American Samoa Archipelago Fishery Ecosystem Plan 2009 Annual Report

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Western Pacific Regional Fishery Management Council
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WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

American Samoa Archipelago Fishery Ecosystem Plan Annual Report

Information and data analysis for this document provided by scientists at NMFS Pacific Islands Fisheries Science Center, American Samoa Department of Marine and Wildlife Resources, and NMFS Pacific Islands Regional Office

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1.0 Introduction

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), fishery management councils create fishery management plans (FMP) to manage fisheries in their respective regions. The Western Pacific Regional Fishery Management Council (Council) developed the American Samoa Archipelago Fishery Ecosystem Plan[1] (FEP) as an FMP, consistent with the MSA and the national standards for fishery conservation and management, in 2009. The Council's archipelagic FEPs represent the first step in a collaborative approach to implement an ecosystem-based approach to fishery management in American Samoa. In addition, the organizational structure for developing and implementing the American Samoa Archipelago FEP incorporates community input and local knowledge into the management process. This report is the first annual FEP report on Council-managed insular fisheries and activities in American Samoa.

The American Samoa Archipelago FEP established the framework under which the Council manages American Samoa's fishery resources, and seeks to integrate and implement an ecosystem approaches to management. The FEP did not establish any new fisheries or fishery management regulations. The FEP identified as management unit species (MUS) those species known to be present in waters around American Samoa and incorporated all of the management provisions of the Bottomfish and Seamount Groundfish FMP, the Crustaceans FMP, the Precious Corals FMP, and the Coral Reef Ecosystems FMP currently applicable to the area.

1.1 American Samoa 2009

The year, 2009, was an eventful one for American Samoa's fisheries and fishing community. Tragically, the year's major events were damaging to both the community and the Territory's infrastructure and economic base.

Tsunami

The major event impacting American Samoa during 2009 was the disastrous tsunami which occurred on 29 September at 7:04 am Samoa time. The National Oceanic and Atmospheric Administration (NOAA) Pacific Tsunami Warning Center issued a Tsunami Watch and Warning for American Samoa as a result of the magnitude 8.1 earthquake recorded 197 miles southwest of Pago Pago at a depth of 18 km (NOAA 2010). Federal Emergency Management Agency (FEMA) subsequently reported American Samoa, (population 65,000), had been struck by a tsunami, causing flooding, damage, and 32 fatalities (plus 2 missing). President Obama declared a major disaster for individual assistance, public assistance, and hazard mitigation (74 FR 51301; October 6, 2009). Council staff prepared a report on the impacts of the tsunami on fisheries and

[1] Can be located at: http://wpcouncil.org/fep/WPRFMC%20American%20Samoa%20FEP%20(2009-09-22).pdf

fishery participants for the Governor’s office to use in a request for fishery disaster relief pursuant to the Magnuson-Stevens Act and the Interjurisdictional Fisheries Act. The Council received a report that the Governor’s office transmitted a fishery disaster relief funding request to the Department of Commerce in 2010.

The report described impacts to the fisheries primarily due to damaged or lost vessels, gear, and infrastructure. Impacts of the tsunami on fisheries are shown in the following comparison of landings from pre-tsunami (October/November 2008) to post-tsunami (October/November 2009), as these are the latest landings data available.

Tsunami damages also included destroying docks, vessels, gear, and infrastructure

October 2008 v. October 2009

- Total revenue from pre and post-tsunami for the month of October (2008 v. 2009) was not largely affected primarily because landings of albacore were greater in 2009, as the longline fleet’s catches were not impacted by the tsunami.
- There was virtually no bottomfishing or reef fish fishing in October 2009 post-tsunami, evidenced by the landings (Figure 3).
- In October 2008, bottomfish landings and revenues were 98% less than in October 2009.
- Declines from 2008 to 2009, in landings of reef fish and some non-tuna PMUS, were also evident.
- Tuna landings were unaffected

November 2008 v. November 2009

- Total revenue from pre and post-tsunami for the month of November (2008 v. 2009) declined by 42% (from >$1 million to $735k).
- Declines in catches of reef fish, bottomfish, and some non-tuna PMUS were evident (see Figure 1).
- Decline in revenue from the bottomfish fishery was evident before and after the tsunami (Figure 2).
- Bottomfish catch decline was the primary contributor to the decrease in revenue.
- Tuna landings were not affected which was to be expected as the majority of large longline vessels were at sea when the tsunami hit and pelagic habitat would not be impacted by a tsunami.

Figure 1: Bottomfish landings, pre and post tsunami (November 2008 v. 2009)

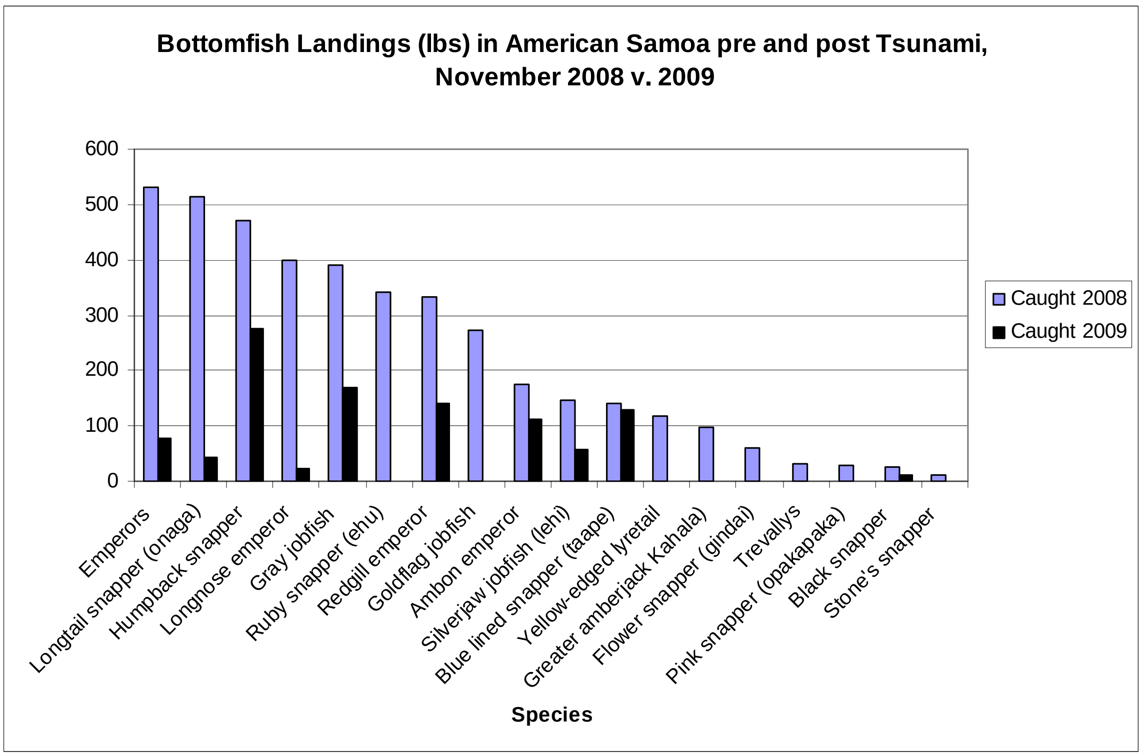


Figure 2: Bottomfish Fishery Revenue Pre and Post Tsunami (Nov 2008 v. 2009)

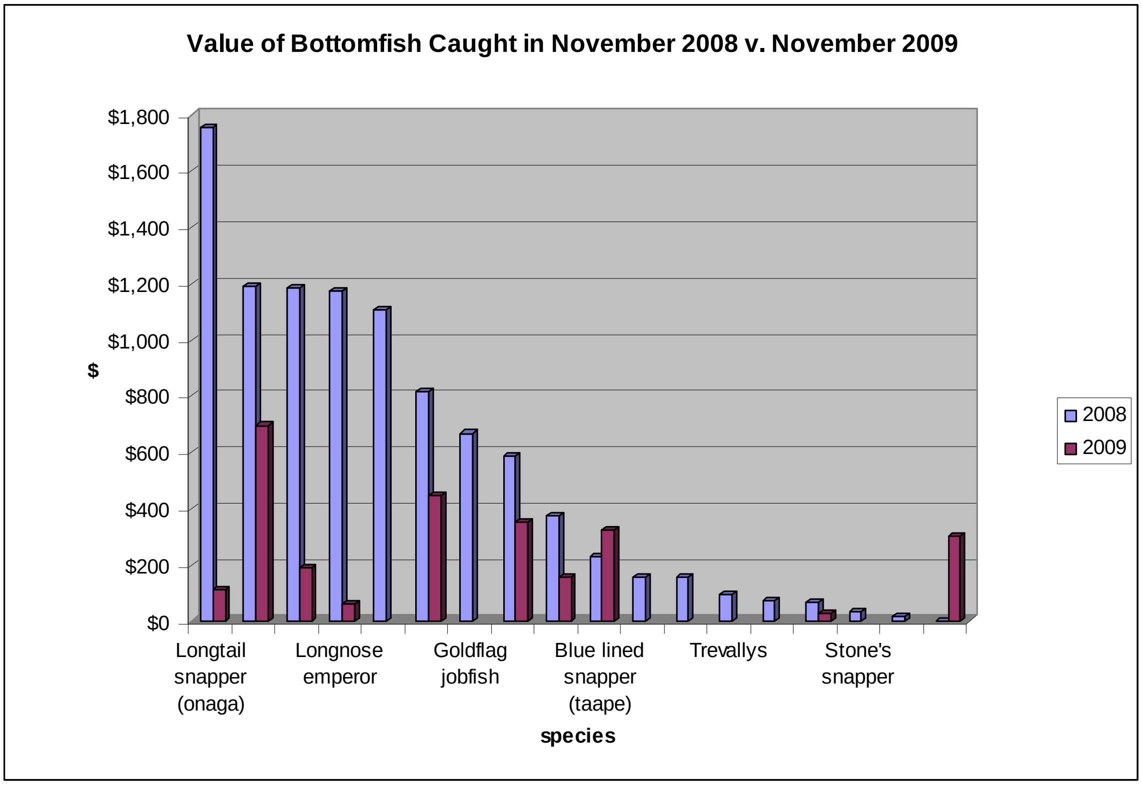
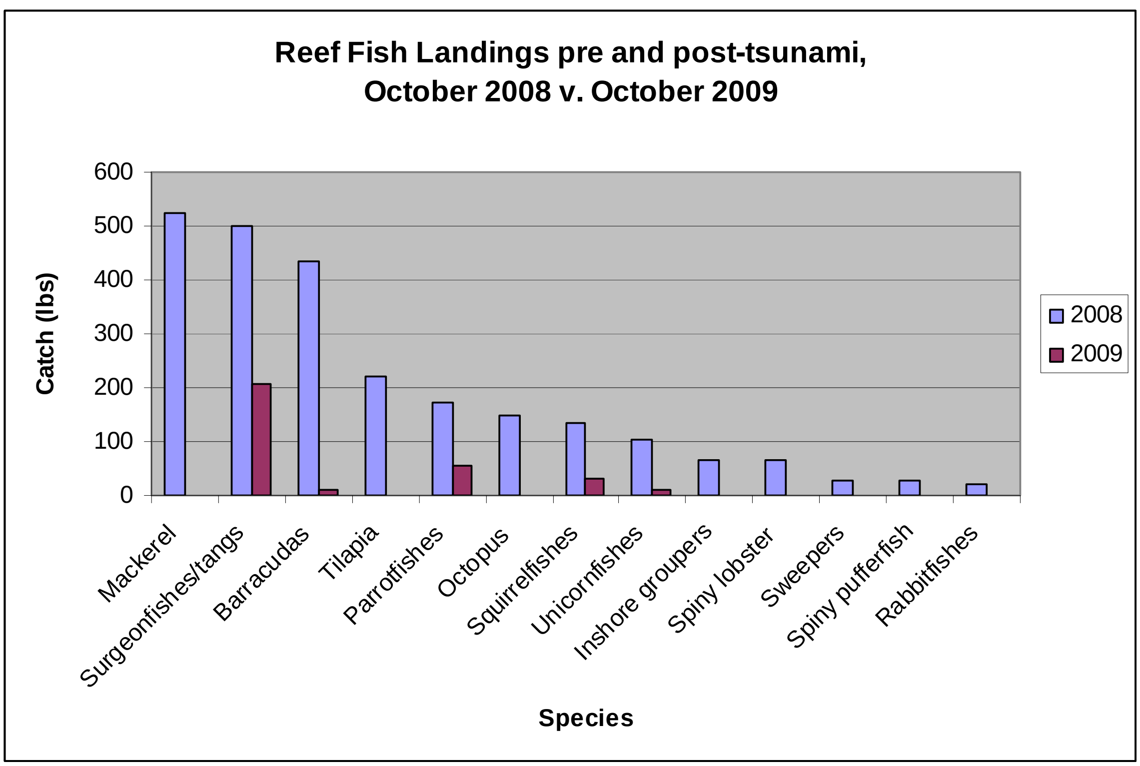


Figure 3: Reef Fish Landings Pre and Post Tsunami (Oct 2008 v. 2009)



Recovery to bottomfish fishery was expected to occur as the fleet is replaced and as fishery participants increased effort. Some coral reef fish habitat was damaged (DMWR 2009, NOAA 2010) and therefore, there may be impacts to the reef fish fishery for some time depending on the severity of the damages. It is likely, however, that within a few years reefs which were not significantly damaged would repopulate areas that were, especially for short-lived species. NOAA conducted an assessment of coral reef impacts that focused on the marine debris damage to Tutuila's coral reefs, which was mitigated through debris removal (NOAA 2010). NOAA worked on site for 19 days coordinating with territorial agencies, to survey roughly one-third of the coastline of Tutuila for marine debris and coral damage, and removed over four tons of tsunami-generated marine debris that threatened coral reefs. This response was beneficial, but much remains that could be done to address tsunami- generated marine debris impacts and to increase the hazard resilience of American Samoa communities.

