Independent Peer Review
of the
2019 Benchmark Stock Assessments for the Bottomfish Management Unit Species of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam

Conducted by
Joseph E. Powers

for the
National Oceanic and Atmospheric Administration (NOAA)
National Marine Fisheries Service (NMFS)
Center for Independent Experts (CIE) Program
External Independent Peer Review

Executive Summary

Three benchmark stock assessments on Bottomfish Management Unit Species of Guam, American Samoa and the Commonwealth of the Northern Mariana Islands (CNMI) were reviewed. The assessments were Bayesian applications of a species-aggregated Pella-Tomlinson production model using a catch history and an index of abundance for each management unit. The assessments were based on prior distributions of four key parameters (productivity rate r, carrying capacity K, skew parameter m, and initial relative biomass P_0). Additionally, priors were specified for process error and estimation error of catch and indices. Application of the models provided the Best Available Science from which status determinations for the three units can be made for American Samoa and Guam. While the model was appropriately explored for CNMI and was the Best Available Science, the results and the lack of contrasts suggest that lower tier data-poor methods might be more appropriate for this unit.

Uncertainties were extensively evaluated through the Bayesian approach as well as through sensitivity analyses. The basic limitations in the precision and accuracy of the catches, the uncertainty in targeting when standardizing indices and the aggregation of data sets across species limited the precision of the status estimates. Additionally, there is concern that aggregating over species of the catch and index data (that forced the application of the species-aggregated production model) may mask depletion status of an individual species. This is an issue not with the assessment itself, but rather with the interpretation of the assessment.

Research recommendations were made to improve the data and to suggest further evaluation of the FMP control rule to account for existing uncertainties.

Background

The National Marine Fisheries Service (NMFS) is mandated by the Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act, and Marine Mammal Protection Act to conserve, protect, and manage our nation's marine living resources based upon the best scientific information available (BSIA). NMFS science products, including scientific advice, are often controversial and may require timely scientific peer reviews that are strictly independent of all outside influences. Therefore, a formal external process for independent expert reviews of the agency's scientific products and programs has been developed.

This report represents just such a review of three benchmark stock assessments for the Bottomfish Management Unit Species (BMUS) in the U.S. territories of American Samoa, the Commonwealth of the Northern Mariana Islands (CNMI), and Guam. These 2019 benchmark assessments incorporate improvements to data standardization and model assumptions, account for variation in creel survey estimates of BMUS catch. Production models were used to estimate biomass and stock status through time, and stock status was evaluated against MSY-based reference points set in the Fishery Ecosystem Plan for each territory. Projections were provided to inform management setting of acceptable biological catch and annual catch limits.

This document is a Western Pacific Stock Assessment Review (WPSAR) for the territorial bottomfish fisheries in Guam, Commonwealth of the Northern Mariana Islands (CNMI) and American Samoa. The review was conducted from April 15-18, 2019 at the offices of the Western Pacific Fisheries Management Council.

Description of the Individual Reviewers' Roles in the Review Activities

Dr. John Neilson and I served as CIE Reviewers, and Dr. Steve Martell from the Western Pacific Fishery Management Council's SSC chaired the meeting and drafted the report of findings of the meeting (with CIE input). Our roles were to review the report, discuss with the authors their methods and results, request the authors to do additional analyses for our clarification, contribute to the meeting report and to report individually on our findings per the terms of reference. The Terms of Reference and my responses to each are given below.

Summary of Findings of Terms of Reference

1. *Is the uncertainty with respect to input data quality and filtering methods well documented, including its potential effect on results?*

Yes, the methods for filtering the data were well documented for the three BMUSs, and repeatable and sensitivity analysis demonstrated the potential effects on results.

The data filtering step is very important in situations like these BMUS's because data collection mechanisms were limited and there were gaps in the data. This fact forced the authors to make informed judgements based on their understanding of the data and the uses of that data. The most significant of these was the definition of a bottomfishing trip from the boat-based creel survey. In the previous assessment, a bottomfishing trip was defined as a trip in which 50% or more of the catch in weight consisted of the BMUS. This by definition excludes trips in which there were zero catches. Many other studies have shown that neglecting zeros (and in this case <50%) will tend to mask trends in the CPUE. Therefore, the authors in this study defined a bottomfishing trip as a trip
that used bottom fishing gear. The change in definition now allows for 0's to be included in the data. This change in trip definition has a noted effect on the relative depletion level in the CPUE series for Guam and American Samoa. This choice was reasonable and justified based on the known bias of

neglecting zeros and the basic logic of a bottomfishing trip including bottomfishing gear. However, it is recognized that this definition is attempting to define trips "targeted" on BMUSs and that fisher behavior (multiple gears, etc.) make targeting decisions more complex. But, given the data on hand, this was an appropriate choice.

