UPDATE ON THE ACTIONS ARISING FROM THE 22ND SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB022)

PREPARED BY: IPHC SECRETARIAT (22 AUGUST 2023)

PURPOSE

To provide the Scientific Review Board (SRB) with an opportunity to consider the progress made during the intersessional period, on the recommendations/requests arising from the SRB022.

BACKGROUND

At the SRB022, the members recommended/requested a series of actions to be taken by the IPHC Secretariat, as detailed in the SRB022 meeting report (IPHC-2023-SRB022-R) available from the IPHC website, and as provided in Appendix A.

DISCUSSION

During the 23rd Session of the SRB (SRB023), efforts will be made to ensure that any recommendations/requests for action are carefully constructed so that each contains the following elements:

1) a specific action to be undertaken (deliverable);
2) clear responsibility for the action to be undertaken (such as the IPHC Staff or SRB officers);
3) a desired time frame for delivery of the action (such as by the next session of the SRB or by some other specified date).

RECOMMENDATION/S

That the SRB:

1) **NOTE** paper IPHC-2023-SRB023-03, which provided the SRB with an opportunity to consider the progress made during the inter-sessional period, in relation to the consolidated list of recommendations/requests arising from the previous SRB meeting (SRB022).
2) **AGREE** to consider and revise the actions as necessary, and to combine them with any new actions arising from SRB023.

APPENDICES

Appendix A: Update on actions arising from the 22nd Session of the IPHC Scientific Review Board (SRB022)

APPENDIX A
Update on actions arising from the 22nd Session of the IPHC Scientific Review Board (SRB022)

RECOMMENDATIONS

Action No.	Description	Update
SRB022–Rec.01 (para. 15)	***International Pacific Halibut Commission 5-year program of integrated research and monitoring (2022-26)*** The SRB **NOTED** the reporting table draft provided by the Contracting Parties (Appendix A of paper IPHC-2023-SRB022-05) and **RECOMMENDED** further modification by adding the following and as shown in Table 1 below: a) New Column: Brief description of the project and how it relates to the core mandate of the Commission; b) Description of the problem being addressed; c) Objective: List of concise objectives (research and how the results will be incorporated); d) Impact scale and timing; e) Interim performance/evaluation metrics.	***Ongoing*** **Update**: See paper **IPHC-2023-SRB022-05**
SRB022–Rec.02 (para. 19)	***Pacific halibut stock assessment*** **NOTING** that the scale of impact from different model weighting approaches presented here is small relative to the impact of other factors in the MSE (e.g. two- vs. three-year assessment intervals and TCEY), the SRB **RECOMMENDED** that the Secretariat continue using the equal weighting approach for model averaging.	***In Progress*** **Update**: Equal weighting will be applied to all four models in the final 2023 stock assessment ensemble.
SRB022–Rec.03 (para. 25)	***Management strategy evaluation*** To improve comparability of MPs in performance achieving TCEY objectives, the SRB **RECOMMENDED** equalizing MP performance on one of the conservation objectives.	***In Progress*** **Update**: This topic is presented and discussed in **IPHC-2023-SRB023-07.**

Action No.	Description	Update
SRB022–Rec.04 (para. 26)	The SRB **RECOMMENDED** that reconditioning the operating model should be limited to situations where the stock assessment has changed significantly. This likely means a three-year schedule for reconditioning the operating model in the year following each full stock assessment.	***Completed*** **Update**: The operating model has been updated following the 2023 stock assessment and is presented in **IPHC-2023-SRB023-07.**
SRB022–Rec.05 (para. 27)	The SRB **RECOMMENDED** that the Secretariat consider using explicit informative priors for conditioning the operating model to make fitting constraints more explicit.	***In Progress*** **Update**: A description of some of the conditioning process is described in **IPHC-2023-SRB023-07**. Additional details will be in the technical document available on the MSE Research webpage.
SRB022–Rec.06 (para. 28)	The SRB **RECOMMENDED** that exceptional circumstance (i) be evaluated annually based on comparisons between the simulation distribution (e.g. a 95% interval) of FISS values from MSE simulations to the realized FISS estimates; and (ii) be clearly distinguished from "unusual conditions". For example, exceptional circumstances should have a high threshold for persistent (i.e. more than a single year) deviation from MSE simulations.	***In Progress*** **Update**: Proposals for defining exceptional circumstances are provided in IPHC-2023-SRB023-07.
SRB022–Rec.07 (para. 29)	The SRB **RECOMMENDED** that an initial response to a suspected "exceptional circumstance" should include presentation at the next SRB meeting to establish whether the situation meets the definition of an "exceptional circumstance" and to formulate a response.	***In Progress*** **Update**: Proposals for defining exceptional circumstances are provided in **IPHC-2023-SRB023-07**.

