REPORT ON THE AMERICAN SAMOA BOTTOMFISH FISHERY DATA WORKSHOP

DRAFT DATE: 11/19/2021

Thomas Remington[1], Marlowe Sabater[1], Felipe Carvalho[2],
Domingo Ochavillo[3], and Todd Jones[2]

National Marine Fisheries Service
Pacific Island Fisheries Science Center

American Samoa Government
Department of Marine and Wildlife Resources

Western Pacific Regional Fishery Management Council

[1] Western Pacific Regional Fishery Management Council
[2] Pacific Island Fisheries Science Center
[3] Department of Marine and Wildlife Resources

[PAGE LEFT INTENTIONALLY BLANK]

Table of Contents

1. Welcome Remarks 1
2. Introductions 1
3. Background and Goals of the Data Workshop 1
4. Evaluation of the Available Data for BMUS 2
    a. Diver Surveys 2
    b. Commercial Purchase Program 3
    c. PIFSC Biosampling presentation 5
    d. Shore-Based Creel presentation 5
    e. Boat-Based Creel presentation 6
    f. Historic Landings 9
5. Summary and Wrap Up 10

AMERICAN SAMOA BOTTOMFISH FISHERY DATA WORKSHOP

Western Pacific Regional Fishery Management Council
Department of Marine and Wildlife Resources
Pacific Island Fisheries Science Center

Tuesday, November 9, 2021, 9 am - 2 pm (ASST); 10 am – 3 pm (HST)

1. Welcome Remarks

The American Samoa Bottomfish Fishery Data Workshop (workshop) began just after 10:00 am HST. Participants generally expressed their appreciation for the opportunity to collaborate on evaluating the available data for the upcoming benchmark stock assessment for American Samoa bottomfish management unit species (BMUS) scheduled to be completed in 2023.

2. Introductions

The following individuals were in attendance from the Pacific Islands Fisheries Science Center (PIFSC): Mia Iwane, T. Todd Jones, Erin Bohaboy, Marc Nadon, Felipe Carvalho, Robert Ahrens, Bradley Gough, Danika Kleiber, and Ashley Tomita. From the Western Pacific Regional Fishery Management Council (Council), Diana Kitiona, Marlowe Sabater, and Thomas Remington were in attendance. From the American Samoa Department of Marine and Wildlife Resources (DMWR), the following individuals were in attendance: Archie Soliai, Sean Felise, Domingo Ochavillo, Tepora Lavatai, Yvonne Mika, Selaina Vaitautolu, Theodore Trevors, and other data technicians.

3. Background and Goals of the Data Workshop

The purpose of the workshop was to initiate discussions regarding the new benchmark stock assessment to be completed for American Samoa BMUS in 2023 and unite all relevant groups in a collaborative process. PIFSC's improvement plan for the upcoming assessment has five components: data, workshops, modeling, review, and management, each of which will occur over the next year and a half prior to the finalization of the next stock assessment. For the data component of the improvement plan, PIFSC conducted an in-depth review of all available BMUS fisheries data in American Samoa, which was reflected in a data report sent to workshop participants. By exploring available data, PIFSC hopes to promote a data-driven decision making process, but it is still essential to learn from the fishing community and DMWR about the local fisheries and context for the data. For the workshop component of the improvement plan, PIFSC intends to hold workshops such as the current one, believing in the benefit of shared understanding with stakeholders on how data can be interpreted.

Social scientists attended the workshop because the PIFSC Fisheries Research and Monitoring Division (FRMD) and Stock Assessment Program (SAP) allowed them to collaborate on this effort to determine how PIFSC engages with stakeholders and research how

to improve engagement processes. The social scientists took notes on how everyone is benefitting from the workshop and communication with one another, with the intent of using the information to guide future engagement processes.

