WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

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FINAL REPORT

Report from Pacific Islands Fisheries Science Center Director

Mike Seki, Pacific Islands Fisheries Science Center (PIFSC) Director, discussed PIFSC work updates and COVID-19 Impacts. Among COVID-19 impacts include cancellation of several research expeditions, delay of monk seal and turtle field camps, cancellation of summer internship programs and suspension of creel fisheries data collection, fish life history work, protected species stranding response, and education and outreach. Seki provided brief updates on the Uku stock assessment, assessment of population-level impacts of the Hawaii and American Samoa longline fisheries on leatherback and loggerhead turtles, and marine mammal surveys. Seki reported that Northwestern Hawaiian Islands (NWHI) monk seal population increased by 2% from 2013 to 2019. New personnel hires include Robert Ahrens for Management Strategy Evaluation, and Danika Kleiber for the Human Dimensions group.

SSC members inquired about contingency plans for fisheries creel data collection. Seki explained that it will take some time to develop such plans, and noted that other discussions regarding electronic reporting, bottomfish management unit species (BMUS), and data modeling approaches are ongoing.

SSC thanked Seki for the presentation.

Program Planning and Research

A. Review of the Standardized Bycatch Reporting Methodology

Council staff presented an update on the review of fishery management plans (FMPs) for consistency with the new Standardized Bycatch Reporting Methodology (SBRM) requirements. NMFS published a final rule in 2017 providing guidance on the requirement of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) that all fishery management plans (FMPs), with respect to any fishery, establish a standardized reporting methodology to assess the amount and type of bycatch occurring in a fishery. The final rule establishes requirements and provides guidance to regional fishery management councils and the Secretary of Commerce regarding the development, documentation, and review of such methodologies. The rule also requires that the Council consult with its SSC and/or the regional NMFS Science Center on reporting methodologies including design considerations such as data elements, sampling designs, sample sizes, and reporting frequency.

The Council, in coordination with NMFS, is required to conduct a review of its FMPs for consistency with the new guidance, and all FMPs must be consistent with the new guidance by February 21, 2022. PIRO Sustainable Fisheries Division (SFD) and Council staff have initiated a review of the existing SBRM provisions in the Council's five Fishery Ecosystem Plans (FEPs). If FEP amendments are required, they will have to be completed by that date

The SSC supported this effort by PIRO and Council staff and looks forward to full review in September.

B. Implementation of the Small-Boat Electronic Reporting App

Council staff provided an overview of the Catch-It Log-It app suite, an electronic reporting system developed by the Council in collaboration with PIFSC. This is an integrated reporting system where the fisher app and fish vendor app are linked by the administration app. This provides a near-real-time reporting system and an alternative source of fishery-dependent data to support the development of a new stock assessment. This self-reporting system is supported by the mandatory license and reporting regulations in Commonwealth of Northern Mariana Islands (CNMI) and Guam, which are still in development. Council staff showed the wireframes of the app and the dashboard system that automatically summarizes the data of individual fishermen on their devices and a community dashboard version that summarizes the data for the fishery as a whole. This effort will be supported by a comprehensive education and outreach of the fishing community and a training workshop for fishermen and fish retailers who will be participating in the program.

SSC members discussed capturing data from smaller fish markets, flexibility in refining and adjusting reporting grids, challenges in using this app for enforcement, issues in fishermen reporting zero catch data, identifying appropriate names of fish that are familiar to fishers, the definition of a trip, solutions to collect data from multiple target trips, differences in the apps public and private dashboards, options to better report fish size from catch, and transitioning from traditional methods of reporting fisheries data to the Catch-It Log-It app. The SSC is interested in the potential of this app and appreciate the effort that was devoted to this project. It could allow crosschecking of other data streams.

C. 2019 Annual SAFE Report and Recommendations

1. Archipelagic Report Overview and Highlights

Stefanie Dukes, Archipelagic Plan Team Chair, presented the highlights of the 2019 Archipelagic Annual Stock Assessment and Fishery Evaluation (SAFE) Reports for American Samoa, Marianas, Hawaii, and Pacific Remote Island Areas. BMUS catch, effort, and participation generally declined for all areas in 2019 except for Guam relative to historical averages. The trophic level biomass showed mixed trends across jurisdictions and a general decline in coral cover. Changes to the protected species section include updates to Endangered Species Act (ESA) consultations with the recent listings of oceanic whitetip sharks and giant manta rays and the implications for bottomfish fisheries. Fisheries data showed that interactions with oceanic whitetip sharks were rare or nonexistent in bottomfish fisheries in all areas and there were no recorded interactions with giant manta rays. Oceanic indicators for 2019 were updated, including indicators such as CO2, which has been increasing exponentially through recent years, and the Pacific Decadal Oscillation, which transitioned from a positive phase to neutral in 2019. Area-specific indicator information also presented includes parameters such as ocean color, which slightly decreased but was in line with climatological values for each area, and sea level, which continued to increase in each area.

The SSC appreciated the inclusion of the number of days of closure of fishing grounds due to military exercises in the Marianas. The SSC also discussed the relevance of EFH to coral reef and other nearshore fisheries in the context of management unit species (MUS) and ecosystem components (EC) species.

The SSC approved the American Samoa, Marianas, Hawaii, and PRIA Archipelagic Annual SAFE Reports.

The SSC thanked Dukes for an informative presentation.

2. Pelagic Report Overview and Highlights

Don Kobayashi, Pelagic Plan Team Chair, presented the highlights of the 2019 Pelagic Annual SAFE Reports for the domestic and international fisheries. The report was updated with fishery performance data from pelagic fisheries in Hawaii, Guam, CNMI, and American Samoa in 2019. The recreational module was updated with non-commercial pelagics data for the first time since 2016, showing relatively consistent catch proportions between species over time. Additionally, the ecosystem considerations chapter was updated with information from 2019 such as socioeconomic data, protected species interaction and ESA consultation information, and new oceanic indicators such as median phytoplankton size.

