

8.1 Volumes and Values of Fish Harvests in Fiji

Coastal Commercial Catches

The following describe the major historical attempts to estimate coastal fisheries production in Fiji:

- A study of fish catches for the island of Viti Levu was carried out between June and October 1993 (Rawlinson et al. 1993). The study estimated that the total catch made by subsistence fishers from rural Viti Levu to be 3,515 mt, and the artisanal catch to be 6,206 mt.
- Dalzell et al. (1996) estimated a coastal fisheries production of 23,252 mt, made up of commercial production of 6,653 mt (worth US\$18,340,043) and subsistence production of 16,600 mt (worth US\$45,767,395).

- Several estimates of the magnitude of harvesting by coastal commercial fisheries are provided in government documentation. The “Inshore Artisanal Fisheries” section of the Department of Fisheries Annual Report 2004 (DoF 2005) states that the total quantity of seafood retailed through the domestic markets in 2004 was 10,969 mt, with a value of F\$44,903,587 (Fiji dollars). The document states that this amount had increased 82% over the previous year, which was likely to be due to an enhanced data collection system.
- The draft Fisheries Department Annual Report 2006 (DoF 2008, 2015) gives information on the “artisanal catch” in 2005 and 2006. An approximate production of 5,994 mt of reef fish and invertebrates was recorded in 2005. Of the total catch landings, 67% were fish and 33% were invertebrates. The value of these landings, as estimated from the market prices, was approximately F\$27 million. An approximate production of 4,922 mt of finfish, at a value of F\$28.6 million, and of non-fish, valued at F\$18 million, was recorded in 2006.

Of the more recent studies estimating coastal fisheries production in Fiji, Gillett (2009) considered several past estimates (including those by the Fisheries Department and Rawlinson), and included all relevant marine fisheries (including coral and other export fisheries), but excluded freshwater subsistence fisheries. Values estimated were the price paid to fishers, or (for subsistence catches) the estimated market values minus the estimated costs of getting the catches to markets. The study estimated a coastal fisheries catch of 26,900 mt, worth F\$108,100,000, made up of a coastal commercial catch of 9,500 mt (worth F\$54,000,000 to fishers) and a coastal subsistence catch of 17,400 mt (worth F\$54,100,000 to fishers).

A study was carried out just after the Gillett (2009) study by researchers from the University of British Columbia. Starkhouse (2009) considered the Gillett (2009) study, but was confined to only coral reef species and non-exported products – which is quite different from the “coastal commercial” and “coastal subsistence” of the Gillett (2009) study. Starkhouse stated the total annual catch volume of reef-associated finfish by artisanal fishing was about 6,401 mt, while reef-associated invertebrates and marine plants contribute an additional 1,342 mt. Together, reef species were estimated to have a gross market value (60% of which is the price paid to fishers) of US\$33.4 million (or US\$20 million paid to fishers). The annual subsistence catch comprised of reef-associated species was estimated to be 10,034 mt (\pm 2,373 mt). The finfish portion of the catch was 8,893 mt (\pm 2,096 mt),

while the invertebrate portion of the catch was 1,141 mt (\pm 578 mt). The gross value of Fiji's subsistence catch (value to fishers) was estimated to be US\$31.0 million (\pm US\$ 7.3 million).

The Institute of Applied Science (IAS) of the University of the South Pacific carried out a survey, during 2008–2009, of the finfish fishing of 46 villages in 22 districts of 10 provinces in Fiji. The study did not make an estimate of the total national catch, but did produce information on catch disposal. Unlike the Gillett (2009) and Starkhouse (2009) surveys, the IAS survey indicated that, averaged across Fiji, 71% of fish and invertebrate catch is sold, 22% is used for subsistence, and 7% is given away (IAS 2009).

A study on coastal fisheries in Fiji, sponsored by the Packard Foundation, examined, in detail, the recent studies above. The report of the study (Gillett et al. 2014) stated that by far the most thorough survey has been the Starkhouse study, which estimated the total catch for the artisanal and subsistence fisheries for reef associated species to be about 17,777 mt, worth US\$51 million (F\$94 million) to fishers. The Packard Foundation work stated that the Starkhouse study did not consider exports (it involved only domestically sold products), nor did it consider catches of species not considered to be associated with coral reefs. The report concluded that, considering these exclusions, the Starkhouse survey results and those of the Gillett (2009) study are not very different (Gillett et al. 2014).

An IUCN study¹ that has considerable relevance to valuing coastal fisheries in Fiji was recently carried out under the MACBIO Programme (the Marine and Coastal Biodiversity in Pacific Island Countries [MACBIO] project). That work focused on the economic evaluation of marine and coastal ecosystem services in Fiji. The ecosystem services analysed were subsistence food provision, commercial food harvesting, mineral and aggregate mining, tourism, coastal protection, carbon sequestration, and research and education. (Gonzalez et al. 2015) The total production of the subsistence fishery in Fiji in 2014 was estimated to be 15,385 mt, with a total national value of F\$59.04 million. For small-scale inshore commercial fisheries, a total national value of F\$14.57–53.69 was estimated, with the actual volume of commercial production less clear.

The MACBIO study appears to attribute considerable credibility to the household income and expenditure survey data (for the subsistence estimate) and to the Fisheries Department's market surveys (for the small-scale commercial component). There is a general emerging sentiment among fisheries

¹ Gonzalez R., V. Ram-Bidesi, N. Pascal, L. Brander, L. Fernande, J. Salcone, and A. Seidl. 2015. Economic Assessment and Valuation of Marine Ecosystem Services: Fiji: A Report to the MACBIO project. GIZ/IUCN/SPREP, Suva.

specialists in the region that “old style” HIES surveys underestimate fisheries production. The Gillett et al. (2014) study examined the Fisheries Department’s market surveys, and commented: “The statistical system that is used to provide coastal fisheries data in Fiji is now no longer functional, primarily due to the prioritisation of scarce government resources... The statistical system has broken down. No enumerator in the Central Division for 3 years. Different systems for the 4 divisions; One junior staff at HQ with no statistical expertise is in charge of compiling statistics from the 4 divisions. Little technical expertise provided by the regional organisations.” The MACBIO study valued subsistence production by the cost of buying an equivalent protein food, whereas the Gillett study used the “farm gate” method. Although either method may be justified, the resulting values could be quite different.