Impacts from the tsunami on fishery-related industries have not been fully assessed, however, there were some total or partial losses to businesses including fish storing and processing facility, and fishery equipment and warehouse. The Community Development Project Program-funded facility for the *Pago Pago Commercial Fishermen Association* project located in Pago Pago was destroyed and washed to sea, including some recently purchased equipment. In addition, some small-scale fish sellers had their earnings decreased by being unable to procure sufficient amount of fish to sell as a result of the tsunami.

Cannery Closure

The other major disruption to the fishing community was the closure of on of the two tuna canneries in Pago Pago, also in September, the day following the tsunami. The closure of the Chicken-of-the-Sea cannery resulted in the loss of an estimated 2,000 jobs and caused increased economic hardship to American Samoa. For more information see the Pelagics Annual report.

2.0 Archipelagic Fisheries

The major fisheries in the American Samoa Archipelago FEP include bottomfish, coral reef, crustaceans, mixed troll-bottomfish, and an atule fishery. The major fishery in American Samoa, in terms of landings and revenue, is by far the pelagics fishery which includes trolling, some pole-and-line, longlining, and purse seining. Pelagic fisheries are not included in this report as they are managed under the Pacific Pelagics FEP and will be part of that annual report.

Data collected from the boat and shore based fishery data collection and underwater census surveys were analyzed by scientists at American Samoa Department of Marine and Wildlife Resources (DMWR) to determine long term trends in catch landing, catch per unit effort (CPUE), biomass and fishing mortality of the top six species groups per gear used in the fishery (Sabater 2010). For the boat-based fishery, bottomfishing, spearfishing and mixed troll-bottomfishing comprised 96% of the total landing from 1986 to 2008 while merely 4% came from trolling and atule fishing. Top catches from these methods combined were snappers (30% of the total catch), surgeonfish (20%), miscellaneous bottomfish (16%), emperors (15%), parrotfish (10%) and groupers (9%).

2.1 Bottomfish Fishery

2.1.1. Introduction to Bottomfish Fishery

Bottomfishing in American Samoa utilizing traditional canoes by the indigenous residents has been a subsistence practice since Samoans settled the Tutuila, Man'ua and Aunu'u islands. It was not until the early 1970's that the bottomfish fishery developed into a commercial activity utilizing motorized vessels. A government subsidized program, the Dory Project, was initiated in 1972 to develop the offshore fisheries into a commercial venture and resulted in an abrupt increase in the size of the fishing fleet and total landings. In 1982, a fisheries development project aimed at exporting high-priced deep-water snappers to Hawaii caused another notable increase in bottomfish landings and revenues (see Figure 1 and Table 2). Between 1982 and 1988, the botttomfish fishery comprised as much as 50% (by weight) of the total commercial landings. Beginning in 1988, the nature of American Samoa's fisheries changed dramatically with a shift in importance from bottomfish fishing to pelagic trolling. The bottomfish fishery of American Samoa was typically commercial overnight bottomfish handlining using skipjack as bait, on 28-30 feet aluminum/plywood alia vessels. Boat-based fishing in American Samoa had been dominated by trolling and bottomfishing, however, currently longline fishing provides the majority of the [pelagic] landings and revenues.

During the early 1980's, fisheries data were collected from the bottomfish fishery by interviewing only commercial vessels. In the current Offshore Creel Survey on Tutuila that started on October 1, 1985, commercial, subsistence and recreational domestic fishing boats landing catch in five designated areas were interviewed and their catch recorded. Every week a total of four weekdays and one weekend of regular morning and evening shift surveys are conducted, with opportunistic interviews conducted during off-days. In the past three years, the sampling period was increased and modified to encompass boats that come in earlier or after the normal sampling period. Two DMWR samplers based on Ta'u and Ofu collect fisheries data from the Manu'a islands fleet and one in Aunu'u.

The bottomfish fishery targets various species of deepwater snappers, groupers, emperors, and others collectively referred to as bottomfish. Table 1 lists the bottomfish management unit species (MUS) included in the American Samoa Archipelago FEP with names in Samoan and English.

Table 1: American Samoa Bottomfish MUS

Samoan Name	English Common Name	Scientific Name
palu-gutusiliva	red snapper/silvermouth	*Aphareus rutilans*
asoama	gray snapper/jobfish	*Aprion virescens*
sapoanae	giant trevally/jack	*Caranx ignobilis*
tafauli	black trevally/jack	*C. lugubris*
fausi	blacktip grouper	*Epinephelus fasciatus*
papa, velo	lunartail grouper	*Variola louti*
palu malau	red snapper	*Etelis carbunculus*
palu-loa	red snapper	*E. coruscans*
filoa-gutumumu	ambon emperor	*Lethrinus amboinensis*
filoa-paomumu	redgill emperor	*L. rubrioperculatus*
savane	blueline snapper	*Lutjanus kasmira*
palu-i'usama	yellowtail snapper	*Pristipomoides auricilla*
palu-'ena'ena	pink snapper	*P. filamentosus*
palu-sina	yelloweye snapper	*P. flavipinnis*
palu	pink snapper	*P. seiboldii*
palu-ula, palu-sega	snapper	*P. zonatus*
malauli	amberjack	*Seriola dumerili*

2.1.2 Fishery Performance and Economic Data

American Samoa's bottomfish fishery has a history of fluctuations in catch and effort since the 1980's due to various reasons including a mid 1980's switch from bottomfishing to trolling for pelagics and in the 1990's to longlining; natural disasters including hurricanes (Tusi in 1987, Ofa in February 1990, Val in December 1991 and Heta in January 2004) and the tsunami of September 2009; increasing fuel prices; and land-based employment opportunities. The average price of bottomfish declined due to the shift of local bottomfish demand to imported bottomfish, primarily from Independent Samoa, which competes with prices for local-caught fish.

However, 2009 has shown some resurgence in levels of landings, effort and CPUE similar to that of the early 1980's indicating that bottomfishing may be being perceived as another viable option other than the pelagic fishing which has been made attractive by the 2009 closure of one of the (two) canneries and limited local market for pelagic fish.

In 2009, a total of 21 local boats landed an estimated 66,235 pounds of bottomfish in the commercial and recreational fisheries, combined. Revenues from the commercial fishery during 2009 was estimated around $167,135 with all catch sold locally. The CPUE for 2009 (9.3 lb/hr) was similar to that of the 1980's when the export fishery was still in existence. The trend for snappers had an increasing CPUE in the mixed troll and bottomfish fishery. Table 2 shows the commercial fishery's major characteristics over time.

Fishing effort (hours and trips) has been increasing from the lowest year on record (2006) attributed to some of the alias that normally troll and/or longline switching bottomfishing when trolling and longline prices and catches decline. Landings have been increasing since 2006 along with effort (Figure 1). Data analysis shows the temporal trend in landings to be closely correlated with number of hours fishing (r=0.95) and the number of trips (r=0.91) rather than the number of boats participating in the fishery (r=0.66).

Figure 4: Total Bottomfish Landings 1982-2009

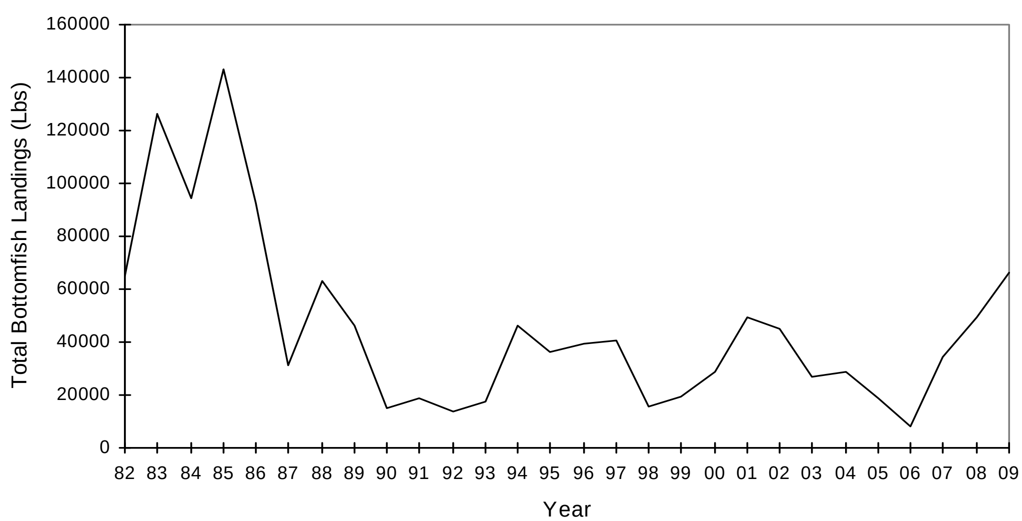


Table 2: Bottomfish Fishery Statistics 1982-2009

Selected Historical Annual Statistics

Year	Total Landings (lb)	CPUE (lb/trip-hr)	Commercial Landings (lb)	Adjusted Revenue	Adjusted Price/Lb.	CPI	Number of Boats
1982	64942	8.5	62016	$271577	$4.37	100.0	27
1983	126327	10.0	125167	$637727	$5.10	100.8	38
1984	94104	10.7	92841	$388249	$4.19	102.7	48
1985	143225	8.1	102670	$326003	$3.18	103.7	47
1986	92283	8.3	91505	$263840	$2.88	107.1	37
1987	31214	11.9	30722	$96843	$3.16	111.8	21
1988	62851	17.3	60104	$200618	$3.34	115.3	32
1989	46476	16.7	35265	$108008	$3.06	120.3	34
1990	14759	9.3	12931	$39474	$3.06	129.6	25
1991	18699	8.6	17749	$52592	$2.97	135.3	23
1992	13777	9.3	13725	$48601	$3.54	140.9	14
1993	17719	7.3	15771	$52133	$3.30	141.1	26
1994	46064	7.8	42215	$131259	$3.11	143.8	25
1995	36254	9.8	35796	$99390	$2.78	147.0	35
1996	39495	15.2	38851	$111061	$2.87	152.5	35
1997	40544	14.7	38994	$128364	$3.30	156.4	37
1998	15782	14.0	14303	$53526	$3.74	158.4	30
1999	19345	12.9	17030	$63558	$3.74	159.9	34
2000	28597	10.4	26464	$79573	$3.01	166.7	34
2001	49201	15.2	38937	$130379	$3.35	169.9	27
2002	45220	8.1	35985	$104922	$2.91	172.1	18
2003	26759	15.3	12713	$34174	$2.69	176.0	19
2004	28861	7.6	16381	$40553	$2.47	188.5	25
2005	18577	6.9	5554	$16274	$2.93	198.3	14
2006	8054	9.3	6204	$17095	$2.76	204.3	21
2007	34601	9.6	32863	$86021	$2.61	215.5	26
2008	49646	8.1	47282	$127469	$2.69	231.5	23
2009	66235	9.3	64515	$167135	$2.59	238.9	21
Averages	45700	10.7	40520	$138443	$3.20		28.4
Std. Dev.	32892	3.1	30396	$132722	$0.58		8.56

The most common bottomfish (non-BMUS) caught in 2009 was the humpback snapper which also accounted for the largest percentage of total revenue (Table 3). The dominant BMUS landed in 2009 were red-gilled emperor (*Lethrinus rubrioperculatus)*, grey jobfish (*Aprion virescens)* and blue-lined snapper (*Lutjanus kasmira*), respectively.

