

# 1 FISHERY PERFORMANCE

## 1.1 FISHERY DESCRIPTIONS

The Samoa Archipelago is a remote chain of 13 islands of varying sizes and an atoll, located 14° south of the equator near the International Date Line. The islands lie between 13° and 14° latitude south and 169° and 173° longitude west, about 480 km (300 mi) from west to east, covering an area of 3,030 sq. km (1,170 sq. miles). With its tropical setting and its latitudinal range lying within the known limits of coral growth, coral reefs fringe the islands and atolls in the archipelago. The archipelago is approximately 4,200 km south of Hawaii in the central South Pacific Ocean. The archipelago is divided into two political entities: Independent Samoa and American Samoa. The Independent Samoa has two large islands, Upolu and Savaii, and eight islets. American Samoa is comprised of five volcanic islands (Tutuila, Aunu'u, Ofu, Olosega, and Ta'u), one low-island (Swains Island), and a coral atoll (Rose Atoll). The five volcanic islands that are part of the American Samoa territory are very steep with mountainous terrain and high sea cliffs and of various sizes. Tutuila Island, the largest (137 km<sup>2</sup>) and most populated island, is the most eroded with the most extensive shelf area and has banks and barrier reefs. Aunu'u is a small island very close to Tutuila. Ofu and Olosega (together as 13 km<sup>2</sup>) are twin volcanic islands separated by a strait which is a shallow and narrow break in the reef flat between the islands. Tau is the easternmost island (45 km<sup>2</sup>) with a more steeply sloping bathymetry.

The Samoa archipelago was formed by a series of volcanic eruptions from the "Samoa hotspot" (Hart et al., 2000). Based on the classic hotspot model, Savaii Island (the westernmost) in Samoa would be the oldest and Tau island (the easternmost) in American Samoa the youngest of the islands in the archipelago. Geological data indicate that Savaii is about four to five million years old, Upolu in Samoa about two to three million years old, Tutuila about 1.5 million years old, Ofu-Olosega about 300,000 years old, and Tau about 100,000 years old. Swains and Rose are built on much older volcanoes, they but are not part of the Samoan volcanic chain (Hart et al., 2004). The geological age and formation of Rose Atoll is not well known, and Swains is part of the Tokelau hot-spot chain which is anywhere from 59 to 72 million years old (Neall and Trewick, 2008; Konter et al., 2008). There are numerous banks in the archipelago, the origins of which are not well known. The South Bank near Tutuila Island, for instance, is of another geological origin.

American Samoa experiences occasional cyclones due to its geographic location in the Pacific. Cyclones occur on one- to 13-year intervals, with the six strong occurrences happening over the last 40 years (Esau in 1981; Tusi in 1987; Ofa in 1990; Val in 1991; Heta in 2004; Olaf in 2005). The territory had two tsunamis in the last 100 years due to its proximity to the geologically active Tonga Trench.

It is in this geological and physical setting that the Samoans have established their culture over the last 3,500 years. For three millennia, the Samoans have relied on the ocean for their sustenance. Fish and fishing activities constitute an integral part of the "*fa'a samoa*", or the Samoan culture. Fish are also used for chiefly position entitlements and other cultural activities during the "*fa'a lalave*" or ceremonies.

### 1.1.1 Bottomfish Fishery

Deep, zooxanthellate, scleractinian coral reefs that have been documented in the Pacific often occur around islands in clear tropical oceanic waters (Lang, 1974; Fricke and Meischner, 1985;

Kahng and Maragos, 2006). These mesophotic coral ecosystems are found at depths of 30-40 m up to 150 m and have been exploited by bottomfishing fishermen mainly targeting snappers, emperors, and groupers. Bottomfishing utilizing traditional canoes by the indigenous residents of American Samoa has been a subsistence practice since the Samoans settled on the Tutuila, Manua, and Aunu'u islands. It was not until the early 1970s that the bottomfish fishery developed into a commercial scheme utilizing motorized boats. The bottomfish fishery of American Samoa was typically comprised of commercial overnight bottomfish handlining using skipjack as bait on 28 to 30-foot-long aluminum/plywood "alia" (a term used for larger boats in Samoa). Imported bottomfish from the independent state of Samoa help satisfy demand, however the imports weaken the local bottomfish fishery. A government-subsidized program, called 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 initiated another notable increase in bottomfish landings and revenue. Between 1982 and 1988, the bottomfish fishery accounted for as much as half of the total commercial landings (by weight).

American Samoa's bottomfish fishery was a relatively larger size between 1982 and 1985 when it was new and expanding. In 1988, a decline in bottomfish fisheries occurred as many skilled and full-time commercial fishermen converted to trolling. Additionally, profits and revenue in bottomfishing suffered from four separate hurricanes, Tusi in 1987, Ofa in February of 1990, Val in December of 1991, and Heta in January of 2004, as well as the 2009 tsunami. The gradual depletion of newly discovered banks and migration of many fishermen into other fishing vendors resulted in the decline of landings through the mid-1980s. Fuel prices have gradually risen in the past four years causing yet another strain on the bottomfish fisheries. The average price of bottomfish has also declined due to the shift in demand from local to imported bottomfish that complete closely with local prices. In 2004, 60 percent of coolers imported from the independent state of Samoa on the Lady Naomi Ferry were designated for commercial sale; data from the Commercial Invoice System show that half of these coolers were filled with bottomfish.

Beginning in 1988, the nature of American Samoa's fisheries changed dramatically with a shift in importance from bottomfishing to trolling. In the past eight years, the dominant fishing method has been longlining (by weight). Bottomfishing has been in decline for years, but it was dealt a final devastating blow by the impacts of the 2009 tsunami. A fishery failure was declared, and the U.S. Congress allocated \$1 million to revive the fishery. This fund has been used to repair boats damaged by the tsunami, maintain the floating docks used by the alia boats, and build a boat ramp. In 2013, the American Samoan government also implemented a subsidy program that provided financial relief associated the rising fuel prices, and the fuel price has become notably lower since then.

### **1.1.2 Ecosystem Component Fishery**

Traditional coral reef fishing in the lagoons and shallow reef areas has included methods such as gleaning and using bamboo poles with lines and baits or with a multi-pronged spear attached. The deep water and pelagic fisheries have traditionally used wooden canoes, hand-woven sennit lines with shell hooks and stone sinkers, and lures made of wood and shell pieces.

Presumably, the change from traditional to present-day fishing methods started with Western contact in the 18<sup>th</sup> century. Today the fisheries in American Samoa can be broadly categorized in terms of habitat and target species as either pelagic fisheries, bottomfish fisheries in mesophotic reefs, or nearshore coral reef fisheries. For creel monitoring program purposes, fisheries are either subsistence (i.e., primarily shore-based and mostly for personal consumption) or commercial (i.e., primarily boat-based and mostly sold). Bottomfishing is a combination of mesophotic reef fishing (i.e., spearfishing) and/or pelagic fishing (i.e., trolling). The coral reef fishery involves gleaning, spearfishing (snorkel or free dive from shore or using boat), rod-and-reel using nylon lines and metal hooks, bamboo pole, throw nets, and gillnets. SCUBA spearfishing was introduced in 1994, restricted for use by native American Samoans in 1998, and finally banned in 2002 following recommendations by biologists from the DMWR and local scientists.