The SSC discussed the use of size frequencies in bigeye tuna stock predictions. **The SSC approved the Pelagic Annual SAFE Report.**

The SSC thanked Kobayashi for the informative overview of the Pelagic Annual SAFE Report.

D. President Executive Order to Increase America's Competitiveness in the Seafood Industry and Protect our Supply Chain

Council staff provided an overview of the President Executive Order 13921 that promotes American seafood competitiveness and economic growth. The purpose of the EO is to remove outdated and unnecessarily burdensome regulations, strengthen efforts to combat illegal, unreported and unregulated fishing, improve transparency and efficiency of environmental reviews, and renew focus on long-term strategic planning to facilitate aquaculture projects. Section 4 of the Executive Order requests each Regional Fishery Management Council to submit within 180 days a prioritized list of recommended actions to reduce burdens on domestic fishing and to increase production within sustainable fisheries and include a proposal for initiating each recommended action within 1 year of the date of the order.

SSC members discussed Reasonable and Prudent Measures (RPM) that accompany biological opinions (BiOps) and noted that the premises that we work under are interpretations of laws that were developed into policies.

The SSC recommended the Council direct staff to convene the SSC subgroup composed of James Lynch, Shelton Harley, and Erik Franklin to identify and prioritize the regulations, orders, and guidance that creates a burden on domestic fishing.

E. Stock Definitions in the Bottomfish & Pelagic Fisheries

Council staff presented on the stock definition for management unit species under Council purview and reviewed definitions of unit stock based on domestic and international criteria. The definition of a unit stock may have many nuances based on fishery distributions, political boundaries, life history, and inter-specific commonalities. The Western Pacific Region encompasses a mosaic of plausible stock boundaries and definitions for its insular fish complexes and highly migratory pelagic fisheries. Misspecifying a most reasonable definition of stock while assessing any of these fisheries can lead to stock status determinations and subsequent management scenarios that may not best reflect the true nature of resources. At present, the Region does not have guidelines or 'best practices' for defining a unit stock. The Western Pacific Region is both geographically and physically unique from any other region in the US, so these attributes need to be considered.

Many of the insular and pelagic stocks in the Western Pacific Region are transboundary and/or straddling. National Standards (NS) 3 of the MSA states; “To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.” The criteria for how stocks in the region are assessed may need to be commensurate to how they are managed, either individually or collectively, per NS3 guidelines – as opposed to separately assessed or defined stocks under a single common management unit.

The SSC recommended the Council direct staff to work with the SSC subgroup composed of Erik Franklin, Steve Martell, Frank Camacho for the insular fisheries and Dave Itano, Graham Pilling, Shelton Harley and Kurt Schaefer for the pelagic fisheries.

F. Public Comment

There were no public comments.

Island Fisheries

A. Main Hawaiian Island (MHI) *Aprion virescens* (Uku) Fishery

1. Report on the Western Pacific Stock Assessment Review of the MHI Uku Fishery

The Western Pacific Stock Assessment Review (WPSAR) of the 2020 MHI Uku (*Aprion virescens*) benchmark stock assessment was convened in Honolulu, HI between February 24-28, 2020. The purpose of the WPSAR was to evaluate the utility and applicability of the data, catch-per-unit-effort (CPUE) standardization, assessment models, model parameters, uncertainty, and assumptions presented in the assessment report for making recommendations on the status determination criteria of Uku. Erik Franklin, WPSAR Chair, provided a report on the outcome of the review, including findings with respect to the terms of reference, recommendations from the panel, and the consensus of the panel in accepting the Uku benchmark assessment, affirming that it can be used to address management goals.

SSC members highlighted the importance of engaging the fishing community for this and future assessments in the region. The WPSAR Chair commended the community input used in the uku assessment and stressed that continued improvement of noncommercial fishing data streams was critical to improve future assessments.

The SSC thanked Franklin for the informative presentation.

2. Peer-Reviewed Benchmark Assessment of Uku Fishery in the MHI

Marc Nadon, PIFSC Stock Assessment Program presented the 2020 Benchmark Assessment for the Main Hawaiian Island Uku Fishery. The Uku snapper (*Aprion virescens*, family Lutjanidae) inhabits the coastal waters of the MHI at depths ranging from 20 to 200 meters. The MHI Uku population was first assessed with other snappers using a catch-only method applied at the family level[1]. That assessment determined that snappers were not overfished. In 2017, Uku was assessed at the species-level using a length-based mortality model and a relatively simple numerical population model to obtain fishing mortality rates and spawning potential ratio. Using this approach, it was determined that the stock was not experiencing overfishing[2]. The current assessment builds off these previous efforts and uses catch, CPUE, diver surveys, and size composition time-series in the Stock Synthesis modeling framework[3]. Stock Synthesis 3.30 is an integrated statistical catch-at-age model that fits a population model to relative abundance and size composition data in a likelihood-based statistical framework to generate maximum likelihood estimates of population parameters, derived outputs, and their associated variability. These outputs are then used to determine stock status and to develop stock projections.

