North Pacific Fisheries Commission

1st Pacific Saury Stock Assessment Workshop REPORT

13-15 December 2016

January 2017

This paper may be cited in the following manner:

North Pacific Fisheries Commission. 2017. 1st Workshop Report. NPFC-2016-WS PSSA01-Final Report. 21 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

North Pacific Fisheries Commission
1st Pacific Saury Stock Assessment Workshop

13-15 December 2016

Busan, Republic of Korea

REPORT

Agenda Item 1. Opening of the Workshop

1. The 1st Pacific Saury Stock Assessment Workshop took place in Busan, Korea and was attended by participants from China, Japan, Republic of Korea, the Russian Federation, Chinese Taipei, and the PICES as an observer.

2. Dr. Doo-Hae An, Director of Distant Water Fisheries Resources Division of the National Institute of Fisheries Science (NIFS) gave a welcome speech in which he mentioned that Korea is highly dependent on Pacific Saury resources of the North Pacific and also noted that efforts for resource management shall be crucial for sustainable use of Pacific saury stock.

1.1 Introduction to the Workshop

3. The Chair, Dr. Mitsuo Sakai, Japan, introduced the objective and main tasks of the Workshop and showed a flow chart for the provisional Pacific saury stock assessment.

1.2 Adoption of the Agenda

4. The agenda was adopted by consensus.

1.3 Meeting arrangements

5. The Secretariat gave the general administrative information for the Workshop.

1.4. Nomination of Rapporteur

6. Ms. Seung-Min Park and Mr. Sanggyu Shin were appointed as rapporteurs.

Agenda Item 2. Current status of Pacific saury fisheries and its stock assessment

2.1. Brief review of the Pacific saury fisheries

7. The Chair provided an overview of the Pacific saury biology in the North Pacific Ocean including distribution, life span, population structure as well as the fisheries characteristics.

8. Each Member gave a brief review of their respective Pacific saury fisheries. In-depth discussions were made based on the content of each presentation. These included stock identification related to stock structure, survey design of fisheries independent survey, fishing days, catches, decision-making procedures, the number of active vessels, fishing grounds, and search time. Chinese Taipei clarified the fishing pattern of their fishing fleets between the Southwest Atlantic Ocean and Northwest Pacific Ocean. China emphasized the importance of background information for CPUE standardization (regarding spatio-temporal changes in coverage of area, size and age composition, innovation of fishing technique as masked efforts), considering the different CPUE trends amongst Members.

9. Mr. Hong, the representative of the Korean stick-held dip net fishery industry expressed concerns on the rapid expansion of the number of fishing vessels, which seemed to be contrary to the NPFC Conservation and Management Measure (CMM 15-02). He requested the Commission make stronger efforts to prevent IUU fishing.

2.2 Data availability and recent Pacific saury stock assessment

10. Participants discussed data availability. Each member discussed how their fishing efforts were measured. The Chair suggested that all participants shall begin with the same base for data availability. Also additional biological information as well as location information collection used by each Member were presented. Participants agreed that they should specify information which participants could provide to the Working Group. Participants suggested two ways to proceed with CPUE standardization: exercising separate data sets, or using aggregated data. China highlighted that participants should seek ways to increase quality and transparency of CPUE standardization and stock assessment.

11. Participants made presentations regarding the NPFC documents NPFC-2016-WS PSSA01-WP08(Rev 1), NPFC-2016-WS PSSA01-WP03, NPFC-2016-WS PSSA01-WP05a and b, which were followed by in-depth discussions on model specification and reliability. The participants agreed that PSSA should develop a Protocol for CPUE standardization. China offered to draft this protocol.

Agenda Item 3. Compilation and evaluation of data submitted prior to the workshop

12. Participants reported that compilation could not be completed due to difficulties related to domestic procedures. Evaluation of data was discussed within Agenda Item 2.2

Agenda Item 4. General framework for Pacific saury stock assessment

13. A number of suggestions were made for CPUE standardization, stock assessment models and projections. Participants agreed that general framework should follow the terms of reference for Pacific saury stock assessment which were adopted by SC.

