



North Pacific Fisheries Commission

NPFC-2023-SWG MSE PS03-Final Report

**3rd Meeting of the Joint SC-TCC-COM Small Working Group on
Management Strategy Evaluation for Pacific Saury (SWG MSE PS)
REPORT**

28 February – 1 March 2023

March 2023

This paper may be cited in the following manner:

Small Working Group on Management Strategy Evaluation for Pacific Saury. 2023. 3rd Meeting Report. NPFC-2023-SWG MSE PS03-Final Report. 16 pp. (Available at www.npfc.int)

North Pacific Fisheries Commission
3rd Meeting of the Joint SC-TCC-COM Small Working Group on Management
Strategy Evaluation for Pacific Saury (SWG MSE PS)

28 February – 1 March 2023

WebEx

REPORT

Agenda Item 1. Introductory items

1.1 Opening of the meeting

1. The 3rd meeting of the joint SC-TCC-COM Small Working Group on Management Strategy Evaluation for Pacific Saury (SWG MSE PS) took place in the format of video conferencing via WebEx, and was attended by Members from Canada, China, the European Union, Japan, the Republic of Korea, the Russian Federation, Chinese Taipei, and Vanuatu. The Pew Charitable Trusts (Pew) and the World Wildlife Fund attended as observers. Dr. Larry Jacobson participated as an invited expert. The meeting was chaired by Dr. Toshihide Kitakado (Japan) who is the co-Chair of the SWG MSE PS. Dr. Kitakado opened the meeting and welcomed the participants.

1.2 Adoption of agenda

2. The agenda was adopted without revision (Annex A). The List of Documents and List of Participants are attached (Annexes B, C).

1.3 Meeting logistics

3. The Science Manager, Dr. Aleksandr Zavolokin, outlined the meeting arrangements.
4. Mr. Alex Meyer was selected as rapporteur.

Agenda Item 2. Overview of the outcomes of previous NPFC meetings

2.1 SWG MSE PS02

5. The Chair presented the outcomes and recommendations from the SWG MSE PS02 meeting (NPFC-2023-SWG MSE PS03-WP01).
6. With regard to HCR options that would allow for in-season adjustment of the total allowable catch (TAC), the invited expert pointed out the possibility that simulations may overstate the performance of these HCRs if a significant amount of time is required between the

identification of a circumstance requiring an in-season adjustment and the implementation of the Commission's response.

2.2 *SSC PS10*

7. The Chair presented the outcomes and recommendations from the 10th Meeting of the Small Scientific Committee on Pacific Saury (SSC PS10; NPFC-2023-SWG MSE PS03-WP01).
8. The SWG MSE PS discussed the issues with using BSSPM model projections. Besides the problems that the SSC PS has previously noted, the Chair cautioned that the current operating model (OM) based on BSSPM may provide optimistic projections for a stock starting at a low biomass level in the absence of current information about stock status as demonstrated in projection analysis for stock assessments and because random process errors in simulations do not provide information about directional changes. China agreed that such simple projections are somewhat unreliable but pointed out that a small recovery trend in the Pacific saury stock has been observed in the latest few years. These observations resulted in substantial discussion among the participants and efforts to model process errors in a realistic manner.
9. Japan expressed concern about the current stock status of Pacific saury, pointing out that biomass and catch are at historically lowest levels. Japan further pointed out that the situation surrounding the Pacific saury fishery has changed significantly over time, such as more fishing being conducted in the high seas, increased size of fishing vessels, advances in fishing-related technologies, and more frequent at-sea transfers, and questioned whether some Members' calculations of CPUE, which are based on days rather than hauls, fully capture catchability or effort.
10. China pointed out that, according to the Annual Summary Footprint for Pacific saury, the number of some Members' fishing vessels has increased in the high seas over the years, while that for some other Members has been stable following the relevant Articles of CMM for Pacific saury. China further pointed out that the SSC PS has agreed on the need to study environmental effects and understand the relative impact of the environment on Pacific saury population dynamics. China highlighted the importance of this work and called for it to be accelerated.
11. The SWG MSE PS agreed to request the SSC PS to hold technical discussions on improving the quality of CPUE indices.

