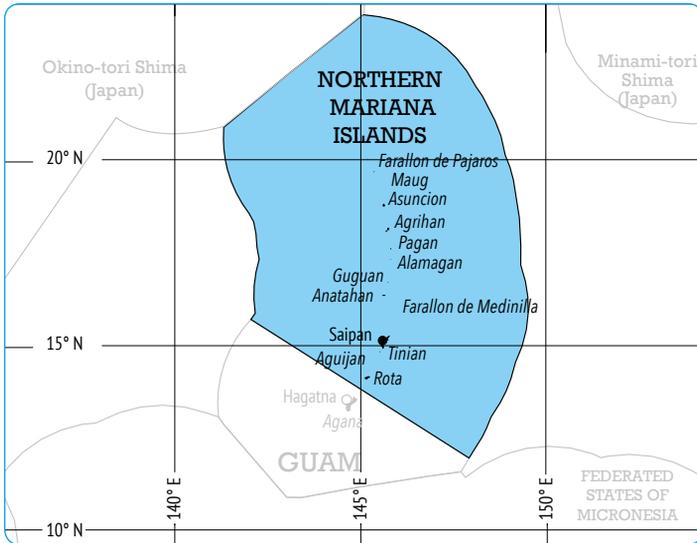


24 Northern Mariana Islands



24.1 Volumes and Values of Fish Harvests in the Northern Mariana Islands

Coastal Commercial Catches in the Northern Mariana Islands

There have been two major attempts to estimate the production of coastal commercial fishing across the Pacific Islands region that have included the Commonwealth of the Northern Mariana Islands (Northern Marianas, or CNMI, in this book). The results of those studies that deal with coastal commercial fisheries of CNMI are summarised below:

- Dalzell et al. (1996) used information from a 1994 report of the Western Pacific Fisheries Information Network (WPacFIN) to estimate mean annual commercial fisheries production in CNMI of 141 mt, worth US\$613,804.

- Gillett (2009) used a 2008 WPacFIN report to estimate that the 2007 production from coastal commercial fishing in CNMI was 231 mt, worth US\$950,000 to fishers.

In addition to the above studies, there have been several other estimates of coastal fisheries production in the Northern Marianas, many of which have yielded very different results. At least some of the differences have arisen for the following reasons: (a) some deal with only reef fish, while others with both reef and pelagic fish; (b) some cover only Saipan, while others also include Rota and Tinian; (c) there are different ways of partitioning the production between commercial and subsistence components; and (d) there are different ways of adjusting the WPacFIN survey results to produce total fisheries production.

To explore the coastal fisheries production of the Northern Marianas, it is helpful to have knowledge of the various fisheries in the area and of the current fisheries statistical situation. A study of nearshore fisheries management in Micronesia (Rhodes et al. 2011) summarises the coastal fisheries of the area (Box 24-1), and a report covering the social, cultural and economic importance of fishing in CNMI (Allen and Amesbury 2012) describes the fisheries data situation (Box 24-2).

Box 24-1: The Fisheries of the Northern Marianas

Extensive commercial fisheries are developed in the southern CNMI islands (Saipan, Tinian, Rota, and Anguian); however, most fishing activity is centered around Saipan (62,392 inhabitants), the capital of the CNMI. Saipan-based boats also frequent the coastal waters of Tinian (population 3,540), Aguijan (uninhabited), and, less often, Rota (population 3,283). In the CNMI, reef fish are mainly harvested through nighttime spearfishing (>80%), followed in rank by hook-and-line. Both gillnets and SCUBA spearfishing are illegal; however, current legislation aims to release the ban on gillnets. In Saipan, several professional, locally owned fishing operations supply markets in Saipan. These operations each consist mainly of 3-4 full-time, low-paid, non-resident workers that have catch-based incentives as part of their salary. A few of the fishing operations are market-owned, while other fishing operations remain independent. Most professional operations will travel as far as Rota (70-120 km), but typically fish in Saipan, Aguijan, or Tinian. The remaining contributions of marketed landings come from "semi-subsistence" CNMI fishermen that sell a portion of their catch to generate additional income. These operations are usually land-based (i.e., no boat used) and typically operate at night. The amount of reef fish sold in Saipan-based markets in 2009 was estimated at 55 mt, with a total market value of almost half a million dollars. Subsistence catch could be up to 4-5 times the commercial volume, with over 16% of households actively fishing.

