WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

Archipelagic Fishery Ecosystem Plan Team Meeting

May 6 – 7, 2019
8:30 a.m. – 5:00 p.m.
Council Office Conference Room
Honolulu, Hawaii

Draft Report

Monday, May 6, 2019
8:30 a.m. – 12:00 noon

1. Welcome and introductions

The meeting started at 8:30 a.m. Stefanie Dukes chaired the meeting. Present were Frank Parrish, Michael Quach, Michael Parke, Ivor Williams, Domingo Ochavillo, Tepora Lavatai, Keena Leon-Guerrero, William Trey Dunn, Michael Tenorio, Brent Tibbats, Annette Tagawa, Paul Murakawa, Joe O'Malley, Minling Pan, T. Todd Jones, Sam Kahng, Reginald Kokubun, Ryan Okano, and Rebecca Walker. Council staff present were Marlowe Sabater, Thomas Remington, and Mark Fitchett. Council contractor Alexander Filardo was also present.

2. Approval of draft agenda, 2018 report & assignment of rapporteurs

The agenda was adopted with no changes. There were no questions on the 2018 meeting report. Remington was assigned rapporteur.

3. Report on previous Plan Team recommendations and Council actions

Council staff reported on the 2018 Plan Team's six recommendations and how the Council took action on the recommendations. The first recommendation was to direct staff to work with the Territory fishery agencies to identify and resolve issues with regards to real-time accurate reporting by identifying regulatory gaps and potential solutions such as mandatory licensing and reporting. Both Guam and CNMI have draft license and reporting regulations. The CNMI regulation package was reviewed by the CNMI AG on September 18, 2018. The Guam regulation is currently stalled due to the nonexistence of the Guam Ocean Fishery Management Council (GOFMC) that is supposed to provide oversight in the review and approval of fishery regulations in Guam.

The second recommendation was to support the development and improvement to data collection systems by exploring options of a dedicated port sampler to conduct a full census of the bottomfish catch, explore the improvement and expansion of the commercial receipt book, and encourage improvements in the timeliness of the data transcription. Council staff met with Mirage InfoDesign LLC regarding a potential Saltonstall-Kennedy project that would develop the online cloud database in support of the commercial receipt book program. Council staff also drafted a proposal to be submitted to The Saltonstall-Kennedy Grant Program via Coastline

Group LLC to develop a centralized data collection hub in CNMI that would also include tools for a port sampler.

The third recommendation was to have the Council direct staff to explore the application of the carry-over provision in the Council's control rules. Council staff formed a working group that discussed the applicability of the carry-over provision for all Western Pacific fisheries including the main Hawaiian Islands deep 7 bottomfish fishery. A discussion paper was presented at the 130th SSC and 174th Council meetings.

The fourth recommendation was about retaining the ACL at 60 lbs. for CNMI slipper lobster. There will be no further action regarding slipper lobster ACLs because the Council designated slipper lobsters as an ecosystem component species (ECS) at its 173rd meeting, and the need for an ACL and AM is no longer applicable.

The fifth recommendation was that the Council direct staff to develop an analysis of options to redefine EFH and any HAPC for precious corals in Hawaii for Council consideration for an FEP amendment. Council staff developed an analysis of options, and presented the analysis to the Council as an action item at the 174th Council meeting. Council staff and Action Team met in late February; the FEP amendment update ongoing and will be completed for the 178th Council meeting.

The sixth recommendation was to adopt the changes proposed by the Social Science Planning Committee to the Human Communities section of the Council's Magnuson-Stevens Reauthorization Act (MSRA) five year research priorities. The SSPC revisions were incorporated into the new MSRA Research Priority document for 2020-2024 and submitted to the Secretary of Commerce and PIFSC on March 29, 2019.

4. 2018 Annual Stock Assessment and Fishery Evaluation (SAFE) Report

A. Fishery Performance

1. Archipelagic fisheries modules

a. American Samoa

Ochavillo presented on American Samoa fishery performance for the 2018 SAFE Report. Data presented were based on creel survey collection from the previous calendar year, which included the total number of invoices and vendors sampled from both regular and opportunistic interviews. American Samoa bottomfish history was briefly described. Annual landings for bottomfish have been highly variable, and there were some instances where commercial data accounted for more landings than the total landings that the creel survey data suggested.

The discrepancy between "shallow" and "deep" bottomfishing within the deep 7 complex was discussed at length. Changes in the fishery data may be due to changes in the fishery itself in recent years. Shallow and deep bottomfishing trips are currently discerned by species catch composition. The Plan Team wondered if the species composition changed in 2009 due to the tsunami that impacted American Samoa, and it was not clear if vessels or fishing grounds were directly lost as a result of the storm. Fishers believe that there has also been a local current speed increase in American Samoa. There is more shallow-bottomfishing than before when the focus was more on deep bottomfishing. There is a relatively low number of part- and full-time

bottomfish fishers today versus 2005, as only six to seven are active full-time at the moment with only one or two part-time fishers. People typically prefer to go fishing for bottomfish, but there can be issues with pricing. Imports of bottomfish from Western Samoa can be cheaper to acquire than going out to fish.

The CPUE for the bottomfish fishery in American Samoa has been showing a declining trend. It is possible that fishers are simply spending more time fishing, and carefully accounting for these hours in data reporting and collection is important. It was noted that the recent tsunami caused a lot of fishermen to drop out of the fishery, and that those that remain must constantly train new foreign fishermen to replace those who had left – this puts additional strain on the remaining vessels. High turnover can be difficult to deal with.

It was reported that all of the 2018 data have been submitted and are complete, but the observable recent spike in spearfishing was thought to be a data glitch. In the presented data, less than 50 percent of bottomfishing species caught were Bottomfish Management Unit Species (BMUS), and the Plan Team showed concern that this may mean that the data are not representative. It is possible that there are discrepancies between species lists, but there should not have been such a large offset in proportions created.

b. Guam

Tibbats presented on Guam fishery performance for the 2018 SAFE Report. There were brief descriptions of the bottomfish fishery, including frequented species, gear types, fishing grounds, and depth fished. A description of the Guam shore-based fisheries showed that they account for the majority of CREMUS catch. A large proportion of shore-based fishers were categorized as using hook and line. All non-commercial data reporting on Guam is voluntary.

