



## **Evaluation of 2016 Catches Relative to its Respective Annual Catch Limits**

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### ***Introduction***

Since the introduction of the Annual Catch Limits (ACLs) by the re-authorization of the Magnuson-Stevens Fishery Conservation Act in 2006 and its implementation in 2012, the Councils are required to monitor all the catches of all management unit species with ACLs on an annual basis. This monitoring would be the basis for the following year's action when the accountability measures are triggered. Majority of the Western Pacific ACLs were lower than the Acceptable Biological Catches (ABCs) based on the SEEM factors. The ABCs were lowered from the Overfishing Limit (used MSY as proxy derived from the results of the Biomass Augmented Catch MSY approach) based on the results of the P\* Analysis. By law when the ACLs had been exceeded more than twice on consecutive years, the ACL specification system will have to be reviewed and changed. The current accountability measure would entail a downward adjustment to the catch limit for the next fishing year by the amount of the overage. The catch to be compared to the ACL is based on the running 3 year average as recommended by the Council at its 160<sup>th</sup> meeting.

At its 2017 Annual Meeting, the Fishery Ecosystem Plan Team evaluated the 2016 catches relative to its respective ACLs. Below are the summaries and the rationale behind the catches and overages (when applicable).

### ***Plan Team's Task***

The task of the Plan Team is to evaluate the catch and to provide rationale for the overage. Plan Team members have the local knowledge of the fishery dynamics as well as the data collection programs. The catch estimates are affected by various factors including but not limited to: population abundance, fishing effort and participation, changes in the data collection system (improvements or lack of implementation) etc. Plan Team must provide adequate explanation why the overage adjustment is necessary (or not necessary).

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### **American Samoa**

None of the American Samoa management unit species complex had exceeded their catch limits. Therefore no further action is required. The catches ranged from a low of 0.6% for humphead wrasse to a high 78.1% for mollusks of the catch limits. The increase in mollusk was due to the high participation count for the gleaning method and three catch interviews with high catch of octopus. The fishery for deepwater shrimp, Kona crab and deep sea corals remain inactive.

Table 1. Evaluation of 2016 catches relative to the 2016 ACL for the management unit species in American Samoa. “NAF” means no active fishery. “ND” means no data. “CD” means confidential data.

Fishery	MUS	ACL	2014	2015	2016	Ave Catch	Overage?	% of ACL
Bottomfish	Bottomfish multi-species complex	106,000	17,555	24,777	21,501	21,278	FALSE	20.1
Crustacean	Deepwater shrimp	80,000	NAF	NAF	NAF			
	Spiny lobster	4,845	1,269	619	1,102	997	FALSE	20.6
	Slipper lobster	30	0	0	13	4	FALSE	14.4
	Kona crab	3,200	NAF	NAF	NAF			
Precious coral	Black coral	790	NAF	NAF	NAF			
	Precious coral in AS expl. area	2,205	NAF	NAF	NAF			
Coral Reef	Selar crumenophthalmus	37,400	609	2,426	2,687	1,907	FALSE	5.1
	Acanthuridae-surgeonfish	129,400	12,123	17,903	12,542	14,189	FALSE	11.0
	Carangidae-jacks	19,900	2,993	7,650	12,308	7,650	FALSE	38.4
	Crustaceans-crabs	4,300	277	177	4,341	1,598	FALSE	37.2
	Holocentridae-squirrelfish	15,100	2,734	1,711	3,465	2,637	FALSE	17.5
	Kyphosidae-rudderfish	2,000	884	436	1,467	929	FALSE	46.5
	Labridae-wrasse	16,200	215	180	427	274	FALSE	1.7
	Lethrinidae-emperors	19,600	5,796	11,603	3,197	6,865	FALSE	35.0
	Lutjanidae-snappers	63,100	15,722	20,646	18,360	18,243	FALSE	28.9
	Mollusk-turbo snails; octopus; clams	18,400	5,780	5,193	32,125	14,366	FALSE	78.1
	Mugilidae-mulletts	4,600	647	677	969	764	FALSE	16.6
	Mullidae-goatfish	11,900	278	810	787	625	FALSE	5.3
	Scaridae-parrotfish	272,000	7,532	9,868	1,355	6,252	FALSE	2.3
	Serranidae-groupers	25,300	5,668	3,234	4,762	4,555	FALSE	18.0
	<b>Siganidae-rabbitfish</b>	<b>163</b>	<b>30</b>	<b>147</b>	<b>1,127</b>	<b>435</b>	<b>TRUE</b>	<b>266.7</b>
	All other CREMUS combined	18,400	2,727	3,020	2,415	2,721	FALSE	14.8
	Cheilinus undulatus	1,743	0	0	10	3	FALSE	0.6
	Bolbometopon muricatum	235	0	0	0	0	FALSE	0
Carcharhinidae-reef sharks	1,615	0	0	0	0	FALSE	0	

**Rationale for the overage:** There is no targeted rabbitfish fishery in American Samoa. Staff requested WPacFIN and DMWR to investigate on the drastic increase in estimated catch. The investigation showed that shore-based expansion utilized the pooling function for this complex in the spear fishery resulted in estimated 957 lbs caught and if no pooling resulted in 163 lbs (Ochavillo and Mika, pers. comm. Email dated 4/10/2017 1:51pm). Further investigation of the raw interview file showed 5 reports with rabbitfish catch:

1/20/16	1 piece	0.793 lb
6/21/16	1 piece	0.881 lb
6/21/16	1 piece	0.771 lb
6/21/16	1 piece	0.639 lb
6/21/16	1 piece	0.573 lb

There were some questions on the reliability of the expansion system to accurately estimate total family level catch with low sample size.

WPacFIN's investigation showed the increase was from the shore-based spear fishery with additional gears counted in all of the night shift surveys (for all 3 routes) in 2016. There were no night shift interviews in 2015. However, the numbers in the SAFE report showed a decrease in participation runs and catch interviews (both regular and opportunistic) in the past 3 years. There was also a decrease in estimated spear effort and participation (SAFE report says 0).

The discussion at the 2017 Archipelagic Plan Team meeting attributed the overage to improvements in the creel survey where DMWR initiated the full 24 hour shift in 2016. This is an attempt to start capturing the night time shore-based spear fishing. It was also pointed out that the calculation of the OFL and the projections of the catch distribution to the risk is under estimated because the recent data is not included where rabbitfish is starting to appear in the catch data.

## Guam

In 2016, jacks exceeded its ACL again by 5,406 lbs based on the three year average catch from 2014 to 2016. The remaining MUS that did not exceed the ACLs have catches ranging from a low of 5% to a high of 65% of the ACLs harvested in the different fisheries. The fishery for deepwater shrimp, Kona crab, and deep water corals remain inactive. There is no catch data recorded for the bumphead parrotfish.