Table 3: BMUS Caught in 2009 and Revenue

Species	Pounds	Price/Lb.	Value
BMUS			
Blue lined snapper	5378	$2.57	$13844
Ruby snapper (ehu)	1397	$2.79	$3898
Flower snapper (gindai)	108	$2.49	$270
Gray jobfish	5597	$2.59	$14492
Pink snapper (opakapaka)	570	$2.50	$1426
Silverjaw jobfish (lehi)	4252	$2.84	$12070
Longtail snapper (onaga)	3755	$2.60	$9776
Yelloweye opakapaka	1482	$2.75	$4080
Goldflag jobfish	472	$2.95	$1394
Blacktip grouper	14	$2.69	$38
Yellow-edged lyretail	1414	$2.66	$3759
Ambon emperor	4174	$2.62	$10952
Redgill emperor	7253	$2.50	$18134
Amberjack	170	$2.65	$451
Black jack	1599	$2.65	$4245
BMUS SUBTOTALS	**37635**	**$2.63**	**$98827**
OTHER			
Black snapper	920	$2.66	$2442
Blue lined gindai	0	$2.20	$0
Brown jobfish	27	$2.69	$72
Humpback snapper	13476	$2.50	$33725
Onespot snapper	103	$2.61	$269
Rufous snapper	26	$2.65	$70
Stone's snapper	638	$2.72	$1738
Yelloweye snapper	5	$2.65	$13
Groupers	680	$2.48	$1688
Peacock grouper	488	$2.61	$1272
Smalltooth grouper	34	$2.75	$94
Spotted grouper	187	$2.65	$497
Tomato grouper	1	$2.65	$2
Yellowspot grouper	135	$2.68	$362
Emperors	5447	$2.47	$13478
Bigeye squirrelfish	31	$2.75	$85
Longnose emperor	3824	$2.66	$10177
Jacks	155	$2.48	$383
Bigeye trevally	635	$2.68	$1700
Bluefin trevally	68	$3.51	$239
OTHER SUBTOTALS	**26880**	**$2.54**	**$68308**
TOTAL BOTTOMFISH	**64515**	**$2.59**	**$167135**

2.1.3 Bycatch and Protected Species

For 2009 there was no reported bycatch in the bottomfish fishery. There was no bycatch reported in 2007 and 2008. Bycatch data from the bottomfish fishery are obtained from DMWR's Offshore Creel Survey interviews by counting fish in the interviews for purely bottomfishing trips with a disposition of bycatch. In addition, the nature of the boat based fishery in American Samoa where all catches are retained for personal use may contribute to the non-bycatch reporting.

No observer data are available regarding interactions with sea turtles in the bottomfish fishery in American Samoa. However, the Sea Turtle Project of DMWR that conducts necropsies of dead turtles did not receive any turtles that died due to bottomfish fishery interactions (Alden Tagarino, personal communication).

2.1.4 Non-commercial Fishery

At this time, there are no non-commercial catch data available for the bottomfish fishery in American Samoa. WPacFIN provided the recreational fishery participants in American Samoa with data forms (paper and electronic) to document their recreational fishing history so in the future recreational catch data would become available.

Some members of the Pago Pago Game Fishing Association that conducts mostly pelagic recreational fishing also conducts bottomfishing in some of the off shore banks but this is very seldom (Andy Wearing, personal communication). These data are not covered by the regular boat-based survey runs.

2.1.5 Ecosystem Components

Distribution of adult bottomfish is correlated with suitable physical habitat. Because of the volcanic nature of the islands within the region including around American Samoa, most bottomfish habitat consists of steep-slope areas on the margins of the islands and banks. In Hawaii, studies have shown the habitat of the major bottomfish species tend to overlap to some degree, as indicated by the depth range where they are caught. Within the overall depth range, however, individual species are more common at specific depth intervals. Depth alone does not assure satisfactory habitat as quantity and quality of habitat at depth are important. Bottomfish are typically distributed in a non-random patchy pattern, reflecting bottom habitat and oceanographic conditions.

2.1.6 Research

Research on habitat availability and conditions in American Samoa are recommended to use in determination of annual catch limits, to identify essential fish habitat, and to determine distribution and depth ranges of BMUS in American Samoa.

Deep water habitat research was conducted by DMWR using drop camera recording the type of habitat and what associated fish are present. This effort is funded by the Sportfish Restoration Program of the U.S. Fish and Wildlife Service. A majority of the deep water habitat surveyed within the insular shelf of Tutuila is sand bottom habitats which were thought to be barren of fish. Contrary to speculations, some sand bottom areas around Tutuila are covered with fleshy macroalgae that are inhabited by small damselfish and wrasses. These small fishes are being preyed upon by deep water jacks. Several of the 20-minute recordings contained such sightings. Other deep water refugia included coral reefs and hard bottom substrates that has mainly coral reef fishes associated with it. This is still an ongoing project and more information is available from DMWR.

2.1.7 Stock Assessments

Overfished and Overfishing Determinations
To date American Samoa's bottomfish stocks have not been determined to be overfished or subject to overfishing.

Maximum Sustainable Yield
A 2005 report by PIFSC (Moffitt et al. 2007) provides the most recent estimate of MSY for deep-water bottomfish around American Samoa is 74,970lbs per year. MSY for shallow-water bottomfish has not been estimated.

Optimum Yield
Optimum yield (OY) for American Samoa's bottomfish fishery is defined as the amount of bottomfish that will be caught by fishermen fishing in accordance with applicable fishery regulations in the FEP, in the EEZ and adjacent waters around American Samoa.

3.1 Coral Reef Fishery

3.1.1. Introduction to Coral Reef Fishery

Traditional coral reef fishing is concentrated on the lagoon and shallow reef areas using different methods including gleaning, bamboo poles with line and bait, but predominantly multi-pronged spears attached to long bamboo poles. The coral reef fishery too has evolved from the utilization of traditional methods to a modern rod and reel using nylon line and metal hooks, some throw and gill nets, and most particularly the introduction of SCUBA spear fishing in 1994. SCUBA spear fishing is highly selective and efficient method and as such has a potential to greatly reducing coral reef fish stocks particularly large bodied fish. Therefore, this method was banned in 2002 following recommendations of biologists from the DMWR and local scientists. Along with the evolution of the gears used in the coral reef fishery, the nature of coral reef fishing also evolved from subsistence to a recreational. Commercial fishing for coral reef stocks was considered low priority especially after the SCUBA spearfishing ban was enacted.

Catches in the coral reef fishery includes an extensive array of species that is included in the MUS list in Appendix A of this document.

The shore-based fishery is comprised of spearfishing, rod and reel, gleaning, gill net, handline, throw net, and bamboo pole. The first four methods contributed 83% of the total catch from 1990 to 2008 while handline, throw nets and bamboo pole contributes 9%, 6%, and 2%, respectively. The top six catches being landed by the shore based fishing method combined were big eye scads (locally known as atule at 29% of the total catch), mollusk (24%), surgeonfish (19%), jacks (13%), invertebrates (9%), and parrotfish (7%).

General linear trends in fish biomass were plotted from underwater census data (Sabater 2010). Results showed an increasing biomass for parrotfish, surgeonfish, and emperors; constant linear trend for snappers and groupers; and a decrease for jacks. Average biomass ranged from 213,000 lbs for groupers to 1,070,000 lbs for parrotfish. Catch to biomass ratio was used as a measure of fishing mortality. Short-term trends covering eight time periods showed a constant fishing mortality for surgeonfish; slightly decreasing for snappers, groupers, and emperors; and an increase for jacks and parrotfish. Fishing mortality ranged from 0.5% for jacks to 4.5% for snappers. Overall fishing mortality was estimated at 2.5% for Tutuila and 1.4% when considering the archipelagic stock. This indicates that the coral reef fish stocks are not being subject to intense fishing pressure given that: (1) fishing effort has been declining over 3 decades; (2) fish biomass and abundance is increasing; and (3) CPUE and fishing mortality remains stable.

A Federal Special Permit is required to fish for and retain coral reef ecosystem MUS designated as Potentially Harvested Coral Reef Taxa (Appendix 1) in EEZ waters around American Samoa. Anyone wishing to fish in the EEZ must contact his or her local marine fisheries office to confirm if a permit is needed, based on the specific target resources sought and the area to be fished. Local marine fisheries offices will handle requests for participation in all existing fisheries in coordination with the NMFS Pacific Islands Regional Office. To date no such permits have been requested or issued and all landings are considered to be from Territory waters.

3.1.2 Fishery Performance and Economic Data

3.1.2.1 Landings

Table 4 gives statistics, including biomass estimates and catch percentages, on the most commonly caught CREMUS families while Figure 5 shows the total catch of reef fish from the expanded creel survey data.

Surgeonfish (Family Acanthuridae) ranked the highest landing for all boat and shore- based fishing methods with most captured by spearfishing. The majority of the Acanthuridae family catch (Figure 5) was comprised of unicornfish, *Naso* spp. (Figure 7) and surgeonfishes, *Acanthurus* and *Ctenochaetus* spp. (Figure 8).

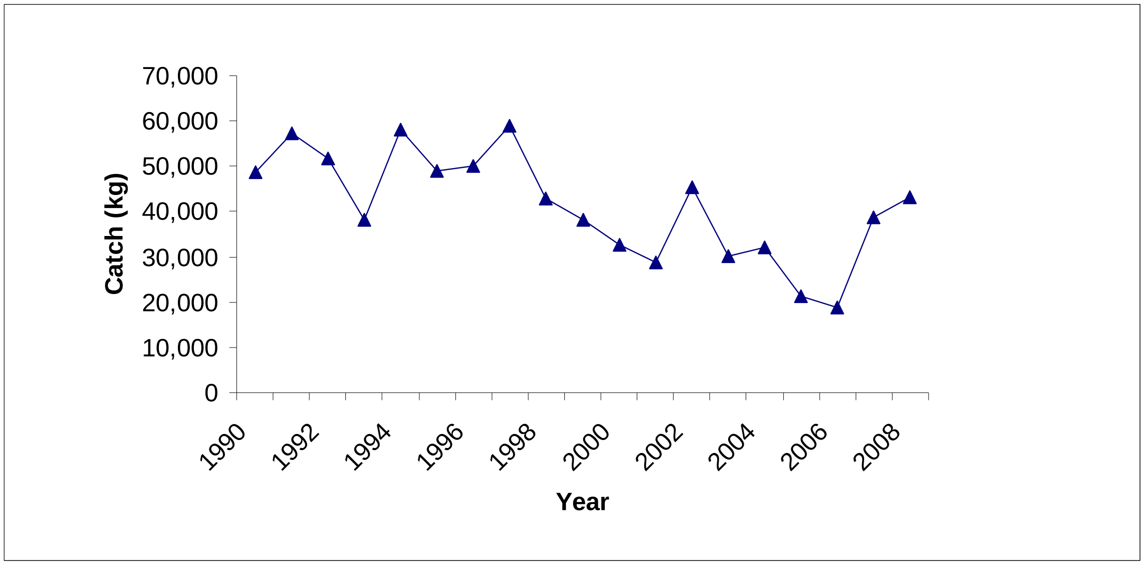
Table 4: CREMUS Fishery and Ecological Statistics for American Samoa, by Family

	Acanthuridae	Carangidae	Carcharhinidae	Holocentridae	Kyphosidae	Labridae
RAMP Biomass Estimate, 2008 and 2010 Surveys (Tutuila Only)	497,952	25,614	7,111	14,870	2,011	53,262
RAMP Biomass Estimate, 2008 and 2010 Surveys (Tutuila, Tau, Ofu, and Olosega)	764,006	40,317	20,394	37,242	8,660	84,015
Mean Annual Catch (Tutuila) from Expanded Creel Surveys, 2004-2008	9,468	6,273	118	1,552	744	2,372
Percentage of Tutuila Biomass Caught	1.90%	24.49%	1.66%	10.44%	37.03%	4.45%
Percentage of Tutuila, Tau, Ofu, and Olosega Biomass Caught	1.24%	15.56%	0.58%	4.17%	8.60%	2.82%
Family Trophic Score, Weighted for the Relative Abundance of Component Species in Catch Record	2.05	4.18	4.14[1]	3.53	2.30[2]	3.60

	Lethrinidae	Lutjanidae	Mullidae	Scaridae	Serranidae	Other	Total
RAMP Biomass Estimate, 2008 and 2010 Surveys (Tutuila Only)	42,513	62,463	20,678	271,926	43,491	577,177	1,619,068
RAMP Biomass Estimate, 2008 and 2010 Surveys (Tutuila, Tau, Ofu, and Olosega)	59,427	131,942	26,543	419,123	96,335	771,923	2,459,927
Mean Annual Catch (Tutuila) from Expanded Creel Surveys, 2004-2008	6,872	13,185	602	3,007	5,289	15,770	65,253
Percentage of Tutuila Biomass Caught	16.16%	21.11%	2.91%	1.11%	12.16%	2.73%	4.03%
Percentage of Tutuila, Tau, Ofu, and Olosega Biomass Caught	11.56%	9.99%	2.27%	0.72%	5.49%	2.04%	2.65%
Family Trophic Score, Weighted for the Relative Abundance of Component Species in Catch Record	3.75	3.64	3.30[2]	2.00[3]	4.17	-	-

[1]No individual species data available so trophic score was calculated by averaging trophic score of species known to exist in American Samoa.
[2]Only 1 species used in calculation.
[3]No species data, but the value presented here is the clear mode of the family.