Action No.	Description	Update
SRB022–Rec.08 (para. 32)	***Biology and ecology*** The SRB **NOTED** that the current maturity sampling design does not determine whether the high rate of individuals at the cortical alveoli stage in the southeastern portion of the study area is a function of differences in seasonal reproductive timing or in size/age at maturity. The SRB **RECOMMENDED** additional investigations on the region-specific seasonal reproductive cycles and evaluating the extent to which differences among regions can be explained by size or age of the sampled individuals.	***In Progress*** **Update**: The IPHC Secretariat is currently conducting a coastwide study on maturity with a significantly higher number of ovarian samples collected during the 2022 FISS and is expanding further the number of collected ovarian samples in the referenced study area during the current 2023 FISS.
SRB022–Rec.09 (para. 35)	The SRB **NOTED** the presentation on whale depredation avoidance devices and **RECOMMENDED** that the Secretariat pursue external funding opportunities for expanding this research and testing one or more devices in the presence of whales.	***Completed*** **Update**: The IPHC Secretariat submitted a grant proposal to test catch protection devices in the presence of killer whales that has been awarded.
SRB022–Rec.10 (para. 36)	**NOTING** that in terms of bioinformatic quality filtering to exclude loci, filtering based on sequencing depth alone may not be sufficient to exclude mitochondrial sequences, the SRB **RECOMMENDED** that loci be mapped to the published Pacific halibut mitochondrial genome to ensure that non-autosomal loci are included in analyses. Filtering based on sequencing depth alone is likely not sufficient to exclude regions of the genome that represent repetitive elements. Suggest sites be checked for repetitive elements.	***Completed*** **Update**: The IPHC Secretariat has addressed this recommendation in **IPHC-2023-SRB023-08.**

Action No.	Description	Update
SRB022–Rec.11 (para. 37)	The SRB **RECOMMENDED** that the Secretariat include other genome-wide summary measures of diversity. Measures could include (a) measures of genome size, (b) percentages of genome as singleton and duplicated loci, (c) other summary measures of diversity including (i) number of loci with minor allele frequency (MAF)>0.01, (ii) number of loci with MAF>0.05, (iii) a measure of deviation of observed and expected heterozygosity (Fis), (iv) observed heterozygosity (Ho) and expected heterozygosity (He).	***In Progress*** **Update**: The IPHC Secretariat has addressed part of this recommendation in **IPHC-2023-SRB023-08** and work is currently in progress.
SRB022–Rec.12 (para. 38)	The SRB **RECOMMENDED** that the Secretariat evaluate multiple 'windows' and inter-window 'spacing' to summarize diversity and differentiation. The SRB is unsure why a 15 Kb 'window was used with 7.5 Kb space for producing Manhattan plots. The size of the window will affect estimates of significance based on a measures of Fst significance. Specifically, the larger the 'window' likely the larger the standard deviation across a greater number of sites. Window size is also likely to affect levels of linkage disequilibrium and down-stream analyses based on it.	***Completed*** **Update**: The IPHC Secretariat has addressed this recommendation in **IPHC-2023-SRB023-08.**
SRB022–Rec.13 (para. 39)	**NOTING** that different outlier tests are based on different assumptions and statistical approaches, the SRB **RECOMMENDED** that the Secretariat implement more than one method. Selection of specific markers would appropriately be based on concordant designation of highly population discriminatory loci identify across methods. The Secretariat is likely to have greater confidence in assignment of 'outliers' based on principles of concordance using multiple and semi-independent software packages and statistical approaches.	***Completed*** **Update**: The IPHC Secretariat has addressed this recommendation in **IPHC-2023-SRB023-08.**

Action No.	Description	Update
SRB022–Rec.14 (para. 40)	The SRB **RECOMMENDED** that after statistical significance of SNP loci has been established, the Secretariat use gene set enrichment analyses to establish functional annotations for genes associated with SNPs.	***Completed*** **Update**: The IPHC Secretariat has addressed this recommendation in **IPHC-2023-SRB023-08.**
SRB022–Rec.15 (para. 41)	The SRB **APPRECIATED** that the Secretariat estimated Tajima's D as recommended (IPHC-2022-SRB021-R), and **RECOMMENDED** that: a) the Secretariat be cautious with filtering SNP loci based on minor allele frequency (MAF) at levels as low as 0.01 as employed in results described in IPHC-2023-SRB022-09, as this may affect values of Tajima's D; and b) a range of values be explored.	***Completed*** **Update**: The IPHC Secretariat has addressed this recommendation in **IPHC-2023-SRB023-08.**
SRB022–Rec.16 (para. 43)	The SRB **RECOMMENDED** looking for genome regions (more than 2 or more co-located 'significant' SNPS) with high divergence as indication of regions containing structural variants. Measures of linkage disequilibrium can also be profitably used to identify structural variants.	***In Progress*** **Update**: The IPHC Secretariat is currently working to address this recommendation.
SRB022–Rec.17 (para. 44)	The SRB **RECOMMENDED** plotting levels of heterozygosity as Manhattan plots across chromosomal regions.	***In Progress*** **Update**: The IPHC Secretariat has begun estimating additional genetic diversity measures and has updated the proposed workflow to reflect this. This would include visualizing heterozygosity levels across chromosomal regions.