Table 2. Evaluation of 2016 catches relative to the 2016 ACL for the management unit species in Guam

Fishery	MUS	ACL	2014	2015	2016	Ave Catch	Overage?	% of ACL
Bottomfish	Bottomfish multi-species complex	66,800	25,344	14,695	28,141	22,727	FALSE	34
Crustacean	Deepwater shrimp	48,488	NAF	NAF	NAF			0
	Spiny lobster	3,135	1,628	389	211	743	FALSE	24
	Slipper lobster	20	0	0	0	0	FALSE	0
	Kona crab	1,900	NAF	NAF	NAF			0
Precious coral	Black coral	700	NAF	NAF	NAF			0
	Precious coral in CNMI expl. area	2,205	NAF	NAF	NAF			0
Coral Reef	<i>Selar crumenophthalmus</i>	50,200	15,497	30,023	3,750	16,423	FALSE	33
	Acanthuridae-surgeonfish	97,600	13,874	19,962	26,601	20,146	FALSE	21
	<b>Carangidae-jacks</b>	<b>21,201</b>	<b>26,121</b>	<b>27,201</b>	<b>26,499</b>	<b>26,607</b>	<b>TRUE</b>	<b>125</b>
	Crustaceans-crabs	7,300	1,577	964	1,420	1,320	FALSE	18
	Holocentridae-squirrelfish	11,400	2,931	3,771	1,192	2,631	FALSE	23
	Kyphosidae-rudderfish	9,600	14,810	1,541	2,395	6,249	FALSE	65
	Labridae-wrasse	25,200	1,086	2,482	2,935	2,168	FALSE	9
	Lethrinidae-emperors	53,000	37,410	12,699	13,314	21,141	FALSE	40
	Lutjanidae-snappers	18,000	7,839	3,570	5,941	5,783	FALSE	32
	Mollusk-turbo snails; octopus; clams	23,800	2,147	22,622	7,356	10,708	FALSE	45
	Mugilidae-mulletts	17,900	387	1,283	822	831	FALSE	5
	Mullidae-goatfish	15,300	11,151	11,619	5,341	9,370	FALSE	61
	Scaridae-parrotfish	71,600	9,116	3,957	11,733	8,269	FALSE	12
	Serranidae-groupers	22,500	7,915	5,214	5,715	6,281	FALSE	28
	Siganidae-rabbitfish	18,600	7,127	5,992	8,010	7,043	FALSE	38
	All other CREMUS combined	185,000	37,949	76,849	33,409	49,402	FALSE	27
	<i>Cheilinus undulatus</i>	1,960	98	143	77	106	FALSE	5
	<i>Bolbometopon muricatum</i>	797	0	0	0	0	FALSE	0
Carcharhinidae-reef sharks	1,900	2,806	1,825	104	1,578	FALSE	83	

**Rationale for the overage:** The catch in the last three years were stable (26,121 lbs, 27,201 lbs, and 26,499 lbs for 2014, 2015, and 2016, respectively). The ACL for jacks was reduced from 29,300 lbs to 21,201 lbs due to the overage in 2015 of 8,099 lbs with the spike in catch in 2013 of 59,468 lbs. NMFS applied the reduction to the ACL by the amount of the overage (82 FR 5517 2017-01-18) based on the Council’s accountability measure for this data poor stock.

The boat-based troll and the shore-based hook and line, and gill net fishery have shown a sudden increase in CPUE in 2013 that contributed to the increase in catch for that year. Concurrent with this increase in CPUE was an increase fishing effort (expressed in gear hours).

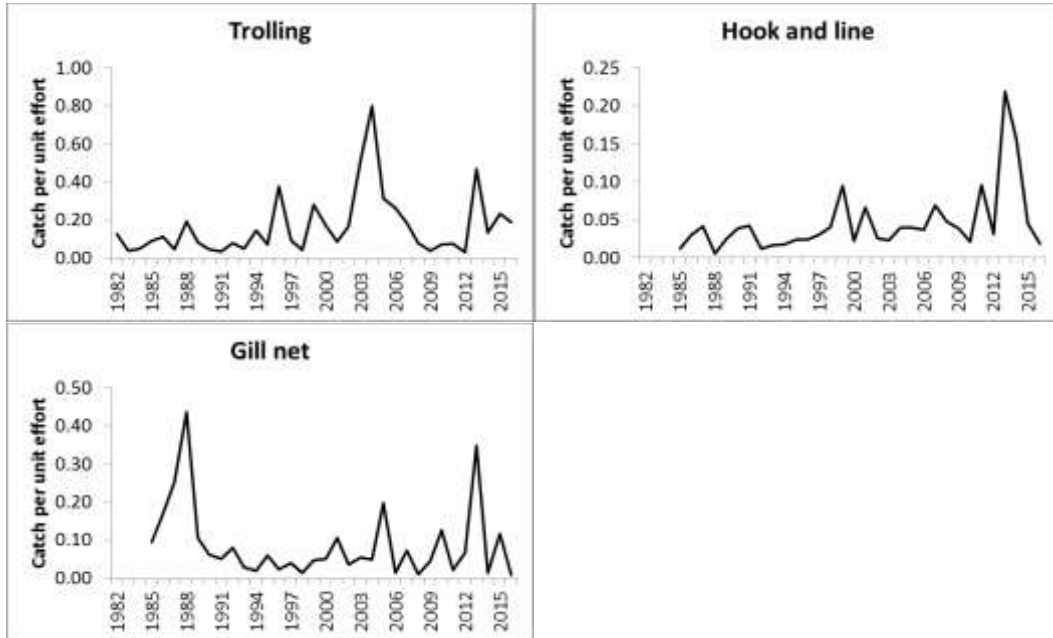


Figure 1. Catch per unit effort for Carangidae in the boat and shore-based fisheries