2. *Is the CPUE standardization properly applied and appropriate for this species, fishery, and available data?*

Yes, the CPUE standardization was properly applied for all three management units: Guam, American Samoa, and the CNMI.

The CPUE standardization approach for the three BMUSs were appropriate: a delta-method in which the zeros and positive trips were standardized separately and then recombined into an overall index.

The choice of variables that could be used in standardization were limited. At the meeting, a few additional options were explored, but results were not substantially affected. It should be noted that the standardization of the American Samoa CPUE changed the nominal very little. For Guam and the CNMI, the standardization effects were more substantial, but still not very large, As always in standardization, the difficulty is in defining variables that affect targeting (type of gear, weekend vs weekday, etc.) and how they interact with seasonal trends, areas and other factors. As noted above, this can be critical. Nevertheless, given the data at hand, the standardization was appropriate for these BMUSs.

It should be noted that the management units are species complexes. The management and thus, necessarily, the assessment are directed at the aggregate of the species in the BMUSs. Thus, an individual species' dynamics may be masked in the aggregate CPUE and in the assessment model discussed below. There have been some temporal trends in catch composition by species, but it is unclear whether these would have been manifested into CPUE trends or aggregate stock dynamics. This is an issue that deserves further research: perhaps, incorporating species information into the CPUE standardization, perhaps adjusting the population model (see below) and probably more importantly to adjust the harvest control rule itself. These will be mentioned in the research section.

Also, there were recent changes made by management in the specific species that comprised the BMUS for American Samoa in this assessment compared to the previous assessment. This was investigated at the meeting and found to not have significant effects on results. However, noting issues of aggregate dynamics masking individual species dynamics, the choice of species in a BMUS should be approached carefully.

3. *Are the assessment models used reliable, properly applied, adequate, and appropriate for the species, fishery, and available data?*

Yes, given the limited availability of data just in the form of catch and relative biomass indices, the choice of a production model was appropriate.

The choice of the population model to assess the bottomfish resources was largely driven by the nature of the data and the management system imposed. Catches and index of abundance data are aggregated over species, and the overfishing/overfished criteria are defined in terms of the aggregate. The

population model that was used was the discrete version of the Pella-Tomlinson model of biomass (B) and catch in weight (C) defined in terms of 4 parameters and process error, η_t

$$B_t = B_{t-1} + \frac{r}{m-1} B_{t-1} + B_{t-1}^m \frac{r}{(m-1)K^{m-1}} - C_{t-1}$$

or with $P_t = B_t/K$

$$P_t = \left[P_{t-1} + \frac{r}{m-1} P_{t-1} + \frac{r}{m-1} P_{t-1}^m - \frac{C_{t-1}}{K} \right] e^{\eta_t}$$

The parameters are: the carrying capacity, K; the initial relative biomass (P_0); a productivity parameter, r; and the "skew" parameter, m. Additionally, estimation errors on the catch and an index of abundance were implemented. The authors had few if any alternatives to this model available to them recognizing that aggregate dynamics may mask the status of an individual species within the aggregate. As opposed to earlier assessment of this resource, the Pella-Tomlinson version of the model was implemented in which m was allowed to deviate from the Shaefer-imposed m=2. This is an improvement in that it allows some flexibility that might more realistically capture the aggregate dynamics. Additionally, applying this model in a Bayesian framework addresses the substantial uncertainty in the data and aggregate dynamics.

As with any model, the ability to estimate parameters precisely depends on the contrasts in the data. Often with few-parameter models such as production models, this is the case. For CNMI, there is little change in the data and the resulting variances are indicative of this. While the application of the model to CNMI was useful, it is likely that a lower-tier data-poor management method might be more appropriate.

4. *Are decision points and input parameters reasonably chosen?*

Yes, the decision points and prior distributions for the assessments of the three BMUSs were reasonably chosen. These were additionally explored using sensitivity analysis.

