

22.1 Volumes and Values of Fish Harvests in Guam

Coastal Commercial Catches in Guam

There have been two major attempts to estimate the production of coastal commercial fishing across the Pacific Islands region that have included Guam. The following describe the results of those studies that deal with coastal commercial fisheries of Guam:

- Dalzell et al. (1996) used information from two Western Pacific Fisheries Information Network annual statistical summaries to estimate an annual coastal commercial fishery production in Guam in the early 1990s of 118 mt.

- Gillett (2009) used information from the Western Pacific Fisheries Information Network and other sources to estimate that the 2007 production from coastal commercial fishing in Guam was 44 mt, worth US\$195,000 to the fisher.

Guam focuses more attention on coastal commercial fisheries statistics than any other Pacific Island country or territory. A study of nearshore fisheries management in Micronesia (Rhodes et al. 2011) describes the collection of fisheries data in Guam (Box 22-1).

Box 22-1: The Collection of Fisheries Data on Guam

Fisheries data on Guam are collected via two programs: (1) the creel survey program and (2) total commercial landings. The first, a dedicated program for estimating catch data, is done via creel surveys conducted by the Division of Aquatic and Wildlife Resources (DAWR), through the Guam Department of Agriculture. That program started in the mid-1960s and continues today. In 1982, with support from the Western Pacific Fishery Information Network (WPacFIN), DAWR modified their collection technique and included expansion methods, allowing for island-wide estimates of total catch. In the same year, the second program was implemented by WPacFin in collaboration with DAWR and several local fish dealers and involved the collation and tabulation of total commercial landings through the voluntary use of trip tickets. The Guam Fishermen's Co-operative, the largest and most central distribution point for marketing fresh local fish, has worked with WPacFin in developing a cooperative fishery data collection system providing data that is adjusted using an annual percent coverage factor to create total estimated commercial landings. A summary of the commercial landing data is published yearly.

Source: Rhodes et al. (2011)

Information from the survey of total commercial landing [(1) in the above box] was used to construct Table 22-1 and Table 22-2.

Table 22-1: Guam Estimated 2014 Commercial Landings

Species	Pounds	Kg	Value (US\$)	Price (US\$/lb)
Null	279	126	785	2.81
Unknown	25	11	73	2.94
Bigeye scad (atulai)	1,562	708	3,998	2.56
Jacks	454	206	1,402	3.09
Mulletts	224	101	676	3.01
Bottomfishes (unknown)	705	319	2,402	3.40
Ehu (red snapper)	102	46	433	\$4.25
Gindai (flower snapper)	131	59	535	4.09
Groupers	815	369	2,607	3.20
Kalikali (pink snapper)	461	209	1,851	4.02
Lehi (silverjaw)	92	42	384	4.16
Onaga (red snapper)	336	152	1,978	5.89
Opakapaka (pink snapper)	264	120	1,124	4.25
Uku (gray snapper)	174	79	531	3.06
Amberjack	60	27	184	3.07
Reef fishes (unknown)	14,177	6,422	46,046	3.25
Wrasses	22	10	70	3.25
Rabbitfishes	47	21	152	3.25
Rudderfish (guilli)	51	23	165	3.25
Mafute (emperor)	1,453	658	4,509	3.10
Squirrelfishes	10	5	33	3.25
Parrotfishes	11,363	5,147	39,423	3.47
Snappers	76	34	246	3.25
Surgeonfishes	642	291	2,112	3.29
Unicornfishes	14,082	6,379	45,738	3.25
Goatfishes	186	84	604	3.25
Barracudas	1,529	693	3,271	2.14
Mahimahi	30,650	13,884	70,044	2.29
Marlins	23,223	10,520	36,387	1.57
Spearfish	28	13	42	1.50
Sailfish	407	184	706	1.73
Rainbow runner	1,895	858	4,209	2.22
Wahoo	14,005	6,344	32,986	2.36
Skipjack tuna	29,259	13,254	57,173	1.95
Dogtooth tuna	1,271	576	2,291	1.80
Yellowfin tuna	7,113	3,222	16,630	2.34
Crabs	42	19	222	5.32
Lobsters	1,628	737	6,079	3.73
Octopus	279	126	897	3.21
TOTAL	159,121	72,082	388,996	2.44

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

Table 22-2: Guam Estimated Commercial Landings, 2011–2104

Species	Pounds	Kg	Value (US\$)	Price (US\$/lb)
2014	159,121	72,082	388,996	2.44
2013	239,514	108,500	603,188	2.52
2012	200,275	90,725	507,286	2.53
2011	265,483	120,264	677,765	2.55

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

The estimated total coastal commercial catch on Guam from the tables above is 72 mt, worth US\$388,996 to fishers. This is much greater than the 44 mt estimated from the Gillett (2009) study. As noted in the 2009 study, landings in 2007 were unusually low, which is likely to be due to a spike in the cost of fuel.