The background and goal of the PIFSC data report prepared prior to the workshop was to determine steps that can be taken to improve the next American Samoa BMUS benchmark stock assessment in 2023. Because the assessment will be a benchmark, PIFSC can revisit the model and methods used to determine stock status. In the most recent assessment, PIFSC utilized a surplus-production model, focusing on catch and catch per unit effort (CPUE) for the BMUS species complex. Utilizing an age-structure model, as has been done for reef fish in Hawaii and Guam, which would incorporate life history and length data for species-specific assessments, would represent an improvement from the last assessment. However, the question remains if there are sufficient data to implement such a model. At the workshop, participants reviewed all available BMUS fishery data sources in American Samoa, including National Oceanic and Atmospheric Administration (NOAA) diver surveys, the Commercial Purchase Program, the NOAA Biosampling Program, shore-based creel surveys, boat-based creel surveys, and historical catch information. The workshop was not meant to result in management decisions but rather to focus on the data. Outcomes from the workshop will be presented at upcoming meetings of the Council and its advisory bodies.

4. Evaluation of the Available Data for BMUS

a. Diver Surveys

i. Summary

The NOAA diver surveys began in 2002 but were updated with an improved design in 2008. The surveys occur every three years, but the 2021 surveys were cancelled due to the COVID-19 pandemic. Paired divers remain stationary in two circles of a 15 m diameter, count fish that enter the area, determine the species, and estimate size. The surveys occur at all islands in the American Samoa archipelago, but they are restricted to depths above 30 m and, thus, encounter a limited number of BMUS. The surveys ultimately provide size and abundance data (i.e., CPUE) from visual estimates by the divers.

Except for 2021, diver surveys were completed as scheduled for every island in American Samoa. In 2016, there were fewer surveys than usual on the south side of Tutuila, which may have been due to weather or ocean conditions preventing access. The surveys observed five of the 11 BMUS, including *Lutjanus kasmira*, *Variola louti*, *Aprion virescens*, *Lethrinus rubrioperculatus*, and *Caranx lugubris*, but only the first three have been observed in sufficient amounts for appropriate data analysis. *L. kasmira* was seen mostly around Manu'a and not as frequently around Tutuila. The size distributions are separated by area due to the difference in sample size between Manu′a and Tutuila. The index of abundance that is generated from the diver surveys allows managers to look at temporal trends in the number of fish counted to determine abundance over time. However, a main concern is how often species are observed. *L. kasmira* was observed in 37% of surveys in Manu'a but in only 2% of surveys around Tutuila. Thus, for the few BMUS observed during the surveys, there may be enough size and abundance data to generate a short trend starting in 2008.

ii. Discussion

The indication that there were more sightings of *L. kasmira* in Manu'a relative to Tutuila may be due to the difference in habitat in each of the areas. Manu'a has a very specific type of habitat with steep slopes and rich, complex reefs. Tutuila also has these kinds of habitats, but they are spread out over a large "pavement" area with less complex reef and different fish species at different abundances. While the diver surveys also collect data on habitat, their types, and complexity in the survey area, there has been no analysis done to determine the association of habitat with different BMUS.

Regarding the difference in relative gear usage (e.g., amount of spearfishing occurring) between Manu'a and Tutuila, a fishing intensity index could be calculated. Manu'a is smaller and has fewer people fishing there, so it would be possible to investigate if there is higher fishing pressure around Tutuila. The main issue is that, even if the differences in abundance between the two areas could be explained, the abundance indices from the diver surveys would still be weighted more heavily to one area or the other depending on how many individuals were observed in each area. If there is a difference in fishing pressure between the areas, an impact in size structure would be expected. Because there are so few observations of *L. kasmira* around Tutuila, for example, a clear distribution could not be generated. Even looking at the other species with more sufficient data, a model would need to be fit to the data to determine any difference in size distribution.