All available fishery data from recreational and commercial fisheries in the MHI were

[1] Sabater MG, Kleiber P. 2013. Improving specification of acceptable biological catches of data-poor reef fish stocks using a biomass-augmented catch-MSY approach. Western Pacific Regional Fishery Management Council, Honolulu, HI

[2] Nadon MO. 2017. Stock assessment of the coral reef fishes of Hawaii, 2016. Page 212. NOAA Tech. Memo. NOAA-TM-NMFS-PIFSC-60

[3] Methot RD, Wetzel CR. 2013. Stock Synthesis: A biological and statistical framework for fish stock assessment and fishery management. Fisheries Research 142:86–99

used for this stock assessment. Total recreational catch for the 2003–2018 period was obtained from the Hawaii Marine Recreational Fishing Survey and reconstructed for the 1948–2003 period by relating historical catch to human population trends in the MHI. Total commercial catch was obtained from the Division of Aquatic Resources fisher reporting system (FRS). Commercial catches for uku were dominated by the deep-sea handline fishing gear although trolling and inshore-handline catches have increased in recent decades. CPUE data were obtained from all three main fishing gears in the FRS while size composition data were obtained for the deep-sea handline gear only, due to limited data availability. Deep-sea handline data were the only CPUE time-series available for 1948–2002, as trolling and inshore handline data were sparse for this period. Additionally, information from NOAA diver surveys was incorporated as a fishery-independent abundance index between 2005 and 2016.

Uku catches increased from 1948 to the late 1980s, peaking in 1988, and have been declining slowly since then. Model estimates of population biomass show a gradual decline from 1948 to the late 1980s, followed by a brief period of stability and a substantial increase in biomass starting in the early 2000s. Fishing mortality on the stock (average F on ages 5-30) is currently 0.08 with an F/FMSY value of 0.57. Fishing mortality has only been above FMSY (0.14) twice, in 1988 and 1989 when F reached 0.19 and 0.16, respectively. The 2018 spawning stock biomass (SSB) of 819 mt is 272% above the SSBMSST (301 mt). Therefore, relative to the reference points defined by the Fisheries Ecosystem Plan, overfishing is not occurring and the MHI Uku stock is not overfished.

Stock projections for Uku were conducted using the age-structured projection model software AGEPRO[4]. Stochastic projections were conducted using results from the base-case model to evaluate the probable impacts of constant catch quotas on future spawning stock biomass and yield for Uku in the MHI. Results show the projected female spawning stock biomasses and fishing mortality rates under each of the constant-catch scenarios. For example, a constant catch limit of 135 mt each year from 2020 to 2026 would result in a 50% chance of overfishing occurring in 2026.

SSC members inquired about features of the stock synthesis model with respect to CPUE trends and spatio-temporal convergence issues, as well as levels of Uku stock connectivity within the MHI.

SSC members noted that recent increases in CPUE may indicate targeting of Uku. Furthermore, the relatively high growth rate and moderate longevity suggest that it may be more informative to monitor shifts in age-structure for this species rather than size-structure.

The SSC accepted the 2020 Benchmark Assessment for the MHI Uku Fishery as Best Scientific Information Available. The SSC recommended that the Council direct staff to convene the P* and SEEM working groups to quantify uncertainties to set the Acceptable Biological Catch and specify the Annual Catch Limits for the MHI Uku fishery.

[4] Brodziak J, Rago P, Conser R. 1998. A general approach for making short-term stochastic projections from an age-structured fisheries assessment model. Pages 933–954 in F. Funk, T. Quinn II, J. Heifetz, J. Ianelli, J. Powers, J. Schweigert, P. Sullivan, and C. Zhang, editors. Fishery Stock Assessment Models. Alaska Sea Grant, University of Alaska Fairbanks

The SSC thanked Nadon for the informative presentation.

B. American Samoa Bottomfish Fishery

1. Status of the Interim Measure

Brett Schumacher, PIRO SFD, presented a status update of the Interim Measure. At the 135th SSC meeting, Schumacher presented the nature of the request based on the recommendation from the 180th Council meeting. Given that the severe reduction in the catch limit due to a conservative projection from the 2019 benchmark assessment, the Council requested NMFS to apply the Interim Measure provision in MSA that would allow for a short-term to reduction in overfishing and allow the biomass to rebuild and minimize the impacts to the fishing community from a severe reduction in catch. PIFSC calculated that at 13,000 pounds the stock still has a 1 percent increase in biomass. However, implementation of the interim measure is challenging since only 15 percent of the bottomfish habitat is in federal waters. While the Interim Measure is not yet in place, progress is being made, and Schumacher set a target date of July 2020 for publication of the interim final rule.

The SSC thanked Schumacher for the informative presentation.

2. Status of the Annual Catch Limit (ACL) Specification

Council staff presented the status of the ACL specification for fishing year 2021 to 2024. The American Samoa P* Working Group completed the P* analysis. The working group quantified the scientific uncertainty at 20 percent reduction. This puts the ABC at 30 percent risk of overfishing. The catch associated with this risk level is only 2,000 pounds. The overfishing limit (OFL) for the terminal year of the specification is at 7,000 pounds. The average catch (2016-2018) is at 18,352 pounds. Regardless of what catch limit is set, the action would still not prevent overfishing from occurring since there is no near-real-time monitoring and in-season closure of the fishery. The fishery would more than likely exceed the ACL and trigger a post-season adjustment setting the ACL for the following year as zero. The ACL specification action should be done in conjunction with the development of the Rebuilding Plan.

An SSC member knowledgeable in the history of the fishery expressed his opinion that the deepwater snapper complexes on the offshore seamounts have not been heavily fished in over 20 years. and expressed concerns that closing Federal waters would not address the overfishing issue for nearshore bottomfish species in territorial waters.

3. Development of the American Samoa Rebuilding Plan

Council staff presented available information for developing a rebuilding plan for the American Samoa bottomfish fishery. The Council, in consultation with its SSC, is required to develop a rebuilding plan for an overfished stock and implement it within two years. At the same time, the Council must immediately end overfishing for fisheries subject to overfishing. SSC must set a fishing mortality level that would allow the stock to be rebuilt back to BMSY within 10 years. The current projection from PIFSC showed that with no fishing the minimum time to rebuild is 10 years. However, this does not allow the fishery to operate. The maximum level of catch that would allow rebuilding within 10 years is 1,500 lb. At this level of catch, it would also prevent overfishing from occurring. However, the fishery lands an average of 18,352 pounds. Any catch level (13,000 pounds from the interim measure) will result in overfishing occurring and the rebuilding timeline is beyond 10 years. A fishery closure of federal waters does not

guarantee prevention and ending of overfishing since effort continues in territorial waters. Council staff presented 6 management scenarios that were explored under NS1 guidelines to allow fishing to happen without closing the fishery, while at the same time preventing overfishing.

