FINAL

ISC/22/ANNEX/07

ANNEX 07

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 07

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International Scientific Committee for Tuna and Tuna-like Species
in the North Pacific Ocean

March 1-4, 2022
Online meeting

1. WELCOME AND 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 4-day online meeting from March 1-4, 2022(JST).

Mikihiko Kai, SHARKWG Chair, opened the meeting at 9:00 am on March 1, 2022 (JST). Participants included members from China, Chinese Taipei, Japan, Mexico, SPC, 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 progress of Stock Synthesis (SS) model settings for the stock assessment of blue shark (*Prionace glauca*) in the North Pacific.

2. DISTRIBUTION OF DOCUMENTS AND NUMBERING OF WORKING PAPERS

Three working group papers and 5 information papers were distributed and numbered (**Attachment 2**). Also, one presentation file (Review of SS settings) was provided without a working paper. All WG papers were approved for posting on the ISC website (http://isc.fra.go.jp/) where they will be available to the public, however, the posting of document No 2 will be delayed due to internal review.

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
1-5.	M. Kai
6.	S. Teo
7-13.	M. Kai

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

5. SUMMARY OF CURRENT MEETING OBJECTIVES

The WG Chair presented the summary of current meeting objectives. The primary goal of the 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. Another goal was to discuss the scenarios of sensitivity analyses and future projections for the stock assessment.

6. REVIEW OF CATCH AND SIZE DATA FOR NORTH PACIFIC BLUE SHARK STOCK ASSESSMENT

Reconstruction of Catch for Blue Sharks Caught by Non-ISC Countries in the Western and Central North Pacific from 1997 to 2020. (ISC/22/SHARKWG-3/01)

This working paper provided a reconstruction of catch for blue sharks caught by longline and purse seine fisheries of non-ISC countries in the western and central North Pacific from 1997 to 2020. The reported annual catch of blue sharks caught by purse seine fleets was less than 0.1 metric tons and longline catch accounted for most of the catch. Since the public domain reported longline catch of blue sharks is likely to be underreported, the longline catches of four major non-ISC fleets including Micronesia, Kiribati, Republic of Marshall Islands and Vanuatu were estimated using the observed CPUE and reported total fishing effort. The longline catches of the other four non-ISC fleets including Belize, Papua New Guinea, Palau, and Solomon Islands were estimated using an average of the CPUE for four major fleets and reported total fishing effort. The reconstructed annual catch fluctuated between 51 and 1864 metric tons, and those substantially decreased compared to catch previously estimated for non-ISC countries. In addition, the reconstructed annual catch after 2010 were similar to the annual reported catch except for 2011-2013. These results suggest that the recent reported longline catch is consistent with the level of reported catch in the observer data, in line with the increase of observer coverage. The reconstructed annual catches were lower than 1000 metric tons until 2016, thereafter markedly increased the catch over 1100 metric tons due to the significant increase in the fishing effort of longline fleets for tropical tunas.

Discussion

The WG noted that the large difference between the blue shark catch estimated in this study and those provided by SPC for previous assessments. The WG further asked about the reasons for the large difference and how large was the difference compared to the total catch from all fisheries. The WG responded that even though one of the authors of this paper was also responsible for providing the previous estimates, they were unable to replicate the previous model and catch estimates. Therefore, it was not clear as to why there is a large difference between the current and previous estimates. The WG also confirmed that the difference amounted to about 10% of the total catch from all fisheries.

The WG further noted that this issue was discussed at the data preparatory meeting (ISC 2021) and had come up with a catch scenario using the previous catch estimates from SPC in a sensitivity run. **The WG agreed that a sensitivity run with the catch scenario described in the data preparatory meeting would be performed**.

