ANNEX 10

22nd Meeting of the
International Scientific Committee for Tuna
and Tuna-Like Species in the North Pacific Ocean
Kona, Hawai'i, U.S.A.
July 12-18, 2022

REPORT OF THE SHARK WORKING GROUP WORKSHOP

July 2022

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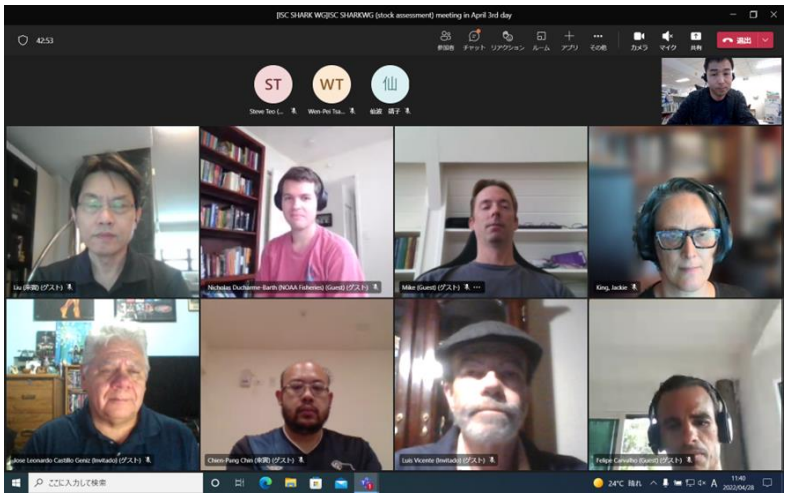
ANNEX 10

REPORT OF THE SHARK WORKING GROUP WORKSHOP

International Scientific Committee for Tuna and Tuna-Like Species
In the North Pacific Ocean (ISC)

April 19-22, 26-28, 2022
Webinar



1. INTRODUCTION

The Shark Working Group (SHARKWG or WG) of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) held a 7-day online meeting from April 19-22, 26-28, 2022 (JST). The pre-assessment meeting of modelers was convened from April 19-22, and then the stock assessment meeting was conducted from April 26-28.

Mikihiko Kai, SHARKWG Chair, opened the pre-assessment meeting and stock assessment meeting at 9:00 am on April 19 and 26, 2022 (JST), respectively. Participants included members from Canada, Chinese Taipei, Japan, Mexico, and United States of America (USA) (**Attachment 1**). SHARKWG Chair welcomed all participants. He wished for all to stay safe and healthy during the COVID-19 pandemic. He also expressed his desire for a productive meeting and for good work on the stock assessment of blue shark (*Prionace glauca*) in the North Pacific.

2. DISTRIBUTION OF DOCUMENTS AND NUMBERING OF WORKING PAPERS

Seven working group papers and 2 information papers were distributed and numbered (**Attachment 2**). All WG papers were not approved for posting on the ISC website (http://isc.fra.go.jp/) where they will be available to the public as the internal review of NOAA Fisheries authored and co-authored reports was not yet finalized.

3. REVIEW AND APPROVAL OF AGENDA

The draft meeting agenda was reviewed, and the agenda was adopted with minor revisions (**Attachment 3**).

4. APPOINTMENT OF RAPPORTEURS

The following participants served as rapporteurs for each item of the approved agenda.

Item	Rapporteurs
1-4.	M. Kai
5.	Y. Semba and C.P. Chin
6.	K.M. Liu and Wen-Pei Tsai
7a.	M. Kinney and N. Ducharme-Barth
7b.	S. Steven and F. Carvalho
7c.	M. Kinney and F. Carvalho
8.	M. Kanaiwa and A. Yamamoto
9-10.	M. Kai

M. Kai lead the writing/updating of the meeting report in cooperation with the participants.

5. SUMMARY OF PRE-ASSESSMENT MEETING AND CURRENT MEETING OBJECTIVES

The WG Chair reported about two pre-assessment meetings held in March 1-4, 2022 and April 19-22, 2022, and mentioned about current meeting objectives.

The primary goal of the first workshop was to fix the fishery data and most of the biological parameters and selectivity patterns used in the base-case model for the stock assessment of North Pacific blue shark in 2022. The WG discussed the details of the methods for the SS3 conditioning, scenarios of the sensitivity analysis and methodology of the future projections. The WG also explored the catch and size data of high seas squid driftnet fishery for 1970s -1990s and could develop those data.

