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

Center for Independent Experts (CIE) Review prepared by:

John D. Neilson, Ph.D.
Independent Fisheries Scientist
1500 Balmoral Avenue
Comox, British Columbia, Canada
V9M 2P6

Email: largepelagicsscientist@gmail.com

Executive Summary

An independent peer review of a benchmark assessment of bottomfish for Guam, Commonwealth of the Northern Marianas Islands (CNMI), and American Samoa was conducted April 15-18, in Honolulu, Hawaii. The document presented here was prepared under contract for the Center for Independent Experts (CIE) and responds to the Terms of Reference for the review.

The CIE Review indicated that the results of the assessment and the determinations of stock status were critically dependent on the procedures for catch and effort data filtering, and to a lesser extent, a revision to the species lists for the three Territories. Since the procedures used in 2019 differed from those used in the previous stock assessment conducted in 2016, the results of the two assessments are not directly comparable.

While the current assessment represents the best available science concerning the stock status of the Territorial Bottomfish Management Unit Species, due to the short time series and non-informative nature of the available data for the CMNI, the model and assessment results may not form a sound basis for fishery management decisions. For all three territories, significant improvements in model robustness and accuracy can be gained by investing further resources into collection of reliable catch and effort information, and fishery-independent surveys of abundance.

Background

The document presented here contains an independent peer review of a benchmark assessment of Territorial bottomfish in the Commonwealth of the Northern Marianas Islands, American Samoa and Guam, following a Center for Independent Experts (CIE) Review conducted April 15-18, 2019. The meeting was scheduled for April 15-19, but concluded one day early. It is prepared under contract for the Center for Independent Experts, following the Statement of Work contained in Appendix 2. The main document that was reviewed was a draft assessment referred to here as Langseth *et al.* (Draft).

The stocks reviewed were species complexes, and the list of species included in the complex differed among the Territories. The last full assessment was completed in 2016 (Yau *et al.* 2016).

Description of the Individual Reviewer's Role in the Review Activities

My role in the process was as a CIE-appointed peer reviewer only. There were three independent experts comprising the review panel (Appendix 3). My role in the process was to prepare for the meeting by reading the supplied materials, attending the scheduled five-day long Honolulu meeting, and to write a report summarizing my views according to the Terms of Reference.

During the course of the review, the review panel requested some additional analyses (see Appendix 4). The authors of the stock assessment provided comprehensive and timely responses to our requests, which were greatly appreciated. The additional analyses are discussed later in this report under the appropriate Term of Reference. I have structured the report to address each Term of Reference, first providing my own perspectives, then providing the section of the draft Chair's Summary Report, to which I contributed. The draft is a panel summary document, and I do not have any minority views to include here. However, there are some points that I will further emphasize.

Summary of Findings for each ToR

I preface my comments by offering my thanks to the assessment team for the production of a very clear and logically organized assessment report draft. It was easy to read and understand, and materially contributed to an efficient and effective review. Also, I wish to thank the assessment team for their work during the week addressing the points raised by the review panel in a patient and thorough manner.

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

My perspectives:

The completeness and quality of the input catch and effort data are the paramount concern with this particular stock assessment. I concluded, as did the rest of the panel,

that the methods used were appropriate for the situation. What was less certain was the reliability of the input data.

To help evaluate that consideration, I compared the time series of landings information from the current assessment, with the previous series presented in Yau et al. (2016).