Box 24-2: The Fisheries Statistics of the Northern Marianas

There are currently no requirements for commercial fishing vessel, operator, or crew licenses for inshore or offshore waters of CNMI. All data collection efforts are on a voluntary basis. Since the mid-1970s, the CNMI Division of Fish and Wildlife (DFW) has been collecting data on fishing in Saipan. DFW later expanded its fisheries monitoring programs to include Rota and Tinian. DFW distributes and collects invoice books from participating fish purchasers on Saipan. These records encompass approximately 90% of all commercial fishing. The Western Pacific Fisheries Information Network (WPacFIN) compiles and expands the data to represent the entire CNMI. The data from 1983 and later are considered the most accurate. DFW's principal method of collecting domestic commercial fisheries data is a dealer invoicing system, sometimes referred to as a trip ticket system. The DFW provides numbered two-part invoices to all purchasers of fresh fishery products (including hotels, restaurants, stores, fish markets, and roadside vendors). Dealers then complete an invoice each time they purchase fish directly from fishers; one copy goes to DFW and one copy goes to their records.

Source: Allen and Amesbury (2012)

The data collection described above, as applied to the year 2014, results in estimates of commercial landings provided in Table 24-1.

Table 24-1: The WPacFIN Northern Marianas Estimated Commercial Landings in 2014

Species	Pounds	Metric tons	Value (US\$)	Price (US\$/lb)
Miscellaneous	105	0.05	282	2.67
Bigeye scad	2,453	1.11	6,610	2.69
Jacks	573	0.26	1,568	2.73
Mullet	102	0.05	261	2.57
Black jack	122	0.06	312	2.57
Giant trevally	4	0.00	17	4.00
Bottomfishes (unknown)	4,208	1.91	14,151	3.36
Sickle pomfret	257	0.12	691	2.69
Ehu (red snapper)	804	0.36	3,149	3.92
Gindai (flower snapper)	583	0.26	2,457	4.21
Groupers	573	0.26	2,861	4.99
Kalikali (yellowtail)	1,052	0.48	3,438	3.27
Onaga (red snapper)	5,623	2.55	34,519	6.14
Opakapaka (pink snapper)	1,980	0.90	7,638	3.86
Jobfish (uku)	1,796	0.81	5,630	3.13
Silvermouth (deep lehi)	1,095	0.50	3,834	3.50

Table 24-1: continuation

Species	Pounds	Metric tons	Value (US\$)	Price (US\$/lb)
Amberjack	881	0.40	2,295	2.61
White lyretail grouper	200	0.09	472	2.36
Blue lined snapper	296	0.13	830	2.80
Red snapper	73	0.03	291	4.00
Wrasses	104	0.05	299	2.88
Rabbitfishes	2,964	1.34	9,112	3.07
Emperors	2,783	1.26	8,348	3.00
Squirrelfishes	1,169	0.53	3,250	2.78
Parrotfishes	10,762	4.88	34,110	3.17
Surgeonfishes	1,228	0.56	3,149	2.56
Orangespine unicornfish	1,827	0.83	5,239	2.87
Unicornfishes	1,280	0.58	3,555	2.78
Goatfishes	3,595	1.63	10,046	2.79
Yellowfin surgeonfish	46	0.02	92	2.00
Pelagic fishes (unknown)	1,025	0.46	2,780	2.71
Barracudas	155	0.07	328	2.11
Mahimahi	37,314	16.90	84,843	2.27
Blue marlin	2,416	1.09	5,242	2.17
Sailfish	87	0.04	160	1.84
Rainbow runner	1,392	0.63	3,115	2.24
Wahoo	7,232	3.28	17,704	2.45
Skipjack tuna	157,571	71.38	363,234	2.31
Dogtooth tuna	4,928	2.23	11,126	2.26
Yellowfin tuna	15,022	6.80	35,197	2.34
Kawakawa (saba)	1,813	0.82	3,628	2.00
Invertebrates	5,683	2.57	49,041	8.63
Octopus	581	0.26	1,587	2.73
Squid	39	0.02	196	5.00
TOTAL	283,797	128.56	746,687	2.63