In 2018, the Council drafted an Amendment 4 to the American Samoa FEP that reclassified a large number MUS as Ecosystem Component Species (ECS; WPRFMC, 2018). The final rule was posted in the Federal Register in early 2019 (84 FR 2767, February 8, 2019). This amendment reduces the number of MUS from 205 species/families to 11 in the American Samoa FEP. All former coral reef ecosystem management unit species (CREMUS) were reclassified as ECS that do not require ACL specifications or accountability measures but are still to be monitored regularly to prioritize conservation and management efforts and to improve efficiency of fishery management in the region. All existing management measures, including reporting and record keeping, prohibitions, and experimental fishing regulations apply to the associated ECS. If an ECS stock becomes a target of a Federal fishery in the future, NMFS and the Council may consider including that stock as a MUS to actively manage that stock. These species are still regularly monitored via other means (see Sections 1.5.3 and 2.1.3).

## **1.2 FISHERY DATA COLLECTION SYSTEM**

American Samoa has been regularly conducting fishery-dependent monitoring since 1982 for the boat-based fishery. The boat-based fishery is mostly trolling for tuna, skipjacks, and trevally, and bottomfishing mostly targets snappers, emperors, and groupers. Boat-based data collection involve two runs: first is the participation run used to determine the number of boats/fisherman out to fish and identify the type of gear being used; second is the interview run where the fishermen are interviewed for the effort and economic data while also measuring the length and weight of each fish identified to the species level.

### **1.2.1 Boat-Based Creel Survey**

The boat-based data collection focuses mostly on the main docks in Fagatogo, Fagasa, Vatia, Fagaalu, and Pago Pago,. Boat-based data collection is also being conducted in Manu'a. Boat-based data collection in both Ofu-Olosega and Tau is opportunistic since there is no set schedule for boats to go out and land their catches.

The survey follows a random stratified design. The stratification is by survey area, weekday/weekend, and time of day. The survey is divided into two phases: 1) participation run; and 2) catch interview phase. The participation run attempts to estimate the amount of participation by counting the number of boats “not on the dock” or the presence of trailers. The catch interview phase occurs after the participation run that documents catch composition, CPUE, length-weight information, catch disposition, and some socio-economic information. The data is transcribed weekly into the WPacFIN database. Catch expansion is done on an annual scale through a simple expansion algorithm using expanded effort and CPUE. For more details of the boat-based creel survey see Oram et al. (2011).

### **1.2.2 Commercial Receipt Book System**

Entities that sell any seafood products are required by law to report their sales to DMWR (ASCA § 24.0305). This is done through a receipt book system collected on the 16th day of every month. Information required to be reported are: (a) the weight and number of each species of fish or shellfish received; (b) the name of the fisherman providing the fish or shellfish; (c) boat name and registration number, if applicable; (d) the name of the dealer; (e) the date of receipt; (f) the price paid per species; (g) the type of fishing gear used; (h) whether the fish or shellfish are intended for sale in fresh, frozen, or processed form; (i) which fish or shellfish were taken within/outside of territorial waters; and (j) other statistical information the department may require.

### **1.2.3 Boat Inventory**

An annual boat inventory is being conducted to track down fishing boats and determine their ownership. This will provide information on how many boats are potentially available to engage in the fishery.

### 1.3 META-DATA DASHBOARD STATISTICS

The meta-data dashboard statistics describe the amount of data used or available to calculate the fishery-dependent information. Creel surveys are sampling-based systems that require random-stratified design applied to pre-scheduled surveys. The number of sampling days, participation runs, and catch interviews would determine if there are enough samples to run the expansion algorithm. The trends of these parameters over time may infer survey performance. Monitoring the survey performance is critical for explaining the reliability of the expanded information.

Commercial receipt book information depends on the number of invoices submitted and the number of vendors participating in the program. Variations in these meta-data affect the commercial landing and revenue estimates.

#### 1.3.1 Creel Survey Meta-Data Statistics

Calculations:

# Sample days: Count of the total number of unique dates found in the boat log sampling date data in boat-based creel surveys.

# Catch Interviews: In boat-based creel surveys, count of the total number of data records found in the interview header data (number of interview headers). This is divided into two categories, interviews conducted during scheduled survey days (Regular) and opportunistic interviews (Opportunistic), which are collected on non-scheduled days.

**Table 1. Summary of American Samoa boat-based creel survey meta-data**

Year	# Sample Days	# Catch Interviews	
		Regular	Opportunistic
1986	186	532	1
1987	110	338	0
1988	158	366	0
1989	160	389	0
1990	160	191	0
1991	134	169	0
1992	127	137	0
1993	140	126	0
1994	209	234	0
1995	239	333	0
1996	222	389	3
1997	226	888	1
1998	229	852	1
1999	207	659	0
2000	206	457	0
2001	205	249	2
2002	194	212	0
2003	220	489	0

Year	# Sample Days	# Catch Interviews	
		Regular	Opportunistic
2004	239	485	5
2005	238	330	0
2006	238	319	7
2007	251	484	6
2008	225	303	11
2009	165	174	9
2010	188	168	2
2011	240	203	1
2012	269	285	14
2013	262	245	0
2014	236	353	27
2015	233	247	26
2016	224	165	47
2017	222	139	33
2018	215	176	11
2019	218	166	12
2020	230	164	2
<b>10-year avg.</b>	<b>235</b>	<b>214</b>	<b>17</b>
<b>10-year SD</b>	<b>17</b>	<b>64</b>	<b>15</b>
<b>20-year avg.</b>	<b>226</b>	<b>268</b>	<b>11</b>
<b>20-year SD</b>	<b>24</b>	<b>110</b>	<b>13</b>

- **Summary: The number of sample days doubled from the 80's to 90's. There has been a general decline in regular interviews throughout the years. The number of opportunistic interviews increased from 2014 up to recent. The variability of opportunistic interviews is related to natural disasters, program staff changes, subsidy program, and covid-19 restrictions.**

### 1.3.2 Commercial Receipt Book Statistics

Calculations:

# Vendors: Count of the number of unique buyer codes found in the commercial purchase header data from the Commercial Receipt Book, BMUS vendors are only from vendors that landed BMUS species.

# Invoices: Count of the number of unique invoice numbers found in the commercial header data from the Commercial Receipt Book, BMUS vendors are only from vendors that landed BMUS species.

**Table 2. Summary of American Samoa commercial receipt book meta-data**

<b>Year</b>	<b># Vendors</b>	<b># Invoices Collected</b>	<b># BMUS Vendors</b>	<b># BMUS Invoices Collected</b>
1992	11	445	8	51
1993	17	695	11	88
1994	21	1,425	13	145
1995	39	2,410	16	193
1996	17	1,755	8	83
1997	18	1,763	2	5
1998	22	1,741	6	17
1999	19	1,525	8	63
2000	19	1,169	7	61
2001	32	1,372	13	158
2002	27	1,076	9	127
2003	31	1,263	13	123
2004	28	937	14	118
2005	68	1,000	14	93
2006	60	1,201	13	109
2007	65	1,355	10	135
2008	47	1,020	11	100
2009	45	806	14	114
2010	34	620	9	54
2011	30	776	7	28
2012	30	827	11	28
2013	34	777	4	19
2014	42	1,126	9	37
2015	45	1,577	6	53
2016	50	1,395	6	18
2017	58	1,372	6	21
2018	62	1,342	3	16
2019	64	1,491	6	41
2020	58	657	3	7
<b>10-year avg.</b>	<b>47</b>	<b>1,134</b>	<b>6</b>	<b>27</b>
<b>10-year SD</b>	<b>12</b>	<b>327</b>	<b>2</b>	<b>13</b>
<b>20-year avg.</b>	<b>46</b>	<b>1,100</b>	<b>9</b>	<b>70</b>
<b>20-year SD</b>	<b>14</b>	<b>284</b>	<b>4</b>	<b>48</b>

**Summary:** The number of engaged vendors has increased throughout the years but the number of invoices declined. In addition, the number of vendors selling BMUS declined throughout the years. This suggests a decline in bottomfish and BMUS commerce. Finally, covid-19 restrictions seem to have negatively affected fish commerce and BMUS commerce.