SSC members noted that Scenario 3 (Support local fishery management actions) and Scenario 4 (Utilize flexibility provision in NS1 guidelines) were the only viable options to address the bottomfish fishery management issues in American Samoa.

The SSC recommended that Council direct staff to continue working with the SSC subgroup (Don Kobayashi, Craig Severance, Domingo Ochavillo, and David Itano) to further explore alternative (non-MSY and non-catch based) approaches to address the management issues (Scenario 4) in accordance with NS1 600.310(h)(2).

The SSC recommended that Council direct staff to work with the Department of Marine and Wildlife Resources in the development of a Fishery Management Plan and concurrently explore the applicability of the flexibility provision of NS1 600.310(h)(2) which includes but is not limited to effort and biological limits, and area management.

SSC members highlighted the cultural significance of the bottomfish fishery. American Samoa is an MSA-designated Fishing Community that is widely recognized as having a unique ability to adapt to technological change while maintaining strong cultural resilience, roots, and identity through the practice of Samoan custom and the Samoan way known as *fa'a samoa*. *Fa'a samoa* remains heavily dependent on continuous access to both the shallow water and deep water complexes of bottom fish, not only for subsistence, sustenance and food security but also, and as importantly for the practice of important cultural ceremonies at the village, district and island wide levels. Certain species of deep water snappers and mid to shallow water emperors were, and very likely continue to be formally cut and presented to lesser and higher chiefs at a variety of cultural ceremonies that are very important to the perpetuation of Samoan cultural continuity, stability, and social solidarity. Therefore, the bottomfish fishery should continue to operate to perpetuate the culture.

The SSC recommended the rebuilding plan should include cultural harvest in the off-shore banks for deep-water snappers.

The SSC noted that the territory bottomfish should be bumped down from tier 2 to tier 5. The main problem is the data and closing the fishery will not generate new information that can support the development of a new assessment. **The SSC recommended the Council direct staff to explore the use of tier 5 control rule for setting the ABC and overlay this information with the elements of the rebuilding plan. Further, the SSC recommends the Council direct staff to explore the creation of sectors in the American Samoa bottomfish fishery that would separate the species complex between the nearshore bottomfish fishery from the off-shore deepwater snapper fishery.**

SSC members reiterated documented concerns with the 2019 Benchmark Territorial Bottomfish Stock Assessment including the data used in the assessment (not subjected to a data workshop), the definition of the BMUS complex, and bottomfish trip definition. Given COVID-

19 impacts to creel survey implementation and recent NOAA research cruise cancellations, SSC members were concerned that there may be limited fishery data and no new scientific information available in time for the next benchmark assessment.

The SSC recommended that Council request PIFSC to prioritize the development of a fishery independent survey in American Samoa.

C. Public Comment

There were no public comments.

Protected Species

A. Assessing Population Level Impacts of Marine Turtle Interactions in the American Samoa Longline Fishery

T. Todd Jones, PIFSC Fisheries Research and Monitoring Division, presented the population level impacts of turtle interactions in the American Samoa longline fishery (ASLL). The modelling framework was adapted from the Hawaii shallow-set longline fishery (SSLL) take model, which the SSC endorsed previously as the best scientific information available for evaluating the impacts of the fishery on these loggerhead and leatherback turtle populations.

The ASLL has no significant effect on the long-term population viability of the western Pacific leatherback stock — which is not surprising since very few leatherbacks are incidentally caught in this fishery.

The SSC thanked Jones for the informative presentation.

B. Summary of Available Information on Sea Turtle Interactions in Foreign Pelagic Fisheries

Council staff summarized available information on marine turtle interactions in Foreign fisheries. There are 3 primary studies providing a range of estimates from a few thousand marine turtle interactions per year to more than 30,000 interactions in the earlier studies focusing on the year 2000.

The US contribution to the total number of Pelagic Fisheries interactions is less than 1-2% each year. Coastal and artisanal fisheries in Mexico and Asia represent the most serious threat to endangered marine turtle populations.

C. ESA Consultations

1. Status of Ongoing Consultations

Chelsey Young, PIRO Protected Resources Division, presented on the current status of ESA consultations for the pelagic longline fisheries and the US purse seine, and the insular bottomfish fisheries in the MHI and territories. The bottomfish and purse seine consultations are expected to be completed by August 2020, ASLL consultation by September 2020, and the Hawaii deep-set longline fishery (DSLL) consultation by October 2020.

The SSC thanked Young for the informative update.

2. Considerations for Developing Reasonable and Prudent Measures and/or Reasonable and Prudent Alternatives

a. Overview

Council staff provided an overview of available information on interactions of leatherback turtles, oceanic whitetip sharks, and giant manta rays in the DSLL and ASLL fisheries. Estimated total interactions for oceanic whitetip sharks (~1000-2000 per year) are low, and rare for giant manta rays (≤30 in most years) and leatherback turtles (≤15 in most years). Giant manta ray bycatch is more frequent in the purse seine fishery.

