

Appendix 4

Commonwealth of the Northern Mariana Islands

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Summary

There was a 30% increase in bottom fish landings from 2003 to 2004 figures. The number of trips during which bottomfishes were caught decreased below the 22-yr mean, but the average bottomfish catch per trip increased by 17%. This fishery continues to show a high turnover with changes in the high liners participating in the fishery. Fishermen sometimes conduct multi-purpose trips that focus primarily on shallow-water bottomfishes and catch pelagic species while in transit. In doing so, the shallow-water bottomfish complex continues to be exploited, but as part of the exploitation of reefs near the populated islands. Redgill emperor (mafute') is the most frequently harvested and easily identified species in this complex, although a variety of snappers and groupers are also harvested.

There were a large number of days in 2004 where the sea conditions were very rough, as large storms and typhoons passed close to the CNMI. In addition, nearly all of the 8 larger vessels previously fishing the northern islands did not fish in 2004. There was no port-side sampling conducted on these commercial trips made by these larger vessels in 2004. These vessels use to catch the majority of the deep-water bottomfishes, although in 2002 one high liner for onaga used small vessels to fish locally off Saipan.

Revenues and prices for bottomfishes were higher in 2004 than in 2003, with the inflation-adjusted revenue increasing by 18% and the inflation-adjusted average price per pound decreasing less than the 22-yr mean.

Fishermen utilizing larger vessels have greater access to the deep-water bottomfish resources, especially in the northern islands of the CNMI. However, this sector of the industry requires more investment, consistent long-term effort, and knowledge to recoup the costs than the shallow-water bottomfish sector. This industry could continue to expand with support from a training program in bottomfishing that addresses the following: proper fish handling and maintenance of product quality, use of fathometers, nautical charts, and modern electronic equipment such as GPS, fish finders, electric reels, marketing, and financial planning.

Bycatch was all within the charter fishery (with the exception of a single interview in 2000). During 2004, bycatch was part of 12.88% of the fishes taken, but was all released alive.

Historical Annual Statistics for CNMI Bottomfishes

Year	Landings Total (Lbs)	CPUE (Lbs/Trip)	CPI	CPI Adjusted Revenue (\$)	CPI Adjusted Price (\$/Lb)	Number of Fishermen
1983	28,529	43	140.90	97,052	3.40	90
1984	42,664	70	153.20	131,265	3.08	101
1985	40,975	117	159.30	117,717	2.87	62
1986	29,911	104	163.50	93,538	3.13	55
1987	49,715	169	170.70	142,838	2.87	46
1988	47,313	181	179.60	130,336	2.75	28
1989	24,438	73	190.20	73,965	3.03	31
1990	12,927	81	199.33	42,354	3.28	33
1991	7,093	47	214.93	25,281	3.56	19
1992	10,598	59	232.90	30,877	2.91	36
1993	18,461	84	243.18	52,235	2.83	20
1994	25,469	74	250.00	76,905	3.02	32
1995	36,101	93	254.48	128,991	3.57	34
1996	66,387	119	261.98	230,216	3.47	71
1997	64,143	137	264.95	217,078	3.38	68
1998	59,022	148	264.18	206,111	3.49	50
1999	55,991	156	267.80	204,633	3.65	53
2000	45,258	56	273.23	128,120	2.83	72
2001	71,256	68	271.01	218,462	3.07	74
2002	46,765	101	271.55	135,146	2.89	53
2003	41,903	89	268.92	120,315	2.87	58
2004	54,452	104	271.28	142,260	2.61	43
Average	39,971	99		124,804	3.12	51
Standard Deviation	18,467	39		61,609	0.31	22

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Introduction

The Commonwealth of the Northern Mariana Islands' (CNMI) bottomfish fishery occurs primarily around the islands and banks from Rota Island to Zealandia Bank north of Sarigan. However, the data are limited to the catches landed on Saipan, which is by far the largest market. Landings (in pounds) and revenues are inflated by 30% to represent the CNMI as a whole (assuming a 60% coverage of the commercial sales on Saipan and that Saipan is 90% of the market). The fishery is characterized in this report by data collected through the Commercial Purchase Database, which indirectly records actual landings by recording all local fish sales to commercial establishments. This data collection system is dependent upon voluntary participation by first-level purchasers of local fresh fish to accurately record all fish purchases by species categories on specially designed invoices. Division of Fish and Wildlife (DFW) staff routinely collected and distributed invoice books to around 27 participating local fish purchasers in 2004; which include the majority of the fish markets, stores, restaurants, hotels, government agencies, and roadside vendors (fish-mobiles). This reduction from participants last year is likely the result of reduction in the number of vendors, businesses closing and a decrease in voluntary compliance with the program.

Although this data collection system has been in operation since the mid-1970s, only data collected since 1983 are considered accurate enough to be comparable for most aspects of the fishery. The identification and categorization of fishes on the sales invoices has improved markedly in the last 10 years. Unfortunately, two inherent problems remain in the database. First, a number of the bottomfish MUS are not listed on the sales receipts. This was partially corrected by the addition of new taxa (but not all BMUS species) to the receipts (black jack, giant trevally, amberjack, ehu, blueline snapper, and kalikali were added to sales invoices in 2001). Moreover, for those BMUS species not specifically listed on the receipts there remains some confusion regarding where they should be added to the receipts. Second, the commercial sales invoice is a voluntary program which not all vendors participate in.

The CNMI's bottomfishery still consists primarily of small-scale local boats engaged in local commercial and subsistence fishing, although a few (generally <5) larger vessels (30–60 ft) usually participate in the fishery. The bottomfishery can be broken down into two sectors: deep-water (>500 ft) and shallow-water (100–500 ft) fisheries. The deep-water fishery is primarily commercial, targeting snappers and groupers. The snappers targeted include members of *Etelis* and *Pristipomoides*, whereas the eight-band grouper (*Epinephelus octofasciatus*) is the only targeted grouper. The shallow-water fishery, which targets the redgill emperor (*Lethrinus rubrioperculatus*), is mostly commercial but also includes subsistence fishermen. These fishermen are taking not only bottomfishes, but many reef fishes (especially snappers and groupers) as well. Hand lines, home-fabricated hand reels and electric reels are the commonly used gear for small-scale fishing operations, whereas electric reels and hydraulics are the commonly used gear for the larger operations in this fishery. Historically, some trips have lasted for more than a day, but currently, effort is defined and calculated on a daily trip basis. Fishing trips are often restricted to daylight hours, with vessels presumed to return before or soon after sunset, unless fishing in the northern islands. In terms of participation, the bottomfish fleet consists primarily of vessels less than 30 ft long that are usually limited to a 50-mi radius from Saipan. The larger commercial vessels that are able to fish extended trips and which focus their effort from Esmeralda Bank to Zealandia Bank are presumed to have landed the majority of the deep-water bottomfish reported through the purchase receipt forms.