#### 1.4 FISHERY SUMMARY DASHBOARD STATISTICS

The Fishery Summary Dashboard Statics section consolidates all fishery-dependent information comparing the most recent year with short-term (recent 10 years) and long-term (recent 20 years) average (shown bolded in [brackets]). Trend analysis of the past 10 years will dictate the trends (increasing, decreasing, or no trend). The right-most symbol indicates whether the mean of the short-term and long-term years were above, below, or within one standard deviation of the mean of the full time series.

Legend Key:



- increasing trend in the time series



- above 1 standard deviation



- decreasing trend in the time series



- below 1 standard deviation



- no trend in the time series































- within 1 standard deviation

e.g., 10,000 [**1,000**] – point estimate of fishery statistic [% difference from short/long term average]

















































**Table 3. Annual indicators for American Samoa bottomfish fisheries describing performance and comparing 2020 estimates with short- (10-year) and long-term (20-year) averages**

Fishery	Fishery statistics	Short-term (10 years)	Long-term (20 years)
<b>Bottomfish</b>	<b>Total estimated catch (lb)</b>		
All gears (BMUS only)	All BMUS from creel survey data	8,040[▼35%]	11,040[▼44%]
	All BMUS from commercial purchase data	307[▼75%]	307[▼84%]
	<b>Catch-per-unit-effort (from boat-based creel surveys)</b>		
Bottomfishing (BMUS only)	Bottomfishing lb/trip	26[▼39%]	26[▼43%]
	Bottomfishing lb/gr-h.	1.1515[▼4%]	1.1515[▼25%]
	<b>Fishing effort (from boat-based creel surveys)</b>		



Bottomfishing (BMUS only)	Estimated total bottomfishing trips	39[▼36%]  	39[▼42%]  
	Estimated total bottomfishing gear hours	871[▼72%]  	871[▼68%]  
<b>Fishing participation (from boat-based creel surveys)</b>			
Bottomfishing (BMUS only)	Estimated number of bottomfishing vessels	6[▼40%]  	6[▼50%]  
	Estimated average number of fishermen per bottomfishing trip	2[▼33%]  	2[▼33%]  
<b>Bycatch</b>			
BMUS	# fish caught	404[▼75%]  	404[▼85%]  
	# fish discarded/released	0[no change]  	0[no change]  
	% bycatch	0[no change]  	0[no change]  

**Table 4. Annual indicators for American Samoa ECS fisheries describing performance and comparing 2020 estimates with short- (10-year) and long-term (20-year) averages**

Fishery	Fishery statistics	Short-term (10 years)	Long-term (20 years)
<b>ECS</b>	<b>Total estimated catch (lb)</b>		
Prioritized ECS	<i>Sargocentron tiere</i> from creel survey data	NA[▼100%]  	NA[▼100%]  
	<i>Sargocentron tiere</i> from commercial purchase data	NA[no change]  	NA[no change]  
	<i>Cernimugil crenilabis</i> from creel survey data	NA[▼100%]  	NA[▼100%]  
	<i>Cernimugil crenilabis</i> from commercial purchase data	0[no change]  	0[no change]  
	<i>Parulirus penicilatus</i> from creel survey data	307[▼58%]  	307[▼80%]  
	<i>Parulirus penicilatus</i> from commercial purchase data	171[▼83%]  	171[▼87%]  
	Clams from creel survey data	NA[no change]  	NA[no change]  
	Clams from commercial purchase data	NA[no change]  	NA[no change]  
	<i>Octopus cyanea</i> from creel survey data	NA[no change]  	NA[no change]  
	<i>Octopus cyanea</i> from commercial purchase data	NA[no change]  	NA[no change]  
	<i>Epinephelus malanostigma</i> from creel survey data	110[▲38%]  	110[▲175%]  
	<i>Epinephelus malanostigma</i> from commercial purchase data	NA[no change]  	NA[no change]  

“NA” = no data available.

## 1.5 CATCH STATISTICS

The following section summarizes the catch statistics for bottomfish, a one-year snapshot of the top ten landed species, and the top six prioritized species (and species groups) in American Samoa as determined by DMWR. The six species are the bluelined squirrelfish (*Sargocentron tere*), fringelip mullet (*Crenimugil crenilabis*), green spiny lobster (*Panulirus penicillatus*), clams, day octopus (*Octopus cyanea*), and one-blotch grouper (*Epinephelus melanostigma*). Estimates of catch are summarized from the creel survey and commercial receipt book data collection programs. Catch statistics provide estimates of annual harvest from the different fisheries. Estimates of fishery removals can provide proxies for the level of fishing mortality and a reference level relative to established quotas. This section also provides detailed levels of catch for fishing methods and the top species complexes harvested in bottomfish fisheries in addition to the top ten landed species and top six prioritized species.

### 1.5.1 Catch by Data Stream

This section describes the estimated total catch from the boat-based creel survey programs as well as the commercial landings from the commercial receipt book system. The difference between the creel total and the commercial landings is assumed to be the non-commercial component. However, there are cases where the commercial landing may be higher than the estimated creel total of the commercial receipt book program. In this case, the commercial receipt books can capture fishery data better than the creel surveys.

Calculations: Estimated landings are based on a pre-determined list of species (Appendix A) identified as BMUS regardless of the gear used, for all data collection (boat-based creel surveys and the commercial purchase reports).

**Table 5. Summary of American Samoa BMUS total catch (lb) from expanded boat-based and shore-based creel surveys and the commercial purchase system for all gear types**

Year	Boat-Based Creel Survey Estimates	Shore-Based Creel Survey Estimates	Total Creel Survey Estimates	Commercial Landings
1992	8,050	1,132	9,182	1,895
1993	9,675	403	10,078	3,464
1994	24,195	560	24,755	2,375
1995	22,246	262	22,508	5,112
1996	22,477	1,040	23,517	1,082
1997	26,812	NA	26,812	419
1998	10,501	NA	10,501	851
1999	12,687	NA	12,687	3,197
2000	13,850	NA	13,850	3,693
2001	30,064	NA	30,064	3,447
2002	23,621	NA	23,621	1,448
2003	12,971	NA	12,971	2,511
2004	11,000	10	11,010	3,233
2005	8,226	46	8,272	2,490

Year	Boat-Based Creel Survey Estimates	Shore-Based Creel Survey Estimates	Total Creel Survey Estimates	Commercial Landings
2006	3,051	343	3,394	2,203
2007	10,913	161	11,074	4,001
2008	22,095	256	22,351	3,171
2009	34,388	194	34,582	3,035
2010	7,044	4	7,048	1,084
2011	14,083	3	14,086	711
2012	2,099	7	2,106	1,161
2013	5,732	1	5,733	882
2014	13,984	NA	13,984	3,140
2015	21,528	8	21,536	2,047
2016	19,307	6	19,313	566
2017	14,791	190	14,981	1,131
2018	11,957	283	12,240	838
2019	11,082	551	11,633	1,749
2020	7,751	289	8,040	307
<b>10-year avg.</b>	<b>12,231</b>	<b>149</b>	<b>12,365</b>	<b>1,253</b>
<b>10-year SD</b>	<b>5,621</b>	<b>184</b>	<b>5,597</b>	<b>802</b>
<b>20-year avg.</b>	<b>14,284</b>	<b>147</b>	<b>14,402</b>	<b>1,958</b>
<b>20-year SD</b>	<b>8,362</b>	<b>159</b>	<b>8,346</b>	<b>1,089</b>

“NA” = no data available.