The WG noted that the blue shark CPUE from observers on the fleet of the Federated States of Micronesia (FSM) had a large drop from 2008 (1.25 per 1000 hooks) to 2014 (0.11 per 1000 hooks) but that there were no data between those years. Currently, it was assumed that the intervening years (2009 – 2013) had the same average CPUE as the entire period (1997-2020; 1.03 per 1000 hooks) before a knife-edge drop in 2014. However, some in the WG was unsure if that was appropriate because shark management measures (CMM2011-04 for Oceanic Whitetip shark; CMM2013-08 for Silky shark) were implemented by the WCPFC during the intervening years that likely impacted the shark CPUE and resulted in the low CPUE in and after 2014. It was also unclear if the management measures resulted in a gradual or knife-edge change in CPUE. After examining and discussing the data for the South Pacific blue shark, which is under the same management measures, the WG judged that there was no evidence for a knife-edge change in CPUE. Therefore, **the WG agreed to develop two sensitivity catch scenarios that have gradually decreasing blue shark CPUE for FSM starting in: 1) 2009 or 2) 2011, when the first management measure was implemented in place**.

Blue Shark Catch and CPUE for the US Hawaii Longline Fleet. (ISC/22/SHARKWG-1/02)

This working paper details the approach used for preparing the US Hawaii longline catch (or total mortality) of blue shark for use in the 2022 ISC stock assessment of North Pacific blue shark. A random forest modeling approach was taken to predict encounter probability and positive catch of blue shark for un-observed logbook records. These models were combined to produce predictions of total blue shark interactions for the fishery. Mortality was determined by partitioning interactions into retained, and discarded individuals where discarded individuals are assumed to suffer from post-release mortality. Total mortality was calculated by combining the predicted mortality from un-observed logbook records with the assumed true observed mortality (retentions and discards) from onboard observer records. Uncertainty in this estimate was developed using a parametric bootstrap and incorporates uncertainty in the post-release mortality assumption. Sensitivity to the choice of predictive model, and assumption for which un-observed logbook records to apply the predictions to were explored. This analysis built on the approach used in previous ISC stock assessments for blue shark but made three critical revisions to the: 1) choice of predictive model, 2) choice of assumption used to apply predictions to un-observed logbook records, and 3) choice of post-release mortality value.

Discussion

The WG had questions on the modeling approach and the source for the post-release mortality rates. After some discussion, **the WG agreed to follow the recommendations from this paper, and to use the upper and lower ranges of reconstructed catch from 'Random Forest predicted for all un-observed logbook records' option for the reliability assumption in a sensitivity analysis**.

Revision of Fleet Definition of Size Data of Blue Shark (Prionace glauca) Collected by Japanese Commercial Longline Fishery and Longline Research Program in the North Pacific. (ISC/22/SHARKWG-2/03)

In the Shark Working Group in 2021, the size data of blue shark (*Prionace glauca*) caught by Japanese fishery and research cruise was summarized, based on the several data sources. In this summarization, size data from several sources were aggregated based on the gear configuration (e.g., night and shallow-setting or daytime and deep-setting). However, this kind of aggregation could lead to poor fitting of SS to the observed size data, due to the gap of operation area among sources. In this context, operation pattern including area, time period, target were re-examined for size data from Kinkai-shallow fleet (Fleet 4) and the fleet definition for the size data from Kinkai-deep (Fleet 5) and Enyo-deep (Fleet 7) was also checked.

Fleet 4 size data consists of three sources (1. shallow-set research, 2. observer data on Kinkai-shallow commercial vessel, and 3. port sampling data for the catch of commercial Kinkai-shallow vessel). The operation area of shallow-set research data (1999-2021) partially overlapped with that of commercial vessels and may not be representative of the Kinkai-shallow fleet. Research data between 1978 and 1982 also overlapped with the commercial fishing ground after 1994, but the effort was concentrated in the northern area with targeting of salmon shark and blue shark, before shifting to the eastern area outside of Kinkai-shallow fishing ground. Size data collected from observer data overlapped with the port sampling data. Thus, only port-sampling data for Kinkai-shallow was suggested to be representative of Fleet 4.

Regarding the other fleets, 507 size observations included in Fleet 5 were collected from fishing vessels > 120 metric tons and/or outside the fishing ground of Kinkai (offshore) fishery, and were thus re-assigned to F7 size data.

Discussion

The WG asked if there was a time block prior to 2008 for Fleet 4 in the previous assessment. The WG responded that in the previous assessment, time block was not used because there was no size composition data for the fleet prior to 2008. After some discussion, **the WG agreed with the recommendation from the author not to use the size data for Fleet 4 prior to 2008**.