Agenda Item 5. CPUE standardization

5.1. Environmental variables to be used for CPUE standardization

14. Participants discussed environmental variables which constitute important factors for CPUE standardization. Participants identified as important environmental variables for stock assessment, sea surface temperature (SST), salinity, and moon phase, some of which can be obtained directly from fishing activities while others through satellite remote sensing or from commercial agents. Korea noted that surface temperature should be a priority at the current state. Japan mentioned about the difficulty in obtaining salinity from fishery vessels and the related data could only be utilized in the future. Russia introduced the experience of incorporating SST data into their CPUE standardization (Daily High-Resolution-Blended Analyses for Sea Surface Temperature, Reynolds et al., 2007); however, it was noted that such data were less helpful than expected in terms of CPUE standardization process, e.g. in reducing the residuals. Chinese Taipei pointed that *in situ* sea surface water temperature was used in their CPUE standardization process and also mentioned an ongoing study on the relationship between the environmental variables and Pacific saury stock.

15. The Chair noted that the comparison between simulated data and actual data has not been successfully done so far so data could be obtained from fishing vessels, satellite remote sensing, and assimilated models for modeling. The Chair proposed that common and agreeable data set be collected for the purpose of CPUE standardization and that China list potential environmental variables while continuing to discuss the current availability of those data. In this regard, China volunteered to provide long-term environmental data as the Chair presented his idea to use data actually provided by Members, if necessary.
    The Chair re-emphasized that environmental variables are crucial to CPUE data set and Members shall consider or decide the timeline for the common data for the NPFC, and he highlighted that the first step would be listing of potential effects for CPUE and present a table during the meeting period if possible.

5.2 Models to work towards finalizing CPUE standardization

16. With requirements of the participants, China presented a draft of proposed protocol for CPUE standardization (NPFC-2016-WS PSSA01-WP12, Annex E). Participants discussed model parameters which depended on catchability, gear selectivity, and fish availability. The protocol for CPUE standardization was adopted by PSSA workshop. Participants suggested the necessity of setting limitations for determining to include or exclude variables when selecting a model (e.g. less than 5%, 1%) since some data are not useful albeit important.

17. The Chair suggested three CPUE data sets: from Japan, Russia, and Chinese Taipei for the Pacific saury assessment, which were agreed upon by participants. The Chair also encouraged Korea to provide their standardized CPUE data sets.

18. Other types of abundance indices could be considered so long as they meet certain scientific criteria.

Agenda Item 6. Exploration of stock assessment models

19. China gave a presentation on development of a Bayesian state-space production model (BSPM), which incorporated functions for retrospective analyses and projections. China pointed out that at the early stage of model development more emphasis should be put on model parameterization. Japan proposed to exchange basic ideas for a modeling exercise. China highlighted the importance of transparency of a modeling process.

20. Participants acknowledged the necessity to make comparisons among various models. Chinese Taipei noted that catch data also constitutes an important element besides CPUE for stock assessment.

21. Japan gave a presentation on stock assessment of Pacific saury by BSPM, followed by discussions on presented formula based on inclusion either of process error or observation error. Japan gave another presentation on state-space population dynamics models to introduce intended extension of the models, to highlight the characteristics and merits of estimation methods, and to show planned presentation styles. China raised questions about stability of parameters and time period for different "q."

22. Chinese Taipei gave a brief presentation on their BSPMs.

23. In discussion, participants suggested for all given parameters, they have to look at the difference in posterior and prior distribution and suggested approaches to proceed with stock assessment including base case scenario and others.

24. Participants agreed to use the state-space production model as the base model for stock assessment. Further discussions noted importance of process errors and observation errors, availability of CPUE, approaches to select CPUE, and data reliability. The Chair confirmed the use of the state-space production model.

Agenda Item 7. Consideration of biological reference points and potential uncertainties

25. China proposed that it is important to separate limit reference points and target reference points for the short term, while evaluating performance of reference points for longer term. Russia presented the use of the DLMtool for the stock assessment of data limited fisheries. Participants suggested they could take the MSY approach for the development of biological reference points (BRPs). China commented F_{MSY} could be a limit reference for fisheries mortality and B_{MSY} as target reference point for stock biomass.

