ANNEX 05

26th Meeting of the
International Scientific Committee for Tuna
and Tuna-Like Species in the North Pacific Ocean
Taipei City, Chinese Taipei
22-29 June 2026

REPORT OF THE PACIFIC BLUEFIN TUNA WORKING[1]

March 24-27, 2026
Sapporo, Japan

June 2026

[1] Prepared for the 26th Meeting of the International Scientific committee on Tuna and Tuna-like Species in the North Pacific Ocean (ISC) held June 22-29, 2026, in Taipei City, Chinese Taipei. Document should not be cited without permission of the authors.

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INTERNATIONAL SCIENTIFIC COMMITTEE FOR TUNA AND TUNA-LIKE SPECIES IN THE NORTH PACIFIC OCEAN (ISC)

PACIFIC BLUEFIN TUNA WORKING GROUP

INTERSESSIONAL WORKSHOP

March 24-27, 2026

Hokkaido University, Sapporo, Japan

Meeting Report

1 Opening and Introduction

1.1 Welcome and introduction

S. Nakatsuka, Chair of the PBFWG welcomed the participants and opened the meeting.

1.2 Adoption of agenda

The adopted agenda is attached as Appendix 1. The list of participants and the list of documents are attached as Appendix 2 and 3, respectively.

1.3 Appointment of rapporteurs

Rapporteurs are assigned as follows: Item 2: Y. Tsukahara, Item 3.1 and 3.2: M. Maunder, Item 3.3-3.5: H.H. Lee and Item 4: H. Fukuda.

2 Management Strategy Evaluation

2.1 Review of the 2026 JWG intersessional meeting report

The PBFWG chair reported on the discussions and results of the JWG intersessional meeting held in Newport Beach, USA in March 2026. The JWG agreed to further consider two additional candidate HCRs which set the target reference point to FSPR27.5% and set the total allowable catch (TAC) every two years (2-year cycle). At the JWG meeting, the PBFWG chair noted that conducting a full simulation by the next JWG meeting in July 2026 is unfeasible, while the expected TAC for the 1st period can be available using the estimation model (EM) from the MSE with the latest data. In addition to the calculation of the TAC, the PBFWG was also requested to draft an “Exceptional

circumstances protocol" for the PBF MSE and to provide information on the recent recruitment to the JWG.

The PBFWG discussed concern that the performance of the newly proposed HCRs had not been tested in MSE simulations. Because all previous HCRs assumed a 3-year cycle for each management period, the performance of HCRs with a 2-year cycle has not yet been tested within the latest MSE simulation framework. Generally, a management procedure (MP) with a shorter management period would have higher adaptability by promptly detecting the changes in stock dynamics. Given the current PBF MSE results, the TAC will increase/decrease more quickly in the short term, and thus the SSB trajectory will change; for example, the speed of the SSB increase would be suppressed and the degree of SSB overshoot would become less noticeable, given the 25% increase/decrease limit on TAC change between management cycles when SSB > LRP.

Although conducting the full simulation test immediately was unfeasible for the newly proposed HCRs, it was pointed out that the PBFWG may need to consider providing managers with preliminary information on performance, if possible, especially for the robustness against the recruitment drop scenario in the robustness test. The PBFWG reviewed the risk of breaching the LRP for HCRs with multiple F targets. The HCRs with an F target greater than 30% showed a less than 10% risk or breaching 7.7%SSB0, while those below 25% showed a risk exceeding 10%.

The PBFWG agreed that once the MP is adopted by the JWG, the PBFWG should fully evaluate it by rerunning the MSE simulations. These results will also be used for the evaluation of Exceptional Circumstances.

2.2 TAC1 calculations for the NPB MP candidates

The PBFWG reviewed the calculated TACs for the first management period (TAC1) for the newly proposed HCRs (HCRs 17 and 18). The TACs for large fish in the WPO were identical, reaching the 25% upper limit for TAC changes in both HCRs. The TACs for small fish in the WPO and EPO were different due to the variations in the impact ratio for each HCR. The actual TAC values are in Appendix 4 of this report.

2.3 Relationship between the MP update and stock assessment

Before the 2026 intersessional JWG meeting, the MP with a 3-year cycle was expected to be implemented. The PBFWG planned the schedule for the assessment and TAC calculation accordingly. However, since the MP with a 2-year cycle is now the most likely to be selected in accordance with the JWG discussions, the PBFWG reconsidered the schedule to accommodate a 2-year cycle.

To avoid the potential confusion caused by discrepancies between the stock assessment and the estimation model in the MP calculation, it is generally not recommended to conduct both simultaneously in the same year. On the other hand, the PBFWG needs to address the recommendations from external reviewers for the next benchmark assessment, and the need for more frequent MP updates makes scheduling difficult. After a lengthy discussion, the PBFWG agreed to conduct the benchmark assessment in 2030. Subsequently, in 2031, the PBFWG will perform the OM reconditioning based on the 2030 assessment model in preparation for the MP review planned in 2032.

In addition to the benchmark assessment, the PBFWG also agreed to conduct a "Health Check", using the 2024 stock assessment model with the latest data. Through this Health Check, the performance of the recruitment index will also be evaluated by checking its internal consistency with the existing information. The detailed work schedule is summarized in Table 1 of this report.

The PBFWG discussed whether the full dynamics model of SS3 should be used as the EM instead of ASPM-R+. Using a full dynamics model enables us to provide TAC advice based on more detailed information, whereas the current HCRs were evaluated using the ASPM-R+ within the MSE. Although the PBFWG recognized the advantages of the full dynamics model, it agreed to use the ASPM-R+ for MP TAC calculations for the consistency with the MSE.

