**1st intersessional meeting of the Working Group on New Stock Assessment Models**
**May 28, 2025 (9 am – 12 pm, Tokyo time)**
**WebEx**

**Summary**

## Agenda 1. Opening of the meeting

The 1st intersessional meeting of the Working Group on New Stock Assessment Models in the 2025 operational year (WG NSAM 2025-01) commenced at 9 am on 28 May 2025, Tokyo time.

The meeting was attended by Members from China (Libin Dai), Japan (Toshihide Kitakado, Shinichiro Nakayama), Korea (Hyejin Song), Chinese Taipei (Yi-Jay Chang, Jhen Hsu), Russia (Vladimir Kulik, Igor Chernienko) and the USA (Erin Bohaboy, Don Kobayashi) as well as the Secretariat (Robert Day, Alex Zavolokin, Sungkuk Kang). Drs. Larry Jacobson, Quang Huynh and Tom Carruthers attended as invited experts and assisted the Secretariat in preparing this meeting summary. Dr. Libin Dai led the meeting.

The Lead opened the meeting and welcomed participants. The participants introduced themselves.

## Agenda 2. Adoption of Agenda

There were no amendments to the agenda.

## Agenda 3. Review the modeling progress in 2024

The Lead, Dr. Libin Dai, introduced the background information of the WG and reviewed the modeling progress in 2024 (data availability and sharing, preferred modeling approaches, hypotheses, etc.). His presentation is available on the Collaboration site under WG on New Stock Assessment Models.

At WG NSAM 2024-01, a state-space model was presented by Japan and a preliminary SS3 model was presented by Chinese Taipei. From these preliminary models, priority items were identified for the development of the Pacific saury assessment with SS3. These priority items included the number of age groups to include in the age structure, choice of length units (fork length vs. knob length), the functional form of selectivity, the start year of the model (1980 vs. 1994), the use of a single joint CPUE series, availability of the Japanese survey data, availability of an environmental time series to inform recruitment, natural mortality and steepness values, and an evaluation of model

diagnostics.

The main changes were to model time-varying catchability for the early Japanese CPUE (1980-1993), fix the von-Bertalanffy growth function within the model while estimating the growth parameters outside the model using a Gompertz function, and use an age-specific Japanese survey index. However, a retrospective pattern persisted with a positive Mohn's rho, and the hindcasting prediction error was high.

At WG NSAM 2024-02, alternative steepness values were explored, and it was agreed to use the steepness value of 0.82 for the base case, informed by Hsu et al. 2024. The participants also agreed to maintain constant catchability in the Chinese Taipei's CPUE index. Alternative hypotheses regarding growth, natural mortality, and selectivity were explored to improve the fit to the length composition, at the judgment of the invited expert. These steps improved the fits to the CPUE and length composition data, but there was little change in the retrospective pattern.

At WG NSAM 2024-03, more data was added to the model by increasing the terminal year from 2022 to 2023, and additional size data from Korea and China were included. At this time, the recommendations from the group included a reduction in the number of age classes in SS3 to two (age 0 and 1+), use of asymptotic selectivity instead of dome selectivity, prioritizing the fit to the Japanese fishery-independent survey index over the fishery-dependent CPUE indices, use of density-dependent or random-walk catchability relationships for CPUE as appropriate, and suggest explore time-varying growth modeling to account for reductions in body size of Pacific saury.

The Lead then asked the invited expert, Dr. Larry Jacobson, to present the latest model, Step 16, which was also presented at SSC PS 14 (see Agenda 4).

Agenda 4. Review/present any new progress (if any)
The invited expert, Larry Jacobson, presented the structure of the latest SS3 model (presentation is available on the Collaboration site under WG on New Stock Assessment Models). Dr. Jacobson confirmed that the most of the recommendations from WG NSAM 2024-03 were incorporated in the latest model. The number of age groups was reduced, asymptotic selectivity was used, the terminal year was changed to 2024 to accommodate the 2024 Japanese survey, the published Gompertz growth curve was used, and the survey was prioritized over the CPUE series for model fitting.

