SACRAMENTO RIVER FALL CHINOOK AD-HOC WORKGROUP REPORT ON METHODOLOGY REVIEW – FINAL TOPIC SELECTION

The Sacramento River Fall Chinook (SRFC) Work Group (SRWG) has identified three topics that could be suitable for salmon methodology review this year:

1. **Derivation of proxy S_{MSY}/S_{MSP} ratio and F_{MSY} value suitable for use for SRFC.** Reference points are the first topic identified in the SRWG Terms of Reference (TOR), and this would directly address the F_{MSY} reference point and provide a major step in addressing the S_{MSY} reference point. The SRWG discussed the June 2024 recommendations of the STT being "supportive of identifying a reasonable ratio between S_{MSY} and S_{MSP} to inform a data-based estimate of S_{MSY}" and the SSC "that the currently used proxy value for F_{MSY} be updated using recent data from other Chinook stocks that are representative of the SRFC stock under current conditions". The SRWG noted that for the Ricker spawner-recruit relationship as typically employed for PFMC-managed salmon, $S_{MSY}/S_{MSP}=F_{MSY}$[1]. Thus, a single literature review could inform estimation of both quantities, via a meta-analytic approach similar to the basis for the existing F_{MSY} proxy. The SRWG reviewed the analyses informing the current F_{MSY} proxy, identified some as no longer representative, identified others that have been updated based on more recent data, and identified additional analyses of relevance. The SRWG proposes presenting its criteria for inclusion of analyses, the set of analyses identified as appropriate, and the resulting potential S_{MSY}/S_{MSP} and F_{MSY} proxy value suitable for use for SRFC. The SRWG has completed a written report describing all of this.

   Sacramento River Fall Chinook cohort reconstruction (CR) and comparison to the Sacramento Index (SI). This would address point 2 of June 2024 Council Guidance to evaluate the CR and compare it with existing methods. Emily Chen (U.C. Berkeley) has completed a cohort reconstruction for SRFC brood years 2008-2016 that includes both hatchery- and natural-origin fish, as recommended by the SSC and STT in their June 2024 reviews of the SRWG Progress Report. The SRWG reviewed preliminary results and found comparisons between the SI and CR estimates of ocean abundance, potential escapement in the absence of fishing, and exploitation rates to be compelling, with potentially significant management implications in both the near term (e.g., improved exploitation rate calculations for use in status determinations) and longer term (e.g., reference point revisions when sufficient years of data have accumulated). The SRWG also noted interesting patterns in maturation rates that could be significant for forecasting. More accurate estimates of abundance would be useful in evaluating forecast performance and areas of potential improvement. Dr. Chen informed the SRWG that she could have complete documentation in advance of the two-week deadline for review materials and would be available remotely during the potential methodology review dates.

[1] This does not seem to be widely appreciated or written down in an easy to cite format, though it can readily be derived from equation T1.7 of Schnute and Kronlund (2002), noting that for a Ricker gamma=0 and S_{MSP}=1/beta.

2. **Uncertainty metrics and buffering approaches for SRFC forecasts.** This would address tasks in the TOR related to the harvest control rule and updated forecast methods. The SRWG discussed published work (Satterthwaite and Shelton 2023) that describes how bias and uncertainty in salmon forecasts can be quantified, and buffers based on a desired level of risk tolerance can be derived, using a framework similar to the existing P*/sigma approach used for groundfish and coastal pelagic species. If this approach is deemed technically sound, it could facilitate the SRWG's assigned tasks related to potential improvements to forecasting (e.g., as a bias correction applied to the point estimate) and/or the control rule for SRFC (as a buffer to the control rule input). Uncertainty metrics would also directly address point 3 in the SSC's April 2024 report on preliminary topic selection ("Forecasts and abundance estimates should include uncertainty bounds") and buffers could complement work under points 2 (integration of stoplight indicators) and/or 4 (application of risk tables consistent with March 2024 Council direction to the EWG) as well.

The SRWG understands that all materials submitted for methodology review are due two weeks in advance of the review and should be technically sound, comprehensive, clearly documented, and identified by author(s). The SRWG anticipates no problems with meeting those requirements for any of these items.

References:

Satterthwaite, W. H., and A. O. Shelton. 2023. Methods for assessing and responding to bias and uncertainty in U.S. West Coast salmon abundance forecasts. Fisheries Research 257:106502. Available online at https://doi.org/10.1016/j.fishres.2022.106502, or https://repository.library.noaa.gov/view/noaa/48014/noaa_48014_DS1.pdf for public domain version.

Schnute, J. T. and A. R. Kronlund. 2002. Estimating salon stock-recruitment relationships from catch and escapement data. Canadian Journal of Fisheries and Aquatic Sciences 59:443-449. Available online at https://dx.doi.org/10.1139/F02-016.

PFMC
08/20/24