Source: http://www.pifsc.noaa.gov/wpacfin/cnmi/Pages/cnmi_data_2.php

Table 24-2: The WPacFIN Northern Marianas Estimated Commercial Landings, 2011–2104

Species	Pounds	Metric tons	Value (US\$)	Price (US\$/lb)
2014	283,797	128.56	\$46,687	2.63
2013	315,054	142.72	739,646	2.35
2012	230,310	104.33	526,543	2.29
2011	217,092	98.34	503,821	2.32
2010	285,378	129.28	608,970	2.13

Source: <http://www.pifsc.noaa.gov/wpacfin>

Various fisheries specialists have commented on the accuracy and validity of the WPacFIN Northern Marianas estimates, summarised below:

- Cuetos-Bueno and Houk (2014) stated that the proportion of reported catch relative to the “real” total catch is not adequately quantified. However, through local expert judgment, the reported catches can be adjusted by applying a factor of 10% to account for fish not recorded in the database, thus providing estimates of total commercial landings in CNMI.
- Rhodes et al. (2011) indicated that the dependence upon a voluntary, receipt-based data collection system may limit representativeness and accuracy. Several studies have suggested that the data collection methods may have introduced influential deficiencies that have led to underestimating the actual catch.
- The monitoring of commercial purchases is associated with numerous difficulties (J. Gourley, per. com. September 2015).

The Cuetos-Bueno and Houk (2014) study appears have carried out the most comprehensive examination of past efforts to estimate total coastal fisheries production in the Northern Marianas. This included scrutinising four studies on commercial fishing and five sources of subsistence fishing information. The study concludes:

Conservative and non-conservative estimates of modern catch volumes in the CNMI were calculated by combining the commercial landings derived from the present Saipan-based Nutritional Assistance Program¹ datasets (expanded by 10 % to account for sales made outside of the island of Saipan; Hamm et al. 2010), with the non-commercial landings derived from van Beukering et al. (2006). The non-conservative estimate for total reef

¹ This is a United States Department of Agriculture food coupon program.

fish landings during the mid-2000s was 514 mt per year, while a more conservative estimate that accounts for potential perception biases in the fishermen interviews (i.e., a 50 % reduction) was 257 mt/year... Present evidence introduced from socioeconomic surveys suggested that non-commercial fisheries were between five and nine times commercial counterparts in the mid-2000s.

In considering the above fisheries production information it must be noted that: (1) the results are applicable to the mid-2000s; and (2) the study is focussed on “reef fish landings”, which is a subset of all landings from coastal fishing.

With regard to the two points above:

- in the period 2007 to 2014 the resident population of the Northern Marianas declined by 13.8%;
- the last garment factory closed in 2008. With the decline in garment workers there has been less demand for fish (J. Gourley, per. com. September 2015);
- the number of commercial fishers (full-time or part-time) and seafood purchasers, as well as total commercial landings, have decreased over the long term in response to downturns in the domestic economy. Pelagic participation peaked in the mid-1980s and then grew again in the mid-1990s, and dropped again in the early 2000s. (information from various sources cited in Allen and Amesbury [2012]);
- research by fisheries specialists from the University of Guam indicates that there was a near-40% decrease in the landings of pelagic fish by coastal fishers from 2006 to 2011 (J. Cuetos-Bueno, per. com. January 2016); and
- in the above table, for WPacFIN Northern Marianas Estimated Commercial Landings in 2014, the reef fish component of the landings (i.e. the total minus the pelagic fish) is about 20% of the total commercial landings.