- **Summary: Non-commercial BMUS landings is 90%, only 10% of BMUS is sold. Variability in BMUS landings due to natural disturbances, government subsidy. BMUS landings has steadily declined since 2015 with steeper decline due to covid-19 restrictions. There was a 30% decline due to covid in BMUS landings; 80% decline in commerce of BMUS.**

### 1.5.2 Expanded Catch Estimates by Fishing Method

Catch information is provided for boat-based fishing methods that contribute most of the annual catch for American Samoa.

Calculations: The creel survey catch time series are the sum of the estimated weight for selected gear in all strata for all species and all BMUS species.

**Table 6. Total catch time series estimates (lb) for all species and BMUS only using American Samoa expanded boat-based creel survey data for bottomfishing gears**

Year	Bottomfishing		Bottom-Troll Mixed		Spearfishing	
	All	BMUS	All	BMUS	All	BMUS
1986	59,512	1,648	61,310	2,194	33,451	NA
1987	9,161	316	35,676	309	32,884	NA

Year	Bottomfishing		Bottom-Troll Mixed		Spearfishing	
	All	BMUS	All	BMUS	All	BMUS
1988	28,798	16,528	35,990	7,645	53,616	45
1989	20,556	12,075	42,483	14,022	40,828	584
1990	8,308	4,754	11,829	4,651	1,441	NA
1991	14,439	7,328	14,004	3,734	833	NA
1992	14,941	8,050	NA	NA	NA	NA
1993	18,535	7,984	5,277	1,647	734	NA
1994	52,382	22,395	8,812	1,674	32,996	NA
1995	20,900	11,442	37,078	10,699	6,531	2
1996	39,932	18,110	13,626	4,348	6,369	19
1997	37,784	21,621	10,131	4,870	85,169	320
1998	10,759	7,280	6,542	3,102	77,443	119
1999	15,009	9,896	8,142	2,616	63,509	176
2000	25,104	12,045	3,888	1,746	42,922	60
2001	53,374	28,692	3,756	1,373	9,841	NA
2002	47,689	22,852	1,774	768	8,562	NA
2003	28,119	12,364	1,599	607	5,557	NA
2004	29,591	9,526	3,517	1,470	4,405	NA
2005	17,911	6,723	4,066	1,500	416	2
2006	12,028	2,539	1,169	494	2,589	19
2007	36,093	10,228	1,273	580	19,249	105
2008	54,674	21,495	1,809	575	8,030	25
2009	81,909	34,113	1,175	275	17,208	NA
2010	16,307	6,917	272	83	60,110	44
2011	29,834	12,973	5,355	1,091	33,210	19
2012	13,515	1,834	1,646	259	15,950	1
2013	27,126	5,240	1,853	437	31,784	51
2014	32,471	13,165	4,006	801	17,695	4
2015	43,173	20,110	5,715	1,197	25,756	203
2016	28,363	14,435	15,300	4,398	7,272	474
2017	29,940	12,697	8,594	1,980	8,759	114
2018	18,763	11,145	3,550	658	6,140	121
2019	18,426	10,507	2,773	482	8,514	47
2020	13,636	5,790	6,812	1,453	7,193	318
<b>10-year avg.</b>	<b>25,525</b>	<b>10,790</b>	<b>5,560</b>	<b>1,276</b>	<b>16,227</b>	<b>135</b>
<b>10-year SD</b>	<b>8,889</b>	<b>5,004</b>	<b>3,860</b>	<b>1,153</b>	<b>10,011</b>	<b>147</b>
<b>20-year avg.</b>	<b>31,647</b>	<b>13,167</b>	<b>3,801</b>	<b>1,024</b>	<b>14,912</b>	<b>77</b>
<b>20-year SD</b>	<b>17,024</b>	<b>8,264</b>	<b>3,359</b>	<b>918</b>	<b>13,711</b>	<b>121</b>

“NA” = no data available.

- **Summary: BMUS landings closely track bottomfish landings. BMUS accounts for 40% of the bottomfish landings. However, mixed bottomfish-trolling shows a different trend, almost like a different fishery and showing a decline in BMUS landings. There were hurricane impacts in 1987, 1990, 2004 and 2005. There was also negative impact of 2009 tgsunami. For the Covid 19 impacts, there was a 26% decline in bottomfish and 45% decline in BMUS but different trend in mix BTM-TRL.**

### 1.5.3 Top and Prioritized Species in Boat-Based Fishery Catch

Catch time series can act as indicators of fishery performance. Variations in the catch can be attributed to various factors, and there is no single explanatory variable for the observed trends. A one-year reflection of the top ten harvested species (by weight) is included to monitor which ECS are being caught the most annually. Additionally, DMWR selected six species/groups that were reclassified as ECS that are still of priority for regular monitoring, and complete catch time series of these species are included in the report as well.

Calculations: Catch tallied from the boat-based expanded species composition data combining gear types for all species excluding BMUS, prioritized ECS, and pelagic MUS species.

**Table 7a. Top ten landed ECS in American Samoa from boat-based creel survey data in 2020**

Common Name	Scientific Name	Catch (lb)
Humpback snapper	<i>Lutjanus gibbus</i>	2,784
Redlip parrotfish	<i>Scarus rubroviolaceus</i>	1,453
Bigeye barracuda	<i>Sphyraena forsteri</i>	1,127
Bluespine unicornfish	<i>Naso unicornis</i>	1,058
Blue-banded surgeonfish	<i>Acanthurus lineatus</i>	1,010
Twinspot snapper	<i>Lutjanus bohar</i>	871
Orangespot emperor	<i>Lethrinus erythracanthus</i>	681
Bigeye trevally	<i>Caranx sexfasciatus</i>	561
Bluefin trevally	<i>Caranx melampygus</i>	541
Redtail parrotfish	<i>Chlorurus japanensis</i>	509

Calculations: Catch tallied from commercial receipt data combining gear types for all species excluding BMUS, prioritized ECS, and pelagic MUS species.

**Table 7b. Top ten landed ECS in American Samoa from estimated commercial landings data in 2020**

Common Name	Scientific Name	Catch (lb)
Blue-banded surgeonfish	<i>Acanthurus lineatus</i>	4,822
Reef fishes (unknown)	Multi-genera multi-species	2,403
Striped bristletooth	<i>Ctenochaetus striatus</i>	2,094
Parrotfishes	<i>Scarus</i> spp.	1,792
Unicornfishes	<i>Naso</i> spp.	1,624

Pacific sailfin tang	<i>Zebrasoma veliferum</i>	694
Squirrelfishes	<i>Sargocentron</i> spp.	300
Inshore groupers	Multi-species	262
Humpback snapper	<i>Lutjanus gibbus</i>	82

Calculations: Catch tallied from boat-based expanded species composition data for species identified as priority ECS (Appendix A).