This assessment of the 2014 production of the coastal commercial fisheries of Guam is probably very accurate compared to those made by the present study for other Pacific Island countries and territories.

Coastal Subsistence Catches

The degree of economic development in Guam is very high relative to most Pacific Island countries and territories. This could partially explain why partitioning coastal fishing activity into commercial and subsistence components is more difficult in Guam than elsewhere in the region. Zeller et al. (2007) state that, because there are few full-time commercial fishers, there is little distinction between commercial, subsistence and recreational fishing, and many fishing trips contribute to all three segments.

Dalzell et al. (1996) estimated an annual subsistence catch for Guam in the early 1990s of 472 mt. Gillett (2009) estimated subsistence production in 2007 of 70 mt, worth US\$217,000 to fishers.

With the reasonably accurate estimate of the production from coastal commercial fisheries in the section above, one way to approach the more difficult tasks of estimating coastal subsistence production is by the subsistence/commercial ratio:

- VanBeukering (2007) gives the results of a household survey of 400 local residents aimed at determining the nature and level of the value of Guam's coral reefs. The report states that about 40% of the fish and other seafood consumed by the respondents came from non-commercial fishers.

- According to staff of the Division of Aquatics and Wildlife Resources, the subsistence/commercial ratio is about 30/70 (J. Gutierrez and B. Tibbatts, per. com. September 2015).

With the 2011–2014 coastal commercial production averaging 98 mt (table above), the above points suggest a coastal subsistence production of about 42 mt. Using the farm gate approach to valuing subsistence production (i.e. reducing the coastal commercial price by 30%), the subsistence production was worth about US\$158,358 to fishers.

Locally Based Offshore Catches

Although several Asian longline vessels transshipped tuna in Guam, those vessels are not considered locally based. For the purpose of the present study it is assumed that in 2014 there was no locally based offshore fishing in Guam.

Foreign-Based Offshore Catches

There is no authorised foreign fishing in Guam zone.

Freshwater Catches

According to staff of the Division of Aquatics and Wildlife Resources, a small amount of eels and *Macrobrachium* is captured in Guam's streams, plus a somewhat larger amount of tilapia in ponds and in Masso Reservoir (J. Gutierrez, per. com. October 2008).

Statistics are not collected on the production from freshwater fishing activities. For the purpose of the present study it is assumed that in 2014 the production from freshwater fishing was 3 mt, worth US\$11,000.

Aquaculture Harvests

In August 2008 Guam's Bureau of Statistics and Plans forwarded aquaculture information to FAO, giving a 2007 production of 162 mt, made up of tilapia (100 mt), milkfish (40 mt), catfish (10 mt) and shrimp (12 mt). (Bureau of Statistics and Plans, unpublished data). Since that period the usual compiler of Guam aquaculture information has retired (H. Gong, per. com. October 2015).

An SPC publication (Amos et al. 2014) give estimates of Guam's aquaculture production (Table 22-3).

Table 22-3: Guam Aquaculture Production 2007–2014

	2007	2008	2009	2010	2011	2012
Aquaculture production (mt)	162	162	141	129	111	111
Aquaculture production (thousands US\$)	1391	1391	1189	1128	907	907

Source: Amos et al. (2014)

More recent Guam aquaculture statistics are not readily available. The aquaculture specialist at the University of Guam has not made new estimates of aquaculture on the island. That specialist stated there has probably been less production since 2008 because the number of shrimp farms has fallen from four to one, and there is currently less tilapia and catfish visible in the markets. (H. Gong, per. com. October 2015).

The above information is inadequate for making an estimate of the 2014 aquaculture production for Guam. Nevertheless, for the purpose of the present study, the production is deemed to be 100 mt, with a farm gate value¹ of US\$800,000.

Summary of Harvests

A crude approximation of the annual volumes and values² of the fishery and aquaculture harvests in 2007 can be made from the above sections (Table 22-4).

Table 22-4: Annual Fisheries and Aquaculture Harvest in Guam, 2014

Harvest Sector	Volume (mt)	Value (US\$)
Coastal Commercial	72	388,996
Coastal Subsistence	42	158,358
Offshore Locally based	0	0
Offshore Foreign-based	0	0
Freshwater	3	11,000
Aquaculture	100	800,000
Total	217	1,358,354

The estimates above are judged to be not very accurate, except for the estimate for the coastal commercial fisheries, which appears to be quite good relative to those in this study from other Pacific Island countries and territories.

¹ The values on the Guam aquaculture production table are not farm gate values, but rather are prices at "final consumption". Hence, those prices must be deflated to obtain farm gate prices.

² The values in the table are dockside/farm gate prices.

Figures 22-1 and 22-2 show the volumes and values of the 2014 Guam fisheries production.

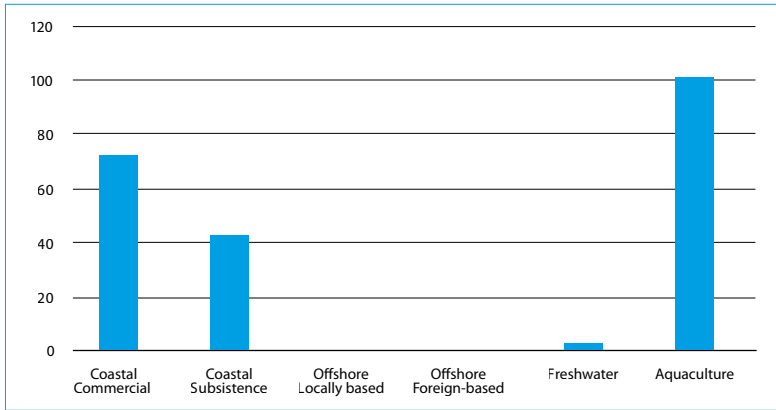


Figure 22-1: Guam Fisheries Production 2014 by Volume (mt)

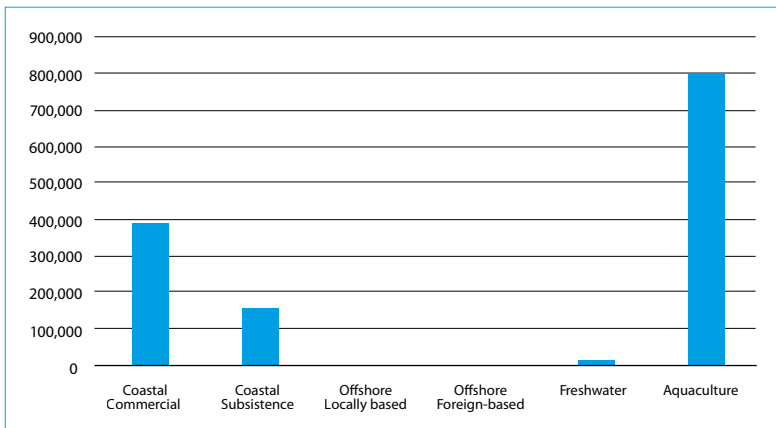


Figure 22-2: Guam Fisheries Production 2014 by Value

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 Guam from those studies are provided in Table 22-5.³

³ The earliest Benefish Study, Gillett and Lightfoot (2001), did not include aquaculture, freshwater fisheries or the non-independent territories.

Table 22-5: 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	44	195,000
	2014	72	388,996
Coastal Subsistence	1999	n/a	n/a
	2007	70	217,000
	2014	42	158,358
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	3	10,000
	2014	3	11,000
Aquaculture	1999	n/a	n/a
	2007	162	948,000
	2014	100	800,000

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

In the above table, the total volume of coastal fisheries production is quite similar between 2007 and 2014. The main difference is in how the total amount is partitioned between commercial and subsistence.

22.2 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 Guam 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\$4.756 billion in 2012 and US\$4.882 billion in 2013 (BEA 2014).

Method Used to Calculate the Official Fishing Contribution to GDP

Officials of the Guam Bureau of Statistics and Plans are not certain that the BEA GDP estimate for Guam considers the fishing sector (A. Perez and M. Guerrero, per. com. September 2015).

Estimate of Fishing Contribution to GDP

Table 22-6 below represents one option for estimating fishing contribution to the GDP of Guam. 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 22.1, above (summarised in Table 22-4), and determines the value added by using value-added ratios (VARs) characteristic of the type of fishing concerned. Those VARs were determined through knowledge of the fisheries sector and by use of specialised studies (Appendix 3).

Table 22-6: Fishing Contribution to Guam GDP in 2014

Harvest Sector	Gross Value of Production (US\$, from Table 22-4)	VAR	Value Added (US\$)
Coastal Commercial	388,996	0.60	233,398
Coastal Subsistence	158,358	0.75	118,769
Offshore Locally based	0	0	0
Freshwater	11,000	0.85	9,350
Aquaculture	800,000	0.65	520,000
Total	1,358,354	---	881,516

The contribution of fishing to GDP in 2014 estimated in the table (US\$1.36 million) represents about 0.03% of the US\$4.882 billion GDP of Guam for 2013.

22.3 Exports of Fishery Production

Given that Guam has a large amount of tourism and military activity, and a small fisheries sector, the fishery exports of Guam have limited economic importance. Determining the precise quantity is difficult, because any bona fide fisheries exports are aggregated in the statistics with the transshipped catch of foreign longliners that make port calls in Guam. Bureau of Statistics and Plans (2015) gives the export of “Fish, chilled, fresh, frozen, dried and

salted” as US\$3.2 million in the last quarter of 2014. Almost all of those fishery exports, if not the entire amount, is likely to be from the transshipping longliners.

The following are possible exceptions to the above:

- An aquaculture specialist at the University of Guam indicated that shrimp broodstock is occasionally exported (J. Brown, per. com. October 2008).
- Staff of the Division of Aquatic and Wildlife Resources indicate that a New York-based aquarium business exports from Guam small amounts of aquarium fish – probably around US\$10,000 per year. (J. Gutierrez and B. Tibbatts, per. com. September 2015).

22.4 Government Revenue from Fisheries

Access Fees for Foreign Fishing

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

Other Government Revenue from Fisheries

Any fishing licensing fees paid by vessels based in Guam go to US government agencies, rather than to the Government of Guam.

22.5 Fisheries-Related Employment

In August 2008 Guam’s Bureau of Statistics and Plans forwarded the following fisheries-related employment information to FAO, covering calendar year 2007:

- 1,565 full-time fishers
- 60 part-time fishers
- 170 occasional fishers
- The above includes two people employed full-time in “aquatic-life cultivation”
- All of the jobs above are filled by men (none are reported to be held by women).

The number of full-time fishers stated above seems very large compared to other surveys. Allen and Bartram (2008), citing a number of studies, show the following:

- The Guam Fishermen's Cooperative membership includes 164 full-time and part-time fishers, and it processes and markets an estimated 80% of the local commercial catch.
- Although in some cases commercial fishing contributes substantially to household income, nearly all Guam domestic fishers hold jobs outside the fishery.
- Domestic fishing in Guam supplements family subsistence, which is gained by a combination of small-scale gardening, ranching and wage work.

VanBeukering (2007) gives the results of a household survey covering 400 local residents, aimed at determining the nature and level of the value of Guam's coral reefs. The report states that approximately 40% of local residents fish on a regular basis, which was identified to be more important as a social activity than as an income-generating activity.

A community awareness study carried out for the Guam Coastal Management Program covered participation in fisheries (Glimpses Advertising 2012). The results indicated that 49% of Guam's population reported participation in fisheries in 2011.

The "Current Employment Report" of Guam's Department of Labor is of limited use in determining the importance of fisheries-related employment. The most detailed disaggregation in that report is the category "agriculture" (which includes fisheries). In June 2014 there were 190 private sector agriculture workers, of which 20 were women.

22.6 Levels of Fishery Resource Consumption

Several older studies provide information on per capita fish consumption, summarised below:

- Gillett and Preston (1997) estimated that the production from coastal fisheries (commercial and subsistence) in Guam in the early 1990s represented an annual per capita fish supply of 4.4 kg.
- Zeller et al (2007) indicate that seafood imports in 2002 were 20.9 kg/person.

- Allen and Bartram (2008) cite Amesbury (2006), which states that annual seafood consumption in Guam is estimated to be about 60 lbs (27.2 kg) per capita.
- VanBeukering (2007) shows that most households consume fish approximately twice a week. This has not changed a great deal in the last decade. However, presently more than half of all consumed fish comes from stores or restaurants, while around 40% comes from immediate or extended family, or friends.

The Development Plan for Aquaculture on Guam (Brown et al. 2010) indicates that the total annual seafood supply obtained is about 8 million pounds (3,624 mt), and per capita consumption is about 45 pounds (20.4 kg) per year, which, given the crudeness of the methods used, is not significantly different from a previous estimate of 60 pounds (27.2 kg) per year given by a 2006 survey (J. Amesbury 2006, cited in Allen and Bartram 2008).

A study of market forces and nearshore fisheries management in Micronesia (Rhodes et al. 2011) states that, in Guam, consumption rates for the period 1985–2002 – which include total fish imports, plus reported catches from commercial non-pelagic landings and creel survey landings converted to a per capita basis – range from 21.7 to 22.6 kg per year, which is similar to findings for reef fish consumption in other recent studies.

22.7 Exchange Rates

Guam uses the US dollar (US\$).