From the table above, the WPacFIN Northern Marianas Estimated Commercial Landings in 2014 were about 128.56 mt, worth about US\$746,687. The approach taken in the present study in estimating total coastal commercial fishery production in CNMI is to expand that volume and value by 10%, as suggested by the Cuetos-Bueno and Houk (2014) study (to account for off-Saipan sales). This results in 2014 CNMI coastal commercial fisheries production of about 142 mt, worth US\$821,356.

Coastal Subsistence Catches

Zeller et al. (2007) used a statement in a 1947 report to estimate subsistence fish production in CNMI in 1950 of 456 mt:

The native population of Saipan is somewhat in excess of 4,600 persons, and since they traditionally consume nearly a pound of fish per day, there is a steady market for fishery products. (Smith 1947).

This statement (of unknown accuracy), and the associated estimate of 456 mt in subsistence catches, are key in Zeller et al. (2007) establishing a “data anchor point”. This and other data points were used to “reconstruct” coastal catch data for the period 1982 to 2002. Their catch estimate for CNMI’s non-commercial fisheries in 2002 was 106 mt.

Dalzell et al. (1996) estimated a subsistence catch of 2,825 mt (worth US\$12.3 million) for the early 1990s. Subsequent discussions with a researcher of that study suggest that the estimate may have been erroneously inflated by leakage of fish from the Zuanich tuna facility (P. Dalzell, per. com. December 2008).

Other estimates of subsistence production have been derived through the percentage of the estimated total catch. For example, a CNMI Division of Fish and Wildlife (DFW) study in the early 1990s (Graham 1994) assumed that subsistence catches were 1.7 times the volume of commercial reef fish landings.

Hospital and Beavers (2014) was a survey of 112 boat-based fishermen on the islands of Saipan (80% of sample), Tinian (10%) and Rota (10%). They gave results on the disposal of the catch:

The ultimate disposition of catch from CNMI fishermen reflects the diverse social, cultural, and economic motivations for fishing. Approximately 28% of fish catch was reported to be consumed at home, while 38% was given away to relatives, friends or crew, and approximately 29% of fish was sold, in the past 12 months. The remaining catch was either released (2%) or exchanged for goods and services (3%). This diversity of catch disposition extends across all subgroups of the fishery including fishery highliners who, despite their avid market participation, still retain approximately 22% of the fish they catch for home consumption and participation in traditional fish-sharing networks and customary exchange.

Cuetos-Bueno and Houk (2014) examined several historical estimates of CNMI's coastal subsistence production, which ranged from a maximum of 456 mt per year in the 1950s to around 100 mt per year in the early 2000s. They also re-assessed the Van Beukering et al. (2006) study, and concluded subsistence reef fisheries production for CNMI of between 235 mt and 470 mt for the mid-2000s.

It should be noted that: (1) coastal fisheries production is likely to have declined in the decade since the focus period of the above study; (2) the above study was confined to subsistence reef fish catches (i.e. it did not consider pelagic fish catches); and (3) Hospital and Beavers (2014) reported a significant proportion of pelagic and deep-bottom fishing activities as non-commercial.

Subsistence fisheries production in CNMI in 2014 was likely to have been around 350 mt. Using prices in the above table, and the farm gate method for valuing subsistence production, that volume of fish was worth about US\$1.4 million to fishers.

Locally Based Offshore Catches

The last locally based offshore fishing operation in the Northern Marianas is described by Allen and Amesbury (2012) in Box 24-3.

