South Pacific Regional Fisheries Management Organisation

14th MEETING OF THE SCIENTIFIC COMMITTEE

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SC14 - SQ 02
Report of the Third Squid Workshop SCW18

SQWG

SPRFMO

South Pacific Regional Fisheries Management Organisation

Squid Working Group

SPRFMO SC Third Squid Workshop (SCW18)

12 August 2026
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Summary

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1. The Third Squid Workshop (SCW18) advanced the development of a common scientific framework for the assessment of jumbo flying squid (*Dosidicus gigas*) in the SPRFMO Convention Area. The workshop consolidated a common and traceable catch database, reviewed the available abundance indices and their standardisation, and identified remaining uncertainties associated with historical catch allocation, CPUE construction and representativeness, environmental effects, population structure and model assumptions. Specific technical improvements were identified for the Chinese and Chilean CPUE indices, while further information was requested on the Peruvian standardised CPUE series.

2. The workshop agreed on a common framework for comparing candidate stock assessment models using consistent data and assumptions. The principal dimensions considered were assessment period, temporal resolution, CPUE weighting, environmental effects on productivity and catchability, prior distributions and the form of the production function. A final model-testing matrix was agreed to guide the remaining analyses. The model runs completed during SCW18 were not sufficient to support adoption of a final stock-status estimate or management-relevant assessment result. High-priority E-BSP and SPiCT assessments will therefore be completed before the pre-SC Squid Workshop on 5 September 2026, where the results will be reviewed and recommendations to SC14 developed.

3. SCW18 also reviewed progress of the Assessment Simulation Task Team and the development of the SquidSim operating model. The simulation framework was refined to represent uncertainty in population and fishery structure, biological processes, environmental variability and data availability. The workplan was updated for 2026–2027, with simulated datasets to be distributed in early 2027, candidate assessments completed by the end of March 2027, and an in-person ASTT workshop planned for April–May 2027 to review results and prepare advice for SC15.

4. The workshop recommended continued improvement of CPUE standardisation and assessment methods, completion of the stock assessment models discussed during SCW18, stronger provision of fishery and operational data by Members, and active participation in the SQWG intersessional work.

It also recommended convening a dedicated data workshop during 2026–2027, in coordination with the Ecosystem Working Group, with a primary focus on CPUE standardisation, spatio-temporal modelling and the incorporation of relevant environmental information.

Meeting Details

5. The SPRFMO SC Third Squid Workshop (SCW18) was held in person in Shanghai, China, from 29 July to 1 August 2026. The workshop focused on the stock assessment and simulated assessment of jumbo flying squid and was conducted under the South Pacific Regional Fisheries Management Organisation through the Squid Working Group (SQWG), chaired by Dr Gang Li.

Opening of the Meeting

6. The Third Squid Workshop (SCW18) opened on 29 July 2026 in Shanghai, China, with welcoming remarks and introductions by the participants. The workshop brought together representatives of SPRFMO Members, invited experts and Observers to advance the stock assessment and simulated assessment work for jumbo flying squid (*Dosidicus gigas*).

Adoption of the Agenda

7. The workshop adopted the agenda contained in SCW18-Doc00. The agenda organised the work into an initial review of the available data and assessment approaches, followed by hands-on stock assessment runs and diagnostics, interpretation of the assessment results, and development of the simulated assessment framework. The workshop also confirmed that its expected outputs would include assessment conclusions and recommendations, agreement on priority simulated assessment experiments, reporting responsibilities, and a post-workshop workplan for submission to SC14.

Workshop Objectives

8. The workshop aimed to advance the scientific basis for the assessment of jumbo flying squid in the SPRFMO Convention Area and to support the provision of scientific advice, following guidance provided by the Commission and the Scientific Committee.

9. The main objectives are to:

1. Review and advance the stock assessment of jumbo flying squid, including available data, candidate models, assumptions, diagnostics, sensitivities and assessment results.
2. Identify robust assessment conclusions and key uncertainties, including the implications of data limitations, model structure, fleet definitions and biological assumptions for scientific advice.
3. Progress the simulated assessment work, including review of simulation scenarios, simulated datasets and candidate assessment experiments.

4. Develop workshop outputs for SC14, including conclusions, recommendations, reporting responsibilities and a post-workshop workplan for any remaining assessment or simulation tasks.

Key Discussion Summary

10. The workshop organised its technical discussions around the development of a common assessment dataset, the review of available abundance indices, the identification of the principal structural assumptions affecting the assessment, and the design of a common framework for model testing. The discussion focused on distinguishing uncertainty arising from the input data from uncertainty associated with CPUE standardisation, model structure and parameter assumptions.

Data and assessment inputs

Fishery-dependent data

11. The SC Chairperson, Dr Ricardo Oliveros Ramos, presented SCW18-Doc02, which described the validation, reconstruction and integration of monthly jumbo flying squid (*Dosidicus gigas*) catch series for 1997–2025. The proposed database combined information submitted by Chile, China, Chinese Taipei, Ecuador, the Republic of Korea and Peru. Monthly submissions were aggregated and compared with FAO Area 87 annual catches, while official national statistics and other documented sources were used when the submitted information was incomplete or did not represent total national catches.

12. The workshop noted that the Member submissions differed in their temporal coverage, operational detail and completeness. The Chilean, Chinese, Korean and Chinese Taipei series could be retained after completing missing periods or applying limited reconstruction. In contrast, the submissions from Peru and Ecuador represented monitoring or sampling information rather than complete national catches and therefore required reconstruction from complementary official sources.

Member	Principal treatment in the proposed database	Main issue identified
Chile	Monthly Member records were retained for 2000–2025, with 2001–2002 supplemented using official SERNAPESCA information.	Recovery and reconciliation of earlier monthly records remained desirable.
Peru	National catches were reconstructed from official PRODUCE statistics and complementary documented sources, distinguishing artisanal catches from historical industrial catches.	The submitted series did not represent complete national catches, and the historical industrial component required assumptions regarding fleet and area attribution.
Ecuador	Available monthly patterns were combined with selected annual reference totals from official and documented sources.	Temporal coverage was incomplete and some annual totals required clarification.