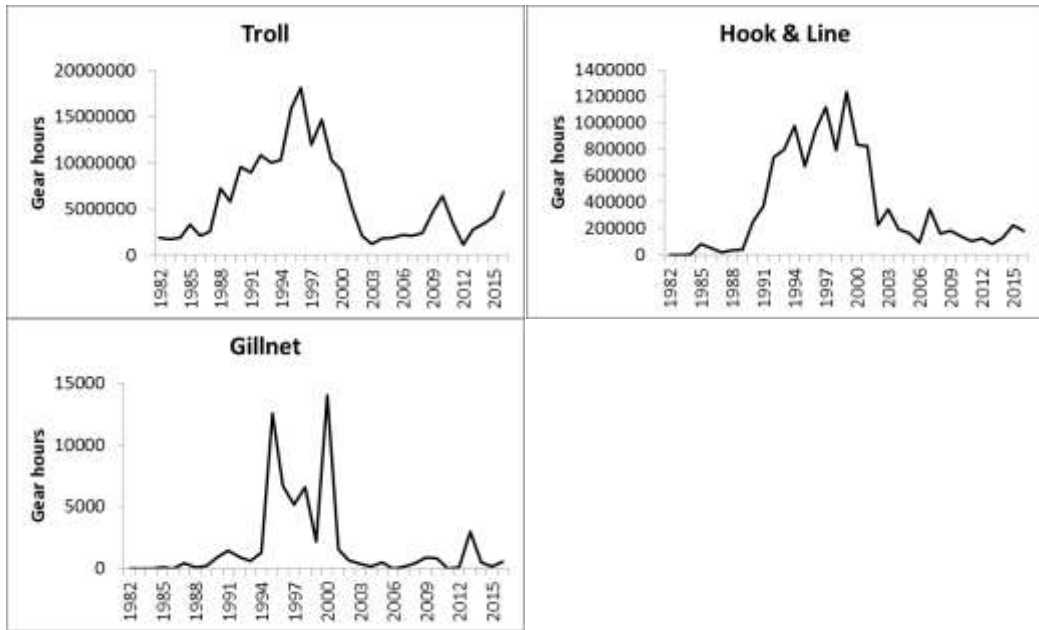
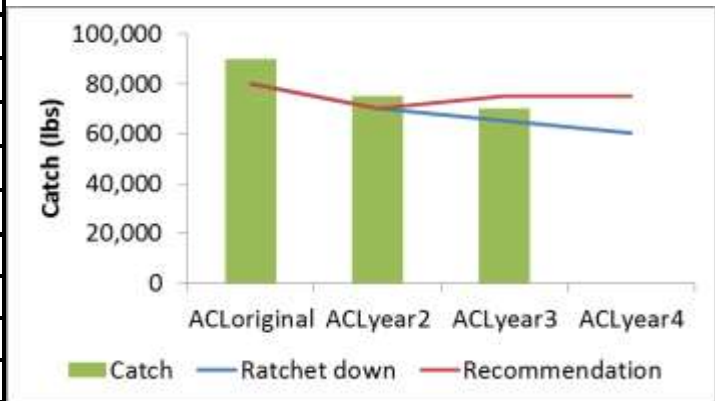


Figure 2. Fishing effort for Carangidae in the boat and shore-based fisheries

This overage in catch can be attributed to the implementation of the accountability measure and not due to a change in the fishery dynamics or the stock. There were concerns expressed at the Plan Team discussion that this would initiate a “ratchet down effect” when the overage is applied to the current year ACL. The Plan Team recommended that the Council revisit the accountability measure and consider application of the overage to the original ACL to avoid the ratchet down effect. For example:

**Scenario 1: High catch on year 1 and lower catch on year 2**

	Ratchet down	Recommendation
OFL	100,000 lbs	100,000 lbs
ACL <sub>original</sub>	80,000 lbs	80,000 lbs
Year 1 <sub>catch</sub>	90,000 lbs	90,000 lbs
Year 1 <sub>overage</sub>	10,000 lbs	10,000 lbs
ACL <sub>year2</sub>	70,000 lbs	70,000 lbs
Year 2 <sub>catch</sub>	75,000 lbs	75,000 lbs
Year 2 <sub>overage</sub>	5,000 lbs	5,000 lbs
ACL <sub>year3</sub>	65,000 lbs	75,000 lbs
Year 3 <sub>catch</sub>	70,000 lbs	70,000 lbs
Year 3 <sub>overage</sub>	5,000 lbs	0 lbs
ACL <sub>year4</sub>	60,000 lbs	75,000 lbs



**Scenario 2: Constant high catch**

	Ratchet down	Recommendation
OFL	100,000 lbs	100,000 lbs
ACL <sub>original</sub>	80,000 lbs	80,000 lbs
Year 1 <sub>catch</sub>	90,000 lbs	90,000 lbs
Year 1 <sub>overage</sub>	10,000 lbs	10,000 lbs
ACL <sub>year2</sub>	70,000 lbs	70,000 lbs
Year 2 <sub>catch</sub>	90,000 lbs	90,000 lbs
Year 2 <sub>overage</sub>	20,000 lbs	20,000 lbs
ACL <sub>year3</sub>	50,000 lbs	60,000 lbs
Year 3 <sub>catch</sub>	90,000 lbs	90,000 lbs
Year 3 <sub>overage</sub>	40,000 lbs	30,000 lbs
ACL <sub>year4</sub>	10,000 lbs	50,000 lbs

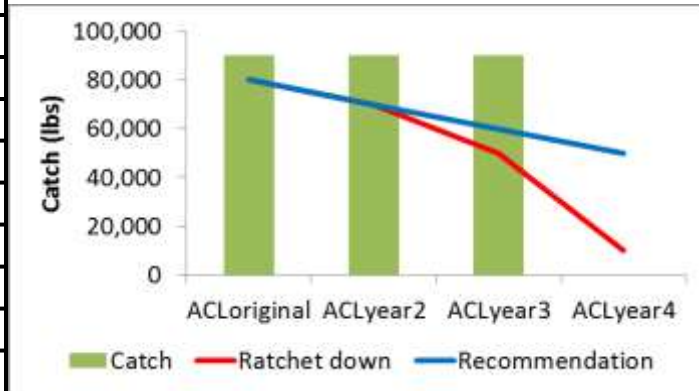


Figure 3. Projections of ACLs based on the 2 scenarios to address the ratchet down effect

Scenario 1 depicts an annual catch scenario that exceeded the ACL on the first year and an overage adjustment was applied on year 2. The year 2 catch also exceeded the ACL but the difference is how the overage was applied on year 3. If applied to the year 2 ACL then the ratchet down effect comes into play where year 3 catch still exceeds the ACL. If applied to the original ACL, then year 3 ACL will be higher and the catch would be below that ACL.

Scenario 2 depicts a constant high catch where the ACLs are always below the average catch. This scenario can include when the ACL is under estimated. The rate of ACL decline is less pronounced when the overage is applied to the original ACL compared to the reduced ACL.

The MSY and OFL estimate for the jack complex in Guam was 31,700 lbs. The current average catch of 26,607 lbs will not result in overfishing since its below the OFL. This level of catch produces a risk level between 15-20% based on Sabater and Kleiber (2013) and alternatives presented to the Council at its 159<sup>th</sup> meeting on March 2014. The Plan Team may recommend no overage adjustment since the level of risk is below the estimated OFL and still prevents overfishing.