Action No.	Description	Update
SRB022–Rec.18 (para. 45)	**NOTING** that use of high-throughput low-coverage DNA sequencing data can lead to biased estimates of the site frequency spectrum (SFS) due to high levels of uncertainty in genotyping, the SRB **RECOMMENDED** exploring other derivations from Secretariat proposed work described in IPHC-2023-SRB022-09 including visualisations of SFS in multi-dimensional space.	***Completed*** **Update**: The IPHC Secretariat has addressed this recommendation in **IPHC-2023-SRB023-08**.
SRB022–Rec.19 (para. 46)	**NOTING** that one of the primary objectives of the Pacific halibut genome project is to provide spatial discrimination of 'populations' (IPHC reporting regions) and to assign individuals to these groups, and that the Secretariat described genetic relationships among individuals from different IPHC reporting region and years of collection based on multivariate ordination using principle component analyses (PCA), and that levels of variability explained associated with PCA axes projects is low, the SRB **RECOMMNEDED**: a) conducting additional analyses to evaluate statistical significance of measures of inter-population differentiation (Fst); and b) re-analysis using only outlier loci.	***In Progress*** **Update**: The IPHC Secretariat is currently working to address this recommendation.
SRB022–Rec.20 (para. 47)	The SRB **RECOMMENDED**: a) that the Secretariat move forward to stock discrimination to satisfy the Secretariat objective of using genetic data to define spatial structuring including unsupervised clustering methods (e.g. K-means, Structure, etc.) as well as PCA-based clustering (e.g. Discriminant Analysis of Principle Component) clustering; b) using assignment testing and mixture analyses such as leave-one-out cross-validation simulations to assess the potential accuracy of mixed stock analysis (MSA).	***In Progress*** **Update**: The IPHC Secretariat is currently working to address this recommendation.

Action No.	Description	Update
SRB022–Rec.21 (para. 52)	***Management Supporting Information*** The SRB **NOTED** the presentation demonstrating how secondary FISS objectives influence choices for future FISS designs that may have already been endorsed by the SRB based only on primary objectives. The SRB **RECOMMENDED** that the MSE include some scenarios in which the FISS is skipped (as also requested above in para. 30) because of occasional (or persistent) economic constraints on executing full FISS designs. Such simulation scenarios would provide some indication of the potential scale of impacts on MP performance of maintaining long-term revenue neutrality of the FISS.	***Completed*** **Update**: Three scenarios for FISS data collection were simulated in the MSE and are presented in **IPHC-2023-SRB023-07.**
SRB022–Rec.22 (para. 55)	***Other business*** The SRB **NOTED** the continuing gap within the Secretariat of research scientist expertise in both population genomics and life history modelling. In terms of prioritizing future hires, e.g. re-opening previous hiring attempts for a research scientist life history modeller, the SRB **RECOMMENDED** prioritizing a research scientist position in population genomics given the investments and future potential contribution of this research to the overall goals of the Commission.	***Pending*** **Update:** Insufficient funding at this time.

REQUESTS

Action No.	Description	Update
SRB022–Req.01 (para. 16)	***International Pacific Halibut Commission 5-year program of integrated research and monitoring (2022-26)*** The SRB **REQUESTED** that during the next update of the Plan, consider specifying the role and timing of input from the SRB in developing and reviewing project methods, performance metrics.	***Ongoing*** **Update**: See paper **IPHC-2023-SRB022-05.**

Action No.	Description	Update
SRB022–Req.02 (para. 18)	***Pacific halibut stock assessment*** **NOTING** that analysis of whale depredation has clarified that the potential scale of removals from depredation is relatively small, except in IPHC Regulatory Area 4A, the SRB **REQUESTED** that updated analysis using USA observer data be presented at SRB023 to evaluate whether incorporation of whale depredation in the stock assessment is warranted.	***Completed*** **Update**: Results included in **IPHC-2023-SRB023-06.**
SRB022–Req.03 (para. 30)	***Management strategy evaluation*** The SRB **NOTED** that situations in which critical data streams (e.g. FISS index or age data) are unavailable for one or more years does not constitute an "exceptional circumstance" and **REQUESTED** that the MSE include evaluation of such missing FISS data scenarios for the SRB023.	***Completed*** **Update**: Three scenarios for FISS data collection were simulated in the MSE and are presented in **IPHC-2023-SRB023-07.**
SRB022–Req.04 (para. 50)	***FISS design evaluation*** The SRB **NOTED** that IPHC Regulatory Area 4B will not be sampled in 2023 and **REQUESTED** that the Secretariat present an analysis of the predicted CV for unsampled and partially sampled IPHC Regulatory Areas in 2024.	***Completed*** **Update**: see paper **IPHC-2023-SRB023-09.**