WESTERN PACIFIC STOCK ASSESSMENT REVIEW

Stock Assessment of American Samoa Bottomfish, 2023

Panel Summary Report

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Prepared for
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Background

This document provides a panel summary report of the Western Pacific Stock Assessment Review (WPSAR) by panelists E. Franklin (chair), P. Cordue, and J. Powers to the Terms of Reference for the "Stock assessment of American Samoa Bottomfish, 2023" by M. Nadon, M. Oshima, E. Bohaboy, and F. Carvalho. This WPSAR addresses a set of twelve (12) Terms of Reference (TOR) for the review of benchmark stock assessments for nine species of bottomfish in American Samoa, following guidelines established in the WPSAR framework. The WPSAR framework identifies a peer review process for the scientific information used to advise the Western Pacific Regional Fishery Management (WPRFMC) Council about the conservation and management of fisheries in the region. The review was held February 17-23, 2023 in the Tradewinds Hotel, Tutuila, American Samoa. A draft version of these responses was presented publicly to the stock assessment team, WPSAR principals, and stakeholders on the final day of the review.

Abbreviations and species names for American Samoa BMUS are in the following table. Note that ETCA and PRFI were not assessed and had a status of "unknown" prior to the review.

APRU	*Aphraeus rutilans*	LUKA	*Lutjanus kasmira*
APVI	*Aprion virescens*	PRFI	*Pristipomoides filamentosus*
CALU	*Caranx lugubris*	PRFL	*Pristipomoides flavipinnus*
ETCA	*Etelis carbunculus*	PRZO	*Pristipomodies zonatus*
ETCO	*Etelis coruscans*	VALO	*Variola louti*
LERU	*Lethrinus rubrioperculatus*		

Responses to the Terms of Reference for the WPSAR

Note that for questions 1-10 and their subcomponents, the reviewers provided a "yes" or "no" answer and did 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. Consensus responses from the panel are presented below. The reader is directed to the individual WPSAR reports for more details provided by each reviewer on the TORs.

TOR 1. Of the data considered for inclusion in the assessment, were final decisions on inclusion/exclusion of particular data appropriate, justified, and well-documented?

Yes, the data included were appropriate, justified, and well documented. Reconstruction of historical catch for 1967-1987 was well done. Standardized CPUE indices before 2016 were excluded from base case assessments. The full CPUE time series (pre-2016) need to be re-examined in more detail prior to the next stock assessments for possible inclusion in base models. This was explored at the meeting and results suggested that it did not impact the status determinations decisions but needs further work.

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

Yes, the CPUE standardization was properly applied and appropriate. The explanatory variables used were sensible and at an appropriate scale. The use of principal components as a proxy for targeting particular species was an appropriate approach. The number of annual surveys informing CPUE was relatively low. The CPUE indices in the base models were short and typically flat with high CVs that had little effect on model results. The effects on CPUE from fuel subsidies and changes in the fleet composition from periods of vessel inactivity due to lack of seaworthiness should be further examined.

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

Yes, the assessment models were reliable, properly applied, adequate, and appropriate for the individual species, fishery, and level of available data which would preclude more complicated models. The assessment software Stock Synthesis (v 3.30) is a standard integrated statistical catch-at-age model that is reliable and well tested.

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

Yes, the decision points and input parameters were reasonably chosen. The process of transitioning from the 2019 assessment using a surplus production model on the species complex to the 2023 assessments using integrated catch-at-age models for each species was not well documented with intermediate stock assessments, analyses, or narrative to provide "bridging runs" from one methodology to the other. This is especially critical given the change in fishery status between the prior and current assessments.

Most life history parameters were not from local studies but were reasonably chosen from studies of the same species in other regions or via the stepwise modeling method. The choice to fix many of the input parameters led to an underestimate of the uncertainty in assessment results but these concerns were adequately explored in sensitivity analyses.

