expected to spend in 2000 to maintain law and order (police and prisons).

Employment

A crucial benefit of tuna fisheries to Pacific Islands economies is the employment they provide. The labor-intensive nature of many tuna fishing and tuna processing operations, together with the scarcity of formal jobs in the region, heightens the relative importance of tuna-related employment.

The tuna resource generates employment in the following three categories:

- Direct employment on fishing vessels and in processing operations
- Employment connected to the tuna industry

- Indirect spinoff employment resulting from links to other sectors of the economy

Estimation of tuna-related employment

Direct employment on fishing vessels and in processing operations was estimated using a variety of sources: knowledge of the region, interviews with individuals having close contacts with industry, discussions with fisheries officers from the Pacific Islands countries, and published and unpublished reports. The results are given in Table 5.⁴

The table shows total direct employment of nearly 15,000 in the tuna industry of the Pacific Islands.

The second category of employment—jobs connected to the tuna industry—is less well defined and hence more difficult to quantify. In this category are jobs that contribute in some way to the tuna industry and for which the industry is either the sole or a major client. Office staff at the tuna fishing companies in Nuku'alofa, teachers at the Fisheries Training Centre in Tarawa, outboard mechanics in Fakaofu, roving fish vendors in Funafuti, and aluminum welders at the catamaran boatyard in Apia would fit into this category.⁵

The third category of employment in the tuna industry is indirect spinoff employment resulting from links to other sectors of the economy. Demand for canned mackerel, shoes, taxis, theater entertainment, and so forth, among the 8,000 or so who are directly employed on vessels and in processing plants in Fiji, Solomon Islands, and PNG, for example, will lead to the creation of more jobs in these other industries. Of the three employment categories, spinoff employment is the least obvious and the most difficult to quantify.

⁴For the Solomon Islands, this report considers only the period up to the civil disturbances in mid-2000, which forced at least the temporary closure of many tuna-related facilities.

⁵Other examples: the staff of the security company providing guards for Solomon Taiyo in Noro, secretaries in the offices of lawyers specializing in fisheries affairs in Kolonia, salesmen in the fishing gear store in Port Moresby, staff of the fish shop in Niue, refrigeration mechanics in Majuro, staff of the cargo department of the national airline in Fiji, sellers of the longline by-catch in Rarotonga, providers of food to the foreign fleets based in Koror, sales staff of the store that supplies outboard engines in Nauru, and the staff of the agency in Port Vila that services longline vessels.

Table 5: Direct Employment in Tuna Fishing and Processing in FFA Member Countries, 2000

Country	Total Jobs	Fishing							Smaller Commercial Vessels		Processing and Export
		Foreign Fishing Vessels	Transshipment	Longline	Purse Seine	Pole/Line	Artisanal	Others ^a			
								Artisanal	Others ^a		
Cook's Islands	77			7			70				
Federated States of Micronesia	614	150		56	30		25 (Kosrae) 100 (Chuuk) 45 (Pohnpei) 30 (Yap)			178	
Fiji	1,407	340		462		25				400 (PAFCO cannery) 130 (sashimi) 35 (nat'l fisheries co.) 8 (tuna jerky) 410 (joining plant)	
Kiribati	1,193	350					800				
Marshall Islands	519	14	20				75				
Nauru	21			6				15			
Niue	47							12 (commercial skiffs) 35 (semicommercial skiffs)			
Palau	36	1				10	25				
Papua New Guinea	3,015		25	340	75					2,500 (cannery) 15 (joining) 60 (export processing) 1,450 (cannery) 40 (sashimi)	
Solomon Islands	2,853	138		240	135	750	100				
Tokelau	38						20	18 (commercial alia fishing)			
Tonga	403	3		140			30			150 (Pago Pago canneries) 80 (sashimi)	
Tuvalu	57	7					50				
Vanuatu	130	120					10				
Samoa	4,070	60		455						55 (Apia) 3,500 (Pago Pago canneries)	
Total	14,480	1,183	45	1,706	240	785	1,360	80		9,011	

^a Including unspecified smaller commercial vessels

Sources: Gillett and McCoy (1997); Gillett (1994); interviews with national fisheries officers, FFA staff, and regional experts

In-depth analysis would be required to gauge its magnitude. Some indication could be obtained by following the flow of income from the tuna fishery through the economy. Intuitively, the greater the amount of income retained within a country's economy, the greater the spinoff employment would be. This suggests that the labor-intensive tuna fisheries (e.g., the pole/line fleets of Fiji and the Solomon Islands) would produce proportionally greater spinoff employment than the capital-intensive purse seine fisheries, where much of the expenditure is for imported products.