Dr. Jacobson also reviewed the progress made during the past year. The estimated stock trends have been stable, although the magnitude of the stock changes with changes to the data or model structure. The latest model runs have lower spawning biomass compared to early runs, but the lower estimates are plausible given the early maturity of the species. From a management perspective, he

recommended exploration of trend-based control rules which can be more robust than those based on absolute abundance.

Dr. Jacobson reported the trends in catchability estimated in the model. The Japanese early CPUE series had monotonically increasing catchability as the fishery developed. On the other hand, there was no consistent temporal trend to the Chinese Taipei CPUE catchability but there was some evidence for a density-dependent relationship. For the other CPUE series (Japan late, Korea, Russia, and China), two of the four series had hyper-depletive patterns despite the prior belief that all series would exhibit hyper-stable behavior. Dr. Jacobson recommended development of the joint CPUE to simplify the model diagnostic process.

Another remaining issue is that the model still had poor fits to the size, particularly that there too many old post-spawning fish (30-35 cm).

As the outgoing invited expert, Dr. Jacobson provided recommendations to the new consultants at Blue Matter Science and the working group on how to continue the work. He indicated that rapid progress was possible if the consultants have significant freedom to make decisions on the best model structure. The SS3 forum (https://groups.google.com/g/ss3-forum) should be utilized by the consultants and working group and consultants to identify how the software can accommodate the fast growth and short lifespan of the species, as there are multiple possible configurations that use seasonal time steps. Accordingly, the data provided by members should have a small temporal resolution, e.g. monthly time steps, which can be aggregated as necessary by the modelers.

After the presentation by Larry Jacobson, the invited expert Dr. Quang Huynh presented a brief review of an earlier model (Step 7). He noted that he agreed with all of the critiques and recommendations provided by Dr. Jacobson. Dr. Huynh stressed the importance to reconcile and communicate the differences between biological age and model age, as the advancement of integer age classes in SS3 may differ from annular ring deposition in Pacific saury otoliths. Dr. Huynh also recommended the lower steepness be considered in a sensitivity scenario as inferred from the annual stock-recruit pairs estimated in the model. Finally, he indicated that the CPUE series with time-varying catchability likely provided no information on stock trends although it may be informative to estimate trends in catchability to learn about the behavior of the fishery.

## Agenda 5. Set up a timeline and workplan for meetings and delivering products in 2025

The Lead presented the plan for 4 meetings in 2025, with the goal of the final assessment in December.

Dr. Jacobson suggested that the invited experts and WG members should review and modify biological assumptions in the existing SS3 model towards resolving problems in fitting the size

composition data, if possible. It would be helpful to make recommendations for additional improvements. He also suggested to include length data from the Japanese survey, if available, and conduct a preliminary and informal test of model performance with a stock-recruitment environmental linkage. Some potential environmental indices were prepared by Canada at the December 2024 meeting. The purpose is to evaluate the potential utility and gain experience with such an environmental linkage.

Dr. Nakayama asked if the environmental variable time series was necessary for the final model. The Lead responded that it will depend on progress during the rest of the year, and that the Consultants have freedom to explore the direction of future modeling.

Dr. Huynh indicated that Blue Matter Science will further study the structure of the latest model, incorporate suggestions from Dr. Jacobson, and provide recommendations at WG NSAM 2025-02.

## Agenda 6. Consider developing a GitHub Repository for Pacific saury

The Lead suggested to establish a GitHub repository for the SSC PS to improve version control and transparency, facilitate collaboration, assure code quality, provide documentation and allow reproducibility. This will be discussed at SSC PS15 in September 2025.

## Agenda 7. Review the Agenda items of WG NSAM meeting in Yantai

The Lead presented a draft agenda for the next WG NSAM meeting in Yantai, China on 11-13 July. The agenda was posted on the website https://www.npfc.int/meetings.

The meeting will be held in a hybrid format in the morning (9:00-12:00) and in-person in the afternoon (13:30-17:00).

## Agenda 8. Other matters

The WG NSAM **requested** Japan to provide length composition data from Japanese surveys as follows: total number of catch individuals in each 1 cm size class by three areas, west of 165°E, 165°E – 180° and 180° - 165°W, from 2003 to the most recent year.

## Agenda 9. Close of the meeting

The meeting closed at 11:45 am on 28 May 2025, Tokyo time.