	Guam 2019	CNMI 2019	Am Sam 2019	Am Sam 2016	CNMI 2016	Guam 2016
1982	27.357					26.384
1983	44.593					40.782
1984	52.018					19.322
1985	68.251					49.195
1986	29.560	90.689		Data av. And used in 2016	29.912	20.427
1987	37.000	23.763		Data av. And used in 2016	49.714	29.301
1988	50.455	44.718		Data av. And used in 2016	47.313	46.318
1989	47.796	33.426		Data av. And used in 2016	24.439	58.582
1990	37.223	14.885		Data av. And used in 2016	12.929	42.384
1991	42.767	17.637		Data av. And used in 2016	7.092	39.596
1992	46.714	12.559		Data av. And used in 2016	10.598	50.394
1993	53.233	11.611		Data av. And used in 2016	18.461	55.609
1994	54.128	28.817		Data av. And used in 2016	25.47	49.055
1995	35.031	30.866		Data av. And used in 2016	36.1	40.855
1996	51.242	28.713		Data av. And used in 2016	66.388	54.186
1997	28.032	39.928		Data av. And used in 2016	64.143	30.611
1998	29.480	22.593		Data av. And used in 2016	59.024	37.687
1999	47.084	17.282		Data av. And used in 2016	55.991	53.339
2000	66.447	176.129	23.913	19.816	45.258	66.666
2001	46.427	77.861	42.301	37.847	71.256	54.352
2002	21.727	34.006	31.657	34.149	46.765	24.044

2003	29.835	20.119	21.039	19199	41.903	43.253
2004	25.236	76.132	17.622	17.206	54.475	36.915
2005	29.046	57.854	14.541	16.329	70404	36.529
2006	34.917	35.294	15.569	7.913	29.34	38.054
2007	18.186	57.995	22.359	21.874	39.476	27.459
2008	34.249	22.908	32.965	34.812	42.07	37.316
2009	40.735	74.587	40.446	47458	41.176	40.222
2010	26.544	67.944	11.978	9.509	22.395	28.958
2011	54.062	30.203	24.569	26.277	22.487	59.618
2012	19.714	140.631	7.688	13.11	15.304	22.085
2013	30.243	29.229	19.740	23.63	22.51	29.848
2014	20.554	13.889	20.352			
2015	11.711	11.281	29.511			
2016	30.192	59.774	20.181			
2017	15.864	70.228	15.913			

Table 1. Comparison of catch time series in previous and current stock assessments. While the differences are generally slight and attributable to the use of a new species list for the assessment and different data filters, there were two years for CNMI that were quite different (highlighted in red). The review returned to this point later in the week.

In general, the Review Team was very concerned about the change of status of American Samoa (not overfished, no overfishing) in 2016 to overfished and overfishing occurring in 2019. To evaluate this further, the stock assessment authors were asked to apply the same data filtering conventions used in 2019 to the 2016 data set for American Samoa.

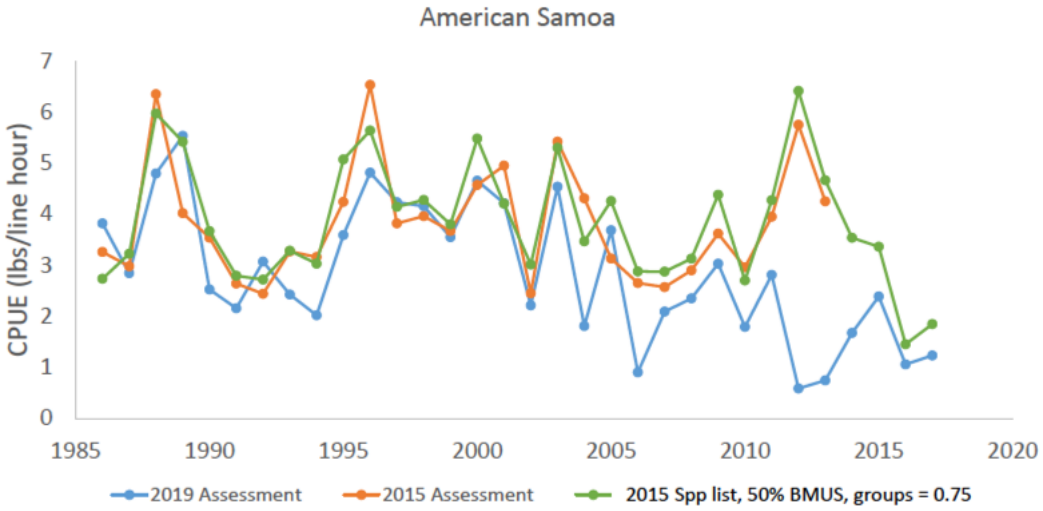

Fig. 1. Trends in CPUE for American Samoa, comparing the data used in the 2016 and 2019 assessments, and applying the new data filtering methods to 2016 data set.