**MSY/OFL Proxy (lb), Estimated Catch (lb), ACL Alternatives (in lb) and Probabilities of Overfishing (P\*) CREMUS Stocks and Stock Complexes in Guam**

	Selar crumenophthalmus- clabulo-cr. bicoloris	Acanthuridae- surgeonfishes	Algae	Carangidae- jacks	Carcharhinidae- reef sharks	Crustaceans- crabs	Holocentridae- squirrelfishes	Kyphosidae- rudderfishes	Labridae- wrasses	Lethrinidae- emperors	Lutjanidae- snappers	Mollusks- octopus	Mugilidae- mulletts	Mullidae- goatfishes	Scaridae- parrotfishes	Serranidae- groupers	Siganidae- rabbitfishes	All other CREMUS combined
<b>MSY</b>	61,300	118,000	7,600	31,700	2,900	8,600	13,900	10,300	28,500	78,000	21,800	29,000	26,200	16,400	87,100	28,600	19,700	211,300
<b>OFL Proxy</b>	60,800 P*=50%	114,700 P*=50%	7,800 P*=50%	32,200 P*=50%	2,900 P*=50%	8,600 P*=50%	13,800 P*=50%	10,300 P*=50%	28,200 P*=50%	76,600 P*=50%	20,700 P*=50%	28,600 P*=50%	24,500 P*=50%	16,300 P*=50%	86,500 P*=50%	27,400 P*=50%	19,700 P*=50%	209,200 P*=50%
<b>2012 Catch</b>	120,513	6,083	61	18,122	1,761	2,453	1,956	1,608	590	18,425	8,410	8,463	16,441	6,761	6,673	4,971	2,843	35,237
<b>Ave. Catch (2010-2012)</b>	87,215	6,923	110	21,779	1,062	1,080	1,290	3,793	864	17,563	7,268	5,554	7,825	5,273	6,923	6,644	5,179	30,677
<b>Alternative 1 (Status Quo)</b>	56,514 P*<10%	70,702 P*<40%	5,329 P*<5%	45,377 P*>50%	6,942 P*>50%	5,523 P*<5%	8,300 P*<5%	13,247 P*>50%	5,195 P*<5%	38,720 P*<15%	17,726 P*<25%	21,941 P*<15%	15,032 P*<20%	25,367 P*>50%	28,649 P*<5%	17,958 P*<15%	26,120 P*>50%	83,214 P*<5%
<b>Alternative 2 (ACL=ABC)</b>	52,300 P*=30%	101,700 P*=35%	7,100 P*=35%	29,900 P*=30%	?? P*=??	7,600 P*=35%	12,000 P*=35%	9,800 P*=35%	25,800 P*=35%	58,000 P*=35%	18,600 P*=35%	25,000 P*=35%	19,400 P*=35%	15,600 P*=40%	75,000 P*=35%	23,700 P*=35%	19,500 P*=40%	191,300 P*=35%
<b>Alternative 3 (ACL Lower than ABC)</b>					2,200 P*=35%									15,300 P*=35%			19,200 P*=35%	
		97,600 P*=30%	6,900 P*=30%		2,000 P*=30%	7,300 P*=30%	11,400 P*=30%	9,600 P*=30%	25,200 P*=30%	53,000 P*=30%	18,000 P*=30%	23,800 P*=30%	17,900 P*=30%	15,100 P*=30%	71,600 P*=30%	22,500 P*=30%	19,100 P*=30%	185,000 P*=30%
	50,200 P*=25%	93,500 P*=25%	6,600 P*=25%	29,300 P*=25%	1,800 P*=25%	7,000 P*=25%	10,800 P*=25%	9,400 P*=25%	24,700 P*=25%	48,000 P*=25%	17,400 P*=25%	22,700 P*=25%	16,600 P*=25%	14,800 P*=25%	68,100 P*=25%	21,400 P*=25%	19,000 P*=25%	179,000 P*=25%
	47,900 P*=20%	90,100 P*=20%	6,400 P*=20%	28,600 P*=20%	1,600 P*=20%	6,600 P*=20%	10,200 P*=20%	9,100 P*=20%	24,500 P*=20%	43,700 P*=20%	16,800 P*=20%	21,600 P*=20%	15,400 P*=20%	14,300 P*=20%	64,600 P*=20%	20,300 P*=20%	18,900 P*=20%	173,000 P*=20%
	45,500 P*=15%	86,200 P*=15%	6,100 P*=15%	27,800 P*=15%	1,400 P*=15%	6,200 P*=15%	9,600 P*=15%	8,900 P*=15%	24,100 P*=15%	39,800 P*=15%	16,100 P*=15%	20,400 P*=15%	14,100 P*=15%	14,000 P*=15%	60,600 P*=15%	19,100 P*=15%	18,700 P*=15%	166,000 P*=15%
	42,800 P*=10%	81,100 P*=10%	5,700 P*=10%	26,800 P*=10%	1,200 P*=10%	5,800 P*=10%	9,000 P*=10%	8,500 P*=10%	23,800 P*=10%	36,200 P*=10%	15,400 P*=10%	19,200 P*=10%	12,700 P*=10%	13,600 P*=10%	56,200 P*=10%	17,900 P*=10%	18,600 P*=10%	159,000 P*=10%
	39,300 P*=5%	74,500 P*=5%	5,300 P*=5%	25,200 P*=5%	1,000 P*=5%	5,200 P*=5%	8,200 P*=5%	8,100 P*=5%	23,200 P*=5%	31,500 P*=5%	14,400 P*=5%	17,600 P*=5%	11,000 P*=5%	13,200 P*=5%	51,100 P*=5%	16,400 P*=5%	18,300 P*=5%	150,000 P*=5%



### Commonwealth of Northern Mariana Islands

In 2016, the commercial receipt books reported 304 lbs of lobsters being sold. The three year average catch is 101 lbs (zeros in the first 2 years). The ACL of 60 lb was exceeded by 41 lbs. There is no long time series of catch for slipper lobsters that the Tier 5 approach (average catch) can be based on. The ACL was estimated from using a proxy based on the average Hawaii catch divided by the EFH area for Hawaii slipper lobsters multiplied by the estimated EFH area for CNMI. For the rest of the MUS complex that did not exceed the ACL, the fisheries were able to land MUS ranging from 0.2% with wrasses to a high of 18.2% for rabbitfish.

Table 3. Evaluation of 2016 catches relative to the 2016 ACL for the management unit species in CNMI.