Bottomfishing requires more technical skill than pelagic trolling, including knowledge of the location of specific bathymetric features. Presently, bottomfishing can still be described as “hit or miss” for most of the smaller (12–29 ft) vessels. Without fathometers or nautical charts, the majority of fishermen utilizing smaller vessels often rely on land features for guidance to a fishing area. This type of fishing is inefficient and usually results in a lower catch-per-unit-effort (CPUE) in comparison with pelagic trolling. These fishermen tend to make multi-purpose trips—trolling on their way to reefs where they fish for shallow-water bottomfish and reef fish. Larger sized (30-ft and larger) vessels typically utilize Global Positioning System (GPS), fathometers, and electric reels, resulting in a more efficient operation. In addition, reef fishes are now commanding a consistently higher price than in previous years. This appears to be reflected in an increased number of fishermen using small vessels focusing on reef and/or pelagic species over bottomfishes.

Fishermen targeting the deep-water bottomfish, if successful, tend to fish for 1–4 years before leaving the fishery, whereas the majority of fishermen targeting shallow-water bottomfish tend to leave the fishery after the first year. The overall participation of fishermen in the bottomfishery tends to be very short term (less than 4 years). The slight difference between the shallow-water fishermen and the deep-water fishermen likely reflects the greater skill and investment required to participate in the deep-water bottomfishery. In addition, these tend to be larger ventures that are more buffered from the vagaries of an individual’s choices and are usually dependent on a skilled captain/fisherman. Overall, the long-term commitment to hard work, maintenance and repairs, and staff retention appear to be difficult, if not impossible for CNMI bottomfishermen to sustain more than a few years.

2004 Recommendation

- 1) To request NMFS and the Council continue to assist the CNMI by supporting the MARAMP cruises to the northern islands of the CNMI.

2003 Recommendations & Progress

- 1) To request NMFS and the Council continue to assist the CNMI by contracting a specialist to map commercial fishing banks, particularly around Farallon de Medinilla, Marpi Reef, and the banks closest to Saipan, Tinian, and Rota.

The Council had contracted a private company to conduct a multi-beam side sonar map survey of Farallon de Medinilla, unfortunately the vessel chartered had mechanical problems during the survey.

- 2) To request NMFS and the Council continue to assist the CNMI by supporting the MARAMP cruises to the northern islands of the CNMI.

Another cruise is scheduled for September 2005.

Figures, Interpretations, Calculations, and Tables

Figure 1.—Commercial bottomfish landings, allocated to sector of the fishery (or categorized as “assorted bottomfishes”).

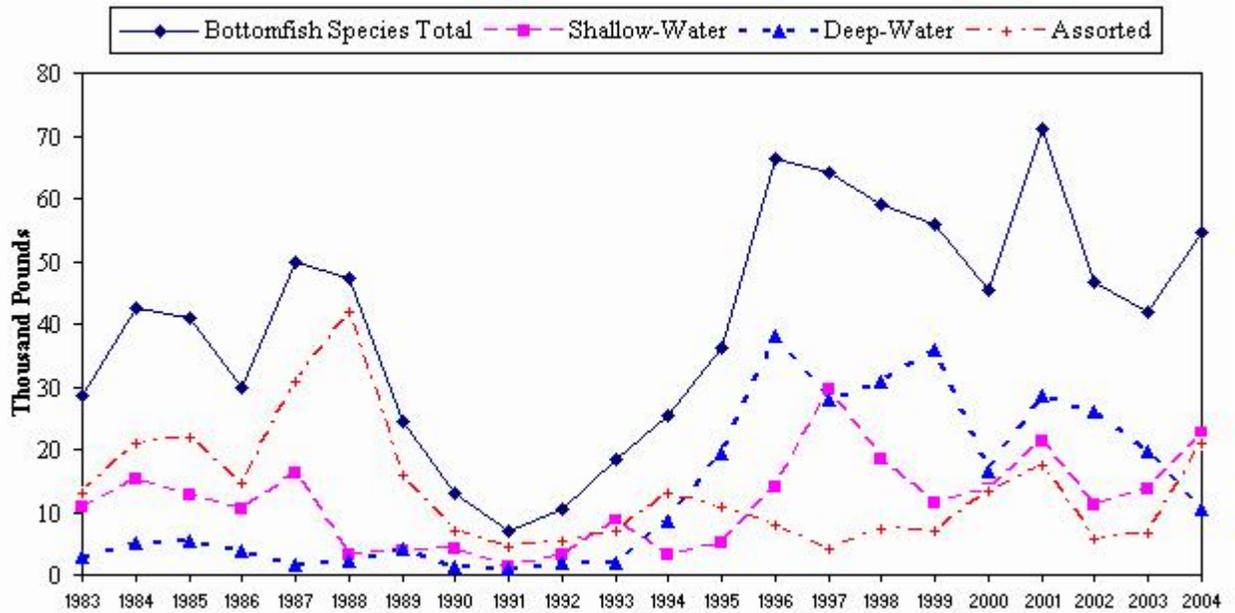


Figure 2.—Commercial bottomfish landings of deep-water species.

