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PRELIMINARY DRAFT

**Acceptable Biological Catch for the Bottomfish Management Unit Species in
American Samoa for Fishing Year 2021 to 2022**

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1 Introduction

1.1 Background

The National Marine Fisheries Service (NMFS) and the Western Pacific Fishery Management Council (Council) manage fisheries for bottomfish in the U.S. Exclusive Economic Zone (EEZ), generally 3–200 nautical miles (nm) around the U.S. Pacific Islands, through one of four Fishery Ecosystem Plans (FEP) authorized by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). Three of the FEP are archipelagic-based, including the FEP for the American Samoa Archipelago, the FEP for the Hawaiian Archipelago, and the FEP for the Mariana Archipelago (which applies to Federal waters around Guam and the Commonwealth of the Northern Mariana Islands (CNMI)). In each archipelago, bottomfish fisheries harvest an assemblage, or complex, of species that includes emperors, snappers, groupers, and jacks. NMFS manages Hawaii and Mariana bottomfish fisheries through separate management actions, so this document will focus solely on American Samoa bottomfish fisheries.

The fourth FEP covers Federal waters of the U.S. Pacific Remote Island Areas (PRIA), which includes Palmyra Atoll, Kingman Reef, Jarvis Island, Baker Island, Howland Island, Johnston Atoll, and Wake Island. On January 6, 2009, the President issued Presidential Proclamation 8336 establishing the Pacific Remote Islands Marine National Monument (Monument). This proclamation prohibited commercial fishing within the Monument. NMFS implemented regulations to codify this prohibition on June 3, 2013 (78 FR 32996). The President further expanded the Monument’s boundaries by proclamation on September 25, 2014 and prohibited commercial fishing within the expanded boundaries (Presidential Proclamation 9173). NMFS implemented regulations to codify this change on March 25, 2015 (80 FR 15693). These actions eliminated commercial bottomfish fishing in these areas. Therefore, NMFS does not permit commercial fishing for bottomfish in the PRIA, and this document will not focus on fishing around the PRIA.

Under all Pacific Island FEPs, Federal regulations require NMFS to set an annual catch limit (ACL) and implement accountability measures (AM) for each bottomfish stock and stock complex, as recommended by the Council, and in consideration of the best available scientific, commercial, and other information about the fishery for that stock or stock complex.

The Bottomfish Management Unit Species (BMUS) list was revised by a NMFS rule published on February 8, 2019 (84 FR 2767) that reclassified certain bottomfish species as ecosystem component species (ECS), which left 11 species as BMUS in American Samoa. Thus, the ACLs and AMs for 2021 and 2022 evaluated in this document apply to the 11 remaining bottomfish species, consistent with Council’s recommendations.

Table 1. List of bottomfish species in American Samoa that remain bottomfish management unit species (BMUS) and those that were reclassified as ecosystem component species (ECS) on February 8, 2019 (84 FR 2767).

Scientific Name	Common Name(s)	Family	Designation
<i>Aphareus rutilans</i>	Red snapper, silvermouth, lehi	Lutjanidae	BMUS
<i>Aprion virescens</i>	Gray snapper, jobfish	Lutjanidae	BMUS
<i>Caranx ignobilis</i>	Giant trevally	Carangidae	ECS
<i>Caranx lugubris</i>	Black trevally, jack	Carangidae	BMUS
<i>Epinephelus fasciatus</i>	Blacktip grouper	Serranidae	ECS
<i>Etelis carbunculus</i>	Red snapper, ehū	Lutjanidae	BMUS
<i>Etelis coruscans</i>	Red snapper, onaga	Lutjanidae	BMUS
<i>Lethrinus amboinensis</i>	Ambon emperor	Lethrinidae	ECS
<i>Lethrinus rubrioperculatus</i>	Redgill emperor	Lethrinidae	BMUS
<i>Lutjanus kasmira</i>	Blueline snapper	Lutjanidae	BMUS
<i>Pristipomoides auricilla</i>	Yellowtail kalikali	Lutjanidae	ECS
<i>Pristipomoides filamentosus</i>	Pink snapper, paka	Lutjanidae	BMUS
<i>Pristipomoides flavipinnis</i>	Yelloweye snapper	Lutjanidae	BMUS
<i>Pristipomoides sieboldii</i>	Pink snapper, kalekale	Lutjanidae	ECS
<i>Pristipomoides zonatus</i>	Flower snapper, gindai	Lutjanidae	BMUS
<i>Seriola dumerili</i>	Amberjack	Carangidae	ECS
<i>Variola louti</i>	Lunartail grouper, lyretail grouper	Serranidae	BMUS

Recent ACLs and recommendations for Pacific Island bottomfish fisheries

On August 31, 2015 (80 FR 52415), NMFS specified the 2015 ACLs in American Samoa at 101,000 lb.

The 2016 ACLs for bottomfish in the Pacific Island territories were specified on April 21, 2017 (82 FR 18716). The 2016 ACLs were based on new estimates of maximum sustainable yield in a 2016 stock assessment (Yau et al. 2016) as follows: American Samoa bottomfish ACL = 106,000 lb.

The 2017 ACLs for bottomfish in the Pacific Island territories were specified on December 11, 2017 (82 FR 58129). The 2017 ACLs were based on estimates of maximum sustainable yield in the 2016 stock assessment and were identical to the 2016 ACLs: American Samoa bottomfish ACL = 106,000 lb

The Council did not recommend and NMFS did not implement ACLs for American Samoa bottomfish for 2018. This is because the Council and NMFS developed an amendment to reclassify certain Pacific Island MUS as ECS in 2018 to prioritize conservation and management efforts and improve fishery management in the region.

In October 2018 at the 174th meeting, the Council recommended ACLs for bottomfish for 2019 identical to the ACLs implemented in 2017. The rule to reclassify species had not been finalized at the time of the ACL recommendation, and the available science on which to base the ACLs was the 2016 stock assessment for the original 17 BMUS. On February 8, 2019, NMFS published a final rule (84 FR 2767) to reclassify certain bottomfish in the American Samoa, Hawaii, and Mariana FEPs as ECS. Therefore, the ACL and catch monitoring for 2019 applied to the bottomfish complex as the group of 17 species as it existed at the time the Council made the recommendation for 2019. However, due to the publication of the new stock assessment in 2019 (see below), NMFS did not pursue implementing the ACL for 2019.

In October 2019 at the 180th Council meeting, the NMFS Pacific Islands Fisheries Science Center (PIFSC) presented a stock assessment for the revised BMUS complex in American Samoa, Guam, and the CNMI. This assessment included catch projections and associated risks of overfishing beginning in 2020. The results of the assessment indicated that the BMUS stock in American Samoa is overfished and experiencing overfishing. Thus, the Council is required to end overfishing immediately, which requires the Council's Scientific and Statistical Committee (SSC) to set an acceptable biological catch (ABC) and the Council to consider the SSC's recommendation in recommending an ACL to meet this Magnuson-Stevens Act and NS1 requirement.

