**Western Pacific Regional Fishery Management Council**

**FINAL Report of the American Samoa BMUS P\* Working Group Meeting**
August 29, 2023, 9:00 am to 5:00 pm
Tradewinds, Naumati Ballroom American Samoa

## 1. Introductions

Marlowe Sabater, opened the meeting at 9:10 a.m. Members in attendance at the Naumati Ballroom include Heather Nelson (PIRO SFD), Tepora Lavatai, Sean Felise, Shaun Laolagi, Fernan Asalele, Archie Soliai (DMWR), Muamalae Tata Aga, Brian Peck and Will Sword (Fishermen). Members joining virtually included Marc Nadon, Eva Schemmel (PIFSC), Keith Kamikawa (PIRO), Nate Ilaoa (AP Vice Chair).

## 2. Recommendations from previous Council meetings

Council staff provided the recommendations from the 195th Council meeting. In June 2023, the Pacific Island Fisheries Science provided a report of the 2023 American Samoa Bottomfish Benchmark Stock Assessment and accepted it as best scientific information available (BSIA) on the status of the fishery. The Council directed staff to develop a fishery ecosystem plan (FEP) amendment to discontinue the current bottomfish rebuilding plan and for staff to convene the P\* and SEEM working groups to quantify the scientific and management uncertainties to set and specify the acceptable biological catch (ABC) and annual catch limit (ACL) alternatives for initial action at the 196th meeting in September 2023.

## 3. Overview of the P\* process

Council staff provided an overview of the P\* process. The Fishery Ecosystem Plans required the Council to revisit the P\* analysis once new information becomes available. The P\* process determines the risk level to which the fishery will be managed based on the scientific uncertainties surrounding the stock assessment and the stock it described. There are 4 dimensions in the P\* analysis: 1) Assessment Information; 2) Uncertainty Characterization; 3) Stock Status; and 4) Productivity-Susceptibility. Each dimension has criteria scored by working group members. The total scores will be deducted from the 50% risk of overfishing described in Nadon et al. 2023. The catch that corresponds to the final P\* reduction from the 50% risk of overfishing will be used by the SSC to specify the Acceptable Biological Catch at its 149th Meeting in September 2023.

A working group member asked how the P\* and SEEM scores will be applied for the ABC and ACL. Council staff said the P\* score will be applied to set the ABC at a level that is below the 50% risk of overfishing and the SEEM score will be applied to further reduce the risk of overfishing from the ABC to create ACL and ACT alternatives for the Council to consider.

**4. Report on 2023 Benchmark Stock Assessment for the AS BMUS**

Marc Nadon, PIFSC SAP lead, provided an overview of the 2023 benchmark stock assessment for the American Samoa BMUS. The assessment used a single-species age-structured model integrated into the Stock Synthesis 3 modeling framework and incorporated historical catch from 1967 to 1985 using older government reports. This assessment was a result of a culmination of a three-year stock assessment improvement plan to improve the data and to have a representative assessment. Estimates of harvest rate (H), annual biomass (B), the harvest rate associated with overfishing as determined by the harvest control rule (HCR), maximum sustainable yield (MSY), and the biomass at maximum sustainable yield ($B_{MSY}$) \were used to determine of stock status relative to reference points determining overfishing and overfished status. Stock projections and corresponding risk of overfishing were calculated for 2022–2028 over a range of hypothetical eight-year catches for nine BMUS: *Aphareus rutilans, Aprion virescens, Caranx lugubris, Etelis carbunculus , Etelis coruscans, Lethrinus rubrioperculatus, Lutjanus kasmira, Pristipomoides filamentosus, Pristipomoides flavipinnis, Pristipomoides zonatus,* and *Variola louti.*

A fisherman asked if the assessment captured fishing data during the gap of the dory program and the development of the alia fishery. Nadon said the gap was not substantial and the assessment recognized there may have been light fishery activity.

A fisherman asked if the dory fishing program affected the development of the alia fishing fleet. Nadon said the dory fishing program went into disrepair and fishermen found that that the alia program was more suited towards their fishery. This transition from the dory fleet to alia can be seen in the assessment.

