NPFC-2025-SSC PS15-RP02

2nd intersessional meeting of the Working Group on New Stock Assessment Models

11-13 July 2025
Hybrid

Summary

Agenda Item 1. Opening of the meeting

The 2nd intersessional meeting of the Working Group on New Stock Assessment Models in the 2025 operational year (WG NSAM 2025-02) commenced at 9 am on 11 July 2025, Beijing time. The meeting was in a hybrid format. Participants attended in-person in Shanghai, or online via Webex. Webex discussions were generally during the morning with face-to-face discussions during the afternoon.

The meeting was attended by Members from Canada, China, Japan, Korea, Russia, Chinese Taipei and the USA. Two invited experts attended the meeting: Dr. Larry Jacobson (remotely) and Dr. Quang Huynh (in-person). The list of participants is attached (Annex A).

Agenda Item 2. Adoption of Agenda

Shinichiro Nakayama suggested omitting *Agenda Item 5 State-space age-structured model (SAM)* because the WG had already agreed to focus on SS3. Participants agreed with the suggested modification.

Agenda Item 3. Overview of development progress of new stock assessment models for Pacific saury

The Lead, Dr. Libin Dai, introduced background information for the WG NSAM and reviewed the modeling progress in 2025. His presentation is available on the WG NSAM 2025-02 meeting webpage.

Agenda Item 4. Stock Synthesis 3 (SS3)

4.1 Review of any progress

Quang Huynh gave an update on the development of the Pacific saury SS3 assessment and described his recent modeling progress starting with the previous Step16 model discussed at the WG NSAM 2025-01 meeting in May 2025.

Step17 models included revisions and updates of the Step16 model with the annual time step. Step17 models were an improvement because the biomass ratio of age 0 / total biomass seemed more plausible. However, stock size was very sensitive to model structure. The new assumed spawning time (December 31st to allow a cohort to spawn twice) was helpful in some sense but not realistic because the spawning season is protracted. Fishing seemed to have little impact on the stock. Fit to large fish in size composition data was still poor and the model was not able to match the downturn in fishery mean size during recent years. The fit to recent Japanese survey data for age 0 saury was still poor.

It was decided to use a model with shorter seasonal time steps. It was not possible to model Pacific saury population dynamics in annual time steps because growth and mortality are so high, change dramatically over the course of a year and are dependent on size. Step18 was series of seasonal models.

Results showed that the scale of estimated total biomass was roughly similar to previous models but the proportion of age 0 biomass was more plausible. Fit to size composition data was improved on average. However, model results still did not match the decline in fishery mean size during recent years.

Initial Step18 fits had residual patterns around the estimated stock-recruit curve near the origin. However, the results improved somewhat when the steepness parameter was estimated.

On Day 2, Quang Huynh presented Step19 models which changed the timing and selectivity of the Japanese survey and added 2024 catch. Sensitivity analysis indicated that stock size and trends did not considerably change when the fishery CPUEs were removed from the model. This behavior indicated that the model primarily estimated stock size from the survey.

On Day 3, Step21 models carried out sensitivity analysis regarding trends in fishery mean size during recent years. The hypotheses were that changes in mean size were due to: changes in growth, changes in selectivity (movement of large fish off the spawning grounds or changes in targeting) or scarcity of large fish due to low stock size. The model was able to match the observed trends in mean size in each of these three cases.

The various hypotheses for recent changes in mean size have different consequences in the context of the assessment and it will be important to decide which are most likely. It was agreed that Japanese survey age data could be used to investigate the growth change hypothesis. Japan agreed to provide a simple analysis showing trends in mean size over time based on Japanese survey data.

A Member pointed out that the proportion of mature fish is a poor proxy for reproductive output. A more realistic approach is to use the product of the proportion mature, batch fecundity, eggs per batch and number of batches per year. It was decided to obtain the necessary reproductive data from Japanese biologists.

4.2 Review and development of specifications for base and sensitivity cases

Participants reviewed the specifications of the SS3 model developed at SSC PS14. The revised specifications of the SS3 model and description of Step19 models and other options for future candidate cases are attached (Annex B and Annex C, respectively). The base case could not be identified at this point, and will be re-visited in later meetings.

4.3 Model diagnostics

Step18 had a retrospective pattern (positive Mohn's rho), and hindcasting results were poor because terminal recruitment deviations were consistently overestimated. This result suggests that recruitment in the terminal year of the model wasn't estimable and that projections would be misleading. However, improved fit the Japanese survey in recent years might solve these problems.

Likelihood profile results showed a clear, nearly flat but broad minimum for R0 but profile results for steepness were erratic.

Results from a "dynamic B_0" analysis suggest that fishing mortality has little effect on the stock. Estimated exploitation rates were higher than expected under this hypothesis but exploitation rates apply only to the mature and exploited part of the stock. It will be important to evaluate the likely importance of fishing on stock dynamics.

In summary, the remaining modeling difficulties seem to center on the most recent years of the model and include possible changes in mean size, difficulties matching recent trends in the age 0 survey data, poor spawner-recruit fit at current low stock sizes and retrospective/hindcasting deficiencies.

Further intersessional diagnostic work is planned to evaluate the performance of the additional models presented during this meeting.

4.4 Other

No other matters were discussed.

Agenda Item 5. Data gaps and needs for Pacific saury stock assessment

Shin Nakayama gave a presentation introducing a Japanese survey and length composition data for PS (available on the Collaboration site under WG on New Stock Assessment Models). He briefly explained the survey materials and methods and pointed out that significant number of fish less than 15cm could escape from the trawl net, so the age-0 index derived from the survey covers 0.4-0.5-year fish and older. Shin Nakayama then explained the PS size distribution calculation method and informed participants that survey size composition data will be provided to the next SSC PS meeting in September.

Participants discussed whether Japanese survey data should be modeled as two time series (one for age 0 and one for age 1) or a single time series with size composition data and a size or age selectivity curve. Participants **agreed** to use the Japanese survey data as a single time series (age-aggregated index) with size composition data for the future base case because size data provide information about size selectivity assumed in the model. Age-specific indices may be used as a sensitivity case.

Participants noted a sharp decline in the average body length of Pacific saury in Korean fishery in recent years. Hyejin Song responded that this was due to a change in commercial practices. As the PS catch decreased significantly, smaller individuals, which were previously not targeted, have been utilized more in recent years. In recent years, due to low catch levels, smaller size grades that were previously not commercialized have also been included in the marketed product. This seems to have influenced the recent size composition, making the overall fish size appear smaller. However, since Korea does not have field-based biological sampling for PS, they are unable to determine whether this reflects a change in growth or just changes in market selection. Participants confirmed with Korea that the observed temporal pattern of Korean size composition data from Korean fleets is not due to a data error.

Participants reviewed the method for calculating Korean catch-at-size data and **agreed** to keep them for SS3 modeling.

The Lead presented a table comparing the sum of monthly 1 by 1 degree CPUE data with the annual summary footprint for cross-checking. Using Japan’s data as an example, he found relatively small differences in these two sources of data and encouraged Members to review their CPUE data to ensure they match the catch statistics reported in their Annual Reports.

Agenda Item 6. Other matters

6.1 Priority issues and timeline for next meeting

Participants developed a timeline for WG NSAM-related work toward SSC PS16 in December 2025.

Date	Meeting	Objective
July 11-13	WG NSAM 2025-02	• Review and update intersessional modeling work • Identify key uncertainties in assessment • Check diagnostic analysis results and biological plausibility • Establish preliminary candidate case scenarios
Sep 01-05	SSC PS15	• Report the modeling progress from WG NSAM 2025-02 • Obtain the latest fishery, CPUE (Member-specific CPUE and joint CPUE) and survey data (include size comps) from Members • Check ALKs and VAST estimates • Confirmation with biologists (growth, maturity, spawning timing, etc.)
TBD (2 days in Nov?)	WG NSAM 2025-03	• Update model specification for all case scenarios • Identify base and sensitivity cases based on diagnostic analysis results and biological plausibility • Draft a stock assessment report and make recommendations for review by the SSC PS • Try to incorporate environmental covariate in key population/fishery processes (low priority)
Dec 11-14	SSC PS16	• Review the first stock assessment report of age-structured models • Compare the assessment results of SS and BSSPM

6.2 Other

Participants **proposed** that SSC PS change the name of this group from WG NSAM to SWG NSAM to align it with other informal SC subsidiary groups.

Participants noted that the contract with Dr. Larry Jacobson will end after this meeting. They thanked Dr. Jacobson for his contributions to the SSC PS work and support to Members over the past 8 years.

Participants **requested** Quang Huynh to share the SS3 input files and relevant codes on the Collaboration site under WG on New Stock Assessment Models.

Agenda Item 7. Workload till SSC PS15 and PS16

See agenda item 6.

Agenda Item 8. Close of the meeting

The meeting closed at 11:50 am on 13 July 2025, Beijing time.

