Report of the 28th Session of the IOTC Working Party on Tropical Tunas, Data Preparatory Meeting

Virtual Meeting, 10 June – 12 June 2026

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ACRONYMS

AFAD	Anchored Fish Aggregating Device
ASAP	Age-Structured Assessment Program
ASPIC	A Stock-Production Model Incorporating Covariates
ASPM	Age-Structured Production Model
B	Biomass (total)
BDM	Biomass Dynamic Model
BET	Bigeye tuna
B_0	The estimate of the unfished spawning stock biomass
B_{curr}	The estimate of current spawning stock biomass
B_{MSY}	Biomass which produces MSY
B_{thresh}	Threshold level, the percentage of B0 below which reductions in fishing mortality are required
CE	Catch and effort
CI	Confidence Interval
C_{max}	Maximum catch limit
CMM	Conservation and Management Measure (of the IOTC; Resolutions and Recommendations)
CPCs	Contracting parties and cooperating non-contracting parties
CPUE	Catch per unit of effort
current	Current period/time, i.e. $F_{current}$ means fishing mortality for the current assessment year
DFAD	Drifting Fish Aggregating Device
D_{max}	Maximum change in catch limit
EEZ	Exclusive Economic Zone
ENSO	El Niño–Southern Oscillation
E_{targ}	The estimate of the equilibrium exploitation rate associated with sustaining the stock at B_{targ}.
EU	European Union
F	Fishing mortality; F_{2011} is the fishing mortality estimated in the year 2011
FAD	Fish aggregating device
FOB	Floating Object (or Fish aggregating devices FADs)
F_{MSY}	Fishing mortality at MSY
GLM	Generalised linear model
HBF	Hooks between floats
I_{max}	Maximum fishing intensity
IO	Indian Ocean
IOTC	Indian Ocean Tuna Commission
IWC	International Whaling Commission
K2SM	Kobe II Strategy Matrix
LL	Longline
M	Natural Mortality
MSC	Marine Stewardship Council
MSE	Management Strategy Evaluation
MSY	Maximum sustainable yield
n.a.	Not applicable
PS	Purse seine
q	Catchability
ROS	Regional Observer Scheme
RTTP-IO	Regional Tuna Tagging Project in the Indian Ocean
RTSS	RTTP-IO plus small-scale tagging projects
SC	Scientific Committee, of the IOTC
SB	Spawning biomass (sometimes expressed as SSB)
SB_{MSY}	Spawning stock biomass which produces MSY (sometimes expressed as SSB_{MSY})
SCAA	Statistical-Catch-At-Age
SKJ	Skipjack tuna
SS3	Stock Synthesis III
Taiwan, China	Taiwan, Province of China
VB	Von Bertalanffy (growth)
WPTT	Working Party on Tropical Tunas of the IOTC
YFT	Yellowfin tuna

STANDARDISATION OF IOTC WORKING PARTY AND SCIENTIFIC COMMITTEE REPORT TERMINOLOGY

SC16.07 (para. 23) The SC **ADOPTED** the reporting terminology contained in Appendix IV and **RECOMMENDED** that the Commission considers adopting the standardised IOTC Report terminology, to further improve the clarity of information sharing from, and among its subsidiary bodies.

HOW TO INTERPRET TERMINOLOGY CONTAINED IN THIS REPORT

Level 1: ***From a subsidiary body of the Commission to the next level in the structure of the Commission:***
RECOMMENDED, RECOMMENDATION: Any conclusion or request for an action to be undertaken, from a subsidiary body of the Commission (Committee or Working Party), which is to be formally provided to the next level in the structure of the Commission for its consideration/endorsement (e.g. from a Working Party to the Scientific Committee; from a Committee to the Commission). The intention is that the higher body will consider the recommended action for endorsement under its own mandate, if the subsidiary body does not already have the required mandate. Ideally this should be task specific and contain a timeframe for completion.

Level 2: ***From a subsidiary body of the Commission to a CPC, the IOTC Secretariat, or other body (not the Commission) to carry out a specified task:***
REQUESTED: This term should only be used by a subsidiary body of the Commission if it does not wish to have the request formally adopted/endorsed by the next level in the structure of the Commission. For example, if a Committee wishes to seek additional input from a CPC on a particular topic, but does not wish to formalise the request beyond the mandate of the Committee, it may request that a set action be undertaken. Ideally this should be task specific and contain a timeframe for the completion.

Level 3: ***General terms to be used for consistency:***
AGREED: Any point of discussion from a meeting which the IOTC body considers to be an agreed course of action covered by its mandate, which has not already been dealt with under Level 1 or level 2 above; a general point of agreement among delegations/participants of a meeting which does not need to be considered/adopted by the next level in the Commission's structure.
NOTED/NOTING: Any point of discussion from a meeting which the IOTC body considers to be important enough to record in a meeting report for future reference.

Any other term: Any other term may be used in addition to the Level 3 terms to highlight to the reader of and IOTC report, the importance of the relevant paragraph. However, other terms used are considered for explanatory/informational purposes only and shall have no higher rating within the reporting terminology hierarchy than Level 3, described above (e.g. **CONSIDERED**; **URGED**; **ACKNOWLEDGED**).

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EXECUTIVE SUMMARY

The 28th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Tropical Tunas (WPTT), Data Preparatory Meeting was held online from 10 June - 12 June 2026. The meeting was opened by the Chairperson, Dr David Kaplan (EU, France) who welcomed participants and Vice-Chair, Mr Mohamed Shimal (Maldives). A total of 68 participants attended the Session (cf. 64 in 2025, 72 in 2024, 76 in 2023, and 67 in 2022). The list of participants is provided at Appendix I.