Studies on various fisheries outside the Pacific Islands (Weber 1994, Swerdloff and Pooley 1979, and Meyer 1987, among them) have been made to estimate the direct and indirect employment associated with fisheries. Some of these reports have indicated a multiplier effect for employment, or a relationship between the number of direct jobs in fishing and processing and the number of jobs created indirectly. Fishing industry sources in New Zealand claim that eight jobs are created ashore for every one fisherman at sea (H. Walton and C. Huflett, personal communications). One longline company operator in Fiji feels that for every person working on one of his vessels or in his plant, five other jobs are created elsewhere in the economy (G. Southwick, personal communication). On the other hand, an economist with long experience in the region and with tuna fisheries believes that the ratio of direct to indirect employment would be between 1:1 and 1:2 (A. Hughes, personal communication). Detailed investigations to determine the multiplier effect of employment in the tuna industry of the Pacific Islands is far beyond the scope of the present study. Hypothetical calculations using a conservative ratio of two indirect jobs for every direct job in fishing and processing (14,480 in Table 5) gives a total tuna-related employment in the Pacific Islands of about 43,000. On a ratio of 1:1 the number of jobs would be about 29,000. This figure should, however, be used with caution: the ratio has little quantitative basis and could vary significantly between Pacific Islands countries. Nevertheless, a ratio of between 1:1 and 1:2 appears to be on the cautious side.

Arama (2000) expresses the impact of tuna employment somewhat differently. That study indicates that, for every employee at PAFCO, another four people (family members) are affected by the job.

Relative importance of employment to the Pacific Islands economies

According to UNDP (1994), there were about 370,000 wage-paying job opportunities in the Pacific region in 1991. Information on the number of formal jobs in the region at the end of the decade is not readily available, but there are indications that growth, if any, in the number of such jobs during the 1990s has been very slow. The number of jobs remained static in PNG (AusAID 2000), grew only very slightly in FSM (Bank of Hawaii 2000), and actually dropped in the Solomon Islands. Growth in wage-paying jobs in other Pacific Islands countries has also been sluggish (UNDP 1997e), as it has been in the private sector (1999a). A 5 percent increase in the number of wage-paying jobs during the decade would have resulted in 388,000 jobs by 2000. The 29,000 to 43,000 tuna-related jobs mentioned above would therefore represent between 8 percent and 11 percent of all wage-paying jobs in the Pacific Islands region.

The lack of reliable employment data makes it more difficult to assess the importance of such employment for specific countries. A rough comparison of available information on national employment with direct employment in fishing/processing (from Table 5) produced the results shown in Table 6.

The information in Table 6 should be interpreted with caution. The total employment information is in some cases several years older than the tuna industry employment data. The method of calculating the total employment may also vary between countries (Kiribati, for example, bases its calculation on provident fund contributions, while FSM uses census data). Nevertheless, it is apparent that the loss of direct employment on tuna fishing vessels and in tuna processing factories would severely damage the economies of Kiribati, Samoa, and the Solomon Islands, and would have a major impact on most of the other countries listed in Table 6. The subsequent reduction in spinoff employment would amplify the negative effects.