- **Summary: Species groupings and amount in lbs are expectedly different between creel and commercial invoices. *Lutjanus gibbus* was the top in ECS in creel but lowest in invoice. *Acanthurus lineatus* was top in commercial invoice.**

**Table 8a. Catch (lb) from boat-based creel survey expansion data for prioritized species in American Samoan ECS fisheries**

Year	<i>Sargocentron tiere</i>	<i>Crenimugil crenilabis</i>	<i>Panulirus penicilatus</i>	Clams (multi-species)	<i>Octopus cyanea</i>	<i>Epinepheus melanostigma</i>
1986	NA	NA	1,903	NA	NA	NA
1987	NA	NA	2,545	NA	NA	NA
1988	NA	NA	5,973	NA	NA	NA
1989	NA	NA	4,212	NA	NA	NA
1990	NA	NA	186	NA	NA	NA
1991	NA	NA	146	NA	NA	NA
1992	NA	NA	NA	NA	NA	NA
1993	NA	NA	47	NA	NA	NA
1994	NA	NA	1,375	NA	NA	NA
1995	NA	NA	269	NA	NA	NA
1996	NA	NA	379	NA	NA	NA
1997	NA	NA	4,885	NA	NA	NA
1998	NA	NA	3,924	NA	NA	NA
1999	NA	NA	2,065	NA	NA	NA
2000	NA	NA	1,762	NA	NA	NA
2001	NA	NA	1,544	NA	NA	NA
2002	NA	NA	753	NA	NA	NA
2003	NA	NA	910	NA	NA	NA
2004	NA	NA	560	NA	NA	NA
2005	NA	NA	29	NA	NA	NA
2006	NA	NA	225	NA	NA	NA
2007	NA	3	1,618	NA	NA	NA

Year	<i>Sargocentron tiere</i>	<i>Crenimugil crenilabis</i>	<i>Panulirus penicilatus</i>	Clams (multi-species)	<i>Octopus cyanea</i>	<i>Epinepheus melanostigma</i>
2008	NA	NA	1,113	NA	NA	NA
2009	NA	NA	2,759	NA	NA	NA
2010	NA	NA	14,305	NA	NA	NA
2011	NA	NA	3,135	NA	NA	NA
2012	NA	NA	566	NA	NA	NA
2013	79	4	1,727	NA	NA	13
2014	9	NA	140	NA	NA	52
2015	NA	NA	7	NA	NA	52
2016	18	42	249	NA	NA	71
2017	32	NA	1,042	NA	NA	174
2018	20	143	148	NA	NA	182
2019	29	181	NA	NA	NA	146
2020	NA	NA	307	NA	NA	110
<b>10-yr avg.</b>	<b>19</b>	<b>37</b>	<b>732</b>	<b>NA</b>	<b>NA</b>	<b>80</b>
<b>10-yr SD</b>	<b>25</b>	<b>68</b>	<b>1,003</b>	<b>NA</b>	<b>NA</b>	<b>69</b>
<b>20-yr avg.</b>	<b>9</b>	<b>19</b>	<b>1,557</b>	<b>NA</b>	<b>NA</b>	<b>40</b>
<b>20-yr SD</b>	<b>19</b>	<b>50</b>	<b>3,130</b>	<b>NA</b>	<b>NA</b>	<b>63</b>

“NA” = no data available.

Calculations: Catch tallied from commercial purchase data for species identified as priority ECS (Appendix A).

**Table 8b. Catch (lb) from commercial purchase data for prioritized species in American Samoan ECS fisheries**

Year	<i>Sargocentron tiere</i>	<i>Crenimugil crenilabis</i>	<i>Panulirus penicilatus</i>	Clams (multi-species)	<i>Octopus cyanea</i>	<i>Epinepheus melanostigma</i>
1996	NA	NA	3,104	NA	NA	NA
1997	NA	NA	4,262	NA	NA	NA
1998	NA	NA	3,088	NA	NA	NA
1999	NA	NA	2,255	NA	NA	NA
2000	NA	NA	808	NA	NA	NA
2001	NA	NA	1,105	NA	NA	NA
2002	NA	NA	762	NA	NA	NA
2003	NA	NA	779	NA	NA	NA
2004	NA	NA	506	NA	NA	NA
2005	NA	NA	3,238	NA	NA	NA
2006	NA	NA	5,380	NA	NA	NA
2007	NA	NA	1,649	NA	NA	NA
2008	NA	NA	1,417	NA	NA	NA

Year	<i>Sargocentron tiere</i>	<i>Crenimugil crenilabis</i>	<i>Panulirus penicillatus</i>	Clams (multi- species)	<i>Octopus cyanea</i>	<i>Epinepheus melanostigma</i>
2009	NA	NA	680	NA	NA	NA
2010	NA	NA	1,464	NA	NA	NA
2011	NA	NA	974	NA	NA	NA
2012	NA	NA	621	NA	NA	NA
2013	NA	NA	899	NA	NA	NA
2014	NA	NA	1,292	NA	NA	NA
2015	NA	NA	989	NA	NA	NA
2016	NA	NA	2,203	NA	NA	NA
2017	NA	NA	767	NA	NA	NA
2018	NA	3	743	NA	NA	NA
2019	NA	NA	1,256	NA	NA	NA
2020	NA	NA	171	NA	NA	NA
<b>10-yr avg.</b>	NA	<b>0</b>	<b>992</b>	NA	NA	NA
<b>10-yr SD</b>	NA	<b>1</b>	<b>533</b>	NA	NA	NA
<b>20-yr avg.</b>	NA	<b>0</b>	<b>1,345</b>	NA	NA	NA
<b>20-yr SD</b>	NA	<b>1</b>	<b>1,162</b>	NA	NA	NA

“NA” = no data available.

**Summary:** The priority ECS for American Samoa are the soldierfish *Sargocentron tiere*, the giant clams *Tridacna*, the nearshore grouper *Epinephelus melanostigma*, the nearshore mullet *Crenimugil crenilabris*, the octopus *Octopus cyanea* and the lobster *Panulirus penicillatus*. All of these priority ECS have data very recently probably due to sampling changes. However, only the lobster has substantial data throughout the years. Lobster landings were affected by previous hurricanes but not by the 2009 tsunami. Lobster landings were also not correlated with the government alia fishing subsidy. However, covid-19 restrictions seem to have led to 86% decline in sales.



## **1.6 CATCH-PER-UNIT-EFFORT (CPUE) STATISTICS**

This section summarizes the estimates for CPUE in the boat-based fisheries both for all species and for BMUS only. The boat-based fisheries include bottomfishing (handline gear), spearfishing (snorkel), and bottom-trolling mixed that comprise a majority of the total bottomfish catch. Trolling is primarily a pelagic fishing method but also catches coral reef fishes including jacks and gray jobfish. CPUE is reported as both pounds per gear hour and pounds per trip in the boat-based methods.

**Calculations:** CPUE is calculated from interview data by gear type using  $\sum \text{catch} / \sum (\text{number of gears used} * \text{number of hours fished})$  or  $\sum \text{catch} / \sum \text{trips}$  for boat-based data. If the value is blank (i.e., zero), then there was no interview collected for that method. Landings from interviews without fishing hours or number of gears are excluded from the calculations.