The primary goal of the second workshop was to decide the base-case model candidate. The WG discussed the outcome of SS3 and model diagnostics for the base-case candidate with CPUEs of S5 (early CPUE with Japan Kinkai shallow LL) and S6 (late CPUE with Japan Kinkai shallow LL). The WG (US) also suggested to use another base-case model candidate with composite-CPUE for late period for 1994-2020, where the composite-CPUE is one combined CPUE time series for three CPUEs (S1: US_HW_DP; S3: TAIW_LG; S7:JPN_RTV) based on the statistical method developed by Peterson et al. (2021). The WG checked the fits of both base-case model candidates to the data and conducted the model diagnostics.

The main purpose of this meeting is to get a consensus on the outcomes of the base-case model from all participants of the ISC SHARKWG. The WG also need to discuss whether the alternative model with composite CPUE is appropriate as alternative base-case model candidate. If it is reasonable to use as alternative base-case model, the WG will conduct the ensemble approach.

Discussion

No discussion.

6. REVIEW OF CATCH AND SIZE DATA FOR HIGH-SEAS SQUID DRIFTNET FISHERY

Reconstruction of Catch for Blue Sharks Caught by High Seas Squid Driftnet Fisheries of the Republic of Korea and Chinese-Taipei in the North Pacific from 1979 to 1992. (ISC/22/SHARKWG-2/1)

This working paper details the reconstruction of catch for blue sharks caught by high seas squid driftnet fisheries of the Republic of Korea and Chinese-Taipei in the North Pacific Ocean from 1979 to 1992. Although previous studies clearly indicated that the squid driftnet fisheries of Republic of Korea and Chinese Taipei operated in the high seas in the 1980s and the beginning of 1990s and likely caught a large number of blue sharks as bycatch, the catch data of these countries had not been used in previous stock assessments for blue sharks in the North Pacific Ocean. The main reason was the lack of useful catch statistics for blue sharks because these fleets targeted flying squid, *Ommastrephes bartrami*. In previous assessments, the blue shark catch for the Japanese squid driftnet fishery was reconstructed from logbooks and observer data but such information was unavailable from the Republic of Korea and Chinese-Taipei fisheries. To reconstruct the catch of blue sharks caught by these fleets, two approaches were applied using the records of statistics in the published paper. (1) The nominal CPUE of blue shark caught by the Japanese squid driftnet fleet was multiplied by fishing effort, but this method was only applied to the data of Republic of Korea. (2) The ratio of blue shark to squid catch from the Japanese squid driftnet fleet was applied to the total flying squid catch for both fleets to estimate blue shark catch. The estimated catch of the Republic of Korea squid driftnet fishery was calculated as the average of both methods while the estimated catch for the Chinese-Taipei squid driftnet fishery was calculated from only the second method. The squid driftnet fishery started in 1978 and was banned in 1993 (i.e., last year with positive catch was 1992) but various information from the fisheries were missing from the early and late years of the fisheries. Linear interpolation was used to fill in the blue shark catch for years with missing information. Subsequently, the total blue shark catch of all three fisheries was used in the base case model of the 2022 stock assessment. The estimated total catch of the squid driftnet fisheries sharply increased in the early 1980s before gradually increasing in the mid-1980s and peaking in 1988. After that, the catch decreased until the year of ban of high seas drift net fishery.

Discussion

The WG confirmed that the Chinese Taipei has no shark bycatch data of driftnet-fishery in 1980s and 1990s.

Length Frequency of Blue Sharks Sampled by Canadian Observers in the Japanese Flying Squid Driftnet Fishery in 1991. (ISC/22/SHARKWG-2/2)

This working paper describes the length composition data of blue sharks sampled by Canadian observers in the Japanese flying squid driftnet fishery in the North Pacific Ocean in 1991. The length composition data in total length (cm) was digitally extracted from a figure in McKinnell and Seki (1998; Shark bycatch in the Japanese High Seas squid driftnet fishery in the North Pacific Ocean. Fish. Res. 39, 127–138). The total length was converted to precaudal length (PCL) using the allometric equation used for Japanese fisheries on this stock. Given that the data presented in this study are currently the best available scientific information on the size of blue sharks caught by this important historical fishery, it is recommended to use this length composition data to represent the size of fish caught by the Japanese squid driftnet fishery in the 2022 stock assessment of blue shark in the North Pacific Ocean. It is also recommended that the WG continue working on rediscovering data for this important historical fishery.