Some effort in this review was directed at examination of the priors (K, r, m, Po, process error and estimation errors on catch and indices) and how they interacted with the production model. Much of this was appropriately addressed through sensitivity analysis in the original assessment document.

The report refers to "r" as the intrinsic rate of increase and compares it to a prior generated for the intrinsic rates from Musick et al. for various species-types. For these BMUSs, there is limited available life-history information and it is unclear how they affect an aggregate "r". Alternatives, might have been used (average of individual species priors based on individual growth rate?). But it is unlikely that without appropriate research that this approach would be better than what was used. Also, this was addressed by sensitivity analysis anyway.

The priors for K were based on the Our Living Oceans MSY estimates from some decades ago with little documentation available to the authors. Therefore, they examined this through sensitivity analysis. In the cases of CNMI and American Samoa, they were significant in establishing scale (such as MSY). This suggests that some basic abundance estimate would go a long way in improving these assessments (see research).

The parameters m and r are somewhat confounded as shown by their correlation from the assessment results. Misspecification of a prior for m, or r, is likely to result in some bias in estimates of FMSY. Additionally, this particular parameterization of the Pella-Tomlinson model uses the ratio r/(m-1) as the

maximum rate of productivity, i.e. the annual change in B when B is very, very small. The assessment report refers to "r" as the intrinsic rate of increase and compares it to a prior generated for the intrinsic rate from Musick et al. However, in this parameterization the intrinsic rate of increase is r/(m-1). The net effect of this is rather small. In the case of CNMI, it was non-existent, as m was fixed at 2 in that case. But it probably exacerbates the correlation between m and r that was evident in the Guam and American Samoa cases. One might reparameterize the model by h=r/(m-1) to h say and then estimate h, m and K with the prior for the intrinsic rate related to h. However, I expect the correlation will remain. It is the nature of the simple Pella-Tomlinson model. A sensitivity of this was run for Guam, and while the results were not very different, these results indicate, however, that one should not overly interpret the biological meaning of the median posteriors of r, m, K and P_0. If the medians are plugged into a deterministic version of the Pella-Tomlinson difference equation, one does not get the median trajectory from the assessment. The median trajectory is based on a mixture of the parameters. Appropriately, the authors made projections based on the entire range of uncertainty in the priors.

At the meeting, I wanted to explore the process error in the model structure. In the model

$$P_t = \left[P_{t-1} + \frac{r}{m-1}P_{t-1} + \frac{r}{m-1}P_{t-1}^m - \frac{C_{t-1}}{K}\right] e^{\eta_t}$$

the same process error is acting on the stock growth $\left[\frac{r}{m-1}P_{t-1} + \frac{r}{m-1}P_{t-1}^m - \frac{C_{t-1}}{K}\right]$ that occurs during the time period, as well as instantaneously on the stock size at the beginning of the time period (P_{t-1}). I suggested that P_{t-1}be moved outside the brackets of the above, i.e. the process error only acts on the change of biomass during the period, not on the initial biomass. I was convincingly argued down from this notion based, not the least, on the practicality of fitting the model in log-space and literature on the performance of somewhat similar models. On further examination, the above is equivalent to

$$P_t = P_{t-1} + \left[\frac{r}{m-1}P_{t-1} + \frac{r}{m-1}P_{t-1}^m - \frac{C_{t-1}}{K}\right] e^{\eta_t} e^{\eta_{t-1}}$$

for time periods after the first. So, the impact is moot. The mode of the process error posteriors compared to the mode of the prior in the assessment support this. Still, it would be nice to differentiate from process error during an interval versus that at the beginning of the interval. But that is too much to ask of this simple model structure.

As noted in the section on CPUE, a notable weakness in this approach is the aggregate species dynamics forced on the authors by limitations in the data. Individual species facing depletion or overharvesting may be masked by the aggregate. Some possible ways to begin to address this are suggested in the research section.

However, in my opinion, an appropriate way to approach this is by examining the harvest control rule itself and how that might be modified to adjust for possible species-aggregate masking.

5. *Are primary sources of uncertainty documented and presented?*

Yes, these three assessments are true Bayesian approaches, so the whole estimation apparatus is designed to evaluate uncertainty. These uncertainties are well explained in the assessment document and are better understood than in most assessments.

Nevertheless, possible biases, particularly in the catch estimates, may exist and should be addressed in the future.

6. *Are model assumptions reasonably satisfied?*

Yes, the model assumptions are reasonably satisfied for the three BMUSs.

