WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

Monitoring and Bycatch Component Team for Revising Territorial BMUS Lists
A subgroup of the Archipelagic Fishery Ecosystem Plan Team

Draft Report

Monitoring and Bycatch Component Team Members: Keith Bigelow (PIFSC), Jenny Suter (PIFSC), Domingo Ochavillo (American Samoa DMWR), Frank Villagomez (CNMI DFW), Jason Biggs (Guam DAWR), Thomas Remington (Lynker, Council Contractor) and Matthew Seeley (Council Staff).

Potential Changes to Bycatch Monitoring

After the passing of the Sustainable Fisheries Act in 1996, section 303(a)(11) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires that all fishery management plans (FMPs) establish a standardized bycatch reporting methodology (SBRM) to assess the amount and type of bycatch occurring in the associated fisheries and include conservation and management measures that minimize bycatch and bycatch mortality to the extent practicable.

The American Samoa and the Mariana Archipelago Fishery Ecosystem Plans (FEPs) describe bycatch monitoring in American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands (CNMI). The methods for collecting, recording, and reporting bycatch data are comprehensively described in the SBRM created collaboratively by the Western Pacific Regional Fishery Management Council (WPFMC) and the National Marine Fisheries Service (NMFS; WPFMC 2021). The amount of bycatch recorded in the territorial bottomfish fisheries is described in the annual Stock Assessment and Fisheries Evaluation (SAFE) reports for American Samoa and the Mariana Archipelago (WPFMC 2022a; WPFMC 2022b), and these data are presented in raw form from creel survey interviews. Information collected on bycatch in the territorial bottomfish fishery is not subject to expansion. Currently, the deep-water Bottomfish Management Unit Species (BMUS)are preferred targets that are kept for both commercial and non-commercial purposes while the territorial (i.e., shallow-water) bottomfish fisheries have relatively low catch rates. (WPFMC 2022a; WPFMC 2022b).

The potential action to update the BMUS lists in American Samoa, Guam, and the CNMI (hereafter, BMUS revision) to include deep-water species and transition shallow-water species to territorial fishery management plans is necessary for the lists to reflect the current state of the fisheries. *The proposed action to revise the territorial BMUS lists would not impact how these fisheries are conducted, nor would it be likely to influence fishery bycatch rates since the primary target bottomfish species would remain the same.*

Raw bycatch information for the bottomfish fisheries is presented in the annual SAFE reports for American Samoa (Table 1; WPFMC 2022a), Guam (Table 2; WPFMC 2022b), and the CNMI (Table 3; WPFMC 2022b). In each of the territories, BMUS bycatch stemming from boat-based fisheries is low to non-existent. The bycatch estimates are self-reported by fishers during creel

survey interviews, and thus, the data are likely biased downward. 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 number of individuals designated as bycatch. Percent bycatch is the sum of all released divided by the number caught. Information on the species released is not available in the 2021 annual SAFE reports.

In American Samoa, bycatch data are available from 1992 through 2021 (Table 1). There has been no recorded BMUS bycatch over the course of the time series, and only one recorded instance of non-BMUS bycatch occurred in the American Samoa insular boat-based fishery in 2003. Thus, bycatch is almost non-existent in the fishery, and there are no documented instances of BMUS releases or discards in the past 30 years.

Table 1. Time series of raw bycatch data from the American Samoa non-pelagic boat-based fishery.

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	637	0	0	2,440	0	0
1993	1,534	0	0	860	0	0	2,394	0	0
1994	5,447	0	0	2,210	0	0	7,657	0	0
1995	2,397	0	0	1,008	0	0	3,405	0	0
1996	3,940	0	0	2,059	0	0	5,999	0	0
1997	2,910	0	0	2,283	0	0	5,193	0	0
1998	998	0	0	846	0	0	1,844	0	0
1999	3,213	0	0	2,417	0	0	5,630	0	0
2000	3,386	0	0	3,052	0	0	6,438	0	0
2001	3,499	0	0	2,703	0	0	6,202	0	0
2002	3,362	0	0	3,597	0	0	6,959	0	0
2003	3,778	0	0	4,019	1	0.0249	7,797	1	0.0128
2004	2,970	0	0	3,764	0	0	6,734	0	0
2005	1,807	0	0	1,877	0	0	3,684	0	0
2006	1,573	0	0	4,260	0	0	5,833	0	0
2007	2,752	0	0	4,184	0	0	6,936	0	0
2008	4,616	0	0	3,972	0	0	8,588	0	0
2009	11,080	0	0	8,441	0	0	19,521	0	0
2010	2,902	0	0	2,119	0	0	5,021	0	0
2011	4,229	0	0	3,130	0	0	7,359	0	0
2012	775	0	0	4,362	0	0	5,137	0	0
2013	1,031	0	0	3,494	0	0	4,525	0	0
2014	3,123	0	0	3,504	0	0	6,627	0	0
2015	3,602	0	0	3,666	0	0	7,268	0	0
2016	888	0	0	1,234	0	0	2,122	0	0
2017	926	0	0	1,425	0	0	2,351	0	0