Discussion

The WG asked if there is any other US observer blue shark length frequency data for the high seas squid driftnet fishery. The WG mentioned that there is no information about the data at this moment but it might be possible to obtain the information from Dr. Mike Seki.

7. STOCK SYNTHESIS (SS3) MODELING FOR NORTH PACIFIC BLUE SHARK

7.1. Review Base-Case Model Candidate and its Model Diagnostics

Effects of Version Update of Stock Synthesis on the Stock Assessment Results for Blue Shark in the North Pacific. (ISC/22/SHARKWG-2/3)

This working paper examined the effects of version update of Stock Synthesis (SS) model on the main results of stock assessment for blue sharks in the North Pacific Ocean. The version of SS was updated from V3.24 to V3.30.18 for the base-case SS files used in the previous stock assessment in 2017. Comparisons of main outcomes for the base-case model indicated that there were small differences between the version of models. We considered that the latest version of SS is more suitable for the use of the upcoming stock assessment than the previous version because new functions were added to the latest version and many bugs were removed from the previous version.

Discussion

No discussion.

Stock Synthesis Settings of Data File for the Stock Assessment of Blue Shark in the North Pacific. (ISC/22/SHARKWG-2/4)

This working paper summarizes the Stock Synthesis (SS3) dataset used in the stock assessment for blue sharks in the North Pacific Ocean in 2022. The SS3 dataset is available for 1971-2020 and is comprised of catch, CPUE and length composition data. These data were updated through 2019/2020 using newly available statistics for each ISC member, non-member countries and relevant international organizations. Some data used in the previous stock assessment in 2017 were also reconfigured and revised.

Discussion

No discussion.

Stock Synthesis Settings of Control File for the Stock Assessment of Blue Shark in the North Pacific. (ISC/22/SHARKWG-2/5)

This working paper summarizes the contents of the Stock Synthesis (SS3) control file and explains the procedure of model configuration and parameterization for selecting a base case model that will be used in the stock assessment of blue shark in the North Pacific Ocean in 2022. First, the version update was conducted for the control file used in the previous stock assessment in 2017. Second, the updated control file was reconfigured by updating biological parameters and changing the model structures. Third, the fitting of the annual abundance indices and length composition data were adjusted using a two-step data-weighting approach (adjusted the CV of CPUE and conducted the down-weighting of the sample size of length composition data using variance adjustment factors of relevant fleets). Fourth, the bias-adjustment parameters of the stock recruitment relationship were updated following the suggested SS3 output, and the sigma-R was tuned by repeatedly changing the value based on the recruitment deviations and standard error of the recruitment deviations.

Discussion

The WG commented that in the Pacific Ocean the growth of blue sharks for male and females is different and males grow larger than females. This is not the case in other oceans, such as the Atlantic and Indian Oceans. This looks to be represented correctly in the model, which is good.
The WG asked about the selectivity assumption of a double normal selectivity, basically, what is a double normal selectivity. The WG responded that a double normal selectivity is a more flexible selectively curve form with 6 parameters that can be used to define the ascending and descending limb of the curve. This could mean that a double normal has either a central peak like a domed selectivity, or it could have a central plateau. The WG also asked if a double normal curve is bimodal, the WG responded that no there is only one peak for a double normal curve, if the data is bimodal then a cubic spline selectivity would need to be used instead.

The WG asked if the weighting method used on the length composition data presented here was the same as what was used in the last assessment. The WG responded that no, a different approach was used this time. In the 2017 assessment the effective sample size was based on a maximum number of samples (first stage), followed by a second stage which applied the McAllister and Ianelli re-weighting method. The issue with this approach is that the McAllister and Ianelli method tends to chop off large sample sizes, and enforces an upper limit on the sample size. This compresses the range of sample sizes and up-weights (relatively speaking) smaller sample sizes. To avoid this issue, the weighting of the length composition data was adjusted by fleets and years based on sample sizes relative to the maximum sample size of representative fleet. This approach avoids the upper limit that occurs in the McAllister and Ianelli method and instead allows fleets and years with more data to be weighted more than those with less data. The WG commented that the albacore WG used this approach as it assumed that all albacore fleets were reasonably well sampled, and so they wanted to preserve the difference in sample size across years/fleets