Table 6: Relative Economic Importance of Direct Employment in Tuna Fishing and Tuna Processing in the Pacific Islands

Country	Total Employment		Direct Employment in Tuna Fishing/ Processing	
	No.	Year	No.	% of Total Employment
Vanuatu ^a	18,500	1995	130	0.7%
Solomon Islands ^b	26,408	1997	2,853	10.8%
Kiribati ^c	11,142	1990	1,193	10.7%
Marshall Islands ^d	13,200	1992	120	0.9%
FSM ^e	18,669	1997	614	3.2%
Samoa ^{f,j}	23,009	1999	510	2.2%
Fiji ^g	93,400	1992	1,407	1.7%
Cook Islands ^h	7,113	1991	77	10.8%
PNG ⁱ	214,000	1998	3,105	1.4%

^a UNDP (1996)^b Bank of Hawaii (1998)^c Miles et al. (1992)^d UNDP (1997a)^e Bank of Hawaii (2000)^f Central bank data^g Bartsch (1992)^h UNDP (1997d)ⁱ SPC (1998), AusAID (2000)^j If cannery employment were considered, the tuna industry employment figure would be 4,070, or 17.7% of total employment.

Other employment considerations

Tuna industry employment provides support for government policies related to decentralization, women's activities, and private-sector development. Many Pacific Islands governments favor policies that further decentralize employment, increase opportunities in rural areas, and stem the population drift to urban areas. Viable mechanisms for accomplishing these goals are unfortunately not common, but tuna industry employment contributes to the solution:

- The high employment at the canneries in relatively remote areas becomes especially important. The canneries at Levuka in Fiji and Noro in the Solomon Islands provide formal employment

in nonurban areas for about 2,000 people. Arama (2000) states that the PAFCO cannery in Levuka has become the lifeline of the island, providing income and employment, and spurring commercial activity.

- In Kiribati, people from the outer islands are given priority in filling jobs on Japanese tuna vessels.
- Most FSM men working on foreign tuna vessels are residents of remote villages or outer islands.
- Promising tuna jerky operations have started on the outer islands of Tuvalu and the Marshall Islands.
- In Samoa, a significant amount of tuna-related employment aboard the vessels is nonurban because about 40 percent of the longliners in the country are based outside Apia (including 20 percent on Savaii).

Similarly, many Pacific Islands governments wish to provide more employment opportunities for women. The canneries in Pago Pago, Levuka, Noro, and Madang employ over 6,500 Pacific Islands women. The tuna fishing and processing company Solomon Taiyo, note Barclay and Yoshikazu (2000), was the first to provide cash employment to women without tertiary education in the Solomon Islands and still is the only one providing significant opportunities of this kind. Women compose around 85 percent of the employees of the tuna cannery at Madang. Operators of the cannery say that loining and other processing operations now under development or negotiation will likely employ a similar proportion of women (P. Celso, personal communication).

If women are assumed to hold roughly one third⁶ of the estimated 388,000 jobs in the region mentioned in the section "Relative Importance of Employment to the Pacific Islands Economies," then these six tuna processing plants alone directly employ 5 percent of all job-holding women in the region. As women have a large portion of jobs in the growing number of sashimi export firms in the region, the importance of tuna-related employment for women is probably increasing.

In most Pacific Islands countries the public service sector is especially large. In the early 1990s public-sector employment

⁶ On the basis of familiarity with the region and a feel for the makeup of the workforce.

accounted for 70 percent of paid employees in Kiribati, 69 percent in Tuvalu, 48 percent in the Solomon Islands, and 46 percent in FSM (UNDP 1999a). Most governments of the region are actively scaling down the public sector and, at the same time, promoting private-sector growth. The Marshall Islands, for example, reduced the number of Government employees by 33 percent between late 1995 and March 1999, while Nauru retrenched about 30 percent of the public-sector workforce beginning in April 1999 (ADB 2000). The public sector in FSM has also been considerably downsized. (It should be noted in this context that all of the 15,000 people directly employed by the tuna industry and the 29,000 to 43,000 possible jobs alluded to in the section “Estimation of Tuna-Related Employment” are outside the public sector.) In addition, those private-sector jobs are based on creating wealth from natural resources and do not depend on public-sector spending.

Other Economic Benefits from Locally Based Tuna Industries

Some previous studies

Although job generation is often the most visible and appreciated benefit from basing operations locally, tuna resources bring many other types of gains to the local economies. But the matter of how to quantify the benefits from local fishing industries has stirred considerable debate among fisheries economists. Several techniques have recently been applied to the tuna fisheries of the region. Some studies using these techniques are given below.