**All - lb/trip:** All catch and trips are tallied from landings by gear level, including non-BMUS species.

**All - lb/gr-hr.:** All catch and trips are tallied from trips with data on the number of gears used and numbers of hours fished, including non-BMUS species.

**BMUS - lb/trip:** Only BMUS catch and trips that landed BMUS species are tallied from landings by gear level.

**BMUS - lb/gr-hr.:** Only BMUS catch and trips that landed BMUS are tallied from trips with data on the number of gears used and numbers of hours fished.

**Table 9. CPUE (lb/trip and lb/gear hour) for bottomfish fishing gears in the American Samoa boat-based fishery for all species and BMUS only**

Year	Bottomfishing				Bottom-Troll Mixed				Spearfishing			
	All		BMUS		All		BMUS		All		BMUS	
	lb/trip	lb/gr-hr	lb/trip	lb/gr-hr	lb/trip	lb/gr-hr	lb/trip	lb/gr-hr	lb/trip	lb/gr-hr	lb/trip	lb/gr-hr
1986	136	3.1629	189	3.4249	217	5.0818	130	2.1	257	5.0789	NA	NA
1987	138	4.8346	13	0.5778	210	5.1237	61	1.2039	191	5.2366	NA	NA
1988	175	6.6497	107	4.0791	285	6.0957	96	2.3959	215	5.442	13	0.325
1989	159	6.8703	103	4.2144	326	4.5561	107	1.499	332	7.0243	66	0.9381
1990	127	4.1244	83	2.6035	248	4.3152	95	1.6559	170	5.2713	NA	NA
1991	121	2.9885	69	1.5836	219	5.6877	81	1.986	358	6.2807	NA	NA
1992	139	3.9978	80	2.2854	NA	NA	NA	NA	NA	NA	NA	NA
1993	124	2.7464	62	1.3932	255	4.9038	100	1.9295	70	NA	NA	NA
1994	125	2.6166	53	1.1048	193	3.3716	30	0.5322	247	2.4015	NA	NA
1995	121	3.1105	67	1.5048	160	3.4249	49	0.9954	NA	NA	NA	NA
1996	143	5.5806	61	2.2653	283	6.6927	72	1.6676	NA	NA	NA	NA
1997	139	5.0745	79	2.8703	151	6.4212	63	2.6545	294	10.4707	10	0.6145
1998	175	4.8339	116	3.1987	35	1.4583	NA	NA	393	10.9028	NA	NA
1999	151	5.1222	103	3.4378	103	8.5833	NA	NA	186	7.1635	NA	NA
2000	122	4.1111	61	2.0792	36	3	5	0.4167	NA	NA	NA	NA
2001	140	5.5835	76	2.9408	NA	NA	NA	NA	164	6.2363	NA	NA
2002	81	2.6203	40	1.2748	NA	NA	NA	NA	177	3.7455	NA	NA
2003	105	5.262	50	2.5331	157	6.5657	61	2.0101	179	5	NA	NA
2004	77	1.5414	32	1.0551	151	6.2438	73	2.8781	154	6.9104	NA	NA
2005	97	4.7214	53	2.8239	138	7.6418	53	2.9253	30	3	NA	NA
2006	81	3.4699	32	1.0303	97	4.2978	41	1.8162	86	2.1136	4	NA
2007	147	4.2018	50	1.4061	87	3.6797	49	2.0853	104	2.9904	4	0.1011
2008	191	4.4263	82	1.8302	107	2.9317	32	0.8661	106	3.4339	2	0.0581

Year	Bottomfishing				Bottom-Troll Mixed				Spearfishing			
	All		BMUS		All		BMUS		All		BMUS	
	lb/trip	lb/gr-hr	lb/trip	lb/gr-hr	lb/trip	lb/gr-hr	lb/trip	lb/gr-hr	lb/trip	lb/gr-hr	lb/trip	lb/gr-hr
2009	320	5.711	135	2.3881	278	4.1685	65	0.9738	330	9.2102	NA	NA
2010	190	3.7284	94	1.6112	507	7.6818	308	4.6667	246	6.2103	17	0.5156
2011	194	4.6544	89	2.0253	292	8.2155	68	1.7891	326	8.4875	10	0.1852
2012	54	4.6563	61	2.6506	227	2.8736	55	2.1905	123	11.9337	0	NA
2013	81	1.9066	34	0.5237	162	3.9398	49	1.131	247	7.4339	5	0.1287
2014	118	3.4964	56	1.5382	153	5.2539	31	1.0654	124	2.8798	1	0.0125
2015	109	2.9842	51	1.3638	140	0.6288	31	0.137	147	3.4904	14	0.2842
2016	87	0.5867	41	0.2754	166	3.2375	46	1.0297	49	1.3187	9	0.2632
2017	91	1.128	36	0.4372	145	0.3066	58	0.1873	45	0.1348	3	0.0034
2018	65	1.7273	35	0.9424	75	3.5179	19	0.8353	32	0.9214	2	0.0587
2019	66	2.3901	33	1.1076	138	4.2227	27	0.8384	31	0.8313	1	0.0696
2020	58	2.8195	26	1.1515	114	5.0616	25	1.0678	59	1.4646	4	0.0726
<b>10-year avg.</b>	<b>92</b>	<b>2.635</b>	<b>46</b>	<b>1.2016</b>	<b>161</b>	<b>3.7258</b>	<b>41</b>	<b>1.0272</b>	<b>118</b>	<b>3.8896</b>	<b>5</b>	<b>0.1198</b>
<b>10-year SD</b>	<b>39</b>	<b>1.3016</b>	<b>18</b>	<b>0.6999</b>	<b>57</b>	<b>2.1647</b>	<b>16</b>	<b>0.5931</b>	<b>95</b>	<b>3.7992</b>	<b>4</b>	<b>0.0975</b>
<b>20-year avg.</b>	<b>118</b>	<b>3.3808</b>	<b>55</b>	<b>1.5455</b>	<b>174</b>	<b>4.4705</b>	<b>61</b>	<b>1.583</b>	<b>138</b>	<b>4.3873</b>	<b>5</b>	<b>0.1461</b>
<b>20-year SD</b>	<b>63</b>	<b>1.4829</b>	<b>27</b>	<b>0.7756</b>	<b>99</b>	<b>2.1528</b>	<b>62</b>	<b>1.0794</b>	<b>90</b>	<b>3.1139</b>	<b>5</b>	<b>0.1408</b>

“NA” = no data available.

## **1.7 EFFORT STATISTICS**

This section summarizes the effort trends in the American Samoa bottomfish fishery. Fishing effort trends provide insights on the level of fishing pressure through time. Effort information is provided for the top boat-based fishing methods that comprise most of the annual catch.

Calculations: Effort estimates (in both trips and gear hours) are calculated from boat-based interview data. Trips are tallied according the interview data in boat-based creel surveys. Gear hours are generated by summing the data on number of gears used\*number of hours fished collected from interviews by gear type. For the boat-based estimates, data collection started in 1982, but is reported here from 1989.

All - Trips: All trips tallied by gear type.

All - Gear-hrs: Gear hours tallied by gear type.

BMUS - Trips: Trips that landed BMUS tallied by gear type.

