1.11 STATUS DETERMINATION CRITERIA

1.11.11Bottomfish Fishery

Overfishing criteria and control rules are specified and applied to individual species within the multi-species stock whenever possible. When this is not possible, they are based on an indicator species for the multi-species stock. It is important to recognize that individual species would be affected differently based on this type of control rule, and it is important that for any given species, fishing mortality does not currently exceed a level that would result in excessive depletion of that species. No indicator species are used for the bottomfish multi-species stock complexes. Instead, the control rules are applied to each stock complex as a whole.

The maximum sustainable yield (MSY) control rule is used as the maximum fishing mortality threshold (MFMT). The MFMT and minimum stock size threshold (MSST) are specified based on the recommendations of Restrepo et al. (1998) and both are dependent on the natural mortality rate (M). The value of M used to determine the reference point values is not specified in this section. The latest estimate published annually in the stock assessment and fishery evaluation (SAFE) report is used, and the value is occasionally re-estimated using the best available information. The range of M among species within a stock complex is taken into consideration when estimating and choosing the M to be used for the purpose of computing the reference point values.

In addition to the thresholds MFMT and MSST, a warning reference point, B_{FLAG}, is specified at some point above the MSST to provide a trigger for consideration of management action prior to B reaching the threshold. MFMT, MSST, and B_{FLAG} are specified as indicated in Table 1.

Table 1. Overfishing threshold specifications for BMUS

MFMT	MSST	B_{FLAG}
$F(B) = \frac{F_{MSY} B}{c B_{MSY}}$ for $B \le c B_{MSY}$ $F(B) = F_{MSY}$ for $B > c B_{MSY}$	$c B_{MSY}$	B_{MSY}
where c = max (1-M, 0.5)		

Standardized values of fishing effort (E) and CPUE are used as proxies for fishing mortality (F) and biomass (B), respectively, so E_{MSY}, $CPUE_{MSY}$, and $CPUE_{FLAG}$ are used as proxies for F_{MSY}, B_{MSY}, and B_{FLAG}, respectively.

In cases where reliable estimates of $CPUE_{MSY}$ and E_{MSY} are not available, they would be estimated from catch and effort times series, standardized for all identifiable biases. $CPUE_{MSY}$ would be calculated as half of a multi-year average reference CPUE, called $CPUE_{REF}$. The multi-year reference window would be objectively positioned in time to maximize the value of $CPUE_{REF}$. E_{MSY} would be calculated using the same approach or, following Restrepo et al. (1998), by setting E_{MSY} equal to E_{AVE}, where E_{AVE} represents the long-term average effort prior to declines in CPUE. When multiple estimates are available, the more precautionary is used.

Since the MSY control rule specified here applies to multi-species stock complexes, it is important to ensure that no species within the complex has a mortality rate that leads to excessive depletion. In order to accomplish this, a secondary set of reference points is specified to evaluate stock status with respect to recruitment overfishing. A secondary "recruitment overfishing"

control rule is specified to control fishing mortality with respect to that status. The rule applies only to those component stocks (species) for which adequate data are available. The ratio of a current spawning stock biomass proxy ($SSBP_t$) to a given reference level ($SSBP_{REF}$) is used to determine if individual stocks are experiencing recruitment overfishing. SSBP is CPUE scaled by percent mature fish in the catch. When the ratio $SSBP_t/SSBP_{REF}$, or the "SSBP ratio" (SSBPR) for any species drops below a certain limit ($SSBPR_{MIN}$), that species is considered to be recruitment overfished and management measures will be implemented to reduce fishing mortality on that species. The rule applies only when the SSBP ratio drops below the $SSBPR_{MIN}$, but it will continue to apply until the ratio achieves the "SSBP ratio recovery target" ($SSBPR_{TARGET}$), which is set at a level no less than $SSBPR_{MIN}$. These two reference points and their associated recruitment overfishing control rule, which prescribe a target fishing mortality rate ($F_{RO\text{-}REBUILD}$) as a function of the SSBP ratio, are specified as indicated in Table 2. Again, E_{MSY} is used as a proxy for F_{MSY}.

Table 2. Recruitment overfishing control rule specifications for BMUS

$F_{RO\text{-}REBUILD}$	$SSBPR_{MIN}$	$SSBPR_{TARGET}$
$F(SSBPR) = 0$ for $SSBPR \leq 0.10$ $F(SSBPR) = 0.2\ F_{MSY}$ for $0.10 < SSBPR \leq SSBPR_{MIN}$ $F(SSBPR) = 0.4\ F_{MSY}$ for $SSBPR_{MIN} < SSBPR \leq SSBPR_{TARGET}$	0.20	0.30

1.11.12Current Stock Status

1.11.12.1 Bottomfish

Biological and other fishery data are poor for all bottomfish species in the America Samoa Archipelago. Generally, data are only available on commercial landings by species and CPUE for the multi-species complexes as a whole. At this time, it is not possible to partition these effort measures among the various bottomfish MUS. The most recent stock assessment (Langseth et al. 2019) for the American Samoa bottomfish MUS complex (comprised of 11 species of shallow and deep species of snapper, grouper, jacks, and emperors) was based on estimates of total catch and an abundance index derived from the nominal CPUE generated from the creel surveys. The assessments used a state-space Bayesian surplus production model within the modeling framework Just Another Bayesian Biomass Assessment (JABBA), which included biological information and fishery-dependent data through 2017. Determinations of overfishing and overfished status can then be made by comparing current biomass and harvest rates to MSY-level reference points. The American Samoa BMUS were determined to be both undergoing overfishing and in an overfished state (Table 3).

