

FORECAST INFORMED RESERVOIR OPERATIONS: PRELIMINARY VIABILITY ASSESSMENT FOR LAKE MENDOCINO

PREPARED BY SONOMA COUNTY WATER AGENCY • SUMMER 2017

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BACKGROUND

Lake Mendocino, located on the East Fork of the Russian River in California, has a total storage capacity of 122,500 acre-feet. Lake Mendocino is created by Coyote Valley Dam, which was constructed in 1958 for flood control, and provides water supply, recreation and stream flow.

The US Army Corps of Engineers (Corps) owns the project and makes flood control releases in accordance with the Water Control Manual (WCM). Sonoma County Water Agency (SCWA) is the local partner and controls releases when water levels are in the water supply pool.

The WCM, issued in 1959 and with minor revisions in 1986, was developed without the benefit of modern forecasting methods. The WCM specifies reservoir operation according to a rule curve, which dictates water storage during a flood event and water releases soon thereafter to create storage space for the next potential flood. The rule curve is predicated on historical weather patterns – wet during the winter, dry otherwise.

THE PROBLEM The rule curve does not account for increased variation in weather patterns and reductions to inflows into Lake Mendocino resulting from a 56% reduction of diversions from the Eel River due to changed hydroelectric facility operations. This region experiences some of the most variable weather in California, with frequent droughts and floods. As a result, the water supply reliability of Lake Mendocino is impaired with significant consequences to downstream municipal and agricultural water users as well as endangered coho salmon, threatened steelhead trout and Chinook salmon.

A VIABLE SOLUTION Applying scientific advances in weather and stream flow prediction can lessen the impacts of weather extremes without the need for expensive infrastructure expansion. This cost-effective approach, called Forecast

(over)

Informed Reservoir Operations (FIRO), is being assessed for its viability to optimize water management and improve resilience of Lake Mendocino.

A Steering Committee is working collaboratively on this project, which has transferability potential to other reservoirs. The preliminary viability assessment (PVA), which will be released in August 2017, finds that FIRO is a viable approach to improving management of Lake Mendocino in anticipation of upcoming conditions. Specifically, the PVA (available at link) finds that:



- Integrating forecasts of inflows into the reservoir and downstream flows into the river into decisions about reservoir releases would permit operators to more reliably meet water management objectives and environmental flows in the Russian River basin.
- Based on data from 1985-2010, median end of year reservoir storage attributable to FIRO was modeled and found to range from 8,633 AF to 27,780 AF, or up to a 49% increase.
- Making decisions about reservoir releases based on forecasts of reservoir inflows and local flows does not adversely affect flood risk management.
- Atmospheric River-type storms are the key drivers of both drought and flood risk in this region, as these events produce heavy and sometimes prolonged precipitation. The high-impact storms of 2017, following a years-long drought, illustrate the type of extremes that the watershed can experience in relatively short time periods.
- Current forecasting skill, especially during extended dry periods, provides an opportunity to implement some elements of FIRO. However, significant uncertainty remains in the strength, timing, duration, and orientation of land-falling Atmospheric Rivers.

PROJECT STATUS AND APPLICATION TO OTHER AREAS

Based on the results of the PVA, the Steering Committee is developing a FIRO Final Viability Assessment. The Final Viability Assessment will consider and recommend FIRO strategies that could be implemented in the near-term using current technology and scientific understanding, and identify and develop new science and technologies that can ensure FIRO implementation is safe and successful in the long term.

The Steering Committee is developing a plan for using FIRO to support requests to the Corps for deviations to the WCM over the next few years. Deviation requests will be designed to explore the viability of implementing FIRO strategies using current forecast skill and technology with the appropriate limitations that meet Corps conditions for deviations.

Finally, additional research will be conducted by the contributing agencies and centers, including CW3E, SCWA and Corps ERDC. The results of these studies will be included in the Final Viability Assessment to answer key questions identified in the PVA. Transferability of this project to other reservoirs and to flood reduction potential of FIRO will also be assessed.

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