North Pacific Fisheries Commission

Biological Reference Point/Harvest Control Rule/Management Strategy Evaluation Workshop

REPORT

4-5 March 2019

March 2019

This paper may be cited in the following manner:

Biological Reference Point/Harvest Control Rule/Management Strategy Evaluation Workshop. 2019. 1st Workshop Report. NPFC-2019-WS BRP_HCR_MSE01-Final Report. 13 pp. (Available at www.npfc.int)

2nd Floor Hakuyo Hall,
Tokyo University of Marine Science and Technology,
4-5-7 Konan, Minato-ku, Tokyo
108-8477, JAPAN

TEL +81-3-5479-8717
FAX +81-3-5479-8718
Email secretariat@npfc.int
Web www.npfc.int

North Pacific Fisheries Commission
Biological Reference Point/Harvest Control Rule/Management Strategy Evaluation
Workshop

4-5 March 2019
Yokohama, Japan

REPORT

Agenda Item 1. Opening of the Workshop

1. The Biological Reference Point/Harvest Control Rule/Management Strategy Evaluation Workshop (WS BRP_HCR_MSE) of the North Pacific Fisheries Commission (NPFC) took place in Yokohama, Japan on 4-5 March 2019, and was attended by Members from Canada, China, Japan, the Republic of Korea, the Russian Federation, and Chinese Taipei. Dr. Doug Butterworth, Mr. Patrick Cordue and Dr. Laurence Kell also attended the workshop as invited experts.

2. The workshop was opened by the WS BRP_HCR_MSE Chair, Mr. Luoliang Xu, who outlined the objectives and procedures for the workshop.

3. Japan extended its sincere welcome to all the participants to Yokohama and emphasized the importance of the workshop to the work of the NPFC.

4. The Executive Secretary, Dr. Dae-Yeon Moon, explained that the purpose of the WS BRP_HCR_MSE is to consider potential directions on the application of the biological reference points (BRPs), harvest control rules (HCR) and management strategy evaluation (MSE) for the NPFC priority species, and to provide recommendations to the Scientific Committee (SC). The Executive Secretary also thanked the United States, on behalf of the NPFC, for providing voluntary contribution for funding the participation of the invited experts.

5. The Chair presented an overview of the Terms of Reference for the Workshop and explained the expected outputs.

Agenda Item 2. Adoption of Agenda

6. The participants agreed to add an agenda item entitled “basic information about NPFC priority

species" between "Adoption of the Agenda" and "Review of the general concept and best practices of BRP, HCR and MSE."

7. The revised Agenda was adopted (Annex A). The List of Documents and Participants List are attached (Annexes B, C).

Agenda Item 3. Basic information about NPFC priority species

8. The Chair of the Small Scientific Committee on Pacific Saury (SSC PS), Dr. Toshihide Iwasaki, presented the biological and fisheries-related information used for the Pacific saury stock assessment, and explained the current stock assessment work being done by the NPFC.

9. The Chair presented the biological and fisheries-related information available for chub mackerel and explained the relevant stock assessment work being done by the NPFC.

10. Science Manager, Dr. Aleksandr Zavolokin, presented a list of data available for stock assessment of Pacific saury and chub mackerel.

11. Dr. Butterworth pointed out the importance of recruitment variability in short-lived pelagic species such as Pacific saury, as a poor incoming year-class poses a significant risk for the health of the overall stock of such a species. Being able to identify poor recruitment is important for implementing appropriate management measures. Length composition data can help identify the strength of the incoming year-class.

Agenda Item 4. Review of the general concept and best practices of BRP, HCR and MSE

12. Dr. Butterworth gave a presentation on quantifying resource risk for highly variable species in MSE and measuring risk consistently for fisheries on small pelagics (NPFC-2019-WS BRP_HCR_MSE01-WP09). He argued that pristine biomass (B_0) is not always well estimated for short-lived and highly variable stocks, such as small pelagic species, and B_0-based reference points should not be used for such species. Dr. Butterworth also used the example of the management of South African sardine to explain the difficulties in defining a level of acceptable risk, due to the variability of estimates of B_0, recruitment and natural mortality.

13. Dr. Kell presented a review of target and limit reference points used in pelagic species fisheries by other regional fisheries management organizations (RFMOs) and fishery management bodies (NPFC-2019-WS BRP_HCR_MSE01-WP08 (Rev. 1)). Dr. Kell pointed out the importance of tailoring reference points to life history characteristics such as growth and maturity and also to variability in recruitment; understanding the weaknesses and uncertainties inherent in reference points; and testing the robustness of reference points for fishing mortality

and spawning stock biomass.