The meeting reviewed the available data for tropical tuna species, with a particular focus on skipjack tuna. Participants discussed the updated and revised input data for the upcoming skipjack tuna assessment, focusing on CPUE indices from both the Maldives Pole and Line and the EU purse seine fisheries, as well as two acoustic indices for estimating relative skipjack tuna abundance in the Indian Ocean. The WPTT discussed the model parameters, data availability, and assessment approaches. The WPTT agreed on the initial model structure and sensitivity analyses required to build the final model grid for the skipjack tuna Stock Synthesis model.

1. OPENING OF THE MEETING

1. The 28th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Tropical Tunas (WPTT), Data Preparatory Meeting was held online from 10 - 12 June 2026. The meeting was opened by the Chairperson, Dr David Kaplan (EU, France) who welcomed participants and Vice-Chair, Mr Mohamed Shimal (Maldives). A total of 68 participants attended the Session (cf. 64 in 2025, 72 in 2024, 76 in 2023, and 67 in 2022). The list of participants is provided at Appendix I.

2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION

2. The WPTT **ADOPTED** the Agenda provided in Appendix II. The documents presented to the WPTT28(DP) are listed in Appendix III.

3. The WPTT **NOTED** the late submission of several documents and **RECALLED** that the IOTC requires working papers to be submitted at least 15 days prior to the meeting. While it is recognised that delays are often caused by resource and time constraints beyond the control of the authors, the WPTT **URGED** scientists to make every effort to submit papers before the deadline to allow adequate review by meeting participants.

3. THE IOTC PROCESS: OUTCOMES, UPDATES AND PROGRESS

3.1. Outcomes of the 28th Session of the Scientific Committee

4. The WPTT **NOTED** paper IOTC–2026–WPTT28(DP)–03 on the Outcomes of the 28th Session of the Scientific Committee.

5. The WPTT **NOTED** that in 2025, the SCs reviewed the action points on joint CPUE standardizations and stock assessment of yellowfin tuna as recommended by the WPTT27.

3.2. Outcomes of 30th Session of the Commission (IOTC Secretariat)

6. The WPTT **NOTED** paper IOTC–2026–WPTT28(DP)–04 on Outcomes of the 30th Session of the Commission.

7. **NOTING** that the Commission also made a number of general comments and requests on the recommendations made by the Scientific Committee in 2025, which have relevance for the WPTT, the WPTT **NOTED** that there were several management measures adopted during that meeting that were also of interest to the WPTT. The report from that meeting has yet to be finalised.

8. The WPTT **NOTED** that the overall catch limit for yellowfin tuna set by the newly adopted Resolution 26/01 exceeds the estimated range of Maximum Sustainable Yield (MSY), and for this reason, the Commission has raised concerns about the potential impact on the yellowfin stock, especially given that additional provisions within the resolution could allow the total catch to surpass the specified limit. The WPTT **AGREED** on the importance of monitoring actual catches of yellowfin tuna and their potential effects, particularly in light of the upcoming yellowfin assessment scheduled for 2027.

9. The WPTT **NOTED** the new measures endorsed by the Commission aimed at enhancing the operations of IOTC meetings. These measures include formalizing the meeting registration process, introducing additional procedures to strengthen participation, and establishing a requirement for CPC participants to obtain authorization from their Heads of Delegation or accredited observer organizations. Additionally, the Commission adopted new rules that mandate the timely submission and format of working papers to scientific working party meetings (details are in the Commission report, which is under adoption at the time of this meeting). It was **NOTED** that these decisions stem from the recommendations of a dedicated small working group tasked by the Commission to enhance the structure and function of IOTC

meetings (IOTC-2026-S30-08_Rev2), addressing past concerns raised by some CPCs regarding meeting operations (IOTC-2025-S29-08_Rev1). The WPTT further **NOTED** that this new process aims to ensure that meeting participation is properly endorsed and vetted, aligning with best practices in other RFMOs.

3.3. Review of Conservation and Management Measures relevant to tropical tuna (IOTC Secretariat)

10. The WPTT **NOTED** paper IOTC–2026–WPTT28(DP)–05 containing a Review of Conservation and Management Measures relevant to tropical tuna. The aim of this document was to encourage participants at the WPTT28(DP) to review the existing CMMs relevant to tropical tunas.

3.4. Progress made on the recommendations of WPTT27 (IOTC Secretariat)

11. The WPTT **NOTED** paper IOTC–2026–WPTT28(DP)–06 on the Progress made on the recommendations of WPTT27. The WPTT **AGREED** to consider and revise as necessary, its previous recommendations, and for these to be combined with any new recommendations arising from the WPTT27(DP), **NOTING** that these will be provided to the SC for its endorsement.

4. REVIEW OF THE DATA AVAILABLE AT THE SECRETARIAT FOR TROPICAL TUNA SPECIES

12. The WPTT **NOTED** papers IOTC-2026-WPTT28(DP)-07a and IOTC-2026-WPTT28(DP)-07b , which provided an overview of the information and data held by the Secretariat on the three oceanic tropical tuna species, with a specific focus on skipjack tuna, which is scheduled for assessment this year. The documents describe long-term catch trends, the distribution of catches across the Indian Ocean, the main characteristics of the fisheries in recent years, the reporting quality of the Secretariat's core datasets.

13. The WPTT **NOTED** the decreased catch in the Maldives baitboat fisheries in 2024, with skipjack tuna catches dropping by approximately 30% compared to 2023. The decline was attributed to oceanographic conditions, particularly increased sea surface temperatures, which have affected fishing operations and made it more difficult for fishers to locate and capture tuna. The WPTT further **NOTED** that climate change may also be impacting other fisheries, contributing to reduced catches across multiple sectors.