The Oram *et al*. paper on creel survey documentation is reportedly with PIFSC for revisions. Prior to this document, there was in-house procedure documentation at PIFSC; it was an internal, stripped-down version. Another version finalized by Kimberly Lowe at PIFSC in the past year or two was awaiting approval to become technical documentation, but it did not go through.

There has been a large commercial effort to harvest coral reef fish in recent years from recent migrants from the Federated States of Micronesia (FSM). With the increase in air cargo prices, it became more profitable to have FSM migrants fish in Guam rather than import reef fish to Guam. In 2018, there were seven vendors reporting of an estimated ten from FSM. Tibbats believes there to be 12 total vendors. Hotels do not report as vendors, and there is no reporting of hotel sales whatsoever. There have been discussions in the past on how to best capture these data. There are difficulties in getting data from the FSM vendors due to not being comfortable or not understanding the monitoring. The definition of "vendors" in this context means physical shops that sell fish.

The early years of the TSI project were asked about, where folks documented somewhere around 15 stores that sold fish across the island. It is not uncommon for some vendors to close down, and then re-open after a year or two. The folks that did this project roughly five years ago marked down the location of all vendors on a map.

There were discrepancies between the monitored catch total and commercial totals, likely because there is a large portion of this catch was designated for personal use.

The hook and line data from 2009 was an order of magnitude higher than other prior and subsequent years; this could possibly be due to small data expansion issues. However, hook and line is one of the gears that there is the most data for, so it is unlikely to be a data issue and will have to follow-up.

c. CNMI

Leon-Guerrero presented on CNMI fishery performance for the 2018 SAFE Report. There were brief descriptions of staff changes in the Department of Fish and Wildlife (DFW), followed by creel survey data descriptions broken down by shore- and boat-based fishing. There was concern from DFW staff that they are not appropriately capturing BMUS fishing trips as evidenced by the large drop in the data from last year to this year. However, there was a slight increase in creel CREMUS landings overall. It was also observed in the CNMI that there has been a shift in fisher preference from deep to shallow bottomfishing. It was also interesting to note that fisher participation increased but CPUE decreased. This could be due to new creel samplers that are more efficient in how they do their work. The increase of fishers could also be new and inexperienced fishers. There has been a decrease in the number of fishermen that have historically been a part of the fishery. The 2018 CNMI fishery performance data were complete but there were issues in integrating data from different time periods. This is important because Plan Team members noted a shift in fisher targeting over the course of the time series as well.

It is possible that the 2018 CNMI data had been driven by Super Typhoon Yutu, especially since all of the data were trending down; however, because the storm hit at the end of the year, it was not extremely likely. Sugar Dock was not sampled for four months immediately following the storm, but it should not have made that big of an impact. It was noted that once the inexperienced fishers drop out that CPUE should eventually go up, but it could go either way depending on how the economy is, etc. For example, if there are lay-offs, it could further increase participation. The core of some of the fisheries now is younger guys with smaller boats. The ambitious ones that stay in the fishery could prove to be more than weekend warriors. Since it's such a small fishery, nuanced factors can have seemingly big impacts.

There were several "n.d." designations present in the data tables presented. These kinds of data are most valuable when there is a hi-liner active in the fishery due to the consistency they bring to the table. If there is a hi-liner present, for example, there is some proportion of stability associated with them for that fishery; the criteria for this must be defined, however. Perhaps there should be a separate analysis to determine criteria for an assessment emphasizing hi-liners.

Adding footnotes for data points that need additional explanation associated with local fishery documentation in the Annual SAFE Reports was suggested. There will be tables cut out of the report due to the Ecosystem Component amendment. Some justifications will be cut out, and others will be discussed at this meeting. The Plan Team agreed that using these kinds of explanations to capture the nuances of the data is a good idea to have at a per-table level.

d. Hawaii

Okano presented on Hawaii fishery performance for the 2018 SAFE Report. General trends in commercial catch were briefly described and broken down by gear type. The inshore handline data was considered for deletion because all of the current data was non-disclosed due to confidentiality. Non-disclosed data is from two or less fishers. The palu ahi gear was not coded until 1984-85, but it existed before then and was just not properly teased out in the data until that time. Even when a new code would be implemented, it typically takes time for the fishers to be trained in correct reporting and for data to be reflective. There were some issues data collection and reporting due to coding. Gear and species codes were standardized in 2002, which caused notable shifts in the data for certain species and gear types around that time. The recent increase in CPUE for deep-sea handline, however, could be due to more large fish entering the fishery.

There were more trips than reports because the number of trips takes into account "skunk" trips where fishers went out but did not catch what they were targeting. Skunk trips are for all species for the entire trip. Prior to 1989, these skunk trips were not appropriately included in the data. These data have been broken down by gear and thus are gear specific. For other zeros for certain gear types and species, they simply have not been caught and sold commercially. The data were only from 2002 because the data starting in 1948 had issues in gear coding standardization. Due to the labeling, all uku were classified in another troll gear method, for example.

While there are currently not many data annotations in the Archipelagic Annual SAFE Reports, but it would be a good idea for all areas within the region to explain data circumstances. However, the reports only cover ten years of data, and the footnotes would not make sense for shorter time series. This could be remedied if the annotations were table-specific. There is likely more than one factor impacting data over the years. In individual years, however, there may be notable events that play bigger roles in driving trends, etc.

There is no hard cap for the Hawaiian purse seine fishery. The purse seine net fishery for CREMUS finfish is extremely intricate and is likely a reason as to why there is so little reporting. Fishermen have said that purse seining is the last gear they would want to use for catching akule. There is a lot of gear conflict between the seines and inshore handline.

The Hawaii crustacean fishery was noted as a good example of a pulse fishery, with boats coming to the mainland every few years to harvest. There was discussion on the removal of the crab trap table from the SAFE report due to pervasive "NULL" and non-disclosed data cells.