In the period since the Gillett (2009) and Starkhouse (2009) studies there have been a number of events and changes in Fiji that could affect coastal fisheries production, which include the following:

- The Fiji population has increased by 3.1% in the period 2007 to 2014 (SPC PRISM website data). There has also been increasing urbanisation.
- The focus of the Fisheries Department has continued to be on increasing fisheries production, rather than on measures to ensure the continuation of that production.
- The Fisheries Department has established additional rural fisheries service centres and has acquired a vessel to purchase fish from the outer islands. Both of these actions tend to facilitate the flow of commercial fish to urban centres.
- Several recent studies (summarised in Gillett et al. [2014]) point to the fully or over-exploited nature of many of the important fishery resources in the country.
- NGOs have been increasingly active in community-level marine conservation efforts.
- The exports of almost all categories of coastal fisheries products have increased in the period 2007–2013 (DoF 2014).
- The net change in prices for domestically consumed coastal fishery products over the period 2007–2014 has been relatively small, according to information from the Fiji Bureau of Statistics consumer price index.

Selectively applying the above information, it is estimated that coastal fisheries production in Fiji in 2014 was 27,000 mt, worth F\$133 million, made up of a coastal commercial catch of 11,000 mt (worth F\$75 million to fishers) and a coastal subsistence catch of 16,000 mt (worth F\$58 million to fishers).

Coastal Subsistence Catches

For several decades annual estimates of coastal subsistence fisheries catches appeared in Fisheries Department annual reports. The last estimate by the department appeared in the 2007 Annual Report (DoF 2008), when an estimate of 19,000 mt from 2004 was quoted. The 2004 Annual Report (DoF 2005) gives subsistence fishery harvests, as follows: 2000 – 18,000 mt; 2001 – 18,200 mt; 2002 – 18,400 mt; 2003 – 18,600 mt; 2004 – 18,800 mt. The 2014 Annual Report (Fisheries Department 2015) does not contain the word “subsistence”.

It is important to provide some background on the older estimates of subsistence production by the Fisheries Department. The subsistence estimates were based on a 1979 small-scale fishing survey, which covered only Viti Levu, and relied on the ability of a single respondent in each village to recall landings over the previous 12 months (G. Preston, per. com. August 2001). For over three decades, the estimate of small-scale production for all of Fiji (the largest component of the domestic catch) has been made simply by adding 200 mt of fish to the unreliable 1979 figure. The results of a small-scale fisheries survey in 1993 (Rawlinson et al. 1993) were not used to modify the 1979 estimate.

In the Starkhouse (2009) study the subsistence catch was estimated to be 10,034 mt, which is much lower than the estimates in the annual reports of the Fisheries Department. Starkhouse has indicated that this is because of the inadequacies of the 1979 survey and the flawed practice of adding 200 mt each year, given recent temporal and spatial population growth patterns. (B. Starkhouse, per. com. August 2008).

Following the approach taken in the above section on coastal commercial fishing, it is estimated that, in 2014, Fiji’s coastal subsistence catch was 16,000 mt, worth F\$58 million to fishers.

Locally Based Offshore Catches

According to Fiji’s Annual Scientific Report to the Western and Central Pacific Fisheries Commission (OFD 2015), in 2014 the national fleet

consisted of 105 Fiji national vessels, of which 10 vessels were chartered foreign flagged vessels. The remaining 95 vessels were Fiji-flagged, and fished in Fiji's EEZ, other EEZs and on the high seas within the WCPO. The Fiji national fleet is categorised as follows:

- Less than 21 m category – there are 11 vessels in this category, and the vessels mainly use ice for preserving the catch, which is targeted for the fresh sashimi market. These vessels predominantly fish within Fiji's archipelagic waters and territorial seas, spending one to two weeks on each trip.
- 21 m and less than 30 m category – there are 47 vessels in this category, and they use ice slurry and freezers to preserve the catch. These vessels mainly fish within Fiji's EEZ, and spend three weeks to two months per fishing trip. Fresh catch is usually caught towards the end of the fishing trip to maintain its standard for the market preference.
- Greater than 30 m category – there are 47 vessels in this category, and they use freezers to preserve their catch. These vessels mainly fish within Fiji's EEZ and outside Fiji's national jurisdiction, targeting albacore. They spend more than three months on each trip.

McCoy et al. (2015) contains some information about recent changes in the Fiji-based longline fleet. A decline in albacore catch rates that began around 2009 has coincided with an increase in fishing effort that began in 2008. Although the albacore resource does not appear threatened (i.e. stocks are not in an overfished state, and over-fishing is not occurring), the decline in catch rates has resulted in some major economic problems for Fiji's domestic longline fleet. Many Fiji-flagged longline vessels are old, with some initially intended for other fisheries, such as pole-and-line. The vessels are often not able to compete with newer, subsidised vessels from China that have entered the fishery. Consequently, over the past two to three years two companies have ceased longlining, and their assets were acquired by other companies.

Estimates of the volumes and values of catches of the four main commercial species of tuna in the area of the Western and Central Pacific Fisheries Commission have been made by the Forum Fisheries Agency using data sourced from the Pacific Community's Oceanic Fisheries Programme. The volumes and values can be determined using the "catch by national fleet" and "value by national fleet" spreadsheets of FFA (2015). The volumes/values in Table 8-1 have been adjusted to take into consideration: (a) the bycatch (the FFA spreadsheet is only concerned with tuna catches); and (b) transport charges (the FFA spreadsheet only gives values at overseas markets). The values listed are therefore equivalent to Fiji dockside prices (prices paid to fishers).

Table 8-1: Volumes and Values of the Catch of Fiji's Longline Fleet

	2010	2011	2012	2013	2014
Catch volume adjusted for bycatch (mt)	15,681	20,384	18,722	15,978	17,079
Catch value adjusted for bycatch sales and transport costs (US\$)	41,530,512	67,336,835	63,441,007	40,571,732	54,364,955

Source: FFA (2015)

From the above table it can be seen that, in 2014, the production from Fiji's longline fleet was 17,079 mt, worth US\$54,364,995 (F\$107,642,610) to fishers.