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

Yes, the primary sources of uncertainty were documented and presented. The model diagnostic analyses were comprehensive and well presented. The assessments included base models and several sensitivity runs. A more systematic approach needs to be taken to investigating sensitivity of results to life history parameters (i.e., M, h, L_{inf}). The assumption of fixed life history parameters led to an underestimated uncertainty of stock size and risk of being overfished. Future assessments should also examine the impacts of recruitment variability and time-variation in selectivity on model results.

TOR 6. Are model assumptions reasonably satisfied?

Yes, the model assumptions were reasonably satisfied. The assessment results were driven by the assumptions that life history parameters were fixed, selectivity was flat topped, recruitment was deterministic, observed catch was known with limited error, and length frequencies were representative of the catch. These assumptions may differ substantially from reality. However, the sensitivity of the assessment results generally led to lower probabilities of stocks being overfished or experiencing overfishing.

TOR 7. Are the final results scientifically sound, including but not limited to estimated stock status in relation to the estimated overfishing and overfished status determination criteria (SDC)?

Yes, the final results were scientifically sound, including for status determination criteria. Base assessment model results should not be applied in isolation. The additional sensitivity runs performed during the review should be added to the assessment to better inform managers of the uncertainty in the results. In particular, the *Lutjanus kasmira* assessment results should be interpreted cautiously due to concerns about the life history parameters.

TOR 8. Are the methods used to project future population state adequate, including the characterization of uncertainty, and appropriately applied for implementation of overfishing limits (OFL)?

Yes, the methods used to project future population state were adequate and appropriately applied. Uncertainty in projections was underestimated due to the uncertain catch histories, lack of process error, and assumptions of known life history parameters and no recruitment variability inherited from the base models.

TOR 9. If applied, is the choice of indicator species to evaluate more poorly known species that are in a stock complex appropriate?

Yes, the choice of indicator species to evaluate more poorly known species that are in a stock complex was appropriate. Two species were not assessed and had "unknown" stock status. Based on preliminary biological, habitat, and catch information presented during the meeting, *Etelis coruscans* should be considered as an indicator species for *E. carbunculus* and *P. flavipinnus* as an indicator species for *P. filamentosus*.

TOR 10. Can the results be used to address management goals stated in the relevant FEP or other documents provided to the review panel? 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 1-9 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.

Yes, the assessment results can be used to address management goals stated in the relevant FEP including the bridging analysis and the sensitivity analyses performed during the review meeting. Recent fishing effort is relatively low so overfishing was not a concern. *Lutjanus kasmira* assessment results should be interpreted cautiously. Stock status and fishery catch limits of indicator species should be used for *E. carbunculus* and *P. filamentosus*.

TOR 11. As needed, suggest recommendations for future improvements and research priorities. Indicate whether each recommendation should be addressed in the short/immediate term (this assessment), mid-term (next assessment) 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.

Short/immediate term (this assessment)

- Incorporate a text section, model runs, and analyses to bridge between prior and current assessment data, model, and results per the guidance provided in the discussion above.
- For LUKA, have a stock assessment run with the historical catch series assumed to be measured with error (with appropriate CV and error structure).
- Incorporate life history sensitivity runs and analysis.
- Add section on indicator species. Present standardized criteria and justification for indicator species chosen.
- Add to report a summary table of biological reference points for each species

Mid-term term (next assessment)

- Perform local life history studies for BMUS species and utilize those parameters for base case assessments, with LUKA as a priority.
- Ensure standardized methods of creel survey provide reliable and representative catch, CPUE, and length composition data.
- Revisit incorporation of longer CPUE (1988-2015) time series in base models.
- Incorporate the additional sensitivity runs (Linf, M, selectivity) prepared for this assessment as a standard part of model evaluation.
- Consider full Bayesian stock assessment to explicitly incorporate uncertainty of data inputs into models.
- Catch histories need to be assumed known in the base models with sensitivity runs performed for "low" and "high" catch history scenarios.

Long term (5-10 years)

- Continue to perform local life history studies for BMUS species and utilize those parameters for base case assessments.
- Perform a fishery-independent survey to estimate BMUS density, abundance, biomass, and length composition.

TOR 12. This report is the Summary Report from the WPSAR Chair.