INTER-AMERICAN TROPICAL TUNA COMMISSION

1ST EXTERNAL REVIEW OF DATA USED OF STOCK ASSESSMENTS OF TROPICAL TUNA IN THE EASTERN PACIFIC OCEAN

La Jolla, California (USA)
02-06 October 2023
(by videoconference)

This document outlines the main topics covered by presentations and the relevant documents. The documents in bold are the key documents.

1 Introduction:

1.1 Summary of assessment and management of tropical tunas

Maunder, M.N., and Harley, S.J. 2006. Evaluating tuna management in the eastern Pacific Ocean. Bulletin of Marine Science. 78(3): 593–606

Maunder, M.N., Deriso, R.B. 2014. Proposal for biomass and fishing mortality limit reference points based on reduction in recruitment (SAC-05-14)

Maunder, M.N., Deriso, R.B. 2016. Application of harvest control rules for tropical tunas in the eastern Pacific Ocean (SAC-07-07g)

Valero, J. 2023. Management strategy evaluation (MSE) for tropical tuna fisheries in the EPO: progress report (SAC-14-INF-F)

Presentation: overview of the fisheries, assessments and management for tropical tunas (Alex Aires-da-Silva)

1.2 How the assessments are done.

Xu, H. 2023 (presentation recording). Results of the spatial simulation experiment YFT IO (IATTC team). Presentation to the In-person workshop of the Spatial Stock Assessment Simulation Experiment

Minte-Vera, C.V., Maunder, M.N., Aires-da-Silva, A.M. 2021. Auxiliary diagnostic analyses used to detect model misspecification and highlight potential solutions in stock assessments: application to yellowfin tuna in the eastern Pacific Ocean. ICES Journal of Marine Science 78 (10): 3521– 3537

Aires-da-Silva,A., Maunder, M.N., Xu, H., Minte-Vera, C., Valero, J.L., Lennert-Cody, C.E. 2020. Risk analysis for management of the tropical tuna fishery in the eastern Pacific Ocean. SAC-11-08 REV.

Presentation: How the assessments are done and the risk analysis approach (Mark Maunder).

1.3 Data collection programs

1.3.1 Purse-seine observer program, port sampling program, logbook, and estimation of catches:

Lennert-Cody, C., De La Cadena, C., Chompoy, L., Altamirano Nieto, E., Vogel, N.W., Wiley, B.A., Maunder, M.N., Aires-da-Silva, A. 2023. Enhanced monitoring program for bigeye tuna catches: preliminary results of pilot study and workplan for 2023. SAC-14-10

Lennert-Cody, C.E., Maunder, M.N., Majumdar, A. 2022. The effect of pandemic-related port-sampling data loss on the 2020 purse-seine catch estimate of bigeye tuna in floating-object sets. SAC-13 INF-L

Majumdar, A., Lennert-Cody, C.E., Maunder, M.N., Aires-da-Silva, A. 2022. Identifying and correcting the purse-seine fleet catch for bias caused by the covid-19 pandemic in 2020-2021. SAC-13-05

Román, M.H., Lennert-Cody, C.E., Maunder,M.N., Aires-da-Silva,A., Vogel, N.W. 2017. A review of fishery data available for small purse-seine vessels, with emphasis on FADs. SAC-08-06a

IATTC. 2019. Summary of purse-seine data available for bigeye tuna in the eastern Pacific Ocean. BET-02-06.

Suter, J.M. 2010. An evaluation of the area stratification used for sampling tunas in the eastern Pacific Ocean and implications for estimating total annual catches. IATTC Special Report 18.

Tomlinson, P.K. 2004. Sampling the tuna catch of the eastern Pacific Ocean for species composition and length-frequency distributions. IATTC Stock Assessment Report 4, pages 311-333.

Presentation: Purse-seine observer program, port sampling program, cannery data, logbook, effect of covid19 pandemic, how the use of data can be improved, enhanced monitoring program, need for improvements on data collection, and need of a workshop to discuss how data collection can be improved (Cleridy Lennert-Cody)

1.3.2 Longline data

Minte-Vera, C., Xu, H., Vogel, N.W., Boster, J.E., Lennert-Cody, C., Maunder, M.N., Aires-da-Silva, A. 2019. Data from longline fisheries. BET-02-03.