A working group member asked if this transition in the fleet was reflective of the fishery and observations over time with the shallow species BMUS. The fisherman said the alia started in Western Samoa as they saw that it was cheaper than the dory program. Over time there the dory fleet was able to recover, but both the dory and alia are fitted for nearshore fisheries as compared to the longline fleet.

**5. Working group scoring session**
**a. Assessment information**

The assessment information dimension pertains to the scientific information that was utilized in the assessment. The working group selected which level of assessment category the 2023 benchmark assessment belongs to.

The working group determined that the new benchmark is provides estimates of exploitation and biomass and includes MSY derived benchmarks, indicating an assessment information score between 0 and 1.9. Although the assessment does not use a spatial model, there is spatial information on the conduct of the fishery, so the working group determined that a score of 2 or above would be inappropriate. The assessment provides estimates for US waters around American Samoa. The working group then scored the various assessment aspects to determine a score between 0 and 1.9.

Assessment aspects were assigned scores of 0 (aspect captured in the assessment), 0.5 (aspect partially captured in the assessment) and 1 (aspect not captured in the assessment). The assessment aspects are:

- Reliable catch history,
- Standardized CPUE,
- Species-specific data,
- All sources of mortality accounted for,
- Fishery independent data,
- Tagging data,
- Spatial analysis

***Reliable catch history:*** the working group noted the data was not perfect since there is still no mandatory reporting in place. The group said that fishers are out fishing, but there are no creel surveyors capturing their data. The working group discussed the development of the dory and alia program that required fishers to report their catch. Although it was not a perfect census, the catch history provided a good representation of the total catch. The working group believed that the data from the creel is under-estimated and scored it a 0.5.

***Standardized CPUE.*** The CPUE series used the last five years of catch data to show the average catch per trip. Average catch per trip was dependent on where and what time of year the fisher went fishing, and gear types used. CPUE was accounted for in the assessment, but it did not include all of the effects the assessment could address. The working group scored this aspect at 0.5..

***Species-specific data***: The working group discussed the method for incorporating length data in the single-species model. Since this assessment used single-species models and did not assess the fishery as a complex, the working group scored no reduction for species-specific data for all species.

***All sources of mortality accounted for***: The assessment accounts for fishing mortality of landed catch and natural mortality, but does not account for fishing mortality that occurs at of sea. This could include mortality due to shark depredation and bycatch. Members of the working group said bycatch are often used as bait as the fishery tries to keep as much as they can. The working group scored this aspect at 0.5for all species.

***Fishery independent data and tagging data:*** None of these information were available for the benchmark assessment. Therefore the working group scored this aspect at 1for all species.

***Spatial analysis:*** Fishing data in this fishery fluctuates from year to year, and there was limited spatial information for fishing trips from the bank included in the stock assessment. Because there was not enough spatially explicit information to run an analysis, the working group scored this aspect at 0.5 for all species.

To determine the total reduction from the Assessment Information, the assessment aspect scores were summed and then scaled into a percent reduction from the 50% risk of overfishing.

The sum of the assessment aspect scores was 4.0, which was scaled to a 1.1% reduction from the 50% risk of overfishing. The total percent reduction score for the Assessment Information Dimension was 1.1 % for all species.

### b. Uncertainty characterization

The working group scored this dimension as a 3.5 percent reduction for all species. Uncertainties were carried forward into the projections. The uncertainties were also characterized in the estimation of the stock status. The uncertainty characterization would fall between high and medium.

### c. Stock status

The benchmark assessment showed that the nine assessed BMUS species in American Samoa were not overfishing nor experiencing overfishing. The working group examined where the 2023 stock status is relative to MSST and MFMT. Although *E. coruscan* (palu-loa) and *A. virescens* (asoama) were closest to the overfished limit, the assessment results say there is a low probability with the nature of the fishery. Biomass for all species was greater than both the Minimum Stock Size Threshold and the spawning biomass that produces the maximum sustainable yeild.