Member	Principal treatment in the proposed database	Main issue identified
China	Monthly Member data were retained for 2003–2025; 2001–2002 were reconstructed from FAO annual totals and adjacent-year seasonality.	Differences with FAO statistics in some years and the absence of original monthly data for 2001–2002 required further review.
Republic of Korea	Submitted monthly data were retained for 2015–2020 and 2024; 2012–2014 were reconstructed and confirmed zero catches were included for 2021–2023 and 2025.	Earlier catches associated with fishing off Peru required careful treatment to avoid double counting.
Chinese Taipei	Submitted monthly data were retained for 2002–2025, with omitted months and confirmed missing years treated as zero catch.	No additional annual reconstruction was considered necessary.

13. The workshop recognised that FAO statistics provided a useful annual reference for evaluating the magnitude and completeness of national series, but did not provide the monthly, spatial or fleet resolution required for the assessment database. FAO values were therefore used as annual control totals or diagnostic references, while monthly distributions were derived from Member submissions, official national data or documented seasonal patterns.

14. Particular attention was given to the historical attribution of catches by Japan and the Republic of Korea within and outside the Peruvian exclusive economic zone. The workshop noted that some catches taken by foreign fleets off Peru had historically been represented within the Peruvian industrial series, whereas catches in later years were reported by the respective flag States. Participants agreed that these records should be examined carefully to prevent double counting and to maintain a transparent allocation among fleets and fishing areas.

15. The workshop further noted that, for a production model without fleet-specific selectivity, the principal assessment requirement was an accurate time series of total removals. Correct allocation by flag, fleet and fishing area nevertheless remained important for the traceability and internal consistency of the database and for future analyses using spatial or fleet-specific information.

16. Both the original Member submissions and the reconstructed assessment series were retained. The workshop considered that this distinction was particularly important for Peru and Ecuador, where the submitted information differed from the reconstructed national totals. Maintaining both versions would allow the reconstruction assumptions to be reviewed and revised without altering the original records.

17. The workshop identified several priorities for improving the catch database. These included recovering original monthly records for reconstructed periods, further comparison with official SPRFMO statistics, obtaining additional historical information from Japan, and examining the availability of more highly resolved catch and effort information. The workshop also noted the potential value of port-level information where fishing locations were unavailable, while recognising that landing locations should not be interpreted directly as fishing locations.

18. Lee Qi presented an overview of the catch, effort and CPUE information available from the participating fleets. The information included annual and monthly catch series, fishing effort, nominal CPUE and standardised indices, with substantial differences among fleets in temporal coverage, units of effort and degree of standardisation. The workshop agreed that a common inventory of the available indices was required before their selection and weighting in the assessment.

19. Peru had provided a monthly nominal CPUE series, while previous assessment work had used an annual standardised Peruvian index obtained from national reports. Participants noted that the construction, coverage and representativeness of these series required clarification by Peru. The workshop considered that the available Peruvian information could be used for exploratory testing, but that its role in the final assessment should be explicitly documented and confirmed.

20. The preliminary set of indices considered for evaluation included standardised Chinese and Chilean indices, the nominal Chinese Taipei series, and additional national indices subject to further review. Participants emphasised that the final selection should reflect the temporal and spatial coverage of each fleet, the quality of the underlying data, the standardisation method and the relationship between each index and the component of the stock sampled by the fishery.

Fishery-independent data

Chinese CPUE standardisation

21. The workshop reviewed the methods used to derive the Chinese standardised CPUE series. The approach presented used a generalised additive model incorporating temporal, spatial and environmental covariates, including ENSO conditions, sea surface temperature, sea surface salinity, latitude, longitude and spatial interactions. Fishing effort was represented by operational days within fine-resolution spatial cells.

22. Participants distinguished between fitting the CPUE model and deriving the standardised abundance index. The workshop noted that averaging predictions over the observations used to fit the model could retain the unequal sampling intensity of the fishing fleet and give greater influence to repeatedly sampled combinations of space, time and environmental conditions. A separate prediction dataset representing an agreed spatial and temporal domain was therefore considered necessary to obtain a standardised index that was not determined by the distribution of the observed fishing operations.

23. Differences between nominal and standardised CPUE were examined. The workshop noted that the magnitude and temporal pattern of the standardised Chinese series differed substantially from the nominal observations in some months, including periods corresponding to peaks in the standardised index. Participants considered that the contribution of individual covariates, spatial cells and model components to these differences should be investigated before the index was used as a principal abundance indicator.

24. The current Chinese logbook detailed data series covered only a limited number of recent years and fishing vessels, starting in 2011, even if in recent years the logbook data covers 100% of fishing vessels. The proposed index extended back to 2003 using aggregated data.

25. The workshop discussed whether vessel size, capacity or other measures of fishing power should be included in the Chinese standardisation. Participants proposed testing these effects during the period for which detailed vessel-level information was available. If vessel effects were shown to be negligible, a reduced model could subsequently be applied to earlier years for which vessel characteristics were unavailable. Where individual vessel information was retained, vessel identity could be represented as a random effect and excluded from predictions of the standardised index.

26. The workshop recommended preserving the highest reliable resolution of the fishery data, even where environmental covariates were available only at a coarser resolution. Participants cautioned against deriving one index for the entire fishing area without evaluating spatial heterogeneity in fleet operations, squid distribution and catchability. The spatial domain and prediction grid used to calculate the index should therefore be documented explicitly.

Chilean CPUE standardisation

27. The Chilean CPUE standardisation process for the artisanal jigging fleet was presented. Nominal CPUE was expressed as tonnes per trip, with trips generally representing fishing operations completed within one day. The mixed-effects model included year, month and region as fixed effects and vessel as a random effect.