1.1.1 *Overview of the ACL Implementation Process*

In accordance with the Magnuson-Stevens Act and the FEPs, there are three required elements in the development of an ACL. The first requires the Council's SSC to calculate an ABC that is set at or below the stock or stock complex's overfishing limit (OFL). The OFL is an estimate of the catch level above which overfishing occurs and corresponds with the maximum fishing mortality threshold (MFMT). NMFS defines an ABC as the level of catch that accounts for the scientific uncertainty in the estimate of OFL and other sources. To determine the appropriate ABC, the ACL mechanism described in the FEPs includes a five-tiered system of control rules that allows consideration of different levels of scientific information. Tiers 1 and 2 involve data-rich to data-moderate situations and include levels of scientific uncertainty derived from model-based stock assessments. Tiers 3 to 5 involve data-poor situations and include levels of scientific uncertainty derived from ad-hoc procedures, including simulation models or expert opinion.

When calculating an ABC for a stock or stock complex, the SSC first evaluates the information available for the stock and designates the stock or stock complex into one of the five tiers. The SSC then applies the control rule assigned to that tier to determine ABC. For stocks or stock complexes like bottomfish with estimates of maximum sustainable yield (MSY) and other MSY-based reference points derived from statistically-based stock assessment models (Tier 1 to 3 quality data), the SSC calculates ABC based on an ABC control rule that accounts for scientific uncertainty in the estimate of the OFL and the acceptable level of risk (as determined by the

Council) for catch equal to the ABC that would result in overfishing. The ABC represents the maximum value for which the probability of overfishing (P^*) is less than 50 percent. In accordance with Federal regulations, the probability of overfishing cannot exceed 50 percent (74 FR 3178, January 9, 2011). Each FEP includes a qualitative process by which the P^* value may be reduced below 50 percent by the Council based on consideration of four dimensions of information, including assessment information, uncertainty characterization, stock status, and stock productivity and susceptibility. The FEPs also allow the SSC to recommend an ABC that differs from the results of the ABC control rule calculation based on factors such as data uncertainty, recruitment variability, declining trends in population variables, and other factors determined relevant by the SSC. However, the SSC must explain its rationale.

The second element requires the Council to determine an ACL not exceeding the SSC-recommended ABC. The process includes methods by which the Council's ACL may reduce the ABC based on social, economic, and ecological considerations, or management uncertainty¹ (SEEM). An ACL set below the ABC reduces the probability that actual catch would exceed the OFL and result in overfishing.

Finally, the ACL process may include two types of AMs: in-season AMs and post-season AMs. In-season AMs are intended to prevent an ACL from being exceeded and may include, but are not limited to closing the fishery, closing specific areas, changing bag limits, or other methods to reduce catch. The Council may also recommend an annual catch target (ACT) as an AM so that fisheries do not exceed an ACL. An ACT is the management target of the fishery to account for management uncertainty in controlling the actual catch at or below the ACL. An ACT might be included as a management measure where an in-season fishery closure could not be implemented. A post-season AM which typically involves a downward adjustment to an ACL in the following year if a fishery exceeds the ACL in the preceding year.

If, in a given year, the Council were to determine that landings exceeded an ACL, the Council may recommend that NMFS reduce the ACL in the subsequent fishing year by the amount of the overage. By regulation, in deciding whether to recommend an overage adjustment, the Council would consider the magnitude of the overage and its impact on the affected stock's status. Additionally, if a fishery exceeds an ACL more than once in a four-year period, the Council is required to re-evaluate the ACL process and adjust the system, as necessary, to improve its performance and effectiveness.

Figure 1 illustrates the relationship between the terms used in this section.

¹ Management uncertainty occurs because of the lack of sufficient information about catch (e.g., late reporting, under reporting, and misreporting of landings).

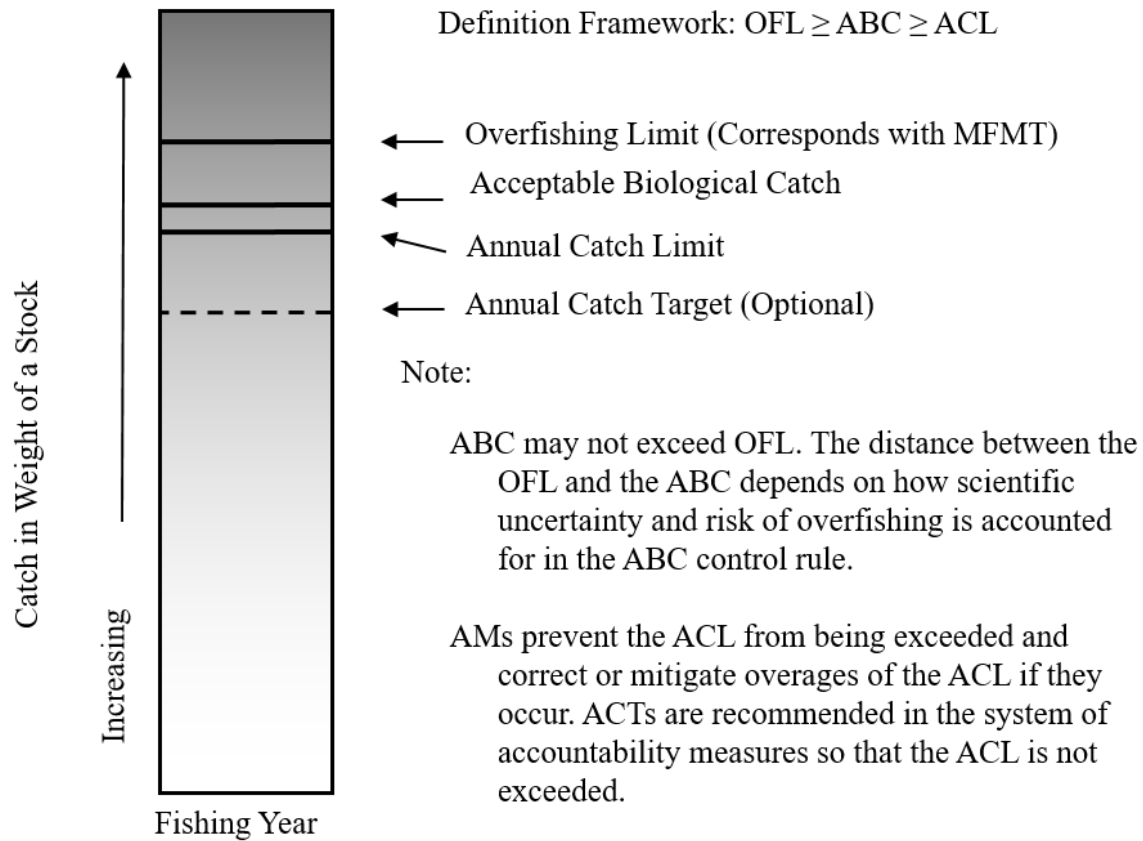


Figure 1. General relationship between OFL, ABC, ACL and ACT.

For more details on the specific elements of the ACL implementation mechanism and process, see Amendment 1 to the PRIA FEP, Amendment 2 to the FEP for the American Samoa Archipelago, Amendment 2 to the FEP for the Mariana Archipelago, Amendment 3 to the FEP for the Hawaii Archipelago, and the final implementing regulations at 50 CFR 665.4 (76 FR 37286, June 27, 2011).

1.2 Purpose and Need

The purpose of the action is to comply with the requirements of the Magnuson-Stevens Act, the provisions of the American Samoa FEP and implementing regulations that require NMFS to set ACLs and AMs for Pacific Island bottomfish fisheries based on Council recommendations by having the Council’s SSC recommend an appropriate ABC for use in the ACL implementation process. The need for this action is for the SSC to produce an ABC recommendation necessary to implement an ACL that provides management oversight, prevents overfishing, and to provides for long-term sustainability of the fishery resources while allowing fishery participants to continue to benefit from their utilization.