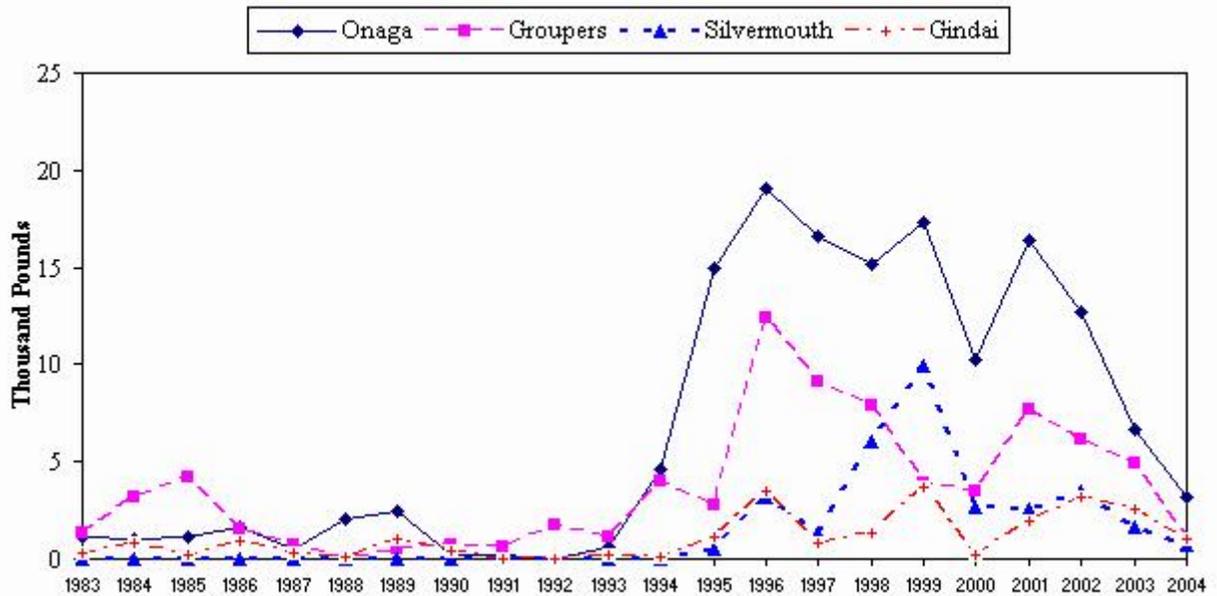
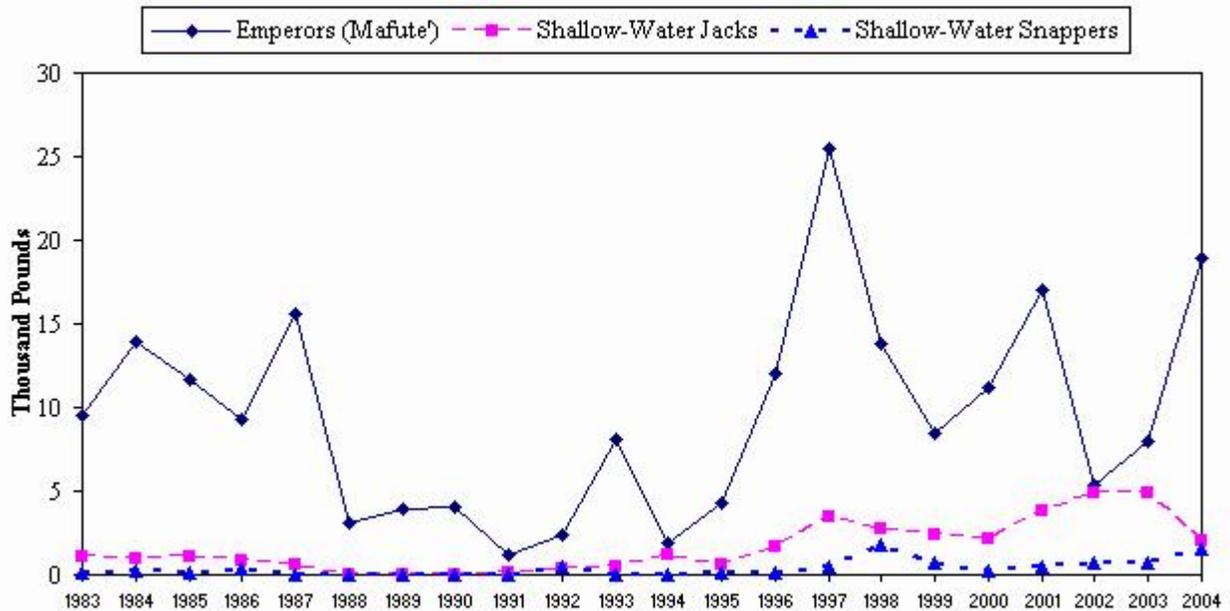


Figure 3.—Commercial bottomfish landings of shallow-water species.



Interpretation: Taken as a whole, the number of pounds of bottomfishes sold (landings) increased in 2004 by 30% from that of 2003. In part, this may be explained by an increase in landings of shallow-water bottom fish, mostly emperors. A majority of the larger vessels conducting deep-water bottom fishing did not fish in the northern islands in 2004. And for 2004, the number of fishermen landing bottomfishes in the CNMI has dropped to below the 22-year mean.

Bottomfishes that were categorized simply as “assorted bottomfish” were the largest portion of the landings until 1995. Since 1995, deep-water bottomfishes have been the largest portion of the catch, with shallow-water bottomfishes becoming the second largest portion of the catch in 1996, and remaining there through 2003. In 2003, “assorted bottomfishes” accounted for 15.6% of the landings. This reflects the use of the new sales invoice forms, with more species specifically listed. The use of the category “assorted bottomfish” will likely continue, because the diversity of the catch is great and many buyers sell these species as “assorted bottomfish,” so there is little perceived need to identify them more completely. However in 2004, shallow water bottomfish comprised the majority of the landings. This is probably due to restrictions on sea conditions, allowing the small fishing vessels to fish close to the islands for shallow-water bottom fish and the lack of fishing effort by the larger northern islands fishing vessels.

Deep-water bottomfish landings increased significantly in 1995 and have remained fairly high until 2001. This is likely the result of an increase in the number of large vessels participating in the deep-water bottomfishery that are capable of fishing the islands and banks north of Farallon de Medinilla. Note however, that deep-water bottomfishes are still caught near Saipan. Since 2001 sea conditions and vessels participating in the northern islands deep bottom fishery has declined fishing effort. 2004 landings of deep-water bottom fish decline drastically because of the lack of fishing effort in the northern islands. The variation in participation of these larger vessels greatly affects this part of the fishery. The landings of onaga (*Etelis coruscans* and some *Etelis radiosus*) fell steeply in 2003 and 2004, to below the 22-year mean. Note that this

sector of the industry also has a high turnover, but differs from the mafute' in that successful onaga fishermen often participate for more (1–4) years. Landing of grouper primarily (*Epinephelus octofasciatus*, but almost certainly including shallow-water BMUS species such as *Variola louti* and *E. fasciatus*) have varied widely over the last 10 years with a 20.3% decrease in landings in 2002 from 2001, 21.6% decrease in landings in 2003 and sharper decrease of 78% in 2004. Silvermouth (*Aphareus rutilans*) have been reported since 1995, and landings have fluctuated considerably. Landing for 2004 were below the 22 year mean. Opakapaka (*Pristipomoides zonatus*, and likely some *P. flavipinnes*) landings have varied somewhat in the last 10 years, with the 2004 landings decreasing by 62%. Ehu (*Etelis carbunculus*) landings increased 56% from last year. Ehu are commonly caught around Saipan by the smaller fishing vessels. Kalikali (*Pristipomoides auricilla* and *P. sieboldii*) appeared in the sales invoice for the first time in 2002. 2003 landings were an order of magnitude greater than previous years and 2004 landing increased by 5%.

The number of pounds of shallow-water bottomfishes commercially sold (landings) appeared to peak between 1996 and 2001. It is likely that there was a comparable peak in landings between 1984 and 1987, but this result is difficult to discern because of the large number of bottomfishes that were categorized as “assorted bottomfish” during the earlier period. The landings of emperor (mafute' of the family Lethrinidae) have experienced large fluctuations over the last 20 years, and particularly over the last 8 years. In 2002, the number of pounds of mafute' commercially sold fell, below the 20-year mean, to the lowest level since 1995. In 2003, the number of pounds of mafute' landed increased slightly, but is still below the 21-year mean. 2004 mafute' landings increased by 136% from 2003. The landings of jacks fished in shallow areas (itemized as “jacks,” amberjack [*Seriola dumerili*], giant trevally [*Caranx ignobilis*], brassy trevally [*C. papuensis*], and black jack [*C. lugubris*] on the sales invoices) appears to have slowly increased over the last 10 years, with the highest landings reported in 2003. Landings of jacks were only 0.57% higher (28 pounds greater) in 2003, than in 2002 but decreased tremendously in 2004 by 87%. This is likely related to the decrease in the amount of the landings from the northern islands bottom fishing fleet. The category “jacks” may include any carangids sold, including BMUS species, as well as *Carangoides orthogrammus*, *Caranx melampyngus*, *C. papuensis*, and *C. sexfasciatus*. Landings of amberjack were higher in 2004 than for any previous years. Giant trevally and black jack were reported in 2002 for the first time and brassy trevally was reported in 2003 for the first time, both likely as a result of being added to the new sales invoice. Jobfish (*Aprion virescens*) have been reported in 8 of the last 20 years, and in 2004 landings were the highest ever reported surpassing the previous year by 100%. Landings of blueline snapper (*Lutjanus kasmira*) and Humpback snapper (*Lutjanus gibbus*) were much higher than last year, but this species is often lumped within assorted reef fishes.