14. The WPTT **NOTED** the impact of changes over time in estimation methodologies used by large purse seine fisheries. In particular, the transition from the T3 to other estimation methods for official and/or scientific reporting was highlighted following the introduction of yellowfin tuna catch limits in 2017. The WPTT **OBSERVED** that some purse seine fleets maintain separate datasets for scientific and official reporting due to differing estimation approaches.

15. The WPTT further **NOTED** that the new T3R estimation methodology, introduced by some fleets (notably the EU), has been applied to data from 2023, with the aim to improving estimation accuracy, providing more robust uncertainty estimates and of minimising variations in catch data compared to previous years. It was also **NOTED** that these fleets plan to review the methodology and assess its application to historical data in order to evaluate its impact on stock assessments.

16. The WPTT was **INFORMED** that the need to revise the T3 methodology arises from factors such as the large spatial extent and static nature of areas used for calculating catch composition in T3 fortran and the allocation of catch quotas. It was also **NOTED** that catches reported by EU-Italy are affected, as they are estimated by EU-France.

17. The WPTT **RECALLED** that during WPM16 there was a request to review the impact of the new T3R methodology compared with previous catch estimates based on the earlier version. It was **SUGGESTED** that these methodological changes should also be presented to the WPDCS, as

requested by the WPM, where data management experts are available to provide technical input.

18. The WPTT further **NOTED** that catches from Indonesian industrial purse seine fisheries, which may include those associated with anchored FADs, are aggregated under log school catch data in the IOTC databases, and that clear guidance on the classification of fishing modes is lacking. In light of increasing tropical tuna catches, the WPTT **REQUESTED** Indonesia to provide clearer information on the associated fishing modes, particularly for years in which purse seine catches were reported.

19. The WPTT **NOTED** the increasing distribution of fishing effort in recent years (2023–2024) for purse seine fisheries in the Eastern Indian Ocean, particularly around Sri Lanka and Indonesia. **NOTING** that catch data from all surrounding net fisheries, including purse seines and ringnets, are classified as purse seine fisheries in the IOTC database. The WPTT **OBSERVED** that the increase in effort reflects contributions from both industrial and small-scale surrounding net fisheries.

20. Furthermore, the WPTT **NOTED** a change in reporting practices by Sri Lanka, which previously reported effort in number of trips but, in 2024, reported effort in fishing days, now incorporated into the effort distribution plot. Additionally, the WPTT **NOTED** that Indonesia has provided increased effort data over the past two years.

5. New Information on Biology, Ecology, Fisheries and Environmental Data Relating to Tropical Tunas

6. Review of New Information on the Status of Skipjack Tunas

6.1. Nominal and Standardized CPUE Indices

21. The WPTT **NOTED** paper IOTC-2026-WPTT28(DP)-09, which provides an update of Bayesian Skipjack tuna CPUE Standardization for the Maldives Pole and Line Fishery, 1995 – 2025, with the following abstract provided by the author:

> "*The standardized CPUE index for skipjack tuna in the Maldives pole-and-line fishery has been a key input in successive stock assessments since the initial 2011 Indian Ocean skipjack stock assessment conducted using the Stock Synthesis framework. The Maldives skipjack CPUE series that used trip-level and logbook data has been extended using a Bayesian standardization approach that integrates multiple datasets, extending the time series back to 1970. Recent stock assessments (2020, 2023) and the Skipjack Management Procedure have adopted the Bayesian standardized CPUE series from 1995 onwards from the Maldives pole-and-line fishery. The updated CPUE index (1995-2025) demonstrates a declining trend followed by recent increases, approaching peak levels observed between 2000 and 2010. Comparisons with the previous indices (1995–2024) show near-identical results, with a very high correlation (r-squared: 0.9998). Model diagnostics indicate consistency with earlier series and suggest the index remains suitable for stock assessment, though improvements are possible. Better logbook coverage and the availability of vessel-specific data for the period currently in use offer opportunities to refine the model structure, hence alternative models to improve precision are being evaluated to use vessel specific data, to be considered for upcoming Skipjack stock assessments*"

22. The WPTT **NOTED** that the analysis incorporated additional logbook information and vessel-specific datasets while maintaining consistency with CPUE standardization approach of the index used in the previous skipjack tuna stock assessment.

23. The WPTT **NOTED** that the updated index remained highly consistent with previous versions and reflected a decline in abundance between 2023 and 2024 followed by an increase in 2025. Model diagnostics indicated satisfactory model performance.

24. The WPTT **DISCUSSED** the relation in pattern observed in the standardized CPUE index and the reported catches of Skipjack tuna; the authors clarified that the index include data until end of 2025, and that there is an increase in 2025 immediately following the decline observed in 2024, which corresponds with lower reported skipjack catch in 2024, and further noted that the index remains highly consistent with previous versions (R^2 = 0.999845 between the 1995–2024 and 1995–2025 indices).

25. The WPTT **NOTED** that the model jointly estimated skipjack and yellowfin tuna catch rates through shared fishing-power effects and that species-specific abundance indices are derived and reported separately. Model diagnostics did not indicate substantial conflicts arising from this assumption.

26. The WPTT **DISCUSSED** whether changes in the spatial distribution of fishing activity could influence the index. It was **NOTED** that the spatial footprint of the fishery has remained relatively stable over the last decade, and the spatial coverage of the data has not changed substantially, so spatial changes are unlikely to be a major driver of recent CPUE trends.