Table 3. Stock assessment parameters for the BMUS complex (from Langseth et al. 2019)

Parameter	Value	Notes	Status
MSY	28.8 (16.4-55.9)	Expressed in 1000 lb (with 95% confidence interval)	
H_{2017}	0.15	Expressed in percentage	
H_{CR}	0.107 (0.044-0.228)	Expressed in percentage (with 95% confidence interval)	

H/H_{CR}	2.75		Overfishing occurring
B_{2017}	102.6	Expressed in thousand pounds	
B_{MSY}	272.8 (120.8-687.4)	Expressed in 1000 lb (with 95% confidence interval)	
B/B_{MSY}	0.38		Overfished

1.12 OVERFISHING LIMIT, ACCEPTABLE BIOLOGICAL CATCH, AND ANNUAL CATCH LIMITS

1.12.11 Brief Description of the ACL Process

The Council developed a tiered system of control rules to guide the specification of ACLs and Accountability Measures (AMs; WPRFMC, 2011). The process starts with the use of the best scientific information available (BSIA) in the form of, but not limited to, stock assessments, published papers, reports, and/or available data. These data are categorized into the different tiers in the control rule ranging from Tier 1 (i.e., most information available, typically a stock assessment) to Tier 5 (i.e., catch-only information). The control rules are applied to the BSIA. Tiers 1 to 3 involve conducting a Risk of Overfishing Analysis (denoted by P*) to quantify the scientific uncertainties associated with the assessment to specify the Acceptable Biological Catch (ABC), lowering the MSY-based OFL to the ABC. A Social, Ecological, Economic, and Management (SEEM) Uncertainty Analysis is performed to quantify the uncertainties associated with the SEEM factors, and a buffer is used to lower the ABC to an ACL. For Tier 4, which is comprised of stocks with MSY estimates but no active fisheries, the control rule is 91 percent of MSY. For Tier 5, which has catch-only information, the control rule is a one-third reduction in the median catch depending on a qualitative evaluation of stock status via expert opinion. ACL specification can choose from a variety of methods including the above mentioned SEEM analysis or a percentage buffer (i.e., percent reduction from ABC based on expert opinion) or the use of an Annual Catch Target (ACT). ACLs can be updated on an annual basis, but the Council normally produces a multi-year ACL for implementation.

The usual AM for American Samoa bottomfish fisheries is an overage adjustment. The next ACL is downward adjusted with the amount of overage from the previous ACL based on a three-year running average.

1.12.12 Current OFL, ABC, ACL, and Recent Catch

No ACLs were implemented by NMFS for American Samoa MUS in 2020. However, NMFS did implement an interim catch limit (ICL) of 13,000 lb for 2020 associated with an interim management measure for the American Samoa bottomfish fishery (85 FR 73003). Consistent with Magnuson-Stevens Act sections 304(e)(6) and 305(c), the Council requested that NMFS implement this interim measure to reduce overfishing of BMUS while the Council develops management measures to end overfishing and rebuild the American Samoa bottomfish stock complex. The catch shown in Table 4 takes the average of the most recent three years as recommended by the Council at its 160th meeting to avoid large fluctuations in catch due to high interannual variability in estimates.

Table 4. American Samoa 2020 ACL table with three-year recent average catch (lb)

Fishery	MUS	OFL*	ABC	ACL**	Catch
Bottomfish	Bottomfish multi-species complex	8,000	N.A.	13,000	10,638

* OFL derived from the stock assessment (Langseth et al. 2019) with 2025 as the terminal year.
** ACL for 2020 was an ICL implemented by NMFS as an interim measure (85 FR 73003).

1.13 BEST SCIENTIFIC INFORMATION AVAILABLE

1.13.11 Bottomfish fishery

1.13.11.1 Stock Assessment Benchmark

The benchmark stock assessment for the territory BMUS complex was developed and finalized by 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. Stock projections were conducted for 2020-2025 for a range of hypothetical six-year catches, and the corresponding risk of overfishing was calculated.

1.13.11.2 Stock Assessment Updates

Updates to the 2007 benchmark stock assessment were done in 2012 (Brodziak et al. 2012) and 2015 (Yau et al. 2016). These included a two-year stock projection table used for selecting the level of risk the fishery will be managed under ACLs. Yau et al. (2016) was considered the best scientific information available for the territory BMUS complexes after undergoing a Western Pacific Stock Assessment Review (WPSAR) Tier 3 panel review (Franklin et al. 2015) prior to the Langseth et al. (2019) benchmark stock assessment. This was the previous basis for P* and SEEM analyses that determined the risk levels to specify past ABCs and ACLs.

1.13.11.3 Other Information Available

Approximately every five years PIFSC administers a socioeconomic survey to small boat fishermen in American Samoa. This survey consists of about 60 questions regarding a variety of topics, including fishing experiences, market participation, vessels and gear, demographics and household income, and fishermen perspectives. The survey requests participants to identify which MUS they primarily targeted during the previous 12 months by percentage of trips. Full reports of these surveys can be found at the PIFSC Socioeconomics webpage.

PIFSC and the Council conducted a workshop with various stakeholders in CNMI to identify factors and quantify uncertainties associated with the social, economic, ecological, and management of the coral reef fisheries (Sievanen and McCaskey 2014). This was the basis for the SEEM analyses that determine the risk levels to specify ACLs. However, species targeted by coral reef fisheries in American Samoa are no longer classified as MUS.