Fig. 1 illustrates two important points. The first is that the trend in CPUE differs considerably between the two stock assessments, particularly in the last few years. The second point is that if the 2016 data filtering conventions were applied to the complete data set, the overall trends are very similar to what was observed in the previous assessment. The more recent divergence in CPUE remains a puzzling feature of the data, and a question that could be more thoroughly explored in the upcoming data workshop, discussed later.

The Review revealed that the differences in the perception of stock status for American Samoa were primarily related to data filtering (how a BMUS (Bottomfish Management Unit Species) directed trip was defined), and secondarily, the species that were included in the BMUS species list (which changed between the two assessments). The net result of the changes in data filtering and preparation are that the 2016 and 2019 stock assessments are not readily comparable.

The potential impacts on the results of data filtering processes are summarized in the following table (supplied by the stock assessment authors during the review meeting), which highlights the differences in relative exploitation rate that arises from the use of the different data filtering in the two assessments.

Parameter	2019 filtering	2016 filtering
K	495.8 (262.0 – 1101.4)	542.7 (281.5 – 1205.1)
r	0.28 (0.13 - 0.58)	0.31 (0.15 – 0.61)
m	2.66 (1.13 - 6.12)	2.29 (0.9 – 5.7)
ψ	0.71 (0.37 – 1.15)	0.69 (0.40 – 1.11)
q	0.012 (0.005 – 0.026)	0.011 (0.0046 – 0.023)
$\sigma^2_{\tau_{Estimated}}$	0.159 (0.090 – 0.301)	0.093 (0.046 – 0.19)
$\sigma_\eta{}^2$	0.034 (0.018 – 0.044)	0.035 (0.019 – 0.044)
MSY	28.8 (16.4 – 55.9)	37.25 (18.25 – 90.0)
BMSY	272.8 (120.8 – 687.4)	282.5 (124.6 – 693.7)
HMSY	0.107 (0.044 – 0.228)	0.133 (0.05 – 0.37)
BMSY/K	0.55	0.52
B_{2017}/BMSY	0.38	0.77
H_{2017}/HCR	2.75	0.58

Table 2. Differences in stock assessment parameter estimates related to the data filtering approaches used in the 2016 and 2019 assessments. Note, in particular, the differences in relative exploitation rate at the bottom of the Table.

The Panel requested further investigation of the anomalously high CPUE value reported in 2012 for CNMI. The assessment authors checked the available data, and reported that there were relatively few interview data for 2012, and there was a higher reported catch of two snapper species (*Etelis coruscans* and *Pristopomoides filamentosus*). Thus, it may be that the reliability of the CPUE reported in 2012 is questionable. The consequence of this observation was considered in an additional model run, which indicated only minor changes in stock assessment parameters when the 2012 catch was assumed to be overestimated by various amounts (see Table 3, below)

	_25	_50	_75	_base
K	1129.8	1131.1	1138.8	1141.2
r	0.316	0.322	0.328	0.334
q	0.005774	0.005696	0.00578	0.005526
σ_{η}^2	0.035	0.035	0.035	0.035
$\sigma_{\tau_{Estimated}}^2$	0.398	0.396	0.392	0.394
m	2	2	2	2
Hmsy	0.158	0.161	0.164	0.167
Bmsy	564.9	565.6	569.4	570.6
MSY	87.8	89.7	91.7	93.6
ψ	0.482	0.483	0.473	0.482
B_Bmsy$_{2017}$	1.09	1.089	1.056	1.085
H_HCR$_{2017}$	0.823	0.813	0.822	0.786

Table 3. Differences in stock assessment parameter estimates related to the estimate of catch in 2012, which was varied from 25% to 75% of the base estimate. Note the relative insensitivity of the relative biomass and harvest rates reported at the bottom of the table.