Bottomfish Management Unit species (BMUS) that were specifically itemized on the sales receipts (and including emperors, the vast majority of which are BMUS species *Lethrinus rubrioperculatus*) increased from 1983 through 1987. They then dropped to a low in 1991 and generally climbed again through 2001. The reported landings of BMUS species decreased in 2002 by 28.3%, and decreased a further 14.3% in 2003, however landings in 2004 increased by 29% remaining above the 22-year mean.

This report only represents the commercial fishery as reported on sales invoices in the CNMI. Charter vessels that do not sell their catch and recreational/subsistence catches are not included here.

Calculation: 2004 annual summaries for each species from sales invoice datasheets are totaled and then inflated by 30% to represent the CNMI as a whole (assuming 60% coverage of the commercial sales on Saipan and that Saipan is 90% of the market).

Table 1.—Commercial landings (in pounds) of all bottomfishes, BMUS species identified to species on invoices, all shallow-water bottomfishes, all deep-water bottomfishes, and selected deep-water bottomfishes.

Table 1. Commercial landings (Lbs) of Bottomfishes

year	btm	bmus	btm_s	btm_d	onaga	grpr_d	lehi	paka	gindai	ehu	kali
1983	28,529	3,407	10,762	2,748	1,118	1,363	0	2,022	267	0	0
1984	42,664	3,463	15,089	4,965	1,026	3,141	0	1,639	798	0	0
1985	40,975	2,223	12,855	5,535	1,117	4,210	0	681	208	0	0
1986	29,912	3,822	10,431	3,965	1,598	1,494	0	987	874	0	0
1987	49,715	1,889	16,176	1,464	472	721	0	1,146	271	0	0
1988	47,313	2,413	3,078	2,086	2,001	0	0	326	85	0	0
1989	24,438	4,021	3,963	4,046	2,478	563	0	538	1,006	0	0
1990	12,927	1,273	4,021	1,348	253	703	0	628	393	0	0
1991	7,093	781	1,387	804	175	629	0	606	0	0	0
1992	10,598	607	3,125	1,794	21	1,773	0	136	0	0	0
1993	18,461	1,722	8,537	1,971	593	1,146	0	898	232	0	0
1994	25,470	5,476	3,055	8,589	4,578	3,953	0	824	58	0	0
1995	36,102	17,736	5,043	19,261	14,910	2,715	521	1,019	1,114	0	0
1996	66,388	32,446	13,839	38,133	19,093	12,409	3,179	6,570	3,452	0	0
1997	64,144	22,133	29,452	27,913	16,631	9,086	1,375	2,780	821	0	0
1998	59,023	27,593	18,278	30,665	15,158	7,864	6,028	2,729	1,295	197	124
1999	55,991	34,648	11,464	35,750	17,351	3,901	9,986	1,772	3,686	821	6
2000	45,258	14,968	13,582	16,592	10,199	3,474	2,659	1,633	214	45	0
2001	71,256	25,264	21,195	28,625	16,358	7,719	2,585	3,951	1,916	8	0
2002	46,766	24,518	11,003	26,113	12,655	6,149	3,479	3,932	3,157	263	410
2003	41,904	17,988	13,567	19,549	6,649	4,906	1,624	2,262	2,550	729	3,090
2004	54,452	12,849	22,403	10,369	3,138	1,073	737	849	1,042	1,137	3,242
Average	39,972	11,874	11,468	13,286	6,708	3,591	1,462	1,724	1,065	145	312
Standard Deviation	18,467	11,492	7,275	12,706	6,997	3,277	2,491	1,526	1,159	319	928

btm: Total bottomfish; bmus: Total bmus: BMUS species; btm_s: All shallow-water bottomfishes; btm_d: All deep-water bottomfishes; onaga: Onaga; grpr_d: Grouper; lehi: Silvermouth; paka: Opakapaka; gindai: Ginadai; ehu: Ehu; and kali: Kalikali

Table 2.—Commercial landings (in pounds) of fishes only identified as assorted bottomfishes, and selected shallow-water bottomfishes.

Table 2. Commercial landings (Lbs) of Bottomfishes

year	btm_as	empr	jack_a	amber	giant_j	brass_j	blk_jack	uku	jack_s	taape	snapr
1983	12,998	9,555	1,031	0	0	0	0	0	1,031	0	175
1984	20,971	13,925	906	0	0	0	0	0	906	0	259
1985	21,904	11,676	962	135	0	0	0	81	1,098	0	81
1986	14,528	9,250	818	0	0	0	0	363	818	0	363
1987	30,929	15,568	607	0	0	0	0	0	607	0	0
1988	41,823	3,078	0	0	0	0	0	0	0	0	0
1989	15,891	3,963	0	0	0	0	0	0	0	0	0
1990	6,931	4,021	0	0	0	0	0	0	0	0	0
1991	4,296	1,212	175	0	0	0	0	0	175	0	0
1992	5,543	2,338	337	0	0	0	0	450	337	0	450
1993	7,055	8,083	454	0	0	0	0	0	454	0	0
1994	13,002	1,870	1,169	0	0	0	0	16	1,169	0	16
1995	10,779	4,276	596	0	0	0	0	171	596	0	171
1996	7,846	11,990	1,697	0	0	0	0	152	1,697	0	152
1997	3,998	25,445	3,482	0	0	0	0	526	3,482	0	526
1998	7,351	13,853	2,362	317	0	0	0	1,746	2,679	0	1,746
1999	7,004	8,419	2,019	343	0	0	0	683	2,363	0	683
2000	13,451	11,223	2,142	28	0	0	0	190	2,169	0	190
2001	17,485	16,987	3,761	21	0	0	0	425	3,782	0	425
2002	5,718	5,364	4,584	184	48	52	0	389	4,868	352	771
2003	6,526	7,999	3,685	322	26	725	138	597	4,896	75	672
2004	20,831	18,889	477	488	91	27	931	1,194	2,015	102	1,499
Average	13,494	9,499	1,421	84	8	37	49	317	1,597	24	372
Standard Deviation	9,413	6,240	1,375	148	22	154	199	443	1,521	78	476

Btm_as: Assorted bottomfish; empr: Emperor (mafute’); jack_a: As jacks; amber: Amberjack; giant_j: Giant trevally; blk_jack: Black jack; uku: Jobfish; jack_s: All shallow water jacks; taape: Blueline snapper; and shallow-water snappers

Table 3.—Commercial landings of bottomfishes, and their associated revenues and prices for 2004.