26. Chinese Taipei and China both presented the interpretation of potential uncertainties: associated with input data (catch, CPUE, prior knowledge where available, etc.), estimation, models, implementation, and BRPs which should be incorporated into decision making process.

Agenda Item 8. Next steps towards finalizing Pacific saury stock assessment

27. The Chair confirmed that the stock assessment for Pacific saury should be finalized at the 1st meeting of the Technical Working Group on Pacific Saury Stock Assessment (TWG PSSA) in February 2017 and its report shall be submitted by 17 March, 2017 to SSC PS meeting in 2017.

28. Draft provisional agenda for the 1st TWG PSSA meeting, which will be held 20-22 February 2017 in Yokohama, Japan, was circulated to participants for discussion. Regarding Item 5 of that Agenda, China noted that time left for CPUE standardization finalization is limited. Russia suggested all participants ask permission to respective governments for data exchange. Participants agreed to make some revisions on Agenda Item 5 and 8. Chinese Taipei expressed concerns as fisheries data are considered confidential and government authorization shall be required in advance. China noted that data for standardizing CPUE should be provided to stock assessment participants to ensure transparency of the process. The Secretariat proposed to make confidentiality agreements to expedite data sharing process if participants agree on it.

29. Participants discussed about the provision of raw and aggregated data and considered limitations and possibilities. China highlighted stock assessment should be conducted with best available science and available data, and the Commission could develop a necessary protocol. Chinese Taipei emphasized that provisions of the raw data or aggregated data in this workshop were not authorized by their government and this issue should be discussed in the SC meeting. The Chair noted standardized CPUE data can be relatively easily provided compare to raw data. China clarified that both sufficient and detailed information should be provided for standardized CPUE data to secure transparency and credibility. The Chair suggested they need a template format. Participants agreed to come up with a protocol. Japan made a suggestion to have example for plots and tables, and Ms. Naya from Japan volunteered to provide it. China highlighted the importance of transparency in the CPUE standardization.

30. Japan disagreed to provide raw data for the following reasons: difficulty in obtaining government permission, time limitation and absence of "data exchanging protocol." Russia noted that if there was a protocol on data exchange in the NPFC, then it would be applicable only to the Convention area, but the most part of national saury catch of Russia and Japan occurs in their EEZs and therefore the NPFC should encourage Fisheries Agencies to facilitate data exchange on a broader scale covering the whole area of fishing efforts. China highlighted stock assessment should be conducted with best available science and best available data to improve the confidence in the stock assessment results. The Commission may consider developing a necessary protocol. The Chair noted standardized CPUE data can be relatively easily provided compare to raw data, so for the provisional stock assessment in 2017, it would be better to begin with sharing the standardized CPUE data which will be provided by each participant with good consideration of the CPUE standardizing protocol. China highlighted

again the importance of transparency for the confidence in the quality of standardized CPUEs and subsequent stock assessment.

31. Participants discussed the proposed stock assessment protocol suggested by China. After discussions and accompanying revisions, all participants agreed on the proposed stock assessment protocol (NPFC-2016-WS PSSA01-WP13 Rev 1, Annex F). The Chair confirmed that the protocol could be modified or aggregated further until and after the TWG PSSA Meeting in February since the final recommendation shall be submitted to SC.

Agenda Item 9. Other matters

32. Korea presented a template (NPFC-2016-WS PSSA01-WP11a and b) for fisheries and biological data collection which included the following six categories of information: vessel, net, fishing lamp, time and location, Pacific saury catch, and by-catch together with a separate biological data collection section. Japan explained that there are too many Japanese fishing vessels which are too small in size to collect biological data. Japan pointed out each member has different fisheries style and asked when to start collection of the above information. The Chair noted two issues related to data collection templates: first, what information we need for stock assessment and, second, whether this information should be collected by fisheries or observers and whether NPFC should develop an observer program for data collection. The Chair proposed this data collection template to be deferred to the next meeting. Korea suggested to gather contact points of members so that smooth operation shall be made on fulfillment of data collection. The purpose of this template is to develop a compiled data base for Pacific saury stock assessment. Members nominated the following contact persons for a correspondence group on developing a data collection template: Siquan Tian, Satoshi Suyama, Eunjung Kim, Dmitriy Antonenko, and Wen-Bin Huang.

