

Questions on Shasta Division elements of the 2019 ROConLTO BA

Shasta Storage Management and Allocations Logic

4.9.1.4 Fall and Winter Refill and Redd Maintenance

Q: Please describe how Reclamation will determine fall flows, and the likelihood of winter-run and fall-run redd dewatering occurrence after October 31. (pg. 4-32) *"Reclamation will minimize effects with a risk analysis of the remaining Winter-Run Chinook Salmon redds, the probability of sufficient cold water in a subsequent year, and conservative distribution and timing of subsequent Winter-Run Chinook Salmon redds. If maintaining flows puts the subsequent year class at a 10 percent or less risk, Reclamation will reduce releases to rebuild storage."*

Q: How is putting a subsequent year class at 10% or less risk determined when maintaining flows? This risk analysis conflicts with other statements in the BA including the (1) inability to determine cold water pool until April, and (2) that *"end of September storage shows little ability to modify the tier in the subsequent year"* (pg. 5-21,) The minimum fall flows provided in Table 4-9 are only *"examples of possible Keswick Releases"*, and we would have to assume that some number of redds would be dewatered based on historic redd data and river stage. **Q:** Are you proposing to operate to these example flows? Please provide specific commitments or a potential range of operations.

4.9.1.2 Spring Pulse Flows:

Q: How often will spring pulse flows occur, and at what duration, magnitude and volume? *"Under the Core Water Operation, Reclamation would not release spring pulse flows unless the projected May 1 Shasta Reservoir storage is greater than 4 MAF. If Shasta Reservoir total storage on May 1 is projected to be greater than 4 MAF, Reclamation would make a Spring pulse release as long as the release would not cause Reclamation to drop into a lower Tier of the Shasta summer temperature management or interfere with the ability to meet other anticipated demands on the reservoir. (pg. 4-27)"* There is some guidance for pulse flows on the American River (section 4.9.4.1) but it is not clear if similar/same operational guidance would be applied to the Sacramento River.

Q: What is meant by a *"drop into a lower Tier of the Shasta summer temperature management or interfere with the ability to meet other anticipated demands on the reservoir"*?

Q: What is the expected effect of the pulse flows (Section 5.6.3.2 (Spring Pulse Flows) and what is the quantifiable benefit (Section 5.8.3.3.2 (Rearing to Out-migrating Juveniles)?

Q: How are allocation decisions made? The considerations are listed in 4.4, but an explanation of how factors are considered in making those allocations is not described. We need an explanation to evaluate risk of temperature operations for the duration of the project.

Q: Summer water temperature management is a factor considered in allocations, however we need more details on how it is considered relative to priorities or other objectives.

Shasta Temperature Management

4.9.1.3.1 Summer Cold Water Pool Management

In Tier 2 and Tier 3, reclamation proposes to operate at 53.5°F at CCR for a shorter duration than the full temperature management season. **Q:** Please provide a description and analysis of operations to estimate the level of impact to species. Without it, we will have to make assumptions about the temperature dependent mortality (pg. 5-20, ~24% of years).

Because the magnitude of effect is only addressed qualitatively and relative to the WOA (5.6.3.1 Upper Sacramento River Seasonal Operations including Shasta Cold Water Pool Management, and 5.6.3.1.1 Egg to Fry Emergence), it is unclear what the difference is between the PA and COS in terms of HEC5Q modeling? **Q: Are Tier 2 and 3 modeled in HEC5Q? CalSim II, run on a monthly time-step, provides the input for HEC5Q. How would a mid-month change in the temperature target be modeled or forecasted?**

5.6.3.1.1 (Egg to Fry Emergence)

Q: Need clarification on the modeled difference in upstream Sacramento River temperature between the PA and COS? Is it due to the change in temperature compliance location? *"The main difference in flow and water temperature management between the proposed action and COS during the June through September Winter-run Chinook Salmon spawning and incubation period would be in how the TCD would be operated to preserve sufficient cold water pool and what water temperature thresholds would be used."*

Q: Would like a clarifying discussion of Anderson Model and approach to provide optimal temperatures at 53.5 F for Days 37-67, and not greater than 56 F during Tier 2 & 3 scenarios.

Q: Is "Model 2" of the Anderson paper being used?

Q: On p.2 of Appendix D Attachment 2-6 in the "Anderson Model" section, it suggests that mortality for the Anderson model is only applied on the five days before hatching. Is this accurate?

Q: Do all the figures in Appendix D, Attachment 3-8 include a mix of Tiers?

Q: What is the distribution of "# of days at 53.5 days" in Tiers 2 and 3 in all modeled years?