

Application of Stochastic Dynamic Programming and HEC-ResSIM for Development of Forecast-based Operational Rules for Lake Mendocino in the Russian River Basin, California

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Abstract. Forecast-based operations (FBO) are reservoir control strategies whereby releases are based on real-time inflow forecasts rather than actual reservoir inflows. A joint effort between Colorado State University, the National Oceanographic and Atmospheric Administration, and the Sonoma County Water Agency, with cooperation from the U.S. Army Corps of Engineers, is focusing on developing forecast-based operating rules for Lake Mendocino in the Russian River basin of Northern California. The Russian has experienced devastating extremes of drought and flood conditions over the past several years due in part to impacts of atmospheric river (AR) phenomena impacting California coastal areas, such as the 2006 AR event that produced 10 inches of rain in two days in the basin. The potential benefits of forecast-based operations is to provide temporary conservation storage space in a portion of the designated flood control zone of the reservoir for important water supply augmentation and improved downstream aquatic habitat conditions for endangered and threatened fish species, but with consideration of the potential increased risk of flooding through FBO implementation, as well as the risk of the inability to recover foregone water supply. Preliminary findings of efforts to integrate real-time forecast information into a stochastic dynamic programming model are reported, with the goal of validating the forecast-based operating rules through simulation of the impact of these rules using the U.S. Army Corps of Engineers' HEC-ResSIM model.