Foreign-Based Offshore Catches

FFA (2015) provides information on the catches by foreign-based offshore fishing in the Fiji zone. These are given in Table 8-2. The only foreign vessels that have been authorised to fish in the zone in the last few years have been US purse seiners under the US Multi-Lateral Treaty on Fisheries² (A. Raiwalui, per. com. August 2015).

Table 8-2: Value of the Catch by Foreign-Based Offshore Fishing in the Fiji Zone

	2010	2011	2012	2013	2014
Volume (mt)	1,189	452	531	162	0
Value of catch adjusted for transport (US\$)	1,293,298	679,501	989,489	294,554	0

Freshwater Catches

Harvests of freshwater finfish and invertebrates in Fiji consist mainly of freshwater clams (*Batissa violacea*), eels, various species of freshwater crustaceans, and introduced fish, such as tilapia and carps.

There is no consolidated accounting of the catches of these species, but the fragmented information that does exist provides some help in determining the overall harvest level:

- A freshwater clam, known locally as *kai* (*Batissa violacea*), is found in all major river systems in Fiji, and is the basis of the largest freshwater fisheries in the country, and one of the top three in the Pacific region. The *kai* fishery is distinct in that it is dominated by women, who can spend three to four hours per day, four to five days per week, free-diving for *kai*, which are then sold at roadside stalls or in local markets (IUCN 2014).

² Treaty on Fisheries between the Governments of Certain Pacific Island States and the Government of the United States of America

- The Fisheries Department Annual Report 2004 (DoF 2005) provides the amounts of various fishery products sold in municipal and non-municipal markets in 2004. 2,526 mt of Batissa³ were sold at the two types of markets, for a total price of about F\$2.2 million. 500 mt of various species of freshwater crustaceans were sold, for a total price of about F\$6 million.
- Richards (1994) reports that annual markets sales of Batissa ranged from 1,000 mt to 1,800 mt in the period 1986 to 1992.
- Fisheries Department staff indicated that the harvest of clams/crustaceans for non-market purposes is probably less than what is marketed.
- Eels are taken in fresh water in Fiji. Nandlal (2005) reports eels are an important source of protein for the rural population, but Richards (1994) states there is not a strong local demand for freshwater eels, and there is no organised fishery for them.
- Thaman (1990) indicates that flagtails (*Kulia spp.*) and a number of gobi species are important for interior villages, but that abundance has decreased in recent years.
- The numbers of fish species in Fijian rivers have been significantly affected by a loss of catchment forest cover and introductions of tilapia. On average, stream networks with have established tilapia populations have 11 fewer species of native fish than do intact systems. (Jenkins et al. 2009)

Any estimate of the production of Fiji's freshwater fisheries necessarily involves substantial "educated" guesswork. The estimate provided in the Gillett (2009) study was 4,146 mt, worth F\$6,860,000. Decreasing that volume by 10% for degradation of freshwater systems, and increasing the value by 20% to account for price increases, results in an estimate of 3,731 mt, with a value to fishers of F\$7,408,000.

Aquaculture Production

Aquaculture efforts in Fiji have included tilapia, carp, freshwater shrimp, penaeid shrimp, milkfish, seaweed, giant clams, trochus, pearl oysters, milkfish, beche-de-mer, sponges, turtles, mudcrab, and corals. The primary focus of the Fisheries Department in the last few years has been on tilapia, shrimp, seaweed and pearl oysters.

An attempt was made to estimate aquaculture production in Fiji for 2014. This was difficult due to a number of factors, including: (a) several cases of lack of

³ This includes the shell weight. The raw meat recovery represents approximately 20% of the overall weight.

production statistics; (b) other situations where one set of production statistics conflict with other production statistics and/or export statistics; and (c) commercial secrecy.

Pearl production in Fiji is especially difficult to estimate. The Fisheries Department has declared exports by the major producer for 2013 but not for 2014. Many pearls are sold domestically to tourists, and therefore do not appear in export declarations or trade statistics. In Fisheries Department records the declared FOB value for 2013 for the major producer was F\$305,445, for 19.980 kg of pearls. FAO trade statistics for that year indicate only US\$7,390 [sic] of Fiji pearl exports. The major producer indicated that his annual exports in recent years have ranged from F\$1 million to F\$2 million annually (J. Hunter, per. com. December 2015). In order to make even a crude estimate of pearl production in Fiji with the information available to the present study, a number of assumptions must be made, some of which may not reflect the real situation. It is possible to advance an estimate of pearl production in Fiji based on the following assumptions about the major producer: (a) it is actually exporting F\$1 million to F\$2 million of pearls per year, (b) it sends 90% of its production overseas, (c) it is responsible for 95% of the production of pearls in Fiji, (d) the farm gate value is 90% of the FOB value, and (e) the FOB value per kg (F\$15,288; obtained from the 2013 declaration) is accurate.

With those assumptions, an estimate of the annual Fijian pearl production for recent years is about 103.2 kg, with a farm gate value of F\$1,578,000. This value does not include post-harvest value-adding (i.e. manufacture of jewellery), which is probably substantial.

Another pearl-related aquaculture activity in Fiji is the production of oyster spat by communities for sale to the larger pearl oyster farms. A Fisheries Department official with responsibility for the pearl industry indicated that, in recent years, about 30 communities have been involved in the sale of spat. It is estimated that the average participating community sells an average of F\$3,000 worth of spat per year (1,500 individual spat), representing a gross annual value across the 30 communities of about F\$90,000 (45,000 spat). (G. Vuibeqa, per. com. November 2015)

The head of the Aquaculture Division of the Fisheries Department indicated a production of 145.6 mt of tilapia in 2013, and 150.5 mt in 2014 (S. Singh per. com. Nov 2015). The Fisheries Department Annual Report 2014 (DoF 2015) indicates 2014 tilapia production of 20.196 mt.