Box 24-3: The Rise and Fall of Locally Based Offshore Fishing in the Northern Marianas

In 2008, a longline fishing company began operating out of Saipan. USA Islands Seafood Inc. (USAISI) was purchased by private investors in May 2008. The firm's mission was to produce, process and market quality fish and processed fish products at competitive prices in the local market and to establish itself as the leading seafood exporter in the region. The company aims to maintain an environmentally friendly and sustainable fishery to assist in protecting and preserving the fishery reserves of the CNMI. The USAISI fishing fleet in Saipan was made up of 4 vessels, the 70-ft F/V Jenny (which appeared in the movie *The Perfect Storm*), the 80-ft F/V Pacifica, the 85-ft F/V Miss Saipan, and the 100-ft F/V Lady Carolina. Its website lists 12 species of fish that they caught: 4 species of tuna (albacore, bigeye, yellowfin, and skipjack); 4 species of billfish (blue marlin, striped marlin, shortbill spearfish, and broadbill swordfish); and 4 other species (mahimahi, wahoo, opah, and monchong). According to one of the owners, Dave Lewis, they also caught and marketed about 10 sharks a month (threshers, makos, white tips, blue sharks, and even the shallower black tips). However, USAISI has shut down operations and does not fish anymore in the CNMI.

Source: Allen and Amesbury (2012)

In the period 2009 to 2015 there was no locally based offshore fishing in the Northern Marianas.

Foreign-Based Offshore Catches

There is no authorised foreign fishing in the CNMI zone.

Freshwater Catches

There are no freshwater fisheries in CNMI.

Aquaculture Harvests

The Commonwealth of the Northern Mariana Islands Aquaculture Development Plan 2011–2015 (Northern Marianas College 2011) provides information on aquaculture production:

Saipan AquaCulture, the largest commercial producer of shrimp, uses 32 concrete tanks with re-circulating systems. The company produces shrimp for local consumption and export to Guam. In 2009–2010, Saipan AquaCulture also began exporting SPF shrimp broodstock to Asia. Saipan AquaCulture has its own hatchery and is also becoming a provider of post-larval shrimp to two of CNMI's smaller shrimp producers. The two other shrimp producers in CNMI are based on Rota and Saipan, and use small-scale re-circulating systems for production. Another small shrimp farm is under construction on Saipan. There are eight tilapia farmers in CNMI (five in Saipan, two in Rota and one in Tinian). Three strains of tilapia are currently in production: the Chitralada variety from Thailand (*Oreochromis niloticus*), red Thai Variety (Red Hybrid), and Pearl White Variety.

The aquaculture specialist at the Cooperative Research Extension and Education Service of Northern Marianas College (M. Ogo, per. com. November 2014) kindly provided information on recent aquaculture production in CNMI, as follows:

- The shrimp *Litopenaus vannamei* for Saipan and Guam markets: 2014 production was about 25 tons,² valued at US\$9 per pound.
- *Litopenaus* broodstock for export: 2014 production was about 15,000 pieces, at US\$40 per piece.

² This is assumed to be a "short ton" (i.e. 2,000 pounds).

- Tilapia (both live and fresh) sold in stores, farmers' markets, and direct to customers' doors: 2014 production was about 40,000 pounds, with a farm gate price of about US\$2 per pound.
- The total 2014 aquaculture production was about 90,000 pounds (40,770 kg), and 15,000 pieces, with a farm gate value of US\$1,130,000.

Summary of Harvests

A crude approximation of the annual volumes and values³ of the fishery and aquaculture harvests in 2014 can be made from the above sections (Table 24-3).

Table 24-3: Annual Fisheries and Aquaculture Harvest in CNMI, 2014

Harvest Sector	Volume (mt, and pcs where indicated)	Value (US\$)
Coastal Commercial	142	821,356
Coastal Subsistence	350	1,400,000
Offshore Locally based	0	0
Offshore Foreign-based	0	0
Freshwater	0	0
Aquaculture	41 mt and 15,000 pcs	1,130,000
Total	533 mt and 15,000 pcs	3,351,356

Figures 24-1 and 24-2 show the volumes and values of 2014 CNMI fisheries production. Aquaculture is not shown on the volumes figure, due to the use of mixed units (pieces and mt).

