Baykeeper response: ISB review questions re: 2025 exceedence of winter-run Chinook loss

Response to Q. 1. Yes. Better utilization of actual OMR data is needed. USGS gauges monitor actual flows in Old and Middle River (OMR). The Old and Middle River Index (OMRI, the metric for management in the 2019 and 2024 BiOps) is supposed to approximate OMR. However, data from SacPAS reveal that OMRI regularly underestimated the magnitude of negative flows during the 2024 and 2025 OMR management season (Figure 1). Because the relationships between negative OMR flow and impacts to native fishes are power functions, even seemingly small deviations from required flow minima (e.g., the difference between OMR and OMRI) can lead to large impacts, especially for highly imperiled species that are disproportionately susceptible to the effects of water exports.

Response to Q. 3. We can't know how well operations intended to prevent additional loss of listed fish (as described in the 2024 BiOp) would have worked because Reclamation did not implement those operations. In 2025, permitted CVP operations required reducing exports such that the 7-day average OMRI reached -3,500 cfs for 7 consecutive days after the 50% loss threshold was exceeded. Similarly, reduction in exports to produce OMRI ≥-2,500 cfs for 7 consecutive days was required, based on the predictions of the winter-run Machine Learning Model after the 75% loss threshold was exceeded (2024 BiOp at 590; Biological Assessment at 3-62; and COA 8.4.3 of the CESA ITP). This model was queried on two separate occasions (~3/25 and 4/7) and indicated the need to reduce exports to improve OMR conditions; yet exports were not reduced enough to bring OMRI to ≥ -2,500 cfs until the end of April (Figure 1). Measured OMR did not timely meet either of these seven-day thresholds.

Data from 2024 and 2025 show that salvage-related loss rates dropped rapidly after OMR became significantly more positive (Figure 1), consistent with the well-established correlations between OMR and salvage of listed fish. Unfortunately, we don't know how much this reactive management action improved overall survival – salvage indicates that large numbers of fish have already been drawn into the southern Delta, where mortality is extremely high.

Response to Q. 4. Yes. There is not substantial evidence that maintaining OMR as negative as -5,000 cfs (or more negative) is sufficiently protective of imperiled salmonids. Results from 2024 and 2025 indicate that negative flows of that magnitude represent considerable risk to migrating salmonids. In 2025, the 50% and 100% loss thresholds were exceeded within five days (between 3/18 and 3/22). This illustrates the general observation that, once fish entrainment/salvage begins, it is difficult to stop. Preventing exceedance of the 100% loss threshold would likely have required reduction in exports (and associated improvement in OMR flow) before the 50% and 75% loss thresholds were exceeded.

Data for 2024 and 2025 confirm the long-established relationship between negative OMR and fish salvage. In both years, rates of salvage/loss dropped dramatically after OMR became significantly more positive (Figure 1). However, the improvement in OMR did not occur early enough to prevent exceedance of the 50%, 75%, and 100% loss thresholds and was not sufficient in magnitude or duration to eliminate additional winter-run Chinook Salmon loss after thresholds

were exceeded. Notably, entrainment of winter-run (and other salmonids) was high in 2024 even though OMR/OMRI remained less negative than -5,000 for most of the season (Figure 1). This indicates that OMR flows more positive than -5,000 are necessary to maintain salvage/loss below levels permitted by the BiOp and ITP.

Response to Q. 5. Recent Freeport flows and winter-run monitoring in the lower Sacramento River should inform decisions about OMR flow. Perry et al. (2018) found routing of salmon smolt into the central and southern Delta increased as Sacramento River flows declined (but see Hance et al. 2021). Both Perry et al. and Hance et al. found that smolt survival decreased dramatically when Freeport flows were <35,000 cfs. When the likelihood of juvenile salmon routing into the Central Delta is high and/or migration survival is likely to be low, OMR flows should be managed to be lower than -2,500 cfs (at most). This recommendation is consistent with OMR management rules in the 2008/2009 BiOps.

Response to Q. 6. As described above, the decision to operate exports such that OMRI was more negative than -2,500 cfs was not consistent with the results of the Machine Learning Model, the ITP, or the CVP LTO operations permitted by the BiOp. Specifically, the Salmon Monitoring Team notes from 3/25 state (at 4-5): "CDFW recommended operating to an OMRI more positive than -3,500 cfs through April 11, with further advice to target an OMRI of -2,500 cfs due to a higher chance of minimizing potential loss at the facilities if operating to –2,500 OMRI, according to recent model runs." This recommendation was not implemented for approximately 1 month, during which time additional loss of winter-run and other listed salmonids occurred.