The major assumptions behind this model are that CPUE is proportional to abundance of the stock complex, and that the dynamics and production of the aggregate complex are appropriately assessed by modeling the aggregate alone. Without independent information on the abundance of each species, there is no way to validate this assumption. Additionally, the FMPs have specified that the management units shall be these complexes, therefore the model assumptions are appropriate for that goal.

Nevertheless, there is concern that individual species status might be masked by the aggregate. While there were some shifts in catch proportions over time, nothing major was shown that would indicate the abundance proportions (not catch proportions) had significantly changed.

As noted above, I believe that this might be appropriately addressed through examination of the harvest control rule which is outside the remit of this review.

7. *Are the final results scientifically sound, including estimated stock status in relation to the estimated biological reference points, and can the results be used to address management goals stated in the relevant FEP or other documents provided to the review panel?*

For American Samoa and Guam, the data appear to be informative to provide information about the underlying production function. However, there is insufficient contrast in the data for CNMI to resolve the production function even using a more restricted parameter set (in the CNMI m was fixed at 2).

Yes, three models were suitable for providing scientifically sound advice using the Best Available Scientific Information. However, the limited contrasts in the data for CNMI indicate it is likely that a lower-tier data-poor management method might be more appropriate.

8. *Are the methods used to project future population state adequate and appropriately applied for meeting management goals as stated in the relevant FEP?*

Yes, the projection methods are appropriately being carried out through 2025 to match the administrative assessment schedule. Periodic updates using the current assessment should be carried out prior to the next planned benchmark assessment currently scheduled for 2025.

9. *If any results of these models should not be applied for management purposes with or without minor short-term further analyses (in other words, if any responses to any parts of questions 1-8 are "no"), indicate:*

Yes, the results were suitable. The assessment team made a number of evaluations at the meeting of the effects of each step to the changes in filtering methods and the effect it has on CPUE trends for American Samoa and Guam. These results are important and should be documented perhaps as an appendix to the assessment report.

10. *As needed, suggest recommendations for future improvements and research priorities. Indicate whether each recommendation should be addressed in the short/immediate term (2 months), mid-term (3-5 years) and long-term (5-10 years). Also indicate whether each recommendation is high priority (likely most affecting results and/or interpretation), mid priority, or low priority.*

As indicated in the body of this review there are severe data limitations that restrict the choice of analyses and models, and the accuracy and precision of the assessments. These should be a relatively high priority. An **immediate term high priority** is for a data workshop (already being planned) for CNMI. Information on absolute abundance, even from a single year event, would reduce the uncertainty in estimates of carrying capacity and BMSY. This might be approached by one-time habitat-based density estimates or by direct measure of F by tagging or estimates of catchability.
Additionally, community outreach is needed in showing the fishing community or industry how reporting of catch, and underreporting of catch, scales the annual ACL values. Further development of the CPUE series, possibly including factors suggested by fishers participating in the Data Workshop.

Investigations of relative productivity of species forming the BMUS complex has been noted as important to address (**medium priority, medium term**). Possible avenues might be: grouping species by productivity in standardization of the CPUE, for example a shallow water BMUS complex vs a deep-water complex. Additionally, I recommend (**medium priority, medium term**).
that there be some research not on the assessment itself, but rather the control rule used to manage the stock in order to address problems of managing a species complex. Should the rule be adjusted from the default form in the FMPs to adjust for species shifts?

Given the catch data collection methodologies, there is the potential for misestimating catches, perhaps substantially. If the Data Workshop concludes that there are significant unreported catches, consider approaches to include such removals in the assessment and how they might be estimated (**medium priority, medium term**).

Investigations of oceanographic covariates (**long-term, lower priority**) might be addressed. But, recent research (*Haltuch et al. 2019. Unraveling the recruitment problem: A review of environmentally-informed forecasting and management strategy evaluationFisheries Research. https://doi.org/10.1016/j.fishres.2018.12.016*) should be noted in designing that research.

Conclusions and Recommendations in Accordance with the TORs

The three benchmark stock assessments were Bayesian applications of a species-aggregated Pella-Tomlinson production model using a catch history and an index of abundance for each management unit. Prior distributions of four key parameters (productivity rate r, carrying capacity K, skew parameter m, and initial relative biomass Po). Additionally, priors were specified for process error and estimation error of catch and indices. Application of the models provided the Best Available Science from which status determinations for the three units can be made for American Samoa and Guam. While the model was appropriately explored for CNMI and was the Best Available Science, the results and the lack of contrasts suggest that lower tier data-poor methods might be more appropriate for this unit.