Figure 5: Total American Samoa Reef Fish Catch from Creel Survey Data, 1990-2009



Source: Luck and Dalzell 2010

Figure 6: Total American Samoa Catch of Surgeonfishes (Acanthurids), 1986-2009

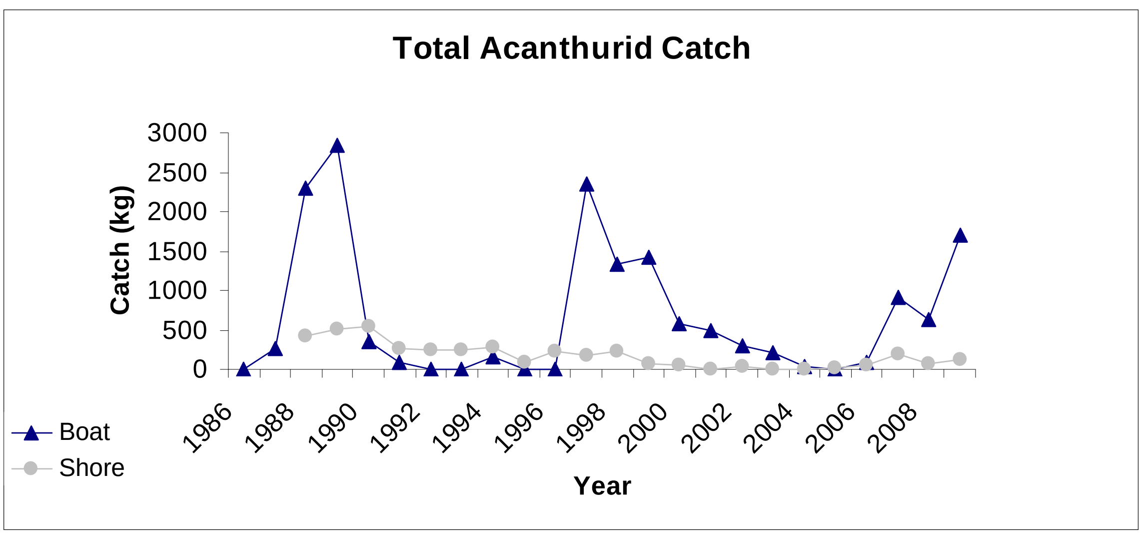


Figure 7: Total American Samoa Catch of Unicornfish (*Naso spp*.), 1986-2009

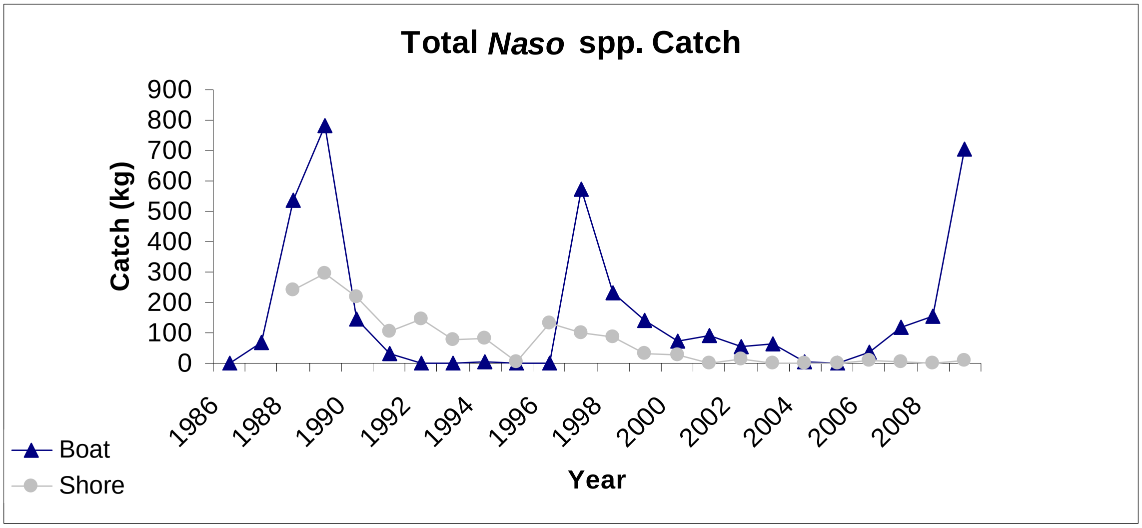


Figure 8: Total Catch of *Acanthurus* and *Ctenochaetus*, combined, 1986-2009

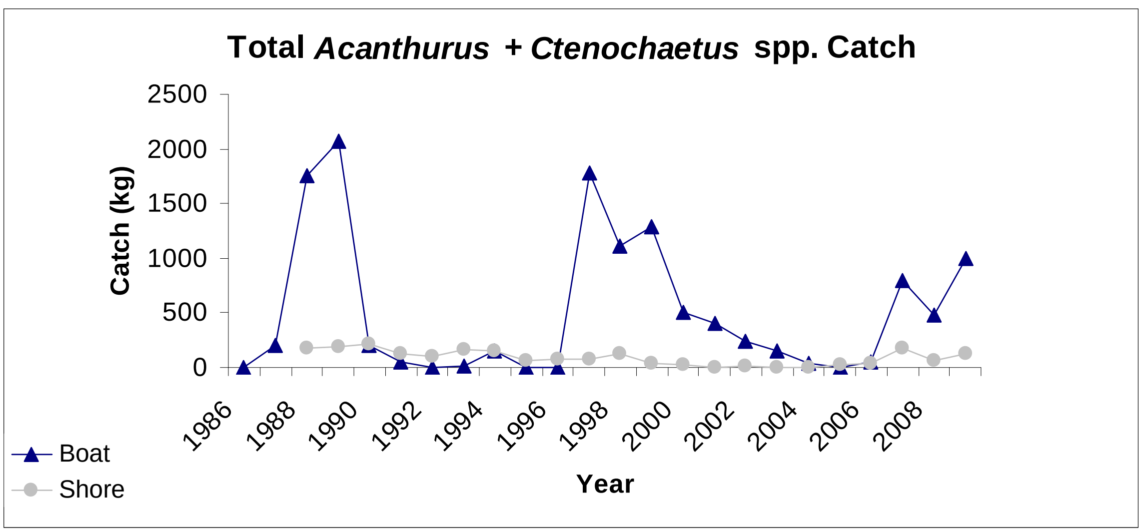


Figure 9: Total American Samoa Catch of Emperors (Lethrinidae), 1986-2009

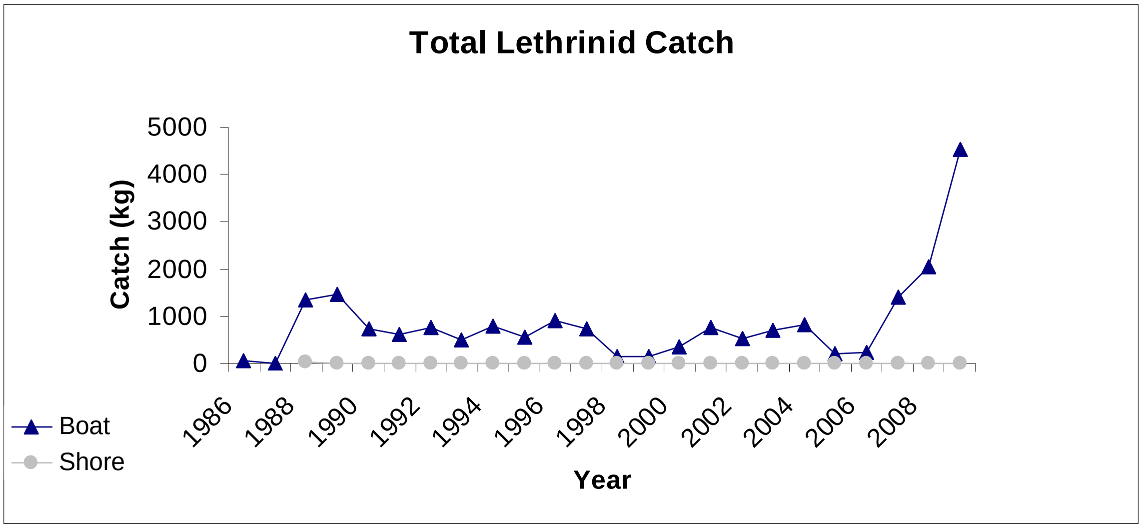


Figure 10: Total American Samoa Snapper (Lutjanidae) Catch, 1986-2009

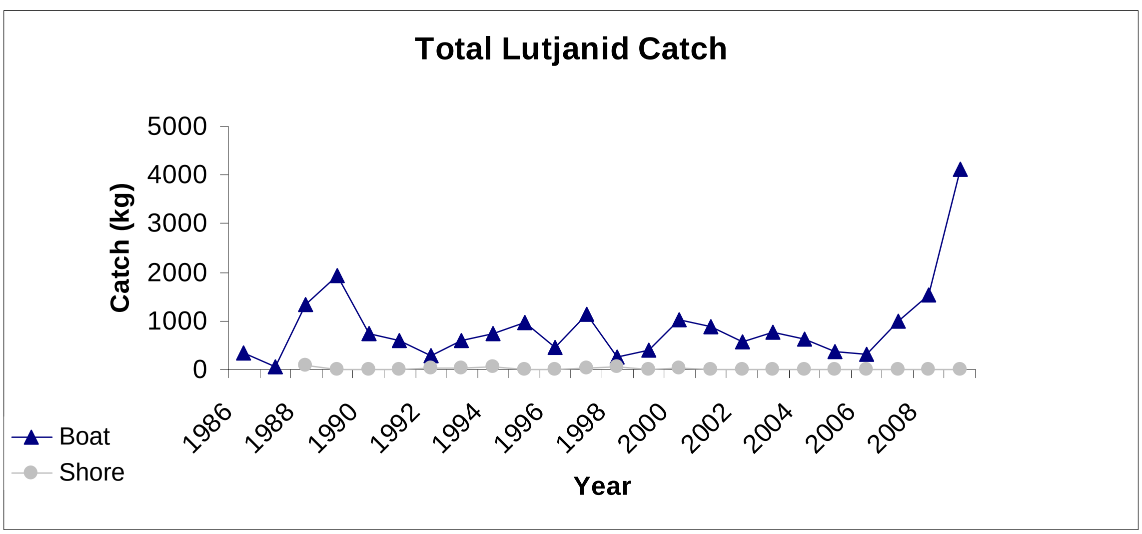


Figure 11: Total American Samoa Parrotfish (Scaridae) Catch, 1986-2009

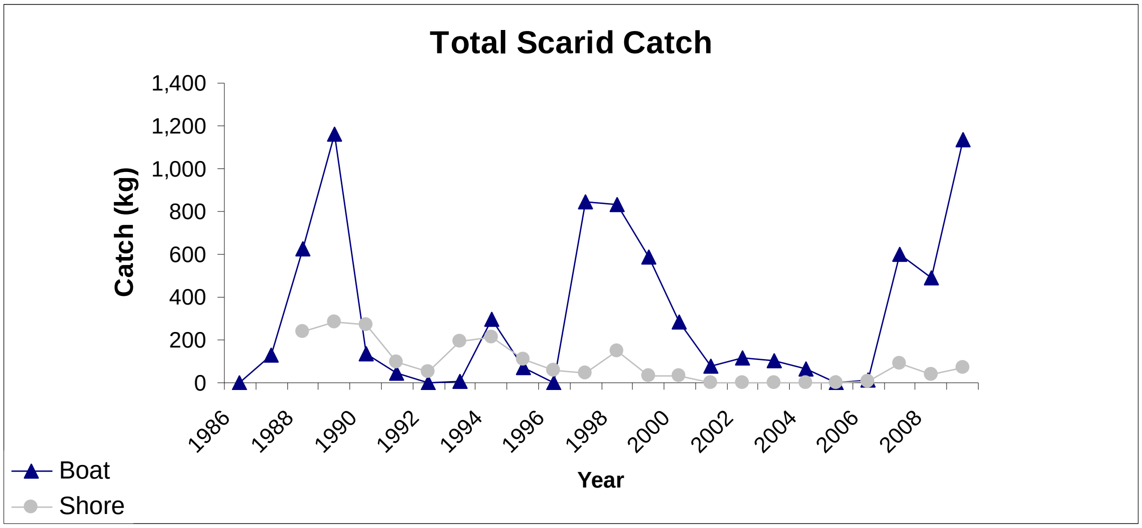


Figure 12: Total American Samoa Grouper (Serranidae) Catch, 1986-2009

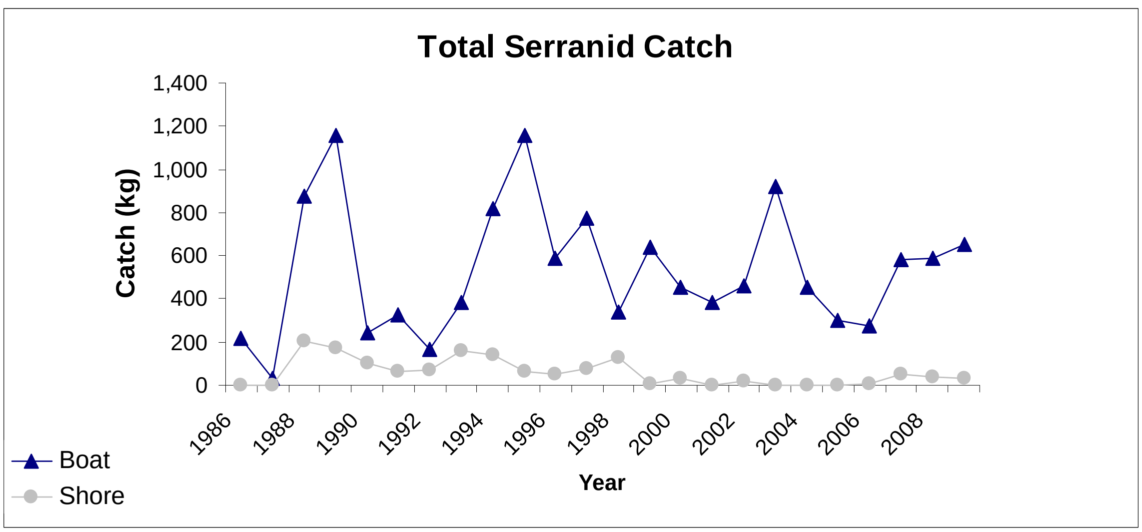
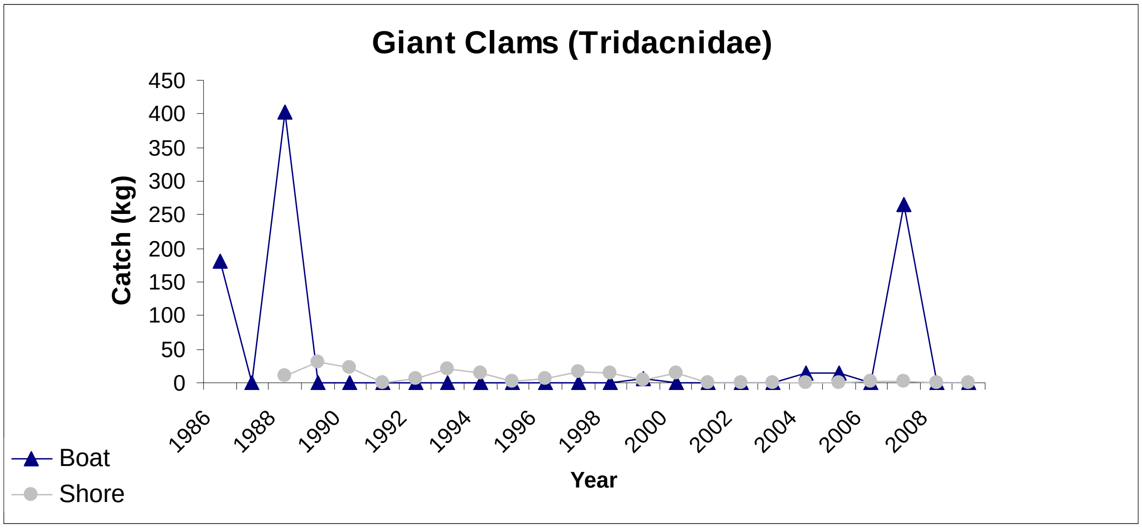


Figure 13: Total American Samoa Giant Clam (Tridacnidae) Catch, 1986-2009



3.1.2.2 Catch per unit effort (CPUE) Trends

The CPUE for the top 3 species groups (surgeonfish, parrotfish, and miscellaneous reef fish) was relatively constant over 23 years. There was an increase in the CPUE from 1995 to 2001 during the SCUBA spearfishing period. The CPUE for surgeonfish increased greatly during the introduction of SCUBA on the spear fishery and rapidly declined after reaching a peak in 1997. It remained steady from 1998 to 2002 at roughly 11.5 lbs per hour after which it continued to decline to a current low at 3 lbs per hour.

Parrotfish CPUE had a slight rise during the SCUBA spearfishing period but not as drastic as surgeonfish and it did not show that intermediate steady phase after reaching the peak CPUE in 1997. It continued to decrease and was constant at around 3.5 lbs per hour. Miscellaneous reef fishes CPUEs do not show fluctuations found in surgeon and parrotfish. The low CPUEs before and after the highs during the SCUBA spearfishing period cancel any long-term effect of spearfishing in the overall trend in reef fish CPUE.

The CPUE for the shore-based fishery was determined to be constant to slightly decreasing over a 19-year period as affected by the gleaning of invertebrates, and fishing for atule, mullets and squirrelfish (Sabater 2010). The decline can be attributed to changes in the nature of the fishery, the biology of coral reef MUS and the interaction of fishing with other factors such as habitat limitation and degradation. In some cases, CPUE was shown to be increasing like in the gleaning of mollusk, spearfishing for surgeonfish and parrotfish, and using rod and reel for grouper.

3.1.3 Bycatch and Protected Species

There have been no reported or observed interactions between protected species and coral reef fisheries in Federal waters around American Samoa and the potential for interactions is believed to be low due to the gear types and fishing methods used. Most of the catches that are not sold are retained for personal consumption. There were some reported fatalities in sea turtles due to deep hooking from rod and reel along the shoreline based on necropsy report (Alden Tagarino, Personal Communications). None were reported from the boat-based fishery.

3.1.4 Non-commercial Fishery

At this time, there are no non-commercial catch data available for the coral reef fishery in American Samoa. WPacFIN provided the recreational fishery participants in American Samoa with data forms (paper and electronic) to document their recreational fishing history so in the future recreational catch data would become available. The majority of fishery participants along the shoreline are part of the subsistence fishery. Thus, the shore-based coral reef catches can be considered as non-commercial.