From the Chair's Summary Report:

The panel all concurred that **Yes** the methods for filtering the data were well documented, and repeatable. The panel also notes that with sparse and disparate datasets, analysts often have to make assumptions and judgement calls.

For this assessment, a bottomfishing trip was defined in the boat-based creel survey as a trip that used bottom fishing gear. The previous assessment was based on a different definition; a bottomfishing trip was defined as a trip with more than 50% by weight of BMUS. This change in definition now allows for zeros to be included in the data. This change in trip definition has a marked effect on the relative depletion level in the CPUE series for Guam and American Samoa.

The review panel concurred that the change in definition is appropriate as it seems reasonable to assume that a vessel was targeting bottomfish when using bottomfishing gear, and that it's possible that the previous definition may contain trips with troll caught BMUS, that are now excluded under the new filter.

Based on the information available, the exploration of the input data made during the review, and the number of sensitivity analysis that were conducted, the review panel was not able to justify making any changes to the necessary assumptions to proceed with this assessment.

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

My Perspectives:

Yes. However, I recognize that the CPUE standardization was an initial analysis, and will be improved as additional covariates are identified, possibly through the Data Workshop planned by the PIFSC in August.

Reports from Territorial fisheries experts who presented during the review indicated that while their fisheries could be considered to be generally artisanal, larger vessels with advanced fishing technologies did participate in this fishery over certain years, that seemed to vary by Territory. From the work done during the review week, it was also demonstrated that vessels fishing in deeper water will experience higher catch rates in the CNMI and Guam (corresponding data were not available for American Samoa).

- CNMI

	weekend	weekday
n	306	260
avg	1.00	1.73
sd	2.45	4.32

Depth			
D	M	S	U
144	50	313	59
2.60	1.36	0.75	1.35
4.20	1.12	2.92	4.49

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- Guam

	weekend	weekday
n	2834	986
avg	0.635	0.765
sd	1.364	1.310

Depth			
D	M	S	U
967	251	2528	74
1.407	0.606	0.381	1.069
2.070	0.969	0.821	1.390

Table 2. Pivot tables for two factors included in the catch rate standardization, namely type of day (weekday or weekend), and depth (deep, midwater, shallow, unknown) for CNMI and Guam. The number of observations, average and standard deviations are provided. Note the consistent trend of increasing catch rate with depth.

I raised the point that while the current standardization includes depth, the variable presence of larger vessels which would presumably fish deeper waters is not accounted for at present. The assessment team suggested investigating this by including an interaction term, depth x year in the analyses, which the review team agreed could be helpful. However, the catch rate standardization was re-run, the interaction term was not selected by the model for inclusion, using AIC criteria.

Notwithstanding the above result, I still feel it would be very helpful to determine if a "data mining" operation could uncover more details about the catch and catch rates that were associated with those larger vessels. Currently, those trips are aggregated with the artisanal trips, and this procedure could be masking important changes in the population dynamics. Perhaps the Data Management Workshop planned for later this year could include this point in their agenda.

From the Chair's Summary Report

Yes, the CPUE standardization was properly applied. The CPUE index for this fishery is from a species complex. The primary assumption is that trends in abundance for each species in the complex are exactly the same. Data on species composition over time were presented during the meeting, and it was not clear that this assumption was well met. Therefore, the Panel returned to this point as a research recommendation.

The currently available CPUE data cannot be used to interpret the trends of any one member of the complex. Therefore, increases in abundance of one species in the complex can mask severe declines in another.

The results of the CPUE standardization did not result in large changes in trends in comparison to the nominal CPUE.

The review panel notes that the change in trip definition has had a bigger effect on CPUE trends between the 2016 and this assessment.