- The total expenditures of locally based vessels could serve as a rough, surrogate indicator of the impact of an industry on a country. Kingston et al. (1993) studied two foreign tuna fishing companies that had local operations in Palau involving 173 Chinese and 52 Taiwanese longliners in 1993. For these two local longline companies, the sum of all local expenditures, referred to as “benefit to country,” was \$2,143,550 in 1992 and \$3,092,500 in 1993.
- The Palau Conservation Society (PCS 1999) used another method to quantify the benefits from the tuna industries. It estimated the total amount of expenditures or payments made in Palau.

Then, using a basic knowledge of the structure and dynamics of the Palau economy, it made a rough estimate of the proportion of expenditure that does not leave Palau, referred to as the “indirect benefit” to the country. The annual indirect benefits to Palau from the locally based longline industry were estimated to be \$671,000 over the period from 1993 to 1997.

- A similar technique was used by ADB (Lucas et al. 1996) to estimate the benefits retained by low-productivity longliners based in FSM. An estimate was made of vessel expenditures in 18 categories, as well as the amount in each category that does not immediately leave the country, referred to as “retained benefit.” The retained benefits per season from one FSM-based longliner amounted to \$148,003.
- FFA (1998), in studying the Majuro Fishbase in the Marshall Islands, defined “economic benefits” as the proportion of expenditure accruing to domestic factors of production. Assuming an annual catch of 2670 MT, economic benefits, including license fees, came to about \$0.27 million.
- Smith and Tamate (1999), studying the benefits of the Fiji pole/line fishery, examined the vessel expenditure categories and estimated the percentage of each category of expenditure that went to nonimported items. They added the dollar equivalent of the weighted average percentage (what they called the “domestic value added”) to the gross income of the fishery to estimate the “total value to the economy.” The pole/line fishery had a total value to the Fiji economy of F\$0.46 million to F\$5.52 million annually from 1988 to 1998.

Details of two studies

A study made by Palau Conservation Society (PCS) and the Forum Fisheries Agency (FFA) in Palau from 1993 to 1999 was the most comprehensive ever on the economic impact of tuna development on a Pacific Islands country. Another study, a recent one on Solomon Taiyo, was one of only a few that have traced the effects of a commercial tuna company on a country in the region. Some of the results of these two studies are summarized below, to illustrate facets of the tuna-related benefits.

The PCS and FFA study (PCS 1999) looked into the benefits generated by the locally based foreign tuna fleet in Palau. The report showed:

- *Gross economic value:* Palau's locally based longline fishery had an average annual gross (wholesale) value of about \$28 million from 1993 through 1997. Sashimi-grade bigeye and yellowfin accounted for about \$25 million of that total value.
- *Net economic value:* Of the fishery's \$28 million gross value, roughly \$9 million were net benefits, equivalent to the net economic rent generated by the fishery. The remaining \$19 million was used to defray the costs of capturing, transporting, handling, and marketing the catch, as well as managing the fishery and providing public services and infrastructure to the industry.
- *Distribution of net value:* About \$1 million (\$1.2 million in revenues less \$0.3 million in public services), or 10 percent of the available rent, accrued directly to Palau through various taxes on the industry. The remainder of the rent accrued to the transshipment companies and foreign fishing companies (together about \$7 million) and the Japanese marketing agents (about \$1 million). Assuming that the locally based companies had 40 percent local ownership, roughly \$1 million in private-sector profits were retained in Palau. Direct net benefits to Palau therefore totaled about \$2 million.
- *Indirect benefits:* The fishery generated indirect benefits for Palau through wages paid to Palauans and through local spending by foreign workers and vessels making port calls. Indirect benefits totaled about \$0.2 million per year in the public sector and about \$0.7 million in the private sector. The industry supported the equivalent of about 10 Government jobs filled by Palauans.
- *Significance of benefits:* The Palau economy appears to be capturing 20 percent to 30 percent of the fishery's available rent—about half to the public sector and half to the private sector. The \$1 million in Government revenues from the locally based fishery represented 5 percent of domestic Government revenue.
- *Distribution of benefits within Palau:* Palau's foreign fisheries provide an important source of revenue for the country's 16 states, among which 85 percent of the revenues from foreign fishing permits are distributed. Of the \$1.9 million in net

Government benefits from all foreign fisheries (1993–1997 annual average), about \$1.1 million, or 57 percent, went to the states. In 1997, foreign fishing revenues contributed 4 percent to 34 percent of the total revenues of each state.