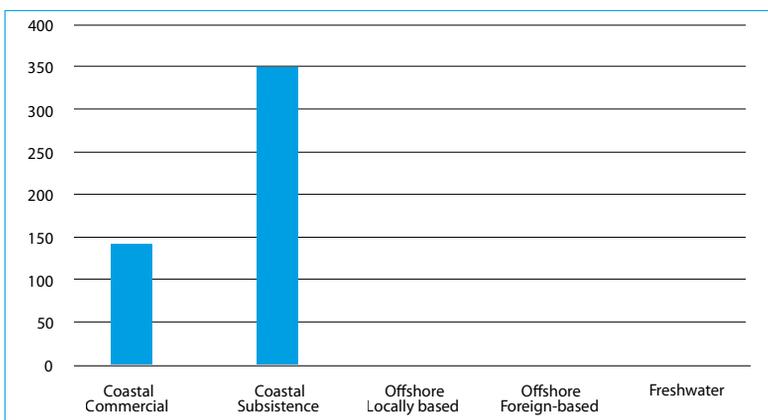


Figure 24-1: Northern Marianas Fisheries Production by Volume (mt), 2014

³ The values in the table are dockside/farm gate prices.

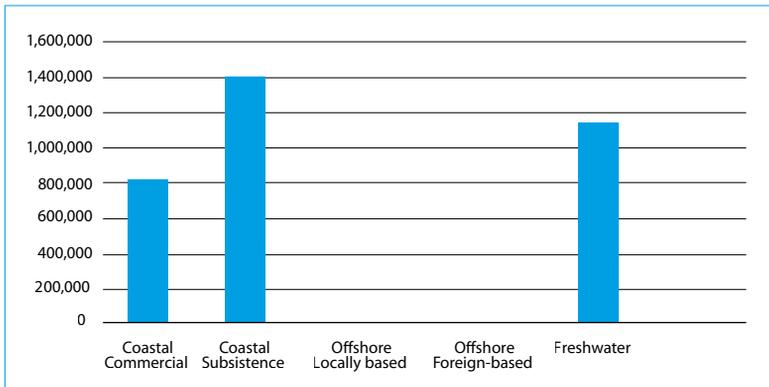


Figure 24-2: Northern Marianas Fisheries Production by Value (US\$), 2014

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 fishery production levels for CNMI from those studies are provided in Table 24-4.⁴

⁴ The earliest Benefish Study, Gillett and Lightfoot (2001), did not include aquaculture, freshwater fisheries or the non-independent territories.

Table 24-4: Estimates by the Benefish Studies of Annual Fisheries/Aquaculture Harvests

Harvest Sector	Estimate Year	Volume (mt, and pcs where indicated)	Nominal Value (US\$)
Coastal Commercial	1999	n/a	n/a
	2007	231	950,000
	2014	142	821,356
Coastal Subsistence	1999	n/a	n/a
	2007	220	631,700
	2014	350	1,400,000
Offshore Locally based	1999	n/a	n/a
	2007	0	0
	2014	0	0
Offshore Foreign-based	1999	n/a	n/a
	2007	0	0
	2014	0	0
Freshwater	1999	n/a	n/a
	2007	0	0
	2014	0	0
Aquaculture	1999	n/a	n/a
	2007	14	205,000
	2014	41 mt and 15,000 pieces	1,130,000

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

The apparent changes in production for the three-year period represents a real change in production in some cases, but this can also represent a change in the methodology for measuring the production (hopefully an improvement), or the availability of new information. In the table above, the production levels for coastal commercial and coastal subsistence change significantly between the years. Some of that change is due to the way in which the production was estimated – In the present study additional analysis was available from the Cuetos-Bueno and Houk (2014) study. In contrast, changes in production figures in the table for aquaculture (based on the availability of better quality data) are likely to reflect real changes in the amounts being harvested.

24.2 Contribution of Fishing to GDP

Current Official Contribution

The Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce has made estimates of the GDP of the Northern Marianas, under the Statistical Improvement Program funded by the Office of Insular Affairs of the U.S. Department of the Interior.