28. The workshop discussed the implications of using additive year and month effects in the Chilean model. Participants noted that this structure imposed the same seasonal pattern in each year unless an interaction or another time-varying seasonal term was included. The standardised and nominal series should therefore be compared to determine whether the model retained meaningful interannual variation in seasonal abundance and whether alternative year-month or year-quarter formulations should be evaluated.

29. Set-level fishing positions were not available for the Chilean artisanal fleet. Potential approaches for incorporating environmental information included linking observations to regional conditions, using environmental information near the landing port, or including large-scale climate indicators. The workshop noted that any spatial linkage should reflect the short duration and likely operating range of the trips and should be supported by an explicit rationale.

30. Participants discussed published guidance cautioning against temporal smoothing in a CPUE index intended for use in a surplus production model. Excessive smoothing could introduce temporal dependence into the abundance index and overlap with the population dynamics that the assessment model was intended to estimate. At the same time, the workshop noted that annual effects could be too coarse for a short-lived species. Year-month or year-quarter factors were identified as alternatives requiring further evaluation.

Environmental variability

31. The workshop distinguished two potential pathways through which environmental variability could affect the assessment. Environmental conditions could alter the availability or catchability of squid and should then be addressed through CPUE standardisation. They could also affect biological productivity and population dynamics, in which case the relationship should be represented within the assessment model or examined through complementary analyses.

32. Participants noted that El Niño conditions may alter the depth and spatial distribution of jumbo flying squid, including movement towards more southern fishing grounds, thereby affecting fleet accessibility and observed catch rates. Failure to distinguish changes in availability from changes in abundance could bias the interpretation of CPUE and stock status. However, the workshop recognised that the short time series, limited number of major ENSO events and spatial differences among fleets and phenotypes constrained the statistical identification of these effects.

33. Niño 1+2 and Niño 3.4 were identified as initial candidate indices. The Peruvian Coastal Thermal Index (PCTI) was also presented as a regional indicator of coastal environmental variability. Participants noted that broad-scale indices might not adequately describe conditions in the principal fishing grounds and encouraged the development or evaluation of regional indices tailored to the spatial domains occupied by the fisheries and relevant phenotypes.

Conclusions

34. The workshop did not select a single environmental indicator. Participants agreed that oceanic and coastal indicators should remain available for comparative analyses and that different indices could be appropriate for different fleets or mechanisms. Environmental variables used in CPUE standardisation should be distinguished from those used to represent variability in production-model parameters.

35. Participants also emphasised the importance of information from the current fishing season when interpreting assessment results and developing scientific advice. Chile indicated that it was preparing information of the current fishing season 2026 for SC14. The workshop noted that recent fishery information could be particularly relevant if management decisions were based on assessment data that did not fully represent rapidly changing stock and environmental conditions.

36. The workshop recognised the need for further dedicated work on CPUE standardisation. It proposed that the available operational data, model specifications, prediction procedures and resulting indices be reviewed before the SC14. This review should include direct comparisons of nominal and standardised series and an examination of the observations, covariates and spatial cells responsible for prominent features in the standardised indices.

Assessment framework and principal assumptions

37. The workshop reviewed candidate production-model approaches presented by China (B-SPM) and Chile (SPiCT). Participants agreed that comparisons among assessment methods should focus on model structure and assumptions rather than on differences in the input data. Candidate models should therefore be fitted, as far as their structures permit, to a common catch series and a common set of abundance indices.

38. The workshop agreed to establish a common database and common stock assessment framework for the next phase of model testing. The framework would include an agreed set of input data, consistent baseline assumptions and common prior specifications for the principal production-model parameters. Alternative configurations would be compared against this reference framework.

39. The purpose of the common framework was to ensure that differences among assessment results could be attributed to identifiable assumptions or model structures rather than to inconsistent data preparation. The framework would allow the effects of assessment period, temporal resolution, CPUE selection and weighting, environmental configuration and prior assumptions to be examined systematically.

Model start year

40. The appropriate starting year for the assessment received substantial discussion. Participants noted that the reconstructed catch series extended to 1997, but that the composition and development of the fisheries changed during the early part of the series. Low catches before the expansion of several fisheries could reflect limited fishing activity rather than low biomass or productivity and could consequently influence estimates of r and K.

41. Other participants noted that a short assessment period might represent only one productivity regime and provide limited information about the response of the stock under contrasting environmental conditions. A longer series could improve the representation of increasing and decreasing production phases and provide more environmental variation, but only if the early catch and abundance information was sufficiently reliable.

42. The workshop considered that the impact of the start year should be evaluated through model diagnostics and sensitivity analyses rather than resolved only through conceptual discussion. Configurations beginning in 2001 and 2012 were identified for initial comparison, representing a longer period with broader historical coverage and a shorter period with more complete recent fishery information, respectively. The final decision for the model start year would be determined from comparative model results.

Model time scale

43. Annual, quarterly and monthly assessment time steps were discussed. Participants noted that reliable monthly catch information was principally available beginning in the early 2000s, which constrained the data available for fine-resolution models. The choice of time step therefore involved a trade-off between the length of the time series and the temporal resolution of the population and fishery dynamics.

44. Given the short lifespan, rapid growth and semelparous life history of jumbo flying squid, participants considered that an annual time step might be too coarse to represent within-year changes in production, abundance and fishing activity. Monthly and quarterly configurations were therefore proposed for evaluation. The workshop did not select a reference time step at this stage and agreed that the results and diagnostics should be examined before determining the most appropriate configuration.

45. The workshop distinguished the temporal resolution of the scientific assessment from the period over which management advice might ultimately be expressed. Participants noted that a monthly or quarterly model could still produce annual summaries or advice, while a scientifically appropriate time step should not be rejected solely because existing management processes operated annually. The implications of alternative time scales for monitoring and advice were to be considered after the model results were reviewed.