BMUS - Gear-hrs: Gear hours tallied by gear type for trips landed BMUS with data on both number of gears used and numbers of hours fished

**Table 10. Effort (trips and gear hours) for bottomfish fishing gears in the American Samoa boat-based fishery for all species and BMUS only**

Year	Bottomfishing				Bottom-troll Mixed				Spearfishing			
	All		BMUS		All		BMUS		All		BMUS	
	Trips	Gr-hrs	Trips	Gr-hrs	Trips	Gr-hrs	Trips	Gr-hrs	Trips	Gr-hrs	Trips	Gr-hrs
1986	135	5,341	13	346	80	3,385	5	260	39	1,976	NA	NA
1987	19	544	4	90	57	2,337	3	152	51	1,860	NA	NA
1988	41	1,082	37	974	34	1,589	22	879	73	2,887	1	40
1989	30	694	28	681	34	2,435	34	2,435	40	1,893	3	210
1990	19	587	16	512	15	863	15	863	8	258	NA	NA
1991	32	1,300	29	1,256	19	730	14	571	2	114	NA	NA
1992	26	902	24	841	NA	NA	NA	NA	NA	NA	NA	NA
1993	38	1,719	33	1,475	3	156	3	156	1	NA	NA	NA
1994	40	1,917	37	1,784	9	514	8	451	4	411	NA	NA
1995	23	896	19	842	25	1,165	22	1,090	NA	NA	NA	NA
1996	37	949	34	916	10	423	8	343	NA	NA	NA	NA
1997	46	1,261	45	1,241	14	330	14	330	31	871	5	83
1998	17	614	17	614	2	48	NA	NA	2	72	NA	NA
1999	15	442	14	418	1	12	NA	NA	4	104	NA	NA
2000	10	297	9	265	1	12	1	12	NA	NA	NA	NA
2001	37	886	35	878	NA	NA	NA	NA	9	237	NA	NA
2002	44	1,343	44	1,343	NA	NA	NA	NA	7	330	NA	NA
2003	83	1,103	82	1,103	10	99	10	99	7	110	NA	NA
2004	103	4,882	92	2,631	20	484	19	484	3	67	NA	NA
2005	56	743	53	687	29	455	28	455	1	10	NA	NA
2006	88	1,779	56	1,451	12	272	12	272	7	88	1	NA
2007	127	4,147	121	4,085	13	306	11	258	71	2,282	10	366
2008	105	4,349	102	4,311	10	366	10	366	35	1,051	6	241

Year	Bottomfishing				Bottom-troll Mixed				Spearfishing			
	All		BMUS		All		BMUS		All		BMUS	
	Trips	Gr-hrs	Trips	Gr-hrs	Trips	Gr-hrs	Trips	Gr-hrs	Trips	Gr-hrs	Trips	Gr-hrs
2009	109	6,046	107	6,032	8	534	8	534	27	961	NA	NA
2010	42	2,132	36	2,086	1	66	1	66	94	3,533	2	64
2011	55	2,173	52	2,135	18	608	16	569	58	2,158	1	54
2012	99	1,088	14	269	5	277	2	42	55	513	1	NA
2013	75	3,160	36	2,276	11	399	8	252	68	2,171	6	202
2014	125	4,081	107	3,818	22	642	22	642	64	2,761	2	160
2015	122	4,045	116	3,997	27	5,542	25	5,498	26	1,093	4	190
2016	63	8,127	62	8,119	46	1,785	46	1,785	35	1,230	7	228
2017	73	5,650	72	5,650	18	7,420	13	3,780	35	10,195	9	7,117
2018	58	2,083	57	2,083	16	280	11	249	46	1,577	10	392
2019	58	1,469	57	1,469	7	229	7	229	41	1,446	6	115
2020	43	881	39	871	17	357	16	339	48	1,933	14	675
<b>10-year avg.</b>	<b>77</b>	<b>3,276</b>	<b>61</b>	<b>3,069</b>	<b>19</b>	<b>1,754</b>	<b>17</b>	<b>1,339</b>	<b>48</b>	<b>2,508</b>	<b>6</b>	<b>913</b>
<b>10-year SD</b>	<b>27</b>	<b>2,164</b>	<b>29</b>	<b>2,265</b>	<b>11</b>	<b>2,439</b>	<b>12</b>	<b>1,755</b>	<b>13</b>	<b>2,633</b>	<b>4</b>	<b>2,076</b>
<b>20-year avg.</b>	<b>78</b>	<b>3,008</b>	<b>67</b>	<b>2,765</b>	<b>15</b>	<b>1,006</b>	<b>13</b>	<b>796</b>	<b>37</b>	<b>1,687</b>	<b>4</b>	<b>490</b>
<b>20-year SD</b>	<b>29</b>	<b>2,021</b>	<b>30</b>	<b>2,023</b>	<b>11</b>	<b>1,885</b>	<b>11</b>	<b>1,362</b>	<b>26</b>	<b>2,182</b>	<b>4</b>	<b>1,530</b>

“NA” = no data available.

- **Summary: Catch-per-unit effort as reflected in lbs/gr-hr has declined in bottomfishing, BMUS, BTM-TRL and BTM-TRL BMUS throughout the years. The number of bottomfishing trips seems to have increased but the number of BTM-TRL trips declined throughout the years. Covid-19 impacts, there was a 60% decline in BTM-TRL trips and 40% decline in BTM and BMUS gr-hrs.**

## 1.8 PARTICIPANTS

This section summarizes the estimated participation in each fishery. The information presented here can be used in the impact analysis of potential amendments in the FEPs associated with the bottomfish fisheries. The trend in participation over time can also be used as an indicator of fishing pressure.

Calculations: For boat-based data, the estimated number of unique vessels is calculated by tallying the number of vessels recorded in the interview data via vessel registration or name.

All: Total unique vessels by gear type.

BMUS: Unique vessels from trips that landed BMUS by gear type.

**Table 11a. Estimated number of unique vessels for bottomfish fishing gears in the American Samoa boat-based fishery for all species and BMUS only**

Year	Bottomfishing		Bottom-Troll Mixed		Spearfishing	
	All	BMUS	All	BMUS	All	BMUS
1986	20	5	20	3	7	NA
1987	11	3	14	3	8	NA
1988	12	12	11	9	9	1
1989	14	13	13	13	4	1
1990	5	4	6	6	2	NA
1991	13	12	9	7	1	NA
1992	9	9	NA	NA	NA	NA
1993	10	9	3	3	1	NA
1994	8	7	6	6	2	NA
1995	10	8	12	12	NA	NA
1996	15	14	8	6	NA	NA
1997	13	12	8	8	4	3
1998	9	9	1	NA	2	NA
1999	9	8	1	NA	1	NA
2000	8	7	1	1	NA	NA
2001	12	11	NA	NA	5	NA
2002	13	13	NA	NA	3	NA
2003	14	14	4	4	4	NA
2004	21	21	7	6	3	NA
2005	13	12	5	5	1	NA
2006	20	14	1	1	2	1
2007	21	19	6	4	3	3
2008	18	16	8	8	3	2
2009	14	14	4	4	3	NA
2010	11	8	1	1	5	1
2011	8	7	5	5	2	1

Year	Bottomfishing		Bottom-Troll Mixed		Spearfishing	
	All	BMUS	All	BMUS	All	BMUS
2012	11	6	4	2	2	1
2013	13	10	5	3	3	2
2014	16	13	9	9	4	1
2015	14	14	10	9	4	2
2016	15	15	10	10	3	2
2017	11	11	8	7	6	3
2018	9	9	6	5	3	3
2019	6	6	3	3	5	2
2020	7	6	6	6	3	3
<b>10-year avg.</b>	<b>11</b>	<b>10</b>	<b>7</b>	<b>6</b>	<b>4</b>	<b>2</b>
<b>10-year SD</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1</b>
<b>20-year avg.</b>	<b>13</b>	<b>12</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>1</b>
<b>20-year SD</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>1</b>

“NA” = no data available.