Uncertainties were extensively evaluated through the Bayesian approach as well as through sensitivity analyses. The basic limitations in the precision and accuracy of the catches, the uncertainty in targeting when standardizing indices and the aggregation of data sets across species limited the precision of the status estimates. Additionally, there is concern that aggregating over

species of the catch and index data (that forced the application of the species-aggregated production model) may mask depletion status of an individual species.

Data limitations that restrict the choice of analyses and models and the accuracy and precision of the assessments. Improvements in the data will provide the best avenue for better assessments. Given the catch data collection methodologies there is the potential for misestimating catches. A data workshop is being planned for CNMI. This type of workshop would be helpful in developing CPUE indices and catch estimates by species or species group. Additionally, such workshops are a mechanism for community outreach on how reporting of catch, and underreporting of catch, scales the annual ACL values. Further development of the CPUE series, possibly including factors suggested by fishers would be useful, as well. If the Data Workshop concludes that there are significant unreported catches, consider approaches to include such removals in the assessment and how they might be estimated.

Information on absolute abundance, even from a single year event, would reduce the uncertainty in estimates of carrying capacity and BMSY. This might be approached by one-time habitat-based density estimates or by direct measure of F by tagging or estimates of catchability.

Investigations of relative productivity of species forming the BMUS complex has been noted as important to address. Possible avenues might be grouping species by productivity in standardization of the CPUE; for example, a shallow water BMUS complex vs a deep-water complex.

Additionally, it is recommended that the control rule be revisited. Should the default form in the FMPs adjust for species shifts? The goal would be to improve the probability that the rule would results in desired goals (no overfishing, not overfished), given the aggregate nature of the data and assessment.

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Appendix 1: Bibliography of materials provided for review

Langseth, B., J. Syslo, A, Yau, and F. Carvalho. 2019. Draft Stock Assessments of the Bottomfish Management Unit Species of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam, 2019 (Draft). National Marine Fisheries Service Pacific Islands Fisheries Science Center, 1845 Wasp Boulevard Honolulu, HI *(this draft was basis of review*).

Chaloupka, M., E.C. Franklin and D. R. Kobayashi. 2015. WPSAR Tier 3 Panel Review of Stock Assessment Updates of the Bottomfish Management Unit Species of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam in 2015 Using Data through 2013. August 11-12, 2015. Prepared For Pacific Islands Fisheries Science Center, NOAA/NMFS Pacific Islands Regional Office, NOAA/NMFS Western Pacific Regional Fishery Management Council.

Winkler, H. F. Carvalhoa and Maia Kapur, 2018. JABBA: Just Another Bayesian Biomass Assessment. Fisheries Research 204: 275-288.

Yau, A., M.O. Nadon, B.L. Richardsa, J. Brodziak, and E. Fletcher. 2016. R Stock Assessment Updates of the Bottomfish Management Unit sSpecies of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam in 2015 Using Data through 2013. U.S. Dep. Commer. NOAA Tech. Memo., MOAA-TM-NMFS-PIFSC-51. Doi:10.7289/V5PR7T0G.

Western Pacific Regional Fishery Management Council. 2009. Fishery Ecosystem Plan for the American Samoa Archipelago. Western Pacific Regional Fishery Management Council, 1164 Bishop Street, Suite 1400, Honolulu, Hawaii 96813. September 24, 2009.

Western Pacific Regional Fishery Management Council. 2009. Fishery Ecosystem Plan for the Mariana Archipelago. Western Pacific Regional Fishery Management Council, 1164 Bishop Street, Suite 1400, Honolulu, Hawaii 96813. September 24, 2009.

Appendix 2 Statement of Work

Performance Work Statement (PWS)

National Oceanic and Atmospheric Administration (NOAA)

National Marine Fisheries Service (NMFS)

Center for Independent Experts (CIE) Program

External Independent Peer Review

2019 Benchmark Stock Assessments for the Bottomfish Management Unit Species of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam

Background

The National Marine Fisheries Service (NMFS) is mandated by the Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act, and Marine Mammal Protection Act to conserve, protect, and manage our nation's marine living resources based upon the best scientific information available (BSIA). NMFS science products, including scientific advice, are often controversial and may require timely scientific peer reviews that are strictly independent of all outside influences. A formal external process for independent expert reviews of the agency's scientific products and programs ensures their credibility. Therefore, external scientific peer reviews have been and continue to be essential to strengthening scientific quality assurance for fishery conservation and management actions.