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

Review of Current Stock Synthesis (SS) Settings for North Pacific Blue Shark Stock Assessment. (ISC/22/SHARKWG-1/P01)

The WG presented details of the latest SS settings in the process of determination of the SS base case model used in the upcoming stock assessment for North Pacific blue shark. The following topics were discussed; (1) outcomes of the version update of the assessment model, (2) outlines of fishery data including catch, CPUE and size data, (3) biological parameters including growth, maturity ogives, weight-length relationships, stock recruitment relationships, bias adjustment parameters, sigma-R, and selectivity pattern, and (4) weighting methodology for CPUE and length composition data.

Discussion

The WG confirmed that the objective of this pre-assessment meeting. The WG discussed the effect of the version update on the outcomes. The WG also discussed the parameterization of Sigma-R, settings of time block for Japanese large-mesh driftnet fishery and US fisheries, appropriateness for the separation of large mesh driftnet fishery, Francis weighting methods of length composition data, alternative CPUE scenarios and an implementation of the recruitment bias adjustment. The WG further discussed alternative scenarios of annual catch for high seas squid driftnet fishery and the settings of selectivity parameters as well as length composition data.

The WG agreed to tune the parameter of Sigma-R and to ultimately fix the parameter in consideration with the productivity of blue shark. The WG commented that the blue shark is a much higher productive species related to other pelagic sharks with respect to steepness (the estimate is around 0.6), however, it is less productive than tunas. Therefore, an intermediate value might be better for Sigma-R.

The WG also agreed to separate the fleet of Japanese large mesh driftnet fishery in two fleets for 1971-1993 and 1994-2020 because the high seas driftnet fishery was banned in 1993 and the Japanese large-mesh driftnet fishery shifted the operation area to the coastal area within Economic

Exclusive Zone (EEZ) since 1994. Additionally, the selectivity curve of Japanese coastal fisheries is mirrored to this fleet, but Japanese large-mesh driftnet fishery is considered to have changed the target species from swordfish to albacore and changed the range of selectivity in accordance with the expansion of operation area from coastal to far seas in 1980s. Further **the WG agreed to add time block to the Japanese large mesh driftnet fishery for 1973-1981 and 1982-1993** to reflect the differences of operational area and target species.

The WG confirmed that the Francis weighting method is reasonable for implementing the down weighting of the fleet-specific length composition data at the final stage. **The WG agreed to conduct the bias adjustment of recruitment deviations at the final stage of model settings**.

The WG discussed a possibility of ensemble approach for the combinations of late CPUE time series that has similar annual trends such as Hawaii longline CPUE, Taiwan large scale CPUE and Japanese research and training vessel CPUE as alternative base case. However, the WG was concerned that the spatial resolution and length of time period for all the CPUEs are limited except for Japan Kinkai shallow CPUE. However, the Hawaii and Japanese research and training vessel CPUEs have merit since they were estimated based on non-target fishery dependent catch and effort data. **The WG agreed to use Japan early and Japan late CPUEs for the base case model, but if the model diagnostics for the alternative candidate model shows better performance at the stock assessment meeting, the WG could revisit such an ensemble approach.**

The WG estimated annual catch of blue shark caught by high seas driftnet fishery of Chinese Taipei and Republic of Korea using the records of statistics in the document paper (Ito et al., 1993) during this workshop. The WG acknowledged that these fisheries operated in the high seas in the 1980s and that their annual catch of blue shark should be accounted for in the stock assessment. The WG decided to estimate this catch using three approaches:1) by multiplying the nominal CPUE of blue shark (Fujinami et al., 2021) by fishing efforts of each country; 2) by calculating the ratio of blue shark catch to fishing effort; 3) and by estimating blue shark catch based on the scale of squid catch. **The WG agreed to use the median value of three methods for the base case and to conduct a sensitivity analysis using the value of the confidence intervals (2times of standard deviation) shown in the Yatsu et al. (1993).**

The WG estimated the annual catch of blue shark using the three methods described above. The estimates of catch were summarized in **Table 1**. Linear interpolation was used to fill in the Korean catch for 1980-1982 assuming 0 catch in 1979 and was used to fill in catch of both Korea and Taiwan for 1991-1992 assuming 0 catch in 1993.