3.1.5 Ecosystem Components

For coral reef ecosystems worldwide, the future will entail monitoring and possibly remediating the potential effects of global warming. Some scientists have predicted serious consequences may afflict reefs and reef species from increased water temperature and ocean acidification that could impact the underlying calcareous structure of coral reefs along with many reef-associated organisms. In American Samoa, these same potential threats may exist and therefore continued and perhaps increased and focused monitoring will be an important future endeavor necessary to continue to move forward with ecosystem-based management.

3.1.6 Research and Monitoring

3.1.6.1 Current and Ongoing Research/Monitoring

The Pacific Islands Fisheries Science Center's Coral Reef Ecosystem Division's (CRED) Reef Assessment and Monitoring Program (RAMP) conducts biological surveys and associated habitat and bathymetric mapping operations on a biennial basis at 55 U.S. Pacific Islands, covering the majority of U.S. coral reef areas in the Pacific including American Samoa (PIFSC 2010). CRED scientists use consistent survey methods at all locations visited, and include both small-scale (belt or stationary point count) and large-scale (towed-diver) fish and benthic surveys. Since mid-2007, the survey design for small-scale surveys has been based on a stratified random sampling design within 0-30 m hard-bottom habitats which was the methodology used in Table 2 biomass estimates. This information will be used as part of biomass estimates for the Council and the SSC to use in setting annual catch limits (ACLs).

CRED scientists conduct Rapid Ecological Assessment (REA) fish surveys at each site, including SPC operations, over hardbottom. Extrapolated population estimates are based on the area of hardbottom in each stratum. The estimated biomass density is then multiplied by habitat area in each stratum to come up with estimated population size /biomass (PIFSC 2010). Table 1 shows surgeonfish biomass estimates, by depth strata, at Rose Atoll.

Figure 14: Location of fish survey sites at Rose Atoll in 2008 (n=27).

Colors correspond to survey strata: dark blue=lagoon 6-18 m; light blue=backreef 0-6 m; green= 0-6 m forereef; yellow=6-18 m forereef; red=18-30 m forereef. Habitat and bathymetric data used to create Figure 1 were generated by the Pacific Islands Benthic Habitat Mapping Center. Since this figure was generated, habitat and depth layers have been improved by integration of data from new additional sources. Areas in white are "softbottom", "unknown", "reef crest", or "channel". Source: PIFSC 2010

Table 5: Surgeonfish biomass at Rose Atoll habitat and depth strata.

Habitat (# survey sites)	Depth	Area (m^2)	Mean Biomass density (gm^{-2})	Estimated Biomass (kg)
Lagoon (2)	0-6 m	53,841	5.35	288
(4)	6-18 m	100,615	1.79	180
	18-30 m	-	-	-
Backreef (9)	0-6 m	3,660,856	2.42	8,853
	6-18 m	240,712	2.42[1]	582
	18-30 m	10,678	2.42[1]	26
Forereef (13)	0-6 m	60,808	13.00	791
(19)	6-18 m	827,200	11.79	9,755
(14)	18-30 m	214,169	10.05	2,153
Crest	0-6 m	419,000	2.42[1]	1,013

Channel	0-6 m	9,294	13.00^{2}	121
	6-18 m	31,286	11.79^{2}	369
	18-30 m	7,248	10.05^{2}	73
			ROSE TOTAL (kg)	**24,203**

Biomass density derived from CRED RAMP visual survey data. Area per habitat/depth strata derived from CRED GIS information. Note. Biomass densities derived from surveys in 2008-2010. Source: PIFSC 2010

Table 6: Reef fish population estimates for American Samoa.