Species	Landings (Lbs)	Revenue (\$)	Average Price (\$/Lb)
Amberjack	488	957	1.96
Blackjack	931	1,781	1.91
Blueline Snapper	102	331	3.25
Bottom Fish	20,831	49,409	2.37
Brassy Trevally	27	55	2.00
Ehu (red Snapper)	1,137	3,406	3.00
Emperor (mafute/misc.)	18,889	51,140	2.71
Giant Trevally	91	250	2.75
Gindai (flower Snap)	1,043	3,105	2.98
Grouper (misc.)	1,073	3,172	2.96
Jacks (misc.)	477	1,216	2.55
Jobfish (uku)	1,194	2,252	1.89
Kalikali (yellowtail)	3,242	8,266	2.55
Onaga (red Snapper)	3,138	12,046	3.84
Opakapaka (pink Snp)	849	2,586	3.05
Red Snapper	204	407	2.00
Silvermouth (deep Lehi)	737	1,882	2.55
Total	54,452	142,260	2.61

Interpretation: The average price per pound decreased for all landings of bottomfishes from \$3.02/lb in 2003 to \$2.61/lb in 2004, with the exception of assorted jacks (increased 28¢/lb), giant trevally (increased 25¢/lb), grouper (increased 38¢/lb), and onaga (increased 38¢/lb). Onaga commanded the best price this year, with only opakapaka, gindai, ehu, and blueline snapper within 50¢ per pound. Most fishes are sold as whole fish (and very few as filets or steaks). The larger species are often purchased by the hotel restaurants, which are now seeing far fewer customers and often importing fishes from outside the CNMI. In addition, the local public appears to show a greater demand for reef fishes. This report only represents the commercial fishery as reported on sales invoices in the CNMI. Charter vessels that do not sell their catch and recreational/subsistence catches are not included here.

Calculation: Landings in pounds are from a simple database summation of reported purchases of each species of bottomfish. Total bottomfish landings sum across all bottomfish species. Revenue in dollars is from a simple summation of the value field. The landings and revenues values listed for 2004 are inflated by 30% to represent the CNMI as a whole (assuming 60% coverage of the commercial sales on Saipan and that Saipan is 90% of the market).

Figure 4.—Commercial bottomfish landings and inflation-adjusted revenue.

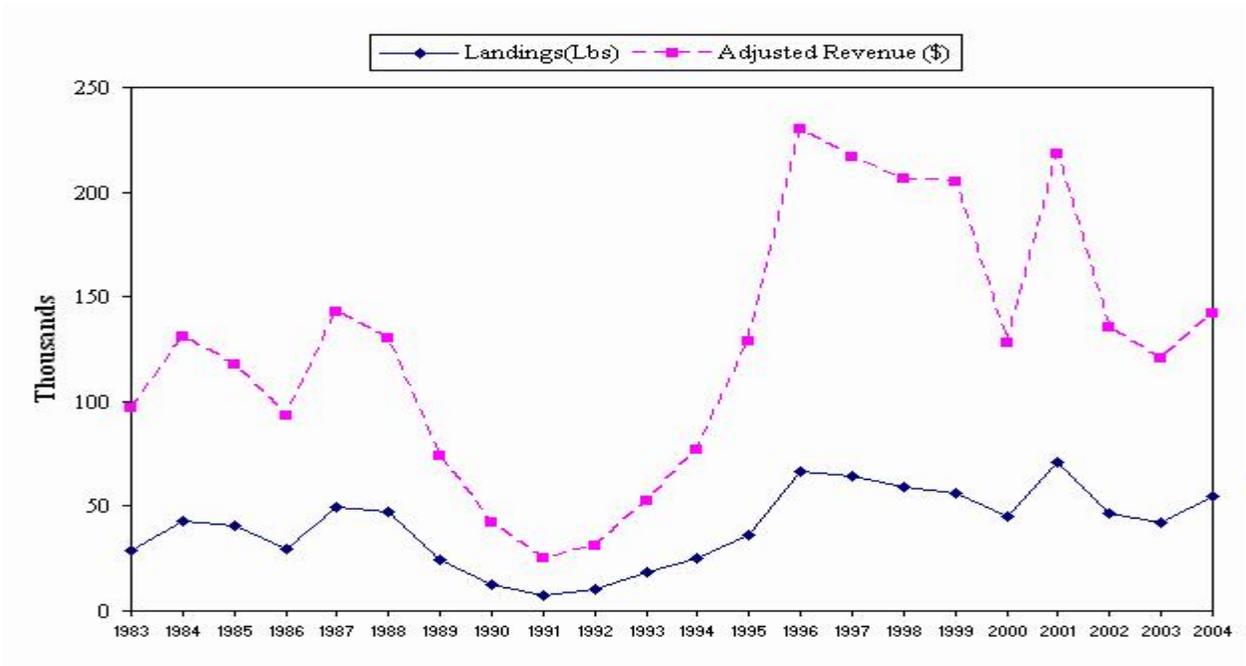
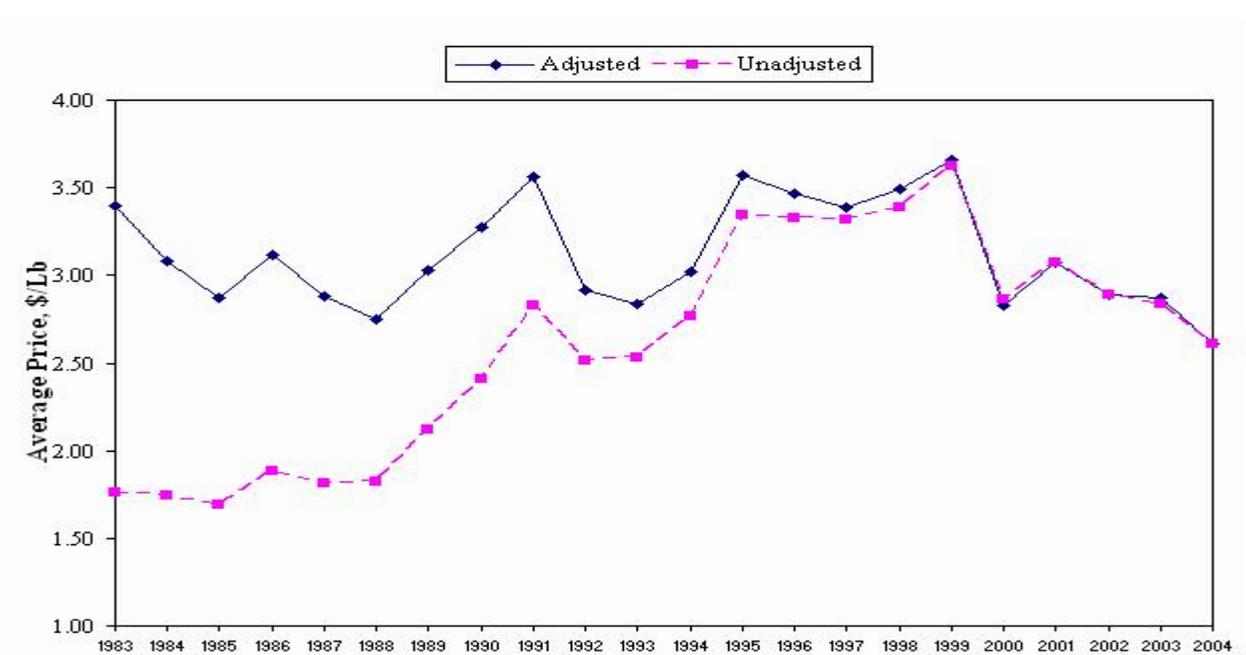


Figure 5.—Average price of bottomfish.