27. The WPTT NOTED paper IOTC-2026-WPTT28(DP)-10, which summarises a standardized catch per unit effort analysis of skipjack tuna in the Indian Ocean for the European purse seine fleet operating on floating objects, with the following abstract provided by the author:

> "*Indian Ocean EU purse seine floating object (FOB) school catches of skipjack tuna (SKJ; Katsuwonus pelamis) per fishing set for the period 1991-2025 were standardized with two geostatistical spatiotemporal modelling approaches using the sdmTMB R package. One approach considered only the recent time period 2010-2025, but included detailed covariates describing intensity and use patterns of drifting fish aggregating devices (dFADs) by the fleet. The second approach considered the full time period 1991-2025, but was limited to standardization for vessel size, identifier and mixed layer depth. In both cases, a generalized Gamma model was chosen for modeling catches as this distribution family had the lowest AIC. Predictions were made on an extrapolation area for every time step (year-quarter). To calculate the standardized CPUE index, we aggregated the spatial predictions based on an area-weighting approach. We also presented influence plots to explore the impacts of the model components on the standardized CPUE index. The FOB index from this study showed large, multi-year fluctuations with a relatively weak long-term negative temporal trend, though over the most recent period (>2010), estimated abundance is more or less stable with an increase in abundance over the period 2021-2022 followed by somewhat lower, but not historically unusual, values for the period 2023-2025. The index provided here can be incorporated into the 2026 skipjack stock assessment model to inform changes in biomass of skipjack tuna in the Western Indian Ocean*"

28. The WPTT **NOTED** the analysis used logbook data and produced a long series (1991–2025) and a short series (2010–2025) with the latter having incorporated additional operational and dFAD-related covariates unavailable for the full time series.

29. The WPTT **NOTED** the index was derived using sdmTMB geostatistical spatiotemporal models incorporating spatial (ω) and spatiotemporal (ε) random effects, and the standardisation distinguishes density covariates (conditioned upon during prediction) from catchability covariates (fixed during prediction). Authors clarified that the quarter-specific spatial effect represents latent seasonal abundance variation (not catchability), while the spatiotemporal effect captures variation changing over time and space; predicted indices incorporate both ω and ε. Spatiotemporal approaches have stronger effects when covariates show large temporal

changes, though overall standardisation impacts were modest given the extensive dataset, with corrections most evident in 2002–2006 and 2014–2018.

30. The WPTT **NOTED** the prediction/extrapolation grid retained areas with persistent fishing activity (accounting for ~95% of historical catches) and excluded highly seasonal or intermittently fished cells to avoid extrapolation into poorly sampled regions (e.g., grid cells fished in fewer than ten years were removed for the long series). Authors clarified resulting grids were broadly similar across analyses, but alternative spatial definitions could affect indices.

31. The WPTT **DISCUSSED** the similarity between nominal and standardised CPUE trends and the relatively small uncertainty in the standardised index. Authors attributed this to the large number of observations and stable spatiotemporal patterns, while participants expressed concerns that confidence intervals may underestimate true uncertainty and welcomed efforts to improve uncertainty estimation.

32. The WPTT **NOTED** several dFAD-related covariates explained little variability and **DISCUSSED** potential environmental drivers of cyclical patterns. The WPTT **ASKED** about assumptions for dFAD covariates (e.g., number of buoys, buoy-access) and whether buoy density accounted for non-European dFADs or other floating objects. Authors clarified buoy-access was inferred from company-level (not vessel-level) information and buoy density was derived solely from European fleet data, acknowledging these assumptions may influence estimated effects and may be important.

33. The WPTT **ASKED** about the "follow" variable for echosounder buoy usage and fleet-specific effects. Authors pointed out limited detectability of this variable, restricted daily buoy position data, and that fleet-specific analyses or interaction terms could be informative but were not yet explored. Relatedly, authors indicated separate standardisations for French and Spanish fleets had been considered but not yet undertaken and thought differences were unlikely to substantially alter results, though such analyses could provide additional insight.

34. The WPTT **NOTED** evidence of a gradual northward and eastward shift in fishing activity (notably in quarters 1 and 2) and **DISCUSSED** whether this reflects changes in fleet behaviour, stock distribution, or both. Authors pointed out that increased use of echosounder buoys may have enabled targeting of previously less-exploited areas, potentially contributing to observed spatial patterns. The WPTT **ENCOURAGED** further examination of environmental variability as a driver of temporal patterns.

35. The WPTT **ASKED** about covariate correlations and model selection. Authors pointed out that multicollinearity among candidate covariates had been assessed, highly correlated variables removed from consideration, and the remaining covariates showed relatively low correlation.

36. The WPTT **NOTED** papers IOTC-2026-WPTT28(DP)-11, which provided analysis of an ABBI (Associative Behavior Abundance Index) for Skipjack tuna derived from echosounder buoys data in the Western Indian Ocean, combining acoustic observations from multiple buoy generations to estimate abundance trends, with the following abstract provided by the author:

> "*This paper presents abundance trends for skipjack tuna (Katsuwonus pelamis) in the Western Indian Ocean using the Associative Behavior-Based abundance Index (ABBI). Relying acoustic data collected by echosounder buoys deployed by industrial tropical tuna purse seine fishers on drifting floating objects, the ABBI approach provides direct and effort-independent estimates of tropical tuna abundance. Compared to previous applications, the ABBI index presented in this study combines data from different echosounder buoy models, the M3I and M3I+ buoys (Marine Instruments inc.). The methodology which is developed allows producing a joint abundance index for skipjack tuna across buoy generations over 2013-2024*"

37. The WPTT **NOTED** that the ABBI methodology differs from conventional CPUE standardisation by estimating abundance directly from acoustic biomass observations associated with floating objects and that standardization procedures (T3 levels 1–2) were applied to catch and logbook data while avoiding more extensive level-3 corrections.