1.3 Best Scientific Information Available

In August 2019, NMFS PIFSC completed a benchmark stock assessment for bottomfish in American Samoa, Guam, and the CNMI (Langseth et al. 2019). The assessments used a state-

space Bayesian surplus production model within the modeling framework Just Another Bayesian Biomass Assessment (JABBA). Estimates of harvest rate (H), annual biomass (B), the harvest rate associated with overfishing as determined by the harvest control rule (H_{CR}), maximum sustainable yield (MSY), and the biomass at maximum sustainable yield (B_{MSY}) allowed for determination of stock status relative to reference points determining overfishing ($H/H_{CR} > 1$) and overfished ($B < 0.7 \times B_{MSY}$) status for the American Samoa bottomfish stock complex. Stock projections were conducted for 2020 to 2025 for a range of hypothetical six-year catches, and the corresponding risk of overfishing was calculated.

The 2019 benchmark assessment was reviewed by the Western Pacific Stock Assessment Review (WPSAR) Tier 1 panel on April 15-18, 2020. The panel found the assessment update adequate for management use (Martell, Powers, and Nielson 2019). The SSC, at its 134th meeting in October 15, 2019, received the WPSAR review reports and the peer-reviewed benchmark stock assessment. The SSC had concerns regarding the application of the assessment to the single BMUS complex and the quality of the data used in the assessment. The SSC also noted the improvements in the benchmark assessment compared to the 2015 assessment update. The SSC accepted the 2019 benchmark assessment as the best scientific information available for setting harvest limits for fishing years 2020 to 2022. The SSC also recommended that the Council direct staff to convene the P* and SEEM working group to quantify the uncertainties to set the ABC and specify the ACLs.

1.4 Task for the SSC

Specifying the Acceptable Biological Catch

The SSC's task is to recommend the ABC for the bottomfish fishery in American Samoa for fishing years 2021-2022, which will be used to support the Council's ACL specification process to implement an ACL for the fishery. The Council's ACL specification process allows for a maximum of four years to be set at once, but this specification spans two years since the rebuilding plan for American Samoa BMUS will be subsequently implemented. The ACL specified by the Council should not exceed the SSC's ABC. The Council's ACL process is described in the FEPs and includes methods by which the ACL may be reduced from the ABC based on management uncertainties through a Social, Ecological, Economic, and Management (SEEM) Uncertainty Analysis. In April 2020, due to the COVID pandemic, it was not possible to convene the SEEM Working Group after the P* Working Group met. The Government of American Samoa issued a stay-at-home order. Additionally, there was also not a sufficient level of catch to which the SEEM score could be applied that would allow for some catch to be harvested in the fishery. The American Samoa Advisory Panel suggested setting the ACL equal to the SSC's recommended ABC. Setting the ACL equal to the ABC will provide the highest level of catch without the fishery being subject to overfishing while the stock is allowed to rebuild in relatively small increments. However, despite the maximum level of P* allowed based on the analysis, the fishery lands an order of magnitude higher than the harvest limits, which raises difficulty in managing this fishery without an effective accountability measure.

2 Summary of Bottomfish Fishery Information

2.1 American Samoa Bottomfish MUS

2.1.1 Estimation of OFL

According to the PIFSC 2019 bottomfish benchmark stock assessment (Langseth et al. 2019), the long-term MSY for American Samoa BMUS is estimated to be 28,800 lb (95% CI=16,400 – 55,900 lb). This is lower than the previous MSY estimate in the previous assessment update (Yau et al. 2016). Stock projection results, which assumed that a six-year catch limit would be harvested in its entirety each year, indicated that an ACL of 8,000 lb would result in a 50 percent probability of overfishing from 2020 to 2025 (Table 2). Also, an ACL of 5,000 lb is considered to be the OFL proxy for 2021 and 2022 (Table 2). As a reference, estimated average annual total catch during the period 2017 to 2019 was 12,614 lb with 11,093 lb landed in 2019, the most recent year for which complete catch data (i.e., total and commercial catch) are available (Table 4). The average catch and the 2019 catch estimate are above the OFL for 2021 to 2022 by 252 and 222 percent, respectively. There were two years in the time series (i.e., 2012 and 2013) where the catches were below the OFL since the implementation of ACLs in 2012.

The 5,000 lb of catch associated with the OFL projects a standing stock biomass of 105,400 lb and a harvest rate of 5 percent in 2022. The probability of the stock is overfished in 2022 under this OFL is 73 percent (see Table 19 in Langseth et al 2019).

Table 2. American Samoa BMUS probabilities of overfishing in fishing year 2020-2025.

Probability of overfishing ($H/H_{CR}>1$) in terminal year	2020	2021	2022	2023	2024	2025	Probability of overfishing ($H/H_{CR}>1$) in terminal year	2020	2021	2022	2023	2024	2025
0.01	0	0	0	0	0	0	0.26	1	1	1	1	2	2
0.02	0	0	0	0	0	0	0.27	1	1	1	1	2	2
0.03	0	0	0	0	0	0	0.28	1	1	1	2	2	2
0.04	0	0	0	0	0	0	0.29	1	1	1	2	2	2
0.05	0	0	0	0	0	0	0.30	1	1	2	2	2	3
0.06	0	0	0	0	0	0	0.31	1	1	2	2	2	3
0.07	0	0	0	0	0	0	0.32	1	1	2	2	3	3
0.08	0	0	0	0	0	0	0.33	1	2	2	2	3	3
0.09	0	0	0	0	0	0	0.34	1	2	2	3	3	3
0.10	0	0	0	0	0	0	0.35	1	2	2	3	3	4
0.11	0	0	0	0	0	0	0.36	1	2	2	3	3	4
0.12	0	0	0	0	0	0	0.37	2	2	3	3	4	4
0.13	0	0	0	0	0	0	0.38	2	2	3	3	4	4
0.14	0	0	0	0	0	0	0.39	2	2	3	3	4	4
0.15	0	0	0	0	0	0	0.40	2	3	3	4	4	5
0.16	0	0	0	0	0	0	0.41	2	3	3	4	4	5
0.17	0	0	0	0	0	1	0.42	2	3	3	4	5	5
0.18	0	0	0	0	1	1	0.43	2	3	4	4	5	6
0.19	0	0	0	0	1	1	0.44	3	3	4	5	5	6
0.20	0	0	0	1	1	1	0.45	3	3	4	5	6	6
0.21	0	0	1	1	1	1	0.46	3	4	4	5	6	6
0.22	0	0	1	1	1	1	0.47	3	4	5	5	6	7
0.23	0	0	1	1	1	1	0.48	3	4	5	6	6	7
0.24	0	1	1	1	1	2	0.49	3	4	5	6	7	7
0.25	0	1	1	1	1	2	0.50	4	5	5	6	7	8

Source: Langseth et al. (2019).