Fishery	MUS	ACL	2014	2015	2016	Ave catch	Overage?	% of ACL
Bottomfish	Bottomfish multi-species complex	228,000	8,756	10,906	51,598	23,753	FALSE	10.4
Crustacean	Deepwater shrimp	275,570	NAF	NAF	NAF			
	Spiny lobster	7,410	0	0	2,065	688	FALSE	9.3
	<b>Slipper lobster</b>	<b>60</b>	<b>0</b>	<b>0</b>	<b>304</b>	<b>101</b>	<b>TRUE</b>	<b>168.9</b>
	Kona crab	6,300	NAF	NAF	NAF			
Precious coral	Black coral	2,100	NAF	NAF	NAF			
	Precious coral in CNMI expl. area	2,205	NAF	NAF	NAF			
Coral Reef	<i>Selar crumenophthalmus</i>	77,400	375	204	0	193	FALSE	0.2
	Acanthuridae-surgeonfish	302,600	2,079	6,391	2,223	3,564	FALSE	1.2
	Carangidae-jacks	44,900	8,512	2,860	11,686	7,686	FALSE	17.1
	Crustaceans-crabs	4,400	0	0	0	0	FALSE	0
	Holocentridae-squirrelfish	66,100	158	545	302	335	FALSE	0.5
	Kyphosidae-rudderfish	22,700	557	468	0	342	FALSE	1.5
	Labridae-wrasse	55,100	237	121	0	119	FALSE	0.2
	Lethrinidae-emperors	53,700	6,606	3,851	12,815	7,757	FALSE	14.4
	Lutjanidae-snappers	190,400	309	681	948	646	FALSE	0.3
	Mollusk-turbo snails; octopus; clams	9,800	0	0	0	0	FALSE	0
	Mugilidae-mulletts	4,500	307	281	307	298	FALSE	6.6
	Mullidae-goatfish	28,400	38	1,550	1,680	1,089	FALSE	3.8
	Scaridae-parrotfish	144,000	697	1,796	2,526	1,673	FALSE	1.2
	Serranidae-groupers	86,900	569	129	153	284	FALSE	0.3
	Siganidae-rabbitfish	10,200	757	2,576	2,242	1,858	FALSE	18.2
	All other CREMUS combined	7,300	873	908	914	898	FALSE	12.3
	<i>Cheilinus undulatus</i>	2,009	0	0	69	23	FALSE	1.1
	<i>Bolbometopon muricatum</i>	797	0	0	0	0	FALSE	0
	Carcharhinidae-reef sharks	5,600	0	0	0	0	FALSE	0

**Rationale for the overage:** The dealer invoicing system is used to monitor the crustacean MUS because the creel surveys are inadequate to capture these fisheries that harvest lobsters. This system, however, can be compounded with fish products sold in local markets that are imported from elsewhere in Micronesia. It is hard to determine if the slipper lobsters recorded in the dealer invoice are caught locally or imported from elsewhere and reported to the system. In addition, the Territory Science Initiative that started in CNMI in 2015 with the goal of improving the reporting (quantity, frequency and quality of data submission) of fish dealers. Since 2012, the total number of invoices increased with a significant decrease in 2015 when DFW lost a biologist in-charge of the dealer invoicing system and the TSI project is still in its initiation stage. In the previous years, there were no reported catches of lobsters (spiny and slipper lobsters). In 2016, there were 59 invoices that reported lobsters and 19 unique fishers contributing to the 59 reports. This is an increase that was not accounted for in the calculation of the OFL, ABC, and ACL. This is an artifact of the improvements in the data collection.

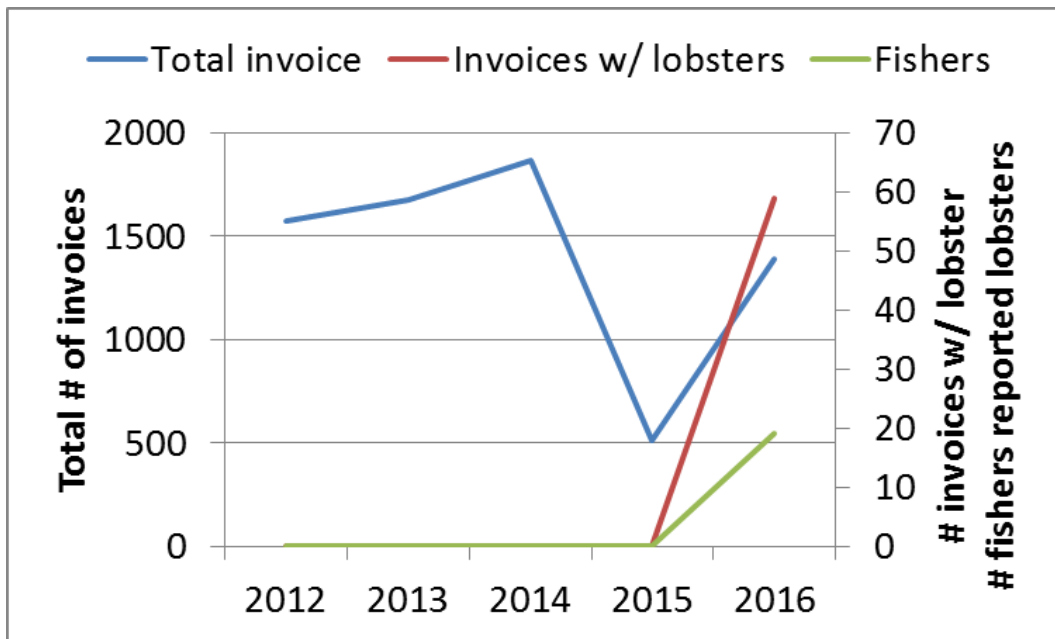


Figure 4. Total # of invoices in CNMI logged from the Dealer Invoice System. Also shows the number of invoices and fishers that reported lobsters in the catch.

## Hawaii

In 2016, two MUS exceeded the ACLs. The crustacean fishery dominated by white crab landings exceeded the ACL by 5.6% based on recent three year average. The mollusk fishery dominated by octopus landing exceeded the ACL by 24.8%.

Table 4. Evaluation of 2016 catches relative to the 2016 ACL for the management unit species in Hawaii. Note that the MHI deep 7 stock complex is on fishing year and is currently still open.