33. Participants discussed catch data sets available from FAO and NPFC data sets based on members' annual reports. Participants compared these two data sets and discussed which data could be used for stock assessment. Korea explained the differences between FAO and NPFC data sets and agreed to submit revised data to the Secretariat. Russia noted they would also provide data collected since the 1980s. Chinese Taipei clarified that FAO data for 2004 are not accurate and suggested to use NPFC data for the mentioned year. The Secretariat was tasked to distribute revised catch data to members. The participants agreed to tentatively use FAO long-term total catch data together with data provided by China.

34. The Chair clarified that for the next TWG PSSA meeting, members should submit CPUE standardization documents by 20 January 2017.

Agenda Item 10. Adoption of the Report

35. The report of the workshop was adopted by consensus.

Agenda Item 11. Concluding remarks and close of the Workshop

36. The workshop closed at 16:41 on 15 December 2016.

37. The participants thanked Korea for successfully hosting this workshop and the Chair for his able leadership and guidance during the meeting.

Annexes

Annex A – Agenda

Annex B – Annotated Agenda

Annex C – List of Documents

Annex D – Participants List

Annex E – Protocol for CPUE standardization

Annex F – Stock assessment protocol

Annex A

NPFC-2016-WS PSSA01-MIP02

North Pacific Fisheries Commission
1st Pacific Saury Stock Assessment Workshop
13-15 December 2016
Busan, Republic of Korea

Agenda

Agenda Item 1. Opening of the Workshop
- 1.1 Introduction to the Workshop
- 1.2 Adoption of the Agenda
- 1.3 Meeting arrangements
- 1.4 Nomination of Rapporteur

Agenda Item 2. Current status of Pacific saury fisheries and its stock assessment
- 2.1 Brief review of the Pacific saury fisheries
- 2.2 Data availability and recent Pacific saury stock assessments

Agenda Item 3. Compilation and evaluation of data submitted prior to the workshop

Agenda Item 4. General framework for Pacific saury stock assessment

Agenda Item 5. CPUE standardization
- 5.1 Environmental variables to be used for CPUE standardization
- 5.2 Models to work towards finalizing CPUE standardization

Agenda Item 6. Exploration of stock assessment models
- 6.1 Potential stock assessment models (BSPM and others)
- 6.2 Initial parameterization and configuration for the potential models
- 6.3 Trial runs of the models

Agenda Item 7. Consideration of biological reference points and potential uncertainties

Agenda Item 8. Next steps towards finalizing Pacific saury stock assessment

Agenda Item 9. Other matters

Agenda Item 10. Adoption of the Report

Agenda Item 11. Concluding remarks and close of the Workshop

Annex B

NPFC-2016-WS PSSA01-MIP03

North Pacific Fisheries Commission
1st Pacific Saury Stock Assessment Workshop
13-15 December 2016
Busan, Republic of Korea

Annotated Agenda

Agenda Item 1. Opening of the Workshop

The TWG PS leader Dr. Mitsuo Sakai shall open the 1st Pacific Saury Stock Assessment Workshop. Korea shall present an opening address to welcome the participants.

1.5 Introduction to the Workshop

Dr. Sakai shall introduce participants to the workshop, state its objective and explain its background.

1.6 Adoption of the Agenda

The provisional agenda shall be reviewed, amended as appropriate, and adopted.

1.7 Meeting arrangements

Science Manager Dr. Aleksandr Zavolokin shall outline procedural matters including the meeting schedule, document list and administrative arrangements.

1.8 Nomination of Rapporteur

Participants shall nominate a Rapporteur.

Agenda Item 2. Current status of Pacific saury fisheries and its stock assessment

2.3 Brief review of the Pacific saury fisheries

Participants shall present brief review of their national Pacific saury fisheries and Dr. Sakai shall give a summary on Pacific saury fisheries in the North Pacific Ocean.

2.4 Data availability and recent Pacific saury stock assessments

Participants shall brief their recent Pacific saury stock assessments, highlight data availability and discuss data gaps.

Agenda Item 3. Compilation and evaluation of data submitted prior to the workshop

Fisheries data and fisheries-independent data, which are submitted by participants to the Secretariat prior to the workshop, will be compiled and evaluated.