14. Dr. Butterworth presented the pros and cons of best assessment versus management procedure (MP) based management (NPFC-2019-WS BRP_HCR_MSE01-WP05). MP-based approaches can reduce lengthy negotiations and free up time for longer-term research, enable better evaluation of risk, provide a sound basis to impose limits on TAC variability, are consistent with the Precautionary Principle, and provide a framework for interactions with stakeholders. In practice, there is growing acceptance for them when they have been applied. However, there has been a greater frequency of recourse to exceptional circumstances and MP revisions than was originally foreseen. Furthermore, the MSE processes are lengthy, resulting in less time saved than originally envisioned. It may also be difficult to explain MPs to stakeholders and convince stakeholders of their value initially.

15. Dr. Butterworth gave a presentation on what makes an MP an MP and an MSE an MSE (NPFC-2019-WS BRP_HCR_MSE01-WP03). He explained that an MSE is an approach that can be used to evaluate management strategies that are well specified and implementable in reality, while an MP is a fully-specified management strategy. Furthermore, the more incompletely the management strategy is specified, the more complex the evaluation process will be.

16. Following a query from the invited experts, Chinese Taipei provided a more detailed explanation of the Pacific saury stock assessment work done by the NPFC to date, including comparison of CPUE indices, stock assessment results and some issues to be addressed to move forward.

17. Mr. Cordue presented a case study on orange roughy, covering stock assessment, reference points, HCR and MSE (NPFC-2019-WS BRP_HCR_MSE01-WP02). Based on the case study, he argued that excellent stock assessment and MSE are not mutually exclusive, and advised having the best possible stock assessment and also conducting an MSE in order to determine an MP. Mr. Cordue pointed out that MPs based on accurate stock assessments will most likely perform much better than those based on inaccurate assessments. Lastly, he emphasized that accurate stock assessment requires a defensible model using defensible data and assumptions.

18. Dr. Butterworth presented a case study on South African hake (NPFC-2019-WS BRP_HCR_MSE01-WP06). While recognizing that the case of South African hake differed greatly from that of Pacific saury or chub mackerel, he used the case study to illustrate in concrete terms how MPs can be implemented successfully.

Agenda Item 5. Overview of the outcomes of literature reviews on BRPs and HCRs that have been applied to small pelagic fish stock management

19. Dr. Kell presented a review of HCR and MSE used in pelagic species fisheries by other RFMOs and fishery management bodies (NPFC-2019-WS BRP_HCR_MSE01-WP01, 07). He provided an overview of the precautionary approach, and presented examples of HCR simulations and MSE approaches. Dr. Kell highlighted the importance of limiting MSE to one stock at a time and of developing a multi-year road map. He also pointed out that, while conducting an MSE can be a lengthy process, the lessons learned from conducting it for one stock can be transferred to other stocks.

Agenda Item 6. Potential directions on application of BRPs, HCR and MSE to the management of NPFC priority species

20. Dr. Butterworth gave a presentation on improving communication as the key to more effective MSE processes (NPFC-2019-WS BRP_HCR_MSE01-WP04, NPFC-2019-WS BRP_HCR_MSE01-IP02). He outlined typical issues faced by RFMOs in implementing MPs, and explained an initiative by the PEW Organisation to deal with these issues, with a focus on intermediary groups and their scientist-stakeholder interactions, and improving visual communication tools for presentation of complex results.

21. The participants recommended conducting MSE for only one species at a time due to the resource-intensive and complex nature of the process. Of the target species being considered at the Workshop, the participants noted that chub mackerel is a longer-lived species than Pacific saury and more stock assessment data are available, enabling the operating model to be conditioned. They therefore recommended conducting MSE for chub mackerel as the first priority.

22. For Pacific saury, the invited experts suggested that age-structured stock assessment models would be more appropriate than age-aggregated models and that age-structured operating models were preferable to length-based operating models.

23. For Pacific saury, the participants recognized the value in developing an age-structured operating model for use in simulation work to identify and evaluate potential reference points (for example B_{lim} and F_{target}). They suggested that initial simulation work focus on constant F runs (e.g. to investigate MSY-based reference points, B_{lim} and F_{target}) and empirical HCR (e.g. taking a constant proportion of the estimated survey biomass). The participants also pointed out that model-based and empirical HCRs could both be considered when a full MSE is undertaken.

24. For chub mackerel, the invited experts suggested that initial assessments be conducted with a range of models. The stock assessment results can be used to ground-truth a range of age-based operating models for use in an MSE. The operating models can also be used to investigate potential reference points. A range of model-based and empirical HCRs could be explored in the MSE.

25. The participants suggested that it would be useful to explore the possibility of creating an intermediary group consisting of scientists, managers and stakeholders, as needed, when conducting an MSE.