<b>Fishery</b>	<b>Management Unit Species</b>	<b>ACL</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>Ave catch</b>	<b>Overage ?</b>	<b>% of ACL</b>
Bottomfish	MHI Deep 7 stock complex	318,000	311,179	307,075	open	309,127	FALSE	97.2
	Non deep 7 stock complex	178,000	104,390	123,931	118,960	115,760	FALSE	65.0
Crustacean	Deepwater shrimp	250,773	46,226	27,399	18,689	30,771	FALSE	12.3
	Spiny lobster	15,000	10,221	5,882	3,747	6,617	FALSE	44.1
	Slipper lobster	280	0	0	0	0	FALSE	0.0
	Kona crab	27,600	2,081	2,774	1,152	2,002	FALSE	7.3
Precious coral	Auau channel black coral	5,512	C.D.	C.D.	C.D.		FALSE	0.0
	Makapuu bed-pink coral	2,205	N.A.F.	N.A.F.	N.A.F.		FALSE	0.0
	Makapuu bed-bamboo coral	551	N.A.F.	N.A.F.	N.A.F.		FALSE	0.0
	180 fathom bank-pink coral	489	N.A.F.	N.A.F.	N.A.F.		FALSE	0.0
	180 fathom bank-bamboo coral	123	N.A.F.	N.A.F.	N.A.F.		FALSE	0.0
	Brooks bank-pink coral	979	N.A.F.	N.A.F.	N.A.F.		FALSE	0.0
	Brooks bank-bamboo coral	245	N.A.F.	N.A.F.	N.A.F.		FALSE	0.0
	Kaena point bed-pink coral	148	N.A.F.	N.A.F.	N.A.F.		FALSE	0.0
	Kaena point bed-bamboo coral	37	N.A.F.	N.A.F.	N.A.F.		FALSE	0.0
	Keahole bed-pink coral	148	N.A.F.	N.A.F.	N.A.F.		FALSE	0.0
	Keahole bed-bamboo coral	37	N.A.F.	N.A.F.	N.A.F.		FALSE	0.0
	Precious coral in HI exploratory area	2,205	N.A.F.	N.A.F.	N.A.F.		FALSE	0.0
Coral Reef Ecosystem	S. crumenophthalmus-akule	988,000	267,319	385,930	423,823	359,024	FALSE	36.3
	D. macarellus-opelu	428,000	263,896	207,661	217,658	229,738	FALSE	53.7
	Acanthuridae-surgeonfish	342,000	107,072	89,055	74,071	90,066	FALSE	26.3
	Carangidae-jacks	161,200	37,358	42,850	38,718	39,642	FALSE	24.6
	Carcharhinidae-reef sharks	9,310	1,558	2,086	2,199	1,948	FALSE	20.9
	<b>Crustaceans-crabs</b>	<b>26,637</b>	<b>39,623</b>	<b>26,847</b>	<b>17,950</b>	<b>28,140</b>	<b>TRUE</b>	<b>105.6</b>
	Holocentridae-squirrelfish	148,000	58,456	51,011	48,422	52,630	FALSE	35.6
	Kyphosidae - rudderfish	105,000	20,225	19,363	12,472	17,353	FALSE	16.5
	Labridae - wrasse	205,000	6,508	7,832	7,250	7,197	FALSE	3.5
	Lethrinidae - emperors	35,500	4,723	3,253	1,910	3,295	FALSE	9.3
	Lutjanidae-snappers	330,300	33,644	36,254	39,103	36,333	FALSE	11.0
	<b>Mollusk-turbo snails, octopus, giant clam</b>	<b>31,163</b>	<b>41,395</b>	<b>38,015</b>	<b>37,256</b>	<b>38,889</b>	<b>TRUE</b>	<b>124.8</b>
	Mugilidae-mulletts	19,200	7,356	7,252	5,465	6,691	FALSE	34.8
	Mullidae-goatfish	165,000	58,811	65,886	66,558	63,752	FALSE	38.6

Scaridae-parrotfish	239,000	73,505	44,385	32,727	50,206	FALSE	21.0
Serranidae - groupers	128,400	2,414	949	1,533	1,632	FALSE	1.3
All other CREMUS combined	485,000	75,253	71,980	46,081	64,438	FALSE	13.3

**Rationale for the overage:**

Similar to Guam jack, the catch in 2016 was stable or even decreasing compared to the previous two years. The ACL for Hawaii crustacean was reduced from 33,500 lbs to 26,637 lbs due to the overage in 2015 of 6,836 lbs with the spike in catch in 2013 of 44,201 lbs. The ACL for Hawaii mollusk was reduced from 35,700 lbs to 31,163 lbs due to the overage in 2015 of 4,537 lbs with the spike in catch in 2013 of 41,328 lbs. NMFS applied the reduction to the ACL by the amount of the overage (82 FR 5517 2017-01-18) based on the Council’s accountability measure for this data poor stock.

Mollusk is dominated by the day tako fishery using the spear. The catch for day tako increased significantly over the years. The fishery indicators showed that the number of participants declined over the years and the number of trips (fishing effort). But despite the decrease in participation and effort, the catch increased and the CPUE also increased (Figure 6). There are years where catches will be above normal reflecting the condition of the environment favorable to increased productivity. It was also noted that a recent publication<sup>1</sup> showed that a number of fisheries were independent of stock production.

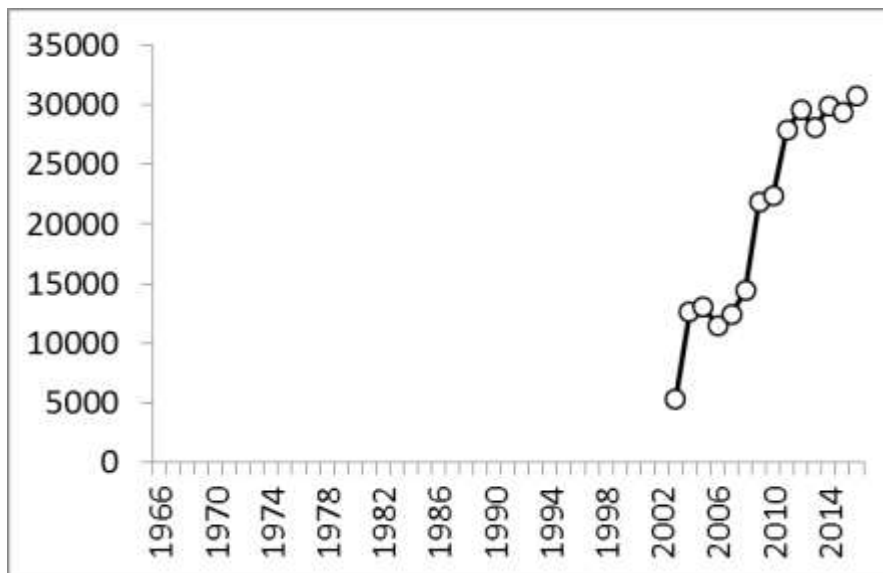


Figure 5. Catch over time of day tako from the inshore spear fishery

<sup>1</sup> Vert-pre, K., et al. 2013. Frequency and intensity of productivity regime shifts in marine fish stocks. PNAS, 110 (5), 1779-1784