2.1.2 Stock Status

In 2017, the most recent year for which stock status information is available, $H_{2017}/H_{CR} = 2.75$ while $B_{2017}/B_{MSY} = 0.38$ (Langseth et al. 2019; Table 3). The production model results indicate that during the period 1982 through 2017, there were years where the stock was not overfished nor experiencing overfishing, several years where overfishing was occurring but the stock was not overfished, one year the fishery was overfished but not subject to overfishing, and in the terminal year of the analysis (2017), the stock is both overfished and experiencing overfishing (Figure 2).

Table 3. Stock assessment parameters for the American Samoa BMUS complex in 2017.

Param	Value	Notes	Status
MSY	$28.8 \pm 16.4-55.9$	Expressed in 1,000 lb (95% CI)	
H_{2017}	0.15	Expressed in percentage	
H_{MSY}	$0.107 \pm 0.044-0.228$	Expressed in percentage (95% CI)	
H/H_{CR}	2.75		Overfishing
B_{2017}	102.6	Expressed in 1,000 lb	
B_{MSY}	$272.8 \pm 120.8-687.4$	Expressed in 1,000 lb (95% CI)	
B/B_{MSY}	0.38		Overfished

Source: Langseth et al. (2019).

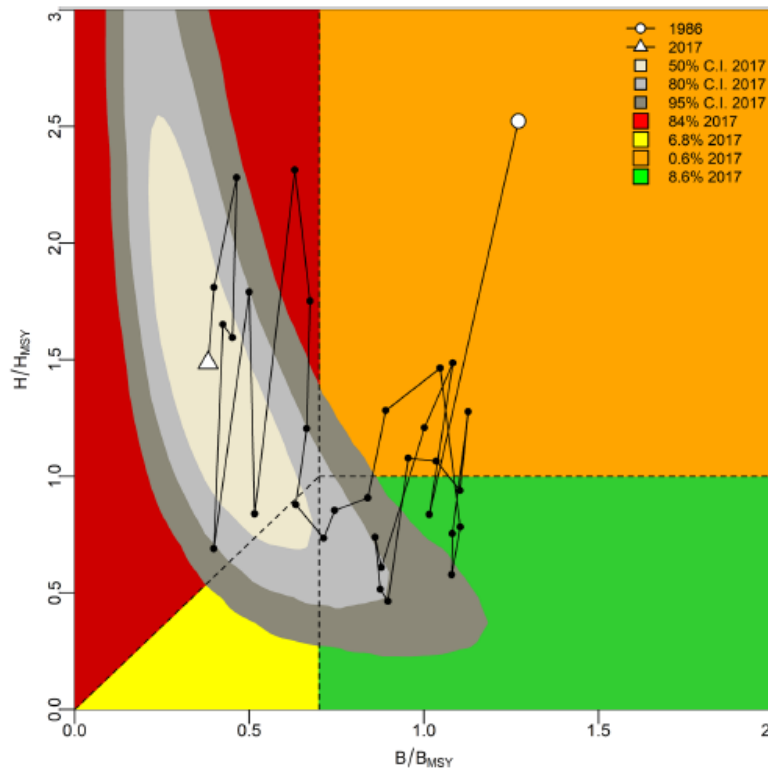


Figure 2. Kobe plot of relative biomass and relative exploitation rate from the best fitting production model for American Samoa from 1982 to 2017.

Source: Langseth et al. (2019).

In 2019, the most recent year for which annual estimated BMUS catch data are available, there was an estimated total catch of 11,093 lb from boat-based creel surveys and just 1,402 lb recorded from commercial purchase reports. The 2019 point estimate of catch is lower than the recent three-year average, and the estimated commercial catches for 2017 and 2019 are higher than the recent three-year average commercial catch (Table 4). The difference between the creel total and the commercial landings is assumed to be the non-commercial component of the catch. The average catch and the 2019 point estimate are above the OFL for 2021 and 2022. This exceedance in catch, if it were to continue, will not prevent overfishing from occurring.

Table 4. Annual estimated BMUS catch (lb) in American Samoa from 2000 to 2019.

Year	Estimated Total Catch (lb)	Estimated Commercial Catch (lb)
2000	*13,850	3,693
2001	*30,064	3,447
2002	*23,621	1,448
2003	*12,971	2,511
2004	*11,000	3,233
2005	*8,226	2,490
2006	3,051	2,203
2007	*10,913	4,001
2008	*22,095	3,171
2009	*34,388	3,035
2010	*7,044	1,084
2011	*14,083	711
2012	2,099	1,161
2013	*5,732	882
2014	*13,984	3,140
2015	*21,528	2,047
2016	*19,307	1,131
2017	*14,791	1,131
2018	*11,957	838
2019	*11,093	1,402
Three-year average (2017–2019)	12,614	1,124

Source: WPRFMC (2020).

* = Catch greater than OFL (5,000 lb) for 2021 and 2022.

2.2 ACL Alternatives for Bottomfish MUS

2.2.1 Features Common to All Alternatives

Each alternative assumes that all existing Federal and local resource management laws and regulations will continue, as will non-regulatory monitoring of catch by the American Samoa Department of Marine and Wildlife Resources (DMWR) with assistance from NMFS PIFSC’s Western Pacific Fisheries Information Network (WPacFIN). These programs include boat-based

and shore-based creel survey programs. The Council has two years to prepare and implement an FMP, FMP amendment, or proposed regulations to rebuild an overfished stock. However, if overfishing is still occurring for that stock, the Council should immediately take appropriate steps to end overfishing (see Magnuson-Stevens Act section 304(e)(6) and implementing regulations at 50 C.F.R. § 600.310(j)(2)(i)).

No Federal permit is required to fish for BMUS in American Samoa, and there is no Federal reporting requirement. However, a commercial fishing license is required for all fishermen engaged in commercial fishing in the waters of American Samoa (American Samoa Administrative Code (ASAC) § 24.0981). In addition to the permit requirement, entities that sell seafood products are required to report sales on a monthly basis to the American Samoa DMWR (ASAC § 24.0906). DMWR reports commercial fishery sales information to NMFS through the WPacFIN system. Under all the alternatives, NMFS would work with WPacFIN and DMWR to encourage timely processing of data and would track catches towards any applicable limit as data are provided to NMFS.

A coordinated closure of Federal and territorial waters would improve the ability of management measures to limit catch to a designated catch limit, but American Samoa does not have regulations in place that provide for a complementary closure of bottomfish fishing in territorial waters if a Federal catch limit is reached. For that reason, the following environmental and fishery outcome analysis of the alternatives accounts for the action that NMFS can take within its regulatory authority. Each action alternative assumes that only Federal waters would be closed as an in-season AM.

2.2.2 Alternative 1: No Action – Do not specify the ABC

Under Alternative 1, the SSC would not recommend an ABC for 2021 to 2022. Alternative 1 serves as the no-management action alternative. Since the fishery did not operate under an ACL for 2018 and 2019, and thus did not utilize an ABC recommended by the SSC, this is also the “status quo” and environmental baseline alternative. Without an ABC or an associated ACL, the fishery would not operate under catch limits, so AMs would not be needed.

The Council and NMFS are required to implement ACLs and AMs, which require the setting of an ABC by the SSC. The “no action” alternative would not be in compliance with the Magnuson-Stevens Act, or the provisions of the FEPs and implementing Federal regulations since an ACL cannot be implemented without an ABC recommended by the SSC. This is included because it represents the no-management action alternative and is the recent fishery baseline. This alternative allows us to compare the effects of action alternatives to the environmental baseline.