Main Outcomes and Model Diagnostics of the Stock Synthesis Base-Case Model Candidate in the Stock Assessment for Blue Sharks in the North Pacific. (ISC/22/SHARKWG-2/6)

This working paper summarizes main outcomes of the Stock Synthesis (SS3) base-case model candidate and its model diagnostics in the stock assessment for the blue sharks in the North Pacific Ocean. The main outcomes include: 1) Estimates of key management quantities; 2) Time series of spawning output, age-0 recruits (1000s) and fishing mortality; 3) Kobe plot. The model diagnostics include: 1) R0-profiles of the log-likelihoods; 2) Age-structured Production Model (ASPM); 3) Retrospective analysis; 4) Jitter analysis. The base-case model candidate was determined based on the entire model fits to the data that indicated better fits for the representative abundance indices and all length composition data, and the hessian matrix was positive definite with sufficient small value of maximum gradient (1.31E-05). The annual spawning biomass constantly decreased until 1992 and slightly increased until recent years. The annual fishing mortality gradually increased in the late 1970s and 1980s and suddenly dropped around 1990, after that it has been slightly decreasing. The annual age-0 recruits were stable over the assessment period and the number was maintained between 10 and 20 million. The Kobe matrix indicated that the current stock status is not overfished, and overfishing has not been occurred in recent years.

Discussion

The WG commented about the R0 likelihood profile, indicating that there is conflict between the early and late CPUE indices, neither is really in agreement with the total length composition profile. There is a concern that the profile is dominated by the recruitment component which assumes fixed parameters for sigma-R and steepness.

The WG asked, in the retrospective analysis, what the purpose of normalizing the SSB trend was? The WG answered that the main purpose of the retrospective is to check for bias in recent years of data, to see this more clearly the retrospective was normalized. The WG indicated that they had not seen this before and it could make important information from the retrospective harder to interpret. Absolute bias is what is important in a retrospective, and as such the analysis should not be normalized. The WG agreed that the retrospective would be redone and no longer normalized, instead it will be presented as an absolute value.

The WG asked about the jitter analysis and asked that a focus be given to values at the bottom of the plot for the total negative log-likelihood. This would allow us to see if there was any meaningful difference in the negative log-likelihood (NLL) which would indicate if a local or global minimum had been reached. If any of these models had a lower NLL then we might need to revise the base case. The WG indicated that if the jitter shows a lower NLL but that model is not used as the base case then you did not find a global convergence, which is something you would need to explain in the report and investigate how this does or does not impact management advice. The WG also commented that the albacore WG used two rounds of jittering, where the best model from the first jitter round (lowest NLL) becomes the base case model for the second round of jittering. This ensures that a global minimum was reached.

7.2. Review Alternative Base-Case Model Candidate and its Model Diagnostics

Alternative Late-Period CPUE Hypothesis & Implications for the Stock Synthesis of Blue Sharks in the North Pacific. (ISC/22/SHARKWG-2/7)

This working paper details the approach used to construct an alternative CPUE hypothesis for the late model period from three candidate indices (Hawaii longline index, Taiwanese longline index, and Japanese research and training vessel index) using Dynamic Factor Analysis (DFA). Sensitivity analyses to the construction of the DFA composite index, along with how the DFA is incorporated into the Stock Synthesis model are described. The effect of including the DFA composite index in the Stock Synthesis model appeared to be sensitive to the choice of fishery selectivity and the addition of extra variance for the index. DFA trends and Stock Synthesis outputs appeared relatively robust to changes to the input CV for each of three input indices. A baseline DFA composite index model was identified which assumed selectivity mirroring with the Japanese Enyo Deep longline, added extra variance to ensure an average CV of 0.2 for the index, and assumed the input CV for each index was the same as specified in the Stock Synthesis model fitting to the Japanese Kinkai shallow late index. Comparisons between models fitting to the baseline DFA composite index and the Japanese Kinkai shallow late index indicated marginally better fits to common likelihood components for the DFA composite index model though it was difficult to exclude either CPUE hypothesis based on model diagnostics. Both models showed retrospective bias which was identified to be caused by the large observed sample size for the Taiwanese small scale longline length composition data in 2018 and 2020. Six additional sensitivities were run using the baseline DFA composite index model to explore eliminating the retrospective pattern via down-weighting or removing the length composition data in 2018 and 2020 for the Taiwanese small scale longline, and also investigate the effect of adding extra variance to ensure an average CV of 0.4. Evaluation of the six sensitivity models fitting to the baseline DFA composite index model did not identify a clear best model based on fits to the data or model diagnostics. Given this, and the clear difference in population trajectory and scale between the two-alternative late CPUE hypotheses, a way forward would be to consider a model ensemble where each alternative CPUE hypothesis is weighted equally.