Agenda Item 4. General framework for Pacific saury stock assessment

Participants will discuss the general framework for Pacific saury stock assessment, data,

models, biological reference points (BRPs), scenarios, projection etc. Amendments for the Provisional Agenda of the TWG PS meeting will be considered.

Agenda Item 5. CPUE standardization

5.3 Environmental variables to be used for CPUE standardization

Environmental variables will be identified and evaluated to be used towards finalizing CPUE standardization.

5.4 Models to work towards finalizing CPUE standardization

Models will be identified and discussed to work towards finalizing CPUE standardization.

Agenda Item 6. Exploration of stock assessment models

6.4 Potential stock assessment models (BSPM and others)

Participants shall suggest and discuss potential models for Pacific saury stock assessment.

6.5 Initial parameterization and configuration for the potential models

Participants shall explore initial parameterization and configuration for the potential models.

6.6 Trial runs of the models

Trial runs of the models shall be conducted.

Agenda Item 7. Consideration of biological reference points and potential uncertainties

Participants shall discuss the possible target and limit biological reference points (BRPs), potential uncertainties in the assessment and possible implications.

Agenda Item 8. Next steps towards finalizing Pacific saury stock assessment

Participants shall identify detailed tasks, timing and milestones to finalize stock assessment through TWG PS meeting in February 2017 and, if necessary, intersessional work before the SC meeting in April.

Agenda Item 9. Other matters

Participants shall discuss other matters, if any.

Agenda Item 10. Adoption of the Report

The report of the workshop will be adopted by consensus.

Agenda Item 11. Concluding remarks and close of the Workshop

Dr. Sakai will make concluding remarks and close the workshop.

Annex C

NPFC-2016-WS PSSA01-MIP05

North Pacific Fisheries Commission

1st Pacific Saury Stock Assessment Workshop

13-15 December 2016

Busan, Republic of Korea

LIST OF DOCUMENTS

MEETING INFORMATION PAPERS

Symbol	Title
NPFC-2016-WS PSSA01-MIP01	Meeting information
NPFC-2016-WS PSSA01-MIP02	Provisional agenda
NPFC-2016-WS PSSA01-MIP03	Annotated Provisional agenda
NPFC-2016-WS PSSA01-MIP04 (Rev 1)	Indicative schedule
NPFC-2016-WS PSSA01-MIP05	Provisional List of Documents

REFERENCE DOCUMENTS

Title
Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean
NPFC Administrative Documents

WORKING PAPERS

Symbol	Title
NPFC-2016-WS PSSA01-WP01	National summary report - China
NPFC-2016-WS PSSA01-WP02	National summary report - Russia
NPFC-2016-WS PSSA01-WP03	Summary of CPUE standardization - Russia
NPFC-2016-WS PSSA01-WP04a	National summary report - Chinese Taipei
NPFC-2016-WS PSSA01-WP04b	National summary report - Chinese Taipei (presentation)
NPFC-2016-WS PSSA01-WP05a	Summary of CPUE standardization - Chinese Taipei
NPFC-2016-WS PSSA01-WP05b	Summary of CPUE standardization - Chinese Taipei (presentation)
NPFC-2016-WS PSSA01-WP06	Flow chart for provisional Pacific saury stock assessment
NPFC-2016-WS PSSA01-WP07 (Rev 1)	National summary report - Japan
NPFC-2016-WS PSSA01-WP08 (Rev 1)	Summary of CPUE standardization - Japan
NPFC-2016-WS PSSA01-WP09 (Rev 1)	National summary report - Korea
NPFC-2016-WS PSSA01-WP10	Summary of CPUE standardization - Korea
NPFC-2016-WS PSSA01-WP11a	Suggestion on the Pacific Saury Data Collection Template - Korea
NPFC-2016-WS PSSA01-WP11b	Data Collection Template - Korea
NPFC-2016-WS PSSA01-WP12	Protocol for CPUE standardization
NPFC-2016-WS PSSA01-WP13 (Rev 1)	Stock assessment protocol

Annex D

1st Pacific Saury Stock Assessment Workshop
PARTICIPANTS LIST

CHAIR

Mitsuo SAKAI
Chief Researcher, Tohoku National Fisheries Research Institute, Japan Fisheries Research and Education Agency (FRA)
25-259 Shimo-Mekurakubo, Samemachi, Hachinohe-shi, Pref.Aomori, 031-0841 Japan
Tel: +81-46-854-4115
E-mail: sakaimit@affrc.go.jp

CHINA

Yong CHEN
Adjunct Professor, Shanghai Ocean University
999 Huchenghuan Road, Lingang New City, Shanghai 201306, China
Tel: +86-21-61900319
E-mail: cheny@shou.edu.cn

Bai LI
Research Associate, Shanghai Ocean University
999 Huchenghuan Road, Lingang New City, Shanghai 201306, China
Tel: +86-21-61900221
E-mail: bai.li@maine.edu

Siquan TIAN
Associate Professor, Shanghai Ocean University
999 Huchenghuan Road, Lingang New City, Shanghai 201306, China
Tel: +86-21-61900221
E-mail: sqtian@shou.edu.cn

JAPAN

Toshihide KITAKADO
Associate Professor, Tokyo University of Marine Science and Technology
5-7, Konan 4, Minato-ku, Tokyo 108-8477 Japan
Tel: +81-3-5463-0568
E-mail: kitakado@kaiyodai.ac.jp

Chiaki MIZUGAKI
Assistant Director, Fisheries Agency of Japan
1-2-1 Kasumigaseki, Chiyoda-Ku, Tokyo 100-8907 Japan
Tel: +81-3591-1086
E-mail: Chiaki_mizugaki400@maff.go.jp

Miyako NAYA
Research Assistant, Tohoku National Fisheries Research Institute, Japan Fisheries Research and Education Agency (FRA)
25-259 Shimo-Mekurakubo, Samemachi, Hachinohe-shi, Pref. Aomori, 031-0841 Japan
Tel: +81-46-854-4115
E-mail: naya@affrc.go.jp

Satoshi SUYAMA
Senior Researcher, Tohoku National Fisheries Research Institute, Japan Fisheries Research and Education Agency (FRA)
25-259 Shimo-Mekurakubo, Samemachi, Hachinohe-shi, Pref. Aomori, 031-0841 Japan
Tel: +81-46-854-4115
E-mail: suyama@affrc.go.jp

KOREA

Seok-Gwan CHOI
Senior Scientist, National Institute of Fisheries Science
216 Gijang-Haeanro, Gijang-eup, Gijang-gun, Busan 46083 Korea
Tel: +82-51-720-2320
E-mail: sgchoi@korea.kr

Chansoo PARK
Assistant Director, Ministry of Oceans and Fisheries

Eunji KIM
Assistant Researcher, National Institute of Fisheries Science
216 Gijang-Haeanro, Gijang-eup, Gijang-gun, Busan 46083 Korea
Tel: +82-51-720-2326
E-mail: ej358@naver.com

Eunjung KIM
Scientist, National Institute of Fisheries Science
216 Gijang-Haeanro, Gijang-eup, Gijang-gun, Busan 46083 Korea
Tel: +82-51-720-2328
E-mail: eunjungkim@korea.kr

Jae-bong LEE
Scientist, National Institute of Fisheries Science
216 Gijang-Haeanro, Gijang-eup, Gijang-gun, Busan 46083 Korea
Tel: +82-51-720-2321
E-mail: leejb@korea.kr

Jong Hee LEE
Scientist, National Institute of Fisheries Science
216 Gijang-Haeanro, Gijang-eup, Gijang-gun, Busan 46083 Korea
Tel: +82-51-720-2322
E-mail: jonghlee@korea.kr

Junyoung LEE
Assistant Researcher, National Institute of Fisheries Science
216 Gijang-Haeanro, Gijang-eup, Gijang-gun, Busan 46083 Korea
Tel: +82-51-720-2326
E-mail: joon8914@naver.com

Sang-gyu SHIN
Assistant Researcher, National Institute of Fisheries Science
216 Gijang-Haeanro, Gijang-eup, Gijang-gun, Busan 46083 Korea
Tel: +82-51-720-2327
E-mail: gyuyades82@gmail.com

WooSung YANG
Assistant Researcher, National Institute of Fisheries Science
216 Gijang-Haeanro, Gijang-eup, Gijang-gun, Busan 46083 Korea

Inchul BARG
Chief wireless operator, Seolim Fisheries Co., Ltd.
Tel: +82 10-6766-3785

Gangyong CHOI
Captain, Seongkyung Fisheries Co., Ltd.
Tel: +82 10-4407-1080

BeongSuk GWAK
Captain, Sunmin Fisheries Co., Ltd
Tel: +82 10-7288-0094

JeongDae KIM
Chief wireless operator, Sunmin Fisheries Co., Ltd.
Tel: +82 10-5124-6173

SangHun HA
Manager, DongwonHaesarang Co., LTd
#24 Gamcheonhang-Ro Saha-Gu, Busan, Korea
Tel: +82 10-8531-2321
E-mail: Ty5101@hanmail.net

Namkyu HAM
Director, Kyungtae Co., Ltd.
Tel: +82 10-3877-4915

SeungChul HAN
Captain, DongwonHaesarang Co., LTd.
#24 Gamcheonhang-Ro Saha-Gu, Busan, Korea
Tel: +82 10-6587-8577
E-mail: Ty5101@hanmail.net

llSub HONG
CEO, Samyoung Fisheries Co., Ltd.
Tel: +82 10-4554-9526

SeongHwan HONG
Captain, Seolim Fisheries Co., Ltd.
Tel: +82 10-9393-3867

SeokJae JEONG
Tel: +82 10-8534-6251

YeonJun JEONG
Captain, Wonyang Trading Co., Ltd.
Tel: +82 10-5106-0201
E-mail: Suddus73@naver.com

ChiYeong KIM
CEO, Yeram Co., Ltd.
Tel: +82 10-3593-2647
E-mail: Cykim3523@hanmail.net

DoSeong KIM
General Manager, Changjin Trading Co., Ltd.
#652-2,Nambumin-dong, Seo-gu, Busan, Korea
Tel: +82 10-7508-2807
E-mail: Chang23@chol.com

GwangSop KIM
Director, Kyungtae Co., Ltd.
Tel: +82 10-3268-3289

Serim KIM
Captain, Yeram Co., Ltd.
Tel: +82 10-3578-0977

Yongil KIM
CEO, Wonyang Trading Co., Ltd.
Tel: +82 10-3598-6044

Hanjo LEE
Director, Seongkyung Fisheries Co., Ltd.
Tel: +82 10-7223-3248

SangYeol LEE
Chief wireless operator, Changjin Trading Co., Ltd.
#652-2, Nambumin-dong, Seo-gu, Busan, Korea
Tel: +82 10-7757-2147
E-mail: Chang23@chol.com

JungRok LIM
Captain, Seamax Fishery Co., Ltd.
Tel: +82 10-3068-6063

JungHo PARK
Captain, DongwonHaesarang Co., Ltd.
#24 Gamcheonhang-Ro Saha-Gu, Busan, Korea
E-mail: Ty5101@hanmail.net

SeongJu CHO
Assistant Manager, Korea Overseas Fisheries Association

YangSik CHO
Manager, Korea Overseas Fisheries Association

Hyunggyun LEE
Director, Korea Overseas Fisheries Association

YoonGil LEE
Assistant Manager, Korea Overseas Fisheries Association

RUSSIA

Vladimir KULIK
Head of laboratory, Pacific Scientific Research Fisheries Center (TINRO–Center)
4, Shevchenko Alley, Vladivostok, 690091, Russia
Tel: +79990579969
E-mail: vladimir.kulik@tinro-center.ru

Dmitriy ANTONENKO
Head of laboratory, Pacific Scientific Research Fisheries Center (TINRO–Center)
4, Shevchenko Alley, Vladivostok, 690091, Russia
Tel: +79146978130
E-mail: dmantonenko@yandex.ru

CHINESE TAIPEI

Yi-Jay CHANG
Assistant Professor, National Taiwan University
No. 1, Sec. 4, Roosevelt Road, Taipei, Taiwan
Tel: +886-2-33661392
E-mail: yjchang@ntu.edu.tw

Wen-Bin HUANG
Professor, National Dong Hwa University
No.1, Sec. 2, Da Hsueh Rd., Shou-Feng, Hualien, Taiwan
Tel: +886-3-8635191
E-mail: bruce@mail.ndhu.edu.tw

OBSERVER

PICES
Sukgeun JUNG
Professor, Jeju National University
102 Jejudaehakno, Jeju-si, 63243, Korea
Tel: +82-64-754-3424
E-mail: sukgeun.jung@gmail.com

NPFC SECRETARIAT
Dae-Yeon MOON
Executive Secretary, NPFC
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
E-mail: dymoon@npfc.int

Aleksandr ZAVOLOKIN
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
E-mail: azavolokin@npfc.int

Seung-Min PARK
Rapporteur

Annex E

NPFC-2016-WS PSSA01-WP12

Protocol for CPUE standardization

The use of CPUE in a stock assessment implicitly assumes that CPUE is proportional to stock abundance/biomass. However, many factors other than stock abundance/biomass may influence CPUE. Thus any other factors, other than stock abundance/biomass, that may influence CPUE should be removed from the CPUE index. The process of reducing/removing the impacts of these factors on CPUE is referred to as CPUE standardization.

The following protocol is proposed for the CPUE standardization:

(1) Conduct a thorough literature review to identify key factors (i.e., spatial, temporal, environmental, and fisheries variables) that may influence CPUE values;

(2) Determine temporal and spatial scales for data grouping for CPUE standardization;

(3) Plot spatio-temporal distributions of fishing efforts and catch to evaluate spatio-temporal patterns of fishing effort and catch;

(4) Calculate correlation matrix to evaluate correlations between each pair of those variables;

(5) Identify potential explanatory variables based on (1)-(4) to develop full model for the CPUE standardization;

(6) Make statistical assumptions on the full models and fit the data to the assumed statistical models (i.e., GLM, GAM, Delta-lognormal GLM, Neural Networks, Regression Trees, Habitat based models, and Statistical habitat based models);

(7) Select and evaluate the models using methods such as likelihood ratio, AIC, BIC or cross validation;

(8) Evaluate if distributional assumptions are satisfied and if there is a consistent spatial/temporal distribution of residuals in CPUE standardization modeling;

(9) Determine the optimal model to estimate yearly standardized CPUE and their associated uncertainty.

(10) Plot nominal and standardized CPUEs over time.

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

Stock assessment protocol

We propose the following procedures to be included in the PS stock assessment:

(1) Identify the data that will be available to the stock assessment;

(2) Evaluate data quality and quantity and potential error sources (e.g., sampling errors, measurement errors, and associated statistical property (e.g., biased or random errors, statistical distribution) to ensure that the best available information is used in the assessment;

(3) Select population models describing the dynamics of PS stock and observational models linking population variables with the observed variables;

(4) Develop base case scenarios and alternative scenarios for sensitivity analyses;

(5) Compile input data and prior distributions for the model parameterization for the base case and alternative scenarios;

(6) For each scenario, fit the model to the data, diagnostics of model convergence, plot and evaluate residual patterns, compare prior and posterior distributions for key model parameters, and evaluate biological implications of the estimated parameters;

(7) Develop retrospective analysis to verify whether any possible systematic inconsistencies exist among model estimates of biomass and fishing mortality

(8) Identify final model configuration and model runs for each scenario;

(9) For each scenario, estimate and plot exploitable stock biomass and fishing mortality (and their relevant credibility distributions) over time;

(10) For each scenario, estimate biological reference points (e.g., MSY, Bmsy, Fmsy) and its associated uncertainty;

(11) Identify target and limit reference points for stock biomass and fishing mortality;

(12) Have the Kobe plot for each scenario;

(13) Determine if the stock is “overfished” and “overfishing” occurs for the base and sensitivity

scenarios;

(14) Finalize the base-case scenario;

(15) Develop alternative ABCs for the projection (e.g., 5-year projection);

(16) Conduct risk analysis for each level of ABC defined in Step (15) for the base-case scenario;

(17) Develop decision tables with alternative state of nature;

(18) Determine optimal ABCs based on decision tables developed in Step (17);

(19) Provide scientific advice on stock status and appropriate catch level to SC through SSC PS.