Mollusks and limu have been combined in the past because they are "invertebrates" that are harvested by hand-picking, but this does not matter anymore due to their classification as ECS. Limu harvest in the MHI mostly takes place on Kauai. Because someone is reporting the limu, that there are folks who are collecting, reporting, and selling limu using a commercial marine license. It was noted, however, that there was a massive decline in macroalgae statewide in 2014.

There has been a general lack of tako around Oahu over the past few years, and there have been more undersize (half-pound) individuals observed. Tako are recreationally caught in large numbers, and the data being looked at was only displaying commercial records. In Kaneohe Bay, recreational take of tako could be as much as 25 times commercial take.

It was asked if changes in the Hawaii Bottomfish Restricted Fishing Areas (BRFAs) will impact the local bottomfish fishery. The Plan Team generally did not think that there will be large impacts, as they did not foresee a large number of new fishermen rushing to join the fishery.

2. Discussions

Discussions took place during and directly after each individual presentation.

3. Public Comment

There was no public comment.

1:00 pm – 5:00pm

B. Ecosystem Considerations

1. Protected species section

Filardo presented on protected species in the Western Pacific region for the 2018 SAFE Report. A brief description of archipelagic fishery indicators relative to protected species was provided. NMFS is reviewing information on oceanic whitetip sharks and giant manta rays. The Plan Team's task was to discuss any increased risk to protected species due to this year's fishery performance. Needs for the SAFE report include improving data associated with insular protected species interactions.

There are not expected to be interactions with ESA-listed species, yet NMFS is reviewing on oceanic whitetip sharks and giant manta rays. NMFS has been helping with the consultations, and depending on the area there are not even individual species codes for each of these species in the different Western Pacific regions. There have not been interactions reported otherwise. PIRO's Protected Resources Division (PRD) is the body that is analyzing these data, and all this section was meant to note is that the assessments underway. Scalloped hammerheads are listed for American Samoa as well, though there have been no reported interactions. Plan Team members from American Samoa's DAWR stated that fishers report depredation over the banks.

2. Climate, ecosystems and biological section

a. Environmental & climate variables

Parrish presented on environmental and climate variables in the Western Pacific region for the 2018 SAFE Report in place of Tom Oliver. The presentation started on the basin-wide scale (carbon dioxide, pH, interannual climatic indices, etc.) before moving in closer to the archipelago-wide scale (sea surface temperature, sea level height, rainfall, etc.). There has been increased CO_2 and decreased pH. It was noted that the impact of effects of CO_2 and pH on small marine animals secreting tests can be up to 800 m depth in Hawaii.

The indices describing El Niño and the Pacific Decadal Oscillation were presented, and it was noted how these patterns can impact distribution of ocean-associated species (like seabirds). 2018 had positive/warm cycles. Tropical storms were also presented, and while regional differences were apparent they were all greater than their previous years' numbers.

Focusing more regionally, Hawaii sea surface temperature (SST) showed a positive increasing trend, and the associated coral thermal stress exposure showed no mass bleaching events via degree heating weeks (closely tied to resiliency of the system). Local sea level rise in Honolulu was emphasized. American Samoa SST showed a significant increasing positive trend with a recent coral thermal stress level that indicates mass bleaching and death. Local sea level rise in Pago Pago was highlighted as more extreme than Hawaii as well. Marianas SST shows a significant increasing positive trend as well, with coral thermal stress exposure in 2018 coming down from an event where mass mortality expected in 2017. There was severe bleaching in 2013, 2014, and 2017. The Mariana Archipelago had the highest estimated sea level rise over the next century. The Pacific Remote Island Areas (PRIAs) had major coral thermal stress even in 2015 and 2016. Sea level rise for PRIAs tended to be less than a foot over the next 100 years.

b. Life history and length-derived variables

O'Malley presented on life history and length-derived variables in the Western Pacific region for the 2018 SAFE Report. The biggest accomplishment over the past year was the Mariana Life History Research Cruise. A brief quantitative description of life history was presented to the Plan Team members. A paper on growth and longevity for Hawaiian grouper had recently been completed. The results were very different than previous estimates of certain life history parameters, but this can be the nature of growth and longevity studies on these kinds of species. It is difficult to sample big fish since they do not come through the market that much. The species being discussed is known to undergo sex change, so it is mostly males driving large size. There is no historical information on the species and how large it has gotten in the past, as it is generously confounded with other species. Small samples (< 20 cm) popped up in multiple years of data. While some Plan Team members believed the presented curve seemed forced, it may be because of relatively high variability due samplers are looking to acquire the largest fish.

Another paper on deepwater snappers in American Samoa and the Mariana Archipelago found that there was not much difference in size between fished and unfished areas, while there was a large truncation in age observed. It was noted that anything that impacts maximum length and length at maturity are important factors. Teasing out fishing impacts on evolutionary traits is extremely difficult. If all the large individuals are removed, what remains could be a genetically similar stock at just a lower size frame. Tibbats asked if there would be d. While opakapaka in the MHI show different habitat usage based on size where juvenile bottomfish eventually recruit to adult habitat; it is not clear however, if this is the case for all. There were recounted stories of small individuals being caught in adult habitat. Some species must have adults that recruit to non-optimal habitat if certain species are caught in certain areas at certain times of the year.

The Mariana Life History Research Cruise was then described, and a breakdown of reef-associated and bottomfish species sampled was shown. The cruise is scheduled to go down to American Samoa in 2020.

There were more samples in Anatahan versus the other Mariana sites because more time was spent on the first cruise in the northern islands of the archipelago. There were target sample numbers for each species, but the number of samples does not reflect abundance.

c. Biomass estimates for Coral Reef Ecosystem Components

Williams presented on biomass estimates for coral reef finfish in the Western Pacific region for the 2018 SAFE Report. The data came from the Pacific Coral Reef Assessment Monitoring Program (RAMP). Data gathering was briefly described, followed by basin-wide and individual region data trends. Each island in the greater region is visited for three to five days every three years during the same season where the water regime is similar with some variability. It is good data for the big picture, but it has its limitations in collection frequency, spatial distribution of collection sites, depth of visual surveys, etc.