Griffith, S., Duffy, L. 2017. A preliminary metadata analysis of large-scale tuna longline fishery data in the eastern pacific ocean: a precursor to ecological risk assessment SAC-08-07b

IATTC. 2023. Synopsis of longline observer data reporting pursuant to resolution C-19-08. SAC-14-INF-B

Griffiths, S., Lennert-Cody, C.E., Wiley, B., Fuller, L. 2021. Update on operational longline observer data required under resolution C-19-08 and a preliminary assessment of data reliability for estimating total catch for bycatch species in the eastern Pacific Ocean BYC-10-INF-D

Presentation: Longline data and data submission resolution (Carolina Minte-Vera)

1.3.3 Tagging data:

Fuller, D.W., Lovell, M.S., Opiekun, M.J. 2023. The regional tuna tagging project conducted by the IATTC during 2019-2023: summary report and future directions. SAC-14-07

Schaefer, K.M., Fuller, D.W. 2022. Horizontal movements, utilization distributions, and mixing rates of yellowfin tuna (*Thunnus albacares*) tagged and released with archival tags in six discrete areas of the eastern and central Pacific Ocean. Fisheries Oceanography. 31: 84–107. doi: 10.1111/fog.12564

Schafer, K., Fuller, D., Hampton, J., Caillot, S., Leroy, B., Itano, D. 2015. Movements, dispersion, and mixing of bigeye tuna (*Thunnus obesus*) tagged and released in the equatorial Central Pacific Ocean, with conventional and archival tags. Fisheries Research 161:336-355. https://doi.org/10.1016/j.fishres.2014.08.018

Presentation: The regional tuna tagging projects conducted by the IATTC (Dan Fuller)

2 Stock structure & fisheries definitions

2.1 Conceptual model for yellowfin tuna

Minte-Vera, C., Maunder, M.N., Xu, H., Lennert-Cody, C.E., Lopez, J., Aires-da-Silva,A., Fuller,D.W., Lovel, M.S. 2023. Yellowfin tuna stock assessment: conceptual model and exploratory analyses. SAC-14-06

Presentation(s): Yellowfin tuna stock structure and fisheries definitions (Carolina Minte-Vera)

2.2 Bigeye tuna stock hypotheses

Presentation(s): Bigeye tuna stock structure and fisheries definitions (Haikun Xu).

3 Data for the assessment

3.1 Catch

3.1.1 Purse-seine catch:

Lennert-Cody, C., De La Cadena, C., Chompoy, L., Altamirano Nieto, E., Vogel, N.W., Wiley, B.A., Maunder, M.N., Aires-da-Silva, A. 2023. Enhanced monitoring program for bigeye tuna catches: preliminary results of pilot study and workplan for 2023. SAC-14-10

Majumdar, A., Lennert-Cody, C.E., Maunder, M.N., Aires-da-Silva, A. 2022. Identifying and correcting the purse-seine fleet catch for bias caused by the covid-19 pandemic in 2020-2021. SAC-13-05

R code: https://github.com/HaikunXu/BSE

Presentation: Estimation of catches (BSE) with consideration of the multispecies nature (Cleridy Lennert-Cody)

3.1.2 Purse-seine discards

Presentation: Estimation of discard (Carolina Minte-Vera)

3.1.3 Longline catch

Minte-Vera, C., Xu, H., Vogel, N.W., Boster, J.E., Lennert-Cody, C., Maunder, M.N., Aires-da-Silva, A. 2019. Data from longline fisheries. BET-02-03.