The DSLL observer coverage has been ca 20% since 2001 while the ASLL coverage has been ca 20% since 2012 — the Hawaiian SSLL fishery has 100% observer coverage. The SSC discussed that it would not be feasible to implement many of the RPM's that were developed in the SSLL due to the partial observer coverage. The US state and Federal regulations prohibit shark finning and retention. Furthermore, tagging data show high survival rates when much of the trailing gear is removed.

b. Report of the SSC Working Group

RPMs are applicable for a "no jeopardy" finding by NMFS. On the other hand, if NMFS determines that a federal action is likely to jeopardize the continued existence of the at-risk species, then a Reasonable and Prudent Alternative (RPA) will be issued as part of the BiOp.

The Working Group (WG) reviewed the RPMs provided in the SSLL fishery BiOp to determine what might be applicable in the DSLL and ASLL. However, due to the 20% target observer coverage rate in the DSLL and ASLL fisheries, it is not possible to implement measures such as trip limits, hard caps, or other regulations that require independent verification of the catch.

The WG also suggested that a Monte Carlo simulation modeling assessment conducted in 2015 should be updated to reflect recent information derived from published meta-analyses on the interaction rates for protected species.

The WG reached out to industry to inquire what they perceived to be viable RPMs for the DSLL. The WG received feedback on the importance of training requirements that are currently only for vessel owners and operators, the need for crew training, and the importance of removing as much trailing gear as possible. There is no crew training in place, so that would be a new initiative.

The industry also expressed a strong interest in industry-led initiatives for developing appropriate mitigation measures, avoidance procedures and cooperative mechanisms to minimize interactions with protected species. The SSC also discussed the importance of working with industry to develop appropriate cost-effective tools to mitigate these rare events and be proactive.

The SSC adopts the Working Group report and recommends that the Council take into account the following considerations for developing RPMs/RPAs in the DSLL and ASLL fisheries:

- **Relative impact of leatherback, giant manta ray, and oceanic whitetip shark interactions in the DSLL and ASLL are low compared to other fisheries, and thus any measures implemented in DSLL and ASLL are likely to have only a limited effect at the population level.**
- **Hard caps and trip limits are not considered feasible measures in the DSLL and ASLL at this time without 100% observer coverage or an effective Electronic Monitoring program in place given the current observer coverage of ca 20%.**
- **Development of time-area closures or move-on rules should consider tradeoffs of target catch and protected species interactions as well as potential impacts of effort displacement. Several projects are underway (e.g., the PIFSC EBFM project on**

longline bycatch covariates) to evaluate potential impacts of effort removal/redistribution from closed areas on fishery performance.

- **Mitigation measures for protected species should create incentives for industry to report and reduce impacts, such as allowing industry to develop a bycatch management plan to be implemented across the fleet and approved by the Council each year. Exploring the feasibility of an industry-led program coupled with establishment of management incentives through the Council process should be considered as a high priority.**
- **Given the low levels of verification for foreign fleets operating on the high seas in the North Pacific, data from the Hawaiian longline fleet gives almost the only reliable information on the possible overall number of interactions with protected species by longline fishing. Therefore, there is significant conservation value in the information collected by the fleet, and from the fleet through observer coverage and electronic monitoring.**

D. ESA and MMPA Updates

Young provided ESA and Marine Mammal Protection Act updates for corals, turtles, insular false killer whales. For corals, a status update was provided for *Pocillopora meandrina* and ESA critical habitat for 7 other coral reef species. Status updates on leatherback turtle subpopulations and the 5-year review of the North Pacific loggerhead were also presented. Overviews of status of recovery plan development for insular false killer whale, giant manta ray, and oceanic whitetip shark were also presented. In 2019, 14 confirmed false killer whale interactions were reported and 1 'blackfish' interaction. There were no reported interactions to date for 2020. However, due to COVID-19 observer deployment issues, observer coverage in DSLL has been below target for the second quarter.

The SSC thanked Young staff for the informative update.

E. Public Comment

Eric Kingma (Hawaiian Longline Association) provided comments on the RPMs for the DSLL fishery noting that Industry looks forward to collaborating with the SSC on innovative mitigation measures that are cost-effective and transferable to foreign fleets as well.

Molly Lutcavage (Kauai) was supportive of industry led initiatives for mitigation measures and noted how successful this approach was in the Atlantic swordfish fishery. Successful methods for tagging leatherback turtles have already been developed from her research in the Atlantic. She also suggested that exchanging information with Atlantic researchers might be worthwhile.

Brettny Hardy (Earthjustice) commented on the RPMs for oceanic whitetip sharks, and favors more regulations and limits for this species, as well as, increased observer coverage that would be necessary to detect these rare events.

Pelagic Fisheries

A. Report on Impacts to Pelagic Fisheries from COVID-19

Justin Hospital, PIFSC Ecosystem Sciences Division, provided an overview of pelagic fisheries impacts from the COVID-19 pandemic. The United Fish Agency has provided daily auction reports to PIFSC in an effort to monitor 2020 market conditions pre- and post-COVID. Hawaii markets experienced a nearly 70% decline in average weekly revenues the last two weeks of March, and industry implemented daily vessel offloading limits. Since April, revenue has gradually increased, but still represents a 47.8% reduction from pre-COVID 2020 average weekly revenues. Post-COVID bigeye prices are down 35% and revenues for bigeye are down 40%, while all longline fish combined prices are down by 41%, compared to pre-COVID 2020 average prices. Swordfish prices were noted to be volatile while 'white fish' prices collapsed and have not shown signs of recovery. Another project was examining demand of bigeye through time and price flexibility. These endeavors will require continued cooperation with industry.

SSC members noted that small boat fishing effort apparently increased during this period resulting in increased consumption by those fishers and their communities, and also uncertainty of potential markets for those landings. SSC members inquired about the future of fisheries in Hawaii, with respect to depressed prices(?)and regarding possible changes in operational costs for longline fishing operations. SSC members inquired on the very low market prices for the white-fish complex (non-tuna species) and it was suggested that it is resulting from low demand by restaurants. SSC members noted relatively higher walu prices, and proposed it may be related to continued exports. An SSC member offered the New Zealand perspective on fisheries during this COVID19 pandemic, and also inquired about potential US government funding opportunities for further study.