Agenda Item 3. Review progress on development of an interim harvest control rule (HCR) as a short-term task

12. The Chair presented a preliminary demonstration with the Shiny application to evaluate the performance of several HCRs (NPFC-2023-SWG MSE PS03-WP01).

13. The SWG MSE PS noted that the three HCR options show recovery in a short time period. This may be due to BSSPM's optimistic and slightly unrealistic assumption of the high potential of recovery, which is in part because the unfavorable conditions of recent years have not been considered. The SWG MSE PS also noted that the three HCRs (HCR0: $F_{MSY} * B$, HCR1: a usual hockey-stick type of HCR, and HCR3: a hybrid version of HCR1 with an in-season adjustment based on Japanese fishery-independent survey) show different speeds of recovery between HCR0 and HCR1/HCR3 showing an increased chance of the population recovering in a shorter time period for HCR1/HCR3. The SWG MSE PS further noted that the HCR parameters of the three options are preliminary and could be tuned based on further discussion.

3.1 Management objectives

3.2 Reference points and tuning criteria

14. The SWG MSE PS reviewed and updated the three types of management objectives discussed at SWG MSE PS01 and SWG MSE PS02. The SWG MSE PS agreed to continue discussions around these three objectives below, putting higher priority on (a).
- (a) Recovery of the stock:
- i. The stock status is recovered above $B_{tar} = B_{MSY}$ within "xx" years with "pp" probability (for example, xx could be xx=4-6 and "pp" could be pp=60-80%);
 - ii. The stock status is maintained above the B_{tar} level over "yy-yy" years with "pp" probability.
- (b) Avoiding unsustainable state of the stock:
- i. The annual probability that the stock drops below B_{lim} should not exceed "pp" probability;
 - ii. The annual probability that the fishing mortality exceeds F_{lim} should not exceed "pp" probability.
- (c) Achieving high and stable catch:
- i. Catch is high and stable as much as possible;
 - ii. Maximum interannual variation of TAC over "yy-yy" period should be less than 40%.
15. With regard to the maximum interannual variation of TAC, depending on the simulation results, the SWG MSE PS discussed the possibility of limiting this to 20 or 25% if the TAC is set based on an average of multiple years.
16. The SWG MSE PS reviewed the list of preliminary reference points discussed at the SSC PSint01 and SWG MSE PS02. The SWG MSE PS reaffirmed that the list of ranges for biological reference points generally contains typical values, although $1 * F_{MSY}$ may be more appropriate as F_{lim} rather than F_{tar} . Regardless, the range is purposely wide for computational, discussion and exploratory purposes. The default values are for demonstration purposes.

Neither implies any advice or decision about recommended harvest guidelines for Pacific saury.

Reference point	Default value	Potential range
$B_{tar} = c * B_{MSY}$	$c = 1$	$c = 0.8 - 1.2$
$B_{lim} = c * B_{MSY}$	$c = 0.35$	$c = 0.2 - 0.5$
$F_{tar} = c * F_{MSY}$	$c = 1$	$c = 0.8 - 1.2$
$F_{lim} = c * F_{MSY}$	$c = 1.35$	$c = 1.2 - 1.5$

17. The SWG MSE PS noted that the current OM shows a somewhat optimistic recovery process for the reasons identified in paragraph 8, and further development of process error assumptions in the model is needed to make “pp” and “time frame” calculations, as indicated in objective (a) in paragraph 14, more realistic.
18. The SWG MSE PS agreed to continue to look at different combinations of HCR parameters, such as setting the overall discount rate to F_{MSY} .

3.3 Conditioning of operating models (OMs)

19. The SWG MSE PS noted the previous discussions on the conditioning of OMs in the SWG MSE PS01, SSC PSint01, and the SWG MSE PS02 meetings.
20. The SWG MSE PS agreed that Option A is to be used as the default option. However, it also noted that, since the current assumptions, which do not account for environmental effects, are somewhat optimistic for population recovery, there is an urgent need to extend the current OM with BSSPM by incorporating environmental information.
21. The SWG MSE PS noted that a great deal of uncertainty exists regarding the environmental factors driving variability in Pacific saury. It is therefore important that recommended HCR options are robust and perform well under a range of assumptions. The SWG MSE PS therefore agreed to structure its testing analyses around a range of hypotheses including:
 - (a) Long-term climate change over next 10-15 years (some reasonable, but not necessarily perfect, patterns to be developed);
 - (b) Short-term change over 5 years;
 - (c) Random (constant mean) but high variation.
22. The SWG MSE PS agreed to also continue development of age-structured models so that it may be used to condition a set of OMs if feasible.

3.4 Candidate HCRs and constraints therein

23. The SWG MSE PS considered the candidate HCRs and the constraints therein and agreed on the need to hold further discussions on the following:
- (a) Choice of an input value of “B” for HCR (average of recent 2 years as a default, and single recent year for trial since this option may be used for HCR2 and HCR3 with some in-season adjustment);
 - (b) Maximum allowable change in TAC over two consecutive years (within 40%, but 20-25% when the value of B is based on the average of two years);
 - (c) HCR parameters can be tuned to meet a higher priority objective. To do so, however, more concrete and specific objectives need to be set.
24. The SWG MSE PS noted the need to confirm the feasibility of HCR2 and HCR3 with in-fishing season adjustment of TACs. One possible way is to set a preliminary and precautionary TAC, and increase it when a good sign of abundance is detected in the Japanese fishery-independent survey. The SWG MSE PS also discussed the possibility of setting a trigger level for determining if the TAC should be adjusted or not.
25. The SWG MSE PS agreed to use $HCR = \text{Recent } F \text{ (such as recent three-year average)} * B$ for demonstration purposes.

3.5 Performance measures

26. The SWG MSE PS reviewed the performance measures discussed at SWG MSE PS01 and SWG MSE PS02 and agreed to continue to base discussions around them. The possible performance measures reflecting the management objectives are as follows:
- (a) Recovery of the stock:
 - i. Probabilities that the stock status is above B_{tar} at 1, 2, ..., 5, 10, 15 years after the HCR is implemented;
 - ii. Probabilities that the stock status is in Kobe green quadrant at 5, 10, 15 years after the HCR is implemented.
 - (b) Avoiding unsustainable state of the stock:
 - i. Probabilities that the stock status is below B_{lim} at 1, 2, ..., 5, 10, 15 years after the HCR is implemented;
 - ii. Probabilities that the fishing mortality exceeds F_{lim} at 1, 2, ..., 5, 10, 15 years after the HCR is implemented.
 - (c) Achieving high and stable catch:
 - i. Average catch by 1-5, 6-10, 11-15 years after the HCR is implemented;
 - ii. Annual catch variation by 5, 10, 15 years after the HCR is implemented;
 - iii. Probabilities that the TAC hits the predetermined maximum change by 5, 10, 15 years after the HCR is implemented.

27. The SWG MSE PS noted that, in addition, the first calculated TAC by HCRs will also need to be presented.

3.6 Simulation platform

28. The Chair reported on progress in the development of the Shiny application.

29. At the request of the SWG MSE PS, the Chair agreed to share the code for the Shiny application for interested participants to use. The Chair explained that the Shiny application was primarily for the convenience of Members, and it is currently conditioned based on the 2022 stock assessment. However, the Chair may conduct final calculations using the same code without the Shiny interface and include information from the 2023 stock assessment, which may provide different results.

30. The invited expert also recommended that the Shiny application output include metadata (e.g. date, settings, etc.) when simulations are run.

3.7 Template for presentation of results

31. The SWG MSE PS agreed to defer the finalization of a template for the presentation of results to its next meeting.

3.8 Other matters

32. No other matters were discussed.

Agenda Item 4. Discussion toward the development of management procedures (MPs) as a mid-term goal

4.1 Management objectives and some constraint conditions for the regulation of fishery

33. The SWG MSE PS agreed to focus on its short-term goal until sufficient progress is made and to defer discussions on its mid-term goal.

34. The SWG MSE PS reaffirmed the need to ensure as smooth a transition as possible from the short-term goal when setting the HCR to the mid-term goal when developing the MPs.

4.2 Technical matters on operating models, MPs, performance measures and simulation

35. The SWG MSE PS tasked the SSC PS to continue to work to develop an age-structured stock assessment model, without going into technical details. This will contribute to the more comprehensive MSE framework that will be used to develop the long-term MP.

Agenda Item 5. Implementation schedule and safeguard for exceptional circumstances

5.1 Implementation schedule of an HCR

36. The SWG MSE PS reviewed the implementation schedules for the three HCR options agreed to at the SWG MSE PS02 meeting and agreed that the HCR to be selected at COM08 should be recommended for use in setting the 2024 TAC (Annex D).

5.2 Mid-term plan of implementation and its review process

37. The SWG MSE PS reaffirmed that normally after the completion of HCR and MPs, reviews are conducted within the timeframe of two to three years, but considering the nature of Pacific saury, regular review might be warranted at the beginning of this time period.

5.3 Definition of exceptional circumstances

38. The SWG MSE PS reaffirmed that the exceptional circumstances can be the population dynamics falling beyond the range of the confidence interval and the unavailability of fisheries independent surveys.

39. The SWG MSE PS reaffirmed that the finalized HCR should include definitions of exceptional circumstances.

Agenda Item 6. Other matters

6.1 Selection of co-Chair

40. The Science Manager explained that the position of co-Chair of the SWG MSE PS representing the Technical and Compliance Committee (TCC) is currently vacant and invited nominations from Members.

41. As there were no nominations, the SWG MSE PS agreed to request the Commission to appoint a co-Chair.

Agenda Item 7. Timeline and future process

7.1 Timeline

42. The SWG MSE PS reviewed and revised the timeframe agreed to at SWG MSE PS02 (Annex E).

7.2 Future process with assistance of SSC PS

43. The SWG MSE PS compiled a list of technical tasks requiring the assistance of the SSC PS and potentially the assistance of the Commission:

- (a) Review CPUE indices (including joint CPUE) for possible improvement (see paragraphs 9 and 10)
- (b) Review BSSPM in light of handling of process error and environmental changes (bias correction, auto-correlation, fluctuation etc.)
- (c) Develop some working hypotheses for some OMs to test robustness of HCRs

- (d) Test the performance of one-year biomass estimate or two-year average
- (e) Test the performance over different constraints
- (f) Run simulation with several combination of HCR parameters
- (g) Run simulation separately over OM scenarios

7.3 Workplan till SWG MSE PS04 meeting

44. The SWG MSE PS developed a workplan of intersessional activities until the 5th SWG MSE PS meeting (Annex E).

Agenda Item 8. Recommendations to the Commission

45. The SWG MSE PS recommends that:

- (a) the Commission ensure the adequate allocation of funds for the continued development and utilization of a simulation platform for the evaluation of HCR if needed.
- (b) the SWG MSE PS04 and 05 meetings be held in person, with a hybrid option, and be funded by the Commission if needed.
- (c) the invited expert, Dr. Larry Jacobson, be invited to the next SWG MSE PS meetings.
- (d) the Commission endorse the timeframe through 2024 including the proposed meetings and tasks (Annex E).
- (e) the Commission appoint a co-Chair of the SWG MSE PS representing the TCC.

46. The SWG MSE PS agreed that future meetings should include scientists, managers and stakeholders to facilitate communication and completion of this important work.

Agenda Item 9. Adoption of report

47. The SWG MSE PS03 Report was adopted by consensus.

Agenda Item 10. Close of the Meeting

48. The meeting closed at 13:10 on 1 March 2023, Tokyo time.

Annexes:

Annex A – Agenda

Annex B – List of documents

Annex C – List of participants

Annex D – Timeframe of NPFC meetings toward setting a Harvest Control Rule

Annex E – Timeline and tasks

Agenda

Agenda Item 1. Introductory items

- 1.1 Opening of the meeting
- 1.2 Adoption of agenda
- 1.3 Meeting logistics

Agenda Item 2. Overview of the outcomes of previous NPFC meetings

- 2.1 SWG MSE PS02
- 2.2 SSC PS10

Agenda Item 3. Review progress on development of an interim harvest control rule (HCR) as a short-term task

- 3.1 Management objectives
- 3.2 Reference points and tuning criteria
- 3.3 Conditioning of operating models (OMs)
- 3.4 Candidate HCRs and constraints therein
- 3.5 Performance measures
- 3.6 Simulation platform
- 3.7 Template for presentation of results
- 3.8 Other matters

Agenda Item 4. Discussion toward development of management procedures (MPs) as a mid-term goal

- 4.1 Management objectives and some constraint conditions for the regulation of fishery
- 4.2 Technical matters on operating models, MPs, performance measures and simulation

Agenda Item 5. Implementation schedule and safeguard for exceptional circumstances

- 5.1 Implementation schedule of an HCR
- 5.2 Mid-term plan of implementation and its review process
- 5.3 Definition of exceptional circumstances

Agenda Item 6. Other matters

- 6.1 Selection of co-Chair

Agenda Item 7. Timeline and future process

- 7.1 Timeline

7.2 Future process with assistance of SSC PS

7.3 Workplan till SWG MSE PS04 meeting

Agenda Item 8. Recommendations to the Commission

Agenda Item 9. Adoption of report

Agenda Item 10. Close of the meeting

List of Documents

MEETING INFORMATION PAPERS

Document Number	Title
NPFC-2023-SWG MSE PS03-MIP01	Meetings Information
NPFC-2023-SWG MSE PS03-MIP02	Provisional Agenda
NPFC-2023-SWG MSE PS03-MIP03	Annotated Indicative Schedule

REFERENCE DOCUMENTS

Document Number	Title
NPFC-2022-SWG MSE PS02-Final Report	SWG MSE PS02 Meeting Report
NPFC-2022-SSC PS10-Final Report	SSC PS10 Meeting Report

WORKING PAPERS

Document Number	Title
NPFC-2023-SWG MSE PS03-WP01 (Rev. 1)	Development of HCR for Pacific saury for the short-term objective

List of Participants**CHAIR**

Toshihide KITAKADO
kitakado@kaiyodai.ac.jp

CANADA

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

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

Amber LINDSTEDT
Amber.Lindstedt@dfo-mpo.gc.ca

CHINA

Ce LIU
liuce@cofa.net.cn

Libin DAI
644318716@qq.com

Chuanxiang HUA
cxhua@shou.edu.cn

Qiuyun MA
qyma@shou.edu.cn

Zijun ZHOU
zhouzijun@cofa.net.cn

EUROPEAN UNION

Karolina MOLLA GAZI
karolina.mollagazi@wur.nl

JAPAN

Miwako TAKASE
miwako_takase170@maff.go.jp

Takumi FUKUDA
takumi_fukuda720@maff.go.jp

Kazuhiro OSHIMA
oshima_kazuhiro28@fra.go.jp

Miyako NAYA
naya_miyako88@fra.go.jp

Shuya NAKATSUKA
nakatsuka_shuya49@fra.go.jp

Shin-Ichiro NAKAYAMA
nakayama_shinichiro16@fra.go.jp

Hiroomi MIYAMOTO
miyamoto_hiroomi47@fra.go.jp

Taiki FUJI
fuji_taiki65@fra.go.jp

Midori HASHIMOTO
hashimoto_midori91@fra.go.jp

Hiroshi KUBOTA
kubota_hiroshi89@fra.go.jp

Shingo OTA

shingo_ota810@maff.go.jp

Satoshi SUYAMA
suyama@affrc.go.jp

Sayako TAKEDA
sayako_takeda590@maff.go.jp

Kyutaro YASUMOTO
kyutaro_yasumoto890@maff.go.jp

KOREA

Jeongseok PARK
jeongseokpark@korea.kr

Hyejin SONG
hyejinsong@korea.kr

Jung-re KIM
riley1126@korea.kr

Sanggyu SHIN
gyuyades82@gmail.com

Tae-hoon WON
th1608@korea

RUSSIA

Dmitrii ANTONENKO
dmantonenko@yandex.ru

Vladimir KULIK
vladimir.kulik@tinro-center.ru

Victor ZAMYATIN
victor.zamyatin@tinro-center.ru

CHINESE TAIPEI

Yi-Jay CHANG
yjchang@ntu.edu.tw

Jhen HSU
jhenhsu@ntu.edu.tw

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

VANUATU

Mei-Chin JUAN
meichin.mdfc@gmail.com

Ada SOKACH
akettner@fisheries.gov.vu

OBSERVERS

THE PEW CHARITABLE TRUSTS

Dave GERSHMAN
dgershman@oceanfdn.org

Shana MILLER
smiller@oceanfdn.org

Ashley WILSON
awilson@pewtrusts.org

WORLD WILDLIFE FUND

Shuhei UEMATSU
uematsu@wwf.or.jp

INVITED EXPERT

Larry JACOBSON
larryjacobson6@gmail.com

RAPPORTEUR

Alex MEYER
meyer@urbanconnections.jp

SECRETARIAT

Robert DAY
rday@npfc.int

Alex ZAVOLOKIN
azavolokin@npfc.int

Judy DWYER
jdwyer@npfc.int

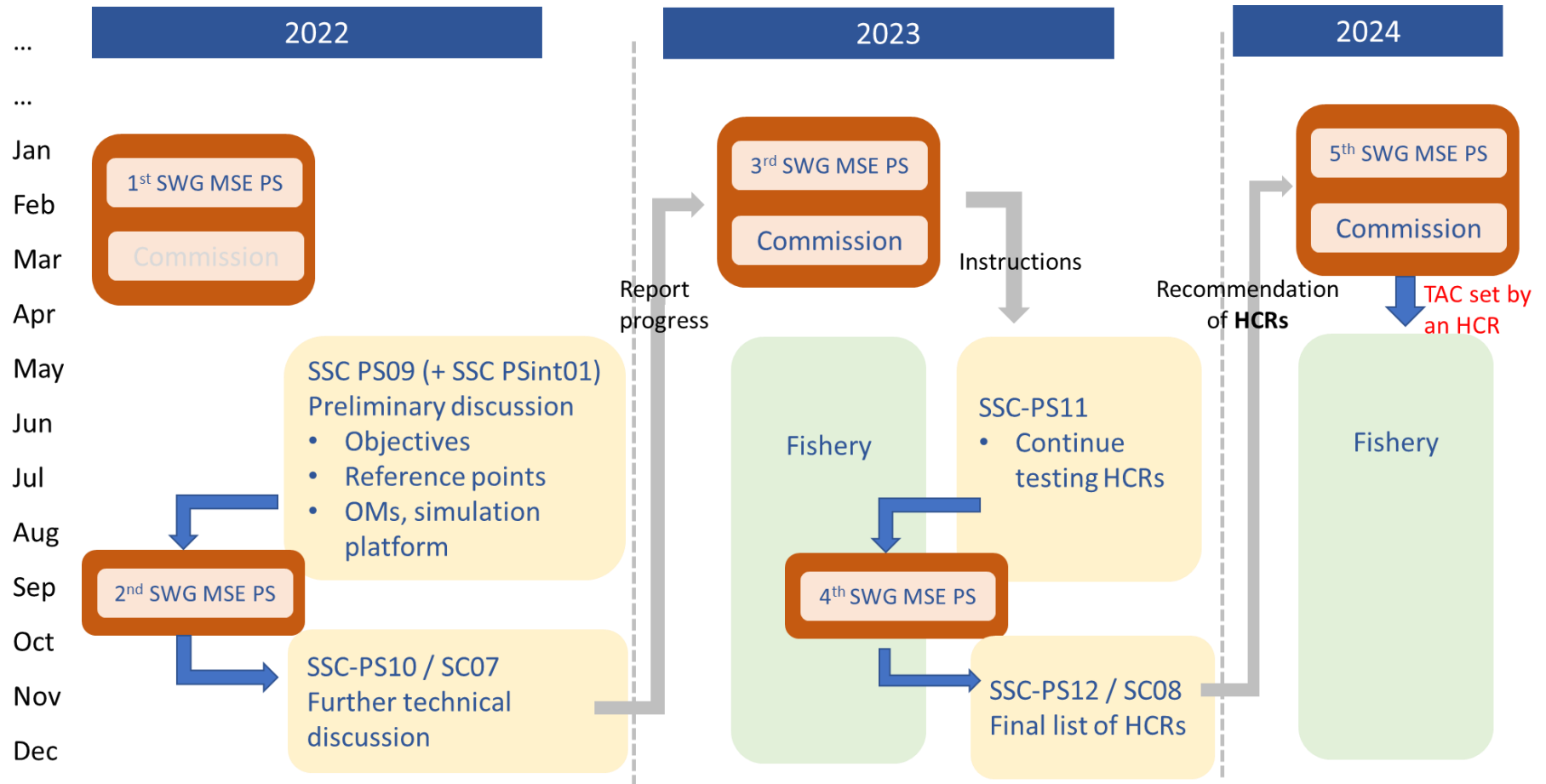
Yuko YOSHIMURA-TAKAMIYA
ytakamiya@npfc.int

Sungkuk KANG
skang@npfc.int

Natsuki HOSOKAWA
nhosokawa@npfc.int

Timeframe of NPFC meetings toward setting a Harvest Control Rule

Implementation schedule



Timeline and tasks

Meeting	Date	Task	Format
COM07	Mar 22-24, 2023	<ul style="list-style-type: none"> Review of management advice from SC Review and endorsement of SWG MSE PS 01-03 reports 	In-person (hybrid)
Intersessional technical work (under SSC PS)	April-May	<ul style="list-style-type: none"> Start discussion on CPUE Review other issues if ready 	Virtual
Ditto	June	<ul style="list-style-type: none"> Review progress on OMs including development of robustness scenarios Review progress on evaluation of HCRs 	Virtual
Ditto	Late July	<ul style="list-style-type: none"> Review further progress on OMs Review further progress on evaluation of HCRs 	Virtual
SSC PS11	Aug 28-31	<ul style="list-style-type: none"> Review standardized CPUE up to 2022 Review Japanese survey estimates including 2023 Review progress on new assessment models and finalize a set of models and specification Review progress on HCR works Conduct initial BSSPM analyses to see if there are any gaps between 2022 and 2023 assessments 	In-person (hybrid)
SWG MSE PS 04	Aug 31-Sep 2	<ul style="list-style-type: none"> Review progress on HCR works Finalize a set of OMs, management objectives and template of performance metrics and candidate HCRs Capacity building 	In-person (hybrid)
Intersessional technical work (under SSC PS)	Oct-Nov	<ul style="list-style-type: none"> Review progress on tasks identified in SWG MSE PS 04 	Virtual
SSC PS12	Dec 11-14	<ul style="list-style-type: none"> Update BSSPM analyses and provide recommendations to SC/COM Review progress on new assessment models and finalize a set of models and specification (relevant to the mid-term MSE work as conditioning of operating models) Finalize technical works 	In-person (hybrid)
SWG MSE PS 05	1 month prior to COM08	<ul style="list-style-type: none"> Select an HCR and make a recommendation to the Commission 	In-person (hybrid)
COM08	2024	<ul style="list-style-type: none"> Adoption of CMM on HCR for PS? 	In-person (hybrid)