It was noted that parrotfish harvest has been down statewide in recent years. There were several fish families around Oahu, however, that have seen increased biomass from where the data collection first began a decade ago. There were not large patterns of change across the time series for individual areas, but there were only a few years of available data and it was difficult to tease out meaningful trends. The sample size is not huge, making it easy to over-interpret results. American Samoa (and Tutuila in particular), for example, showed positive results with respect to fish biomass in the most recent year sampling cycle (2016-18).

Moving forward with ecosystem components, it is not feasible to do visual surveys at the species level – perhaps some combination of family and function would be the best compromise to develop such groups. There are some fish species that are not covered well by visual survey. "Biomass busters" (e.g. a large group of a certain species migrating through the sampling area at a given time) are sampled every now and then and do not translate to good biomass data. Some Plan Team members asked for clarification regarding supplementing biomass data with fishery data for key species. Ideally, species-level patterns would be obtainable, but there is a reliance on the groups made for collection at the moment. It would be beneficial to better formulate the make-up of these kinds of groups. Functional groups may be a good avenue to explore on the ECS front as well. The ecosystem component amendment was done because available fisheries managers cannot generate ACLs for the hundreds of species within the jurisdiction, but these species still need to be monitored.

3. Habitat section

Parke presented on habitat in the Western Pacific region for the 2018 SAFE Report. The contents of the habitat module were described alongside what additional habitat data can be monitored in the module. This was difficult given the lack of habitat programs in the Pacific Islands region. Levels one through four for essential fish habitat (EFH) descriptions were described briefly. PIFSC is cooperating with the Council and PIRO to come up with some sort of joint program that will move everyone towards more EFH-centered, habitat-based work. One of the proposed projects had to do with the predator-prey relationships for shallow-water MUS. This would be a potential project that would help PIRO in some of their EFH reviews. There has been some discussion about how recently lost mapping capabilities may be replaced going forward, but a lot of good mapping data already exists out there at the moment. Coarse resolution bathymetry and backscatter are already available, which can act as a base for future evaluations. Finally, the bigeye tuna project, which does not focus on EFH but tries to determine bigeye tuna spawning areas, will bring some measureable oceanographic habitat features into play for the stock and associated assessments. The schedule of EFH review is in flux at the moment, but the original

one had territory bottomfish this year, which has been pushed back to next year.

EFH maps are available online, and that certain staff at each agency should have direct access. There are, for example, mapping products for the MHI showing bottomfish habitat from Ben Richards' habitat work based on slope and depth.

4. Socioeconomics section

Pan presented on the socioeconomics of in the Western Pacific region for the 2018 SAFE Report. There was focus on fish trip costs, pounds sold, revenue, and fish price for the past ten years for each of the areas in the Western Pacific region. Each of these parameters was shown for each area for both reef fish as well as bottomfish. American Samoa has the lowest relative fuel cost in the evaluated areas across the region, but fish price trend was relatively flat. Guam bottomfish pounds sold was lower in 2018 than 2017. The fish price trend was also flat for both bottomfish and reef fish, but fishing costs were relatively reduced from the previous year; 2018 trip costs were not available. CNMI had both revenue and pounds sold decline over past two years. Fish price trend showed an increasing trend, while trip cost was unavailable. Hawaii had a slight decline in the number of total federal bottomfish fishers, with slightly more BMUS being sold of the total caught. The unemployment rate slightly increased in Hawaii relative to both the US at large and Alaska. Pounds sold for bottomfish decreased over past two years. Price of deep 7 was notably higher than non-deep 7, though both have increased over the past decade. Number of fishers for reef fish was similar to bottomfish. Reef fish price was very flat. Trip cost by gear type for Hawaii was also presented, with trolling being the most expensive and spearfishing being the least. WPacFIN looked at the issue of more pounds sold than caught; it is likely because the data were from two different data collection systems.

It was asked whether distance to a particular fishing area may play into the presented socioeconomic data; this parameter is likely just as important for small-boat fishermen as it is for those on larger vessels. The line of thought is as follows: are people willing to make the trip to Penguin Banks if the price of fuel is relatively lower, etc.? Are there more trips with a lower fuel price? The program only tracks what kind of fishing trip, and does not track the associated fishing area necessarily. Perhaps their distance traveled could be found based on reporting grids, but this would be difficult because there are non-linear distances and odd-shaped polygons. It was also noted that trip cost is not based on fishing area, and it is roughly based on what was the total overall cost for that fisher's trip.

There have been improvements in dealer reporting over the past decade; while there had been no dealer license reports, there is now a weekly report of dealers since last summer. Currently, 40 percent of dealers give the weekly report by the next week. Commercial data receipt data are expanded based on percent coverage, and an adjusted measure is needed to convey this.

5. Marine Planning section

Council staff presented on the marine planning section for the Western Pacific region for the 2018 SAFE Report. O'Malley asked what is the action needed by the Plan Team on the marine planning section. Walker responded that input on ways to make the module more useful will be the focus going forward. This information can be used for analyzing cumulative effects. It can be

used to determine impacts to fisheries when the Council and NMFS conduct analyses for amendments. This information can also be used to document what is going on in terms of marine activities and can be identified as a factor affecting the fisheries. O'Malley expanded that the section can be used to explain the fishery statistics. It provides historical documentation on the marine activities and may explain certain patterns in fishery statistics (as had been discussed earlier in the day).

6. Discussions

Discussions took place during and directly after each individual presentation.

7. Public Comment

There was no public comment.

C. Administrative Reports

Walker presented on the number of federal permits and other regulatory actions undertaken last year for the 2018 SAFE Report. Time series on numbers of permits were displayed, and regulatory actions taken in 2018 were briefly summarized. It was suggested that the Plan Team input Marine National Monument Permits into the report this year, of which there are two currently. These are essentially non-commercial fishing permits that can be applied for.