The BEA estimated that the GDP of Guam was US\$665 million in 2012, and US\$682 million in 2013 (BEA 2014).

Method Used to Calculate the Official Fishing Contribution to GDP

Officials of Central Statistics, in CNMI's Department of Commerce, are not certain that the BEA GDP estimate for the Northern Marianas considers the fishing sector (J. Andrew, per. com. September 2015).

Estimate of Fishing Contribution to GDP

Table 24-5, below, represents one option for estimating fishing contribution to the GDP of the Northern Marianas. 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 23.1, above (summarised in Table 24-3), 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).

Table 24-5: Fishing Contribution to CNMI GDP in 2014

Harvest Sector	Gross Value of Production (US\$, from Table 24-3)	VAR	Value Added (US\$)
Coastal Commercial	821,356	0.60	492,814
Coastal Subsistence	1,400,000	0.80	1,120,000
Offshore Locally based	0	0	0
Freshwater	0	0	0
Aquaculture	1,130,000	0.45	508,500
Total	3,351,356	---	2,121,314

The contribution of fishing to GDP in 2014, estimated in the above table (US\$2.1 million), represents about 0.3% of the US\$682 million GDP estimate for CNMI for 2013.

24.3 Exports of Fishery Production

The Bureau of Economic Analysis of the U.S. Department of Commerce has made estimates of the exports of the Northern Marianas. BEA (2014) indicates that the total exports of CNMI were US\$15 million in 2012 and US\$16 million in 2013. Information is not readily available for fishery exports.

It is often assumed that there are no finfish exports for CNMI (e.g. Rhodes et al. 2011). The aquaculture section of this chapter states that two aquaculture products are exported:

- The shrimp *Litopenaus vannamei* for Saipan and Guam markets: 2014 production was about 25 tons,⁵ valued at US\$9 per pound.
- *Litopenaeus* broodstock for export: 2014 production was about 15,000 pieces, valued at US\$40 per piece.

For the purpose of the present study it is assumed (with limited evidential basis) that one-quarter of the market shrimp and all of the broodstock are exported. This equates to exports of about US\$712,500 in 2014, which represents about 4.5% of all exports in 2013.

The large tourism industry generates substantial imports of seafood. In addition to canned fish, CNMI imports fresh fish from Palau, FSM and Marshall Islands. VanBeukering (2006) notes rapidly increasing reef fish imports into Saipan, particularly after 1998.

24.4 Government Revenue from Fisheries

Access Fees for Foreign Fishing

There is currently no authorised foreign fishing in the CNMI zone, and no access fees are received. United States vessels are considered to be domestic vessels.

⁵ This is assumed to be a "short ton" (i.e. 2,000 pounds).

Other Government Revenue from Fisheries

There are no requirements for commercial fishing vessels, operators or crew licenses for inshore or offshore waters of CNMI. (Allen and Amesbury 2012).

24.5 Fisheries-Related Employment

Various studies of CNMI fisheries contain information on aspects of employment. Rhodes et al. (2011) state that in Saipan several professional, locally owned fishing operations supply markets in Saipan. These operations each consist mainly of three to four full-time, low-paid, non-resident workers, with catch-based incentives as part of their salary. Some of the fishing operations are market owned, while others remain independent. Most professional operations will travel as far as Rota (70–120 km), but typically fish in Saipan, Aguijan or Tinian. The remaining contributions of marketed landings come from “semi-subsistence” CNMI fishermen that sell a portion of their catch to generate additional income. These operations are usually land based (i.e., no boat is used), and typically operate at night. More than 50 professional fishers are estimated to work for formal businesses, while the number of independent and semi-subsistence fishers is unknown.

VanBeukering (2006) states that fishing is an important cultural activity on Saipan, even if it is for pleasure rather than for catching fish to eat or sell. Twenty percent of all people interviewed in that study were active fishers, and they fish once every week or two weeks. For some, giving fish to family and friends is a traditional practice, or is otherwise a way of demonstrating care.