The SSC thanked Hospital for the informative presentation.

B. Council Pelagic Research Initiatives

Council staff provided an overview of research projects that the Council is supporting to uphold its Pelagic Fisheries Research Plan, which is being updated. These include research on efficacy of closed areas, shark depredation in the Marianas archipelago, ancillary pelagic status indicators, oceanic whitetip shark projections, and other projects. SSC members and Council staff also had a recent paper accepted for publication in PlosONE on blue water marine protected areas (MPAs), showing that closures in the Pacific Remote Island Areas do not have discernible impacts on pelagic fish indicators. Council staff also noted the significance of small boat fisheries in past Council actions and the need to analyze data from small boat fisheries to better manage them and for their inclusion into the Pelagic FEP.

SSC members inquired about compiling the historical spatial distribution of catch and effort in the Hawaiian nearshore troll fishery. SSC members asked for clarification regarding specific deliverables of the initiative and provided important guidance on how to effectively engage with the small boat community, and the major challenges to establish credibility and trust.

C. Status Determination of Oceanic Whitetip Shark and WCNPO Striped Marlin

Council staff provided an overview of the stock status determination letters for oceanic whitetip sharks and Western Central North Pacific striped marlin. These letters are from the Regional Administrator and Agency Assistant Administrator and will require actions within one year under MSA Section 304(i) to address both domestic and international overfishing. Striped marlin and oceanic whitetips will require action based on best available science information (BSIA) and resultant status determination criteria under the Pelagic FEP.

D. Satellite Tagging of Striped Marlin in the Hawaii Longline Fishery

Molly Lutcavage and Tim Lam, of the Large Pelagic Research Center, presented on satellite tagging initiatives on striped marlin using 31 pop-off satellite archival tags (PSATs) including 3 X-tags and 28 MiniPATs. Two tags had deployments of over 365 days. This information is very important to inform managers on stock structure and on residency of striped marlin in proximity to Hawaii fisheries. The stock is currently delineated at 150W and there is evidence from this tagging study that regional fishery management organization (RFMO) stock boundaries do not encapsulate the range of striped marlin caught by Hawaii longline fisheries. Several tags demonstrate movement from east of 150W into waters west of the delineation. Other tags showed long-term movements traversing both east and west of the 150W boundary. One tag caught in Hawaii fisheries showed movement to the Southwest Pacific off Australia. PSAT results did not show movement patterns towards the west past 170W. Conventional tagging of striped marlin off California and the Northern Mexico coast showed displacement towards Hawaii. The presenters noted that tagging of yellowfin ahi also demonstrates that the jurisdictional boundary may not be sufficient.

SSC members inquired about whether this research group will be continuing tagging experiments on yellowfin as well as striped marlin around Hawaii using PSATs and complimented their efforts. The response was that several proposals have not been funded. The SSC asked how the results of the striped marlin tagging around Hawaii complement the results of previous tagging studies in other areas throughout the Pacific. Council staff noted observed connectivity between southern California and Hawaii based on conventional tagging of striped marlin that show apparent movement from California towards Hawaii during periods of observed high reproductive activity of the species around the Hawaiian Islands.

The SSC thanked Lutcavage and Lam for the informative presentation.

E. SWFSC Pelagic Fisheries Research of Interest

Barbara Muhling, Southwest Fisheries Science Center (SWFSC), presented on relevant pelagic activities conducted by the SWFSC (La Jolla, CA). Muhling discussed in depth an albacore tuna prediction mechanism utilizing oceanographic variability. The presentation went into detail on juvenile albacore diet, archival tagging results, climate impacts on the US albacore fishery, and socioeconomic changes to the US albacore fishery. North Pacific juvenile albacore diets are dominated by squids in cooler waters; however, Pacific Decadal Oscillation index in a negative phase elicited more anchovy in the diets. Archival tagging of albacore in the North Pacific indicates movement along temperature isotherms. Tagged fish move in and out of the California Current zone through the year. Distribution of the albacore fishery is related to oceanographic drivers, which have economic implications as fisheries need to move further.

SSC members inquired on the results of the albacore archival tagging studies in the Northeast Pacific Ocean (NEPO), particularly patterns of movement discerned by lengths at release. The SSC also noted the observed oceanographic influences on albacore movements in the NEPO, which have also been reported in investigations of South Pacific albacore. SSC members commented that most of the albacore catch around Hawaii comes from deep longline sets, and inquired about the size at which albacore tend to move westward from NEPO and whether they return.

The SSC thanked Muhling for the informative presentation.

F. International Fisheries

1. WCPFC

a. Pre-Assessment Workshop for Bigeye and Yellowfin Tunas

Graham Pilling, SPC, presented on outcomes of the SPC Pre-Assessment Workshop. This workshop was held virtually from April 21-23, 2020. The WCPFC is expecting new stock assessments for bigeye tuna and yellowfin tuna. There is new ongoing life history (growth) information on yellowfin tuna and ongoing discussion of age validation of bigeye tuna. Tagging data seeding for regional movement was a notable challenge. Catch per unit effort (CPUE) analyses are using geostatistical approaches. Model uncertainty grids will be discussed at the Science Committee meeting based on model configurations including steepness, mixing period, overdispersion, size composition, regional stock structure, and growth inputs..
The SSC inquired about the continued use of the number of hooks between floats for estimation of fishing depth of longlines, for use in standardization of CPUE. Another SSC member inquired about the geostatistical model being used for tropical tuna stock assessments for the WCPFC.