38. The WPTT **DISCUSSED** mixed-species aggregations and species-composition inference. Authors clarified the ABBI estimates abundance at the aggregation level, using sampled catch data to estimate species proportions and extrapolate skipjack contributions across aggregations, and observer/logbook data are assumed representative of the fishery.

39. The WPTT **DISCUSSED** potential multiple observations of the same aggregation and technological differences among buoy models. Authors explained model-specific standardization was implemented using overlapping periods among buoy generations (e.g., M3I vs M3I+) to account for effort creep and technological improvements and presented model comparisons showing generally consistent trends across buoy types.

40. The WPTT **DISCUSSED** technological improvements and their potential effects: authors considered that newer buoy generations improve biomass detection (potentially reducing overestimation biases) but cautioned that technology alone is unlikely to fully explain recent trends and suggested comparisons with standardized purse seine CPUE and other abundance indicators.

41. The WPTT **NOTED** relatively large uncertainty in some annual estimates (notably 2023) and **DISCUSSED** potential causes—differences among buoy models, regional coverage, changes in species composition, lower sample sizes, or increased catch variability. Authors indicated the 2023 anomaly had not yet been fully investigated and further work was encouraged.

42. The WPTT **ASKED** about assumptions and data coverage for buoy-related covariates (e.g., number of buoys, buoy-access, buoy density) and whether non-European fleets were accounted for. Authors clarified buoy-access was inferred from company-level information (not vessel-level), buoy density was derived from primarily French (European) fleet data, and acknowledged missing data for other fleets may influence estimates and warrant further investigation, including use of Form 3BU where available.

43. The WPTT **SUGGESTED** that further analyses would be beneficial, including diagnostic analyses (variance decomposition, influence plots) to quantify contributions of buoy model, FOB density, and spatial effects; exploration of fleet-specific analyses (e.g., Spanish vs French fleets), interaction terms, and validation of species-composition algorithms from new buoys, and investigation of finer spatial resolution where sample sizes permit.

44. The WPTT **ASKED** about choices of spatial resolution and aggregation. Authors clarified the 10°×10° grid was selected to ensure sufficient sample sizes per spatio-temporal stratum, and that future collaboration and additional fleet data could allow finer-resolution analyses.

45. The WPTT **NOTED** that standardization can substantially affect abundance indices and **ENCOURAGED** careful balancing of bias correction versus preserving observed patterns. Authors reiterated the ABBI's aim is to provide the best possible estimate given current data while acknowledging remaining structural uncertainties and recommending further investigation of drivers of uncertainty and comparisons with other indices.

46. The WPTT **NOTED** paper IOTC-2026-WPTT28(DP)-12, which provided an Index of Abundance of Juvenile Skipjack Tuna (Katsuwonus pelamis) in the Indian Ocean Derived from Echo-sounder Buoy Data, with the following abstract provided by the author:

    "*Collaboration between Spanish vessel-owner associations and buoy providers has enabled the retrieval of data from satellite-linked GPS tracking echosounder buoys deployed by tropical tuna purse seiners operating in the Indian Ocean since 2012. These buoys transmit*

real-time information on Fish Aggregating Device (FAD) positions and acoustic estimates of fish biomass beneath them.Echosounder buoys provide a valuable source of fishery-independent data to monitor tuna aggregations. However, the acoustic signal represents an integrated biomass that does not distinguish species or size composition. To overcome this limitation, buoy data must be combined with fishery information, including species composition and size structure, to derive species-specific indicators.This study presents an updated abundance index of juvenile skipjack tuna in the Indian Ocean based on echosounder buoy data for the period 2012–2024."

47. The WPTT **DISCUSSED** buoy technologies and standardization: five Satlink buoy models (DS+, DSL+, ISD+, ISL+, SLX+) were used and they differ in frequency, sampling interval, and transmission. The data provider maintained a consistent processing framework and buoy model was included as a covariate in standardization. Interactions between year-quarter and buoy model were evaluated. It was **NOTED** that further work is necessary to fully evaluate technological effects and to obtain additional manufacturer information to aid interpretation.

48. The WPTT **ASKED** about spatial extent, prediction treatment in areas with limited buoy coverage, and regional uncertainty. It was **NOTED** that observations from 5°×5° cells with fewer than 100 acoustic records were excluded to ensure adequate sample size. The authors agreed that future work should investigate spatially explicit uncertainty, regional diagnostics, and alternative spatial domains (e.g., restricting to the tropical belt 15°N–15°S) to test robustness and facilitate comparisons.

49. The WPTT **DISCUSSED** differences between recent trends in the buoy-derived juvenile index and CPUE-based indicators, noting that broader spatial coverage of the buoy index may contribute to discrepancies. The authors emphasized that increases in observation number and changes in buoy deployment distribution have occurred over time, and that the standardization explicitly accounts for spatial and temporal effects to mitigate such biases.

50. The WPTT **QUERIED** whether the index is truly fishery-independent given reliance on fishery data for species composition and size. The authors clarified that acoustic observations are fishery-independent, while conversion to species-specific abundance requires auxiliary fishery-dependent information. It was **NOTED** that a consistent standardized procedure was applied across the dataset.

51. The WPTT **NOTED** a few methodological suggestions including exploring more advanced spatiotemporal modelling approaches similar to CPUE standardizations. Authors noted that the current framework includes year-quarter and spatial area effects and their interactions but agreed that advanced spatiotemporal methods could be valuable future developments. The WPTT also **SUGGESTED** explicitly comparing trends by region and buoy model to strengthen confidence in the index.