26. The participants noted that consideration could be given to the role of small pelagic fish in the ecosystem as key low trophic level stocks and also to climate variability when setting the reference points.

Agenda Item 7. Recommendations to the SC and its subsidiary bodies

27. The WS BRP_HCR_MSE considered two priority species, Pacific saury and chub mackerel, and recommended the following to the SC and its subsidiary bodies:
    (a) The Workshop recommended conducting MSE for only one species at a time due to the resource-intensive and complex nature of the process. Because chub mackerel is a longer-lived species than Pacific saury and more stock assessment data are available, enabling the operating model to be conditioned, the Workshop recommended conducting MSE for chub mackerel as the first priority (see Punt et al. 2016 for best practices).
    (b) For Pacific saury, the Workshop recommended to consider developing an age-structured operating model for use in simulation work to identify and evaluate potential reference points (for example B_{lim} and F_{target}). It is suggested that initial simulation work focus on constant F runs (e.g. to investigate MSY-based reference points, B_{lim} and F_{target}) and empirical HCR (e.g. taking a constant proportion of the estimated survey biomass). Model-based and empirical HCRs could both be considered when a full MSE is undertaken.
    (c) For chub mackerel, the Workshop recommended considering to conduct initial assessments with a range of models, which could be used in a subsequent MSE.
    (d) The Workshop recommended that the SC propose to the Commission to explore the possibility of creating an intermediary group consisting of scientists, managers and stakeholders, as needed, when conducting an MSE.
    (e) Consideration could be given to the role of small pelagic fish in the ecosystem as key low trophic level stocks and also to climate variability when setting the reference points.

Agenda Item 8. Adoption of the Report

28. The report was adopted by consensus.

Agenda Item 9. Close of the Workshop

29. The workshop closed at 17:28 on 5 March 2019.

Annexes:

Annex A – Agenda

Annex B – List of Documents

Annex C – List of Participants

Annex A

Agenda

Agenda Item 1. Opening of the Workshop

Agenda Item 2. Adoption of Agenda

Agenda Item 3. Basic information about NPFC priority species

Agenda Item 4. Review of the general concept and best practices of BRP, HCR and MSE

Agenda Item 5. Overview of the outcomes of literature reviews on BRPs and HCRs that have been applied to small pelagic fish stock management

Agenda Item 6. Potential directions on application of BRPs, HCR and MSE to the management of NPFC priority species

Agenda Item 7. Recommendations to the SC and its subsidiary bodies

Agenda Item 8. Adoption of the Report

Agenda Item 9. Close of the Workshop

Annex B

List of Documents

MEETING INFORMATION PAPERS

Document number	Title
NPFC-2019-TWG CMSA02-MIP01 (Rev. 2)	Meeting Notice and Information
NPFC-2019-WS BRP_HCR_MSE01-MIP02	Provisional Agenda
NPFC-2019-WS BRP_HCR_MSE01-MIP03 (Rev. 1)	Provisional Annotated Agenda
NPFC-2019-WS BRP_HCR_MSE01-MIP04 (Rev. 4)	Indicative Schedule

REFERENCE DOCUMENTS

Document number	Title
	Terms of Reference for BRP/HCR/MSE Workshop

WORKING PAPERS

Document number	Title
NPFC-2019-WS BRP_HCR_MSE01-WP01 (Rev. 1)	Review of target and limit reference points
NPFC-2019-WS BRP_HCR_MSE01-WP02	Case Study: Orange Roughy
NPFC-2019-WS BRP_HCR_MSE01-WP03	What Makes an MP an MP and an MSE an MSE?
NPFC-2019-WS BRP_HCR_MSE01-WP04	More successful MSE/MP implementation – what's needed?
NPFC-2019-WS BRP_HCR_MSE01-WP05	Best assessment vs management procedure-based management: pros and cons
NPFC-2019-WS BRP_HCR_MSE01-WP06	An illustration of a working management procedure: South African hake
NPFC-2019-WS BRP_HCR_MSE01-WP07	Harvest Control Rules
NPFC-2019-WS BRP_HCR_MSE01-WP08 (Rev. 1)	Reference Points
NPFC-2019-WS BRP_HCR_MSE01-WP09	Measuring risk consistently for fisheries on small pelagics

INFORMATION PAPERS

Document number	Title
NPFC-2019-WS BRP_HCR_MSE01-IP01	Glossary of terms for harvest strategies, management procedures and management strategy evaluation
NPFC-2019-WS BRP_HCR_MSE01-IP02	Improving communication: the key to more effective MSE processes
NPFC-2019-WS BRP_HCR_MSE01-IP03	Report of the 2018 joint tuna RFMO management strategy evaluation working group meeting