D. Data Integration Chapter

1. Draft Data Integration Section

Council staff presented on the next draft data integration section for the 2018 Hawaii SAFE Report. There was an analysis done seeing uku harvested in the MHI were at all correlated with selected oceanographic parameters including ENSO indices, vorticity, zonal flow, and other current flow. There were potential relationships discovered between standardized uku CPUE and summertime zonal flow as well as the Multivariate ENSO Index v2. ENSO is a concrete event now and it can be verified two years after. The ENSO effects should be lined up with the recruitment and the settling of the fish. The situation should be perfect in order for this to be applicable for management. If it is driving uku it may drive other species as well. It is just a matter of tweaking the spawning period and recruitment event. The advantage of this is that it can be observed in the SPC.

When the deep 7 ACL came into play in the mid-2000s, the fishery would close and the fishermen would then target uku; another fishery developed as its own fishery in a way, potentially necessitating the splitting of the time series. A lot of the uku catches are during the summertime. Visual surveys and/or observations could potentially be utilized as additional verification for the analysis.

It was suggested that the analysis look for pulses of small fish in the data utilizing a minimum standard phase lag. The analysis is focused on the +2 year phase lag and is tied to the 2-year-old fish first recruiting into the fishery. There was not as much consideration for the older adults that are fished. Ultimately, the analysis needs to develop a model and validate it with a separate data

set. A potentially important event to consider would be the 1989 spike in the recruitment due to an oceanographic event. It was also suggested to look into the genetic backdrop and also post-larval dispersal work; it would be ideal to explore these methods with Don Kobayashi and talk to the "ToBo" lab for the potential next step. It was suggested to apply the same framework using the Coral Reef Ecosystem Division (CRED) data; pick a species in the CRED data and apply this modeling framework. Using the Big Island DAR UVC data might be useful because of the long time series, but there are also roving survey data and artificial reef data.

Other Plan Team members noted that they would like to see the abstracts of the best scientific information regarding potential data integration and fishery ecosystem relationships summarized in the chapter three for easy accessibility of the managers.

2. The Impact of Climate Change and Variability on Octopus Gleaning in American Samoa

Ochavillo presented on the impacts of changing climate on octopus harvest in American Samoa. The South Pacific Intertropical Convergence Zone, which gets displaced during ENSO, causes a cool drought in American Samoa, for example. There are two types of ENSO events, Central and Eastern Pacific events, and the type of ENSO can determine the level of impacts for American Samoa in particular. The objective of the study was to use climate variability data to characterize ENSO and determine how it may impact octopus gleaning in the archipelago. The results of the study showed that wave energy was likely the dominant factor of ENSO events that impacted American Samoa fisheries. Increased sea level and SST decreased participation and catch rates for octopus. Future work will include looking at climate impacts on gleaning participation, watersheds, and catch rates (i.e., non-fishing impacts).

The low period for tako CPUE around 2005 coincided with no ENSO activity that year. It is possible that this result is due to a low amount of data points as well. Gleaning effort is based on reefs being exposed. If climate variability impacts wave action that affects people's access to the reefs, increased ENSO could lead to decreased participation. There was also a drop off for wave height/energy against octopus CPUE, where it must be that wave energy would be too high. There was lower CPUE at low wave energies before it slightly increased prior to dropping off entirely. It is likely that this is due to non-linear relationships between the parameters.

3. Public Comment

There was no public comment.

Tuesday, May 7, 2019
8:30 a.m. – 12:00 noon

5. Ecosystem Component and changes to the Annual SAFE Report

The second day of the meeting started at 8:30 a.m. Council staff presented and led discussion on changes to the Annual SAFE Report associated with the ecosystem component amendment to the FEPs. The Plan Team's task was to discuss and recommend how to monitor ecosystem components, associated changes to the Annual SAFE Report, and changes to species groupings

of management unit species (MUS) for better stock assessments in the future. Staff referenced the biomass presentation from that Williams had given the day prior when beginning to discuss monitoring. Members asked what "monitoring" means, trying to understand the exact obligations; however, the National Standard 1 is vague about what monitoring is, and if the species is not in the FEP then there is no monitoring required. The multivariate analysis used to establish ECS made the distinction of species primarily in State/federal waters using proxies or would have been insufficient spatial information for certain species. Most of these fisheries are in State and territorial waters, however. The SAFE Report should convey if the species are predominantly caught in federal waters before determining if they are overfished or experiencing overfishing. There are not clear management objectives for ECS in the FEPs, so there needs to be a "why" when it is asked what is being monitored. State and federal catch in the current SAFE Report are not distinguished. The Council is required to manage species throughout their full range, regardless if it is primarily in federal or state waters. No new data gathering was proposed in this amendment, nor would data collection efforts be reduced. One thing to note is the lower priority that ECS designation brings relative to MUS. There was brief discussion on reallocation from ECS to those that need assessments such as MUS. There were no new species added to MUS this year.

It was suggested that shallow-bottom and deep-bottom MUS be made distinct in the data for the purposes of assessment. Members recognized the two separate segments of the fishery, and that people may switch targets based on varying conditions, etc. It is about categorizing the MUS such that it makes ecological sense during assessments. Moving forward, the FEP would need to be amended to change the subgroups of species before PIFSC could do any sort of assessment on these new groups; it is a procedural thing, ultimately. It may be odd to pool the species unless absolutely necessary and even then they should be assessed on the species level if possible. There are quantitative issues in using the catch data for single species assessments because managers cannot distinguish targeting of specific species in the data; bottomfish are typically targeted as a group. If groupings are monitored for the SAFE reports, it does not mean they will be evaluated in the same way in stock assessments. Data collection surveys have been trying to distinguish shallow and deep bottomfishing trips, but right now it is based on species composition. It is about how well the fishers are reporting what their effort was on a given trip, and apparently this is harder to do in the MHI than Guam. If the fishers buy-in to reporting their effort, it would be beneficial. Data has already collected in this way on Guam via proportion of shallow- and deep-bottom for the past 20 years. The trips where these targets become mixed ("mixed trips") become the issue in calculating CPUE indices.