Table 1. Summary of annual catch estimated from three methods and reconstructed catch used in the base case model.

		Method1		Method2		Method3		Base case		
Year	Japan	Republic of Korea	Chinese Taipei	Republic of Korea	Chinese Taipei	Republic of Korea	Chinese Taipei	Republic of Korea	Chinese Taipei	Total
1980	46	90	6			67	12	78	12	137
1981	92	180	23			134	46	157	45	294
1982	1,223	270	38		236	201	76	235	75	1,533
1983	1,669	359	52		452	267	105	313	104	2,087
1984	2,031	829	75		795	350	196	590	195	2,815
1985	2,241	878	64		693	502	155	690	154	3,084
1986	2,453	1,185	64		741	418	98	802	98	3,353
1987	2,213	1,369	39		496	599	132	984	131	3,328
1988	2,895	1,972	83		1,268	715	74	1,344	74	4,313
1989	2,225	1,582	105		1,164	951	211	1,266	209	3,700
1990	1,037	1,120	67		494	877	96	999	96	2,131
1991	943	747				585	64	666	46	1,655
1992	655	373				292	32	333	23	1,010

Red figure denotes the catch number estimated from the linear extolaporation

Blue denotes the values were not used in the catch of squid driftnet fishery due to the issue of fishing effort data

The WG attempted to apply three methods for two fisheries (i.e., Chinese Taipei and Republic of Korea), but the fishing effort of Chinese Taipei has only available as the number of vessels and number of vessel days (see Table1; Yeh and Tung, 1993), although the other two fisheries have information about the total length of driftnet ("tans" and "poks"). In addition, the total number of vessel days is limited for 1986-1990 and includes both small- and large- mesh driftnet fishery. Further the fishery of Republic of Korea has no data of fishing days (Gong et al., 1993). The WG therefore decided to use the estimated catch of Chinese Taipei from only the 3rd method and those of Republic of Korea from the 1st and 3rd methods.

Regarding the 1st method, the WG calculated the catch number of blue sharks caught by squid driftnet fishery for the Republic of Korea. The number of gillnets ("poks"; 1 pok is 50m length) was obtained from the literature (Table 3 in Gong et al., 1993). Since the nominal CPUE of Japanese driftnet fishery was estimated from fishing effort ("tans"; 1 tan is 1 km length) and estimated catch number from GAM (Fujinami et al., 2021), the "pok" was converted to "tan" through dividing the number of gillnets by 20. The catch number of blue shark was calculated through multiplying the nominal CPUE by fishing effort (**Table 2**).

Table 2. Summary of catch estimation for Republic of Korea based on the 1st method.

Year	No. of gillnets(poks): 1pok is 50m length	Converted fishing effrot (1km tan)	Nominal CPUE from Japanese data	Calculated catch number
1983	5,634,961	281,748	1.28	359,361
1984	12,506,039	625,302	1.33	828,585
1985	13,943,441	697,172	1.26	877,715
1986	17,587,232	879,362	1.35	1,184,623
1987	19,781,364	989,068	1.38	1,368,992
1988	24,594,370	1,229,719	1.60	1,972,206
1989	24,780,316	1,239,016	1.28	1,582,068
1990	24,590,505	1,229,525	0.91	1,120,454

Regarding 3rd method, the WG calculated the squid driftnet catch of blue shark for the Republic of Korean and Chinese Taipei fleets by applying the ratio of blue shark to squid catch from the Japanese fleet to total flying squid catch for Republic of Korea and Chinese Taipei, respectively. The Japanese blue shark catch ratio was calculated as reported blue shark catch (numbers) from Fujinami et al. (2021) divided by the reported flying squid catch (metric tons) from Ito et al. (1993). Uncertainty in this ratio was developed by treating blue shark catch and flying squid catch as correlated random variables drawn from a multivariate normal distribution. The assumed mean of the distribution were the annual pairs of blue sharks and flying squid catch, with assumed standard error derived from the reported 95% confidence interval in the catch from Ito et al. (1993). The covariance for this multivariate normal distribution was informed by the correlation in blue shark and flying squid catch time series, with an assumed CV for the correlation of 0.25. Pairs of values drawn from this multivariate distribution were used to create a distribution for the ratio of blue shark to flying squid catch. Each ratio was then applied to the flying squid catch time series of Republic of Korea and Chinese Taipei to calculate the blue shark catch with uncertainty. The estimated catches and the uncertainty are summarized in **Table 3**.

