Progress and Prospects for Connecting the Climate Research and Water Management Communities: Predictions, Applications, and Decision-Making

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The episodic nature of precipitation on the West Coast of the US challenges the abilities of water resource managers to meet regional economic and environmental needs. Maximizing the availability of water stored in reservoirs to meet the full spectrum of potential uses in the West Coast's Mediterranean climate, with winter rains and dry, hot summers, is complicated by the multi-use of many reservoirs for both flood control and water supply. We will present a case study of such challenges in the Russian River Valley with a focus on Lake Mendocino. Lake Mendocino is one of two major reservoir projects used to manage water supply for the Russian River watershed. Lake Mendocino provides water for agriculture, municipal and industrial uses and to maintain required minimum stream flows. Minimum stream flows support both river-related recreation and fish habitat and passage for three salmonid species listed under the federal and California Endangered Species Act. Another water management constraint involves the importation of water since 1908 from the Eel River to the Russian River via a diversion tunnel associated with a hydroelectric facility. Lake Mendocino was designed assuming the historical levels of Eel River imports. In 2004, as part of a FERC relicensing of the facility, Eel River diversions were significantly curtailed thus further impacting the reliability of Lake Mendocino water supply. Prior to this event, more than 60% of annual inflow to Lake Mendocino was from the Eel River while now this source comprises less than 30% of the total annual inflow. We will describe the research opportunities across weather and climate time scales to improve forecasts of the location and duration of extreme precipitation events with lead times from hours, to days, to seasons combined with improve outlooks of the onset, severity, and durations of drought. Collectively, the development of a predictive understanding leading to more skillful and reliable forecasts has the potential to advance operational capabilities to provide the early warnings that is needed to implement 'Forecast Based Operations" and thus be able to 'save some of this water' to meet multiple water resource demands during the dry season. We will also identify a number of research opportunities to enhanced forecast and prediction capabilities that have the potential to inform management practices which could leave more water in the river and support efforts to restore threatened and endangered fish populations.