Barclay and Yoshikazu (2000), on the other hand, sought to find out whether Solomon Taiyo Limited (STL) had been a development success. Their study yielded insights into the benefits provided by a tuna enterprise to a developing country. The Solomon Islands Government had four main goals for STL over the last three decades: it hoped that the company would create more jobs, localize staffing and procurement, generate revenue for the Government, and earn foreign exchange and contribute to a favorable balance of trade. The report on the study showed the following:

- *Employment:* In terms of job creation, STL has been an unqualified success, far exceeding the 100 to 200 jobs originally envisaged. As of June 1999, STL had 2,400 permanent employees and up to 700 casuals. As stated earlier, Solomon Taiyo was the first and still is the only significant source of cash employment opportunities for women without tertiary education in the Solomon Islands.
- *Local staffing:* Solomon Islanders fill nearly all low-level, junior supervisory, and middle management positions, but there has been limited localization of senior management and marketing personnel (only 2 out of 12 positions).
- *Local purchase of goods and services:* The company buys most of its fresh food from villages around Noro and pays royalties for baitfishing to customary reef owners. Domestic procurement amounted to S\$41 million in 1994.
- *Dividends and taxes paid to the Government:* Although STL has rarely paid dividends and income tax on profits, the company has generated substantial revenues for the Government in the form of other taxes such as import/export duties, withholding tax, PAYE (pay as you earn) tax, and licenses. The revenue produced by STL is of prime importance to a government that is chronically short of funds.
- *Foreign currency earnings and contributions to the balance of trade:* STL is one of the few successful exporting businesses in the Solomon Islands. It has succeeded in boosting exports and

earning foreign currency for the country. Without STL the Solomon Islands would be in dire economic straits.

- *Conclusion:* The study concluded that STL has been successful in providing employment, revenue, and overseas trade, and has had moderate success in localization.

Expenditures by locally based vessels

Locally based industrial tuna vessels, foreign as well as locally owned, are increasing in FFA member countries. Table 7 estimates the number of such vessels in the Pacific Islands, using knowledge of the region, interviews with fisheries officers from the various island countries, and discussions with key individuals.

Table 7: Locally Based Tuna Vessels in the Pacific Islands, as of Mid-2000

Country	Type of Vessel			Total Vessels
	Longline	Purse Seine	Pole/Line	
Cook Islands	1			1
FSM	47	5		52
Fiji	42		1	43
Kiribati	2	1		3
Marshall Islands				0
Nauru	1			1
Niue				0
Palau	80		1	81
PNG	34	15		49
Solomon Islands ^a	20	5	30	55
Tokelau				0
Tonga	12			12
Tuvalu				0
Vanuatu				0
Samoa	7			7
TOTAL	246	26	32	304

Note: The vessels in this table are those with a length greater than 15 meters.

^aCivil disturbances in mid-2000 halted, at least temporarily, the operation of many vessels.

The expenditures made on behalf of these 304 locally based vessels and by their crews may not be fully appreciated.

- Carter (1995) states that a tuna seiner spends \$300,000 to \$450,000 on each visit to the home port (four to five port calls are the norm). According to McCoy (1998), annual expenditures for a locally based purse seine vessel in PNG would be about \$1.5 million.
- Wilson (1995) contends that a locally based sashimi longliner doing short trips would spend \$13,000 each trip, and a fleet of 60 such vessels would generate \$8 million each year in home port expenditures. Lucas et al. (1996) estimate that a locally based longliner from Taipei, China would spend \$280,073 a year in FSM. A longliner based in PNG would spend about \$590,000 in the country each year (M. Brownjohn, personal communication). Philipson (1998), using three alternative country scenarios, estimates from \$650,000 to \$950,000 in yearly expenditures for a longline vessel.⁷
- A pole/line vessel based in the Pacific Islands would normally spend about \$300,000 to \$425,000 locally each year (Smith and Tamate 1999; R. Stone, personal communication).