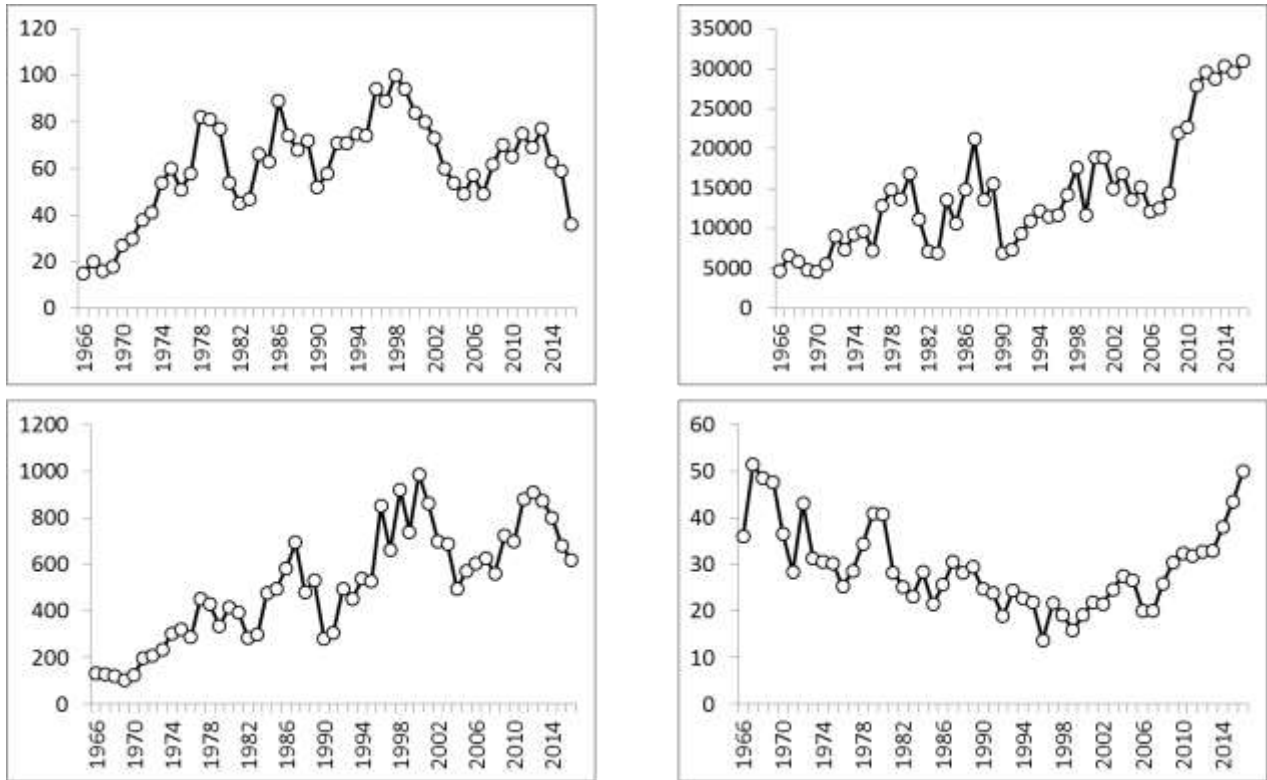


Figure 6. Trends in fisheries indicators for the spear fishery for day tako: A. number of license (top left); B. number of trips (bottom left); C. pound caught (top right); D. catch per unit effort in pounds per trip (bottom right)

For the crustacean coral reef fishery, this is dominated by the kuahonu crab harvested using crab traps. Fishery participation remained stable in the past years while fishing effort decreased. The CPUE increased slightly in the last year.

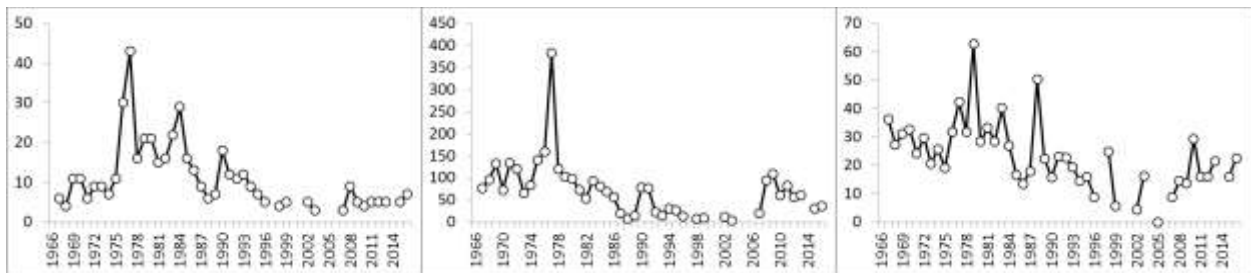


Figure 7. Trends in fisheries indicators for the crab trap fishery for Kuahonu crabs: A) number of license (left); B) number of trips (middle); and C) catch per unit effort in pounds per trip (right).

The estimated MSY, OFL proxy, and ABC for the coral reef crustaceans are 43,100 lbs, 42,800 lbs, and 35,400, respectively. The average catch (2014-2016) at 28,140 lbs is below the projected MSY, OFL, and ABC. For the coral reef mollusk, the estimated MSY, OFL proxy, and ABC are 50,300 lbs, 49,500 lbs, and 38,200 lbs, respectively. The average catch (2014-2016) at 38,889 lbs is below the projected MSY and OFL but above the ABC.