While DMWR representatives noted that fish seem larger in Manu'a than Tutuila, developing species distribution models that consider habitat and other factors, like was done for *A. virescens* in Hawaii, may not be possible. The stock assessment and habitat analysis for *A. virescens* were separate projects that were not tied to one another. Additionally, the analysis would be limited by the amount of data from American Samoa (e.g., habitat around each island and size). Around 80 to 100 size observations are requested to generate a smooth distribution, and size data are only available for four BMUS in American Samoa from the diver surveys due to the limitations of the survey methodology and the species' depth distribution.

b. Commercial Purchase Program

i. Summary

The Commercial Purchase Program in American Samoa began in 1990 and requires all vendors to submit invoices for the purchase and sale of fish. The data from the program do not allow for an estimate of CPUE but do provide size data. Additionally, the commercial catch estimate from the program serves as a hard floor for creel survey estimates (i.e., creel survey catch estimates should be higher than the commercial estimates since creel surveys estimate total catch). There are 828 commercial reports that contain BMUS but do not report the number of pieces, so no estimate of mean length or size distribution can be generated from these reports. There are 67 reports that have one BMUS (i.e., an individual measurement), meaning that mean length or a size distribution could be developed. There are 766 commercial reports that have more than one BMUS, which can allow for an estimate of mean length but not size structure because there are no individual fish measurements. Many of the reports do not indicate the area fished, so it is not clear where the reported BMUS were harvested. The reports that do note

location are mostly from fishing around Tutuila with bottomfishing gear. *L. kasmira* is the most frequent species in the reports followed by *Etelis carbunculus*. Generally, there are less than 30 reports per year for each species, which means there are likely not enough data to generate usable size distributions; the program was not originally meant to generate size data. Ultimately, the Commercial Purchase Program on American Samoa cannot give estimates of total catch or CPUE, and it does not provide much size data due to too many missing components in the vendor reports.

ii. Discussion

In an integrated assessment model, size data from the Commercial Purchase Program could be entered for individual fish to make a size distribution or simply reported as mean length or weight for that year. If there are not enough size data for a smooth size distribution, mean size could be summarized for each year to generate time series with an associated standard deviation.

The PIFSC analysis of the American Samoa Commercial Purchase Program accounts for imports from Samoa by filtering those imported fish. Similarly, fish that are sold multiple times between vendors were filtered to avoid duplicate counts.

Regarding the implementation of the Sellit Logit (SILI) application, which does not include fields to report area fished or gear type used, there is concern with respect to the duplicative efforts in data generation since Catchit Logit (CILI) does collect those data. If CILI is tied to SILI, then information for area fished and gear type could be gleaned. If there is a situation where there are many reports missing area and gear information, the data would be useless, so the two applications need to be well-connected. While the two could be well-connected in the future, only SILI will be mandatory in the immediate future if mandatory licensing and reporting is enacted for commercial fish catch. One suggestion was to make reporting the number of pieces of fish sold required for vendors through SILI, whereas it is more likely for vendors to leave fields blank on paper reports. Unfortunately, it can be hard to infer area fished based on vendor.

Ultimately, it would be difficult to use data from the Commercial Purchase Program to determine size structure. Even if reports that do not have the number of pieces or species identification, there would only be a handful of reports for just a few BMUS. With respect to improving the program to allow the data to be used to determine size structure in the future, ensuring the number of pieces in a purchase is reported would be the most important alongside accurate species identification; this may require additional training for vendors, and it is not clear if this would be a good investment of time to improve the program versus continuing to rely on the boat-based creel survey data. Since each report is vendor-dependent and because fishers usually go on fishing trips as a group, it could be difficult to implement accurate species identification. The Commercial Purchase Program was developed to support the catch estimates for creel surveys and not necessarily to supply size data.

c. PIFSC Biosampling presentation

i. Summary

The goal of the PIFSC Biosampling Program is to collect fish samples for life history data as well as length data used for stock assessments. The program was operational from 2010 to 2015 in American Samoa and collected more than a quarter million samples, mostly from reef species. There are 13,000 samples from BMUS. The data can be to determine size metrics for BMUS, but they cannot be used to determine CPUE. Because the time series is so short, the data may not be very useful for informing the model.