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

My Perspectives

Yes. In general, the models chosen are appropriate for the mixed species nature of the fisheries. Further life history information could be helpful to help ensure that the species

lists do not contain members with disparate productivities, a research recommendation I will return to later.

While I support all of the conclusions from the Chair's summary report, I would emphasize the concern over the modelling results for CNMI, which are largely related to the imprecision of the CPUE data, the short time series and the lack of contrast in the CPUE data (See Fig. 2 below, extracted from the Langseth et al. Draft Stock Assessment.)

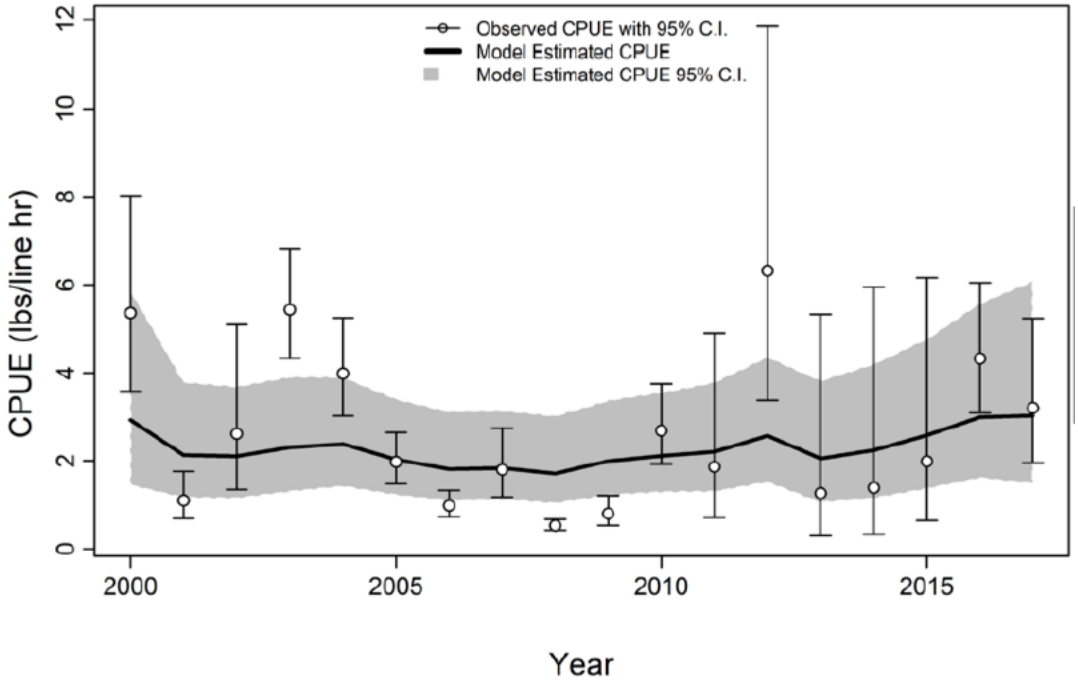

Fig. 2. CPUE time series from CNMI bottomfish, as reported by Langseth et al. (Draft).

From the Chair's Summary Report

Yes. Biomass production models conditioned on catch and fit to a relative abundance index are widely used in stock assessments. These models are very amenable to these types of data; however, sufficient contrast is required in the data to resolve the production function for this stock. This was not the case for the CNMI situation.

The review panel felt that if the scale of the observed catch is known in relation to population biomass, then estimates of MSY from these models are much more robust than estimates of FMSY. Again, we will return to this point for a research recommendation.

The data in American Samoa and Guam are much more informative than data from CNMI.

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

My Perspectives

Yes. The stock assessment team did extensive sensitivity analyses, and identified parameters that were influential in the analyses. I share the concern that the carrying capacity prior is linked to the OLO (Our Living Ocean) earlier analyses, which is not well documented.

From the Chair's Summary Report

Yes, the review panel felt that decision points and prior distributions were reasonably chosen, and further vetted via sensitivity analyses.