Annex C

List of Participants

CHAIR

Luoliang XU
Shanghai Ocean University
xllxxxlxy@yeah.net

CANADA

Chris ROOPER
Fisheries and Oceans Canada
chris.rooper@dfo-mpo.gc.ca

CHINA

Siquan TIAN
Shanghai Ocean University
sqtian@shou.edu.cn

Bai LI
Shanghai Ocean University
bai.li@maine.edu

Jie CAO
Shanghai Ocean University
jcao22@ncsu.edu

Yong CHEN
Adviser
Shanghai Ocean University
cheny@shou.edu.cn

Tianfei CHENG
East China Sea Fisheries Research Institute,
Chinese Academy of Fishery Sciences
chengtf@ecsf.ac.cn
+8618801771019

Lianyong FANG
China Overseas Fisheries Association
admin1@tuna.org.cn

Chuanxiang HUA
Shanghai Ocean University
qyma@shou.edu.cn

Mengying LIU
Shanghai Ocean University
lmy_spongebob@163.com

Qiuyun MA
Shanghai Ocean University
cxhua@shou.edu.cn

Heng ZHANG
East China Sea Fisheries Research Institute,
Chinese Academy of Fishery Sciences
zhangh1@ecsf.ac.cn

JAPAN

Hideki NAKANO
National Research Institute of Fisheries Science
hnakano@affrc.go.jp

Momoko ICHINOKAWA
National Research Institute of Fisheries Science
ichimomo@fra.affrc.go.jp
+81457887645

Midori HASHIMOTO
National Research Institute of Fisheries Science
mhashimoto@affrc.go.jp

Toshihide IWASAKI
Tohoku National Fisheries Research Institute
Japan Fisheries Research and Education Agency
tiwasaki@affrc.go.jp

Taiki FUJI
National Research Institute of Fisheries Science
tfuji114@affrc.go.jp

Yuki KANAMORI
National Research Institute of Fisheries Science
kana.yuki@fra.affrc.go.jp

Shin-Ichiro NAKAYAMA
National Research Institute of Fisheries Science
shin.ichiro.nak@gmail.com

Shota NISHIJIMA
National Research Institute of Fisheries Science
nishijimash@affrc.go.jp

Hiroshi OKAMURA
National Research Institute of Fisheries Science
okamura@fra.affrc.go.jp
+81457887645

Kazuhiro OSHIMA
National Research Institute of Fisheries Science
oshimaka@affrc.go.jp
+81457887516

Satoshi SUYAMA
Tohoku National Fisheries Research Institute
Japan Fisheries Research and Education Agency
suyama@affrc.go.jp

Norio TAKAHASHI
National Research Institute of Fisheries Science
norio@affrc.go.jp

Takaaki UMEDA
Fisheries Agency of Japan
takaaki_umeda470@maff.go.jp

KOREA

Kyum Joon PARK
National Institute of Fisheries Science
mogas@korea.kr
+82517202321

Junghyun LIM
National Institute of Fisheries Science
jhlim1@korea.kr

RUSSIA

Oleg KATUGIN
Pacific Branch of the Federal Scientific Research Institute of Fisheries and Oceanography
okatugin@mail.ru
+79147924364

Alexander MIKHEYEV
Pacific Branch of the Federal Scientific Research Institute of Fisheries and Oceanography
alex_mikheyev@mail.ru
+79146414763

CHINESE TAIPEI

Wen-Bin HUANG
National Dong Hwa University
bruce@gms.ndhu.edu.tw

Yi-Jay CHANG
National Taiwan University
yjchang@ntu.edu.tw

INVITED EXPERTS

Doug BUTTERWORTH
University of Cape Town
doug.butterworth@uct.ac.za

Patrick CORDUE
Innovative Solutions Ltd
patrick.cordue@isl-solutions.co.nz

Laurence KELL
Imperial College London
laurie@seaplusplus.co.uk

NPFC SECRETARIAT

Dae-Yeon MOON
Executive Secretary
dymoon@npfc.int
+81354798717

Aleksandr ZAVOLOKIN
Science Manager
azavolokin@npfc.int
+81354798717

Peter FLEWWELLING
Compliance Manager
pflewwelling@npfc.int
+81354798717

Mervin OGAWA
Data Coordinator
mogawa@npfc.int
+81354798717

Aleksandra TEMNYKH
Consultant-Science
aleksandra@npfc.int
+81354798717

Gunther ERRHALT
Consultant-Compliance
gunther@npfc.int
+81354798717

Alex MEYER
Rapporteur
meyer@urbanconnections.jp
+81364325691