2.4 Monitoring strategy and Exceptional circumstance protocol

The PBFWG discussed the "Exceptional Circumstance Protocol" (ECP) for the PBF MSE, which was drafted by the chair based on protocol for NP albacore. The longline CPUE can be used as an indicator to monitor the stock trend after the implementation of the MP, by comparing it with the range of simulated CPUE trajectories in the MSE. Furthermore, it was suggested that the selectivity should be explicitly included as an indicator in the ECP. In order for an ECP evaluation, the PBFWG noted that a full MSE simulation for the adopted MP needs to be conducted once the JWG adopts an MP which was not tested in the MSE such as HCRs 17 or 18.

Regarding the exceptional circumstance of a recruitment drop, because the current EM does not include a recruitment index after 2011 in the model, it was agreed that the Recruitment Monitoring Index (RTM) would be used as an indicator to detect a low recruitment trend. The PBFWG discussed the possible effects and actions upon detecting the recruitment drop. The current MP uses the population numbers-at-age in the terminal year for TAC calculations. Therefore, theoretically a recruitment drop would be reflected in the TAC calculation. However, the spawning stock biomass would collapse with some delay if recruitment fails continuously, and the group recognized the necessity of actions to evaluate the severity of such an event.

2.5 New Idea for further MP development

Summary

D. Tommasi presented *"Evaluation of Alternative Management Procedures for Pacific Bluefin Tuna under a Recruitment Drop Scenario*". While the candidate MPs tested in the PBF MSE showed adequate performance across the reference set, the effort creep robustness test, and the catchability change robustness test, performance deteriorated for the 10-year recruitment drop robustness scenario. Here we detail the results of additional simulations assessing performance under the recruitment drop robustness of an estimation model with a recruitment index, a harvest control rule based on total rather than spawning stock biomass, and of an MP using a recruitment warning index. We show that the inclusion of a recruitment index improves recruitment estimation in the EM, leading to improvements in both safety and yield during a sustained drop in recruitment. The use of an external recruitment warning index that triggers an exceptional circumstance also improved both safety and yield during a recruitment drop due to an earlier but more gradual reduction in the TAC.

Discussion

The PBFWG thanked the analyst for the additional work and recognized the importance of having a recruitment index in the EM. The RTM index will be available up to the most recent years, while the inclusion of the index in the model requires further investigation in terms of its consistency with the current input data for the assessment in the "Health Check". If the RTM shows good performance, the inclusion of the RTM in the EM will be also considered for future work.

2.6 Deliverable to the 2026 July JWG

The PBFWG reviewed the response to the JWG, which include the TAC1 calculations for the new HCRs, the draft ECP, and an updated recruitment index. The adopted response is provided in Appendix 4.

3 General plan for the 2027 stock assessment

3.1 Review and prioritization of the recommendations from the SA peer review

The PBFWG reviewed the draft recommendations from the peer review panel, which convened prior to the PBFWG meeting. It was noted that a formal report documenting the responses to the reviewers' recommendations needs to be developed once the peer review report is finalized. An Excel table should be developed containing the recommendations and initial responses.

The PBFWG discussed at length the role of the stock assessment once the MP is implemented. It was noted that the role of the assessment is to monitor the status of the stock ("Health Check"), and that continuity is important to track the trajectory of the stock, while improving knowledge of the stock, such as suggested by the peer review, is also important. The PBFWG will continue to discuss how to improve the stock assessment and conduct the Health Check while addressing the

recommendations from the peer review. The preliminary discussion in response to the draft peer review recommendations is summarized below.

Growth

Sensitivity analyses of the assessment model to the growth equation were conducted in 2006 and found a large influence on the stock assessment results. The growth curve has been improved since then and was implemented following the 2016 stock assessments. Many of the panel recommendations are already within the scope of the collaborative aging project which was initiated in 2025 by the researchers from Japan, USA, and Chinese Taipei, but there are no formal results yet. The project is still ongoing and needs more time to review otolith readings by each member to standardize the method.

It was discussed whether the collaborative group should address the recommendations or whether the PBFWG should address them. The recommendations covered both data and analyses. Aging aspects should be considered by the collaborative group, while the PBFWG should look at analyses such as growth models, cohort-specific growth, etc., once the updated (standardized) data is available. At the same time, the collaborative aging group needs to work with the PBFWG, and Japan will lead the further collaboration between the aging group members and the PBFWG. It was suggested that the aging group members should be invited to the ISC Plenary to discuss a plan for further collaboration.

It was noted that sex-specific growth was reported. The PBFWG agreed to further consider the issue when reviewing growth in general.

Reproduction

It was noted that a sensitivity analysis should be conducted based on the latest findings regarding maturity.

Movement and distribution

It was considered a long-term task to construct a model incorporating movement of the stock.

Recruitment

This is considered a long-term project, although progress is being made.

Natural mortality

The PBFWG will consider using a prior for M and conducting a Bayesian analysis to represent uncertainty in the benchmark assessment.

Weight length relationship

The PBFWG previously looked at data from Japan, Korea, and Chinese Taipei in 2019 and found some seasonal and sex-specific differences, but the overall results were very similar to what is being used in the current assessment (Kai et al. 2007). It was noted that changes in the weight-length relationship might alter the definition of small and large fish used for management. There is a need to conduct a more thorough analysis and write a working paper for consideration for use in the benchmark assessment.

Recruitment index

This was recognized as the highest priority, and the PBFWG encouraged further research.