Year	BMUS			Non-BMUS			BMUS + Non-BMUS		
	# Caught	# Discard or Release	% Bycatch	# Caught	# Discard or Release	% Bycatch	# Caught	# Discard or Release	% Bycatch
2018	630	0	0	742	0	0	1,372	0	0
2019	771	0	0	823	0	0	1,594	0	0
2020	404	0	0	632	0	0	1,036	0	0
2021	124	0	0	108	0	0	232	0	0
10-yr avg.	**1,227**	**0**	**0**	**1,999**	**0**	**0**	**3,226**	**0**	**0**
10-yr SD	**1,102**	**0**	**0**	**1,489**	**0**	**0**	**2,347**	**0**	**0**
20-yr avg.	**2,567**	**0**	**0**	**2,968**	**0**	**0.0012**	**5,535**	**0**	**0.0006**
20-yr SD	**2,382**	**0**	**0**	**1,868**	**0**	**0.0054**	**4,068**	**0**	**0.0028**

In Guam, bycatch data are available from 1982 through 2021 (Table 2). BMUS bycatch has been relatively low, with an annual average of one recorded instance of BMUS release over the past decade (Table 2). The maximum amount of bycatch recorded was in 2006 with 27 recorded BMUS releases, and the highest recorded bycatch rate occurred in 2003 at 4.02%. Bycatch for non-BMUS species caught in the Guam insular boat-based fishery is notably higher with an annual average of 48 recorded releases in the past 10 years and a maximum bycatch rate of 21.13% in 2001. Thus, recorded BMUS bycatch occurs at a relatively low rate in a given year, if at all, and recorded non-BMUS bycatch tends to be greater.

Table 2. Time series of raw bycatch data from the Guam non-pelagic boat-based fishery.