**Summary: The number of operating vessels was affected by natural disasters and government subsidy throughout the years. But the number of operating vessels declined throughout the years.**

Calculations: For boat-based data, the estimated number of fishermen per trip is calculated by filtering interviews that recorded the number of fishers, and then  $\sum \text{fishers} / \sum \text{trips}$ . A blank cell indicates insufficient data to generate an estimate of average fishers.

All: Average fishers from all trips by gear type.

BMUS: Average fishers from trips that landed BMUS by gear type.

**Table 11b. Estimated number of fishermen per trip for bottomfishing gears in the American Samoa boat-based fishery for all species and BMUS only**

Year	Bottomfishing		Bottom-Troll Mixed		Spear	
	All	BMUS	All	BMUS	All	BMUS
1986	3	2	2	2	5	NA
1987	3	2	2	2	5	NA
1988	2	2	3	3	4	4
1989	3	3	4	4	5	6
1990	2	2	3	3	4	NA
1991	3	3	3	3	5	NA
1992	2	2	NA	NA	NA	NA



Year	Bottomfishing		Bottom-Troll Mixed		Spear	
	All	BMUS	All	BMUS	All	BMUS
1993	2	2	3	3	5	NA
1994	2	2	3	3	4	NA
1995	3	2	2	3	NA	NA
1996	3	3	3	2	NA	NA
1997	3	3	3	3	5	3
1998	3	3	3	NA	6	NA
1999	2	2	3	NA	4	NA
2000	3	3	3	3	NA	NA
2001	3	3	NA	NA	3	NA
2002	3	3	NA	NA	5	NA
2003	3	3	3	3	4	NA
2004	3	3	3	3	6	NA
2005	3	3	3	3	5	NA
2006	3	4	3	3	4	6
2007	3	3	3	3	5	5
2008	3	3	3	3	4	5
2009	4	4	4	4	6	NA
2010	3	4	3	3	6	5
2011	3	3	3	3	7	9
2012	2	3	5	3	5	NA
2013	3	3	4	4	6	6
2014	3	3	3	3	6	7
2015	3	3	3	3	5	5
2016	3	3	3	3	5	4
2017	6	6	7	4	7	14
2018	3	3	3	2	5	5
2019	3	3	3	3	5	4
2020	2	2	2	2	5	5
<b>10-year avg.</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>6</b>	<b>6</b>
<b>10-year SD</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>
<b>20-year avg.</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>4</b>
<b>20-year SD</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>4</b>

“NA” = no data available.

## 1.9 BYCATCH ESTIMATES

This section focuses on Magnuson-Stevens Fishery Conservation and Management Act (MSA) § 303(a)(11), which requires that all fishery management plans (FMPs) establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery. Additionally, it is required to include conservation and management measures that, to the extent practicable, minimize bycatch and bycatch mortality. The MSA § 303(a)(11) standardized reporting methodology is commonly referred to as a “Standardized Bycatch Reporting Methodology” (SBRM) and was added to the MSA by the Sustainable Fisheries Act of 1996 (SFA). The Council implemented omnibus amendments to FMPs in 2003 to address MSA bycatch provisions and established SBRMs at that time.

Calculations: The number caught is the sum of the total number of individuals found in the raw data including bycatch. The number discarded or released is the total number of individuals in the raw data that are not kept. Percent bycatch is the sum of all released divided by the number caught and multiplied by 100.

**Table 12. Time series of catch and bycatch in the American Samoa boat-based BMUS and non-BMUS fisheries**

Year	BMUS			Non-BMUS			BMUS + Non-BMUS		
	# Caught	# Discard or Release	% Bycatch	# Caught	# Discard or Release	% Bycatch	# Caught	# Discard or Release	% Bycatch
1992	1,803	0	0.00	637	0	0.00	2,440	0	0.00
1993	1,534	0	0.00	860	0	0.00	2,394	0	0.00
1994	5,447	0	0.00	2,210	0	0.00	7,657	0	0.00
1995	2,397	0	0.00	1,008	0	0.00	3,405	0	0.00
1996	3,940	0	0.00	2,059	0	0.00	5,999	0	0.00
1997	2,910	0	0.00	2,283	0	0.00	5,193	0	0.00
1998	998	0	0.00	846	0	0.00	1,844	0	0.00
1999	3,213	0	0.00	2,417	0	0.00	5,630	0	0.00
2000	3,386	0	0.00	3,052	0	0.00	6,438	0	0.00
2001	3,499	0	0.00	2,703	0	0.00	6,202	0	0.00
2002	3,362	0	0.00	3,597	0	0.00	6,959	0	0.00
2003	3,778	0	0.00	4,019	1	0.02	7,797	1	0.01
2004	2,970	0	0.00	3,764	0	0.00	6,734	0	0.00
2005	1,807	0	0.00	1,877	0	0.00	3,684	0	0.00
2006	1,573	0	0.00	4,260	0	0.00	5,833	0	0.00
2007	2,752	0	0.00	4,184	0	0.00	6,936	0	0.00
2008	4,616	0	0.00	3,972	0	0.00	8,588	0	0.00
2009	11,080	0	0.00	8,441	0	0.00	19,521	0	0.00
2010	2,902	0	0.00	2,119	0	0.00	5,021	0	0.00
2011	4,229	0	0.00	3,130	0	0.00	7,359	0	0.00

Year	BMUS			Non-BMUS			BMUS + Non-BMUS		
	# Caught	# Discard or Release	% Bycatch	# Caught	# Discard or Release	% Bycatch	# Caught	# Discard or Release	% Bycatch
2012	775	0	0.00	4,362	0	0.00	5,137	0	0.00
2013	1,031	0	0.00	3,494	0	0.00	4,525	0	0.00
2014	3,123	0	0.00	3,504	0	0.00	6,627	0	0.00
2015	3,602	0	0.00	3,666	0	0.00	7,268	0	0.00
2016	888	0	0.00	1,234	0	0.00	2,122	0	0.00
2017	926	0	0.00	1,425	0	0.00	2,351	0	0.00
2018	630	0	0.00	742	0	0.00	1,372	0	0.00
2019	771	0	0.00	823	0	0.00	1,594	0	0.00
2020	404	0	0.00	632	0	0.00	1,036	0	0.00
<b>10-yr avg.</b>	<b>1,638</b>	<b>0</b>	<b>0.00</b>	<b>2,301</b>	<b>0</b>	<b>0.00</b>	<b>3,939</b>	<b>0</b>	<b>0.00</b>
<b>10-yr SD</b>	<b>1,351</b>	<b>0</b>	<b>0.00</b>	<b>1,377</b>	<b>0</b>	<b>0.00</b>	<b>2,411</b>	<b>0</b>	<b>0.00</b>
<b>20-yr avg.</b>	<b>2,736</b>	<b>0</b>	<b>0.00</b>	<b>3,097</b>	<b>0</b>	<b>0.00</b>	<b>5,833</b>	<b>0</b>	<b>0.00</b>
<b>20-yr SD</b>	<b>2,322</b>	<b>0</b>	<b>0.00</b>	<b>1,751</b>	<b>0</b>	<b>0.01</b>	<b>3,883</b>	<b>0</b>	<b>0.00</b>