Current data collection that indicates fishing area create issues because more than one fishing ground cannot be input at a time, so surveyors have been essentially asking for one spot. This means that there would need to be changes in data collection and interactions with the fishermen. Fishers would be less interested in extending the survey process as well, as it would get awfully burdensome, so WPacFIN uses effective CPUE for these processes.

The most efficient avenue is likely using systems already in place to monitor ECS. Perhaps five reporting groups from reef fish data at island scale from visual surveys may reasonably represent the overall community. The lack of an objective in the FEP for ECS makes this a good starting point. The whole premise of doing ECS is not to avoid ACLs, but to try to manage these groups of species in an ecologically-sensible manner.

The Plan Team was generally happy with the MUS lists as is. It was suggested that there should be one species added to BMUS that is being split off from a current species (*Etelis carbunculus*), but this would require an FEP amendment with justification as to why they are being brought in. The species can still be monitored at a higher level even if is not officially MUS. There are no data currently for the new bottomfish species because it is not coded and the taxonomy is being worked out. Some thought that those species specified as ECS should just be monitored under the system in place now, and there should not be a separate group of MUS that necessitate additional or fishery-dependent data. It was agreed upon that the MUS will use fishery-dependent data, and ECS will be grouped and utilize fishery independent data. It was considered if any fishery-dependent data for important ECS needed to be included. For the SAFE report, it is necessary to report a number associated with the state of the group; something like a biomass metric would satisfy that requirement. The question for the Plan Team is how to decide what would comprise the different reporting groups for ECS as it would likely vary according to area.

It was asked how ECS were listed in the SAFE report before. They were mostly CREMUS, etc., but categorized on the family level. It has been extremely difficult to replicate data due to the overwhelming number of species. Some members noted that does seem weird to want to group these together, but also get more specific in the case of bottomfish. It is also about simplifying the process for the overwhelming nature of data-poor CREMUS. Coral reef fish have usually proved to be problematic, always resulting in giant lists. One solution would be looking at the CREMUS list and taking out all species that are not priority. The issue is that there are so many different versions of CREMUS lists, but perhaps there is information that can be gleaned so brand new lists do not have to be developed from scratch. Doing the groupings makes more sense when considering how data-poor some of these species are. Some members were more interested in picking important species as opposed to designating functional groups. The group wondered if there is any way to monitor with both functional groups as well as important species within those groups (e.g., fishery-independent data for functional groups, and fishery-dependent data for key species). Council staff noted that it is the Council's obligation to monitor the ecosystem, not necessarily a single fishery status given the nature of the data. The objectives concerning ecosystem function are much different than managing an individual stock, but the specific objectives are not clear for the group regarding ecosystems. The Plan Team noted that they should at least develop a direction to move forward in agreement in thinking about ecosystem monitoring. The groupings do not necessarily have to follow the results from both fishery-dependent and independent data streams.

The group came to consensus on more closely monitoring key species from each territory in the region using fishery-dependent data, and other ECS would be classified in functional groups that will utilize fishery-independent data. There was concern about deciding on species and losing those that may be important in the catch record, but this should have been considered when the ECS were split from the MUS; this justification should be described in the SAFE report. Perhaps a table of top-landed species could be included. There could potentially be a top ECS table as well, so monitored species could change year to year as needed. Looking at the revenue associated with the key species selected may be useful. It was reiterated that all of the same data would still be available, but how the data are presented in the Annual SAFE Report will change. The Plan Team members reached consensus on selecting five key species from each area to be designated as ECS not worrying about the designations of the functional groups at the moment.

6. Finalizing the species table for the Annual SAFE Report

Dukes did not present on finalizing the species tables for each group going forward for use in the Annual SAFE Report, and this item was largely taken up in previous presentations and discussions.

7. Calculations of effort and participation in the Annual SAFE Report

Quach gave a presentation on how effort and participation have been calculated for data displayed in the Annual SAFE Report. It is important to note that the data presentation may change drastically next year with the implementation of the ECS amendment. The goal was originally to come up with a universal metric of fishery participation. It was discussed if , going forward, the SAFE Reports could utilize number of fishers instead of number of trips as its main participation metric. Boat-based participation in 2017 was shown to have increased by over 100 percent, which did not seem to be realistic. The number includes repeated effort, so they are not unique fishermen but there is not a good handle on double-counting in this survey. The Plan Team brainstormed potentially better ways to display the participation metric. "Number of fishers" can be misleading, because you can look at this metric vs. Hawaii and think that American Samoa had more fishers. Number of total fishing trips may be better. Alternatively, just making the labels more clear so as to understand the metric better would be appropriate. Some suggested that it could become reporting average number of trips as well as average number of fishers per trip. There was consensus that there should be a metric of total number of fishing trips conducted, but they also wanted to know the number of fishermen. This could potentially be done from a license database; in American Samoa, each interview has the number of fishermen. An expansion on this front, though, may not be good. Further clarification of the labels was determined to be needed.

8. Machine Learning Software to support fishery data collection

Sunny Bak-Hospital presented on her project to develop machine learning software in support of fishery data collection in the Western Pacific region. There had been a total of ten videos annotated at this point in time (bounding boxes, species identification, etc.) at about 99 percent accuracy. There are 55 remaining videos on deck for the project. Potential uses for this software include surveying as well as electronic monitoring and reporting. The original objective for this project was identification, but length is part of this project now as well using the bounding box and measuring board. It may require more input from biologists to get all details correct.

It was asked if the software could be trained to be used in another environment (i.e., not a fish board). If testing data exist to see what the background would be, the feasibility could be determined. In the future, once the software is trained, it will be converted to JavaScript. Past that, the future goals would be using the software to support the territories in mandatory licensing and reporting regulations (in CNMI, for example). The system now operates by annotating videos, but in the future it would just be a video system that fish can be run through that collects data. A large library is not necessarily needed, but the software needs to be trained.