Hospital and Beavers (2014) provide the results of interviews with 112 CNMI fishers. Fishers were asked about compensation arrangements for their time and assistance, which elicited a diversity of responses across the fleet. About 45% of crew fishers reported that they receive no compensation for their time as crew members, many of whom indicated that they were family or friends who simply enjoyed fishing. Additionally, 15% reported that they contribute a portion of trip costs in exchange for the fishing opportunity. Of the crew survey respondents who receive compensation, approximately 40% reported that they keep a percentage of total fish caught on a trip, with the mean percentage being 39%. No crew fishers reported that they keep all of the fish they catch on a trip. For crew members involved in trips where fish are sold, 71% reported that they receive a share of trip

revenues (an average of 33% of trip revenues). An additional 30% stated that compensation varied from trip to trip. The survey asked: “How would you define yourself as a fisherman? (check all that apply)”. Table 24-6 categorises the responses.

Table 24-6: How CNMI Fishers Categorise Themselves

Full-Time Commercial	Part-Time Commercial	Cultural	Subsistence
15.2%	17.9%	29.5%	46.4%
Recreational Expense	Purely Recreational	Multiple Motivations	
30.3%	17.9%	36.6%	

The CNMI Prevailing Wage and Workforce Assessment Study (Central Statistics 2015) indicates that, of the 24,658 people employed in 2014, 425 were employed in “farming fishing and forestry”. No further disaggregation is provided.

24.6 Levels of Fishery Resource Consumption

The readily available studies that provide information on CNMI fish consumption are summarised below:

- Gillett and Preston (1997) estimated that production from coastal fisheries (commercial and subsistence) in CNMI in the early 1990s equated to an annual per capita fish supply of 66.5 kg. This figure was partially based on the Dalzell et al. (2006) production estimate of 2,825 mt annually from CNMI’s subsistence fisheries – this amount appears unreasonably large.
- Zeller et al. (2005) state: “the per capita catch rate may have declined from a high of potentially 72.6 kg per person per year in 1950 to 2.9 kg per person per year by 2002.”
- Van Beukering et al. (2006) state that nearly half of the respondents in their survey reported eating “somewhat less fish” than they did 10 years ago. The majority said they ate fish between one and three times per week (28% said every two days, 27% said twice a week, and 23% said once a week). Of the remainder, 4% said they eat fish every day, and 18% ate fish either once or twice a month.
- Zeller et al. (2007), citing Smith (1947), suggest annual per capita consumption during the late 1940s of approximately 166 kg per year.

- Gillett (2009) states that unpublished data from the 2005 HIES indicate that the amount of fish from domestic commercial fishing and canned imports equates to 4.7 kg per capita per year. This amount does not include the production from domestic subsistence fisheries, nor from non-canned imported fish. The study adds: “It can be stated that estimating the per capita fishery product consumption for CNMI residents is complicated by large amount of canned and non-canned seafood imports, the presence of a large tourist population, and a subsistence fishery that was not covered by the 2005 HIES nor explicitly by current fishery monitoring programmes.”
- Bell et al. (2009) cover per capita fish consumption across the Pacific Islands region, but indicate that: “Guam, Marshall Islands, Northern Mariana Islands and American Samoa were not included in the analyses because HIES from these Pacific Island countries and territories make no distinction between cash transactions and subsistence.”
- Rhodes et al. (2011) estimate “total fish consumption” in CNMI to be 23 kg per person per year, and “reef fish consumption” to be 7 kg per person per year. The source of that information is not indicated. The report also states: “Since 1962 nutritional programs have provided food subsidies to families in need. These programs, together with the market economy, have reduced the overall dependence upon local seafood for subsistence, while increasing the purchasing power of individuals. Access to food coupons resulted in a general decrease in local food production.”
- Cuetos-Bueno and Houk (2014) state that 17% of households in Saipan actively participated in non-commercial reef fishing, with a mean monthly non-commercial catch of 16 kg per household per week.

24.7 Exchange Rates

CNMI uses the US dollar (US\$).