### d. Productivity and susceptibility

The productivity attributes were scored by PIFSC LHP, with input from the working group. Each of the nine species assessed in the complex was scored using the attributes from Patrick et al. 2009. The following are the productivity attributes:

| Productivity attributes | High (0) | Moderate (5) | Low (10) |
|---|---|---|---|
| *Rate of population increase - r* | >0.5 | 0.16-0.5 | <0.16 |
| *Maximum age* | <10 yrs | 10-30 yrs | >30 yrs |
| *Maximum size* | <60cm | 60-150cm | >150cm |
| *von Bertalanffy growth coefficient (k)* | >0.25 | 0.15-0.25 | <0.15 |
| *Estimated natural mortality* | >0.40 | 0.20-0.40 | <0.2 |
| *Measured fecundity* | >10e4 | 10e2-10e3 | <10e2 |
| *Breeding strategy* | 0 | between 1 and 3 | ≥4 |
| *Recruitment pattern* | high recruitment success | moderate recruitment success | infrequent recruitment success |
| *Age at maturity* | <2 yrs | 2-4 yrs | >4 yrs |
| *Mean trophic level* | <2.5 | between 2.5 and 3.5 | >3.5 |

Scores of 0, 5, or 10 are given to each species. The attribute scores for each species were averaged out to get the productivity scores per species. Below are the species productivity scores:

**Table 1: Final productivity scores for the 9 assessed AS BMUS**

| Species | SCORES |
|---|---|
| **Palu-gutusiliva -** *Aphareus rutilans* (lehi) | 7.5 |
| **Palu-loa -** *Etelis coruscans* (onaga) | 7.5 |
| **Palu-sina -** *Pristipomoides flavipinnis* (yelloweye opakapaka) | 5 |
| **Palu-ula, palu-sega -** *Pristipomoides zonatus* (gindai) | 5.5 |
| **Tafauli -** *Caranx lugubris* (black trevally) | 5 |
| **Asoama -** *Aprion virescens* (gray jobfish) | 6.5 |
| **Filoa paomumu -** *Lethrinus rubrioperculatus* (red gill emperor) | 4 |
| **Savane -** *Lutjanus kasmira* (blue lined snapper) | 3 |
| **Papa, velo -** *Variola louti* (lunar tail grouper) | 5.5 |

The final productivity scores for the nine assessed BMUS are listed in Table 1

The Susceptibility Attributes were scored by the bottomfish fishermen. The fishermen reviewed the previous susceptibility scores from the 2020 P* analysis., and scored the following attributes:

| Susceptibility attributes | Low (0) | Moderate (5) | High (10) |
|---|---|---|---|
| **Areal overlap** | <25%of stock occurs in the area fished | 25%-50% of the stock occurs in the area fished | >50% of the stock occurs in the area fished |
| **Geographic concentration** | stock distributed in > 50% of its range | stock distributed in 25-50% of its range | stock distributed in <25% of its range |
| **Vertical overlap** | <25%of stock occurs in the depths fished | 25%-50% of the stock occurs in the depths fished | >50% of the stock occurs in the depths fished |
| **Seasonal migrations** | Seasonal migrations decrease overlap w/ the fishery | Seasonal migrations do not substantially affect the overlap w/ the fishery | Seasonal migrations increase overlap with the fishery |
| **Schooling/ aggregation** | Behavioral responses decrease the | Behavioral responses do not substantially | Behavioral responses increase the |

