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**Sent:** Monday, May 02, 2016 3:58 PM

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**Subject:** Fwd: 2016 Sacramento River management plan, modeling evaluation and plan, and Sacramento River Temperature Task Group process

Dear Ron,

Thank you for copying me on your submittals re: Sacramento River Temperature Plan to the State Water Board. However, I have concerns with some of the characterizations in your e-mail. I disagree with the statement that "The exact construct of the temperature management location and target will finalized through continued discussion with the National Marine Fisheries Service (NMFS) and the Sacramento River Temperature Task Force." According to NMFS' March 18 and March 31 response letters to the February and March forecasts, respectively, NMFS expects that "We will continue to use the maintenance of 52°F daily average temperature (DAT) at Keswick Dam as an indicator of the ability to meet 55°F 7-day average of the daily maximum temperatures (7DADM) at the Bonneyview Bridge temperature compliance point (CCR CDEC location) throughout the temperature management season."

In addition, while improvements to the Sacramento River Water Quality Model (SRWQM) have been made over time using lessons learned from 2014 and 2015, such as the use of the 10% local 3-month temperature outlook (L3MTO) for a warmer meteorological forecast (as opposed to the traditionally used 50% L3MTO) and a 0.6°F DAT adjustment to the model, I would disagree with the characterization that "there appears to be agreement that the model used for Sacramento River temperature planning is being applied appropriately and that outstanding concerns are not a result of issues with the model itself." During the drought, there was an expectation by the fish agencies that the model was to be predictive of future operations and Sacramento River water temperatures. However, according to Reclamation, given the significant simplification of the input data (which is derived from a 12-month operations outlook), the unknowns regarding future meteorological conditions, unknown stratification rates within the reservoir, and the finite adjustability of temperature control device (TCD), the model realistically can only provide a broad brush picture of future temperature operations. In general, it cannot provide sufficient precision to define future operations. There are a number of known issues. As one example, the model (just as the real TCD) struggles with very low cold water pool operations, and in cases where the profile changes dramatically near the withdrawal zones. As a consequence of inaccurate modeling, 2014 conditions and planned operations led to elevated temperatures in the Sacramento River that resulted in poor survival of Sacramento River winter-run Chinook salmon eggs and fry.

Given the unavoidable uncertainties of the model, there is a need to exercise greater caution than the 90% exceedance forecast and incorporate a greater buffer into temperature management. Also, continued refinements and investments into tools and models, such as a real-time reservoir temperature profile (via fiberoptic cable), a predictive reservoir stratification model, and the NMFS Southwest Fisheries Science Center's River Assessment Forecast Tool (RAFT), are needed to more accurately forecast and manage Sacramento River water temperatures.

An action item from the second technical modeling workshop on February 5 indicated that there would be a management team meeting to discuss model adjustment progress and trade-offs. I look forward to that meeting to further engage with you and your staff on model development issues. In addition, I'm encouraged to see the proposed changes to the SRTTG, and look forward to hearing about the productive outcomes from that group.

- Maria