Multiplying the number of locally based vessels in FFA member countries (Table 7) by these indicative expenditures per vessel would give a rough approximation of the magnitude of expenditures – about \$150 million. The portion of this figure that actually benefits Pacific Islands economies could be expected to increase as more local businesses develop to serve the needs of the tuna vessels and engage in associated activity. Maxwell and Owen (1994) revealed that for a given purse seine vessel in the region, net economic benefits to the local economy would be about 20 percent of gross expenditures.

Transshipment

In addition to the economic benefits from locally based tuna vessels, substantial gains accrue from vessels that occasionally visit ports in the region to transship fish. A ban on transshipment at sea introduced

⁷ Philipson's estimates include overseas marketing costs, which do not benefit local economies. These costs are excluded here.

by FFA member countries in June 1993 has caused a dramatic increase in port activity at transshipment points.

FFA states that in the first full year of transshipment operations(1994) the benefits were thought to be \$1.5 million in charges and \$10 million in local expenditure. As local businesses grow to cater to this trade, there is likely to be an increase not only in local expenditures but also in the proportion in benefits from those expenditures that will be retained in Pacific Islands countries.

Most purse seine transshipment in the 1990s took place in FSM, the Solomon Islands, PNG, and the Marshall Islands, although there was some transshipment in most FFA member countries. The most popular ports for tuna transshipping in the mid-1990s were (in descending order of preference) Chuuk, Guam, Honiara, Wewak, Manus, Kavieng, Tinian, Rabaul, and Yap.

Regionwide, port calls by purse seiners in Pacific Islands countries result in payments per visit of about \$3,000 to \$4,000 for government services and government levies, irrespective of port (McCoy and Gillett 1998). Payments to the private sector during port calls for transshipment total around \$4,000 per visit. The 507 transshipments known to have been made by the Korean and Taiwanese seiners in 1996 (SPC data) would therefore have resulted in \$3.8 million in local expenditures.

Country-specific information on transshipping shows substantial benefits:

- Heberer (1994) estimates that 294 purse seine transshipments occurred in Chuuk alone during the first six months that the ban on transshipment at sea was in place. "Each port call by a foreign flag purse seine vessel results in a \$5,000 to \$10,000 infusion of commerce to the local economy," he says, adding that 455 jobs can be directly attributed to tuna transshipment.
- Tong and Rodwell (1995) note that there were 1,057 recorded transshipments in FSM from June 1993 to August 1995. At \$7,500 local expenditure per transshipment, this would have resulted in \$7.9 million in local expenditure.
- In 1999 purse seiners transshipped about 90,500 MT of tuna through FSM ports (MMA 2000a). Besides Government taxes/charges, these vessels pay about \$2.2 million yearly to the private sector for services and supplies such as food, accommodation, rental cars, and minor repairs.

- The 238 purse seine transshipments made in the Marshall Islands in 1998 and 1999 (G. Joseph 2000) resulted in about \$1.8 million in expenditure in Majuro.
- Wright (1994) indicates that each purse seine transshipment in the Solomon Islands generates \$1,900 in fees for the Government of the Solomon Islands.
- Forau (1995) calculated that seiners spent \$299,658 in Honiara while transshipping in 1994.

Other Benefits to the Economies

Local expenditures by both locally based and transshipping vessels can be a rough indicator of benefits to the national economies. However, the level of total vessel expenditures does not indicate other financial benefits to the economies. These include foreign exchange earnings, revenue from fines, and sport fishing.

Foreign exchange earnings

Several Pacific Islands countries earn substantial foreign exchange from overseas sales of tuna.

Tuna is now the most important export of Samoa. Fish composed 71.8 percent of all Samoa exports in 1999, according to unpublished information from the Treasury Department, and 82 percent of all the fish exports were tuna or fish caught while fishing for tuna (Watt and Moala 2000). The tuna industry was therefore responsible for about 60 percent of all exports from the country in 1999. The growth of the Samoa economy in 1999, beyond expectations (World Bank 2000), was due in large measure to the export of tuna for canning.