52. The WPTT **ASKED** about the 30-day threshold for defining "virgin" segments and whether time at sea could be used as a covariate. The authors clarified the threshold was chosen conservatively based on prior studies indicating tuna colonization of FADs typically occurs after ~20–35 days. Future analyses could test alternative formulations incorporating time at sea.

53. The WPTT **SUGGESTED** investigating environmental and climatic drivers (chlorophyll, mixed layer depth, temperature, currents, wave conditions) and comparing recent trends with recruitment deviations from stock assessments (e.g., SS3). The authors pointed out these environmental covariates were already considered but explained relatively little deviance, and agreed that comparisons with independent assessment outputs and further exploration of climate variability would provide valuable validation and interpretation.

7. SKIPJACK TUNA STOCK ASSESSMENT

7.1. Discussion on skipjack tuna assessment models to be developed and their specifications

54. The WPTT **NOTED** the presentation IOTC-2026-WPTT28(DP)-13presentation summarizing the structure and configuration of the skipjack tuna assessment model. The WPTT **DISCUSSED** and **AGREED** on the general steps for the new assessment, which will be reviewed by the WPTT in October.

Model Data

55. The WPTT **NOTED** the suggested cutoff date of 1st August for the preparation of data to be used in the upcoming stock assessment and **NOTED** the importance of ensuring that all required datasets are accessible to participants in a timely manner. The WPTT **NOTED** that the reporting deadline for CPCs is the end of June, after which the Secretariat will work to incorporate submissions into the database and prepare assessment datasets during July.

56. The WPTT **NOTED** that delays in data submissions from CPCs remain a challenge and that, where updated information is not received, data from previous years' are often used as a substitute. The WPTT **NOTED** ongoing efforts to streamline data processing at the Secretariat and improve the efficiency of data preparation.

57. The WPTT **NOTED** initiatives to improve transparency in the assessment process, including the development of digital object identifiers (DOIs) to provide a clear record of the exact datasets used in assessments. The WPTT **NOTED** that work is also underway to modernise and improve the catch-raising process, which currently relies on legacy procedures, with the aim of increasing transparency, reproducibility, and confidence that assessments are based on the best available data.

Model structure

58. The WPTT **DISCUSSED** the differences in the temporal structure of the skipjack tuna stock assessment model compared to the yellowfin and bigeye tuna models. The WPTT **NOTED** that all three assessments operate on a quarterly time scale, but that the skipjack model is structured with four seasons within a year rather than using quarters as the primary temporal unit.

59. The WPTT **NOTED** that substantial investigations were undertaken during previous assessments to evaluate alternative temporal structures. The WPTT **NOTED** that the model structure that uses quarters as the temporal unit was considered to better accommodate the tagging data, as it retains the higher age resolution. However, The WPTT **NOTED** that comparative analyses conducted in the past found little difference in model behavior or assessment outcomes between the two approaches, as such no change to the existing skipjack model structure was considered necessary.

CPUE indices

60. The WPTT **DISCUSSED** the incorporation of CPUE indices in the stock assessment model. The WPTT **NOTED** concerns that although ABBI, BAI, and Catch and Effort indices represent similar components of the population they may provide conflicting signals, therefore should not necessarily all be included in the same model.

61. The WPTT **NOTED** a general preference for including one long-term CPUE index in the assessment, as longer time series provide more information on biomass trends. The WPTT

AGREED that the purse seine and pole-and-line indices remain the primary abundance indicators (as in the previous skipjack assessment), while inclusion of the ABBI and BAI indices should be explored through sensitivity analyses.

62. The WPTT **AGREED** to sequentially test the addition of CPUE indices within the assessment, and present diagnostics at the WPTT(AS) later in the year. The WPTT further **NOTED** that previous assessment had included pairing of the BAI indices with the PSLS and **NOTED** that these combinations along with various other combinations will be tested during the sensitivity analyses.

63. Regarding the incorporation of effort creep into the model, the WPTT **NOTED** support for applying a 0.5% annual effort creep adjustment to the primary PL and PSLS indices, consistent with the approach adopted in the recent bigeye tuna assessment.

64. The WPTT **NOTED** differing views on whether effort creep adjustments should also be applied to the ABBI and BAI indices, with some participants suggesting that these indices may already account for technological developments associated with buoy use, while others considered that technological improvements may continue independently and could still influence these indices. The WPTT **NOTED** that the ABBI index may already partially account for effort creep through the inclusion of catch-per-set information, while uncertainty remains regarding the extent to which technological advances affect the BAI index.

Biological parameters (natural mortality, growth, maturity, steenpness)

65. The WPTT **DISCUSSED** the treatment of natural mortality in the skipjack tuna stock assessment. The WPTT **NOTED** that previous assessments evaluated both constant and age-dependent natural mortality formulations and ultimately adopted a constant natural mortality value of 0.8. The WPTT **NOTED** that, given the rapid growth and relatively short lifespan of skipjack tuna, as well as the limited catch of younger age classes, natural mortality assumptions have historically had a relatively modest influence on assessment outcomes.

66. The WPTT **NOTED** general support for applying the Lorenzen function (age-dependent natural mortality), which is considered to be more biologically realistic than constant natural mortality currently implemented. The WPTT **NOTED** that all other tuna stock assessments already incorporate age-varying natural mortality. The WPTT **AGREED** to evaluate the impact of the Lorenzen function natural mortality estimates.

67. The WPTT **NOTED** that the Lorenzen function would initially assume a maximum age of eight years which is the maximum recorded age for skipjack, corresponding to the oldest age class represented in the model. However, the WPTT **NOTED** uncertainty regarding the most appropriate value for maximum age.