CPUE selection and weighting

46. The workshop discussed whether the available abundance information should be combined into a single index or fitted as separate fleet-specific indices. Participants noted that a combined index required an explicit weighting method and could give excessive influence to a high-catch but less reliable nominal series. Conversely, fitting separate indices allowed each series to have its own catchability coefficient and observation error, but could produce conflicting signals and greater model instability.

47. The standardised Chinese and Chilean indices were initially considered likely to receive relatively greater influence, while nominal indices with more limited documentation or spatial representation could receive lower influence or be restricted to sensitivity analyses. The workshop did not agree on final weights for each index of abundance. It considered that the relative influence of each data series could be represented through explicit weights, index-specific observation-error assumptions, or alternative subsets of indices. This should be evaluated within the common model-comparison framework.

48. The workshop noted that the Peruvian CPUE index reported in the national stock assessment showed a different trend from the nominal CPUE series submitted for the workshop. The workshop recommended that SC14 invite Peru to provide additional information on the construction, status and availability of the standardised index, and to clarify the reasons for the differences between the two series.

Other topics

49. The potential implications of population structure and phenotypic variation were also discussed. Participants noted that the Chinese and Chilean fisheries might sample different components or phenotypes of the jumbo flying squid population. Under the working assumption of a single stock, production-model parameters would represent aggregate or synthetic population properties, while differences among fleet indices could reflect availability, catchability, spatial distribution or phenotype composition. Alternative hypothesis should be considered in future stock assessments using more complex models (e.g. stage-structured models or integrated models).

50. The workshop recognised that a single-stock production model could not fully represent changes in the relative contribution, productivity and growth of different phenotypes. Simulation was identified as an appropriate approach for evaluating the robustness of the assessment model to these processes. For the current assessment work, the single-stock assumption was retained as a practical simplification and identified as an important source of uncertainty.

51. Prior distributions for r, K, catchability and initial biomass were discussed. Participants noted that the posterior estimate of r in some presented configurations remained close to its prior, raising questions about the information available in the data. More than one prior configuration was therefore required to evaluate the dependence of the assessment results on prior assumptions.

52. The workshop discussed the use of broad uniform priors and informative normal or log-normal priors as alternative configurations. Participants also noted that prior specifications could not always be transferred directly among model structures and time steps. In particular, rate parameters required consistent treatment when moving from annual to quarterly or monthly models, while the carrying-capacity parameter should remain on a comparable biomass scale.

Conclusions

53. The workshop identified seven principal decision axes for the comparative assessment: 1) the starting year, 2)the selection and relative influence of CPUE indices, 3) the temporal resolution, 4/5) the treatment of environmental variability for q and r, 6) the shape parameter of the production function, and 7) the prior distributions for the main production-model parameters. These axes provided the basis for constructing the model-testing framework.

Model testing, diagnostics and agreed configurations

54. The workshop proposed organising the assessment work through a decision matrix containing the principal data and structural assumptions identified during the discussions. This would allow for systemati comparison across candidate configurations, while maintaining a transparent record of the assumptions associated with each model run.

55. The matrix was intended to include alternative assessment periods, temporal resolutions, CPUE combinations or weights, environmental treatments and prior specifications. Participants noted that the complete factorial combination of all options would be unnecessarily large. The workshop therefore selected a limited set of reference, sensitivity and exploratory runs that isolated the effects of the principal assumptions.

56. The initial model-configuration table developed during the workshop was treated as a working structure rather than a definitive list of models or terminology. It provided fields for the scenario dimensions, prior specifications, model identifiers and individual runs. The definitive naming convention and list of configurations were agreed and it is included as an appendix to this report.

57. Participants agreed that candidate configurations should be evaluated using a common set of diagnostics. These included model convergence, residual patterns, consistency between fitted and observed indices, retrospective behaviour, retrospective analysis, and comparison between prior and posterior parameter distributions. The plausibility and stability of biomass, fishing mortality and management-relevant outputs were also considered important.

58. The workshop noted that passing a limited set of statistical diagnostics did not by itself demonstrate that a model was biologically or scientifically appropriate. Conversely, a failure in convergence under one configuration should not automatically be addressed by shortening the time series without examining the cause. Model diagnostics were to be interpreted together with the data history, fishery development, biological assumptions and intended use of the assessment.

59. Differences among the candidate production models meant that identical parameterisations could not always be imposed. For example, some approaches allowed productivity to vary through time, whereas others treated r as constant. The workshop nevertheless considered that the models could use the same catch and CPUE inputs and could apply comparable assumptions where their structures permitted.

60. The final model-testing framework was agreed as the last technical decision of the stock-assessment component of the workshop. The final table identifies the reference configuration, targeted sensitivity analyses, structural alternatives, exploratory cases and any runs assigned for completion after the workshop.

- Model Scenarios with Naming Convention

Code	Variable	Values	Priority
y1, y2	startYear	1) 20012) 2012	1) High2) High
t1, t2, t3	Timescale	1) Yearly2) Quarterly3) Monthly	1) Low2) High3) High

Code	Variable	Values	Priority
e0, e1, e2, e3	Env_r	0) No environmental index1) 1+2 El Niño2) 3.4 El Niño3) PCT	0) High1) High2) Low3) Low
r1, r2	Rprior	1) $r \sim N(1.5, 0.2)$2) $r \sim U(.05, 2.5)$	1) Low2) High
w1, w2, w3	CPUE weights	1) Scaled by expert judgementCHL = 0.2, CHN = 0.3, TPE = 0.1, PER = 0.2, KOR = 0.12) Equal weights3) Peruvian CPUE with 0 weight	1) High2) Low3) Low
d1, d2	Data series	1) All five indices2) Three indices: CHN, CHL, PER	1) High2) Low
q0, q1	Env_q	0) No environmental index1) q_CHL ~ 1+2 ENSO (or local env), q_CHN ~ 1+2 ENSO, q_PER ~ PCT	0) High1) High
p0, p1	Perucpue	0) Nominal annual CPUE provided by Peru1) Annual CPUE series from national report	0) High1) Low