Island (n)	Area 0-30 m hardbottom (Ha)	ESTIMATED POPULATION BIOMASS (kg) Emperor	Goatfish	Grouper	Jack	Parrot[1]	Reef Shark
Tutuila (171)	4,888	42,513	20,678	43,491	25,614	271,926	7,111
Tau (36)	1,003	8,575	3,191	27,534	5,399	60,795	2,929
Ofu & Olosega (43)	1,055	8,339	2,674	25,310	9,304	86,402	10,354
Rose (61)	558	4,087	2,411	10,307	8,597	13,142	14,682
Swains (41)	281	1,055	293	7,580	10,033	5,450	4,154
TOTAL (352)	**7,785**	**64,569**	**29,246**	**114,222**	**58,947**	**437,716**	**39,231**

Fish species are pooled by CREMUS groupings. Estimated population biomass is for 0-30 m hardbottom habitat only. (n) is number of sites surveyed per island. Each site is surveyed by means of 2-4 7.5 m diameter SPCs – therefore the number of survey replicates is approximately 4 times the number of sites. ‘Parrot’ mean parrotfishes excluding the Bumphead Parrot, and ‘Wrasse’ means wrasses excluding the Humphead Wrasse. Catch data for those two species are pooled into their own CREMUS groupings. Estimated biomass of those is included in ‘others’.
Source: PIFSC 2010

Island	Rudderfish	Snapper	Squirrel/ Soldierfish	Wrasse[1]	Surgeonfish	Others	Total Fish Bio
Tutuila	2,011	62,463	14,870	53,262	497,952	577,177	1,619,068
Tau	4,705	29,547	11,921	17,378	111,952	90,894	374,821
Ofu & Olosega	1,945	39,932	10,451	13,375	154,103	103,852	466,038
Rose	29	12,534	6,262	10,167	24,203	21,669	128,091
Swains	26	9,008	2,218	3,843	18,870	65,524	128,056
TOTAL	**8,716**	**153,484**	**45,721**	**98,025**	**807,079**	**859,116**	**2,716,074**

In addition, research and monitoring work is being conducted by the local resource agencies (i.e. DMWR, ASEPA). DMWR conducts regular monitoring of the coral reefs using belt transects for fish and video transect for habitat characterization at various areas around Tutuila, Ofu, Olosega, and Swains and well as in village marine protected areas through the Key Reef Species and Community Based Fishery Management Programs funded by a Sportfish Restoration Grant. These programs aim to determine long term trends in fish population status and habitat quality brought about by fishery management, and natural recovery or impacts of perturbation from natural and man made sources. One particular Council-funded research project focused on determining the population status of the Pacific humphead wrasse (*Cheilinus undulatus*), a species of concern. Results indicate that juvenile population of humphead wrasses are limited by the availability of the near-shore shallow water habitat. Management strategies should then be tailored to fit the wrasse's population dynamics and biology in order to successfully manage this species. DMWR also conducts deep water habitat research, oceanographic surveys in collaboration with ASEPA which is funded by the Council. The snapshots of the current profile around Tutuila indicated that there is very little residual flow affected by the tides and the general direction is from north towards the south. There is also the presence of eddies around the points that flow through the various embayments which has some repercussions on larval connectivity where larvae spawned on the south shore has little chance of reaching the north shore of Tutuila and in contrast, larvae spawned at the north shore will most likely end up at the south shore of the island. This will ultimately affect MPA design and marine spatial planning where spawning and settlement areas are being highly considered in the decision making.

3.1.6.3 Research Needs

American Samoa's reefs, as all coral reefs, may become affected in the future from effects of global change and increasing ocean acidification. It would, therefore, be prudent to conduct research on potential impacts and damage preventative measures to be better prepared to manage its resources in the future. A more immediate research need is life history information, fishery independent studies, and other research needed to be able to set annual catch limits on coral reef species or species groups in 2011.

3.1.7 Stock Assessments

There are no existing stock assessments on CREMUS stocks. There are biomass estimates for reef fish populations provided by CRED, described in this report, which may be used, among other data, in determining CREMUS annual catch limits.

Overfished and Overfishing Determinations
To date coral reef fisheries around American Samoa have not been determined to be overfished or subject to overfishing.

MSY
No estimates of MSY are currently available for coral reef ecosystem associated species in American Samoa.

OY
Optimum yield for coral reef ecosystem associated species is defined as 75% of their MSY.

4.1 Crustaceans Fishery

4.1.1. Introduction to Crustaceans Fishery

A Federal permit is required to harvest Crustacean MUS in Federal waters around American Samoa and permit holders are required to participate in local reporting systems. No catch or effort information is available to date. All harvests of Crustacean MUS are believed to have occurred in Territorial waters.

Spiny lobster (*Panulirus penicillatus*) is the main species of crustaceans speared by night near the outer slope by free divers while diving for finfish. The majority of the catch comes from boat-based fishers and the amount of lobsters harvested by boats has been steadily increasing since 2006, as shown in the figure below. Other crustacean MUS are shown in the table below.

Table 7: Crustacean MUS

Scientific Name	Common Name	Samoan Name
Panulirus marginatus	spiny lobster	ula
Panulirus penicillatus	spiny lobster	ula-sami
Family Scyllaridae	slipper lobster	papata
Ranina ranina	kona crab	pa‘a
Heterocarpus spp.	deepwater shrimp	NA

Samoan names provided by Fini Aitaoto
pa‘a = general name for crabs

4.1.2 Fishery Performance and Economic Data

Lobsters are taken by hand and harvest currently occurs almost exclusively within territorial waters. The mean catch over the last five years is approximately 240 kg (529 lb) by boat-based fishers and 16.4 kg (36.2 lb) by shore-based harvesters (Figure 15).

Figure 15: Annual Spiny Lobster Catch, by Boat and Shore, 1986-2009

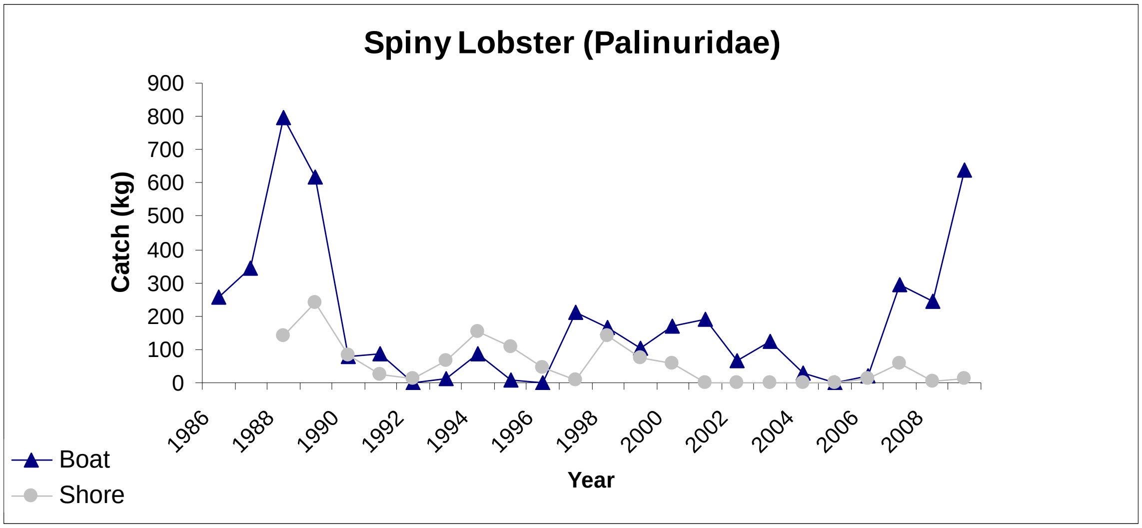


Table 8: Statistics on the American Samoa Lobster Catch Data

Last Five Years	Boat	Shore
Mean Catch (kg)	239.7	16.4
Standard Deviation	258.7	23.5
Confidence Value	226.8	20.6
Upper Bound CI	466.5	36.9
Lower Bound CI	12.9	-4.2
Total Record	Boat	Shore
Mean Catch (kg)	189.4	56.2
Standard Deviation	217.0	65.3
Confidence Value	86.8	27.3
Upper Bound CI	276.2	83.5
Lower Bound CI	102.6	28.9

4.1.3 Bycatch and Protected Species

At this time and under these circumstances, there is no reported bycatch associated with this fishery.

Lobsters around American Samoa are hand harvested, with virtually all harvests to date occurring in Territorial waters. There have been no observed or reported interactions with protected species and the potential for interactions in Federal waters around American Samoa is believed to be very low due to the hand harvest methods used.

4.1.4 Non-commercial Fishery

At this time, there are no non-commercial catch data available for the crustaceans fishery in American Samoa. WPacFIN provided the recreational fishery participants in American Samoa with data forms (paper and electronic) to document their recreational fishing history so in the future recreational catch data would become available.

4.1.5 Ecosystem Components

In the southwestern Pacific, spiny lobsters are typically found in association with coral reefs (Pitcher 1993). Oceanographic features, such as eddies and currents, serve to retain lobster larvae within island areas, however, no studies have been conducted on larval transport and distribution in American Samoa. The relatively long pelagic larval phase for palinurid lobsters results in very wide dispersal of spiny lobster larvae. MacDonald (1986) showed palinurid larvae transported up to 2,000 miles by prevailing ocean currents. American Samoa has a relatively small EEZ due to its proximity to other Pacific Islands including the Cook Islands, Samoa, and others and because of this it may be prudent to consider co-participation in research and management of lobster resources with these other island nations.

4.1.6 Research

Research to identify recruitment limitations and characteristics in addition to age and growth and other life history parameters would be useful in development of future annual catch limits.

4.1.7 Stock Assessments

Overfished and Overfishing Determinations
To date American Samoa's crustacean fisheries have not been determined to be overfished or subject to overfishing.

MSY and OY
No values for MSY and OY are available for crustaceans in American Samoa.

5.1 Precious Corals Fishery

5.1.1. Introduction to Precious Corals Fishery

There is not currently an active precious corals fishery in American Samoa. At this time, no quantifiable information is readily available on precious corals in American Samoa. The following table lists the Precious Coral MUS.

Table 9: American Samoa Precious Corals MUS

Samoan Name	English Common Name	Scientific Name
amu piniki-mumu	pink coral (also known as red coral)	*Corallium secundum* [amu = general name for corals]
amu piniki-mumu	pink coral (also known as red coral)	*Corallium regale*
amu piniki-mumu	pink coral (also known as red coral)	*Corallium laauense*
amu auro	gold coral	*Gerardia* spp.
amu auro	gold coral	*Narella* spp.
amu auro	gold coral	*Calyptrophora* spp.
amu ofe	bamboo coral	*Lepidisis olapa*
amu ofe	bamboo coral	*Acanella* spp.
amu uliuli	black coral	*Antipathes dichotoma*
amu uliuli	black coral	*Antipathes grandis*
amu uliuli	black coral	*Antipathes ulex*

Samoan names provide by Fini Aitaoto

5.1.2 Fishery Performance and Economic Data

There are no landings or economic data as there was no harvest of precious corals in American Samoa in 2009.

5.1.3 Bycatch and Protected Species

Precious corals are not currently harvested in American Samoa waters. Therefore there is no reported bycatch associated with this fishery. Should a fishery develop, the provisions of this FEP would allow harvest only by selective gear (i.e., with submersibles or by hand). The existing federal precious coral fisheries in Hawaii have no bycatch and none would be expected in American Samoa.

5.1.4 Ecosystem Components

Because of the great depths at which they live, precious corals may be insulated from some short-term changes in the physical environment; however, not much is known regarding the long-term effects of changes in environmental conditions, such as water temperature or current velocity, on the reproduction, growth, or other life history characteristics of the precious corals (Grigg 1993).

5.1.5 Research

At this time, no research has been conducted on precious corals in American Samoa. Several studies on deep-water precious corals in Hawaii are ongoing including a study on growth validation of gold coral in the Hawaiian Archipelago (see the Hawaii Archipelago FEP Annual Report for details). This study showed gold corals to grow at much slower rates (0.23 cm per year) than previously believed which must be taken into account in any management decisions (Parrish and Roark 2009).

5.1.6 Stock Assessments

There are no stock assessments for precious corals in American Samoa.

MSY
No MSY estimates are available for the American Samoa Exploratory Area which consists of EEZ waters around American Samoa.

OY
OY for this area is estimated at 1,000 kg per year of all species combined, except black coral.

6.0 Fishing Community

6.1 Community Demonstration Projects Program & Marine Education and Training

The Community Demonstration Projects Program (CDPP) Advisory Panel (AP) met on May 4 – 5, 2010, to review applications for funding under the Western Pacific Community Demonstration Project Program and the Western Pacific Marine Education and Training (MET) Mini Grant Program. Solicitations for applications were published on January 22, 2010 in the Federal Register. The Community Demonstration Project Program solicitation application deadlines were:

- Letter of Intent/pre-proposal, February 18, 2010,
- Review of pre-proposal and invitation to apply March 5, 2010
- Full application April 4, 2010.

Available Funding: $500,000 no minimum or maximum funding limit

Purpose: to foster and promote use of traditional indigenous fishing practices and/or develop or enhance community-based fishing opportunities.

Western Pacific Marine Education and Training mini grants deadline was:

- March 5, 2010, 5:00 PM Hawaii Standard time.
- Available Funding: $150,000, $15,000 funding limit
- Purpose: To improve communication, education and training on marine resource issues through the Western Pacific Region and increase education for marine-related professions among coastal community residents.

The Community Demonstration Project Program Advisory Panel consists of eight individuals two from each of the territorial areas in the Council's area of authority and responsibility:

American Samoa: Kitara Vaiau and Vaasa Simanu
Commonwealth of Northern Mariana Islands: Lino Olopai and Herman Tudela
Guam: Peter Perez and Dave Alvarez
Hawaii: Gary Beals and William Mossman

The process to review and rank the MET proposals and CDPP was to review each proposal through open discussion, individual ranking of the proposal using objective criteria to assign a numerical value, averaging the numerical points for an average score and listing the proposals in rank order at the end of the review. At that point the AP could reopen discussion and adjust the ranking to suit the consensus. Due diligence was applied in the initial review by Federal Program Officer(s) prior to the applications being distributed to the AP.

The MET Mini Grant proposals were ranked by the AP. The American Samoa Community College Distance Learning Project ranked #3 and received $14,847 in funding.

There were seven proposals under the Demonstration Project Program, however, none were for projects located in American Samoa. Funding is limited to $500,000 and a total of $450,160.75 in funding was allocated for this funding cycle.

6.2 Outreach and Education

Outreach and education activities in American Samoa during 2009 includes a traditional lunar calendar workshop convened Nov. 25, 2009, on the island of Tutuila by the Council, the American Samoa's Department of Marine and Wildlife Resources (DMWR), the Office of Samoan Affairs (OSA) and the American Samoa Community College (ASCC) Samoan Studies Institute (SSI). The workshop also involved participants from other American Samoa organizations, fishermen, elders and members of the general public as well as Fisheries Officer Tupai Ualolo from the Fisheries Division in Apia, Samoa. The Apia Fisheries Division had been instrumental in providing Samoa lunar month and moon phase names for the Council's original American Samoa lunar calendar in 2007. The workshop was convened to address informational gaps as well as the variations in the lunar month and phase names throughout the Samoa and American Samoa archipelago. All of the participants agreed that the calendar is a useful tool to assist in fishery management and help communities sustain the resources. However, more research and information collection is needed to enhance the process. A tentative plan was devised to incrementally conduct research on the island of Upolu with the National University of Samoa, on Manu'a and on Savai'i.

Information from the November workshop was incorporated into the 2010 calendar, along with the winning student art from contests organized throughout American Samoa by the Council. Five hundred copies of the calendar were printed and distributed to the villages throughout American Samoa primarily by SSI. The churches of the following villages requested followup workshops: Fagatogo, Pago Pago, Pago Pago AOG, Atuu EFKAS, Fagaalu EFKAS, Matuu ma Faganeanea EFKAS, Tafuna Ierusalema Fou, Tafuna Maamaa, Faleniu, Aasu, Malaeloa, Nua and Seetaga, Fagamalo, Fagalii, Amaluia. The lunar calendar will be used as a resource for language usage if the workshop the church request for is language, if the church asks for a workshop in Samoa research and publication, SSI will provide them with the calendar as evidence of Samoan resources and so forth. The number of copies per church group of the above mentioned village is estimated at 25 - 80. Copies of the calendar were also given to ASCC staff and faculty at the Land Grant, Science Department, Marine Science Program and Adult Education, as well as the Department of Marine and Wildlife Resources and other attendees of the November workshop. Copies of the lunar calendar can be downloaded from the Council's website at www.wpcouncil.org/education <http://www.wpcouncil.org/education> and www.wpcouncil.org/community.

7.0 Administrative and Enforcement Actions

7.1 Administrative Actions

The final rule establishing eligibility requirements and procedures for reviewing and approving community development plans for western Pacific fisheries was published in September 2010 (75 FR 54044). The intent of the final rule is to promote the participation of island communities in fisheries that they have traditionally depended upon, but in which they may not have the capabilities to support continued and substantial participation.

7.2 Enforcement Actions

During 2009, NOAA Office of Law enforcement (OLE) conducted Joint Enforcement Agreement (JEA) training in American Samoa. Descriptions of U.S. Coast Guard and NOAA OLE law enforcement investigations and activities can be found in the Council meeting minutes on the Council’s website at: http://wpcouncil.org/library.html#Council%20Meeting%20Minutes:

7.3 Plan Team Recommendations

At their March 2009 meeting, the American Samoa Archipelago FEP Plan Team recommended that because technicians require intensive fish identification training, the Council should coordinate a training workshop for all Western Pacific members to standardize data collection methods intended to improve the data collection program.

Status: NMFS PIFSC Fisheries Monitoring and Socioeconomics Division chaired a session at a Fisheries Workshop in American Samoa to collect and evaluate information on historic fish catch and species composition, current fish catch rates and species abundance, and current management systems and challenges.

8.0 Conclusion

Clearly the major event that affected fisheries and the community in American Samoa during 2009 was the tsunami that occurred at the end of September. This event caused extensive infrastructure damage to the fishing industry and to many community members in addition to the tragic loss of life. Bottomfish landings, post-tsunami, plummeted because of the inability of participants to go out and fish due to fishing vessel and gear losses and damages from the tsunami. There was also some damages to habitat especially nearshore reefs primarily due to the debris which washed out during the tsunami wave's receding. Everything from clothing to rooftops washed out and ended up on reefs or in the harbor causing some damage to reefs and other nearshore habitat. Most of the debris has since been removed which will help facilitate restoration of affected habitat. The demersal fisheries appear to be rebounding and it is expected that vessel and gear replacement will continue to occur and be facilitated by federal disaster relief funding.

During the next years, 2010 and 2011, the main challenges will include complying the 2011 deadline to have all fisheries managed under annual catch limits (ACLs) especially for the data limited and species numerous fisheries such as the coral reef fishery. An ACL will also have to be determined and implemented for the bottomfish fishery over the same time period.

American Samoa faces economic based challenges and food production challenged exacerbated by the growing human population. Fishery development in American Samoa may be an optimal means by which to partially solve some of these important issues and assist this island archipelago to have a more self sufficient and sustainable future.

9.0 References

Grigg, R. 1993. Precious coral fisheries of Hawaii and the U.S. Pacific Islands. Marine Fisheries Review 55(2): 50–60.

Luck, D. and P. Dalzell. 2010. Western Pacific Region Reef Fish Trends, *A Compendium of Ecological and Fishery Statistics for Reef Fishes in American Samoa, Hawai'i and the Mariana Archipelago, in Support of Annual Catch Limit (ACL) Implementation.* October 4, 2010. Prepared for the Western Pacific Regional Fishery Management Council, 1164 Bishop St., Ste. 1400, Honolulu, Hawai'i.

NOAA. 2010. NOAA American Samoa Tsunami- generated Marine Debris and Coral Damage Response Report. National Oceanic and Atmospheric Administration. June 2010. 12 pp.

Parrish, F. A., and E. B. Roark (2009). Growth validation of gold coral *Gerardia sp*. in the Hawaiian Archipelago. Mar. Ecol. Prog. Ser., 397: 163-172. http://dx.doi.org/10.3354/meps08299.

PIFSC. 2010. US Pacific Reef Fish Biomass Estimates Based on Visual Survey Data. By Ivor Williams, NOAA's Pacific Islands Fisheries Science Center. PIFSC Internal Report IR-10-024. Issued 10 August 2010. 19 pp.

Pitcher, C.R. 1993. Chapter 17: Spiny Lobster, pp. 543-611. In: Inshore Marine Resources of the South Pacific: Information for fishery development and management (A. Wright and L. Hill, eds.), FFA/USP Press, Fiji.

10.0 APPENDIX A: CORAL REEF MUS

Currently Harvested Coral Reef Taxa

Family Name	Samoan Name	English Common Name	Scientific Name
Acanthuridae (Surgeonfishes) [pone = general name for *Acanthurus* spp.]	afinamea	orange-spot surgeonfish	*Acanthurus olivaceus*
	**	yellowfin surgeonfish	*Acanthurus xanthopterus*
	aanini	convict tang	*Acanthurus triostegus*
	**	eye-striped surgeonfish	*Acanthurus dussumieri*
	ponepone, gaitolama	blue-lined surgeon	*Acanthurus nigroris*
	alogo	blue-banded surgeonfish	*Acanthurus lineatus*
	pone-i'usama	blackstreak surgeonfish	*Acanthurus nigricauda*
	laulama,	whitecheek surgeonfish	*Acanthurus nigricans*
	maogo	white-spotted surgeonfish	*Acanthurus guttatus*
	**	ringtail surgeonfish	*Acanthurus blochii*
	ponepone	brown surgeonfish	*Acanthurus nigrofuscus*
	**	elongate surgeonfish	*Acanthurus mata*
	**	mimic surgeonfish	*Acanthurus pyroferus*
	pone	yellow-eyed surgeonfish	*Ctenochaetus strigosus* [pone=genral name for *Ctenochaetus*]
	pone, pala'ia, logoulia	striped bristletooth	*Ctenochaetus striatus*
	**	two-spot bristletooth	*Ctenochaetus binotatus*
	ume-isu	bluespine unicornfish	*Naso unicornus* [ume = general name for *Naso* spp.]
	ili'ilia, umelei	orangespine unicornfish	*Naso lituratus*
	**	black tongue unicornfish	*Naso hexacanthus*
	ume-masimasi	bignose unicornfish	*Naso vlamingii*
	**	whitemargin unicornfish	*Naso annulatus*
	ume-ulutao	spotted unicornfish	*Naso brevirostris*

Family Name	Samoan Name	English Common Name	Scientific Name
	**	barred unicornfish	*Naso thynnoides*
Balistidae (Triggerfishes) [sumu = general name for triggerfishes]	sumu, sumu-laulau	titan triggerfish	*Balistoides viridescens*
	**	orangestriped triggerfish	*Balistapus undulatus*
	sumu-‘apa’apasina, sumu-si’umumu	pinktail triggerfish	*Melichthys vidua*
	sumu-uli	black triggerfish	*Melichthys niger*
	sumu-laulau	blue triggerfish	*Pseudobalistes fuscus*
	sumu-uo’uo, sumu-aloalo	picassofish	*Rhinecanthus aculeatus*
	sumu-gase’ele’ele	bridled triggerfish	*Sufflamen fraenatum*
	atule	bigeye scad	*Selar crumenophthalmus*
	atuleau, namuauli	mackerel scad	*Decapterus macarellus*
Carcharhinidae (Sharks) [malie = general name for sharks]	malie-aloalo	grey reef shark	*Carcharhinus amblyrhynchos*
	aso	silvertip shark	*Carcharhinus albimarginatus*
	malie	Galapagos shark	*Carcharhinus galapagensis*
	apeape, malie-alamata	blacktip reef shark	*Carcharhinus melanopterus*
	malu	whitetip reef shark	*Triaenodon obesus*
Holocentridae (Soldierfish/Squir-relfish [malau = general name for squirrelfishes]	malau-ugatele, malau-va’ava’a	bigscale soldierfish	*Myripristis berndti*
	malau-tui	bronze soldierfish	*Myripristis adusta*
	**	blotcheye soldierfish	*Myripristis murdjan*
	**	brick soldierfish	*Myripristis amaena*
	malau-mamo, malau-va’ava’a.	scarlet soldierfish	*Myripristis pralinia*