Year	BMUS			Non-BMUS			BMUS + Non-BMUS		
	# Caught	# Discard or Release	% Bycatch	# Caught	# Discard or Release	% Bycatch	# Caught	# Discard or Release	% Bycatch
1982	1,062	0	0.00	535	0	0.00	1,597	0	0.00
1983	940	0	0.00	567	0	0.00	1,507	0	0.00
1984	590	0	0.00	2,757	0	0.00	3,347	0	0.00
1985	1,830	0	0.00	3,010	0	0.00	4,840	0	0.00
1986	546	0	0.00	1,078	0	0.00	1,624	0	0.00
1987	1,313	0	0.00	1,206	0	0.00	2,519	0	0.00
1988	1,399	0	0.00	1,603	0	0.00	3,002	0	0.00
1989	2,028	0	0.00	1,534	0	0.00	3,562	0	0.00
1990	1,542	0	0.00	1,328	0	0.00	2,870	0	0.00
1991	1,366	0	0.00	1,417	0	0.00	2,783	0	0.00
1992	1,046	0	0.00	1,481	0	0.00	2,527	0	0.00
1993	946	0	0.00	1,947	0	0.00	2,893	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
1994	1,663	0	0.00	2,067	0	0.00	3,730	0	0.00
1995	1,449	0	0.00	3,536	0	0.00	4,985	0	0.00
1996	1,281	0	0.00	3,963	0	0.00	5,244	0	0.00
1997	983	0	0.00	3,359	0	0.00	4,342	0	0.00
1998	993	0	0.00	4,145	0	0.00	5,138	0	0.00
1999	1,081	0	0.00	3,857	0	0.00	4,938	0	0.00
2000	1,090	6	0.55	2,815	526	18.69	3,905	532	13.62
2001	1,023	16	1.56	2,873	607	21.13	3,896	623	15.99
2002	629	2	0.32	1,875	351	18.72	2,504	353	14.10
2003	497	20	4.02	1,391	171	12.29	1,888	191	10.12
2004	586	0	0.00	1,218	122	10.02	1,804	122	6.76
2005	616	0	0.00	1,090	66	6.06	1,706	66	3.87
2006	1,140	27	2.37	1,048	118	11.26	2,188	145	6.63
2007	417	7	1.68	955	132	13.82	1,372	139	10.13
2008	572	3	0.52	1,085	118	10.88	1,657	121	7.30
2009	860	0	0.00	1,991	77	3.87	2,851	77	2.70
2010	890	0	0.00	1,698	29	1.71	2,588	29	1.12
2011	707	0	0.00	1,421	45	3.17	2,128	45	2.11
2012	309	0	0.00	615	37	6.02	924	37	4.00
2013	293	0	0.00	929	44	4.74	1,222	44	3.60
2014	658	6	0.91	1,794	163	9.09	2,452	169	6.89
2015	366	0	0.00	1,054	70	6.64	1,420	70	4.93
2016	641	2	0.31	1,033	45	4.36	1,674	47	2.81
2017	766	0	0.00	1,547	26	1.68	2,313	26	1.12
2018	406	2	0.49	1,115	27	2.42	1,521	29	1.91
2019	865	3	0.35	982	44	4.48	1,847	47	2.54
2020	302	0	0.00	525	16	3.05	827	16	1.93
2021	859	0	0.00	1,259	5	0.40	2,118	5	0.24
10-yr avg.	**547**	**1**	**0.21**	**1,085**	**48**	**4.29**	**1,632**	**49**	**3.00**
10-yr SD	**224**	**2**	**0.29**	**363**	**42**	**2.42**	**529**	**44**	**1.84**
20-yr avg.	**619**	**4**	**0.55**	**1,231**	**85**	**6.73**	**1,850**	**89**	**4.74**
20-yr SD	**226**	**7**	**1.01**	**384**	**78**	**4.68**	**535**	**80**	**3.53**

In the CNMI, bycatch data are available from 2000 through 2021 (Table 3). BMUS bycatch has not been recorded in any of the past 16 years, with the only instances of BMUS releases occurring in 2000, 2003, and 2005. The maximum bycatch rate for BMUS occurred in 2000 at 2.43%. Non-BMUS bycatch has only been slightly more frequent, with a 20-year average of four

recorded releases. The maximum bycatch rate for non-BMUS occurred in 2003 at 13.2%. Similar to BMUS, bycatch for non-BMUS was recorded most prominently from 2000 to 2004. There were no instances of any recorded bycatch in the CNMI insular boat-based fishery from 2007 until 2020, as there were two recorded releases of non-BMUS in 2021.

Table 3. Time series of raw bycatch data from the CNMI non-pelagic boat-based fishery.

Year	BMUS			Non-BMUS			BMUS + Non-BMUS		
	# Caught	# Discard or Release	% Bycatch	# Caught	# Discard or Release	% Bycatch	# Caught	# Discard or Release	% Bycatch
2000	493	12	2.43	325	9	2.77	818	21	2.57
2001	268	0	0.00	663	1	0.15	931	1	0.11
2002	474	0	0.00	430	14	3.26	904	14	1.55
2003	627	3	0.48	250	33	13.20	877	36	4.10
2004	756	0	0.00	623	20	3.21	1,379	20	1.45
2005	2,206	4	0.18	1,019	0	0.00	3,225	4	0.12
2006	874	0	0.00	971	3	0.31	1,845	3	0.16
2007	1,325	0	0.00	785	0	0.00	2,110	0	0.00
2008	241	0	0.00	917	0	0.00	1,158	0	0.00
2009	596	0	0.00	1,183	0	0.00	1,779	0	0.00
2010	614	0	0.00	860	0	0.00	1,474	0	0.00
2011	482	0	0.00	1,252	0	0.00	1,734	0	0.00
2012	456	0	0.00	326	0	0.00	782	0	0.00
2013	519	0	0.00	338	0	0.00	857	0	0.00
2014	57	0	0.00	159	0	0.00	216	0	0.00
2015	102	0	0.00	94	0	0.00	196	0	0.00
2016	636	0	0.00	85	0	0.00	721	0	0.00
2017	120	0	0.00	194	0	0.00	314	0	0.00
2018	6	0	0.00	101	0	0.00	107	0	0.00
2019	139	0	0.00	105	0	0.00	244	0	0.00
2020	516	0	0.00	692	0	0.00	1,208	0	0.00
2021	915	0	0.00	566	2	0.35	1,481	2	0.14
10-yr avg.	**347**	**0**	**0.00**	**266**	**0**	**0.04**	**613**	**0**	**0.01**
10-yr SD	**288**	**0**	**0.00**	**203**	**1**	**0.11**	**449**	**1**	**0.04**
20-yr avg.	**583**	**0**	**0.03**	**548**	**4**	**1.02**	**1,131**	**4**	**0.38**
20-yr SD	**492**	**1**	**0.11**	**381**	**8**	**2.96**	**763**	**9**	**0.96**