Scientific peer review is defined as the organized review process where one or more qualified experts review scientific information to ensure quality and credibility. These expert(s) must conduct their peer review impartially, objectively, and without conflicts of interest. Each reviewer must also be independent from the development of the science, without influence from any position that the agency or constituent groups may have. Furthermore, the Office of Management and Budget (OMB), authorized by the Information Quality Act, requires all federal agencies to conduct peer reviews of highly influential and controversial science before dissemination, and that peer reviewers must be deemed qualified based on the OMB Peer Review Bulletin standards. (http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf).

Further information on the CIE program may be obtained from www.ciereviews.org.

Scope:

Three benchmark stock assessments for the Bottomfish Management Unit Species (BMUS) in the U.S. territories of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam were conducted by scientists at the Pacific Islands Fisheries Science Center, and combined into a single stock assessment report. For each assessment, all BMUS species were modeled as a single complex. Previous stock assessments for territorial bottomfish were conducted as an update in 2015. The 2019

benchmark assessments incorporate improvements to data standardization and model assumptions, following recommendations from the review panel for the 2015 assessments. The assessments also account for variation in creel survey estimates of BMUS catch. Production models were used to estimate biomass and stock status through time, and stock status was evaluated against MSY-based reference points set in the Fishery Ecosystem Plan for each territory. Projections were provided to inform management setting of acceptable biological catch and annual catch limits. The specified format and contents of the individual peer review reports are found in Annex 1. The Terms of Reference (TORs) of the peer review are listed in Annex 2. Lastly, the tentative agenda of the panel review meeting is attached in Annex 3.

Requirements:

NMFS requires two reviewers who are external to PIFSC, Pacific Islands Regional Office (PIRO), and the Western Pacific Regional Fishery Management Council and its affiliated bodies to conduct an impartial and independent peer review in accordance with this PWS, OMB Guidelines, and the TORs in Annex 2.

CIE reviewers shall have:

- Working knowledge and recent experience in the application of stock assessment models, including production models, sufficient to complete a thorough review;
- Knowledge of data limited assessment methods;
- Expertise with measures of model fit, identification, uncertainty, forecasting, and biological reference points;
- Familiarity with federal fisheries science requirements under the Magnuson-Stevens Fishery Conservation and Management Act;
- Familiarity with local Pacific Islands fisheries as well as artisanal fisheries and fishing practices;
- Excellent oral and written communication skills to facilitate the discussion and communication of results.

Tasks for Reviewers:

Each of the CIE reviewers shall complete the following tasks in accordance with the PWS and Schedule of Milestones and Deliverables.

Pre-review Background Documents: No later than two weeks before the peer review, the NMFS Project Contact will provide reviewers the necessary background information and reports for the peer review. The reviewers shall read all documents prior to the peer review in accordance with the PWS scheduled deadlines.

Required pre-review documents:

- *DRAFT 2019 Territorial Bottomfish assessments: Langseth et al. Title. NOAA Tech Memo.*
- ***Previous Territorial Bottomfish Stock Assessments: Yau, A. M., M. O. Nadon, B. L. Richards, J. Brodziak, and E. Fletcher. 2016. Stock Assessment Updates of the Bottomfish Management Unit Species of American Samoa, the Commonwealth of the Northern Mariana Islands, and***

Guam in 2015 Using Data through 2013. U.S. Dep. Commer., NOAA Tech. Memo., NOAA-TM-NMFS-PIFSC-51, 54p. doi:10.7289/V5PR7T0G

- *Independent peer review report for Yau et al. 2016 stock assessments: Chaloupka, M., E. C. Franklin, and D. R. Kobayashi. 2015. Report for the Independent Peer Review of the Stock Assessment update of the Bottomfish Management Unit Species of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam in 2015 using data through 2013. 15 p.*
- *American Samoa Fishery Ecosystem Plan: Western Pacific Regional Fishery Management Council. 2009. Fishery Ecosystem Plan for the Archipelago of American Samoa. (only section 4.2 (pp 84-89) and section 5.3 (pp 103-108).*