R code: https://github.com/HaikunXu/IATTCassessment/blob/master/R/ll_catch.R

Presentation: Estimation of longline catches (Carolina Minte-Vera)

3.1.4 Longline discards

Presentation: Investigation of high grading (Haikun Xu)

3.2 Indices of abundance

3.2.1 CPUE standardization:

Concept paper:

Maunder, M.N., Thorson, J.T., Xu, H., Oliveros-Ramos, R., Hoyle, S.D., Tremblay-Boyer, L., Lee, H.H., Kai, M., Chang, S.-K., and Kitakado, T. 2020. The need for spatio-temporal modeling to determine catch-per-unit effort-based indices of abundance and associated composition data for inclusion in stock assessment models. Fisheries Research 229: 105594

Longline indices:

Presentations:

1) on spatial domain for indices, use of operational level data versus use of aggregated data, comparison of lognormal versus gamma distribution, effort creep (vessel effect, mention the exploratory runs), indices for each stock for yellowfin tuna (Haikun Xu)

2) background work for indices with flags combined (Japan and Korea) and associated size composition, incorporating environmental effects into the standardization of longline CPUE (Haikun Xu)

Purse index on dolphin set for yellowfin tuna:

Xu, H., Lennert-Cody, C.E., Maunder, M.N., and Minte-Vera, C.V. 2019. Spatiotemporal dynamics of the dolphin-associated purse-seine fishery for yellowfin tuna (*Thunnus albacares*) in the eastern Pacific Ocean. Fish. Res. 213: 121-131

Presentation: changes since the publication, discussion on effort measure, changes in spatial domain according to conceptual model and historical data, comparison of longline and purse-seine index (Carolina Minte-Vera)

Echosounder buoy index

Uranga, J., Lopez, J., Grande, M., Lennert-Cody, C.E., Quincoces, I., Granado, I., Maunder, M.N., Ovando, D., Aires-da-Silva, A., Merino, G., Murua, H., Santiago, J. Tropical tuna biomass indicators from echosounder buoys in the eastern Pacific Ocean. FAD-07-03

Presentation: Feasibility of an echosounder buoy index for bigeye tuna and yellowfin tuna (Jon Uranga and Jon Lopez)

Tagging data index:

Mildenberger, T.K., Nielsen,A., Maunder, M.. 2022. Spatiotemporal tagging model for skipjack in the EPO. SAC-13-08.

Presentation Spatiotemporal tagging model for skipjack (Tobias Mildenberger)

3.3 Composition data

3.3.1 Purse-seine: Length composition from port sampling (BET-02-06)

Presentation: Purse-seine length composition from port sampling (Cleridy Lennert-Cody)

3.3.2 Purse-seine: Categories from observer data

Presentation: add to the presentation above (Cleridy Lennert-Cody)

3.3.3 Longline fleets: length (variations by longline flag, coverage), weight data (not used)

Presentation: Carolina Minte-Vera

3.3.4 Standardized average body weight: from catch in weight and catch in numbers from the operational level data of the Japanese fleet

Presentation: Carolina Minte-Vera

3.3.5 Computation fisheries and index composition data:

Presentation (Haikun Xu):

1) Survey is weighted by the density and fisheries is weighted by the catch, spatiotemporal model to expand the data from the samples

2) How to deal with different fleets to represent the combined catches (for longline catches use of data from Japan and Korea), and combined indices

3) spatiotemporal models (for the purse-seine index for yellowfin tuna the catch rates area in weight, thus there is need to transform from weight to numbers, this can add variability, for the longline indices the catch rate is in numbers

3.3.6 How to treat the pandemic years

Presentation: Summarize the problems there are (Carolina Minte-Vera)

- Purse-seine catch (bias correction)
- Longline catch
- Indices of abundance
- Purse-seine composition data

- Longline composition data

4 Biology

Presentation: Dan Fuller

4.1.1 Length – Weight relationships

4.1.2 Reproductive biology (Maturity, fecundity, etc.)

4.1.3 Weight – weight

5 Effect of data decisions (Model runs with effect of data uncertainty):

(Results will be shown on the presentations above, according to the topic)

- Weighting for longline length composition (sample weighted X catch weighted)
- Weighting for the purse-seine length composition
- Approaches to treat the data from pandemic years
- Uncertainty on how the composition data is rounded (to lower or upper size class boundaries)
- Change on the bin size for length composition data (from 2 to 3 cm or higher at larger sizes, to decrease run time.
- Investigate changes in the population bin sizing as well. [Recommendation from BET-02]
- Investigate uncertainty on splitting the catches by species.
- Investigate assumption of discards in purse-seine
- Investigate assumption of zero discards in longline
- Effect of the pandemic: