DRAFT

NMFS 4/6/2016

SHASTA OPERATIONS AND TEMPERATURE MANAGEMENT – LESSONS LEARNED DURING DROUGHT

Conditions are variable and need to continue to be managed with variable hydrology in mind; the Shasta RPA generally does this with different criteria and processes that are dependent on hydrology/storage. However, there are important lessons learned with new information based on experience over last three years:

1. Cold water pool volume is sensitive to Keswick releases in April, May and June – prior to the temperature management season on-set.
    a. Keswick release schedules (especially for April and May) need to be decided by April 15 in order for SRS Contractors to make planting decisions and purchases for the growing season.
2. Capping Keswick releases in June and July is an important and effective strategy to stretch the cold water temperature management season throughout September and October.
3. There was a loss of water temperature control when the full Shasta side gates were accessed for water releases
    a. Delay full side gate operations as long as possible
    b. Explore engineering solutions to access cold water volume below side gates
4. Water temperatures at upstream redd locations are not correlated with flow (i.e. water quality, water quantity).
5. Keswick releases could be maintained throughout the summer at 7,250 cfs for temperature management. They do not need to be upwards of 15,000 cfs.
6. 56 degrees DAT at the redds is not protective. The EPA temperature criteria of 55 7DADM at redds is best available science. (This same document concludes that 48 degrees is optimal).
7. Spring maximum storage that allows access to the upper gates is important to conserve cold water throughout the season. For this reason and to meet 55 7DADM at CCR, spring storage of 4.2 MAF should the attained when possible.
8. Wilkins Slough can go, and be maintained, as low as 3800 cfs.
9. Stable flows are needed to prevent winter-run, spring-run, and fall-run redd de-watering and juvenile stranding.
10. There are opportunities for fall transfers and fall flood up/pacific flyway created by these conditions
11. The temperature model needs continued investment.
    a. The current SRWQM model has difficulty predicting water temperatures with low Shasta storage
    b. Outputs are sensitive to ambient air temperatures – Instead of using a 30 year historical average, we need to use warmer meteorological data to be conservative to more accurately reflect current warmer conditions
    c. We need a reservoir model (stratification is difficult to predict)
    d. We need a comprehensive reservoir/temperature model that addresses the complex operations of Trinity, Whiskeytown, and Shasta reservoirs.

    e. There is a lack of stakeholder understanding behind the NMFS temperature dependent mortality model – we need to invest in collaborative science process with SRS contractors
12. Shasta TCD leaks. There may be engineering solutions that should be investigated to prevent the loss of cold water (tarps, etc.)
13. Various operations and their effects on water temperature should be studied, for example, power peaking at Whiskeytown Reservoir.
14. Low Sacramento River spring flows were correlated with low survival emigrating juvenile spring-run from Deer and Mill Creeks.
15. Disease was documented to be more prevalent in the upper Sacramento River in 2015 than historically thought which may have impacted survival rates in 2013, 2014, and 2015. Further studies are needed.
16. Further studies are needed to understand other stressors in the upper Sacramento River such as predation, lack of spawning/rearing habitat, food web supply, bioenergetics, etc.