Tuna is also the top export of the Federated States of Micronesia. The Government recorded \$10.4 million in total exports in 1996, the most recent year for which such data are available. Of this total, \$9.83 million, or 94.5 percent, came from fish exports (FSM 1998). Tuna accounted for about 95 percent of the fish exports (P. Sitan, personal communication) and, hence, for 90 percent of the value of all exports from FSM.

In the Solomon Islands tuna consistently contributes from 20 percent to 46 percent of the total value of exports (Solomon Islands Government 1999) while the export of most other commodities such as logs and gold is quite variable (Martin 2000).

In the Marshall Islands the new loining plant is likely to make semiprocessed tuna a leading export commodity.

Tuna products are also an important feature of the two most diversified economies of the region:

- The PAFCO cannery in Fiji exported \$13.9 million worth of tuna products in 1999 (Tuwai 2000) and a more or less equal amount of fresh tuna – about 5 percent of the value of all exports (SPC 1998b).
- PNG exported \$39.5 million worth of tuna in 1998 and \$29.3 million worth in 1999 (NFA export receipts). The tuna industry accounts for between 1 percent and 2 percent of all of the country's exports, including those from the major mining and petroleum industries.

Taxation

Apart from fees for access to tuna resources, many governments in the region earn substantial revenue from taxes on tuna-related activities. A few examples from the region illustrate the importance of these taxes:

- In PNG, domestic purse seine vessels pay from \$463,000 to \$595,000 in taxes and charges on entering the fishery and another \$237,000 to \$301,000 in taxes and charges annually. Longline fishery vessels pay \$41,464 in taxes and charges on entering the fishery and another \$62,224 annually (Lightfoot 1999).
- In the Solomon Islands, Solomon Taiyo pays little or no income tax but it has generated substantial revenues for the Government in other taxes such as import/export duties, withholding tax, PAYE tax, and licenses – a boon to a government plagued by chronic fund shortages (Barclay and Yoshikazu 2000).
- In FSM (Appendix A), national and state levies and charges on purse seine transshipments earned about \$1.11 million for the Government in 1999. The import duty on diesel fuel used by the

marine sector (mostly by the tuna fishing industry) came to about \$120,000 in 1999, one fourth of all import duties on diesel fuel. Significant national revenue also comes from the import duty on frozen longline bait. Estimates of expenditures by domestic vessels representative of fishing activities in FSM indicate that the 47 locally based longliners generate \$140,000 each year in tax revenue from bait purchases. Other national, state, and municipal taxes bring in around \$50,000.

- In Samoa (Appendix B), about \$1 million in direct import duties and other taxes for fuel, bait, and equipment was expected from the local longline fleet in 2000, a significant portion of all Government income for that year.

Revenue from fines

Some countries in the region earn significant income from fines following the successful prosecution of illegal fishing activity. Data on such fines are not readily available in most countries, and much of the information is hearsay. Nevertheless, there are indications that the amount involved is not paltry.

FFA is often (but not always) advised of such matters. It reports:

- In 1996, 25 cases involving illegal fishing activity were reported to FFA. Twelve of these cases were prosecuted successfully, and about \$3.9 million in fines and vessel forfeitures was collected.
- There were 38 cases of illegal fishing in the region from 1997 to 1999. Eight of these were settled by negotiation and four as a result of court cases. (The rest either remain unsettled or, if settled, have not been reported as such to the FFA Secretariat.) Fines and other compensation in the 12 settled cases amounted to \$635,733 (A. Richards, personal communication).

Information on individual countries came to light during the research for the present study:

- In FSM, more than 70 cases have been brought at the national level for illegal fishing or other violations since 1979. In total, more than \$3.65 million in fines or settlements has been

collected, and eight vessels have been forfeited to the Government. In 1999 two longliners were convicted of illegal fishing, and four more cases were pending (MMA 2000a).

- In PNG in 1997, 10 illegal boats were apprehended and prosecuted (NFA 1998).