Family Name	Samoan Name	English Common Name	Scientific Name
Holocentridae (Soldierfish/Squirrelfish [malau = general name for squirrelfishes]	malau-tuauli	violet soldierfish	*Myripristis violacea*
	**	whitetip soldierfish	*Myripristis vittata*
	**	yellowfin soldierfish	*Myripristis chryseres*
	malau-pu'u	pearly soldierfish	*Myripristis kuntee*
	**	double tooth squirrelfish	*Myripristis hexagona*
	**	blackspot squirrelfish	*Sargocentron melanospilos*
	malau-tianiu	file-lined squirrelfish	*Sargocentron microstoma*
	**	pink squirrelfish	*Sargocentron tiereoides*
	malau-tui, malau-talapu'u, malau-tusitusi, malau-pauli.	crown squirrelfish	*Sargocentron diadema*
	**	peppered squirrelfish	*Sargocentron punctatissimum*
	**	blue-lined squirrelfish	*Sargocentron tiere*
	tamalu, mu-malau, malau-toa	saber or long jaw squirrelfish	*Sargocentron spiniferum*
	**	spotfin squirrelfish	*Neoniphon* spp.
Kuhliidae (Flagtails)	safole, inato	barred flag-tail	*Kuhlia mugil*
Kyphosidae (Rudderfish)	nanue, mata-mutu, mutumutu.	rudderfish	*Kyphosus cinerascens* *Kyphosus biggibus*
	nanue	rudderfish	*Kyphosus vaigienses*
Labridae (Wrasses) [sugale = general name for wrasses]	lalafi, tagafa. malakea	napoleon wrasse	*Cheilinus undulatus*
	lalafi-matamumu	triple-tail wrasse	*Cheilinus trilobatus*
	lalafi-matapua'a	floral wrasse	*Cheilinus chlorourus*
	lalafi-pulepule	harlequin tuskfish	*Cheilinus fasciatus*
	sugale	bandcheek wrasse	*Oxycheilinus diagrammus*

Family Name	Samoan Name	English Common Name	Scientific Name
Labridae (Wrasses) [sugale = general name for wrasses]	sugale	arenatus wrasse	*Oxycheilinus arenatus*
	sugale-tatanu	whitepatch wrasse	*Xyrichtys aneitensis*
	sugale-mo'o	cigar wrasse	*Cheilio inermis*
	sugale-laugutu, sugale-uli, sugale-aloa, sugale-lupe.	blackeye thicklip	*Hemigymnus melapterus*
	sugale-gutumafia	barred thicklip	*Hemigymnus fasciatus*
	lape, sugale-pagota	three-spot wrasse	*Halichoeres trimaculatus*
	sugale-a'au, sugale-pagota, ifigi	checkerboard wrasse	*Halichoeres hortulanus*
	sugale-uluvela	weedy surge wrasse	*Halichoeres margaritaceus*
	uloulo-gatala, patagaloa	surge wrasse	*Thalassoma purpureum*
	lape-moana	red ribbon wrasse	*Thalassoma quinquevittatum*
	sugale-samasama	sunset wrasse	*Thalassoma lutescens*
	sugale-la'o, sugale-taili, sugale-gasufi.	rockmover wrasse	*Novaculichthys taeniourus*
Mullidae (Goatfishes)	i'asina, vete, afulu	yellow goatfish	*Mulloidichthys* spp.
	Vete	yellowfin goatfish	*Mulloidichthys vanicolensis*
	afolu, afulu	yellowstripe goatfish	*Mulloidichthys flavolineatus*
	afoul, afulu	banded goatfish	*Parupeneus* spp.
	tusia, tulausaena, ta'uleia	dash-dot goatfish	*Parupeneus barberinus*
	matulau-moana	doublebar goatfish	*Parupeneus bifasciatus*

Family Name	Samoan Name	English Common Name	Scientific Name
	moana-ula	redspot goatfish	*Parupeneus heptacanthus*
	i'asina, vete, afulu, moana	yellowsaddle goatfish	*Parupeneus cyclostomas*
	matulau-ilamutu	side-spot goatfish	*Parupeneus pleurostigma*
	i'asina, vete, afulu	multi-barred goatfish	*Parupeneus multifaciatus*
Mugilidae (Mullets) [anae = general name for mullets]	anae, aua. fuafua	fringelip mullet	*Crenimugil crenilabis*
	moi, poi	false mullet	*Neomyxus leuciscus*
Muraenidae (Moray eels)	pusi	yellowmargin moray eel	*Gymnothorax flavimarginatus*
	maoa'e	giant moray eel	*Gymnothorax javanicus*
	pusi-pulepule	undulated moray eel	*Gymnothorax undulatus*
Octopodidae (Octopus)	fe'e	octopus	*Octopus cyanea*
	fe'e	octopus	*Octopus ornatus*
Polynemidae	umiumia, i'ausi	threadfin	*Polydactylus sexfilis*
Pricanthidae (Bigeye) [matapula = general name for Priacanthus]	matapula	glasseye	*Heteropriacanthus cruentatus*
	matapula	bigeye	*Priacanthus hamrur*
Scaridae (Parrotfishes) [fuga = general name for parrotfishes]	fuga	stareye parrotfish	*Calotomus carolinus*
	fuga, galo-uluto'i, fuga-valea, laea-mamanu	parrotfish	*Scarus* spp.
	ulapokea, laea-ulapokea	Pacific longnose parrotfish	*Hipposcarus longiceps*

Family Name	Samoan Name	English Common Name	Scientific Name
Scombridae	tagi	dogtooth tuna	*Gymnosarda unicolor*
Siganidae (Rabbitfish)	loloa, lo	forktail rabbitfish	*Siganus aregenteus*
Sphyraenidae (Barracuda)	sapatu	heller's barracuda	*Sphyraena helleri*
	saosao	great barracuda	*Sphyraena barracuda*
Turbinidae (turban shells/green snails	alili	green snails	*Turbo* spp.

Potentially Harvested Coral Reef Taxa

Samoan Name	English Common Name	Scientific Name
sugale, sugale-vaolo, sugale-a'a, lalafi, lape-a'au, la'ofia	wrasses (Those species not listed as CHCRT)	Labridae [sugale = general name for wrasses]
malie, apoapo, moemoeao	sharks (Those species not listed as CHCRT)	Carcharhinidae Sphyrnidae
fai	rays and skates	Dasyatididae Myliobatidae
pe'ape'a	batfishes	Ephippidae
mutumutu, misimisi, ava'ava-moana	sweetlips	Haemulidae
talitaliuli	remoras	Echeneidae
mo'o, mo'otai	tilefishes	Malacanthidae
tiva	dottybacks	Pseudochromidae
aneanea, tafuti	prettyfins	Plesiopidae
tapua	coral crouchers	Caracanthidae
##	flashlightfishes	Anomalopidae
gatala, ataata, vaolo, gatala-uli, gatala-sega, gatala-aleva, ateate, apoua, susami, gatala-sina, gatala-mumu.	groupers (Those species not listed as CHCRT or BMUS)	Serrandiae [gatala = general name for groupers]

Samoan Name	English Common Name	Scientific Name
lupo, lupota, mamalusi, ulua, sapoanae, taupapa, nato, filu, atuleau, malauli-apamoana, malauli-sinasama, malauli-matalapo’a, lai	jacks and scads (Those species not listed as CHCRT or BMUS)	Carangidae
malau	soldierfishes and squirrelfishes (Those species not listed as CHCRT)	Holocentridae
i’asina, vete, afulu, afoul, ulula’oa	goatfishes (Those species not listed as CHCRT)	Mullidae
pone, palagi	surgeonfishes (Those species not listed as CHCRT)	Acanthuridae
pelupelu, nefu	herrings	Clupeidae
nefu, file	anchovies	Engraulidae
mano’o, mano’o-popo, mano’o-fugafuga, mano’o-apofusami, mano’o-a’au.	gobies	Gobiidae [mano’o=general name for gobies]
mu, mu-taiva, tamala, malai, feloitega, mu-mafalaugutu, savane-ulusama, matala’oa.	snappers (Those species not listed as CHCRT or BMUS)	Lutjanidae
sumu, sumu-papa, sumu-taulau.	trigger fishes (Those species not listed as CHCRT)	Balistidae [sumu=general name for triggerfishes]
lo	rabbitfishes (Those species not listed as CHCRT)	Siganidae
nanue, matamutu, mutumutu	rudderfishes (Those species not listed as CHCRT)	Kyphosidae
ulisega, atule-toto	fusiliers	Caesionidae
filoa, mata’ele’ele, ulamalosi	emperors (Those species not listed as CHCRT or BMUS)	Lethrinidae
pusi, maoa’e, atapanoa, u’aulu, apeape, fafa, gatamea, pusi-solasulu.	eels (Those species not listed as CHCRT)	Muraenidae Chlopsidae Congridae Moringuidae Ophichthidae

Samoan Name	English Common Name	Scientific Name
fo, fo-tusiloloa, fo-si'umu, fo-loloa, fo-tala, fo-manifi, fo-aialo, fo-tuauli.	cardinalfishes	Apogonidae
pe'ape'a, laulaufau	moorish idols	Zanclidae
tifitifi, si'u, i'usamasama, tifitifi-segaula, laulafau-laumea, alosina.	butterfly fishes	Chaetodontidae
tu'u'u, tu'u'u-sama, tu'u'u-lega, tu'u'u-ulavapua, tu'u'u-matamalu, tu'u'u-alomu, tu'u'u-uluvela, tu'u'u-atugauli, tu'u'u-tusiuli, tu'u'u-manini.	angelfishes	Pomacanthidae
tu'u'u, mutu, mamo, tu'u'u-lumane.	damselfishes	Pomacentridae
i'atala, la'otele, nofu	scorpionfishes	Scorpaenidae
mano'o, mano'o-mo'o, mano'o-palea, mano'o-la'o.	blennies	Blenniidae [mano'o = general name for blennies]
sapatu	barracudas (Those species not listed as CHCRT)	Sphyraenidae
la'o, ulutu'i, lausiva	hawkfishes (Those species not listed as CHCRT)	Cirrhitidae
la'otale, nofu	frogfishes	Antennariidae
##	pipefishes and seahorses	Syngnathidae
ta'oto	sandperches	Pinguipedidae
tagi	dog tooth tuna	*Gymnosarda unicolor*
taoto-ena, taoto-sama, 'au'aulauti, taotito	trumpetfish	*Aulostomus chinensis*
taotao, taoto-ama	cornetfish	*Fistularia commersoni*
sue, sue-vaolo, sue-va'a, sue-lega, sue-mu, sue-uli, sue-lape, sue-afa, sue-sugale.	puffer fishes and porcupine fishes	Tetradontidae [sue= general name for buffer fishes]

Samoan Name	English Common Name	Scientific Name
ali	flounders and soles	Bothidae Soleidae
moamoa	trunkfishes	Ostraciidae
fugafuga, tuitui, sava'e	sea cucumbers and sea urchins	Echinoderms
amu	blue corals	Heliopora
amu	organpipe corals	Tubipora
**	ahermatypic corals	Azooxanthellates
amu	mushroom corals	Fungiidae
amu	small and large coral polyps	
amu	fire corals	Millepora
amu	soft corals and gorgonians	
lumane, matalelei	anemones	Actinaria
**	soft zoanthid corals	Zoanthinaria
##	(Those species not listed as CHCRT)	Mollusca
sisi-sami	sea snails	Gastropoda
aliao, alili		Trochus spp.
sea	sea slugs	Opistobranches
##	black lipped pearl oyster	*Pinctada margaritifera*
faisua	giant clam	Tridacnidae
pipi, asi, fatuaua, tio, pae, fole	other clams	Other Bivalves
ula, pa'a, kuku, papata	lobsters, shrimps/mantis shrimps, true crabs and hermit crabs (Those species not listed as Crustacean MUS)	Crustaceans
##	sea squirts	Tunicates
##	sponges	Porifera
amu	lace corals	Stylasteridae
amu	hydroid corals	Solanderidae
##	segmented worms (Those species not listed as CHCRT)	Annelids

Samoan Name	English Common Name	Scientific Name
limu	seaweed	Algae
##		Live rock
All other coral reef ecosystem management unit species that are marine plants, invertebrates, and fishes that are not listed in the preceding table or are not bottomfish management unit species, crustacean management unit species, pelagic management unit species, precious coral or seamount groundfish.		

Samoan names provided by Fini Aitaoto

Key:

1. ** = no specific species Samoan name, but may use general group name provided.
2. ## = no specific Samoan name identified, as of the date of this compilation.
3. The extensive use of the hyphen mark in Samoan names reflects the general use of descriptive names where the word after the hyphen is usually a description of the color(s) or other characteristics. A single species/group sometimes has more than one Samoan name depending on the color(s) and size (pers. comm. Chief Mauala P. Seiuli). In several cases, one Samoan name has been traditionally used for several species/groups.
4. Different islands of the Samoa group sometimes have different names for single local species/groups. Hence, the attempt to include all known Samoan names from all the islands of the Samoa group.