Table 3. Summary of catch estimation for Republic of Korean and Chinese Taipei fleets based on the 3rd method.

Year	Japan	Median		Low (2.5th percentile)		High (97.5th percentile)	
		Republic of Korea	Chinese Taipei	Republic of Korea	Chinese Taipei	Republic of Korea	Chinese Taipei
1980	46	67	12	8	1	194	36
1981	92	134	46	15	5	388	132
1982	1,223	201	76	23	9	583	220
1983	1,669	267	105	31	12	777	304
1984	2,031	350	196	40	23	1018	568
1985	2,241	502	155	58	18	1457	449
1986	2,453	418	98	48	11	1215	286
1987	2,213	599	132	69	15	1739	382
1988	2,895	715	74	82	9	2077	216
1989	2,225	951	211	109	24	2761	611
1990	1,037	877	96	101	11	2548	279
1991	943	585	64	67	7	1699	186
1992	655	292	32	34	4	849	93

Red figure denotes the catch number estimated from the linear extolaporation

The WG also decided to estimate the selectivity of this fleets using the information about length frequency of blue shark in the document paper (see Fig7; Mackinnel and Seki, 1998). The WG digitally extracted the length composition data from the figure and summarized the values in the **Table 4**. The total length (TL) was converted to precaudal length (PCL) using the following equation: PCL=0.78×TL－3.75 (Fujinami et al., 2017). The WG also estimated the mean body weight using this information with the sex-specific weight-length relationships (Nakano, 1994) and derived mean body weight (2.7 kg).

The WG discussed the utility of fixing selectivity parameters for some fleets, which have small length composition sample sizes in recent years. The WG concluded that it was unnecessary to fix these parameters.

Table 4. Retrieved length frequency of blue sharks sampled by Canadian observers in the Japanese flying squid driftnet fishery in 1991.

Startbin(TL;cm)	Endbin(TL;cm)	Startbin (PCL;cm)	Endbin (PCL; cm)	Count
33.3	44.4	22.3	30.9	1
44.4	55.6	30.9	39.6	10
55.6	66.7	39.6	48.3	66
66.7	77.8	48.3	56.9	108
77.8	88.9	56.9	65.6	78
88.9	100.0	65.6	74.3	86
100.0	111.1	74.3	82.9	65
111.1	122.2	82.9	91.6	22
122.2	133.3	91.6	100.3	22
133.3	144.4	100.3	108.9	13
144.4	155.6	108.9	117.6	13
155.6	166.7	117.6	126.3	5
166.7	177.8	126.3	134.9	2
177.8	188.9	134.9	143.6	3
188.9	200.0	143.6	152.3	5
200.0	211.1	152.3	160.9	4

8. REVIEW OF CURRENT “BASE-CASE” MODEL AND MODEL DIAGNOSTICS

The WG reviewed the latest six candidates of “base-case” model and compared the main outcomes among them. All scenarios had no warning regarding the maximum gradient, but the hessian matrix was not positive definite. Higher sigma-R (0.6) tended to decrease the scale of biomass, while lower sigma-R (0.3) tended to increase the scale of biomass. The addition of high seas driftnet catch for Chinese Taipei and Republic of Korea to Japanese high seas driftnet catch tended to increase the scale of biomass. The value of sigma-R was also directly estimated in the SS model for both scenarios with only Japanese catch and combined catch of three countries for the driftnet fishery. The estimates of sigma-R were about 0.4 for both scenarios.

Three model diagnostics were also applied for the model with combined catch of three countries and intermediate sigma-R (0.4). Likelihood profile of R0 indicated conflicts among some fleets for length composition data and CPUE data, ASPM (Age Structured Production Model) indicated a clear production function, and Retrospective analysis indicated a slight negative bias for the annual CPUE.