At a market price of F\$5 per kg⁴, the 2014 production (provided by the division head) equates to a farm gate value of F\$526,750.

The head of the Aquaculture Division of the Fisheries Department indicated that the 2014 seaweed production was about 30 mt. At a farmer buying price of F\$0.90 per kg, this equates to a farm gate value of F\$27,000.

Both penaeid and freshwater shrimp are produced in Fiji. According to the Fisheries Department, 11,462 mt of freshwater shrimp and 5,617 mt of penaeid shrimp were produced in 2014. The farm gate value for that production is estimated to be F\$140,425 for penaeid shrimp and F\$183,392 for freshwater shrimp.

Cultured coral and cultured live rock (both for the aquarium trade) are also produced in Fiji. The sole producer of these products indicated that his 2014 production was 2,706 pieces of cultured coral and 37,530 pieces of cultured live rock (W. Smith, per. com. December 2015). Using the producer's price list, the farm gate value of the production of both coral and rock is estimated to be F\$150,000.

Mud crab (*Scylla serrata*) is cultured by one company in Fiji. It was not possible to obtain information from the company. The 2014 production is estimated to be about 7 mt, with a farm gate value of about F\$180,000.

The above information is summarised in Table 8-3.

Table 8-3: Summary of Fiji Aquaculture Production in 2014

Commodity	2014 production volume (kg or pieces)	2014 Production values (F\$)
Tilapia	150,500	526,750
Freshwater shrimp	11,462	183,392
Penaeid shrimp	5,617	140,425
Pearls	103.2	1,578,000
Pearl oyster spat	45,000 pieces	90,000
Seaweed	30,000	27,000
Cultured coral	2,706 pieces	150,000
Cultured rock	37,530 pieces	
Mud crab	7,000	180,000
Total	204,682.2 kg plus 85,236 pieces	2,875,567

⁴ Tilapia at Nausori market on December 15, 2015 sold for F\$5/kg. The farm gate price is estimated to be F\$3.50/kg.

Summary of Harvests

Using the above information, a rough approximation of annual volumes and values⁵ of the Fiji harvest in 2014 can be made (Table 8-4).

Table 8-4: Annual Fisheries and Aquaculture Harvest in Fiji, 2014

Harvest Sector	Volume (mt, and pcs where indicated)	Value (F\$)
Coastal Commercial	11,000	75,000,000
Coastal Subsistence	16,000	58,000,000
Offshore Locally based	17,079	107,642,610
Offshore Foreign-based	0	0
Freshwater	3,731	7,408,000
Aquaculture	204,682.2 mt and 85,236 pieces	2,875,567
Total	252,456 mt and 85,236 pieces	250,926,177

The extremely weak factual basis for the estimates of the coastal and freshwater catches are acknowledged.

Figures 8-1 and 8-2 show the volumes and values of the 2014 Fiji fisheries production. Aquaculture is not shown on the volumes figure, due to the use of mixed units (pieces and mt).

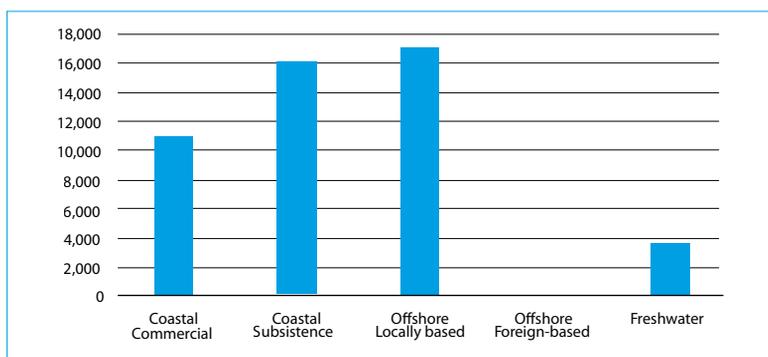


Figure 8-1: Fiji Fisheries Production 2014 by Volume (mt)

⁵ The values in the table are dockside/farm gate prices, except in the case of offshore, foreign-based fishing, where the value in Fiji waters (overseas market prices less imputed transshipment costs) is given.

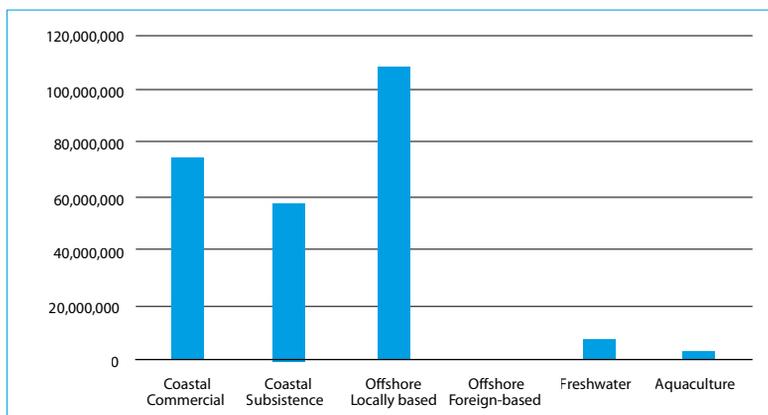


Figure 8-2: Fiji Islands Fisheries Production 2014 by Value (US\$)

Past Estimates of Fishery Production Levels by the Benefish Studies

Similar studies of the benefits to Pacific Island countries and territories from fisheries (“Benefish” studies) have been carried out in the past. Gillett and Lightfoot (2001) focused on the year 1999, Gillett (2009) focused on 2007 and the present study focuses on 2014. The estimated fishery production levels for Fiji from those three studies are presented in Table 8-4.⁶

⁶ The earliest Benefish Study, Gillett and Lightfoot (2001), did not include aquaculture, freshwater fisheries or the non-independent territories.