Size observations were mostly from Tutuila, with the majority of samples collected for *L. kasmira* (>6,300), *L. rubrioperculatus* (>4,500), and *A. virescens* (>950). Approximately 100 samples are sufficient to determine size structure, but several BMUS do not have this many. *Pristipomoides filamentosus*, has the least number of samples (7) as it is not commonly encountered. Most observations came from the bottomfishing gear or trips where both bottomfishing and trolling were utilized. The one exception is *V. louti*, as 70% of its samples came from spearfishing. Both *L. kasmira* and *L. rubrioperculatus* have around 1,000 samples per year, *A. virescens* and *V. louti* have about 100 samples per year, and the remaining BMUS have around 10 to 15 samples per year. For some BMUS, years may need to be aggregated to develop a distribution, but the data are still viable for use. Most of the BMUS have clean size distributions such that the model could likely fit the data well (except for *P. filamentosus*). Another issue is with *E. carbunculus* and the recent discovery of a second, larger species, *E. boweni*. Life history data show that *E. carbunculus* gets to be about 50 cm in length, but *E. boweni* can grow to over a meter in length. For small individuals, it can be hard to distinguish the two species, and mixing of the species in the smaller size samples is an issue in utilizing the data.

ii. Discussion

DMWR has observed many *Etelis* individuals in the past, with some being over 50 cm, but did not realize the difference between the two at the time. Recent surveys have not had any *E. boweni*. While it would be possible to implement a maximum size for *E. carbunculus* and filter out all samples above that size, there would still be an issue with samples below 50 cm having a mix of the two species, each with different growth curves. The assessment model is not configured to handle data combining two species in this way. The data could be utilized if PIFSC assumes that 95% of smaller samples belong to *E. carbunculus*, however, it is not clear if that assumption can be made since there are many samples over 50 cm. The status for each stock could be unknown until size data for each individual species is obtained. Going forward, surveyors should take care to properly identify the two similar species.

d. Shore-Based Creel presentation

i. Summary

The shore-based creel survey program in American Samoa captures shore-based fishing methods like throw net, gill net, spearfishing, and hook and line on lagoons or reefs, utilizing both participation surveys and interviews for catch composition. The program began in the 1970s, but the time series had little continuity until the Western Pacific Fisheries Information

Network (WPacFIN) began managing the data stream in 1988. Shortly thereafter, in 1990, the survey route was modified on Tutuila. Shifting methodology over time limits the time series of the program, which captures roughly 400 interviews per year.

The time series for shore-based creel surveys is split into an “early” period between 1988 and 1996 and a “recent” period from 2005 until the present. Early on, there were many interviews with BMUS (~30 per year), but there have been fewer more recently (1 to 6 per year). Initial interviews mostly captured fishers using nets, whereas, in recent years, the interviews mostly captured hook and line as well as spearfishing. BMUS make up 0.3% of fish in the surveys by weight. In the early 1990s, there were many surveys observing *P. zonatus* and some *L. kasmira* in gill nets and throw nets in Manu'a. In more recent surveys, the number of fish being recorded dwindled, with just four to five of each BMUS being seen each year. Thus, the shore-based creel surveys are not usable to determine BMUS CPUE or size structure despite observing high numbers of *P. zonatus* early on.

ii. Discussion

P. zonatus is a deep water snapper that has not been observed in the NOAA diver surveys, however, the creel survey data show that they were frequently caught early in the creel survey program. Many individuals measured in the early period were small fish from 12 to 14 cm. While this information may not be pertinent for the stock assessment, it is interesting that the fish were found on each island by many surveyors and mostly harvested with gill nets. *P. zonatus* has never been seen during diver surveys in Hawaii, American Samoa, or the Commonwealth of the Mariana Islands (CNMI), despite thousands of surveys being conducted and it being a distinctive species. It is possible that a unique recruitment event occurred over several years in American Samoa. While it also remains possible that *P. zonatus* was misidentified during that time period, there were 11 different surveyors that recorded the data; a mistake may have occurred when the survey data were input into the database by the data manager. It is also possible that the species was mostly caught during their juvenile phase, which may have led to misidentification, but juveniles are not observed elsewhere and the species was prevalent over many years.