Chinese Taipei longline index

The PBFWG noted that the Chinese Taipei longline CPUE index is currently the only abundance index used in the MSE and needs to be carefully monitored if catchability is changing. It was noted that there is little difference in the results between GLMM and VAST, but the GLMM is currently preferred as its time series is longer. However, VAST may be more suitable in the future for the Chinese Taipei index as the population continues rebuilding and the quota is reached earlier. There were fishery closures in 2024 and 2025, but they were short so they probably did not influence the catchability. Closures may become longer in the future, and the PBFWG needs to consider whether the spatio-temporal model can deal with them appropriately. Both approaches should continue to be conducted, and the differences should be evaluated. For the benchmark assessment, the PBFWG should also evaluate the VAST at age index. See Agenda item 3. 3 for further discussion.

Age data in assessment

It was commented that including the conditional age data in assessment may cause bias. The PBFWG should evaluate the age data when it becomes available and determine how it should be used.

TOR 3 (Model Configurations)

These recommendations should primarily be considered when the benchmark assessment is conducted. However, some of them could be evaluated between now and the benchmark assessment. The table of fishery characteristics should be updated with columns for the quality of the composition data and data weighting approach, etc.

Ensemble models

There has been high interest from other parties in developing ensemble models. The need for an ensemble model depends on the objectives for using an assessment model. There is a need to define what the stock assessment model should be used for. An ensemble model is needed for

developing the operating models for the second round of MSE testing to be done in the future. It can also be used as an assessment model. A Bayesian MCMC approach using priors may be considered instead of a large grid approach.

Bootstraping

Previous assessment results showed that the bootstrap results in SS3 is biased, and therefore it was not used to represent uncertainty in the 2024 assessment. In addition, a multivariate normal distribution was used for the Kobe plot uncertainty.

TOR 5 (Research Priorities)

CKMR

It was noted that Japan is making progress on CKMR research to estimate SSB. It was clarified that the samples from other members could help the program, but the sampling design needs to be carefully considered. In order to incorporate genetic data from other members into the Japanese analysis, the samples need to be sequenced using the same patented method used in Japan by each member. It was also noted that CKMR can provide qualitative information such as connectivity between the spawning area and the EPO. The PBFWG encouraged members to further collaborate on CKMR researches.

3.2 Possible areas to be improved

The PBFWG discussed the possible modifications to the fleet structure in the assessment model. Korea noted that an increase in catches by Korean set nets has been observed in recent years, and the possibility of classifying set nets as a new fleet has been considered. Korea is currently reviewing available data to support this fleet classification; however, concerns were raised regarding the limited availability of size composition data. The PBFWG suggested that size composition data from the Korean large purse seine fishery or from Japanese set nets could be used as alternative sources. The PBFWG also encouraged members to review their fleet structures to construct better input data.

3.3 Abundance index

Chinese Taipei longline index

Summary

S.K. Chang made a presentation on the working paper "*Updated abundance indices for the Chinese Taipei Pacific bluefin tuna longline fishery using GLMM and VAST models*" (ISC/26/PBFWG-02/01). The total catch of Pacific bluefin tuna (PBF) from Chinese Taipei coastal and offshore fisheries (mainly longline) reached a peak of 3,089 metric tons (mt) in 1999, followed by a continuous decline to a historic low of 214 mt in 2012. In recent years, the catch has shown a significant

recovery, reaching 2,262 mt in 2024. The latest preliminary estimate for the 2025 catch is 2,339 mt, the second-highest record in the last two decades.

The average length of PBF was around 212–220 cm before 2008. Subsequently, the average length in the North region remained stable at 218–224 cm, while in the South region, it peaked at 235 cm in 2012 and then trended downwards, stabilizing at 206–210 cm between 2020 and 2025. The latest data from 2025 show that the average length in both the South and North regions is approximately 205–206 cm. Length frequency distributions indicate that the catch compositions are dominated by a few cohorts, with variations primarily driven by recruitment fluctuations.

Following the recommendations of the previous meeting, this study employed the delta-Generalized Linear Mixed Model (GLMM) and the Vector-Autoregressive Spatio-Temporal (VAST) model to standardize the CPUE. A key difference from previous analyses is the exclusion of Sea Surface Temperature (SST) as a covariate, as prior research demonstrated its negligible impact on standardized CPUE within the relatively small and seasonally concentrated Chinese Taipei fishing grounds. The results show a high degree of consistency between the models: all standardized CPUE series indicate a decline from 2003, reaching a nadir in 2011–2012, followed by a slow recovery thereafter and a rapid increase since 2020, suggesting a marked stock recovery.

Discussion

The author clarified that the usual season runs from the end of April to early July. In 2024 and 2025, the fishing season closed earlier than in previous years due to the quotas being reached. Specifically, the closure occurred in the mid-June in 2024 and 2025. Consequently, CPUE standardization in both the GLMM and VAST models utilized data up to the available dates in June for 2024 and 2025. There was extensive discussion regarding the Chinese Taipei longline abundance index during both the peer-review meeting and the PBFWG meeting. The PBFWG questioned how the early closure affected the CPUE standardization.

The author confirmed that “month” was used as a fixed effect and the “year:month” interaction as a random effect in both the GLMM and the VAST models. A PBFWG member raised concerns about potential estimation bias when using the year:month interaction term in the case of the shortened month periods in 2024 and 2025. To test this effect, the member suggested conducting cross-validation by excluding data from June and July in 2022–2023 during standardization, and comparing the results with and without these data in both the GLMM and VAST. The PBFWG recommended completing this exercise prior to the 2026 Plenary meeting.

