Western and Central North Pacific Ocean Striped Marlin Assessment Review Terms of Reference

Background

The 2019 Western and Central North Pacific Ocean striped marlin (WCNPO MLS) assessment conducted in Stock Synthesis by the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) billfish working group (BILLWG) indicated that the WCNPO MLS stock was overfished and overfishing was occurring, which prompted the efforts of managers to better understand how the stock would respond to fisheries management actions. In the 2019 assessment, the BILLWG highlighted many important uncertainties that should be considered when evaluating the results of the assessment including: stock structure, driftnet catch, life history parameters (especially growth, maturity, and natural mortality), initial equilibrium conditions, input CPUE index standardization and spatio-temporal structure, and diagnostic patterns. Subsequently, requests have been made to the ISC BILLWG to provide additional information, including a rebuilding target based upon 20% of a dynamic B0 and a rebuilding plan based upon constant catch quotas. While the BILLWG attempted to address many of these concerns in the 2023 stock assessment prior to the development of a rebuilding plan, concerns remain with these uncertainties. The ISC agrees that the assessment requires follow up investigation and expert advice in the form of an external peer review, which is important to improve confidence in future WCNPO MLS stock assessments.

This terms of reference outlines the objective and scope for an external peer review of the 2023 WCNPO MLS stock assessment in the ISC BILLWG based upon the peer review process approved by the ISC Plenary in 2023. It is expected that the outcomes and recommendations from this peer review would be incorporated, to the extent possible, in the next WCNPO MLS assessment, tentatively scheduled for 2027.

Objectives

1. Undertake, in consultation with the ISC Billfish Working Group and following the guidelines described in Process for the Independent Review of stock assessments, a peer review of the 2023 striped marlin (MLS) stock assessment in the Western and Central North Pacific Ocean (WCNPO).
2. Based on the review work, provide recommendations for improving the assessment, including data inputs and related analyses, modeling approaches and treatment of uncertainty.
3. In conjunction with the BILLWG members, identify improvement options that are feasible for application to the next WCNPO MLS assessment.

Scope

The key areas for consideration by the peer review panel based on the recommendations of the stock assessment report and follow-up considerations of the assessment team are listed below:

1. Review the information available on Pacific MLS stock structure and conceptual model and provide any recommendations for changing WCNPO MLS stock boundaries or to the fleet structure.
2. Model inputs, commenting on the adequacy and appropriateness of data sources and data inputs to the stock assessment, with particular attention to:
    a. Growth: review the approach to estimation of growth parameters and consider the implications of potential regional variations in growth.
    b. Catch: review the treatment of the catch data, especially with regards to catch prior to 1993, when driftnet catch total amount is highly uncertain due to unspecified species attribution and spatial extent.
    c. Size composition: review the approach for pre-treatment of size composition data (i.e., reweighting), how size composition is weighted for the likelihood function, and how decisions are made to determine which size data are included.
    d. CPUE: review the standardization methods and spatio-temporal structure of the CPUE data for each fleet, and the decision process for data weighting and exclusion of indices from the model.
    e. Data inputs: identify and provide recommendations on the key areas for improvement in data collection (both fishery data and biological information).
    f. Other life history parameters: review the other life history parameters used (weight-length, maturity, natural mortality, stock-recruitment, etc.) for internal consistency and appropriateness for the WCNPO stock.
3. Model configuration, assumptions and settings, with particular attention to:
    a. Fleet structure: review fleet definitions and spatio-temporal structure of catch, CPUE, and size composition inputs.
    b. Selectivity: review selectivity assumptions and settings.
    c. Initial equilibrium conditions: review the estimation of initial equilibrium catch and fishing mortality, recommend if the BILLWG should be estimating the equilibrium conditions (as in the 2023 model) or fixing them and running sensitivity runs to evaluate the sensitivity of these conditions (as in the 2019 model).
    d. Uncertainty: review the approach used to represent uncertainty in model-derived management quantities, considering structural, model and input data uncertainty.
    e. Start year: review the suitability of the current start year (1975) and suggest potential alternatives, such as 1994 (the start of the high seas driftnet moratorium).
    f. Alternative models: review the use of SS3 as the modeling software and determine if it is an adequate tool for the assessment.
4. Model diagnostics, with particular attention to:
    a. Review the suitability of the diagnostics used and reported for the assessment.
    b. Consider the diagnostics provided for the 2023 WCNPO MLS assessment and provide guidance on follow-up work where the diagnostics suggest issues, i.e., data conflicts.
    c. The driver of the pattern of higher fishing mortality after the high-seas driftnet fishery was banned in 1993.
    d. Evaluate the adequacy of the sensitivity analyses in regard to completeness and incorporation of results. Recommend improvements to the communication of the sensitivity run results (plots, tables, and/or text)

5. Comment on the proposed reference points and management parameters (e.g., MSY, F_{MSY}, SSB_{MSY}, $20\%SSB_{F=0}$); if possible and feasible, estimate values for alternative reference points or alternative methods of determining the appropriate reference years for the dynamic B_0 calculations.
6. Suggest research priorities to improve our understanding of essential population and fishery dynamics, necessary to formulate best management practice, with the identification of priorities to improve future assessments.
7. Comment on whether the stock assessment methods, results, and assessment decision process are clearly and accurately presented in the detailed report of the stock assessment.

Reviewers shall prepare a Peer Review Report which should specifically address each TOR.

Key Activities and Outputs from the peer review:

Activity	**Timeframe**
Review 2023 WCNPO MLS assessment and supporting documentation, prepare requests for BILLWG to address at the peer review meeting,	Prior to the in-person meeting.
In person peer-review meeting at New Taiwan University, Taipei, Taiwan	In person, April 15-19, 2023 (4 days + travel)
Provide individual reviewer reports of peer review meeting to ISC Vice Chair	no later than 30 days after completion of the assessment review meeting.
ISC Vice Chair will report out in person to the ISC Plenary Meeting in British Columbia, Canada (final location TBD)	In-person, June 19-24, 2024
ISC Vice Chair to report out to the WCPFC Scientific Committee meeting (Virtually)	Virtually, August 14-21, 2024

Peer review process:

Three experts unconnected to the WCNPO MLS assessment will serve as reviewers during the 5-day review meeting. Each reviewer will be responsible for providing a report of their findings after the review meeting, according to the schedule above.

The ISC Vice Chair will serve as the chair of the review meeting, facilitating the meeting and discussions, as a neutral participant. They will also summarize the recommendations from the review panel for a

report out on the final day of the meeting, and provide a summary report of the reviewers findings on each item in the TOR to the ISC and WCPFC SC. The ISC Vice Chair will then report to the ISC Plenary meeting (ISC24) and the WCPFC Scientific Committee (SC20) the findings of the review panel.