Based on the limited available life-history information for these species and that the assessment is based on a species complex, it is difficult to determine if the priors for the maximum intrinsic rate of growth are appropriate.

The review panel also notes that the priors for the population carrying capacity were based on the OLO MSY estimates were sensitive in the CNMI and American Samoa. The methods for developing the OLO MSY estimates are not described, and there is concern the OLO estimates are not replicable.

The review panel was also concerned how the informative priors for *m* and *r* interact (are somewhat confounded). Misspecification of a prior for *m*, or *r*, is likely to result in biased estimates of F_{MSY}.

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

My Perspectives

Yes. My view is that the known sources of uncertainty were adequately explored. With the Data Workshop planned for later this year, I expect that the sources of uncertainty will become better understood. I noted during the review that in the 2012 assessment by Brodziak et al., scenarios for underreporting were explored. The review team and the current assessment authors agreed that the assumptions regarding the extent of underreporting in the Brodziak et al. analysis seemed arbitrary. However, it is interesting that underreporting was considered an issue, and this was supported by at least one of the fishing experts that attended our 2019 review meeting.

From the Chair's Summary Report

Yes, this assessment does a great job of documenting sources of uncertainty, and quantifies the uncertainty. However, we also note that the addition of uncertainty to catch observations does not address potential bias with the estimation of catch.

6. *Are model assumptions reasonably satisfied?*

My Perspectives

Yes. As noted below, the proportionality of CPUE to abundance is the key here. I expect that as the standardization model evolves in the future, this assumption will be better met. Also, as life history information becomes more available and differences in individual

species productivity becomes better understood, it will be possible to revisit the species grouping in the complex.

From the Chair's Summary Report

Yes, the major assumptions behind this model are that CPUE is proportional to abundance of the stock complex, and that all species in the complex have the same underlying production function and are subject to the same annual process errors. Without independent information on the abundance of each species, there is no way to validate the assumptions.

The review panel did visually examine proportions of each species in the complex over time for the three Territories. It was difficult to determine if there were significant trends in the catch proportions over time. However, no species seem to have disappeared in the catch from the species complex.

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?*

My Perspectives

Yes. I have nothing to add to the Chair's Summary Report below.

From the Chair's Summary Report

Yes, the review panel felt that all three models were suitable for providing scientifically sound advice using the Best Available Scientific Information. However, the data for CNMI probably do not warrant a Tier 3 assessment and a Tier 5 approach may be more appropriate.

For American Samoa and Guam, the data appear to be informative about the underlying production function. However, there is insufficient contrast in the data for CNMI to resolve the production function. Moreover, in the CNMI assessment the underlying production function was based on the simpler Schaefer production function (i.e., m=2).

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

My Perspectives

Yes. However, the projections are planned over a six-year period. Given the uncertainty in the analyses, this could be inappropriate. I believe the approach of periodic updates is a wise precaution.

From the Chair's Summary Report

Yes. The projection methods are appropriate. The review panel notes that the projection methods were carried out through 2025 to match the administrative assessment schedule.

Periodic updates with 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:*

   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.

My Perspectives

Yes, but with the caveat identified earlier for CNMI.

Additionally, the assessment document could benefit from an Appendix describing, in detail, the impacts of the data filtering process on the input data. Much of the work for this addition has already been done, thanks to the responsiveness of the stock assessment authors to the questions from the Review Panel.

From the Chair's Summary

Yes, the panel felt that all of the results were suitable and that no minor changes are required in the assessment document.

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.*

For this Term of Reference, I had significant input into the Chair's summary, so I have only a few supplemental remarks, which are integrated into the list below.