Table 8-5: Estimates by the Benefish Studies of Annual Fisheries/Aquaculture Harvests

Harvests Sector	Estimate Year	Volume (mt, and pcs where indicated)	Nominal Value (F\$)
Coastal Commercial	1999	9,320	30,000,000
	2007	11,000	75,000,000
	2014	9,500	54,000,000
Coastal Subsistence	1999	21,600	48,600,000
	2007	16,000	58,000,000
	2014	17,400	54,100,000
Offshore Locally based	1999	5,500	50,500,000
	2007	13,744	46,870,000
	2014	17,079	107,642,610
Offshore Foreign-based	1999	917	1,093,000
	2007	492	844,000
	2014	0	0
Freshwater	1999	n/a	n/a
	2007	3,731	7,408,000
	2014	4,14	6,860,000
Aquaculture	1999	n/a	n/a
	2007	85,236 pcs and 204,682.2 mt	2,875,567
	2014	48,100 pcs and 247 mt	2,799,000

Source: The present study, Gillett (2009), Gillett and Lightfoot (2001)

The apparent changes in production for the three years sometimes represents a real change in production, but it can also reflect a change in the methodology for how the production is measured (hopefully an improvement). In the table above, the production levels for coastal commercial, coastal subsistence, and freshwater change significantly between the years, but most of that change is due to the way in which the production was estimated. For example, the drop in production of coastal subsistence fisheries between 2007 and 2014 is due to better information becoming available (through the results of the Starkhouse study), rather than a decrease in the amount of fish being harvested. In contrast, changes in production figures in the table for the offshore fisheries and aquaculture (based on the availability of better quality data) are likely to reflect real changes in the amounts being harvested.

8.2 Contribution of Fishing to GDP

Current Official Contribution

The official contribution of Fishing and Aquaculture to Fiji's GDP in recent years is given in Table 8-6.

Table 8-6: The Official Contribution of Fishing and Aquaculture to GDP (F\$ millions)

	2011	2012	2013	2014p
Fishing & Aquaculture	118.7	122.6	124.9	130.2
Subsistence	37.0	38.7	41.5	45.3
Informal	6.3	6.7	7.1	7.8
General Government	1.6	1.9	2.3	3.2
Non-General Government	73.8	75.3	74.0	74.0
Fiji GDP	5,738.8	6,010.1	6,440.0	7,129.8
Fishing & Aquaculture as % of GDP	2.07%	2.04%	1.94%	1.83%

p = provisional; the GDP is at current basic prices
Source: Fiji Bureau of Statistics website: www.statsfiji.gov.fj

From comment in various reports, there appears to be some confusion, or at least uncertainty, about the actual contribution of fishing and aquaculture to Fiji's GDP, including the following:

- An IUCN report (Verdone and Seidl 2012) misquotes an ADB report in stating: "Artisanal and offshore-commercial fishing activities accounted for 3.16% of Fiji's GDP in 2009 and while it is not officially recorded as GDP, some estimates suggest that subsistence fishing activities produce as much as 4% of Fiji's annual GDP."
- The Fisheries Key Statistics Report 2013 (Fisheries Department 2014) states: "The fisheries sector accounts for an average of 2.7% of GDP for the past 10 years."
- The Fisheries Department Annual Report 2014 (DoF 2015) states: "Fisheries sector contributes around 2.8 percent to GDP"
- The Fiji Times, 15December 2015 states that the contribution of the fishing and aquaculture industries was F\$118.8 million for 2014.

Method Used to Calculate the Official Fishing Contribution to GDP

Staff of the Fiji Bureau of Statistics (B. Krishna, per. com. November 2015) explained some aspects of calculating the fishing contribution to Fiji's GDP:

- The subsistence and informal sectors are from the 2007 HIES, adjusted for population and the price of fish.
- The “non-general government” is actually “general non-government”; that is, the private sector. Gross value of production is from the Fisheries Department. The intermediate consumption is determined by surveys of fishing companies.
- The “general government” category is for wages of government employees that provide services that are closely related to fisheries production (i.e. those that increase productivity).

On the final point, the method used by most countries in the world to calculate GDP is generally based on a standardised System of National Accounts (SNA) that is described in Appendices 2 and 3 of this book. According to that system, the wages paid to government employees for advisory services are not a part of the fishing sector, and therefore the F\$3.2 million contribution to GDP of the “general government” category given in the table above is inconsistent with SNA. Although the Fiji government (through its Bureau of Statistics) can construct the national accounts as it sees fit, the way Fiji's fishing sector is currently constructed is inconsistent with international procedures, and inter-country comparisons are therefore difficult.

A Fiji Bureau of Statistics publication titled “A Study of the Agriculture, Forestry and Fishing Industries 2012” (FBS 2012) contains some information on the fishing-related GDP methodology. Because the sub-classes of the fishing sector given in that report are quite different from the sub-classes in the table above (e.g. “Bech-de-mer diving”, “Taking of marine crustaceans and molluscs”), it is assumed that the report applies to a former methodology.

Alternative Estimate of Fishing Contribution to GDP

Table 8-7, below, represents an alternative to the official method of estimating fishing contribution to GDP in Fiji. It is a simplistic production approach that takes the values of five types of fishing/aquaculture activities for which production values were determined in Section 8.1, above (summarised in Table 8-4), and determines the value added by using value added ratios (VARs) that are characteristic of the type of fishing concerned. Those

VARs were determined through knowledge of the fisheries sector, and by using specialised studies (Appendix 3).

It is not intended that the approach in Table 8-7 replace the official methodology, but rather that the results obtained serve as a comparator to gain additional information about the appropriateness and accuracy of the official methodology, and to indicate any need for its modification.