The Plan Team asked about how well the software does comparing similar-looking species and issues associated with that. The software was able separate similar goatfish, and if they can be

classified correctly then the network is doing a good job. It was suggested to try menpachi to challenge the software as well. The software focuses on color, shape, lines, etc. It creates nodes in an image, and then all sorts of different filters are applied (hundreds of them). It was asked how good the neural network is at handling different backgrounds and lightings. It is not clear how the performance will pan out, but the software has been prepared to handle these sorts of things using all types of color filters and hyperparameters. It was agreed that some sort of color balance at the beginning would be useful.

9. Habitat Indicators for Coral Reef Ecosystem Components

Christopher Hawkins and Darla White, Lynker, presented on their new project to develop habitat indicators for coral reef ECS in the Western Pacific region and for eventual incorporation into the Annual SAFE Report. The presentation was a report on initial findings, and the presenters were ultimately looking for feedback and direction from the Plan Team. Several habitat projects and studies from the region were presented. The purpose of the first step was to determine who has been collecting what benthic data over the years. The next step really is going to be what for each particular archipelago make sense to track, are data available, and how can they be displayed in the SAFE report. A list of oceanic indicators was presented under the groupings of coastal oceanography, temperature, water clarity, pH, and chlorophyll-a. Habitat, fish, and anthropogenic indicators were also presented. The biggest challenge in the project so far has been getting a hold of folks as needed for information.

Some members thought that this was a great project because it integrates a lot of different surveys. The Hawaii Marine and Research Collaborative should be the the go-to, and combined with CRED data, there should be sufficient information. This project was initiated because the SAFE reports are being revised, and there is a need to track habitat information for MUS; however, many are ECS now, so exact application of this is up in the air as well. The Plan Team was asked how important some of these indicators may be for discerning ECS and MUS. One would assume that there are some habitat indicators that someone could look at if issues were seen in the data for a particular species. Initially, the information could just be what is collected on a regular basis in each of the territories. Once the final report is done, the authors will recommend a set of indicators and the Plan Team will advise on inclusion of the associated information into the Annual SAFE Report.

Some Plan Team members suggested getting into recent trends and changes in habitat indicators, because that information is worth much more than static information on several different variables. The overarching question could be "what are the top ten things changing or trending?" and "what are the long and short term trends?" Studies have shown that habitats do indeed shift, but the important thing is what is changing on longer term and larger scales. While oceanographic variables may already be fully covered by the SAFE Reports, there is a lack of information especially on benthic habitats. CRED also has benthic surveys on a three-year cycle that are able to detect longer term change. A metric or status indicator for benthic indicators would be extremely helpful going forward.

There are no indicators for deep bottomfish because there are no consistent surveys for them. However, the focus of the work at hand may lend itself to the shallow bottomfish species. The Plan Team is limited in the use of funds, and the current monies are coming from the CRED.

10. Pacific Insular Fisheries Monitoring and Assessment Planning Summit

Dukes briefly presented on the upcoming Western Pacific Insular Fisheries Monitoring and Assessment Planning Summit to take place on August 5-9 or August 12-16; it is a week-long summit. All territory data source streams will be looked at by participants. There will be three impartial panelists present from the mainland to help when decision points arise. The effort is to ensure that a good look is taken at how data are collected, who uses it, and how can it be made more robust, etc. Data collection resources are not meant to be removed, but perhaps reallocated.

11. Action agenda items

A. Main Hawaiian Islands (MHI) Kona Crab Fishery

1. Stock assessment for the MHI Kona Crab

O'Malley presented on the 2018 benchmark stock assessment for the MHI Kona Crab fishery. It began with background information on the species itself and its associated fishery alongside recent fishery-dependent observations. The model approach was described, as well as results and conclusions from the benchmark assessment. Kona crab in the MHI was not determined to be overfished or to be experiencing overfishing as of 2016.

The CPUE for Kona Crab had been going up slightly the past ten years while the catch had been declining. Since 2006 when no-take of females was implemented, commercial fishers have not found it feasible or worthwhile it to take these fishing trips. Rules-wise, the no-take of females is in Hawaii's revised statutes, but by this fall, an administrative rule will be created to mirror the no-take of females before repealing it during the following legislature. This process will take about a year. There are only commercial landings available for this species. The assessment itself did look at unreported catch, though, and it did not really change the stock status. There is no good handle on the proportion of recreational to commercial takes, but the assessment assumed close to 1:1. It is mostly an offshore fishery around the sandy flats (i.e., not exceptionally deep).

2. P* Working Group Report on the MHI Kona Crab Fishery

Council staff presented on the P* Working Group Report for the MHI Kona Crab fishery based on the 2018 benchmark stock assessment. First, an overview of the P* process as described in the FEP was presented, as well as the four scoring categories used. Essentially this process provides appropriate buffer for a fish stock such that it does not hit its overfishing limit. The end score was 11.55, leading to a P* of 38.45% risk of overfishing. The P* score, when applied to the recommended ACL through 2026, suggested that an ACL of roughly 31,000 lbs. would be appropriate.

3. SEEM Working Group Report on the MHI Kona Crab Fishery

Council staff also presented on the social, ecological, economic, and management (SEEM) Working Group Report for the MHI Kona Crab fishery based on the 2018 benchmark stock assessment. This was done by the Social Science Planning Committee, and one of their goals was to standardize the SEEM process going forward. The SEEM reductions were intended to be implemented similar to the P* reductions in that they follow the same framework. The final

SEEM reduction was -8, meaning the total risk of overfishing at ~30% would be roughly ~28,000 lbs. Plan Team members emphasized that information about the larval phase of Kona Crab needs to be addressed in some capacity in the upcoming Kona Crab environmental assessment.

Unless the no-take of females provision is removed, the take will likely remain at around 2,000 lbs. The Plan Team did not foresee a rush to the fishery while this provision remained in place. The State may revoke the no-take of females provision and the closed season may be lengthened because fishers have been harvesting too many berried females. It was asked if the berried Kona Crab females could have shifted temporally, but since there is no one fishing pre-Summer, there is no way to know this.

B. Discussions

After being left off the agenda, an additional action item was presented. The proposed OFL, ABC, ACL, and ACT for Kona crab for 2020-2023 were presented. Status quo would be an ACL of 3,500 lbs. The other alternatives used numbers from the benchmark stock assessment with various levels of reduction for the ACT from the ACL level. The Plan Team's task was to recommend one of these Alternatives for the Council to consider.