- *Mariana Fishery Ecosystem Plan: Western Pacific Regional Fishery Management Council. 2009. Fishery Ecosystem Plan for the Mariana Archipelago. (only section 4.2 (pp 79-99) and section 5.3 (pp 120-131).*
- *Winker, H., Carvalho, F., Kapur, M. **2018. JABBA: Just Another Bayesian Biomass Assessment. Fisheries Research 204: 275-288.***

Panel Review Meeting: Each CIE reviewer shall conduct the independent peer review in accordance with the PWS and TORs, and shall not serve in any other role or represent any of their organizations in this capacity. Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the TORs. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). NMFS will provide a Chair for this in-person panel review. The NMFS Project Contact is responsible for ensuring that the Chair understands the contractual role of the CIE reviewers.

Contract Deliverables - Independent Peer Review Reports: Each reviewer shall complete an independent peer review report in accordance with the PWS. Each reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each reviewer shall complete the independent peer review addressing each TOR as described in Annex 2. Reviewers are not required to reach a consensus.

Other Tasks – Contribution to Summary Report: This Benchmark Review consists of two CIE reviewers and one review Chair which is not provided by the CIE. Each CIE reviewer will assist the Chair with contributions to a Summary Report that will describe the majority or consensus findings, based on the TORs of the review. Each individual CIE reviewer is not required to report a consensus finding. Reviewers should provide a brief synopsis of their own views on the summary findings and conclusions reached by the review panel in accordance with the TORs.

Foreign National Security Clearance

When reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for reviewers who are non-US citizens. For this reason, the reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 50 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12

regulations available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/ and http://deemedexports.noaa.gov/compliance_access_control_procedures/noaa-foreign-national-registration-system.html. The contractor is required to use all appropriate methods to safeguard Personally Identifiable Information (PII).

Place of Performance:

Each reviewer shall conduct an independent peer review during the panel review meeting scheduled in Honolulu, Hawaii at the Finance Factors Building, 164 Bishop St #140, Honolulu, HI 96813, during April 15-19, 2019.

Period of Performance

The period of performance shall be from the time of award through June 2019. Each reviewer's duties shall not exceed 14 days to complete all required tasks.

Schedule of Milestones and Deliverables: The contractor shall complete the tasks and deliverables in accordance with the following schedule.

Within two weeks of award	Contractor selects and confirms reviewers
No later than two weeks prior to the review	Contractor provides the pre-review documents to the reviewers
April 15-19, 2019	Panel review meeting
Within three weeks of the panel review meeting	Contractor receives draft reports
Within 2 weeks of receiving draft reports	Contractor submits final reports to the Government

Applicable Performance Standards

The acceptance of the contract deliverables shall be based on three performance standards:

(1) The reports shall be completed in accordance with the required formatting and content; (2) The reports shall address each TOR as specified; and (3) The reports shall be delivered as specified in the schedule of milestones and deliverables.

Travel

All travel expenses shall be reimbursable in accordance with Federal Travel Regulations (http://www.gsa.gov/portal/content/104790). International travel is authorized for this contract. Travel is not to exceed $7,700.

Restricted or Limited Use of Data

The contractors may be required to sign and adhere to a non-disclosure agreement.

NMFS Project Contact:

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Annex 1: Peer Review Report Requirements

1. The report must be prefaced with an Executive Summary providing a concise summary of the findings and recommendations.

2. The report must contain a background section, description of the individual reviewers' roles in the review activities, summary of findings for each TOR, in which the weaknesses and strengths are described, and conclusions and recommendations in accordance with the TORs.

3. Reviewers must describe in their own words the review activities completed during the panel review meeting, including a brief summary of findings, of the science, conclusions, and recommendations.

4. Reviewers should discuss their independent views on each TOR even if these were consistent with those of other panelists, but especially where there were divergent views.

5. Reviewers should elaborate on any points raised in the summary report that they believe might require further clarification.

6. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

7. The report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed, regardless of whether or not they read the summary report. The report shall represent the peer review of each TOR, and shall not simply repeat the contents of the summary report.

8. The report shall include the following appendices:

Appendix 1: Bibliography of materials provided for review

Appendix 2: A copy of this Statement of Work

Appendix 3: Panel membership or other pertinent information from the panel review meeting.