Even some of the smaller countries of the region have earned some revenue from fines for illegal tuna-related activity. Niue obtained \$25,000 from a Taiwanese vessel prosecuted in 1999 (B. Pasisi, personal communication). Palau obtained about \$18,000 from a longliner fishing without a license (H. Francisco, personal communication). In 1994, Nauru received a settlement of \$1 million from Korean purse seiners that had been charged with illegal fishing; in late 2000 the country was prosecuting a US seiner for fishing within 12 miles offshore. In September 1998, the Government of Tuvalu reached an out-of-court settlement worth about \$40,000 with the owners of a US purse seiner that had been apprehended for allegedly fishing in a closed area.

It should also be mentioned that the arrest of the US seiners *Danica* (in PNG) and *Jeanette Dianne* (in the Solomon Islands) in the 1980s not only yielded substantial compensation but also helped catalyze regional solidarity in fisheries matters.

Commercial sport fishing

Tourism is a major part of the economy in the Pacific Islands, and the economic development of many of the countries is predicated on an expansion of tourism. Commercial sport fishing (sometimes referred to as game fishing) is a specialized form of tuna fishing that is closely related to tourism. At present there is a large amount of commercial sport fishing activity in the Pacific Islands. With the likely expansion of the tourist industry in the future, there is considerable potential for additional benefits from sport fishing.

Sport fishermen or tourists who are willing to spend considerable amounts of money can catch tropical oceanic game fish, mostly tuna and tuna-like species, from sport fishing vessels that operate mainly out of urban or tourist centers. Numerous analyses (e.g., Ditton et al. 1996), often sponsored by game fishing associations, have shown quite conclusively that local economies benefit from

sport fishing activities out of all proportion to the commercial value of the fish caught. Sport fishermen, especially tourists, spend money on vessel charters, accommodation, provisions, and shore recreation. Where a substantial commercial sport fishing fleet exists, the establishment of secondary industries providing gear, vessels, and general tourist services may follow. Bright (1996) suggests that in the Solomon Islands every dollar spent by sport fishermen has an economic impact of two dollars. It seems likely that commercial sport fishing will continue to develop in the region, and will be strongly influenced by the growth of the tourist industry.

Most Pacific Islands countries have sport fishing operations. The Tuna Management Plan of Vanuatu, for example, states that there are eight charter sport fishing vessels operating in Vanuatu, five different companies in Vila, and one vessel working out of Luganville. About 10 vessels participate in commercial sport fishing in Palau (Gillett 1999). Although sport fishing is often thought of as an activity confined to the major tourist centers of the region (such as the major resorts in Fiji), it benefits even more isolated locations. Niue, for example, has commercial charter operations to take tourists fishing (Leolahi 2000). A publication of the Solomon Islands Visitors' Bureau (SIVB 2000) touts the attractions of tuna game fishing at all four tourist accommodations listed for the relatively isolated Western Province.

The Pacific Islands also benefit from the international sport fishing tournaments held yearly in most countries in the region. Many of these attract significant numbers of overseas tourists and fishermen who spend, sometimes lavishly, for accommodation, food, entertainment, vessel charters and airfare during the competition. Samoa has hosted an international sport fishing competition each year for the past five years. The 2000 competition attracted 60 foreign competitors and an equal number of international spectators (P. Meredith, personal communication).⁸

⁸ Other well-known game fishing tournaments in the region are the Mobil All Micronesia Tournament held in Majuro each year, the Tonga International Game Fishing Tournament in Vava'u, the competition sponsored by the Port Moresby Game Fishing Club, Fiji's Vodaphone International Game Fishing Tournament, the fishing derby held annually by the Palau Sportfishing Association, the Cook Islands international tournament in Aitutaki, and the Pohnpei Tru Value Hardware Annual Gamefishing Tournament.

*Summary of Benefits to Pacific Islands Economies
from Industrial-Scale Tuna Fishing*

Industrial-scale tuna fishing provides large benefits to FFA Pacific Islands member economies: \$60 million in access fees, 25,000 jobs, close to \$130 million in expenditures by locally based vessels, and a host of other benefits. These represent a crucial economic contribution, especially considering the scarcity of other natural resources in many Pacific Islands countries, the generally poorly developed private sectors, stagnating economies, and rapidly increasing populations.