e. Boat-Based Creel presentation

i. Summary

The boat-based creel survey is the strongest available dataset for BMUS in American Samoa. The program began in the early 1980s and was standardized in 1986. Similar to the shore-based creel surveys, there are two components, participation (trips) and catch interviews, used to estimate annual boat-based catch and CPUE. Regarding participation, the number of trips logged for BMUS gear types by port shows that most data come from Fagatogo Marina Dock whereas, in years prior, there were more trips originating from Manu'a than recently. Utilizing vessel identification numbers, the number of unique boats per year making fishing trips that harvest BMUS declined from >20 to around 10 in recent years. An expansion algorithm is used to estimate the total number of trips per year for relevant gear types, and there are many different influences for how many people go fishing (e.g., there are decreases in participation after large natural disasters such as typhoons or tsunamis).

Regarding catch interviews, bottomfishing gears predominantly harvest many BMUS species and have between 50 and 100 interviews per year. Interviews are mostly from Tutuila in recent years, but there were more from Manu'a prior to 2008. Since then, there has been no coverage of Manu'a, and there are usually only a few trips to offshore banks each year. The amount of catch recorded as “unidentified” was high in the beginning time series (1986 to 1987), which is challenging to handle because it is not clear how many of these species were BMUS. In the catch interviews, some BMUS are more common than others and it varies by area. However, *A. virescens* has been fairly common and consistent across islands of the archipelago. For a time series of catch rates, it is important to determine how often species are not observed in interviews at all (e.g., for *P. filamentosus*). For length data during interviews, not every fish gets measured, but more recent surveys have collected a greater amount of size data. While a time series of length observations would be ideal, issues with subsampling early in the program limit the use of length observations from the survey data.

Expanded boat-based annual catch comes from an expansion that uses the number of trips per gear per type of day multiplied by the average catch per trip to get the total catch, but there are uncertainties associated with such an estimate. The expansion has usually only been applied to interviews on Tutuila because all trips in Manu'a were being observed. *V. louti* was seen often previously but has very few landings recently, and *P. zonatus* was common in Manu'a early on before becoming more frequent around Tutuila. Thus, there are different trends over time and area for each species. In the expanded catch data, there are many “unknown” bottomfish, groupers, snappers, and emperors, all of which could include BMUS. Ultimately, boat-based creel survey data can be used to estimate CPUE for some BMUS, and the data are a valuable source of length information since 2016 as well.

ii. Discussion

Regarding species in the data that were commonly observed in previous yers but have dropped off in recent years, DMWR implemented a standardized system of species identification in 2016 that made the data more stable. However, species such as *V. louti* and *P. zonatus* began decreasing in the data around 2010, and it was not clear if there was a change to the surveys that impacted confounding species that are harvested. For several species, the data trends changed abruptly from 2010 to 2015. It is possible that the number of fishers participating in the fishery contributes to the expanded estimates, and DMWR staff noted that, in the case of *V. louti*, there is another grouper that is now caught more frequently than *V. louti*. It is difficult to discern what factors impacted the data prior to 2016, but in those years, the data were often grouped by family. It is possible that there may be distinct locations where fishers could be more or less likely to harvest different species that look similar; if there is a change in the number of fishers that have typical fishing areas, this impact may be observed in the data due to a different sampling of the species. Additionally, the area fished is often incomplete in many boat-based creel survey catch interviews, with the most dependable information being the port where the fisher was sampled. Fishers do not typically identify every place that they fished because they usually have coolers full of fish from different areas, and where they go is often dependent on weather and oceanic conditions. However, it may be of use to determine if certain fish are harvested in certain habitats (i.e., flat vs. steeper areas), and, despite the large amount of

associated assumption, it would be useful to know if changes in the prevalence of species in the surveys are functions of spatial shifts in the fishery.