	Selar crumenophthalmus- akule or bigeye scad	Decapterus macarellus- opeln or mackerel scad	Acanthuridae- surgeonfishes	Carangidae- jacks	Carcharhinidae- reef sharks	Crustaceans- crabs	Holocentridae- squirrelfishes	Kyphosidae- ruderfishes	Labridae- wrasses	Lethrinidae- emperors	Lutjanidae- snappers	Mollusks- octopus	Mugilidae- mullets	Mullidae- goatfishes	Scaridae- parrotfishes	Serranidae- groupers	All other CREMUS combined
<b>MSY</b>	1,150,800	538,000	445,500	185,100	12,400	43,100	159,800	122,800	229,200	39,600	359,300	50,300	24,600	195,700	271,500	141,300	540,800
<b>OFL Proxy</b>	1,138,000 P*±50%	531,200 P*±50%	452,600 P*±50%	183,700 P*±50%	12,500 P*±50%	42,800 P*±50%	158,100 P*±50%	119,600 P*±50%	227,400 P*±50%	39,400 P*±50%	356,200 P*±50%	49,500 P*±50%	24,500 P*±50%	197,500 P*±50%	270,600 P*±50%	139,900 P*±50%	535,600 P*±50%
<b>2012 Catch</b>	279,842	246,223	133,280	50,301	0	21,093	54,541	26,610	7,438	4,994	39,411	38,831	8,793	54,011	84,211	5,040	58,825
<b>Ave. Catch (2010-2012)</b>	396,667	296,800	124,928	43,795	2,467	30,380	70,314	27,511	7,706	6,599	44,962	37,760	10,677	65,317	72,334	5,094	49,399
<b>Alternative 1 (Status Quo)</b>	651,292 P*±5%	393,536 P*±20%	80,545 P*±5%	193,423 P*±50%	111,566 P*±50%	20,686 P*±5%	44,122 P*±5%	†	†	†	65,102 P*±5%	28,765 P*±10%	41,112 P*±40%	125,813 P*±10%	33,326 P*±5%	†	142,282 P*±5%
<b>Alternative 2 (ACL=ABC)</b>	1,025,000 P*±35%	459,800 P*±35%	367,900 P*±35%	168,100 P*±40%	?? P*±??	35,400 P*±30%	150,000 P*±30%	108,600 P*±35%	211,000 P*±35%	36,600 P*±35%	338,200 P*±40%	38,200 P*±30%	20,100 P*±30%	173,100 P*±35%	251,700 P*±35%	132,200 P*±40%	496,500 P*±35%
<b>Alternative 3 (ACL Lower than ABC)</b>				161,200 (P*±35%)	9,800 (P*±35%)						330,300 (P*±35%)					128,400 (P*±35%)	
	988,000 P*±30%	438,000 P*±30%	342,000 P*±30%	154,000 P*±30%	8,800 P*±30%			105,000 P*±30%	205,000 P*±30%	35,500 P*±30%	321,000 P*±30%			165,000 P*±30%	246,000 P*±30%	125,000 P*±30%	485,000 P*±30%
	952,000 P*±25%	418,000 P*±25%	313,000 P*±25%	146,000 P*±25%	8,000 P*±25%	33,500 P*±25%	148,000 P*±25%	101,000 P*±25%	200,000 P*±25%	34,300 P*±25%	312,000 P*±25%	35,700 P*±25%	19,200 P*±25%	157,000 P*±25%	239,000 P*±25%	121,000 P*±25%	471,000 P*±25%
	919,000 P*±20%	400,000 P*±20%	288,000 P*±20%	139,000 P*±20%	7,200 P*±20%	31,400 P*±20%	146,000 P*±20%	98,100 P*±20%	194,000 P*±20%	33,200 P*±20%	303,000 P*±20%	33,400 P*±20%	18,200 P*±20%	148,000 P*±20%	232,000 P*±20%	116,000 P*±20%	457,000 P*±20%
	886,000 P*±15%	381,000 P*±15%	259,000 P*±15%	131,000 P*±15%	6,300 P*±15%	29,100 P*±15%	144,000 P*±15%	94,500 P*±15%	188,000 P*±15%	32,100 P*±15%	292,000 P*±15%	31,300 P*±15%	17,100 P*±15%	138,000 P*±15%	223,000 P*±15%	111,000 P*±15%	440,000 P*±15%
	850,600 P*±10%	363,300 P*±10%	231,100 P*±10%	123,300 P*±10%	5,400 P*±10%	26,600 P*±10%	140,600 P*±10%	90,500 P*±10%	181,000 P*±10%	31,000 P*±10%	280,500 P*±10%	29,200 P*±10%	15,900 P*±10%	128,300 P*±10%	213,400 P*±10%	106,000 P*±10%	424,200 P*±10%
	807,000 P*±5%	346,000 P*±5%	196,000 P*±5%	114,000 P*±5%	4,300 P*±5%	23,900 P*±5%	138,000 P*±5%	86,000 P*±5%	175,000 P*±5%	29,400 P*±5%	264,000 P*±5%	26,600 P*±5%	14,300 P*±5%	116,000 P*±5%	201,000 P*±5%	98,700 P*±5%	405,000 P*±5%

Source: Sabater and Kleiber (2013). Values based on outputs of the *k* revise B method.

† Catch for this species is included in "All other CREMUS combined."

Family Scaridae does not include *Bolbometopon muricatum* (bumphead parrotfish); Family Labridae does not include *Cheilinus undulatus* (humphead or Napoleon wrasse).

Carangidae includes the BMUS, kahala (*Seriola dumerili*) since this species is not included in NMFS bottomfish stock assessments, and is a reef-associated species.

Lutjanidae includes BMUS, taape (*Lutjanus kasmira*) since this species is not included in NMFS bottomfish stock assessments, and is a reef-associated species.

## Options for FY 2018 Annual Catch Limits

Based on the information presented, the Council can choose from the following options for the application of the accountability measures to the management unit species complexes that exceeded the ACLs:

OPTION 1: For the MUS that have catch estimates clearly affected by improvements in the fishery data collection no overage adjustment will be applied in 2018. This will result in the following ACLs:

- American Samoa Siganidae = 163 lbs
- CNMI slipper lobsters = 60 lbs
- For the Guam Carangidae, the overage was due to the accountability measure process where the ACL was reduced by the amount of overage in the previous year. The three year average catch (26,607lbs) is below the estimated OFL (32,200 lbs) and ABC (29,900lbs) and therefore overfishing is prevented. The Council can recommend not taking an overage adjustment.
- For the Hawaii coral reef crustaceans and mollusk, the overage was due to the accountability measure process where the ACL was reduced by the amount of overage in the previous year. The estimated MSY, OFL proxy, and ABC for the coral reef crustaceans are 43,100 lbs, 42,800 lbs, and 35,400, respectively. The average catch (2014-2016) at 28,140 lbs is below the projected MSY, OFL, and ABC. For the coral reef mollusk, the estimated MSY, OFL proxy, and ABC are 50,300 lbs, 49,500 lbs, and 38,200 lbs, respectively. The average catch (2014-2016) at 38,889 lbs is below the projected MSY and OFL but slightly above the ABC. In this case, the Council can recommend not taking an overage adjustment.

OPTION 2: The Council can also recommend full application of the accountability measure regardless of the rationale provided. Per the Council's Accountability Measures, the ACL in the following year will be adjusted by the amount of overage applied to the **original ACL**. Therefore, the ACLs in 2018 for the following MUS complex are as follows:

- American Samoa Siganidae = 0 lbs
- Guam Carangidae = 23,894 lbs
- CNMI slipper lobsters = 19 lbs
- Hawaii coral reef crustaceans = 31,997 lbs
- Hawaii coral reef mollusk = 27,974 lbs

OPTION 3: The Council can also recommend full application of the accountability measure regardless of the rationale provided. Per the Council's Accountability Measures, the ACL in the following year will be adjusted by the amount of overage applied to the **current year ACL**. Therefore, the ACLs in 2018 for the following MUS complex are as follows:

- American Samoa Siganidae = 0 lbs
- Guam Carangidae = 15,795 lbs
- CNMI slipper lobsters = 19 lbs
- Hawaii coral reef crustaceans = 25,134 lbs
- Hawaii coral reef mollusk = 23,437 lbs