Discussion

The WG clarified that the R0 profile for S6_JPN_LATE had an inconsistent trend with that shown by Kai et al. (ISC/22/SHARKWG-2/5). The WG checked the settings of R0-profile and found the mis-setting of the penalty of recruitment deviation and revised the outcome. The WG confirmed the effects of down-weighting/removing the length composition data in 2018 and 2020 for the Taiwanese small scale longline fleet on the shapes of the estimated selectivity curves by fleets. The WG recognized that there are high correlations among a few selectivity parameters of several fleets (e.g., F17_USA_Longline_DP; F18_USA_Longline_SH) for the DFA composite index model. After lengthy discussion, as alternative base-case models, the WG agreed to use the DFA composite index models with and without down-weighting of the size data. The WG also agreed to adopt an ensemble approach using the Japan Kinkai shallow index model and the DFA composite index models with equal weighting (i.e., 50, 25 and 25 %). The WG also confirmed that the down-weighting approach could not resolve the retrospective biases for the Japan Kinkai shallow index model, therefore, it will be necessary to improve the fitting to the size data in the future work. The WG commented on the basic principle of the DFA approach (i.e., reconcile the conflicting trends of multiple CPUEs) in the original paper (Peterson et al., 2021) and questioned why only three CPUE indices were chose in the DFA analysis. The WG answered that the three CPUE are similar annual trends from fisheries with similar operating characteristics, the data sources are not from the commercial logbook, and operation area of Taiwan large-scale longline fishery and Japan research and training vessel data are wide enough for an alternative base-case model.

7.3. Discuss Ensemble Approach if the WG agreed to use the Alternative Base-case Model

The WG recognized that the kobe plots will require specific details in the text and in the figure caption to ensure that readers will not misinterpret the small percentage of models that indicate a possibility of overfishing status. The management advice is based on the average of 3 models which have unequal weighting which could be interpreted differently than if the individual model results are shown. Some members of the WG indicated that there could be additional explorations conducted with the composite CPUE approach. Some working group members also expressed reservations about going forward with the composite model given its introduction close to the conclusion of the assessment. The WG reaffirmed that merits of the models selected should be the focus of discussion and decision, irrespective of potential stock status misinterpretation. Both the original base case model and the new composite CPUE model have issues, and for merits neither model can be selected as better than the other, and stock status should not be used as a way to decide between them. The newness of the composite CPUE model was the main concern to the WG, but members provided support for the DFA approach.

The WG commented that the discussion of the stock status and its possible interpretation is not something that this WG should focus on. It was expressed that the merits of the model should be the point of the discussion, not the potential stock status, or how that status will be interpreted by others. The WG indicated that both the original base case model (proposed at the data prep meeting) and the new composite model both have issues and from a modeling point of view neither model can be pointed to as being better than the other, and for that reason the WG should not be using stock status as a way to decide between them.

The WG suggested that the newness of the composite model was one of the main reasons to question its use.

The WG commented that the outcome of this assessment and the stock status is important and can impact people's lives, something that should be considered and is the reasons to try and keep our explanations clear so as to not lead to misinterpretation. The WG responded that it is true that the WG has a responsibility to the people reliant on the resource but that the WG also have a responsibility to the resource itself, further reasoning to judge the model on its merits and not the resulting stock status.

The WG also commented that the composite model approach has been used repeatedly in the past and is not a new issue. Additionally, the WG commented that the WG has been looking to move towards an ensemble approach for some time now due to the uncertainty in past models.