Table 8-7: Fishing Contribution to GDP in 2014 Using an Alternative Approach

Harvest Sector	Gross Value of Production (F\$, from Table 8-4)	VAR	Value Added (F\$)
Coastal Commercial	75,000,000	.55	41,250,000
Coastal Subsistence	58,000,000	.80	46,400,000
Offshore Locally based	107,642,610	.20	21,528,522
Freshwater	7,408,000	.90	6,667,200
Aquaculture			
Pearls & coral	1,728,000	.45	777,600
Other aquaculture	1,147,567	.73	837,724
Total	250,926,177	--	117,461,046

The total value added in Table 8-7 (F\$117.5 million) is about 10% less than the official value added of F\$130.2 million. In the Gillett (2009) study (which focused on the year 2007), the contribution of fishing in the alternative approach was about 12% less than the official approach. The following should be noted in comparing the official and alternative 2014 contributions:

- The contributions of subsistence fishing are similar in the two approaches.
- As mentioned above, the alternative approach does not include government advisory services. However, the amount in the official approach is relatively small (F\$3.2 million).
- The significant difference appears to be in the “non-general government” category – which would appear to refer to formal private sector fishing. Without more detail on the official methodology it is not possible to specifically identify the source of the difference. One possibility was noted in the Gillett (2009) study: that the contribution from locally based offshore fishing appeared to be too large. It is stated above that: “The intermediate consumption for this category is determined by surveys of fishing companies.” The reports of those surveys were not sighted for the present study.

8.3 Exports of Fishery Production

Unpublished data provided by SPC's Statistics for Development Division (N. Lal, per. com. August 2015) compares the fisheries products exports of Fiji with all exports (Table 8-8).

Table 8-8: Value of Fishery Product Exports (FJ\$ thousands)

	2010	2011	2012 p	2013 p	2014 [p]
Fish of which:	204,227	102,919	57,817	84,415	108,659
Canned fish value (F\$ thousands)	964	2,205	2,645	20,000	24,867
Canned fish volume (mt)	209	447	536	11,484	14,811
Fresh fish value (F\$ thousands)	162,331	51,181	29,214	43,127	37,978
Coral and similar materials (F\$ thousands)	3,480	3,828	4,254	5,156	5,703
Total domestic exports (F\$ thousands)	1,062,931	1,023,676	1,045,129	976,490	1,230,566
Fish and coral as a % of total exports	19.5%	10.4%	5.9%	9.2%	9.3%

p = provisional
Source: SPC (unpublished data)

The composition of the category “fish” in the table is not clear, but presumably it is broader than just finfish. The “canned fish” volumes and values appear too large, as only about 20% of the Pacific Fishing Company (PAFCO) factory output is for canning, and most of its canned products are not exported – the category presumably includes loins (i.e. fish destined for canning overseas).

Additional information about Fiji's fishery exports can be obtained from a database maintained by the Fisheries Department that is compiled from compulsory coastal fishery export permits. Table 8-9 shows the 2014 exports, in either pieces or kg.

Table 8-9: Coastal Fishery Exports 2014

	Unit	Total
Aquarium products	Kg	1,169,303
	pcs	736,566
Beche-de-mer	Kg	132,127
	pcs	70
Fish steak (reef fish)	Kg	211
Gastropods	pcs	100
Invertebrate products	Kg	271
Ornamental products	Kg	600
	pcs	2,064,480
Other marine products	Kg	24,823,233
Reef fish	Kg	17,420
Shells	Kg	39,061
	pcs	2,005,676

Source: Fisheries Department (unpublished data)

Coastal fishery exports also appear in the Fisheries Department Annual Report. Because the exports are categorised differently from the above table, comparisons are difficult, except for beche-de-mer. The 2014 Annual Report (DoF 2015) indicates 2014 beche-de-mer exports were 90,138 kg.

Fiji exports a large amount of tuna. In Fiji's export trade statistics it is not easy to determine tuna exports, because some of the Harmonized System (HS) Codes⁷ for fish in the Fiji Bureau of Statistics export trade data could contain tuna and/or coastal fishery products. For example, the trade statistics show that, in 2014, F\$251,476 of "Other fish excluding livers and roes" were exported. Using a variety of sources, an FFA report (McCoy et al. 2015) summarises the average annual tuna exports of Fiji over the period 2008–2013 (Table 8-10).

Table 8-10: Average Annual Volumes and Values of Fiji Tuna Exports

	Product Category	Volume (mt)	Value (US\$)	Destinations by Value (percent)
USA MARKET	Whole round	1,506	5,875,203	USA (100)
	Fresh and frozen, value added	430	2,420,383	USA (100)
NON-USA MARKET	Fresh tuna	802	7,673,678	Japan (83) New Zealand (11) Australia (5) Others (1)
	Frozen tuna	6,430	19,503,833	Japan (59) Thailand (22) Korea (12) Others (7)

Source: McCoy et al. (2015)

⁷ HS is the international harmonised system of six-digit codes for international trade.

To understand the export from Fiji of tuna products, some knowledge of the tuna processors is required. Box 8-1 from McCoy et al. (2015) summarises the situation in early 2015.

Box 8-1: Tuna Processing in Fiji in 2015

The major government investment in the fisheries sector is in the Pacific Fishing Company (PAFCO), a loining and canning facility at Levuka. PAFCO is a loining and canning plant initially constructed in 1976 as a joint venture with a Japanese partner, C. Itoh (now Itochu). The plant is fully owned by the Fiji government, and since 1999 has produced albacore loins for Bumble Bee Seafoods on a contractual basis. Frozen, cooked albacore loins are produced by PAFCO and shipped to the Bumble Bee canning facility in California. Some canning is also done for the local market. Installed capacity is about 120 mt per day, but it has operated at around 80 mt for the last several years, resulting in total annual throughput of 20,000 to 23,000 mt.

There are six facilities of varying sizes that process and/or semi-process tuna (such as heading and gutting for fresh export) that serve the Fiji-based longline fleet. Most of these facilities have access to products from their own fleets that are owned, chartered or otherwise associated with the enterprise. Two companies – Solander and SeaFresh – export fish, but have processing done by TriPacific Marine Ltd. Fresh yellowfin, big-eye and some albacore is packed and sent to markets in the US, Japan, New Zealand and Australia. One processor, TriPacific – a subsidiary of Foods Pacific, a family-owned food processing business in Suva – does processing and servicing for vessel operators, but does not have vessels of its own. The activities of the newest entrant, Blue Ocean Marine, are reported to be limited to frozen longline bycatch.

Viti Foods Ltd – a Fiji food processing subsidiary of the CJ Patel Group – cans tuna and mackerel for local sale and export. In 2014 it reportedly increased its investment in its plant by an undisclosed amount in order to increase production and meet global food safety compliance standards. The canning plant produces canned tuna and mackerel (the latter from imported raw material) under the Skipper (tuna) and Angel (mackerel) brands. The company reportedly also does some private label canning for local supermarket chains.