Interpretation: Landings, revenues, and adjusted revenues for 2004 all rose above the 22-year mean. Although the landings, revenues, and adjusted revenues for bottomfishes has been comparatively high for the last 9 years compared to the preceding 13 years, there have been considerable changes in the composition of the fishery during the last 9 years.

Inflation-adjusted bottomfish revenues recovered slightly from the marked decrease of 2000, but fell 12.3% from 2002. The inflation-adjusted revenue for 2003 is 4.2% below the 21-yr mean. The 2004 inflation-adjusted revenue increased 18% from last year. The bottomfish fishery has always been a small proportion of the total fisheries, and it appears that bottomfish are now a relatively lower percentage of the trip revenue on trips where bottomfish were caught. Moreover, many of the fishermen catching mafute' do so locally, but appear to be increasing their focus on reef fishes. The bottomfishes are a smaller portion of their sales and seem to be co-lateral catch (i.e., if caught in sufficient numbers while focusing on other species, then they too will be sold). Vessels capable of landing large amounts of onaga are usually larger vessels fishing the northern islands. The difficulty of maintaining the equipment, vessel, and crew to consistently and routinely make these trips successful appears to be difficult in the long term for fishermen in the CNMI, as seen by the loss of 4 of the 8 vessels from the fishery in 2003.

Prices for bottomfishes were less in 2004 than in the past 3 years, with the adjusted average price per pound lower than the 22-yr mean for the last 4 years. 2004 marks the lowest adjusted average prices than any of the previous years. The unadjusted price is near the 22-yr mean. Bottomfishes are not commanding the high prices they once did however this may change due to increasing fuel costs. Local buyers seem to increasingly prefer reef fishes and reef fishes are commanding higher prices each year.

Calculation: The CNMI's consumer price index is computed by the CNMI Department of Commerce using the Laspeyres' formula. The CPIs for 1983–1987 were not available from the CNMI Department of Commerce and were, therefore, estimated by using Guam's annual inflation rate to proportionally adjust the 1988 CNMI CPI. The CNMI Department of Commerce "reset" the CPI to 1.00 for the 1st quarter of 2003, with the 3 subsequent quarters showing devaluation.

Revenue in dollars is from a simple summation of the value field. The average price for bottomfish is calculated by dividing the total revenue by the total landings. The inflation adjustment is made using the Consumer Price Index (CPI) and establishing the 2004 CPI figure as the basis by which calculations of previous years' prices are made.

Table 5.—Commercial landings, consumer price indices (CPIs), revenue, and prices for all bottomfishes.

Commercial landings, CPIs, Price, and Revenue for CNMI Bottomfishes

Year	Landings Total (Lbs)	CPI	CPI Adjusted Factor	Unadjusted Revenue (\$)	CPI Adjusted Revenue (\$)	Unadjusted Price (\$/Lb)	CPI Adjusted Price (\$/Lb)
1983	28,529	140.90	1.93	50,286	97,052	1.76	3.40
1984	42,664	153.20	1.77	74,161	131,265	1.74	3.08
1985	40,975	159.30	1.70	69,245	117,717	1.69	2.87
1986	29,911	163.50	1.66	56,348	93,538	1.88	3.13
1987	49,715	170.70	1.59	89,835	142,838	1.81	2.87
1988	47,313	179.60	1.51	86,315	130,336	1.82	2.75
1989	24,438	190.20	1.43	51,724	73,965	2.12	3.03
1990	12,927	199.33	1.36	31,143	42,354	2.41	3.28
1991	7,093	214.93	1.26	20,064	25,281	2.83	3.56
1992	10,598	232.90	1.16	26,618	30,877	2.51	2.91
1993	18,461	243.18	1.12	46,638	52,235	2.53	2.83
1994	25,469	250.00	1.09	70,555	76,905	2.77	3.02
1995	36,101	254.48	1.07	120,552	128,991	3.34	3.57
1996	66,387	261.98	1.04	221,362	230,216	3.33	3.47
1997	64,143	264.95	1.02	212,822	217,078	3.32	3.38
1998	59,022	264.18	1.03	200,108	206,111	3.39	3.49
1999	55,991	267.80	1.01	202,607	204,633	3.62	3.65
2000	45,258	273.23	0.99	129,414	128,120	2.86	2.83
2001	71,256	271.01	1.00	218,462	218,462	3.07	3.07
2002	46,765	271.55	1.00	135,146	135,146	2.89	2.89
2003	41,903	268.92	1.01	119,124	120,315	2.84	2.87
2004	54,452	271.28	1.00	142,260	142,260	2.61	2.61
Average	39,971			107,945	124,804	2.60	3.12
Standard Deviation	18,467			66,964	61,609	0.62	0.31

Figure 6.—Number of fishermen (boats) making bottomfish landings.

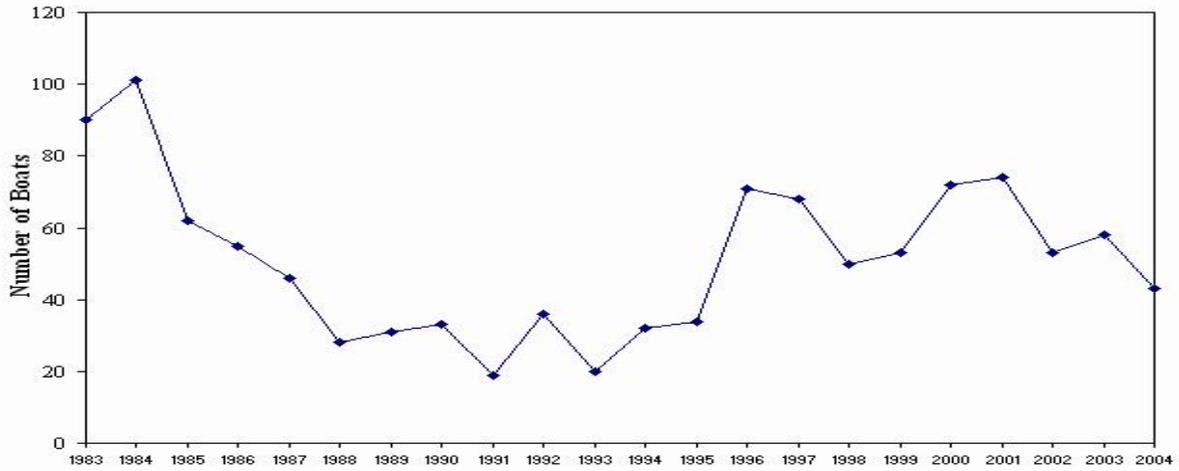


Figure 7.—Number of bottomfish trips.