68. The WPTT **NOTED** that estimating growth parameters for skipjack remains challenging due to the species' rapid growth and the need for high-resolution length-frequency data alongside otolith readings, or similar age data. The WPTT **NOTED** that age at length data for skipjack is not available to allow the estimation of growth within the assessment model.

69. The WPTT **NOTED** a suggestion to include an updated length-at-maturity (L_{50}) parameter for skipjack tuna. The WPTT **NOTED** that an updated estimate of 39.9 cm is available based on more recent analyses (Grande et al., 2014), compared to the earlier estimate of 38 cm included in the previous stock assessment, further **NOTING** that both estimates were derived from the same dataset so the more recent estimate (39.9 cm) is considered to be more robust.

70. The WPTT **NOTED** that although the updated estimate may provide a more precise and robust parameterisation, it is not expected to have a significant impact on overall stock assessment outputs. The WPTT **AGREED** that this updated maturity parameter may be examined in the assessment.

71. The WPTT **NOTED** the importance of sharing relevant scientific papers supporting proposed changes to biological parameters prior to data preparation meetings, to allow sufficient time for review and consideration. The WPTT **AGREED** that any changes to biological parameters or related inputs should be supported by appropriate peer-reviewed scientific literature.

72. The WPTT **NOTED** that stock-recruitment steepness values of 0.7, 0.8 and 0.9 have been used historically across the tropical tuna assessments, although the rationale for selecting these specific values was not clearly identified.

73. The WPTT **NOTED** that there is currently limited information available to support the estimation of species-specific steepness values, and therefore the existing range continues to be used.

Model development and assessment plan

74. The WPTT **NOTED** that model development would begin from the framework used in the previous assessment, with key diagnostics used to identify which indices have a meaningful impact on assessment outcomes and should be included in the final model grid.

75. The WPTT **NOTED** that the final reference model or model grid would be determined following the review of the diagnostics from the sensitivity analyses during the assessment meeting, The WPTT **NOTED** that the assessment advice will be based on the broader model grid rather than a single reference model, consistent with previous assessments. The WPTT **NOTED** that previous assessment grids were based on alternative CPUE scenarios and that some adjustment to the model grid may be required to accommodate new indices, including echosounder-based CPUE. However, the WPTT **NOTED** a preference to avoid major changes to the assessment framework and to determine the most appropriate treatment of indices after reviewing model diagnostics. The WPTT **SUGGESTED** evaluating the influence of alternative indices through sequential addition and sensitivity analyses.

76. The WPTT **NOTED** that the development of alternative abundance indices, including ABBI, was undertaken in response to requests from the Commission. The WPTT **NOTED** the value of continuing to develop and evaluate these indices and encouraged ongoing collaboration among scientists working on alternative approaches to abundance estimation.

77. The WPTT **NOTED** that, under current practice, assessments are conducted on a three-year cycle and so are generally treated as “benchmark” assessments, although in most cases only limited changes to the model grid have been implemented between cycles. Additionally, the WPTT **NOTED** that IOTC does not use the same nomenclature as ICES and/or ICCAT. The WPTT **NOTED** that updates are typically undertaken within the assessment process to evaluate the influence of new data and parameter changes.

78. The WPTT **DISCUSSED** how stock assessments are a separate process from running the management procedure (MP). The stock assessment is used to determine stock status and verify that the MP is working as expected. The WPTT **NOTED** that while MPs are evaluated using specific operating models, stock assessments may use updated or alternative models and further **NOTED** that the models do not need to be identical.

79. The WPTT **NOTED** that stock assessments should continue to incorporate the best available and most up-to-date information where possible, including through sensitivity analyses to evaluate the implications of new data or structural assumptions. The WPTT **NOTED** that any significant deviations in model outputs (e.g. biomass estimates) should be noted, and considered within the MP, to identify if and /or when exceptional circumstances have occurred.

80. The WPTT **NOTED** that while some other organisations such as ICES routinely include external review of benchmark assessments being conducted, this approach is not formally mandated in IOTC but suggested that it may be useful to do this in the future.

Reference points discussions

81. The WPTT **NOTED** that the Scientific Committee agreed in 2025 that the 40% SSB0 target reference point should not be used as the primary basis for determining skipjack stock status. The WPTT **NOTED** that reference points should therefore be revisited through the appropriate scientific processes, including consideration by the Scientific Committee.

82. The WPTT **AGREED** to report stock statistics relative to both MSY-based and depletion-based (40% SSB0) reference points without formally labeling stock status. The WPTT **NOTED** that this approach would allow greater transparency on where the stock lies in relation to multiple benchmarks while leaving final status determination to the SC.

83. The WPTT **NOTED** that, in the context of the most recent skipjack stock assessment conducted in 2023, stock status was provided in relation to depletion based reference points, but MSY based indicators were also presented. The WPTT **NOTED** that while stock assessments can provide estimates relative to multiple reference points, the formal determination of stock status should be aligned with agreed reference points established through the SC and Commission. The WPTT further **NOTED** suggestions that managers are involved in the discussions of appropriate reference points to be used to report on the status of stocks.

8. REVIEW OF THE DRAFT, AND ADOPTION OF THE REPORT OF THE 28TH SESSION OF THE WPTT(DP) (CHAIR)

84. The report of the 28th Session of the Working Party on Tropical Tunas Data Preparatory Meeting (IOTC–2026–WPTT28(DP)–R) was **ADOPTED** by correspondence.