Expected Fishery Outcome

Catches have never approached the ACLs in any jurisdiction since ABCs and ACLs were first implemented in 2012 (Table 5). Because there has previously been no in-season closure, ACLs and associated management do not appear to constrain the fishery. Catches in 2018 and 2019 (when no ABCs, ACLs or AMs were implemented) were similar to or less than the range of

catches during other years when ABCs and ACLs were implemented (Table 5). This catch history indicates the fishery has performed similarly whether or not ACLs and AMs are in place. We, therefore, expect that under Alternative 1, catches in 2021 and 2022 would continue to be similar to past years, all other applicable fishing regulations would remain in force and the fisheries would continue to be monitored. Without a catch limit, a race to fish, while possible without ACLs, is very unlikely. These fishery characteristics show that the lack of an ABC and subsequent implementation of an ACL under Alternative 1 is not expected to impact the way fishery participants operate relative to recent years in the fishery.

Table 5. Comparison of bottomfish catches to annual catch limits (ACLs). ACLs were not specified in 2018 and 2019. All ACL and catch values are in lb.

Year	AS ACL	AS Catch
2012	99,000	2,099
2013	101,000	5,732
2014	101,000	13,984
2015	101,000	21,528
2016	106,000	19,307
2017	106,000	14,791
2018	No ACL	11,957
2019	No ACL	11,093

2.2.3 Alternative 2: Set the ABC at 5,000 lb for 2021 and 2,000 lb for 2022

Under this alternative, the SSC will be utilizing the best scientific information available (Langseth et al. 2019) in recommending the ABC for fishing years 2021 and 2022 to provide the basis for the implementation of an associated ACL. The ABCs under this alternative are 5,000 lb for 2021 and 2,000 lb for 2022 (Table 6). The specification of an ABC of 5,000 lb for American Samoa BMUS in 2021 is equal to the OFL calculated for that year in the new stock assessment (Langseth et al. 2019, see Section 2.1.1). The 2022 ABC specification of 2,000 lb is consistent with the results of the P* Working Group that recommended a reduction score of 20 percent to allow the fishery to be managed at a 30 percent risk of overfishing (WPFMC 2020a) and utilized projection results from the stock assessment to determine this level of catch (Table 2). This specification spans two years instead of the usual four-year specifications by the Council because the rebuilding plan for American Samoa bottomfish will be implemented by 2022. An in-season AM would be implemented for the fishery in which NMFS would monitor catch throughout the year and close Federal waters to bottomfish fishing if the ABC and resulting ACL is reached.

National Standard 1 guidelines at 50 CFR 600.310(f)(2)(ii) state that Council can develop ABC control rules that allow for changes in catch limits to be phased in over time. Large changes in catch limits due to new scientific information about the status of the stock can have negative short-term effects on a fishery and fishing communities, so National Standard 1 allows for the development of a control rule that phases in changes to the ABC over time (i.e., not to exceed three years) to reduce the immediate magnitude of the change as long as the resulting ACL does not exceed the ABC. The NMFS Technical Guidance on implementing phase-in also describes

that the impact of phase-in on a stock rebuilding progress should be considered, as the overriding management goal for stocks in a rebuilding plan, such as American Samoa bottomfish, are to rebuild them the shortest time possible (Holland et al. 2020). For the American Samoa bottomfish fishery, the new stock assessment resulted in an abrupt change to the stock status for BMUS, which will result in a drastically lower ABC and ACL; the application of a phase-in approach will allow for the immediate impacts of the reduced ABC and ACL on the fishing community to be lessened while still preventing overfishing. These ABC specifications will be applied for 2021 and 2022 and will be equal to the associated ACL in accordance with the recommendation by the American Samoa Advisory Panel (see Section 1.4).

The projected standing stock biomass of American Samoa BMUS under a catch level of 5,000 lb would be 95,800 lb in 2021 with a harvest rate of 5 percent. In 2022, a catch level of 2,000 lb is associated with a projected stock biomass of 112,700 lb with a harvest rate of 2 percent, though this assumes a similar catch level is harvested in 2021 as well (see Table 19 in Langseth et al. 2019). The catch level of 5,000 lb would prevent overfishing and allow the fishery to rebuild in a relatively small increment (Table 2). The catch level of 2,000 lb determined by the Council’s P* Working Group would prevent overfishing and allow for the fishery to rebuild in a shorter time frame (WPFMC 2020a; Table 2). However, this ABC would not promote the stock being rebuilt within 10 years in accordance with the Magnuson-Stevens Act Section 304(e) due to its overfished state.

Table 6. Probability of Overfishing and ABC equivalent to the resulting ACL (in pounds) for fishing years 2021 to 2022 using the phased-in approach.

Year	P* level	ABC/ACL (lb)
2021	50	5,000
2022	30	2,000

Under this alternative, the SEEM analysis for American Samoa BMUS will adopt comparable reasoning to the SEEM analysis for Guam BMUS because of the similarities in the circumstances where the projected catch is significantly decreased and the stock status is pessimistic (WPRFMC 2020b) to specify the ACL equal to the SSC-recommended ABC. The SEEM analysis recognizes the importance of the American Samoa bottomfish fishery socially, ecologically and economically and acknowledges the uncertainties surrounding the monitoring and management of the fishery. Regardless of what level of risk the ACL will be set, the difference provided by a buffer will not provide any conservation or management benefit since the average catch for the fishery is an order of magnitude above the ABCs considered. Setting the ACL for the fishery equal to the ABC is also consistent with the recommendation by the American Samoa Advisory Panel.

In each of the archipelagic areas, the fishing year begins January 1 and ends December 31. In accordance with 50 CFR 665.4, when NMFS projects that catches will reach an ACL for any stock or stock complex, the agency must restrict fishing for that stock or stock complex in the applicable U.S. EEZ to prevent catches from exceeding the ACL. The restriction may include, but is not limited to, closing the fishery, closing specific areas, or restricting effort (76 FR 37286,

June 27, 2011). While an in-season restriction is difficult to implement for any territorial bottomfish fishery because catch statistics typically become available about six months after local management agencies collect the data, the Council recommends an in-season AM to close Federal waters when the ABC and resulting ACL are exceeded to better prevent overfishing in the fishery. Additionally, if landings of any stock complex exceed the specified ACL in a fishing year, the AM requires the Council to take action in accordance with 50 CFR 600.310(g) to correct the operational issue that caused the ACL overage. This may include a recommendation that NMFS implement a downward adjustment to the ACL in the subsequent fishing year, or other measures, as appropriate. As an additional performance measure specified in each FEP, if catches exceed any ACL more than once in a four-year period, the Council must re-evaluate the ACL process, and adjust the system, as necessary, to improve its performance and effectiveness. Future changes to an ACL would be subject to separate environmental review at such time as changes are proposed and are not part of the current proposed action.

Expected Fishery Outcome

Under Alternative 2, fishing for American Samoa BMUS would be subject to an ABC and resulting ACL of 5,000 lb for the fishing year 2021 and 2,000 lb for fishing year 2022. The fishery has landed above the levels specified in each of the past 10 years except for 2012, which has 2,099 lb of estimated catch (Table 4). Fishery operations have fluctuated over the past eight years since ABCs and ACLs were first implemented. The average annual catch from 2017 to 2019 was 12,614 lb, which is higher than both proposed ABCs.

Given the current state of American Samoa's bottomfish fleet, it is highly likely that total catch in 2021 and 2022 will exceed the ABCs and resulting ACLs described under this alternative. This will trigger the in-season AM and will cause the American Samoa bottomfish fishery to be closed in Federal waters. This will deny fishing access to the offshore banks for the majority of the year. Currently, the amount of fishing effort in the offshore banks is not well supported by available data. Aside from the offshore banks, the banks off the coast of Taputapu (west most tip of the island of Tutuila), which is a prime fishing ground for the villages of Amanave and Poloa (Will Sword, pers. comm), will be closed. The Interim Measure emergency rule (85 FR 56208, September 11, 2020) calculated that only 15 percent of the BMUS Essential Fish Habitat (EFH) is found in Federal waters and the majority of bottomfish EFH is found in territorial waters within 0-3 nm. The fishery is expected to continue operating in territorial waters since there is no mechanism to close the territorial waters to fishing complementary to a Federal closure.

Figure 3 shows the cumulative catch of American Samoa BMUS on a monthly basis from WPacFIN and demonstrates the variability of the data. For fishing year 2021, an ABC of 5,000 lb is expected to result in a closure of Federal waters by May after 5,400 lb of catch through April considering monthly averages from 2016 to 2018 (Figure 3). However, this level of catch may be reached as early as March (based on 2016 fishery performance) or as late as July (based on 2018 fishery performance). The Council and NMFS do not possess the spatial information or data to discern the amount of BMUS harvested in Federal versus territorial waters around American Samoa. However, if it is assumed that catch is proportional to the amount of bottomfish EFH in either Federal or territorial waters and 15 percent of bottomfish EFH around American Samoa occurs in Federal waters, a rough estimate can be made for the reduction in

catch under an ABC of 5,000 lb. Using the recent average annual catch for the fishery of 12,614 lb, there would be 7,214 lb still expected to be caught after a Federal closure in May and 1,082 lb that may have been caught in Federal waters would not be harvested. Therefore, the total expected catch under an ABC of 5,000 lb would be 11,532 lb assuming fishing effort is not displaced to territorial waters. Thus, this ABC would slightly reduce fishery catch, but adverse impacts to the American Samoa bottomfish stock will persist, overfishing will still occur, and rebuilding will be delayed.

For fishing year 2022, an ABC of 2,000 lb is expected to result in a closure of Federal waters by March after 2,224 lb of catch through February considering monthly averages from 2016 to 2018 (Figure 3). This level of catch may be reached as soon as January (based on 2017 fishery performance) or as late as March (based on 2018 fishery performance). Similar to the ABC for fishing year 2021, a simple calculation can be used to determine the estimated reduction in catch under an ABC and resulting ACL of 2,000 lb. If the fishery continues harvesting as it has in recent years at an average of 12,614 lb, there would still be 10,390 lb expected to be harvested after this time in a given year. If fishing occurs proportional to where bottomfish EFH occurs, 1,559 lb that may have ordinarily been harvested in Federal waters would not be caught. Therefore, the total expected catch for fishing year 2022 under this alternative would be 11,055 lb assuming fishing effort is not displaced to territorial waters. Thus, this ABC would moderately reduce fishery catch, but adverse impacts to the American Samoa bottomfish stock will persist, overfishing will not be prevented, and rebuilding will not occur within the fishery.

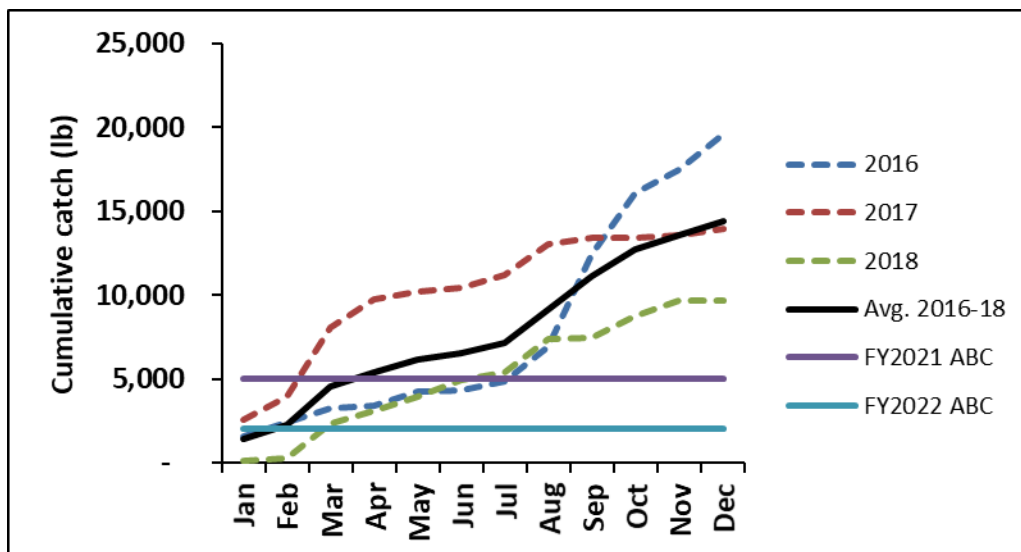


Figure 3. Cumulative monthly catch of American Samoa BMUS from 2016 to 2018 compared to the proposed ABC for Alternative 2 for fishing years 2021 and 2022. (Source: WPacFIN).

2.2.4 Alternative 3: Set the ABC at 2,000 lb for both 2021 and 2022

Under Alternative 3, the SSC will also be utilizing the best scientific information available (Langseth et al. 2019) in recommending the ABC for fishing years 2021 and 2022 to provide the basis for the implementation of an associated ACL. Similar to Alternative 2, the ABC will be set

at a level consistent with the results of the P* Working Group (WPFMC 2020a) using projection results from the stock assessment (Table 2). However, under this alternative, the SSC will apply the same ABC to both fishing years 2021 and 2022 of 2,000 lb. This alternative provides a more precautionary approach to prevent overfishing and allow the rebuilding of the fishery in a shorter time frame. The projected standing stock biomass of American Samoa BMUS under a catch level of 2,000 lb would be 112,700 lb in 2022 with a harvest rate of 2 percent (see Table 19 in Langseth et al. 2019). The catch level of 2,000 lb determined by the Council's P* Working Group would prevent overfishing and allow for the fishery to begin rebuilding from its overfished state. Under this alternative, similar to Alternative 2, the SEEM analysis for American Samoa BMUS will adopt comparable reasoning to the SEEM analysis for Guam BMUS to specify the ACL equal to the SSC-recommended ABC. Also similar to Alternative 2 (see Section 2.2.2), this alternative would employ an in-season AM where Federal waters around American Samoa would be closed to bottomfish fishing if the ACB and resulting ACL are reached.

Expected Fishery Outcome

Under this alternative, the ABC will allow the fishery to be open for roughly two months before a closure of Federal waters to bottomfish fishing is implemented. This will deny fishing access to the offshore banks for the majority of the year. Currently, the amount of fishing effort in the offshore banks is not well supported by available data. Aside from the offshore banks, the banks off the coast of Taputapu (west most tip of the island of Tutuila), which is a prime fishing ground for the villages of Amanave and Poloa (Will Sword, pers. comm), will be closed. The Interim Measure emergency rule (85 FR 56208, September 11, 2020) calculated that only 15 percent of the BMUS Essential Fish Habitat (EFH) is found in Federal waters and the majority of bottomfish EFH is found within 0-3 nm. The fishery is expected to continue operating in territorial waters since there is no mechanism to close the territorial waters to fishing complementary to a Federal closure.

Figure 4 shows the same cumulative catch of BMUS from 2016 to 2018 as Figure 3 but compared to the proposed ABC and resultant ACL of 2,000 lb for fishing years 2021 and 2022 under Alternative 3. This ABC is expected to result in a closure of Federal waters by March after 2,224 lb of catch through February considering monthly averages from 2016 to 2018 (Figure 4). This level of catch may be reached as soon as January (based on 2017 fishery performance) or as late as March (based on 2018 fishery performance). As described under Alternative 2, the Council does not have spatial information to determine the amount of BMUS caught in Federal waters or territorial waters, but the reduction in catch can be estimated with a simple calculation. It is assumed that bottomfish are caught proportional to the distribution of their EFH in Federal and territorial waters and the fishery will continue to harvest bottomfish as it has in recent years. If the average annual catch is 12,614 lb and a Federal closure occurs in March after 2,224 lb of catch, there would be another 10,390 lb ordinarily caught in a given year after this time. Thus, 1,559 lb that might have been caught in Federal waters would not be caught in the fishery. Therefore, the total catch for this scenario would be 11,055 lb assuming no displacement of fishing effort to territorial waters, which is unlikely. Thus, there will still be adverse impacts to the American Samoa bottomfish fishery as it will continue to be subject to overfishing and rebuilding will be delayed.

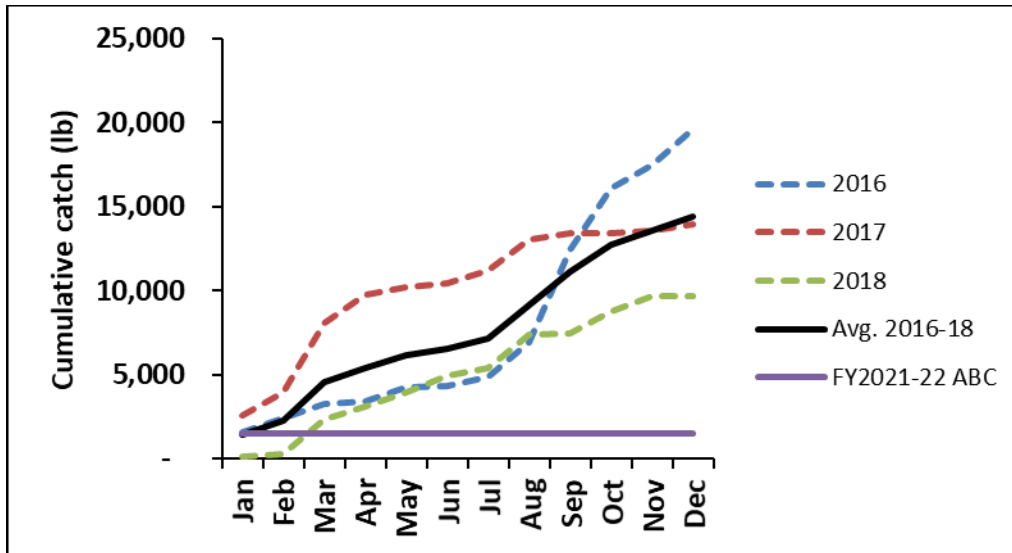


Figure 4. Cumulative monthly catch of American Samoa BMUS from 2016 to 2018 compared to the proposed ABC for Alternative 3 for fishing years 2021 to 2022.

(Source: WPacFIN).

2.2.5 Alternative 4: Establish a Temporary Prohibition on Bottomfish Fishing in Federal waters around American Samoa

Under Alternative 4, the SSC will not specify an ABC and will recommend a fishing prohibition for and possession of BMUS in Federal waters around American Samoa for the entirety of fishing years 2021 and 2022. This is equivalent to implementing a catch limit of 0 lb in Federal waters around American Samoa and is the maximum action the SSC and Council could consider to address overfishing of bottomfish and rebuilding the fishery. There would be no AM associated with this alternative because catch would not need to be checked against an ABC or ACL. All other applicable fishing regulations would remain in place and the bottomfish fishery would continue to be monitored by NMFS and the Council.

Expected fishery outcome

Under Alternative 4, catches in 2021 and 2022 is expected to be moderately less than Alternative 1 and slightly less than Alternatives 2 and 3; this is because the ABC and resulting ACL for Alternatives 2 and 3 are relatively low and would only allow for a small number of fishing trips before the catch limit would be exceeded. Also, bottomfish fishing occurs predominantly in nearshore territorial waters, and it is not anticipated that the American Samoa government will implement a complementary closure of territorial waters alongside the Federal closure. For this reason, the fishery is expected to continue to catch BMUS in territorial waters the closure of Federal waters to bottomfish fishing.

As described under Alternatives 2 and 3, the Council does not have spatial information to determine the amount of BMUS caught in Federal waters or territorial waters, but only 15 percent of bottomfish EFH is located in Federal waters. Assuming that bottomfish are caught proportional to the distribution of their EFH in Federal and territorial waters and the fishery

continues to harvest bottomfish as it has in recent years, the recent average annual catch of 12,614 lb would be reduced by 15 percent (1,892 lb) to 10,722 lb with a closure of Federal waters; however, this also assumes that there would be no displacement of fishing effort to territorial waters, which is unlikely. Thus, this alternative will result in a moderate reduction in catch, but it is expected the American Samoa bottomfish stock will continue to be subject to overfishing and the delay the time for it to rebuild.

Under this alternative, revenue for commercial fishermen would also be reduced by 15 percent assuming fishing is proportional to bottomfish EFH and there is no displacement of fishing effort from Federal waters to territorial waters. Also, assuming the change in catch is similar for non-commercial fishing, Alternative 4 would also result in less catch available for subsistence, cultural and religious purposes than Alternatives 1, 2, and 3. A moratorium on bottomfish fishing in waters around American Samoa would fulfill requirements under the Magnuson-Stevens Act for the Council to take action to end overfishing and rebuild the fishery, but would not consider the needs of the American Samoa fishing community by constraining the fishery to the maximum possible extent.

2.3 Comparison of Features of the Alternatives

Table 7 presents a summary of features of the alternatives and allows a quick comparison among alternatives.

Table 7. Comparison of the proposed fishery management features and expected outcomes of the alternatives.

Topic	Alt. 1 - No Action/Status Quo	Alt. 2 – Recommend ABC of 5,000 lb for 2021 and 2,000 lb for 2022	Alt. 3 – Recommend ABC of 2,000 lb for 2021 and 2022	Alt. 4 – Closure of Fishery in Federal Waters
General characteristics of alternative	No ABC, thus no associated ACL or AM.	ABC and ACL set to reduce overfishing and rebuild the fishery with different ABC in subsequent years; in-season fishery closure would be used as AM. Alt. 2 reduces adverse effects on fishing community during the period of effectiveness by having a higher ABC in 2021 than Alt. 3 before transitioning to a lower level.	ABC and resulting ACL set at the rebuilding catch level to significantly reduce overfishing; in-season fishery closure would be used as AM. Alt. 3 has insignificant reduction of adverse effects on fishing community during the period of effectiveness due to the immediate application of the ACL and does not benefit from a phase-in approach.	ABC and resulting ACL of 0 lb and no AM. Fishing for BMUS prohibited in Federal waters to reduce overfishing. Alt. 4 has no reduction of adverse effects on fishing community during the period of effectiveness.
Duration of the management action	N/A.	2 years.	2 years.	2 years.
ABC and resulting ACL (lb) for BMUS in American Samoa	No limit.	2021: 5,000 lb; 2022: 2,000 lb.	2021-2022: 2,000 lb.	0 lb.
Accountability Measure: Closure of Federal waters to bottomfish fishing when ACL resulting from recommended ABC is reached	No AM. The fishery would not be subject to a potential fishery closure.	If available data indicates the fishery will attain the ACL, NMFS would close the fishery in Federal waters for the remainder of the year.	If available data indicates the fishery will attain the ACL, NMFS would close the fishery in Federal waters for the remainder of the year.	No AM necessary. Fishery closed in Federal waters.
Complementary closure of territorial waters by American Samoa Government	N/A.	Not anticipated in time for this action. Not part of proposed action.	Same as Alt. 2.	Same as Alt. 2.

Topic	Alt. 1 - No Action/Status Quo	Alt. 2 – Recommend ABC of 5,000 lb for 2021 and 2,000 lb for 2022	Alt. 3 – Recommend ABC of 2,000 lb for 2021 and 2022	Alt. 4 – Closure of Fishery in Federal Waters
Possible fishery closure in Federal waters	None.	2021: possibly May – Dec. 2022: possibly Mar. – Dec.	2021-2022: possibly Mar. – Dec.	2021-2022: Jan - Dec
Expected catch of American Samoa BMUS (see text for detail)	2021-2022: 12,614 lb (same as recent average).	2021: 11,532 lb; 2022: 11,055 lb; (if effort not displaced to territorial waters).	2021-2022: 11,055 lb (if effort not displaced to territorial waters).	2021-2022: 10,722 lb (if effort is not displaced to territorial waters).
Reduces overfishing relative to previous years	No. Catch expected to be similar to recent average of 12,614 lb.	2021: Slightly. Catch may be reduced to 11,532 lb; 2022: Slightly. Catch may be reduced to 11,510 lb;	2021-2022: Slightly. Catch may be reduced to 11,055 lb;	2021-2022: Moderately. Catch may be reduced to 10,722 lb;
Authorized catch would allow stock biomass to increase during the specification period	No.	Yes, based on the interim measure emergency rule that indicated the maximum catch that would allow for biomass to increase is 13,000 lb. The ABCs and resulting ACLs under Alt. 2 are below that level and the increment of increase in biomass will be greater than Alt. 1. Biomass increase could be offset by fishing in territorial waters.	Yes, a stricter reduction in catch in 2021 would allow biomass to increase at an increased rate. Biomass increase could be offset by fishing in territorial waters.	Yes, the stricter reduction in catch in 2021 and 2022 would allow biomass to increase at the maximum rate. Biomass increase could be offset by fishing in territorial waters.

Topic	Alt. 1 - No Action/Status Quo	Alt. 2 – Recommend ABC of 5,000 lb for 2021 and 2,000 lb for 2022	Alt. 3 – Recommend ABC of 2,000 lb for 2021 and 2022	Alt. 4 – Closure of Fishery in Federal Waters
Mitigates effects of immediately ending overfishing on communities during ABC/ACL specification time frame	Yes. Fishing would be the same as status quo. This alternative lacks long-term benefits of shortening rebuilding time frame the action alternatives would provide.	<p>Yes, more than Alternatives 3 and 4 as more fishing in Federal waters is expected in 2021 than in the other alternatives while still managing for a reduction in fishing impacts. There would be less fishing in Federal waters during the specification time frame than under the status quo Alt.</p> <p>The approach of implementing a higher ACL in 2021 before the lower ACL in 2020 will help mitigate the impacts on communities with the sudden drop in ABC and ACL. It allows for the community to adjust to the new quota.</p> <p>Long-term, there could be some benefit to stocks due to the shortened rebuilding time frame.</p>	<p>Alternative 3 does less to mitigate effects on fishing communities than the no action and preferred alternatives, but more than Alternative 4.</p> <p>Long-term, there could be some benefit to stocks due to the shortened rebuilding time frame relative to Alt. 1 and 2.</p>	<p>Not in the short term, since this is the maximum action the Council could consider.</p> <p>Long-term, there could be some benefit to stocks due to the shortened rebuilding time frame relative to all other alternatives.</p>

3 References

- Brodziak, J., J. O'Malley, B. Richards, and G. DiNardo. 2012. Stock Assessment Update of the Status of Bottomfish Resources of American Samoa, the Commonwealth of the Northern Mariana Islands and Guam, 2010. NMFS, Pacific Islands Fisheries Science Center, Internal Report IR-12-022. Honolulu, HI. 126 p.
- Langseth B, Syslo J, Yau A, Carvalho F. 2019. Stock assessments of the bottomfish management unit species of Guam, the Commonwealth of the Northern Mariana Islands, and American Samoa, 2019. NOAA Tech Memo. NMFS-PIFSC-86, 177 p. (+ supplement, 165 p.). doi:10.25923/bz8b-ng72.
- Hospital J, Schumacher B, Ayers A, Leong K, Severance C. 2019. A Structure and Process for Considering Social, Economic, Ecological, and Management Uncertainty Information in Setting of Annual Catch Limits: SEEM. PIFSC Internal Report IR-19-011.
- NMFS. 2012. Environmental Assessment for Annual Catch Limit Specifications and Accountability Measures for Pacific Islands Bottomfish Fisheries in 2012 and 2013, including a Regulatory Impact Review. December 13, 2012. 118 p.
- WPFMC. 2009. Fishery Ecosystem Plan for the American Samoa Archipelago. Western Pacific Fishery Management Council. Honolulu, Hawaii. 220 p.
- WPRFMC. 2019. Annual Stock Assessment and Fishery Evaluation Report for the American Samoa Archipelago Fishery Ecosystem Plan 2018. Sabater, M., Ishizaki, A., Remington, T., Spalding, S. (Eds.) Western Pacific Regional Fishery Management Council. Honolulu, Hawaii 96813. 274 p.
- WPRFMC. 2020. Annual Stock Assessment and Fishery Evaluation Report for the American Samoa Archipelago Fishery Ecosystem Plan 2019. Sabater, M., Ishizaki, A., Remington, T., Spalding, S. (Eds.) Western Pacific Regional Fishery Management Council. Honolulu, Hawaii 96813. 274 p.
- WPRFMC. 2020a. American Samoa P* Working Group Report. Western Pacific Regional Fishery Management Council. Honolulu, Hawaii 96813.
- WPRFMC. 2020b. Guam SEEM Working Group Report. Western Pacific Regional Fishery Management Council. Honolulu, Hawaii 96813.
- Yau A, Nadon M, Richards B, Brodziak J, Fletcher E. 2016. Stock Assessment Updates of the Bottomfish Management Unit Species of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam in 2015 Using Data through 2013. Pacific Islands Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Pacific Islands Fish. Sci. Cent. NOAA Tech. Memo.