Annex 2: Terms of Reference for the Peer Review

2019 Benchmark Stock Assessments for the Bottomfish Management Unit Species of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam

External Independent Peer Review under the Western Pacific Stock Assessment Review framework: 2019 Benchmark Stock Assessments for Territorial Bottomfish

For questions 1-8 and their subcomponents, reviewers shall provide a "yes" or "no" answer and will not provide an answer of "maybe". Only if necessary, caveats may be provided to these yes or no answers, but when provided they must be as specific as possible to provide direction and clarification to NMFS. Answers must be provided separately for each territory (American Samoa, CNMI, and Guam).

10. Is the uncertainty with respect to input data quality and filtering methods well documented, including its potential effect on results?

11. Is the CPUE standardization properly applied and appropriate for this species, fishery, and available data?

12. Are the assessment models used reliable, properly applied, adequate, and appropriate for the species, fishery, and available data?

13. Are decision points and input parameters reasonably chosen?

5. Are primary sources of uncertainty documented and presented?
6. Are model assumptions reasonably satisfied?

7. Are the final results scientifically sound, including estimated stock status in relation to the estimated biological reference points, and can the results be used to address management goals stated in the relevant FEP or other documents provided to the review panel?

8. Are the methods used to project future population state adequate and appropriately applied for meeting management goals as stated in the relevant FEP?

9. If any results of these models should not be applied for management purposes with or without minor short-term further analyses (in other words, if any responses to any parts of questions 1-8 are "no"), indicate:

    Which results should not be applied and describe why, and

    Which alternative set of existing stock assessment results should be used to inform setting stock status and fishery catch limits instead and describe why.

10. As needed, suggest recommendations for future improvements and research priorities. Indicate whether each recommendation should be addressed in the short/immediate term (2 months), mid-term (3-5 years) and long-term (5-10 years). Also indicate whether each recommendation is high priority (likely most affecting results and/or interpretation), mid priority, or low priority.

11. Draft a report (individual reports from each of the panel members and an additional Summary Report from Chair) addressing the above TOR questions.

Annex 3: Agenda

External Independent Peer Review under the Western Pacific Stock Assessment Review framework:

2019 Benchmark Stock Assessments for the Bottomfish Management Unit Species of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam

Western Pacific Regional Fishery Management Council Office
1164 Bishop St., Suite 1400; Honolulu, HI 96813
April 15 - 19, 2019, 8:30am - 5pm

Day 1, Monday April 15

1. Welcome and Introductions
2. Background information – Objectives and Terms of Reference
    a. Fishery Operation
    b. Fishery Management
3. History of stock assessments and reviews
4. Data
    a. Western Pacific Fisheries Information Network
    b. Life history information
    c. Other
5. Presentation and review of stock assessment

Day 2, Tuesday April 16

6. Continue presentation and review of stock assessment

Day 3, Wednesday April 17

7. Continue review of stock assessment

Day 4, Thursday April 18

8. Continue review of stock assessment
9. Public comment period
10. Panel discussions (closed)

Day 5, Friday April 19

11. Continue panel discussions (closed, morning)
12. Present panel results (afternoon)
13. Adjourn

Order of agenda items may change. Meeting may run late if needed to accommodate all agenda items.

Appendix 3: Panel membership or other pertinent information from the panel review meeting.

LIST OF TERRITORY BOTTOMFISH BENCHMARK ASSESSMENT WPSAR PARTICIPANTS

NAME	AFFILIATION	NOTE
STEVE MARTELL	SSC	
JOHN NEILSON	CIE	
JOSEPH POWERS	CIE	
JAMES BORJA	GUAM BF FISHERMAN	
MICHAEL FLEMING	CNMI BF FISHERMAN	
DOMINGO OCHAVILLO	AM SAMOA – DMWR	
JOSEPH O'MALLEY	PIFSC	
BRIAN LANGSETH	PIFSC	
JOHN SYSLO	PIFSC	
STEFANIE DUKES	PIFSC	
BETH LUMSDEN	PIFSC	DAY 1 ONLY
MICHAEL QUACH	PIFSC	DAY 1 ONLY
MARLOWE SABATER	WPFMC – WPSAR CC	
BRETT SCHUMACHER	PIRO – WPSAR CC	DAY 1 ONLY
CLAY TAM	HAWAII	DAY 2 ONLY
PAUL BARTRAM	HAWAII	DAY 2 ONLY
MARIO	PIROP	DAY 1 ONLY