Response to Q. 7. The question assumes that there was a need to improve the JPE, or that improving it would have somehow the outcomes in 2024 and 2025. The loss thresholds exceeded in 2025 were for hatchery winter-run Chinook. The production estimate of hatchery fish should be relatively accurate, and it is not clear how that accuracy can be improved upon, or what benefit an improved estimate of hatchery production would provide.

Re: wild winter-run, in 2024. Including environmental conditions in annual estimation of juvenile survival rates may improve accuracy and relevance of the JPE for wild winter-run. We recommend revisiting the assumptions and calculations used to develop the JPE (i.e., as presented in Table 1 of the JPE memo from the JPE Subteam to Garwin Yip dated 1/10/2025). In particular, estimated survival rates from fry-smolt and during downstream migration of smolt are based on long-term averages of survival for hatchery-reared fish (i.e., the survival rate is assumed to be a constant, estimated by the long-term average). Actual survival rates for wild fish during these life stages are unmeasured, but likely respond negatively to temperatures beyond certain thresholds and positively to river flow rate (Henderson et al. 2019; Munsch et al. 2019). There may now be enough historical data to estimate survival rates for key juvenile life stages in a way that incorporates seasonal flow and temperature (and other) data.

Response to Q. 9. Yes, the precautionary principle.

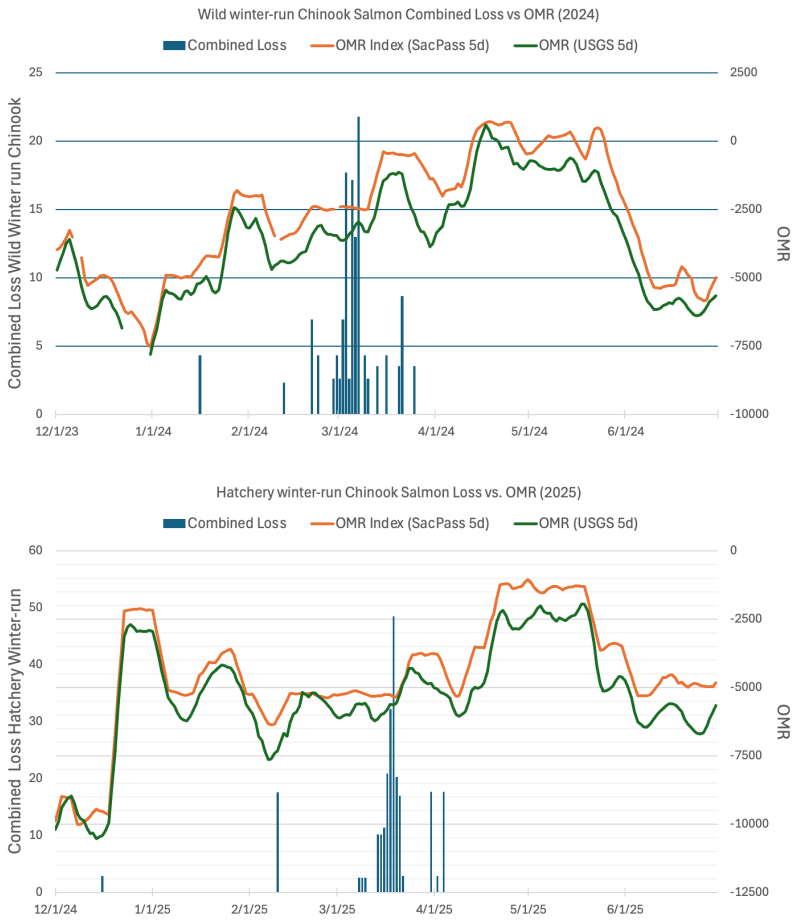

Figure 1: Combined loss of wild winter-run Chinook Salmon in 2024 (upper panel) and hatchery-produced winter run in 2025 (lower panel) compared to Old and Middle River flows estimated by the "OMR index" (orange line) and USGS gage data (green line).

Literature Cited

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