Discussion

The WG discussed the handling way of sigma-R and **agreed to use the value of 0.6 for the time being**, and the sigma-R will be tuned to an appropriate value (e.g., estimated value within the SS model) at the final stage of the SS conditioning. The WG also discussed the pattern of estimated recruitment deviations. The positive recruitment deviates were observed in the 1980s and negative recruitment deviates were observed after 2000. The WG, however, commented that these patterns were not a critical issue at this stage because the ASPM indicated a clear production function in the ASPM. The WG further commented that the pattern seen in the recruitment deviates could be caused by the data conflict between Japan early and late CPUEs and might be resolved by using alternative late index (e.g. composite index from Hawaii longline CPUE, Taiwan large-scale longline CPUE and Japan research and training vessel CPUE).

9. ESTABLISHMENT OF WORK PLAN FOR THE STOCK ASSESSMENT

Discussion

The WG discussed the necessity of further analysis to decide the "base-case" model. The WG raised some points for the improvement of the model settings such as the fitting of selectivity curve for US Hawaii longline size data, more accurate catch data for high seas driftnet fishery and appropriate setting of selectivity curve for this fleet using the size data.

The WG also discussed the scenarios of sensitivity analysis and **agreed to conduct the sensitivity analyses for the listed items** (**Table 5**).

The WG further discussed the scenarios of future projections and **agreed to use the same method as those used in the 2017 assessment.**

- ✓ Four harvest scenarios (Average F+ 20%, Fmsy, Average F-20%, Average F-2017-2019)
- ✓ Projection period (2020-2029)
- ✓ Deterministic recruitment from the SR relationships
- ✓ Selectivity parameters was fixed to the value from terminal year (2020)

Table 5. Summary of items and values for the sensitivity analysis

No	Items	Details	Values
1	Natural mortality schedules	Petersen and Wroblewski	
2	Initial equilibrium catch (MT)	Base-case	20000 40000 60000
3	Late CPUE series	S1:HW_DP S3:TAIW_LG S7: JPN_RTV S9: SPC_OBS_TROPIC S10: MEX Composite CPUE (S1, S3 and S7) All CPUEs	
4	Spawner-recruit function	LFSR used in the previous assessment	Beta=2, Alfa=0.391
5	Beverton-Holt steepness (h)	Base-case	0.613 0.513 0.713
6	Sigma-R	High Low	0.6 0.3
7	Selectivity function	Asymptotic selectivity on F18 (TAIW_LG)	
8	High seas and large mesh driftnet catch	Base-case Previous catch used in 2017	
9	High seas driftnet catch	Base-case Lower value of 95% CI based on the SD of JP fishery (Yatsu et al., 1993) Higer value of 95% CI based on the SD of JP fishery (Yatsu et al., 1993)	 CV=0.21 CV=0.21
10	Non-ISC catch	1. Previous catch etsimates from SPC and ISC 2. Gradual decrease of catch rate for FSM starting in 2009 3. Gradual decrease of catch rate for FSM starting in 2011	
11	US-HW LL catch for shallow-set and deep-set	1. Upper range of reconstructed catch from RF with all unobserved logbook records 2. Lower range of reconstructed catch from RF with all unobserved logbook records	
12	Model specification	Mimic 2017 blue shark assessment	

10. OTHER MATTERS

No discussion.

11. FUTURE SHARKWG MEETINGS

a. Stock assessment meeting for blue shark (Online, April in 2022)

The WG agreed that the online stock assessment meeting will be held in April 19-22, 26-28 (JST).

b. ISC Plenary (Hawaii, JULY in 2022)

12. 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.

13. ADJOURNMENT

The WG Chair thanked everyone for a productive meeting! The meeting was adjourned at 11:41on Friday March 4, 2022 (JST).