TriPacific Marine has invested in processing machinery, and upgraded its plant to produce pouched tuna and wahoo for the domestic and export market, in addition to other fresh/frozen products. The pouch tuna products are aimed at catering to markets in Australia and New Zealand, while wahoo is said to be produced in a smaller, 300 g, consumer size for domestic sale.

8.4 Government Revenue from Fisheries

Access Fees for Foreign Fishing

Since 2006 the only foreign-based vessels that have been licensed to fish in Fiji waters are those operating under the US Multi-Lateral Treaty on Fisheries (A. Raiwalui, per. com. August 2015). It is shown above that catches by the US fleet in the Fiji zone were 162 mt in 2013, while there were no catches in 2014.

According to FFA and US government unpublished data, the equal share that each Pacific Island party (including Fiji) received from the US treaty in 2014 was US\$555,814.65 (F\$1,100,513). As the total revenue of the Fiji government was F\$2,380,735,000 in 2014 (Fiji Bureau of Statistics website), the 2014 access fee payment amounted to about 0.04% of total revenue for that year.

Other Government Revenue from Fisheries

Government revenue from fisheries is collected at both the national and the divisional/provincial levels. At the national level the locally based offshore fleet is required to pay a number of government charges. The Fiji Tuna Management and Development Plan (2012–2016) states: “It is a requirement that all Fiji registered and licensed fishing companies and fishing vessels pay to government fees in accordance to conditions and terms of licenses and permits, and consistent with fixed fees structure. These fees include licensing fees, fishing fees, port charges, export permits and taxes.” In practice, the major fees for the locally based offshore fleet are the access fee, the management fee and the observer levy. According to Fisheries Department unpublished data (J. Amoe, per. com. December 2015), those fees amounted to F\$844,000 in 2013 and F\$701,000 in 2014.

Also, at the national level, the Fisheries Department charges for a variety of permits. In the Fisheries Department Annual Report 2014 (DoF 2015) the number of permits (but not the revenue generated) is given (Table 8-11).

Table 8-11: Permits Issued 2014

Type of permit	Number issued in 2014
Landing permit	1,287
Transshipment	319
Export	393
High seas	67
Bycatch	205
Import	187
CITES	514
Total	2,972

Source: Fisheries Department Annual Report 2014

Fiji is divided into four divisions for government administrative purposes: Northern, Eastern, Western and Central. Certain types of government fees are charged at the divisional and provincial levels. For example, the fees of the Northern Division are given in Table 8-12.

Table 8-12: Sources of Government Revenue in the Northern Division

Source of Revenue	Province of the Northern Division		
	Macuata	Bua	Cakaudrove
Sale of Ice	87,421.18	24,101.55	13,870.32
Inshore Fishing Licence Fees	4,843.40	1,152.90	3,245.45
Vessel Registration Fees	2,952.40	408.70	488.40
Crew Registration Fees	2,907.00	606.05	359.04
Confiscated Species	2,905.20	207.27	0
Slipway Fees	27.60	0	0
Total	101,056.78	26,476.47	17,963.21

Source: Fisheries Department Annual Report 2014

8.5 Fisheries-Related Employment

The Fiji Employment/Unemployment Survey 2010–11 contains some detailed information, but unfortunately the results relevant to fisheries are lumped with some other sectors. For example, the “estimated numbers of wage and salary earners” is only given for the combined category of “Agriculture, Forestry & Fishing”. Similarly, The 2004–2005 Employment and Unemployment Survey provides limited insight into fisheries-related employment, due to aggregating all agriculture, forestry and fisheries occupations. It does, however, give the number of people in Fiji that are either

wage/salary earners or self-employed, as 150,982 (38% female), and 91,818 (25% female), respectively. These more specialised studies are useful for gauging the relative importance of fisheries-related employment in Fiji.

Gillett et al. (2014) attempted to quantify employment in coastal fisheries in the Fiji, and to compare it to employment in offshore fisheries. The report stated:

Starkhouse (2009) appears to be the most methodical study of employment in Fiji's coastal fisheries. That study estimates the number of (a) subsistence fishers in the country to be about 23,000, (b) full-time artisanal fishers to be about 5,000, and (c) part-time artisanal fishers to be 12,000. By contrast, an ADB study (Hand et al. 2005) estimated the number of subsistence fishers in Fiji to be "3,000 full-time equivalents" and the number employed in offshore fishing to be "510 full-time equivalents". If some assumptions are made about the data from the two sources (i.e. 3 part-time artisanal fishers equals one full-time equivalent, 23,000 part-time subsistence fishers equals 3,000 full-time equivalents), then there are (full time equivalents) 9,000 artisanal coastal fishers and 3,000 coastal subsistence fishers. These 12,000 people employed in coastal fishing represent over 23 times the number employed in offshore fishing and 1.5% of the total population.

The Forum Fisheries Agency has a programme – Economic Indicators Project – that collects data on tuna-related employment in standardised form. FFA (2015) contains information on the employment of people from Fiji in the tuna industry (Table 8-13). A total of 3,667 Fijians were employed in the tuna industry in 2014. Across the Pacific, in 2014, 17,663 people were employed as crew on tuna vessels or in tuna processing and ancillary work. Tuna-related employment in Fiji therefore represents 20.8% of the regional tuna-related employment.

Table 8-13: Tuna-Related Employment in Fiji (number of people employed)

	2009	2010	2011	2012	2013	2014
Processing and ancillary	1,054	630	1,018	1,063	1,452	2,000
Local crew	1,290	228	353	531	1,227	1,667
Total	2,344	858	1,371	1,594	2,679	3,667

Source: FFA (2015)

McCoy et al. (2015) contains some additional information on tuna-related employment in Fiji:

The major purpose of government investment in PAFCO is to provide employment in an area of Fiji where there are few jobs. PAFCO remains the single largest fish processing employer with about 900 employees. In 2009 the wages and salaries paid by fish processors in Fiji was estimated at F\$8.9 million, with PAFCO's share at F\$5.4 million. Available jobs at processing facilities at PAFCO and in Suva can vary somewhat on a seasonal basis. PAFCO can add around 100 jobs during peak periods and TriPacific in Suva can seasonally increase their full time staff from 70 to 120 or more. It is unlikely that future opportunities for crew will grow significantly, as the number of licensed vessels has been capped and many Fiji-based vessels are manned by Chinese or other foreigners. It is worth noting that although total annual numbers of Fijians employed onboard tend to be erratic, over time Fijians have obtained competency to a point where many domestic vessels have Fijians working as captains, engineers, and deck bosses.