Of note during 2010 to 2015, the Biosampling Program was initiated on American Samoa at this time. The Biosampling Program impeded normal creel surveys because they paid fishers for their catch, incentivizing fishers to bring them their fish rather than being interviewed through the creel surveys. DMWR has tried to foster relationships with fishers over the years, but the incentives provided by the Biosampling Program at that time shifted fisher preference. While the Biosampling Program had more reef fish from spearfishing than bottomfish, there were still BMUS included in the samples. An analysis of the impact of the Biosampling Program on creel surveys could provide more insight, however, the number of creel survey bottomfishing interviews performed each year between 2011 and 2015 actually increased relative to previous years (with 2010 interviews being low due to the recent tsunami). It is possible that the Biosampling Program attracted spearfishers that harvested BMUS away from the boat-based creel surveys.

Another important change in the data was that Manu'a was no longer included in creel survey interviews from 2010 until present day, and there may be a shift in species based on those more commonly found in one area (i.e., Manu'a) over another (i.e., Tutuila). If surveys ceased in Manu'a, it would impact the time series of data for the territory that could be used in the upcoming assessment because it would appear as a decrease in catch rate for species commonly found there, and vice versa if a species was more frequently harvested in Tutuila. While DMWR representatives felt that the lack of data from Manu'a could have impacted the BMUS CPUE for the previous assessment, all BMUS were grouped together in that assessment and the current workshop is attempting to start from a clean slate for the upcoming stock assessment. The PIFSC SAP would like to calculate CPUE at the species level rather than for the whole complex in the upcoming assessment. DMWR staff suggested that the assessment needs to change according to what data are available and not the other way around. There were several data technicians stationed in Manu'a, but one resigned around 2010 and that may have contributed to the lack of data from that area. Additionally, after the 2009 tsunami, there were not many vessels fishing from Manu'a until the boat repair program was completed. DMWR staff offered to generate a timeline of changes in sampling protocol and staff. PIFSC representatives encouraged DMWR to develop the timeline for recent decades regardless of if that information comes from personal experience or documented changes. There may ultimately be multiple factors impacting data collection in Manu'a, including staff and protocol changes, lower fishing pressure, etc., but it is not clear on how to assess the changes in the fishery from various complicating factors.

The director of PIFSC FRMD made comments addressing the goal of the current workshop, which is to review and understand the available data rather than discuss what data programs should have done in the past. It is important to understand the operational and ecological drivers behind the data streams as well as any apparent inconsistencies instead of placing blame for being in a difficult situation. While there are concerns with the data used for the previous BMUS stock assessment, the objective of the workshop and current process to work together to build the most robust assessments possible based on an understanding of the data. The current process truly represents a clean slate. There are ongoing efforts to improve the existing data streams, but that is separate from the effort to develop the structure for the

upcoming stock assessment. DMWR appreciated the idea of a clean slate and the efforts made for all parties to work together.

The PIFSC SAP constructed some key questions for DMWR, including: (1) is the participation count protocol from Oram et al. (2011) still current, (2) what information (e.g., number of boats, fishers, etc.) is there from 2009 to 2020 in Manu'a since interviews stopped in 2009, and (3) how much of the unspecified species groups in interviews from 1986 to 2015 were BMUS. DMWR representatives noted that the participation count protocol from Oram et al. (2011) is still utilized but the ports change over time based on their usage and that the days during which surveys occur remain the same. For fishing activity in Manu'a since 2009, DMWR staff noted that there was a boat repair program ongoing during that time for vessels damaged during the tsunami, and the introduction of other data collection programs may have impacted creel surveys due to them providing incentives when the creel surveys do not. With respect to determining how many boats have been fishing in Manu'a from 2010 until present day, this may be possible to evaluate from personal anecdotes or a Council survey that was conducted on eligible vessels for the boat repair program in the area after the 2009 tsunami. The boat repair program was initiated in 2014 and completed in 2018. The survey could give information on the number of boats damaged and the number of boats still operational to support estimates of catch from the area for the stock assessment. Regarding unspecified species groups in creel surveys prior to 2015, there was no good answer as to the proportion that may have been BMUS.

f. Historic Landings

i. Summary

Initial information on historical catch information going back to 1967 from American Samoa was initially derived from a series of reports by David Itano. The U.S. Bureau of Commercial Fisheries, the predecessor to NMFS, awarded a grant to do exploratory fishing off the banks in American Samoa using handlines to determine the viability of a commercial bottomfish fishery using periodic data collection. However, many reports from that time are challenging to find. Historical catch information is important to know as the assessment moves to single-species models since having a full catch history on a stock is very informative with respect to what things were like when the stock was unexploited and how much total fish has been taken out of it. PIFSC is still searching for a report by Swedloff on Tautai A'e surveys in 1972 and any DMWR annual report from the 1970s to 1980s.