A lengthy discussion concerning the makeup of the ensemble resulted in the WG agreeing that the models which should be included are the model with the primary Japan late index agreed to at the data preparatory meeting, the composite CPUE model, and the composite CPUE model with 2 years (2018 and 2020) of down weighted size data for small-scale Chinese Taipei longline. The WG also suggested that along with this ensemble, the model from the 2017 assessment should be included with updated data as a sensitivity in order to allow for a comparison.

The WG asked that the outcomes of all three models used in the ensemble approach be plotted in the Kobe plot (along with the resultant ensemble outcome). It was suggested that these plots be included but kept separate for a more traditional Kobe with only the ensemble approach. The WG settled on a Kobe plot with contours indicating the range of outcomes from the models included in the ensemble approach.

8. ESTABLISHMENT OF WORK PLAN FOR THE STOCK ASSESSMENT REPORT

8.1. Finalize the Outcomes of Base-Case Model, Model Diagnostics, Sensitivity Analysis and Future Projection by May 10th (JST).

8.2. Distribute the Draft of Stock Assessment Report by May 16th (JST).

8.3. Complete the Stock Assessment Report by May 31st (JST).

8.4. Submit the Report to the ISC Chair by June 1st (JST).

The WG agreed the above work plan and time schedule for the stock assessment report. The WG discussed the methodology of the sensitivity analysis with ensemble approach. **The WG agreed to combine the results of each sensitivity analysis for three models (i.e., S6CPUE model, S11CPUE model and S11CPUE model with down weighting of size data for F20: TW_SM) with the weighting of 50%, 25% and 25%, respectively. The WG also agreed to plot the points of the sensitivity results on the Kobe plot except for the scenarios of CPUEs (i.e., 7 late CPUE series; S1, S3, S7, S9, S10, all CPUE, composite CPUE with S1, S3 and S7). For the sensitivity analysis with late CPUE scenarios, the WG agreed to plot the time series of SSB and F with the MSY level.** The WG discussed the necessity of the sensitivity analysis for the weighting factor (values) of the ensemble approach for the three models, and **the WG agreed not to present the results in the assessment report. Finally, the WG agreed to present the results of the ensemble approach for the future projections.**

9. OTHER MATTERS

No discussion.

10. FUTURE SHARKWG MEETINGS

10.1. A Half Day Meeting Before the ISC Plenary (July 11 or 12)

10.2. ISC Plenary (July 13-18)

10.3. SHARKWG Meeting (Autumn/Winter)

Discussion

The WG discussed the date of the SHARKWG meeting in the autumn/winter. The WG decided not to fix the date and venue at this moment and will decide at the WG meeting before the ISC Plenary.

11. CLEARING OF REPORT

A draft of the report was reviewed by the participants and the content accepted. The Chair will make minor editorial changes and circulate a draft for comments before finalizing the report.

12. ADJOURNMENT

The WG Chair thanked everyone for a productive meeting! The meeting was adjourned at 13:37 on Thursday April 28, 2022 (JST).

LITERATURE CITED

Peterson, C.D., Wilberg, M.J., Cortés, E., Latour, R.J. 2021. Dynamic factor analysis to reconcile conflicting survey indices of abundance. 2021. ICES J. Mar. Sci. 78, 5. 1711 – 1729.