- Prior Specifications

Parameter	Distribution	Hyper-parameters	Values	Notes
r	Normal	Mean, sd	N(1.5, 0.2)	Meta-analysis from IFOP presentation
r	Uniform	a, b	U(0.5, 2.5)	SPiCT uses log of these
K	Uniform	a, b	U(1x, 15x max catch)	Max catch = 1 300 000 tons
Ratio between B_1 and K	Uniform	a, b	U(0.01, 1)	SPiCT default N(0.5, 1)
q	Uniform	a, b	U(0, 1)	
Shape parameter	Uniform	a, b	U(1, 5)	

61. As an example, the model name: *y2t1e0r1w2d1q0* will correspond to:

Variable	Scenarios
Start year	2012
Time scale	Yearly
Environmental index_r	None
Prior distribution for r	N(1.5, 0.2)
CPUE weights	Equal
Data series	All five
Environmental index_q	None

62. During the hands-on assessment work, the workshop prepared common monthly and quarterly input datasets for use across the candidate assessment models. These included the reconstructed total catch series and the available CPUE indices for Chile, China, Chinese Taipei, the Republic of Korea and Peru. For the provisional quarterly analyses, catches were aggregated as the sum of monthly catches and CPUE indices as the mean of the corresponding monthly values. The workshop recognised that CPUE indices should eventually be standardised directly at the temporal resolution used in the assessment, and therefore treated this aggregation as a practical approach for the current assessment exercise.

63. The workshop prioritised implementation of baseline configurations in E-BSP and SPiCT before expanding the analyses to the complete set of sensitivities. Participants recognised that the number of candidate configurations, the computational requirements of some models and the time required for adequate diagnostic review precluded completion of all agreed analyses during SCW18. The workshop therefore agreed that additional model runs, sensitivity analyses, retrospective analyses and model refinements would be completed following the workshop.

64. The model runs and discussions conducted during SCW18 reinforced the importance of several sources of uncertainty identified earlier in the workshop, particularly the selection and relative influence of CPUE indices, temporal resolution, assessment period, environmental effects, prior assumptions and the form of the production function. Participants agreed that assessment configurations should be evaluated using complete diagnostics, including convergence, residual and Q–Q diagnostics, retrospective behaviour and comparisons between prior and posterior distributions. The workshop further noted that satisfactory statistical diagnostics alone were not sufficient for model acceptance and should be considered together with biological plausibility, fishery history and model assumptions.

65. The workshop did not adopt a final stock-status estimate or management-relevant assessment result from the preliminary runs undertaken during SCW18. Instead, it agreed on a common model-testing framework and prioritised the analyses required to provide a more robust comparison before SC14. The final configuration matrix identifies the assessment periods, temporal resolutions, CPUE treatments, environmental effects, prior specifications and production-function alternatives to be evaluated, together with their relative priorities. High-priority E-BSP and SPiCT assessments were scheduled for completion by 28 August 2026, with the results to be reviewed before and during the pre-SC Squid Workshop on 5 September 2026.

Simulated Assessment

66. The workshop reviewed progress of the Assessment Simulation Task Team (ASTT) and the development of the operating model, SquidSim. The objective of the ASTT is to evaluate the robustness of candidate jumbo flying squid assessment models to uncertainty in population structure, biological and life-history characteristics, and data availability. The operating model is also intended to provide a realistic representation of jumbo flying squid population dynamics that could subsequently be used in a management strategy evaluation framework.

67. The workshop reviewed the simulation plan and the biological and fishery hypotheses to be represented in SquidSim. The population scenarios range from a single-morphotype control to configurations with three morphotypes whose occurrence is determined either spatially or by environmental conditions. Morphotypes may differ in growth, mortality and reproductive parameters. Alternative fishery structures represent either two broad fisheries, separating artisanal and industrial fleets, or four fisheries representing the Equatorial, Peruvian, Chilean and high-seas components. Fishing mortality and selectivity are specified separately by fishery, with temporal variability in fishing mortality intended to reproduce historical patterns.

68. The simulation framework also considers uncertainty in mortality, reproduction, recruitment, growth and gear selectivity, including environmentally driven variability in relevant biological parameters. Process error may be included in the simulated parameters, potentially with temporal autocorrelation. The workshop noted that these scenarios provide a means of evaluating assessment performance when biological processes deviate from the simplifying assumptions of the current single-stock production models.

69. The workshop reviewed the scenarios representing uncertainty in data collection and availability. These distinguish a perfect-information case from scenarios approximating current and potential future data availability. Simulated outputs include total and fleet-specific catches, size information, CPUE, fishing effort and environmental indices, with the level of temporal and fleet resolution varying among scenarios. This framework is intended to assess not only the robustness of alternative assessment models, but also the potential benefits of improvements in fishery monitoring and biological sampling.

70. The workshop noted the progress made in developing SquidSim and updated the ASTT workplan and timeline for the 2026–2027 intersessional period. The revised workplan foresees completion and distribution of simulated datasets in early 2027, followed by application of the candidate assessment models and an in-person meeting to review the results and prepare the ASTT report for SC15.

Activity	Timing
First ASTT coordination meeting	January 2027
Second coordination meeting and distribution of simulated datasets	February 2027
Deadline for completion of simulated assessments	End of March 2027
In-person ASTT workshop for discussion of results and report drafting	April–May 2027
Report of ASTT results	SC15 (2027)

71. The planned in-person ASTT workshop will focus on comparing the results of the simulated assessments, identifying improvements required in the operating model, and drafting the report to the Scientific Committee. The updated workplan therefore shifts the principal model-comparison phase of the simulated assessment to the 2026–2027 intersessional period, while SCW18 served to review progress, refine the simulation design and parameterisation, and establish the timetable for completing this work.