A PBFWG member asked whether age composition data were used in the updated CPUE (i.e., the VAST-at-age model). Although this was not updated, the author noted that similar signals can be

observed in the size compositions. Another question was raised regarding the size and age of catches in the areas around the Okinawa Islands compared to Chinese Taipei. It was noted that the size data from Okinawa show a similar trend to that from the North area of Chinese Taipei.

The PBFWG observed that the influx of the size compositions in the Chinese Taipei longline fishery from 2023 seems to coincide with the high Japanese recruitment index in 2016. The recent increasing trend in the Chinese Taipei longline index may likely suggest higher survival of new adult cohorts following the implementation of management measures after 2015.

The PBFWG recognized that the trend of the stock is examined annually, and the MP requires regular updates following its adoption. Based on the MP cycle, an annually updated Chinese Taipei longline index and its corresponding size composition data are required.

Japanese longline index

Discussion

The PBFWG encouraged research into developing a Japanese longline index following the implementation of individual quotas.

Recruitment index

Summary

K. Nishikawa presented "*Recruitment abundance index of Pacific bluefin tuna based on real-time troll monitoring survey data using Vector Autoregressive Spatio-Temporal (VAST)"*. This presentation had the most recent recruitment information based on monitored operations in the waters around the Goto and Tsushima Islands from November to February of the following year. The authors utilized the chartered operations for this survey to reinforce data collection, which enabled the survey to operate somewhat free from the strict management measures. The preliminary index value in 2025 was provided only for informational purposes. The value was the highest in 2025, although only survey operations prior to February were incorporated in this analysis due to time constraints.

Discussion

The PBFWG recognized that the real-time recruitment monitoring index (RTM) provides more timely information compared to the longline index. For example, in 2026, the Chinese Taipei longline index can only include data up to 2025 (the 2024 fishing year), whereas the RTM index can include data up to 2026 (the 2025 fishing year).

Summary

K. Nishikawa presented "*Data filtering method for the RTM data"*. The recruitment index based on real-time troll monitoring (RTM) data has been developed using both conventional and chartered RTM operations. However, there were differences in the nominal CPUE between the chartered RTM operations and the conventional RTM operations. In this study, the authors conducted the analysis to attempt to separate the operation characteristics of target species by using a GLMM and a Hidden Markov model. The analytical methods will continue to be examined.

Discussion

The PBFWG noted the advantages of using the RTM index on the chartered vessel data, as they specifically target PBF. However, because these data are only available after 2017, efforts are being made to develop a PBF-targeted RTM index using conventional data to fill the pre-2017 gap. The PBFWG also recognized the potential differences in catchability between the conventional and chartered RTM indices and differences in the fishing grounds.

The PBFWG acknowledged the effort to transition the targeting filter for the conventional recruitment monitoring index from a manual to an automated process. The PBFWG encouraged further work for improving the method including, but not limited to: increasing the survey prediction rate from 50% to near 100%, excluding false positives from the CPUE analyses, and exploring the use of different training datasets (e.g., combining Fukuchi's and chartered data versus using chartered data alone).

3.4 Population dynamics model

Extensive discussions on growth and natural mortality took place during the peer-review meeting, after which no further comments were raised.

3.5 Other model structures

Extensive discussions on model structures took place during the peer-review meeting, after which no further comments were raised.

4 Work plan and recommendations

The PBFWG agreed to hold one data preparatory meeting in the fall of 2026 (virtual) and a Health Check meeting in early 2027 (face-to-face). Recent meetings have been held in Japan, the USA, and Taiwan and the PBFWG would appreciate it if other members could consider hosting the future meetings. The PBFWG also agreed to hold a half-day meeting in conjunction with the 2026 Plenary to review catch information and discuss further collaboration on growth research.

5 Other matters

Distribution of Pacific bluefin tuna (Thunnus orientalis) eggs and larvae in Korean waters

Summary

H. Park presented a study on the "*Distribution of Pacific bluefin tuna (Thunnus orientalis) eggs and larvae in Korean waters*" (ISC/26/PBFWG-02/02). Both eggs and larvae of Pacific bluefin tuna were first collected near Jeju Island in 2021, and then their spatial distribution has expanded into the East Sea. In terms of vertical distribution, eggs were predominantly found in the surface layer (0–10 m), whereas larvae were mainly distributed at depths of 10–20 m. Since then, both eggs and larvae have been continuously observed in Korean coastal waters through 2025. Notably, compared to the results of 2021, samples collected in 2025 showed an expanded spatial distribution and an increasing trend in abundance.

Discussion

It was clarified that bluefin eggs and larvae were found in both the Bongo net and MOCNESS, and that the main species found in the samples were PBF, chub mackerel, hairtail, and amberjack. The PBFWG commended the research efforts by Korea and considered the results to be very interesting. It was noted that the spawning area may be expanding in recent years due to the increase in biomass or other factors. It was introduced by Japan that relatively small age-0 fish (about 20 cm) were found around the winter in Tsushima Islands this year.

PBF Recruitment and environmental variability

Summary

M. Betancourt presented "*PBF Recruitment and environmental variability"* (ISC/26/PBFWG-02/03). The study evaluates whether Pacific bluefin tuna (*Thunnus orientalis*) recruitment variability is associated with large-scale climate variability and regional oceanographic conditions, particularly sea surface temperature (SST) and climate indices such as the PDO, ONI, and SOI. Recruitment estimates from the 2022 and 2024 Pacific bluefin tuna stock assessments were analyzed for the period 1952–2022. Two analytical approaches were used: Generalized Additive Models (GAMs) to detect nonlinear relationships between recruitment and environmental variables, and Self-Organizing Maps (SOMs), a machine-learning clustering method, to identify patterns in environmental conditions associated with recruitment levels. The best GAM model corresponded to environmental conditions during the fourth trimester (October–December). The model explained 22.7% of the recruitment variability, which is typical for environmentally driven recruitment models. The SOM identified three clusters of environmental conditions: two clusters with low recruitment associated with high PDO values and lower temperatures, and one cluster with high recruitment associated with warmer temperatures and low PDO values. Both modeling approaches suggest that environmental conditions, particularly temperature and ENSO-related variability, can influence recruitment, especially during the later part of the year. However, environmental factors explain only a moderate portion of recruitment variability, indicating that recruitment is influenced by multiple interacting biological and ecological processes.

Discussion

The PBFWG appreciated the work. The PBFWG noted that the research to understand the environmental impact on recruitment is crucial for PBF management and encouraged further work as a wide variety of information is available for the stock.

Election

Shuya Nakatsuka was re-elected as Chair for the 2nd extension and Shui-Kai Chang was re-elected as Vice-Chair for the 1st extension.

6 Adoption of the meeting report

The draft report was reviewed, revised and adopted.

7 Adjournment

The meeting was adjourned on March 2026.

Table 1: PBFWG work schedule

	PBFWG Poroposed Action Plan	Anticipated tRFMO's management action	Required data and Model
2025	・ISC PBFWG Completed MSE. ・ISC PBFWG provided results to JWG.	・JWG Duscussed on candidate MPs.	
2026	・ISC PBFWG will provide TAC-1 for the requested MP (NPB MP-TAC1) to the JWG. ・ISC PBFWG will provide recruitment index updates to the JWG. ・ISC PBFWG will provide the Exceptional Circumstance criteria to the JWG.	・JWG will agree upon a MP to be introduced since 2027.	
2027	・ISC PBFWG will provide the full-spec MSE simulation results for the agreed upon MP. ・ISC PBFWG will provide the updates on the most relevant information of SSB, Recruitment, and Fishing intensity for the health check of this species. ・Examnation of EC	・NPB MP-TAC1 will be implemented.	・ Health-check assessment (data update assessment): 2024 stock assessment model will be updated with the catch data, size composition data, Taiwanese Longline CPUE index, and recruitment index if available.
2028	・ISC PBFWG will provide TAC-2 for the adopted MP to the JWG. ・Examination of EC	・NPB MP-TAC1 will be implemented.	・Estimation Model will be updated with the catch data, Taiwanese Longline CPUE index, and Taiwanese Longline size composition data.
2029	・Research Year ・Examination of EC	・NPB MP-TAC2 will be implemented.	Taiwanese Longline and Japanese recruitment CPUE indices
2030	・ISC PBFWG will complete the benchmark assessment. ・ISC PBFWG will provide TAC-3 for the adopted MP to the JWG. ・Examination of EC	・NPB MP-TAC2 will be implemented.	・Benchmark stock assessment ・Estimation Modeil will be updated with the catch data, Taiwanese Longline CPUE index, and Taiwanese Longline size composition data.
2031	・MSE Review: ISC PBFWG will re-evaluate the performance of the adopted MP based on the simulation using the re-conditioned OMs based on the benchmark assessment. ・Examination of EC	・NPB MP-TAC3 will be implemented.	・2030 stock assessment model will be re-conditioned as OMs for the MSE simulation. The performance of the adopted MP will be re-evaluated through the same performance metrics with the 2025 PBF MSE.
2032		・NPB MP-TAC3 will be implemented. ・Next MP be adopted.	

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Appendix 1

INTERNATIONAL SCIENTIFIC COMMITTEE FOR TUNA AND TUNA-LIKE SPECIES IN THE NORTH PACIFIC OCEAN (ISC)

PACIFIC BLUEFIN TUNA WORKING GROUP

INTERSESSIONAL WORKSHOP

March 24-27, 2026

Hokkaido University, Sapporo, Japan

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- 2.4 Monitoring strategy and Exceptional circumstance protocol
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- 3.1 Review and prioritization of the recommendations from the SA peer review
- 3.2 Possible areas to be improved
- 3.3 Abundance index
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4 Work plan and recommendations

5 Other matters

6 Adoption of the meeting report

7 Adjournment

Appendix 2

List of participants

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Appendix 3

List of documents

index	Title	Author
ISC26/PBFWG-02/01	Updated Abundance Indices for the Taiwanese Pacific Bluefin Tuna Longline Fishery Using GLMM and VAST Models	S.-K. Chang and Y.-H. Tai
ISC26/PBFWG-02/02	Distribution of Pacific bluefin tuna (*Thunnus orientalis*) eggs and larvae in Korean waters	S. H. Myoung, S. C. Yoon, J.-H. Lee and H. Sohn
ISC26/PBFWG-02/03	PBF Recruitment and environmental variability	M. Dreyfus and M. Betancourt
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number	Title	Author
	Evaluation of Alternative Management Procedures for Pacific Bluefin Tuna under a Recruitment Drop Scenario	Desiree Tommasi
	Recruitment abundance index of Pacific bluefin tuna based on real-time troll monitoring survey data using Vector Autoregre	Kirara Nishikawa, Yohei Tsukahara and Hiromu Fukuda
	Data filtering method for the RTM data	K. Nishikawa, T. Irie, Y. Tsukahara and H. Fukuda
	Information paper	
	Title	Author
	Criteria for identifying exceptional circumstances for north Pacific albacore tuna V03 (ISC/25/ANNEX/04, Attachement 5)	ISC ALBWG

Appendix 4

Response to the Joint IATTC and WCPFC-NC Working Group on the Management of PBF

At its third intersessional meeting held in March 2026, the Joint IATTC and WCPFC-NC Working Group on the Management of Pacific Bluefin Tuna (JWG) requested ISC to provide (i) TAC1 calculation for the new candidate HCR (shown below), and (ii) update on the PBF recruitment index to JWG11. Further, JWG10 in 2025 had requested ISC to provide input for Exceptional Circumstances provisions for PBF MP. This document provides responses of the ISC to those requests from JWG.

(i) Calculation of TAC1 for the new candidate HCRs

HCRs

The new candidate HCR provided by JWG in March 2026 is as follows:

F-target	Control Point 1 (ThRP)	Control Point 2	No. of Control Points	Fmin	Review
FSPR 27.5%	20% $SSB_{F=0}$	7.7% $SSB_{F=0}$	2	SPR70%	MP will be reviewed after 6 years (3 x 2-year cycles)

The ISC PBFWG calculates TAC1 for this HCR based on the two impact ratio assumptions (status quo and 70:30 East-West) as in the case for the original HCRs. For the ease of interpretation, we provide the list of HCRs and their shape, including the new HCRs (numbered as 17 and 18), as Table 1 and Figure 1.

Table 1. List of harvest control rules (HCRs) tested in the PBF MSE and the two new candidate HCRs 17 and 18, put forward by the JWG in March 2026. The target reference point (F_{TARGET}) is an indicator of fishing mortality based on SPR. SPR is the spawning potential ratio. An F_{TARGET} of $F_{SPR40\%}$ is associated with a fishing mortality that would leave 40% of the SSB per recruit compared to the unfished state. An F_{TARGET} of $F_{SPR20\%}$ implies a higher fishing mortality (i.e., 1-

SPR of 0.8) and would result in a SSB per recruit of 20% of the unfished SPR. The control points are SSB-based and refer to the specified percentage of equilibrium unfished SSB ($SSB_{F=0}$). The minimum F (F_{min}) refers to the fraction of the F_{TARGET} that the fishing intensity is set to when SSB is below the LRP, except for HCRs 4, 12, 17 and 18, which specify a specific fishing mortality. For HCRs 5 and 13, when the ThRP is breached, the HCR switches from constant fishing mortality at the F_{TARGET} to a constant TAC set at the catch limits defined in CMM2021-02 (WCPFC 2021) and C-21-05 (IATTC 2021). While HCRs 5, 6, 7, 13, 14, and 15 do not have second control point, an LRP of median SSB from 1952-2014 (6.3% $SSB_{F=0}$) has been specified by the JWG to compute performance metrics. HCRs 9 to 16 and 18 are identical to HCRs 1 to 8 and 17, except for the allocation of fishing pressure between the Western Central Pacific Ocean (WCPO) fleet segment and the Eastern Pacific Ocean (EPO) fleet segment. HCRs 1 to 8 and 17 uses status quo impact ratio between the WCPO and EPO of about 80% to 20% (80:20), while HCRs 9 to 16 and 18 were tuned to reach a WCPO:EPO fishery impact ratio of 70:30.

HCR #	F_{TARGET}	Control Point 1 (ThRP)	Control Point 2	F_{min}	WCPO:EPO Impact Ratio	MP update cycle
1	FSPR30%	$20\%SSB_{F=0}$	$15\%SSB_{F=0}$	10% F_{TARGET}	80:20	3 year
2	FSPR30%	$25\%SSB_{F=0}$	$15\%SSB_{F=0}$	10% F_{TARGET}	80:20	3 year
3	FSPR40%	$25\%SSB_{F=0}$	$20\%SSB_{F=0}$	10% F_{TARGET}	80:20	3 year
4	FSPR30%	$20\%SSB_{F=0}$	$10\%SSB_{F=0}$	FSPR70%	80:20	3 year
5	FSPR25%	$20\%SSB_{F=0}$	NA	NA	80:20	3 year
6	FSPR20%	$20\%SSB_{F=0}$	NA	NA	80:20	3 year
7	FSPR25%	$15\%SSB_{F=0}$	NA	NA	80:20	3 year
8	FSPR30%	$20\%SSB_{F=0}$	$7.7\%SSB_{F=0}$	5% F_{TARGET}	80:20	3 year
9	FSPR30%	$20\%SSB_{F=0}$	$15\%SSB_{F=0}$	10% F_{TARGET}	70:30	3 year
10	FSPR30%	$25\%SSB_{F=0}$	$15\%SSB_{F=0}$	10% F_{TARGET}	70:30	3 year
11	FSPR40%	$25\%SSB_{F=0}$	$20\%SSB_{F=0}$	10% F_{TARGET}	70:30	3 year
12	FSPR30%	$20\%SSB_{F=0}$	$10\%SSB_{F=0}$	FSPR70%	70:30	3 year

13	FSPR25%	20%$SSB_{F=0}$	NA	NA	70:30	3 year
14	FSPR20%	20%$SSB_{F=0}$	NA	NA	70:30	3 year
15	FSPR25%	15%$SSB_{F=0}$	NA	NA	70:30	3 year
16	FSPR30%	20%$SSB_{F=0}$	7.7%$SSB_{F=0}$	5% F_{TARGET}	70:30	3 year
17	**FSPR27.5%**	**20%$SSB_{F=0}$**	**7.7%$SSB_{F=0}$**	**FSPR70%**	**80:20**	**2 year**
18	**FSPR27.5%**	**20%$SSB_{F=0}$**	**7.7%$SSB_{F=0}$**	**FSPR70%**	**70:30**	**2 year**

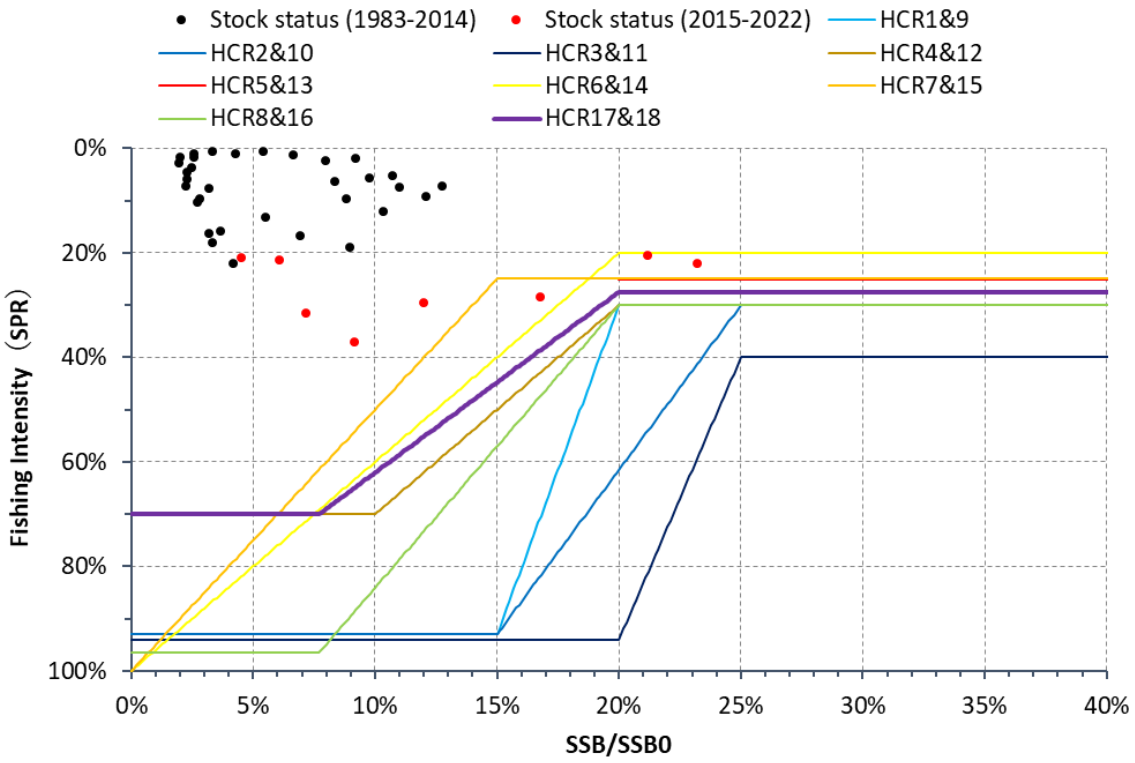

Figure 1. Candidate HCRs evaluated in the PBF MSE and the new candidate HCRs 17 and 18 put forward by the JWG in March 2026. Fishing intensity is an indicator of fishing mortality based on SPR. SPR is the spawning potential ratio that would result from the current year's pattern and intensity of fishing mortality relative to the unfished stock. $SSB/SSB_{F=0}$ is SSB relative to the equilibrium unfished SSB ($SSB_{F=0}$). The points are annual estimates of SPR and relative SSB from the latest PBF stock assessment (ISC 2024). Red dots represent the years when stricter catch limits were in place to rebuild the stock. For HCR 5 (red line), a constant catch management, which was similar to the one applied in 2015-2022, is used if the SSB breaches a control point

set at 20%$SSB_{F=0}$. Note that HCRs 9 to 16 and 18 are not represented as they are identical in shape to HCRs 1 to 8 and 17.

TAC1 calculation for HCRs 17 and 18

As requested, TAC1 for HCRs 17 and 18 were calculated in a same manner as the candidate HCRs evaluated in the PBF MSE and are shown below (Table 2). They are applicable for 2026-2028 and based on an estimation model that includes data up to FY2023. Other performance metrices of MSE are not calculated due to time constraints. Generally speaking, the performance of HCRs 17 and 18 should fall between HCRs 7 and 8 for 17, and between 15 and 16 for 18 as its target level (FSPR27.5%) falls in between those of HCRs 7/15 (FSPR25%) and those of HCRs 8/16 (FSPR30%). However, due to the change of management cycle from 3 to 2 years, the performance could be different, i.e., HCRs 17 and 18 should respond to changes in biomass more quickly, with faster increases in TAC when the stock is growing and vice versa.

Table 2. Calculated TAC1 (for 2026-2028) for HCRs 17 and 18 based on the PBF MSE estimation model updated with FY2023 data. TAC includes all the landings but does not include unseen mortality such as release mortality.

HCRs	TAC1 Total (mt)	TAC1 WCPO large fish (mt)	TAC1 WCPO small fish (mt)	TAC1 EPO (mt)
17	26642	14836	4823	6983
18	28388	14836	4076	9476

(ii) Update on the PBF recruitment index

PBF has a long-term recruitment index from sales slips of troll fisheries in Japan and its early time period (1983-2010) is included in the latest stock assessment in 2024 but the recent period (2011-) was not included due to a possible change in catchability and model misfit. In addition, PBFWG has been reviewing a newly developed standardized CPUE from Japanese troll fisheries based on the troll monitoring program. However, at the time of the last stock assessment, it was considered premature to include this index in the base case model, as not enough years of data were available to assess its consistency with the adult CPUE index. Nevertheless, the PBFWG concluded that this index provides a qualitative indication of recruitment trends.