APPENDIX 1: LIST OF PARTICIPANTS

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APPENDIX 2. MEETING DOCUMENTS AND INFORMATION PAPERS

WORKING PAPERS

ISC/22/SHARKWG-2/01	Reconstruction of catch for blue sharks caught by high seas squid driftnet fisheries of the Republic of Korea and Chinese-Taipei in the North Pacific from 1979 to 1992. **Mikihiko Kai, Nicholas Ducharme-Barth, Yuki Fujinami, Steven L. H. Teo** (kaim@affrc.go.jp)
ISC/22/SHARKWG-2/02	Length frequency of blue sharks sampled by Canadian observers in the Japanese flying squid driftnet fishery in 1991. **Mikihiko Kai, Nicholas Ducharme-Barth, Yasuko Semba, Steven L. H. Teo** (kaim@affrc.go.jp)
ISC/22/SHARKWG-2/03	Effects of version update of Stock Synthesis on the stock assessment results for blue shark in the North Pacific. **Mikihiko Kai, Megumi Oshima, Felipe Carvalho** (kaim@affrc.go.jp)
ISC/22/SHARKWG-2/04	Stock Synthesis settings of data file for the stock assessment of blue shark in the North Pacific. **Mikihiko Kai, Steven L. H. Teo, Nicholas Ducharme-Barth, Yasuko Semba, Felipe Carvalho** (kaim@affrc.go.jp)
ISC/22/SHARKWG-2/05	Stock Synthesis settings of control file for the stock assessment of blue shark in the North Pacific. **Mikihiko Kai, Steven L. H. Teo , Nicholas Ducharme-Barth, Felipe Carvalho** (kaim@affrc.go.jp)
ISC/22/SHARKWG-2/06	Main outcomes and model diagnostics of the Stock Synthesis base-case model candidate in the stock assessment for blue sharks in the North Pacific. **Mikihiko Kai, Steven L. H. Teo, Nicholas Ducharme-Barth, Felipe Carvalho** (kaim@affrc.go.jp)
ISC/22/SHARKWG-2/07	Alternative late-period CPUE hypothesis & implications for the stock assessment of blue sharks in the North Pacific. **Nicholas Ducharme-Barth, Steven L. H. Teo, Mikihiko Kai, Felipe Carvalho** (nicholas.ducharmebarth@noaa.gov)

INFORMATION PAPERS

ISC/22/SHARKWG-2/ INFO-01	Dynamic factor analysis to reconcile conflicting survey indices of abundance. 2021. ICES J. Mar. Sci. 78, 5. 1711 – 1729. **Cassidy D. Peterson, Michael J. Wilberg, Enric Cortés, Robert J. Latour**
ISC/22/SHARKWG-2/ INFO-02	Reconciling conflicting survey indices of abundance prior to stock assessment. 2021. ICES J. Mar. Sci. 78, 9. 3101 – 3120. **Cassidy, D. Peterson, Dean L. Courtney, Enric, Cortés, Robert, J. Latour**

APPENDIX 3 –DRAFT AGENDA OF WEBINAR IN MARCH 2022

SHARK WORKING GROUP (SHARKWG)

INTERNATIONAL SCIENTIFIC COMMITTEE FOR TUNA AND TUNA-LIKE SPECIES IN THE NORTH PACIFIC

STOCK ASSESSMENT MEETING FOR NORTH PACIFIC BLUE SHARK

April 26-28, 2022 (Japan, China, Chinese Taipei, New Caledonia, and Republic of Korea)
Meeting Hours: 09:00 – 13:00 (Japan and Republic of Korea time)
Meeting Hours: 08:00 – 12:00 (China and Chinese Taipei time)
Meeting Hours: 11:00 – 15:00 (New Caledonia time)
April 25-27, 2022 (Canada, Mexico: Ensenada; Mexico City, US: Hawaii; LA Jolla)
Meeting Hours: 14:00 - 18:00 (Hawaii time)
Meeting Hours: 17:00 - 21:00 (Canada, Ensenada, and LA Jolla time)
Meeting Hours: 19:00 - 23:00 (Mexico City time)

DRAFT

1. Opening of SHARKWG Workshop
   a. Opening remarks (SHARK WG Chair)
   b. Introductions
   c. Meeting arrangements
2. Distribution of documents and numbering of Working Papers
3. Review and approval of agenda
4. Appointment of rapporteurs
5. Summary of pre-assessment meeting and current meeting objectives
6. Review of catch and size data for high-seas squid driftnet fishery.
7. Stock Synthesis (SS3) modeling for North Pacific blue shark
   a. Review base-case model candidate and its model diagnostics
   b. Review alternative base-case model candidate and its model diagnostics
   c. Discuss ensemble approach if the WG agreed to use the alternative base-case model
8. Establishment of work plan for the stock assessment report
   a. Finalize the outcomes of base-case model, model diagnostics, sensitivity analysis and future projection.
   b. Distribute the draft of stock assessment report.
   c. Complete the stock assessment report
   b. Submit the report to the ISC Chair by June 1st (Canada time).
9. Other matters
10. Future SHARKWG meetings
    a. A half day meeting before the ISC Plenary (July 11 or 12, JST)
    b. ISC Plenary (July 13-18, JST)
    c. SHARKWG meeting (autumn/winter)
11. Clearing of report
12. Adjournment