Sullivan and Ram-Bidesi (2008) is a study of women in the tuna industries of Fiji, Kiribati and Papua New Guinea. Table 8-14 summarises the results of that study.

Table 8-14: Employment of Women in the Tuna Industry

Indicator	Fiji	Kiribati	Papua New Guinea
Wage employment	Total females in tuna companies: PAFCO= 544 Longline = 110 + 173 Total = 827	CCPL = 4 (in processing)	About 7,000 women work in the PNG tuna industry, including onshore handling, loining/canning, technical and administrative positions.
Indication of importance of above wage employment	37,438 female wage jobs in 2007. Tuna-related wage jobs therefore represent 2.2% of the total female wage jobs in Fiji.	With a total of 7,467 women in cash employment in Kiribati in 2005, the above 4 jobs are relatively insignificant	The 2000 census states that 211,443 women were formally employed. The tuna industry therefore employs 3.3% of all formally employed women.
Annual wages for women formally employed	PAFCO = F\$2,397,606 to F\$3,557,409	About AU\$16,000	Loining/canning: RD = US\$1,875,000 SST = US\$360,000 Frabelle= US\$450,000
No. of women marketing tuna (informal sector)	Unknown	About 189 women are involved full time in the sale of tuna in South Tarawa.	Unknown
Indication of importance of above informal employment	Unknown	Income from artisanal tuna sales represents about 1.3% of all income in South Tarawa.	Unknown

The findings of the study with respect to constraints and available opportunities for women in Fiji are:

- PAFCO is the largest national employer of women in the tuna industry, and is in a unique position as a publicly subsidised private enterprise. Given its central position in the Ovalau economy, important initiatives are needed to increase local participation in general, and to promote transparency in management-staff and management-community relations.
- For the longline fishery, women could progress faster in the companies if they were provided with relevant training, especially those that have demonstrated promise.
- The industry requires more assistance to support product development and secondary processing skills, and to provide opportunities to attract more women into emerging, value-added tuna cottage industries linked to the longline fishery.

Compared to the tuna-related employment described above, there is less information on participation in village-level fisheries in Fiji. As mentioned above, Starkhouse (2009) estimates there are approximately 23,000 subsistence fishers in Fiji.

The SPC ProcFish programme carried out survey work at Dromuna, Muai-vuso, Mali and Lakeba (Friedman et al. 2010). That work included estimates of participation by households in reef fisheries. The results show very high participation in fisheries activities in the four villages (Table 8-15).

Table 8-15: Participation of Households in Reef Fisheries

Village	% of Households
Dromuna	100
Muaivuso	100
Mali	93.8
Lakeba	100
Average across the four sites	98.5

Source: Friedman et al. (2010)

SPC (2013) uses ProcFish data to examine the ratio of men to women fishers across the Pacific. For the Fiji sites examined, about 54% of fishers are men (46% women).

8.6 Levels of Fishery Resource Consumption

The following summarise some of the results of some earlier studies on fish consumption in Fiji:

- The Fisheries Division (2000) gives per capita seafood consumption, based on the official production data divided by the Fiji population. The results show that, in 1999, the rate was 56.0 kg, of which the subsistence fishery provided 46%.
- Preston (2000), using 1995 FAO production, import and export information, indicated the apparent per capita supply of fish in Fiji was 50.7 kg per year.
- The results of the 2004 Fiji National Nutrition Survey (NFNC 2007) provide more insight into the frequency of seafood consumption, rather than the level of seafood consumption. Daily consumption of fresh fish in indigenous Fijian households was 23.4%. Canned fish was eaten by only 8.3% of people on a daily basis. In Indo-Fijian households only 2.4% reported eating fresh fish and 1.9% eating canned fish on a daily basis.

Bell et al. (2009) used information from household income and expenditure surveys conducted between 2001 and 2006 to estimate patterns of fish consumption in Pacific Island countries. The HIES were designed to enumerate fish consumption, based on both subsistence and cash acquisitions. For Fiji, the per capita fish consumption (whole weight equivalent) was 15.0 kg per capita per year in urban areas (fresh fish made up 45% of this amount), and 25.3 kg per capita per year in rural areas (66% fresh fish).

The SPC ProcFish programme carried out survey work at Dromuna, Muai-vuso, Mali and Lakeba (Friedman et al. 2010). That work included estimations of per capita fish consumption. The results (Table 8-16) indicate very high consumption of fresh fish at the four sites.

Table 8-16: Fishery Product Consumption at ProcFish Sites (kg/person/year)

Village	Fresh fish consumption	Invertebrate consumption	Canned fish consumption
Dromuna	74.0	4.4	2.9
Muaivuso	68.0	10.0	3.0
Mali	81.0	13.1	1.8
Lakeba	73.0	10.5	1.8
Average across the 4 sites	74.0	9.5	2.4

Source: Friedman et al. (2010)

In recent years, the total annual catch from locally based offshore fishing was about 17,000 mt (Section 7.1). About 12.5% of the production from Fiji's locally based offshore fisheries is not exported, but rather is marketed domestically in the greater Suva area (G. Southwick, per. com. August 2015). The population of the greater Suva area is about 180,000. This suggests an annual supply of fish to Suva residents from the local offshore fleet of 11.8 kg per capita.

8.7 Exchange Rates

The average yearly exchange rates (Fiji dollar to the US dollar) used in this book are as follows:

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1.73	1.70	1.73	1.60	1.51	1.92	1.81	1.84	1.79	1.88	1.98