The SSC thanked Pilling for the informative presentation.

b. Council Tropical Tunas Concept Paper

Council staff presented on a concept note currently in development to address a future allocation scheme for WCPO tropical tunas as the current conservation and management measure (CMM-2018-01) expires in 2020. The concept framework includes a TAC for all fisheries which would be partitioned based on biological, conservation, or fishery-based criteria pursuant to Convention Articles. Allocations would be sequential by fishery sector and then by flag state, or vice versa. Scientific information needed would be stochastic projections to surmise uncertainty about projected biomass estimates and deterministic projections for population models based on scalars of purse seine effort and longline catch. Factors such as compliance history could also be explored to adjust allocations.

SSC members asked for clarification about the proposed catch allocation scheme based on non-compliance issues, and whether the reallocations should have a spatial component. The SSC also inquired about negotiations with small island developing states (SIDs) regarding allocation catch schemes. SSC members noted that time involved in doing model projections can be extensive and requests will need to be evaluated following the WCPFC SC meeting, noting that fractional factorial analyses could be used to significantly reduce the time involved in performing various model projections.

c. Permanent Advisory Committee

Council staff presented on the Permanent Advisory Committee of the US for the WCPFC. These are the official positions of the United States Commissioners. Issues include tropical tuna allocations, North Pacific striped marlin rebuilding plan, South Pacific albacore harvest strategies, Bluefin tuna, transshipments, and compliance monitoring

SSC members requested clarification about the apparent interim rebuilding target for Pacific bluefin tuna. Council staff confirmed it was an initial rebuilding target that has 100% probability of being reached by 2024, according to latest analyses. The SSC inquired about PAC member comments on the diminished role of the regional observer program in the WCPFC Convention Area. Council staff clarified it was pertaining to accountability of some fisheries having adequate observer coverage. Another SSC member inquired about the mention of diversification of the south Pacific albacore troll fishery and current interest by some longline vessel owners from Samoa in modifying their vessels.

2. International Workshop on Area-Based Management of Blue Water Fisheries

Ray Hilborn presented on the International Workshop on Area-Based Management of Blue Water Fisheries. Vera Agostini, Deputy Director of the Fisheries and Aquaculture Policy and Resources Division at the United Nations Food and Agriculture Organization will be co-chairing the workshop with Hilborn. The workshop will convene June 15-17, 2020 virtually through Zoom. This workshop will provide a compendium of best available science used for recommendations on the implementation of area-based management to achieve specific objectives – conservation, economic, or social. The workshop will wrap into relevant ongoing international fisheries governance initiatives. A series or preparatory papers on area-based management tools (ABMT) in blue water fisheries are in circulation for participants to contribute. These themes are an introductory overview of AMBT in pelagic fisheries, objectives and performance metrics for ABMT, design of ABMT implementation, empirical evidence of ABMT efficacy, research needs, analytical tools, and social impacts. The preparatory papers will eventually coalesce to devise a "Roadmap to Effective Area-Based Management in Blue Water Fisheries" document, which will serve as 'best practices' guidelines for area-based management of highly migratory fisheries across blue water ecosystems.

The SSC thanked Hilborn for the informative presentation and looks forward to the reports.

G. Public Comment

Theresa Labriola (Wild Oceans) commented about their concerns over the current WCPFC conservation and management measures for striped marlin in the WCPO, and suggested some measures to reduce fishing mortality on striped marlin.

WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

Considerations for Developing Reasonable and Prudent Measures and/or Reasonable and Prudent Alternatives

136th SSC Working Group Report

SSC Working Group Members: James Lynch (chair); Steve Martell; Shelton Harley; Milani Chaloupka; Justin Hospital; Donald Kobayashi; Ray Hilborn

Background

The Council at its 181st Meeting in March 2020 reiterated its recommendation to NMFS that they work with the Council to develop any necessary reasonable and prudent measures (RPMs) or reasonable and prudent alternatives (RPAs) under the ongoing Endangered Species Act (ESA) Section 7 Consultations for the Hawaii deep-set longline fishery (DSLL) and the American Samoa longline fishery (ASLL) to ensure that such measures are appropriate and practicable to ensure the sustainability of the fisheries. NMFS Pacific Island Regional Office (PIRO) Protected Resources Division (PRD) has indicated to Council staff that they are not yet in a position to discuss, but encouraged the Council to work with PIRO Sustainable Fisheries Division (SFD) to:

- Consider any actions that the fishery could take to:
  - Avoid adversely impacting listed species; and
  - If impacts cannot be avoided, work to minimize impacts of incidental take
- Start with the Hawaii shallow-set longline (SSLL) RPM applicability & offer new measures
- Focus on leatherback turtles (concern with species status), oceanic whitetip shark (taken in large numbers), and giant manta rays (demographic units poorly understood)

Council staff has initiated coordination with SFD to consider potential measures for the DSLL and ASLL fisheries. The SSC and the Council at their respective June meetings will discuss and provide direction on considerations for RPMs for these fisheries, with a focus on the following:

- Considerations for mitigation measures based on interaction characteristics (e.g., known spatiotemporal patterns; frequency of interactions; mortality rates; potential for conservation benefit)
- Identify high and low priority measures for each species, with justifications
- Recommended analyses to inform considerations for mitigation measures (taking timing and available resources into account)

Working Group Discussion Summary

The working group received a presentation from staff with a summary of available information on interactions with leatherback turtle, giant manta ray, and oceanic whitetip shark in the DSLL and ASLL fishery. The working group noted the following:

- Leatherback turtle and giant manta ray interactions are infrequent in both DSLL and ASLL fisheries. Interaction data over the past 15 years suggest higher interactions for both species in April and south of 10N, however the fishery has had minimal effort at those latitudes since 2015 and thus no observed interactions of these species south of 10N in the last 5 years. Majority of the interactions result in the animal being released alive.
- WCPO oceanic whitetip shark is overfished and experiencing overfishing based on the 2019 stock assessment. Population projections and simulation modeling to evaluate potential management measures at the international level are pending. Ongoing tagging studies suggest releasing sharks in good condition and removing trailing gear are likely to result in higher post-hooking survival.
- DSLL and ASLL fisheries are already using circle hooks and fish bait, which are gear measures implemented in SSLL to reduce interactions with sea turtles.
- Giant manta ray interactions in the DSLL and ASLL are an order of magnitude less than those in the purse seine fishery, thus no measures in the longline fisheries are likely to have an impact on giant manta ray populations compared to measures that could be implemented in the purse seine fishery.
- Space-time closures could be effective for species that have concentration of interactions in small areas.
- Regarding potential gear measures for oceanic whitetip sharks, available analyses[1] suggest that removal of wire leaders, while unlikely to influence initial interaction, lead to increased bite-offs resulting in reductions in fishing mortality for oceanic whitetip sharks, but the effect of leader material is likely to have a smaller effect on catch rates on circle hooks than on J-shaped hooks (both DSLL and ASLL fisheries use circle hooks).

The working group considered the available information regarding these interactions and discussed applicability of RPMs included in the SSLL BiOp as well as other measures that may warrant consideration for the DSLL and ASLL fisheries. The working group's key findings are as follows:

- **Relative impact of leatherback turtle, giant manta ray, and oceanic whitetip shark interactions in the DSLL and ASLL are small compared to other fisheries, and thus any measures implemented in DSLL and ASLL are likely to have limited effect at the population level.**

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[1] *See:*

Gilman E, Chaloupka M, Swimmer Y, Piovano S (2016) A cross-taxa assessment of pelagic longline by-catch mitigation measures: conflicts and mutual benefits to elasmobranchs. Fish and Fisheries 17: 748–784

Gilman E, Chaloupka M, Dagorn L, Hall M, Hobday A, Musyl M, Pitcher T, Poisson F, Restrepo V, Suuronen P (2019) Robbing Peter to pay Paul: Replacing unintended cross-taxa conflicts with intentional tradeoffs by moving from piecemeal to integrated fisheries bycatch management. Reviews in Fish Biology and Fisheries 29: 93-123

Harley S. Caneco B, Donovan C, Tremblay-Boyer L, Brouwer S (2015) Monte Carlo simulation modelling of possible measures to reduce impacts of longlining on oceanic whitetip and silky sharks. Western and Central Pacific Fisheries Commission Scientific Committee Eleventh Regular Session. WCPFC-SC11-2015/EB-WP-02. 162pp

Reinhardt J, Weaver J, Latham P, Dell'Apa A, Serafy J, Browder J, Christman M, Foster D, Blankinship D (2017) Catch rate and at-vessel mortality of circle hooks versus J-hooks in pelagic longline fisheries: a global meta-analysis. Fish and Fisheries 19: 413–430

- **Hard caps and trip limits are not considered feasible measures in the DSLL and ASLL at this time without 100% observer coverage or an effective Electronic Monitoring program in place given the current observer coverage of ca 20%.**
- **Development of time-area closures or move-on rules should consider tradeoffs of target catch and protected species interactions as well as potential impacts of effort displacement. Several projects are underway (e.g., the PIFSC EBFM project on longline bycatch covariates) to evaluate potential impacts of effort removal/redistribution from closed areas on fishery performance.**
- **Mitigation measures for protected species should create incentives for industry to report and reduce impacts, such as allowing industry to develop a bycatch management plan to be implemented across the fleet and approved by the Council each year. Exploring the feasibility of an industry-led program coupled with establishment of management incentives through the Council process should be considered as a high priority.**
- **Given the low levels of verification for foreign fleets operating on the high seas in the North Pacific, data from the Hawaiian longline fleet gives almost the only reliable information on the possible overall number of interactions with protected species by longline fishing. Therefore, there is significant conservation value in the information collected by the fleet, and from the fleet through observer coverage and electronic monitoring.**

Additional discussions on considerations for potential measures are summarized below:

- Hard caps and trip limits
  - There is currently no mechanism to monitor hard caps and trip limits in real time in the DSLL and ASLL as these fisheries do not have 100% observer coverage, and the fisheries do not have incentives to report interactions on unobserved trips. Electronic monitoring supplant gaps in unobserved coverages so that measures such as hard caps and trip limits could be considered in the future, however data storage and cost allocations are still fundamental issues impeding expedient implementation.
  - If any consideration for hard caps is made, the annual take number should be based on the relative risk of the fishery having a measurable impact on the stock. The science would do the risk assessment and the Council would do the risk management by choosing how much risk is acceptable/tolerable. PIFSC has put together a risk assessment table already.
- Spatiotemporal measures (e.g., time-area closures, move-on rules)
  - Move-on rules based upon the PIFSC EBFM project could be a viable option in the future as tools are being developed.
  - Literature shows that time-area closures are more effective than permanent closures.
  - Any spatiotemporal measures should consider tradeoffs of target catch and bycatch, as well as current and future distributions of species.
  - Time-area closures are dependent on immediate information, and need reporting mechanisms in place, such as 100% observer coverage or a fleet data-sharing program (see next item).
- Allow industry to develop a bycatch management plan to be implemented across the fleet. This plan would have to be approved by the Council each year to ensure it is

achieving the Council's objectives for conservation. Industry participants could also rapidly share data on bycatch rates so the fleet is informed.

- Consideration of unintended consequences of management measures is needed, such as restrictions on SSLL shifting effort into DSLL, and seabird mitigation measures (line weighting and associated wire leader usage by DSLL) affecting the ability to safely and efficiently release sharks. An evaluation of ecosystem-wide impacts of bycatch mitigation measures on multiple protected species might be informative in identifying appropriate mitigation measures that are beneficial to all by-caught species.