| | | | |
|---|---|---|---|
| | catchability of the gear | affect the catchability of the gear | catchability of the gear |
| **Morphology affecting capture** | Species shows low selectivity to the fishing gear | Species shows moderate selectivity to the fishing gear | Species shows high selectivity to the fishing gear |
| **Desirability/value of the fishery** | Stock is not highly valued or desired by the fishery | Stock is moderately valued or desired by the fishery | Stock is highly valued or desired by the fishery |
| **Management strategies or current regulations on the species** | Targeted stocks have catch limits and other local management regs; regs fully enforced | Targeted stock have catch limits and other local management regs but no strong enforcement | No regulations both at federal and local side hence no enforcement needed |
| **Fishing rate relative to M** | <0.5 | 0.5-1.0 | >1 |
| **Biomass of spawners (SSB) or other proxies** | B is 40% of B0 (or max observed from time series of biomass estimates | B is between 25%-40% of B0 (or maximum observed from time series of biomass estimates | B is <25% of B0 (or maximum observed from time series of biomass estimates) |
| **Survival after capture and release** | Probability of survival >67% | Probability of survival between 33-37% | Probability of survival <33% |
| **Fishery impact to EFH or habitat in general** | Adverse effects absent, minimal or temporary | Adverse effects more than minimal or temporary but are mitigated | Adverse effect more than minimal or temporary and are not mitigated |

Areal overlap

The working group reached consensus that for all bottomfish, except *Caranx lugubris,* more than 50 percentof the stock occurs in the fished area. They agreed the banks are rarely fished because it is difficult for smaller boats to travel the distance to the banks. Therefore *Caranx lugubris* received a score of 5 because it is more mobile than other species and may migrate out of the fishing area. All other species received a score of 10.

Geographic concentration

The participants agreed that most of the stock is localized, except for *C. lugubris* (tafauli) and *Aprion virescens* (asoama). Th working group discussed that tafauli have a larger home range and are more geographically scattered. The working group also noted that many tafauli and

asoama can be migratory. Therefore both tafauli and asoama were scored at 0. For palu loa the group agreed that the stock was distributed in less than 25% of its range giving it a score of 10. All other species were scored at 5, indicating that the stock is distributed in 25-50% of its range.

Vertical overlap

The participants were in agreement that for *Aphareus rutilans* (palu gutusiliva), *Etelis coruscans* (palu loa) and *Pristopomoides zonatus* (palu ula/palu sina) the working group reached consensus that 25%-50% of the stock occurs in the depths fished because these fish occur at greater depths than those usually fished. These species were scored at 5 for vertical overlap. For all other species the working group agreed that >50% of the stock occurs in the depths fished, and scored these species at a 10 for vertical overlap.

Seasonal migration/Fishing access

The participants agreed that there is no known seasonal migration. They also were in agreement on the limitation of access during parts of the year when fishing deeper habitats was not possible due to rough conditions. They factored the lack of migration and access limitations due to conditions to come up with a score of 5 (not a substantial effect on the overlap of the fishery) for all species.

Schooling/Aggregation

There was agreement that for all deep and shallow water species, a score of 5 was most appropriate. They felt that the species' behavioral responses had somewhat of an effect on catchability of the gear. They noted that only savane and filoa are known to school in large aggregations. They discussed hook sizes as part of their reasoning in giving a score of 5 to all nine species.

Morphology affecting capture
The working group agreed that for all deep and shallow water species a score of 5 was most appropriate. There is limited information on morphology affecting capture. The working group said fishers will use different hook sizes on a single line with smaller hooks towards the top of the line with bigger hooks closer to the lead to be more opportunistic.

Desirability/Value of the Fishery

The participants were in agreement that all of the assessed BMUS were top valued and desired. They said fishers are opportunistic and do not want to come back to port empty-handed. They did note that the palu species do have a higher price per pound value, but the shallow water species have higher values in the villages. They gave a score of 10 for each of the nine assessed species.

Management Strategies/Regulations

The working group agreed that there was a management strategy with the rebuilding plan in place. They gave a value of 5 for all of the species noting there were concerns on the effectiveness of compliance and enforcement.

Fishing Mortality Rate

The working group reached consensus on a score of 5 for all 9 of the assessed species for fishing mortality rate since there was limited data on this aspect.

Biomass of Spawners

The working group reached consensus on a score of 0 for all 9 of the assessed species for the biomass of spawners.

Survival after capture and release

The working agreed that the deep bottomfish have lower survival rates after catching. Palu gutusiliva was given a score or 5, while Palu loa, palu sina, and palu ula were given a score of 10 due to lower survival rates for these species. All other species, which occur in shallow water, were given a a value of 0 noting their higher survivability rate.