The PBFWG reviewed the preliminary result of the recruitment monitoring index update provided by Japan up to 2025 (Figure 2). Though caution is warranted for interpretation of an index which is not endorsed to be included in the stock assessment and is preliminary, the PBFWG concluded that this index is considered to be a qualitative indication of recruitment trends. According to the updated index there is no indication of serious recruitment decline in recent years.

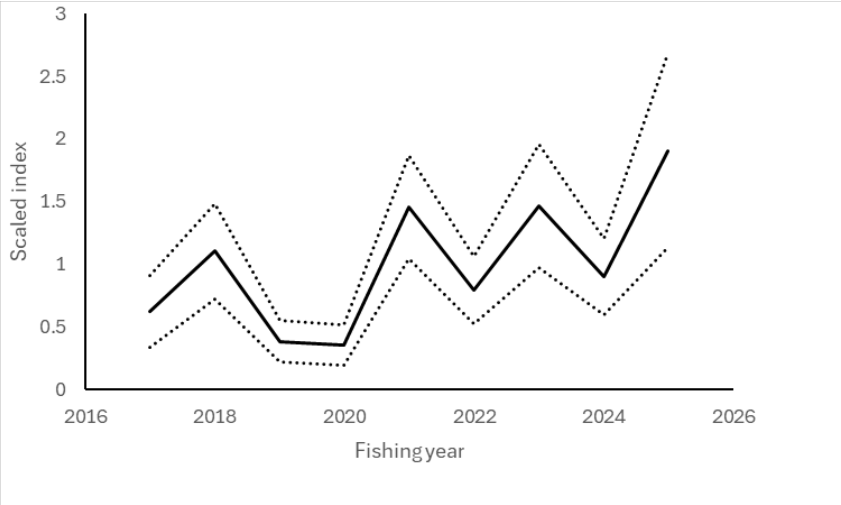

Figure 2. Updated recruitment CPUE index from recruitment monitoring program of Japanese troll vessels. The value of 2025 is preliminary.

(iii) Input for Exceptional Circumstances Provision

The PBFWG used the Exceptional Circumstances provision of northern Pacific albacore as a starting point and provides the attachment for the consideration of the JWG. TAC overage is not included here, as it is controllable through management actions.

Criteria for identifying exceptional circumstances for Pacific bluefin tuna.

March 2026

DRAFT

The Bluefin tuna Working Group (PBFWG) of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) was tasked by the Joint IATTC and WCPFC-NC Working Group on the Management of Pacific Bluefin Tuna (JWG) with developing criteria for the identification of exceptional circumstances that would result in suspending or modifying the application of the adopted management procedure (MP) of PBF, and potentially requires updated Management Strategy Evaluation (MSE) simulation work. Exceptional circumstances define situations outside the range of scenarios over which robustness of MPs was evaluated in the MSE analysis, and for which a different management action than specified by the adopted MP may have to be taken. This guidance document provides an outline of the process for identifying exceptional circumstances for Pacific bluefin tuna (PBF). The document, however, does not provide all necessary actions to apply should an exceptional circumstance be identified for this stock, nor does it cover all possible exceptional circumstances as it is logically impossible to consider all the possibilities.

To identify exceptional circumstances for PBF, the PBFWG will update CPUE every year, continue to update the estimation model for the scheduled MP run, and conduct stock assessments for the stock with updated data sources. The PBFWG will also conduct research to examine new evidence about the current stock status and environmental conditions.

The following general elements will be considered when examining signals of possible exceptional circumstances for PBF:

Stock and Fleet Dynamics: Evidence from stock assessment estimates that the stock is in a state not previously simulated in the MSE (e.g., current SSB estimates are outside the range of uncertainty, or new evidence about the biology of the stock is presented). As well as evidence that the fleet structure or fishing operations have changed substantially.

Application: Data collection required to produce the stock assessment is no longer available and/or appropriate to apply the adopted MP.

Implementation: The implementation of the management action is substantially different from what is prescribed by the MPs. For example, the total removals by the fishery differ substantially from what is prescribed by the MPs. TAC overage is not included here, as it is controllable through management actions.

Based on the general elements above, indicators are summarized in the following table:

Element	Indicator	Range	Evaluation Schedule
Stock and Fleet Dynamics	Depletion of stock biomass	In any year estimates fall outside the range of uncertainty simulated by the operating models (OMs) used in the MSE.	EM update or stock assessment
	Fishing intensity ($F_{\%SPR}$) where SPR is the spawning potential ratio		
	Longline CPUE	In any year estimates fall outside the range of uncertainty simulated by the MSE.	Every year when CPUE is updated.
	Changes in fleet dynamics or selectivity	Any substantial differences from the structure and parameterization used in the OMs of the most recent MSE	As new evidence and research is presented and accepted by the PBFWG
	Biological parameters		
	Recruitment drop	Recruitment index shows low trend persistently.	Every year when CPUE is updated.
Application	EM or Stock assessment	EM or Stock assessment is not producible or estimates are unreliable.	EM update or stock assessment
	Realized catch or effort	If there is evidence that catch or effort outside of management, such as discard mortality or by new fleets, is greater than assumed in the MSE.	As new evidence and research is presented and accepted by the PBFWG

Should evaluation of the above criteria by ISC identifies any exceptional circumstances, the PBFWG will assess the severity and potential impacts on the performance of the MP and

provide advice on the action required, including the need for a change in MP, additional research, and/or updates to the MSE framework for PBF.