There was concern when the State amends its regulations for the no-take of Kona Crab females. While it is unlikely that there will be a rush to the fishery, it is impossible to know and will be prudent to keep a close eye on. If the fishery responds when the regulations are repealed, the managers can step in and revisit this whole process. It was reiterated that the fishery is heavier in the second half of the year. It was not clear to Plan Team members that there exists enough incentive for Kona Crab fishers to come into the fishery with such a low potential economic value. Catch for this fishery, however, has typically been centered on special events and/or holidays. Consensus was eventually reached among Plan Team members for Alternative 3; this would go into effect from January 1, 2020 – 2023. The rule change to remove the no-take of females regulation may take a year or more. Another issue addressed was the lack of status determination criteria for Kona Crab in the Council's FEP, and a possible recommendation for staff to write an amendment to add status determination criteria to the FEP was suggested.

C. Public Comment

There was no public comment.

1:00 p.m. – 5:00 p.m.

12. Monitoring and updating priorities

A. Council's 5-year research priorities

Council staff presented on the Council's new five-year research priorities that have been developed over recent months. Staff worked with Plan Team members to develop recently, and offered the Plan Team members to look through the priorities at their convenience. The Council has a new approach to developing these priorities by streamlining the process alongside the PIFSC Annual Guidance Memo (AGM). The Council is supposed to give their priorities to the

Science Center, and then they determine how much/what they can realistically tackle. This provides continuity between the offices as well with respect to research priorities going forward.

B. Cooperative Research priorities

Council staff presented on the Council's new cooperative research priorities with the Science Center and Regional Office that have been developed over recent months. Similar to the five-year research priorities, Plan Team members were offered to review the documents and comment if there was anything of note.

13. General Discussions

Discussions took place during and directly after each individual presentation. Discussions associated with Plan Team Recommendations mostly had to do with wordsmithing and clarification.

14. Fishery Ecosystem Plan Team Recommendations

2019 Archipelagic Plan Team Recommendations

Regarding the Kona Crab ACL, the Archipelagic Plan Team recommends alternative 3 that specifies the ACL equals to ABC at 30,802 lbs. and sets an Annual Catch Target of 28,324 lbs at risk of overfishing level of 30 percent. As an accountability measure, the catch of Kona crab be monitored in-season using the monthly Fisher Reporting System and will close the federal waters once the ACT is projected to be reached. Further, the Archipelagic Plan Team recommends the Council request the State of Hawaii to establish a process through Chapter 91 to close the State waters once the ACL of Kona crab and *Aprion virescens* is projected to be reached.

Regarding monitoring of MUS catch and annual catch limits, the Archipelagic Plan Team recommends the Council request Division and Aquatic Resources and NMFS-PIFSC provide the Council and PIRO with monthly summaries of the *Aprion virescens* and *Ranina ranina* pounds caught, pounds sold, number of license, and number of trips to track fishery performance relative to ACLs.

Regarding the revisions to the Annual SAFE Report, the Archipelagic Plan Team recommends the Council

- Direct staff to work with NMFS to convene the Plan Team working group for American Samoa, Guam, CNMI and Hawaii to define the **ecosystem component species** that will be monitored as species that comprise the functional groups ('parrotfish', 'browsing surgeon', 'mid-size targeted surgeon', 'medium large snappers', 'non-planktivorous butterflyfishes'), and those that comprise key species in the fisheries (top 5 consistently monitored important species and the 10 annual catch landings)
- direct staff to work with NMFS and AS-DMWR, CNMI-DFW, Guam-DAWR, Hawaii-DAR on the revisions to the fisheries modules of the Archipelagic SAFE Reports due to the changes in the Management Unit Species brought about by the Ecosystem Component designation;

- direct staff to work with NMFS-PIFSC-Ecosystem Science Division and Division of Aquatic Resources on applying the GLM framework to the survey data in order to validate the modeling results;

Regarding the bottomfish management unit species list, the Archipelagic Plan Team recommends the Council direct staff to work with NMFS-PIFSC and American Samoa DMWR to evaluate the representativeness of the BMUS list relative to the all species caught using the bottomfishing gear.

Regarding the Management Unit Species, the Archipelagic Plan Team recommends the Council direct staff to work with NMFS-PIFSC to conduct a data exploration on the feasibility to split the Territory BMUS stock complex using ecological rational (e.g. shallow deep or by life history trait etc.).

Work recommendations:

- Council staff and the chair to work with DAR on determining which table(s) to remove from the Annual SAFE Report;
- WPacFIN to follow-up on the status of the creel survey method documentation;
- The report to incorporate more nuance in the narratives of the fishery performance sections; include the issue on pounds sold greater than pounds caught;
- The report to identify presence and absence of hi-liners in the data sets as well as define the criteria of what a hi-liner is;
- Regarding effort and participation metrics for the Annual SAFE Report, Council staff and Science Center employees to calculate the average fishermen per trip; ensure interview has number of fishermen and average numbers of gear per trip.
- Add the abstracts for studies;
- Cross walk the tables with the information needed for the EAs.

Key species for each area:

Hawaii

- White ulua – *Caranx ignobilis*
- Kumu – *Parupeneus porphyreus*
- Green Spiny lobster – *Panulirus penicillatus*
- Uhu – *Scaridae* spp.
- Limu kohu – *Asparagopsis taxiformis*
- Opihi – *Cellana* spp.

Guam

- *Naso unicornis*
- *Siganus spinus*
- *Lethrinus harak*
- *Chlorurus frontalis*
- *Epinephelus fasciatus*

American Samoa (to deliver final list by end of month)

- *Lutjanus gibbus*
- Mullet
- Lobster
- Palolo

CNMI

- *Naso lituratus*
- *Naso unicornis*
- *Acanthurus lineatus*
- *Scarus ghobban*
- *Lethrinus harak*
- *Signaus argenteus*
- *Scarus rubroviolaceus*

15. Other Business

There was no other business.

PAU