Decisions and agreements

No.	Topic	Decision or agreement	Responsi-bility
1	Common catch database	Maintain a continuously update a catch database as the basis for all assessment models.	SQWG
2	Original and reconstructed catches	Retain both the original Member submissions and the reconstructed assessment series until better information is available.	SQWG
3	Historical catch allocation	Review the allocation of historical catches by Japan, the Republic of Korea and Peru within and outside national EEZs to avoid double counting.	SQWG

No.	Topic	Decision or agreement	Responsibility
4	Historical Japanese data	Seek additional historical catch information from Japan to complete and validate the database.	Secretariat
5	Catch database updates	Continue updating the common database as additional national or historical information becomes available. Enquire the Republic of Korea, Chinese Taipei, Peru and Ecuador to provide updated catch and landings data.	SQWG
6	CPUE inventory	Maintain a common inventory describing the coverage, effort units, standardisation method and limitations of each available abundance index.	SQWG
7	CPUE selection	Evaluate the available CPUE indices jointly and document explicitly which indices are included, excluded or used only in sensitivity analyses.	SQWG
8	CPUE weighting	Test alternative approaches for representing the relative influence of CPUE indices, including index selection, explicit weighting and index-specific observation error.	SQWG
9	Peruvian CPUE	Use the available Peruvian nominal CPUE series for exploratory analyses pending confirmation of their construction and representativeness.	SQWG
10	Peruvian CPUE	Request technical details from Peru and enquire about the availability of a standardised CPUE abundance index.	Secretariat
12	Chinese nominal and standardised CPUE	Investigate differences between nominal and standardised Chinese CPUE and identify the observations, covariates and model components responsible for prominent discrepancies.	China
13	Chinese prediction procedure	Derive the standardised Chinese index using an explicit prediction dataset that represents the agreed assessment domain rather than the distribution of observed fishing operations.	China
14	Chinese vessel effects	Update the test of the effects of vessel size, capacity and other fishing-power variables using the period with detailed vessel-level data.	China
15	Chinese spatial structure	Evaluate spatial heterogeneity in the Chinese fishery and the potential need for separate or spatially structured CPUE indices.	China
16	Fishery-data resolution	Retain the highest reliable resolution of operational fishery data, even where environmental data are available at a coarser resolution.	China
17	Chilean nominal and standardised CPUE	Compare the Chilean nominal and standardised CPUE series and investigate differences in their temporal and seasonal patterns.	Chile
18	Chilean temporal formulation	Evaluate alternatives to additive year and month effects, including year-month or year-quarter formulations.	Chile

No.	Topic	Decision or agreement	Responsibility
19	Chilean environmental covariates	Evaluate regional and large-scale environmental covariates suitable for the Chilean artisanal fishery.	Chile
20	CPUE standardisation review	Convene a dedicated review of CPUE data, model assumptions, prediction procedures and resulting indices before their subsequent assessment use.	SQWG
21	Common assessment framework	Use a common catch database, common CPUE inputs and consistent baseline assumptions to compare candidate assessment models.	SQWG
22	Model comparability	Apply comparable data and assumptions across candidate assessment models where their structures permit.	SQWG
23	Assessment periods	Compare assessment configurations beginning in 2001 and 2012.	SQWG
24	Temporal resolution	Evaluate annual, quarterly and monthly assessment configurations.	SQWG
25	Reference time scale	Select the reference temporal resolution only after reviewing model results, diagnostics and biological plausibility.	SQWG
26	Environmental indices	Evaluate Niño 1+2, Niño 3.4, the Peruvian Coastal Thermal Index and suitable regionalised environmental indices.	SQWG
27	Environmental effects in models	Test configurations in which environmental variability affects production-model parameters r and q.	SQWG
28	Population structure	Retain the single-stock assumption for the current comparative assessment while recognising phenotypic and fleet-specific differences as important uncertainties.	SQWG
29	Reference and sensitivity runs	Define a limited set of reference, sensitivity, structural-alternative and exploratory configurations rather than testing every factorial combination.	SQWG
30	Prior distributions	Evaluate more than one prior configuration, including broad and informative alternatives.	SQWG
31	Common diagnostics	Evaluate candidate runs using convergence, residual, Q–Q, retrospective patterns, prior–posterior and sensitivity diagnostics.	SQWG
32	Interpretation of diagnostics	Interpret statistical diagnostics together with biological plausibility, fishery history and model assumptions; satisfactory diagnostics alone will not determine model acceptance.	SQWG
33	Baseline model runs	Prioritise the agreed baseline runs before undertaking additional sensitivities and model refinements.	SQWG
34	Reporting of model runs	Present complete diagnostics with all accepted assessment runs.	SQWG
35	Final model configurations	Agree on the final model-testing matrix as reported in the Appendix D.	SQWG
36	Follow-up model review	Hold an online follow-up meeting before the pre-SC workshop if additional review of completed model runs is required.	SQWG Chair
37	pre-SC Squid Workshop	Hold an in-person whole-day pre-SC Workshop (5 September 2026) to discuss assessment results and draft recommendations to SC14.	SQWG Chair

Conclusions

72. SCW18 substantially advanced the common scientific framework for the assessment of jumbo flying squid. The workshop consolidated a common and traceable catch database, identified remaining uncertainties in historical catch allocation, and agreed that original Member submissions and reconstructed assessment series should be retained until improved information becomes available.

73. The workshop identified CPUE standardisation as a major source of uncertainty in the assessment. Differences among fleets in data coverage, spatial resolution, fishing power and standardisation methods, as well as differences between nominal and standardised indices, require further evaluation. The workshop therefore agreed on technical improvements to the Chinese and Chilean CPUE standardisation procedures and identified the need for further clarification of the Peruvian CPUE information.