Impacts on Habitat

The working group reached consensus on a score of 0 for all 9 of the assessed species for the fishery impact to EFH or habitat in general. Below are the species level susceptibility scores:

**Table 2: Final susceptibility scores for the 9 assessed AS BMUS**

| Species | SCORES |
|---|---|
| **Palu-gutusiliva -** *Aphareus rutilans* (lehi) | 4.58 |
| **Palu-loa -** *Etelis coruscans* (onaga) | 5.00 |
| **Palu-sina -** *Pristipomoides flavipinnis* (yelloweye opakapaka) | 5.00 |
| **Palu-ula, palu-sega -** *Pristipomoides zonatus* (gindai) | 5.00 |
| **Tafauli -** *Caranx lugubris* (black trevally) | 3.75 |
| **Asoama -** *Aprion virescens* (gray jobfish) | 5.00 |
| **Filoa paomumu -** *Lethrinus rubrioperculatus* (red gill emperor) | 4.58 |
| **Savane -** *Lutjanus kasmira* (blue lined snapper) | 4.58 |
| **Papa, velo -** *Variola louti* (lunar tail grouper) | 4.58 |

The final susceptibility scores for the nine assessed BMUS in Table 2.

The scores for the Productivity and Susceptibility were averaged to determine an overall Productivity-Selectivity score for each of the 9 assessed species. This score represents a percent reduction from the 50% risk of overfishing. The overall score for the Productivity and Susceptibility dimension are listed in Table 3.

**Table 3: Final productivity-susceptibility scores for the 9 assessed AS BMUS**

| Species | SCORES |
|---|---|
| **Palu-gutusiliva -** *Aphareus rutilans* (lehi) | 6.0 |
| **Palu-loa -** *Etelis coruscans* (onaga) | 6.3 |
| **Palu-sina -** *Pristipomoides flavipinnis* (yelloweye opakapaka) | 5.0 |
| **Palu-ula, palu-sega -** *Pristipomoides zonatus* (gindai) | 5.3 |
| **Tafauli -** *Caranx lugubris* (black trevally) | 4.4 |
| **Asoama -** *Aprion virescens* (gray jobfish) | 5.8 |
| **Filoa paomumu -** *Lethrinus rubrioperculatus* (red gill emperor) | 4.3 |
| **Savane -** *Lutjanus kasmira* (blue lined snapper) | 3.8 |
| **Papa, velo -** *Variola louti* (lunar tail grouper) | 5.0 |

## 6. Conclusion

The P* working group finalized the scores for the nine BMUS species assessed for all 4 dimensions listed in Table 4. These 4 scores were summed for each species to determine a total P* score. This score represents the percent reduction from the 50% risk of overfishing that accounts for scientific uncertainty. The total reduction scores ranged from a score of 8 to 11%.*L. rubrioperculatus* (filoa) received the lowest P* score, and could therefore have and ABC set at a 42% risk of overfishing. *A. rutilans* (palu gutusiliva) and *E. coruscans* (palu loa) received the highest P* score, and could therefore have an ABC set at a 39% risk of overfishing.  .

**Table 4: Final dimension scores for the P\* analysis of the 9 assessed American BMUS**

| Dimension | Palu gutusiliva (APRU) | Palu loa (ETCO) | Palu sina (PRFL) | Palu ula Palu sina (PRZO) | Tafauli (CALU) | Asoama (APVI) | Filoa paomumu (LERU) | Savane (LUKA) | Papa velo (VALO) |
|---|---|---|---|---|---|---|---|---|---|
| Assessment information | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| Uncertainty characterization | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| Stock status | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Productivity-Susceptibility | 6.0 | 6.3 | 5.0 | 5.3 | 4.4 | 5.8 | 4.3 | 3.8 | 5.0 |
| Total Risk Reduction Score | 11 | 11 | 10 | 10 | 9 | 10 | 9 | 8 | 10 |
| Risk of overfishing level (P\*) | 39 | 39 | 40 | 40 | 41 | 40 | 41 | 42 | 40 |