Appendix I
List of Participants

Chairpersons					
Title	**First name**	**Last name**	**Affiliation**	**Contracting Parties & Cooperating Non-Contracting Parties (CPC)**	**E-mail**
Mr	David	Kaplan		EUROPEAN UNION	
Title	**First name**	**Last name**	**Affiliation**	**Contracting Parties & Cooperating Non-Contracting Parties (CPC)**	**E-mail**
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			Development Agency		
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Ms	Mariyam	Shama		Maldives	
Mr	Shiham		SFACT		
Mr	Hilario	Murua	ISSF		
Ms	Rosalie	Crespin		EUROPEAN UNION	
Mr	Agurtzane	Urtizberea		EUROPEAN UNION	
Mr	Wen-Pei	Tsai	Invited Expert	TAIWAN	
Mr	Gunawan Dwi	Nugroho		INDONESIA	
Mr	Surya			INDIA	
Mr	Venkatesh			INDIA	
Mr	Anulekshmi			INDIA	
Mr	Rajesh	K M		INDIA	
Ms	Nekane	Alzorriz		EUROPEAN UNION	
Mr	Rajan		ICAR-CMFRI		
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Appendix II
Agenda for the 28th Working Party on Tropical Tunas, Data Preparatory Meeting

Date: 10 June - 12 June 2026

Location: Online

Venue: Virtual

Time: 12:00 – 16:00 (Seychelles time)

Chair: Dr David Kaplan (European Union); **Vice-Chair:** Mr Mohamed Shimal

1. **OPENING OF THE MEETING** (Chair)

2. **ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION** (Chair)

3. **THE IOTC PROCESS: OUTCOMES, UPDATES AND PROGRESS**
   - 3.1 Outcomes of the 28th Session of the Scientific Committee (IOTC Secretariat)
   - 3.2 Outcomes of the 30th Session of the Commission (IOTC Secretariat)
   - 3.3 Review of Conservation and Management Measures relevant to tropical tunas (IOTC Secretariat)
   - 3.4 Progress on the recommendations of WPTT27 (IOTC Secretariat)

4 **REVIEW OF THE DATA AVAILABLE AT THE SECRETARIAT FOR TROPICAL TUNA SPECIES** (IOTC Secretariat)

5 **NEW INFORMATION ON BIOLOGY, ECOLOGY, FISHERIES AND ENVIRONMENTAL DATA RELATING TO TROPICAL TUNAS** (Chair)

5.1 Review new information on the biology, stock structure, their fisheries and associated environmental data for tropical tuna:

- Catch and effort
- Observer data
- Catch at size
- Catch at age
- Biological indicators, including age-growth curves and age–length keys

6 **REVIEW OF NEW INFORMATION ON THE STATUS OF BIGEYE TUNA** (Chair)

6.1 Review of fishery dynamics by fleet (CPCs).
6.2 Nominal and standardised CPUE indices.

7 **SKIPJACK TUNA STOCK ASSESSMENT** (Chair)

7.1 Discussion on skipjack tuna assessment models to be developed and their specifications.
7.2 Identification of data inputs for the different assessment models and advice framework.
7.3 Fishery indicators.

8 **OTHER MATTERS** (Chair)

9 **REVIEW OF THE DRAFT, AND ADOPTION OF THE REPORT OF THE 28th SESSION OF THE WORKING PARTY ON TROPICAL TUNAS (DATA PREPARATORY)** (Chair)

Appendix III
List of Documents for the 28th Working Party on Tropical Tunas, Data Preparatory Meeting

Document	Title
IOTC-2026-WPTT28(DP)-01a	Agenda of the 28th Working Party on Tropical Tunas (DP)
IOTC-2026-WPTT28 (DP)-01b	Annotated agenda of the 28th Working Party on Tropical Tunas (DP)
IOTC-2026-WPTT28 (DP)-02	List of documents for the 28th Working Party on Tropical Tunas (DP)
IOTC-2026-WPTT28 (DP)-03	Outcomes of the 28th Session of the Scientific Committee (IOTC Secretariat)
IOTC-2026-WPTT28 (DP)-04	Outcomes of the 30th Session of the Commission (IOTC Secretariat)
IOTC-2026-WPTT28 (DP)-05	Review of Conservation and Management Measures relevant to tropical tuna (IOTC Secretariat)
IOTC-2026-WPTT28 (DP)-06	Progress made on the recommendations of WPTT27 (IOTC Secretariat)
IOTC-2026-WPTT28 (DP)-07a	Review of Indian Ocean tropical tuna statistical data (IOTC Secretariat)
IOTC-2026-WPTT28 (DP)-07b	Review of Indian Ocean skipjack tuna statistical data (IOTC Secretariat)
IOTC-2026-WPTT28 (DP)-9	An update of Bayesian Skipjack tuna CPUE Standardization for the Maldives Pole and Line Fishery, 1995 – 2025 (Shimal M, Medley P, Ahusan M, Adam S)
IOTC-2026-WPTT28 (DP)-10	Standardized catch per unit effort of skipjack tuna in the Indian Ocean for the European purse seine fleet operating on floating objects (Kaplan D, Grande M, Alonso R, Báez J, Duparc A, Uranga J, Imzilen T, Merino G, Correa G)
IOTC-2026-WPTT28 (DP)-11	ABBI (Associative Behavior Abundance Index) for Skipjack tuna (Katsuwonus pelamis) derived from echosounder buoys data in the Western Indian Ocean (Baidai A, Duparc A, Imzilen T, Dupaix A, Capello M)
IOTC-2026-WPTT28 (DP)-12	Index of Abundance of Juvenile Skipjack Tuna (Katsuwonus pelamis) in the Indian Ocean Derived from Echo-sounder Buoy Data (Uranga J)
IOTC-2026-WPTT28 (DP)-13presentation	Stock assessment model of skipjack tuna (Katsuwonus Pelamis)