74. The workshop established a common framework for comparing candidate stock assessment models. The principal sources of uncertainty to be evaluated include the assessment period, temporal resolution, selection and relative influence of CPUE indices, environmental effects on productivity and catchability, prior assumptions and the form of the production function. A final model-testing matrix was agreed to organise reference and sensitivity analyses consistently across candidate models.

75. The model runs completed during SCW18 were not sufficient to support adoption of a final stock-status estimate or management-relevant assessment result. The workshop therefore prioritised completion of the high-priority E-BSP and SPiCT configurations before the pre-SC Squid Workshop, while recommending that the other assessment models discussed during SCW18 also be finalised. Assessment results will be reviewed together with complete statistical diagnostics and biological plausibility before recommendations are developed for SC14.

76. The workshop also reviewed progress in developing the SquidSim operating model and refined the simulation plan for evaluating the robustness of candidate assessment methods to uncertainty in population structure, environmental variability, fisheries and data availability. The ASTT workplan was updated, with simulated datasets and assessments to be completed during the 2026–2027 intersessional period and results to be reported to SC15.

77. Overall, SCW18 provided a structured basis for completing the comparative stock assessment before SC14 and for continuing the longer-term simulated assessment work. The workshop identified improved CPUE standardisation, increased participation and data provision by Members, and continued evaluation of environmental and ecological processes as priorities for the next phase of SQWG work.

Recommendations to SC14

Data

78. The workshop recommended that a dedicated data workshop be convened during the 2026–2027 intersessional period, ideally during the first semester of 2027, in coordination with the Ecosystem Working Group. Its primary objective would be to review CPUE standardisation methods, with particular emphasis on spatio-temporal models incorporating environmental effects, and to consider relevant environmental indices and ecological interactions.

79. The workshop further recommended that SC14 encourage Members to provide the fishery and operational data required to support this work.

CPUE standardisation

80. The workshop recommended that the technical improvements identified during SCW18 be implemented before the next assessment iteration.

Stock assessment

81. The workshop recommended that all stock assessment models discussed during SCW18 be finalised, while prioritising completion of the agreed high-priority models for presentation at the pre-SC Squid Workshop.

Simulated assessment

82. The workshop noted the progress made in developing the operating model (SQUIDSIM) and updated the simulated assessment workplan and timeline for the 2026–2027 intersessional period.

Participation

83. The workshop recommended that SC14 encourage all Members, particularly those participating in the jumbo flying squid fishery, to contribute actively to the scientific work of the SQWG and to participate in the workshops proposed for the 2026–2027 intersessional period.

Post-SCW18 plan

Task	Lead	Output	Deadline
Complete the stock assessment using E-BSP.	China	Assessment results.	2026.08.28
Complete the stock assessment using SPiCT.	Chile	Assessment results.	2026.08.28
Hold an online meeting to review the completed model runs, if required.	SQWG Chair	Review of assessment results and identification of outstanding work.	Before 2026.09.05
Hold an in-person, full-day pre-SC Squid Workshop to review the assessment results and draft recommendations to SC14.	SQWG Chair	Agreed assessment conclusions and draft recommendations to SC14.	2026.09.05

Meeting closure

84. The meeting was closed the 2026.08.01 at 1709 UTC+08.

Appendices

A. Agenda

Participants

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C. Workshop documents

D. Final model-configuration matrix

Code	Start year	Time scale	Env. on r	CPUE weighting	Env. on q	Shape
y1t1e0r2w1q0p0s1	2001	Yearly	None	Expert	None	Schaefer
y1t1e0r2w1q0p0s2	2001	Yearly	None	Expert	None	Free
y1t1e0r2w1q1p0s1	2001	Yearly	None	Expert	CPUE-specific	Schaefer
y1t1e0r2w1q1p0s2	2001	Yearly	None	Expert	CPUE-specific	Free
y1t1e0r2w4q0p0s1	2001	Yearly	None	Reduced KOR/TPE	None	Schaefer
y1t1e0r2w4q0p0s2	2001	Yearly	None	Reduced KOR/TPE	None	Free
y1t1e0r2w4q1p0s1	2001	Yearly	None	Reduced KOR/TPE	CPUE-specific	Schaefer
y1t1e0r2w4q1p0s2	2001	Yearly	None	Reduced KOR/TPE	CPUE-specific	Free
y1t1e1r2w1q0p0s1	2001	Yearly	Niño 1+2	Expert	None	Schaefer
y1t1e1r2w1q0p0s2	2001	Yearly	Niño 1+2	Expert	None	Free