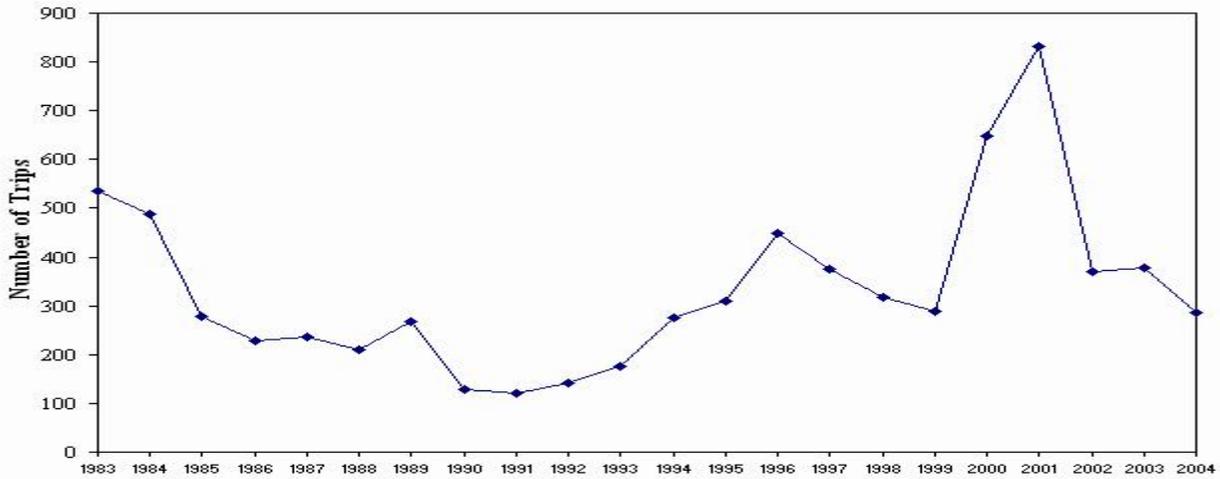


Figure 8.—Bottomfish catch in average pounds per trip.

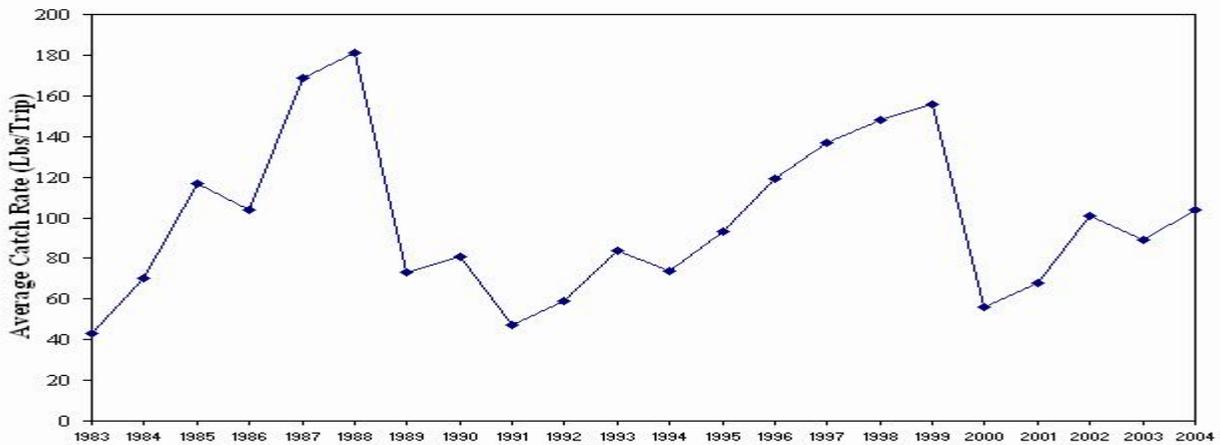
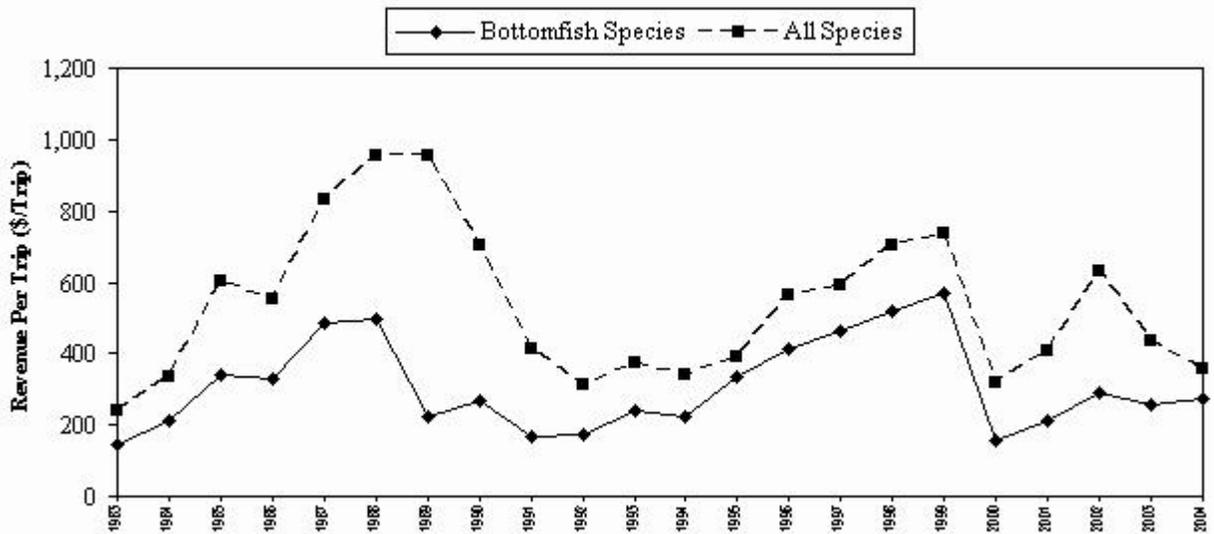


Figure 9.—Average inflation-adjusted revenue per trip landing bottomfish.



Interpretation: The number of fishermen (used as a proxy for the number of boats) making commercial sales of any bottomfish species has varied widely over the last 22 years. This year there were less fishermen selling bottomfish than last year, but the number remains near the 22-year mean. Most of these fishermen are using small vessels and when catching bottomfish, are more likely to target the shallow-water species.

The number of bottomfish trips was high from 1983 through 1989 as a result of consistent fishing activity centered on the island of Farallon de Medinilla. This fishery subsequently largely ceased in 1990, resulting in a drop in bottomfish trips in the early 1990s. In 1994, consistent fishing activity in the northern islands began once more and has continued to the present (although participation seems to be dropping this year). The number of bottomfish trips more than doubled in 2000 and 2001 to reach the highest levels in 18 years. During this time, more of the smaller vessels increased their focus on reef fishes, and although bottomfishes were still being caught and sold, they were no longer the largest (or most valuable) part of the catch. This resulted in fishermen catching bottomfishes as co-lateral catch on more trips. The number of trips decreased in 2002 and remained at this lower level in 2003 (near the 20-year mean), probably as a result of fewer fishermen focusing on catching bottomfishes at all. The number of bottom fishing trips for 2004 decreased below the 22 year mean partly due to rough sea conditions through out the year and the decrease in participation or closure of vendors in the commercial sales invoice program.

The substantial increase in pounds of bottomfish sold per trip since the low in 1991 can be primarily attributed to the northern islands fishery, coincident with the increase in vessels making bottomfish trips, increased revenues, and annual landings during the next 8 years. The average pounds of bottomfish landed per trip in 2000 decreased 63.1% from 1999, and recovered slightly in 2001 and 2002. This year the average pounds of bottomfish sold per trip increased to 5% above the 22-year mean.

Although the average catch per trip is not a very good measure of CPUE, because it is subject to significant biases (e.g., changes in trip length and relative amounts of bottom fishing compared to trolling or reef fishing); it is the only measure readily obtained from the commercial purchase system. However, the

smaller vessels commonly make mixed trips and the relative proportions of bottom fishes to pelagic and reef fishes are changing.

Inflation-adjusted bottomfish revenues recovered slightly from the marked decrease of 2000, although they were 13.0% lower in 2003 than in 2002, this year was higher by 7%. This year's revenues were 18% lower than the 22-year mean. This reflects the decrease in number of vessels fishing the northern islands, thereby decreasing the landings of the more valuable deep-water bottomfishes.

This report only represents the commercial fishery as reported on sales invoices in the CNMI. Charter vessels that do not sell their catch and recreational/subsistence catches are not included here.

Calculation: The purchasers identify the fisherman or boats selling the catch on the sales invoices used when they purchase fishes from the fishermen. The "number of fishermen" is the number of unique fishermen selling their catch of bottomfish within a given year.

Adding each recorded fisherman's sales for each day tallies the number of trips that resulted in landing any bottomfish. This assumes that each fisherman lands only once in a given day, and that all of the catch is sold on that day. Most trips last a single day, but it is also known that the occurrence of longer fishing trips happens. These actions will cause this measure of trips to underestimate the fishing effort tallied here as trips.

The catch rate is calculated by dividing the total weight of all bottomfish landings by the number of trips that landed bottomfish. Bottomfish revenue per trip is the total revenue of the bottomfish sold from a trip. The revenue per bottomfishing trip for all species is the total revenue for all trips that resulted in sales of any bottomfish. The inflation adjustment is made using the Consumer Price Index (CPI) and establishing the 2004 CPI figure as the basis by which calculations of previous years' prices are made.

Table 6.—Number of fishermen (used as a proxy for number of boats), number of trips, catch rate, revenue per trip, inflation-adjusted revenue per trip for bottomfish, and inflation-adjusted revenue per trip for all species when bottomfishing.

Commercial landings, CPIs, Price, and Revenue for CNMI Bottomfishes

Year	Number of Fishermen	Number of Trips	Catch Rate (lbs/Trip)	Unadjusted \$/Trip	Adjusted \$ /Trip	All Species Adjusted (\$/Trip)
1983	90	536	43	75	145	237
1984	101	489	70	121	214	335
1985	62	279	117	199	338	602
1986	55	229	104	197	327	553
1987	46	236	169	305	485	832
1988	28	209	181	330	498	954
1989	31	267	73	155	222	955
1990	33	128	81	195	265	704
1991	19	122	47	132	166	411
1992	36	143	59	149	173	314
1993	20	176	84	212	237	376
1994	32	276	74	205	223	341
1995	34	310	93	311	333	393
1996	71	448	119	395	411	563
1997	68	375	137	454	463	591
1998	50	318	148	503	518	702
1999	53	288	156	563	569	734
2000	72	647	56	160	158	316
2001	74	833	68	210	210	407
2002	53	370	101	292	292	629
2003	58	378	89	252	255	434
2004	43	287	104	273	273	358
Average	51	334	99	259	308	534
Standard Deviation	22	173	39	127	129	211

Table 7. Bycatch During Bottomfishing (2000 --2004)

Species Name	Interview with Bycatch	All Interview	Released Alive	Total Catch	Bycatch Percentage
Non-Charter	1	133			0.75%
Dogtooth Tuna			1	6	16.67%
Blackjack			1	25	4.00%
All Species with Bycatch			2	31	6.45%
Compared with All Caught			2	3897	0.05%
Charter	12	57			21.05%
Redgill Emperor			6	190	3.16%
Triggerfish (misc.)			55	131	41.98%
Emperor (mafute/misc.)			7	122	5.74%
Red Snapper			5	9	55.56%
Blueline Snapper			3	51	5.88%
Lyretail Grouper			5	7	71.43%
Flagtail Grouper			4	79	5.06%
Maitai (blk-tipped Grper)			4	107	3.74%
Jobfish (uku)			1	3	33.33%
All Species with Bycatch			90	699	12.88%
Compared with All Caught			90	991	9.08%

Table 8

Offshore Daytime Creel Survey By Catch Summary
Year 2004

Species	Number Caught					Trip		
	Released	Dead/Injd	Both	All	BC%	With BC	All	BC%
Non Charter						0	34	0
	0	0	0	1057	0	0		
Charter								
Flagtail	4		4	54	7.41			
Triggerfish	16		16	45	35.56			
Total			20	99	20.20			
Compared With All Species			20	301	6.64			

Interpretation: Almost all fishes caught in the CNMI are considered food fishes, including many that show a high incidence of ciguatera locally, including lyretail grouper (*Variola louti*) and red snapper (*Lutjanus bohar*). Table 7 shows the total bycatch for 5 years (2000–2004) of interviews of fishermen during boat-based creel surveys. Table 8 shows the entire reported bycatch during bottomfishing for 2004. The interviews are divided into vessels engaged in non-charter (including commercial, non-commercial, and subsistence fishermen) and charter fishing. In 2003 and 2004, there was only a single charter vessel engaged in bottomfishing. The charter fishing sector largely caters to the tourist population, of which the majority is Japanese. This sector targets shallow-water bottomfishes and reef. Catch rates in this sector must remain high to ensure that the clientele are satisfied with the charter. For this reason, small fishes are often released alive, so that they may be recaptured on subsequent charters. All bycatch, in both sectors, was released alive.