Annexes

Annex A – List of participants

Annex B – SS3 specifications

Annex C – Base case and sensitivity cases

Annex A

List of participants

LEAD

Libin DAI
libin.dai@qq.com

CANADA

Chris ROOPER *
chris.rooper@dfo-mpo.gc.ca

Janelle CURTIS *
Janelle.Curtis@dfo-mpo.gc.ca

CHINA

Qiuyun MA
qyma@shou.edu.cn

Yufei ZHOU
787715502@qq.com

Linlin ZHENG
1915443086@qq.com

Zhengyang JIANG
Jungle_jiang@189.cn

Juncheng LU
ljc13828@qq.com

Zi YANG
yangzi_004763@126.com

Shanshan ZHENG
1968168784@qq.com

Haoqiu WANG
wanghaoqiu2001@163.com

Simeng LI
qzxx20153505@126.com

Zhiwei LIU
1401514772@qq.com

JAPAN

Kazuhiro OSHIMA
oshima_kazuhiro28@fra.go.jp

Toshihide KITAKADO
kitakado@kaiyodai.ac.jp

Shin-Ichiro NAKAYAMA
nakayama_shinichiro16@fra.go.jp

Midori HASHIMOTO *
hashimoto_midori91@fra.go.jp

KOREA

Hyejin SONG *
hyejinsong@korea.kr

RUSSIA

Vladimir Kulik *
vladimir.kulik@tinro.vniro.ru

Igor CHERNIENKO *
igor.chernienko@tinro.vniro.ru

Dmitrii ANTONENKO *
dmantonenko@yandex.ru

CHINESE TAIPEI

Yi-Jay CHANG
yjchang@ntu.edu.tw

Jhen HSU
jhenhsu@ntu.edu.tw

Wen-Bin HUANG *
bruce@gms.ndhu.edu.tw

Kevin Pranata GINTING *
811254007@gms.ndhu.edu.tw

USA
Don KOBAYASHI *
donald.kobayashi@noaa.gov

INVITED EXPERTS
Larry JACOBSON *
larryjacobson6@gmail.com

Quang HUYNH
quang@bluematterscience.com

NPFC SECRETARIAT
Robert DAY *
rday@npfc.int

Alex ZAVOLOKIN
azavolokin@npfc.int

Sungkuk KANG
skang@npfc.int

SS3 specifications

Model specification	**Current**	**Suggested changes**	**Comments and Decisions**
Data and Fleets	RUS and VAN length comps not included	Add VAN length comps	RUS length comps will not be used. Need to confirm with VAN.
Data	Length comps only	Investigate conditional age at length or include ALKs/aging error directly to .dat	Allows incorporation of time variable growth. High priority.
Spatial considerations	None	Possibly use fleets as areas, but very data intense	divide CT or JPN fleets by season (easiest) see NPFC-2024-SSC PS14-WP13 (Future work)
Fleet structure	JPN-early and JPN-late separate	Combine and allow q-walk	Exclusion of CPUE using random-walk q (JPN-early and CT); Exclude all CPUE
Selectivity	confounded with mortality. As is, using logistic by length comps not fitting	Schooling/fishing behavior and spatial structure suggest dome-shaped selectivity could happen	Use asymptotic selectivity as base case and time-varying one as sensitivity case
Catchability	non-linear q		Failed to estimate one exponent for all CPUE

Model timestep	annual with recruitment happening Jan1	explore finer (perhaps monthly) timesteps	Seasonal time step is sufficient for Pacific saury
Variance weighting	CPUE downweighted	remove variance weighting (or upweight CPUE).	Commercial CPUE will be downweighted
Variance weighting	Effective sample size on length comps max 50	investigate more empirical-driven sample size for length comps, or tuning	Finished
Biology	**Current**	**Suggested changes**	**Comments**
Natural mortality/post-spawning mortality	annual mortality	if using a monthly timestep, could input vector of monthly M and account for post-spawning mortality	Season M for specifying post-spawning mortality (Finished)
Growth	Segmented (incorrect parameters) von Bert		Need to confirm with biologists about seasonal pattern
Growth variability		will address using better recruitment/settlement timing	small CV for larger fish (Finished)
Maturity	Length logistic inflection ~ 26 cm		update with suggestions by Japan (Dr. Fuji)
Fecundity (SSB units)	mature female biomass	some other measure of reproductive output (e.g. number of eggs, etc.)	Check biological plausibility

Recruitment timing	annual with recruitment happening Jan1	More realistically represent the long spawning season with variable survival/growth within the season	Estimate differences in average recruitment settlement by season (Finished)
Environment	none	Add environmental index into recruitment	Low priority, future work

Some key model specifications for Step-19 and other options for future candidate cases

Model specification	**Step-19**	**Other options**	**Comments and Decisions**
Data	Length comps only	Conditional age-at-length/ALK	Confirmed with KOR on size comps sampling/data issue
Starting year	1980	1994	
Time step	Seasonal	annual	Seasonal model is prioritized
Spatial considerations	None	Fleets as areas	divide CT or JPN fleets by season (easiest) see NPFC-2024-SSC PS14-WP13 (Future work)
Fleet structure	All CPUE	1. Exclude JPN-early and CT 2. Exclude all CPUE	Explore Seasonal CPUE indices (include both Member-specific CPUE and joint CPUE, be careful about specification on selectivity when using joint CPUE)
Survey indices and selectivity	Age-specific indices with age-based selectivity	Age-aggregated indices with size-based selectivity	Need to incorporate survey size comps and check VAST estimates
Fishery Selectivity	Asymptotic selectivity for fisheries	1. Change from logistic to dome-shaped selectivity (time-block)	

		2. Time-varying logistic selectivity	
Catchability	non-linear q	Check the plausibility of q estimate for survey index	Failed to estimate one exponent for all CPUE
Variance weighting (size comps)	McAllister-Ianelli method	Fishery length comps downweighted	Need to incorporate survey size comps
Natural mortality	Constant	Seasonal M for post-spawning mortality	
Growth	Approximate Gompertz	Explore time-varying growth	Need to confirm with biologists about seasonal pattern and mean size at age over time
Maturity	Length logistic inflection ~ 26 cm		update with suggestions by Japan (Dr. Fuji)
Steepness	Fixed (0.82)	Estimated with MCMC	