Potential Changes to Fishery-Dependent Data Collection

Fishery-dependent data are collected through both the boat and shore-based creel surveys as well as the Commercial Purchase Reporting System (CPRS) in each territory. The data collection

methodologies are described in the American Samoa and Mariana Archipelago annual SAFE reports (WPFMC 2022a; WPFMC 2022b). In American Samoa, commercial fish sales must be reported to the Department of Marine and Wildlife Resources before the 16th day of each month (ASCA § 24.0905). Licensing and reporting requirements were recently implemented for the CNMI (NMIAC § 85-30.5-101 and 85-30.5-105). Guam has no mandatory commercial licensing or reporting regulations.

The potential action to revise the territorial BMUS lists to focus more closely on the deep-water bottomfish species would require minimal changes in the data collection methods for commercial reports and presents an opportunity to refine the designs of the creel surveys. By removing the shallow-water bottomfish species from the BMUS lists, data collection would be able to prioritize data from the boat-based creel surveys because the likelihood of catching a deep-water bottomfish using a shore-based gear is very low barring juvenile deep-water species harvested in shallow-water habitats.

The BMUS revision would not be likely to affect fishing operations for deep-water bottomfish species and therefore would not require significant changes in the creel survey design. There are some improvements that would be able to be implemented with respect to improving the interception rate of bottomfish fishing trips during the catch interview phase of the creel surveys. Increasing the interception rate would increase the likelihood of capturing a representative sample of bottomfish catch data to support the potential implementation of rate-based monitoring (see below) in lieu of the currently implemented catch-based monitoring associated with tracking catch against a specified annual catch limit (ACL).

The CPRS collects information on bottomfish sold to fish dealers, which includes date, dealer name, type of fish/species, weight, price, etc. Although the circumstances vary from territory to territory, only common fish are typically identified to the species level, and the rest are sold in larger groups, such as “miscellaneous bottomfish.” Length information is generally not collected through commercial reports. In some instances, fish are grouped into price categories instead of classifications by fish or species type.

The potential implementation of status determination criteria and accountability measures that use a rate-based approach under the proposed action would necessitate a greater emphasis on the collection of size information rather than catch by weight and/or numbers in the existing data collection systems. The creel survey catch interviews include the measurement of fish length (in millimeters) and weight (in grams). The implementation of length-weight measurements is dependent on several factors: 1) fishers allowing the data collectors access to their catch; 2) managers or surveyors determining the amount of fish to be measured; and 3) the ability of surveyors to randomly select individual fish for measurement. Length estimation would be the primary metric to support the usage of spawning potential ratio (SPR) to monitor fishery performance against the rate-based ACL (see the ACL/AM/(h)(2) component team report).

Recommendations

The Monitoring and Bycatch Component Team recommends the following changes to the data collection methodology associated with action to revise the territorial BMUS lists:

1. Augment the length-based monitoring of catch from bottomfish fishing trips by ensuring the species in the revised BMUS list are properly identified and measured for length (and weight if possible);
2. Encourage the data collection staff at each territorial resource management agency to collect length information, prioritizing the revised BMUS lists;
3. Develop technological solutions to support length-based monitoring, including through the use of mobile devices equipped with image recognition technology to identify and optically measure fish length. This would apply to both creel surveys and the CPRS; and
4. Conduct training sessions for data collectors to improve their fish identification for the new BMUS, and develop methodologies to ensure a random selection of subsamples for length measurements.

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