Code	Start year	Time scale	Env. on r	CPUE weighting	Env. on q	Shape
y1t1e1r2w1q1p0s1	2001	Yearly	Niño 1+2	Expert	CPUE-specific	Schaefer
y1t1e1r2w1q1p0s2	2001	Yearly	Niño 1+2	Expert	CPUE-specific	Free
y1t1e1r2w4q0p0s1	2001	Yearly	Niño 1+2	Reduced KOR/TPE	None	Schaefer
y1t1e1r2w4q0p0s2	2001	Yearly	Niño 1+2	Reduced KOR/TPE	None	Free
y1t1e1r2w4q1p0s1	2001	Yearly	Niño 1+2	Reduced KOR/TPE	CPUE-specific	Schaefer
y1t1e1r2w4q1p0s2	2001	Yearly	Niño 1+2	Reduced KOR/TPE	CPUE-specific	Free
y1t2e0r2w1q0p0s1	2001	Quarterly	None	Expert	None	Schaefer
y1t2e0r2w1q0p0s2	2001	Quarterly	None	Expert	None	Free
y1t2e0r2w1q1p0s1	2001	Quarterly	None	Expert	CPUE-specific	Schaefer
y1t2e0r2w1q1p0s2	2001	Quarterly	None	Expert	CPUE-specific	Free
y1t2e0r2w4q0p0s1	2001	Quarterly	None	Reduced KOR/TPE	None	Schaefer
y1t2e0r2w4q0p0s2	2001	Quarterly	None	Reduced KOR/TPE	None	Free
y1t2e0r2w4q1p0s1	2001	Quarterly	None	Reduced KOR/TPE	CPUE-specific	Schaefer
y1t2e0r2w4q1p0s2	2001	Quarterly	None	Reduced KOR/TPE	CPUE-specific	Free
y1t2e1r2w1q0p0s1	2001	Quarterly	Niño 1+2	Expert	None	Schaefer
y1t2e1r2w1q0p0s2	2001	Quarterly	Niño 1+2	Expert	None	Free
y1t2e1r2w1q1p0s1	2001	Quarterly	Niño 1+2	Expert	CPUE-specific	Schaefer
y1t2e1r2w1q1p0s2	2001	Quarterly	Niño 1+2	Expert	CPUE-specific	Free
y1t2e1r2w4q0p0s1	2001	Quarterly	Niño 1+2	Reduced KOR/TPE	None	Schaefer
y1t2e1r2w4q0p0s2	2001	Quarterly	Niño 1+2	Reduced KOR/TPE	None	Free
y1t2e1r2w4q1p0s1	2001	Quarterly	Niño 1+2	Reduced KOR/TPE	CPUE-specific	Schaefer
y1t2e1r2w4q1p0s2	2001	Quarterly	Niño 1+2	Reduced KOR/TPE	CPUE-specific	Free
y2t1e0r2w1q0p0s1	2012	Yearly	None	Expert	None	Schaefer
y2t1e0r2w1q0p0s2	2012	Yearly	None	Expert	None	Free
y2t1e0r2w1q1p0s1	2012	Yearly	None	Expert	CPUE-specific	Schaefer
y2t1e0r2w1q1p0s2	2012	Yearly	None	Expert	CPUE-specific	Free
y2t1e0r2w4q0p0s1	2012	Yearly	None	Reduced KOR/TPE	None	Schaefer
y2t1e0r2w4q0p0s2	2012	Yearly	None	Reduced KOR/TPE	None	Free
y2t1e0r2w4q1p0s1	2012	Yearly	None	Reduced KOR/TPE	CPUE-specific	Schaefer
y2t1e0r2w4q1p0s2	2012	Yearly	None	Reduced KOR/TPE	CPUE-specific	Free
y2t1e1r2w1q0p0s1	2012	Yearly	Niño 1+2	Expert	None	Schaefer
y2t1e1r2w1q0p0s2	2012	Yearly	Niño 1+2	Expert	None	Free
y2t1e1r2w1q1p0s1	2012	Yearly	Niño 1+2	Expert	CPUE-specific	Schaefer
y2t1e1r2w1q1p0s2	2012	Yearly	Niño 1+2	Expert	CPUE-specific	Free
y2t1e1r2w4q0p0s1	2012	Yearly	Niño 1+2	Reduced KOR/TPE	None	Schaefer

Code	Start year	Time scale	Env. on r	CPUE weighting	Env. on q	Shape
y2t1e1r2w4q0p0s2	2012	Yearly	Niño 1+2	Reduced KOR/TPE	None	Free
y2t1e1r2w4q1p0s1	2012	Yearly	Niño 1+2	Reduced KOR/TPE	CPUE-specific	Schaefer
y2t1e1r2w4q1p0s2	2012	Yearly	Niño 1+2	Reduced KOR/TPE	CPUE-specific	Free
y2t2e0r2w1q0p0s1	2012	Quarterly	None	Expert	None	Schaefer
y2t2e0r2w1q0p0s2	2012	Quarterly	None	Expert	None	Free
y2t2e0r2w1q1p0s1	2012	Quarterly	None	Expert	CPUE-specific	Schaefer
y2t2e0r2w1q1p0s2	2012	Quarterly	None	Expert	CPUE-specific	Free
y2t2e0r2w4q0p0s1	2012	Quarterly	None	Reduced KOR/TPE	None	Schaefer
y2t2e0r2w4q0p0s2	2012	Quarterly	None	Reduced KOR/TPE	None	Free
y2t2e0r2w4q1p0s1	2012	Quarterly	None	Reduced KOR/TPE	CPUE-specific	Schaefer
y2t2e0r2w4q1p0s2	2012	Quarterly	None	Reduced KOR/TPE	CPUE-specific	Free
y2t2e1r2w1q0p0s1	2012	Quarterly	Niño 1+2	Expert	None	Schaefer
y2t2e1r2w1q0p0s2	2012	Quarterly	Niño 1+2	Expert	None	Free
y2t2e1r2w1q1p0s1	2012	Quarterly	Niño 1+2	Expert	CPUE-specific	Schaefer
y2t2e1r2w1q1p0s2	2012	Quarterly	Niño 1+2	Expert	CPUE-specific	Free
y2t2e1r2w4q0p0s1	2012	Quarterly	Niño 1+2	Reduced KOR/TPE	None	Schaefer
y2t2e1r2w4q0p0s2	2012	Quarterly	Niño 1+2	Reduced KOR/TPE	None	Free
y2t2e1r2w4q1p0s1	2012	Quarterly	Niño 1+2	Reduced KOR/TPE	CPUE-specific	Schaefer
y2t2e1r2w4q1p0s2	2012	Quarterly	Niño 1+2	Reduced KOR/TPE	CPUE-specific	Free

85. All configurations use the nominal Peruvian CPUE series and the prior (r U(0.05, 2.5)). These specifications are constant across the configurations and are therefore omitted from the matrix below.

86. The model codes nevertheless retain `r2` and `p0` to preserve the agreed naming convention, where:

- `r2` = (r U(0.05, 2.5))
- `p0` = nominal Peruvian CPUE series