High Priority

1. Data workshop, with the objectives of improving and validating (to the extent possible) the catch and effort data. (short/immediate term)
2. Fisheries independent surveys to provide information on population size (mid-term)
3. Further development of the CPUE series, possibly including factors suggested by fishers participating in the Data Workshop. (short/immediate term)

Medium Priority

1. Investigations of relative productivity of species forming the BMUS complex. Consideration of grouping the species by productivity in standardization (mid-term)
2. If the Data Workshop concludes that there are significant unreported catches, consider approaches to include such removals in the assessment. (mid-term)

Lower Priority

1. Investigations of oceanographic covariates (long-term)

The Review Process

I found the review process to be generally very laudable. There was adequate time for questions and comprehensive responses from the stock assessment team, including additional analyses (see Appendix 4). The meeting agenda was logically organized and key people attended the meeting that could assist with CIE panel review, particularly including fishermen from the three Territories. The lead scientists did an excellent job in summarizing and presenting their work. I also appreciated their willingness to conduct the additional exploration of the data that we requested.

The use of Google Drive for document sharing worked well, and it was convenient to have access to the material before, during and after the meeting.

Conclusions

I trust that this document conveys the main point arising from the CIE review. The assumptions concerning data filtering and handling are absolutely critical, and have a demonstrable impact on the stock assessment. Having said this, as the Chair's summary review states, the Panel could find no fault in how the data were filtered, and the assumptions seem at least as defensible as previous assessments. The current assessment therefore represents the best available science concerning the stock status of the Territorial Bottomfish Management Unit Species.

Notwithstanding the above limitation, the population model and assessment results provide a sound basis for fishery management decisions for American Samoa and Guam. Due to the short time series and the non-informative nature of the available data for CMNI, the model and assessment results probably do not form a sound basis for fishery management decisions. For all three Territories, significant improvements in model robustness and accuracy can be gained by investing further resources into collection of reliable catch and effort information, and fishery-independent surveys of abundance.

It was a pleasure to be a part of this review, and I thank the CIE and the meeting organizers for the opportunity.

Appendix 1: Bibliography of materials provided for review

(Current assessment and subject of this review) 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.

Appendix 2:
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:

John Syslo
john.syslo@noaa.gov
FRMD/PIFSC/NMFS/NOAA
1845 Wasp Boulevard, Bldg. #176
Honolulu, Hawaii 96818
808.725.5363

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).

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

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

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

4. 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:
    i. Which results should not be applied and describe why, and
    ii. 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: Tentative 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: CIE Panel Membership

Dr. Steve Martell (Chair)
Dr. John Neilson
Dr. Joe Powers

Complete List of Participants (supplied by Marlow Sabater):

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 and 4 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

Appendix 4: Additional Analyses Requested During the Meeting

Monday

1. Provide median values for the quantity r/(m-1) for all models.

2. Reparameterize JABBA to exclude the first Pt-1 within the process equation from being multiplied by process error.

3. Repeat 2016 CPUE filtering steps for American Samo and rerun JABBA with the new CPUE series. Keep 2019 species list.

4. Determine the number of interviews and their CPUE for each level for all used covariates (particularly the 'type of day' factor for the CNMI CPUE standardization) in the standardizations.

5. Determine what is contributing to the high 2012 catch for the expanded boat-based creel survey in CNMI.

Tuesday

1. For ASm only. Provide time series of catch and cpue using the 2016 and 2019 species list as used in the assessment for comparison. Provide summary on the relative change in CPUE and catch over time for the two species lists.

2. For Guam only. Provide a time series of the proportion of interviews each year that are shallow and deep. Pending the first request this may be a follow up: If there are trends in these proportions over time, then develop 2 series using a) the shallow interviews only, and b) the deep interviews only.

3. FOR CNMI only. Estimate the sensitivity of MSY estimates to changes in the 2012 catch time series by running three JABBA runs with catch in 2012 reduced by 25%, 50%, and 75%.

4. For AmSam only. Provide the time series (catch) data for the 6 species that were removed from the 2016 BMUS species list.

Wednesday

1. Run JABBA without data and show correlation plots from data-less model runs.
• JABBA cannot strictly run a model without data. Need all catch data and at least one year of CPUE data.