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ATTACHMENT 2. MEETING DOCUMENTS, PRESENTATIONS AND INFORMATION PAPERS

WORKING PAPERS

ISC/22/SHARKWG-1/01	Reconstruction of catch for blue sharks caught by non-ISC countries in the western and central North Pacific from 1997 to 2020. **Mikihiko Kai, Yasuko Semba, Nicholas Ducharme-Barth, Joel Rice, and Peter Williams** (kaim@affrc.go.jp)
ISC/22/SHARKWG-1/02	Blue shark catch and CPUE for the US Hawaii longline fleet. **Nicholas Ducharme-Barth, Zachary Siders, and Robert Ahrens** (nicholas.ducharme-barth@noaa.gov)
ISC/22/SHARKWG-1/03	Revision of fleet definition of size data of blue shark (*Prionace glauca*) collected by Japanese commercial longline fishery and longline research program in the North Pacific. **Yasuko Semba** (senbamak@affrc.go.jp)

PRESENTATIONS

ISC/22/SHARKWG-1/ P-01	Review of current Stock Synthesis (SS) settings for North Pacific blue shark stock assessment. **Mikihiko Kai, Steve Teo, Nicholas Ducharme-Barth, and Felipe Carvalho** (kaim@affrc.go.jp)

INFORMATION PAPERS

ISC/22/SHARKWG-1/ INFO-01	Stock Synthesis User Manual Version 3.30.16. **Method, R.D., Wetzel, C.R., Taylor, I.G., Doering, K**. 2020. NOAA Fisheries, Seattle, WA.
ISC/22/SHARKWG-1/ INFO-02	A cookbook for using model diagnostics in integrated stock assessments. 2021. Fish. Res. 240. 105959. **Carvalho, F. et al.**
ISC/22/SHARKWG-1/ INFO-03	Stock Assessment and Future Projections of Blue Shark in the North Pacific Ocean through 2015. **WCPFC-SC13-2017/SA-WP-10**
ISC/22/SHARKWG-1/ INFO-04	Symposium on biology, distribution and stock assessment of species caught in the High Seas driftnet fisheries in the North Pacific Ocean held by the standing committee on biology and research at Tokyo, Japan in 1991. 1993. **Ito, J., Shaw, W., and Burger, R.L.**
ISC/22/SHARKWG-1/ INFO-05	Shark bycatch in the Japanese High Seas squid driftnet fishery in the North Pacific Ocean.1998. Fish. Res. 39, 127-138. **McKinnel, S., Seki, M.P.**

ATTACHMENT 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

Pre-assessment meeting of stock assessment for North Pacific blue shark

March 1-4, 2022 (Japan and Korea time)
Meeting Hours: 09:00 – 13:00 (Japan and Korea time)
March 1-4, 2022 (Taiwan and China time)
Meeting Hours: 08:00 – 12:00 (Taiwan and China time)
FEB. 28, March 1-3, 2022 (Hawaii time)
Meeting Hours: 14:00 - 18:00 (Hawaii time)
FEB. 28, March 1-3, 2022 (Mexico (Ensenada) and Canada time)
Meeting Hours: 16:00 - 20:00 (Mexico (Ensenada) and Canada time)

DRAFT

Meeting begins at 09:00 am Tuesday JST and Korea (08:00 Taiwan and China, 14:00 Hawaii, and 16:00 Mexico (Ensenada) and Canada)

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 current meeting objectives
6. Review of catch and size data for North Pacific blue shark stock assessment.
7. Stock Synthesis (SS) modeling for North Pacific blue shark
   a. Version update of assessment model
   b. Discussion of data file of SS including the filtering of data
   b-1. Catch data
   b-2. CPUE data

b-3. Size data

・Removal of length composition data (less than 30cm PCL; inconsistent fleet definition)

c. Discussion of control file of SS

c-1. Biological parameters

・Change the S-R function from LFSR to B-H

・Bias adjustment parameter of SRR

・Setting of Sigma-R

c-2. Selectivity pattern and parameters

・Change the selectivity pattern for Japanese high sea squid driftnet fishery

・Time blocks

・Fixation of selectivity parameters

c-3. Weighting of data (Variance adjustment settings)

・CPUE

・Length composition data

8. Review of current “base-case” model and model diagnostics.
9. Establishment of work plan for the stock assessment
   a. Discussion of the further analysis to decide the “base-case” model (if necessary)
   b. Discussion of the sensitivity analysis
   c. Discussion of future projection scenarios
10. Other matters
11. Future SHARKWG meetings
    a. Stock assessment meeting for blue shark
    b. ISC Plenary
12. Clearing of report
13. Adjournment