Total bottomfish catches from historical reports show catch for some years between 1967 to 1985. There was a peak in catch in the 1970s during the dory project at over 80,000 lb of bottomfish, but it is unclear how much of that catch was BMUS. There is limited information on species composition, but species like *L. kasmira*, *A. virescens*, and *Pristipomoides* and *Etelis* spp. were mentioned in older reports. Overall, bottomfish removals from 1967 to 1985 were relatively high, but there is a gap in the data from 1977 to 1981. The hope is to form an idea of how many boats were fishing in these historical time periods and to determine if fishers were harvesting bottomfish stocks greater than three nautical miles from shore prior to 1967.

ii. Discussion

While it is assumed that there was a long tradition of non-commercial bottomfishing in American Samoa prior to commercial fisheries beginning alongside the opening of the canneries in the 1950s and 1960s, DMWR was not established until 1987 and there is a lack of data from before that time. Information on historical bottomfishing could be gleaned by talking to older fishers or consulting archeological studies. Some studies on mittens in American Samoa indicate that most fish bones were from reef fish but not bottomfish. Additionally, there is a report available by Levine on historical fishing methods that should be further examined. It was suggested that Kitiona speak to her grandfather, a long-time fisher in American Samoa that captained a DMWR boat, to provide insights into the historical fishing traditions of the archipelago.

5. Summary and Wrap Up

The goal of the workshop was to evaluate the available data for the upcoming BMUS stock assessment and take steps to improve the assessment. The previous approach utilizing a surplus-production at a complex level will no longer be used. To move forward with assessment, a species-specific, age-structured approach should be utilized with appropriate life history information. The three main data types examined were catch and CPUE, fish size, and life history, as a length-based or integrated model approach do not only rely on catch trends from fishers to determine status of a stock.

In their data report, PIFSC utilized seven evaluation criteria to determine if the available data would allow for a species-specific stock assessment, including (1) species identification, (2) historic catch, (3) spatial distribution, (4) overall species occurrence, (5) recent total catch, (6) individual size observations, and (7) life history studies. The evaluation criteria showed that a species- specific stock assessment would be viable for most BMUS, *Pristipomoides* spp. and *V. louti* would be the most difficult. Ultimately, PIFSC could likely generate single-species, age-structured models for all BMUS except for *P. filamentosus*. Additionally, there are issues *E. carbunculus* being confounded with *E. boweni* in the data.

The next steps in developing the 2023 benchmark stock assessment are holding a data meeting with the Council's Scientific and Statistical Committee (SSC) the week of November 15, 2021, presenting to the whole SSC in late November, holding a data meeting with local stakeholders in February 2022, and then producing the assessment for peer review in early 2023. There is still some work to be done by the Council with DMWR to identify participants for the stakeholder meeting. It is a priority of PIFSC staff to hold the upcoming data meetings in person, especially the meeting with local stakeholders.

PIFSC has not yet made any final decisions for the structure of the stock assessment, as these decisions will be made after the data meetings. PIFSC will bring back the proposed assessment structure to DMWR during modeling discussions. Every step of the current assessment process will allow for engagement with DMWR. The DMWR representatives reiterated the appreciation for the opportunity to meet and discuss the available data, and, despite no final decisions being made at the workshop, DMWR gained a better understanding of the

information that could be used. A clean slate may be the best path forward for all groups involved in the assessment process, and DMWR looks forward to continuing to collaborate throughout the development of the stock assessment.

6. Recommendations

Workshop participants recommended that DMWR develop a timeline showing changes to staff, survey methodology, and other events that may have had an impact on fisheries data or their collection over the last several decades.