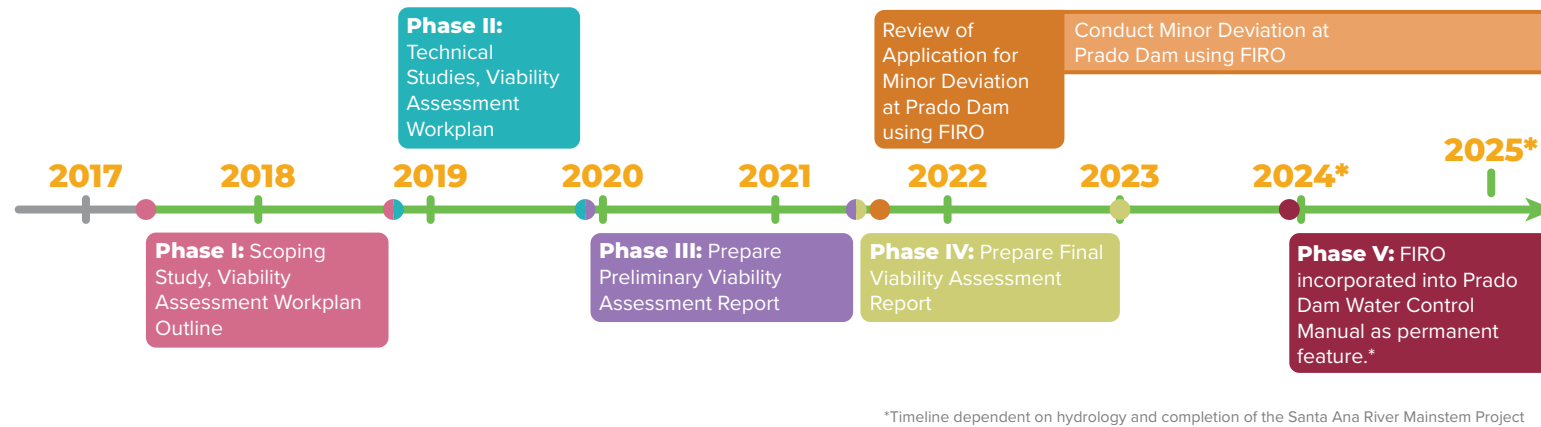




Developing Forecast Informed Reservoir Operations (FIRO) at Prado Dam, CA



Prado Dam FIRO Timeline



Steering Committee:

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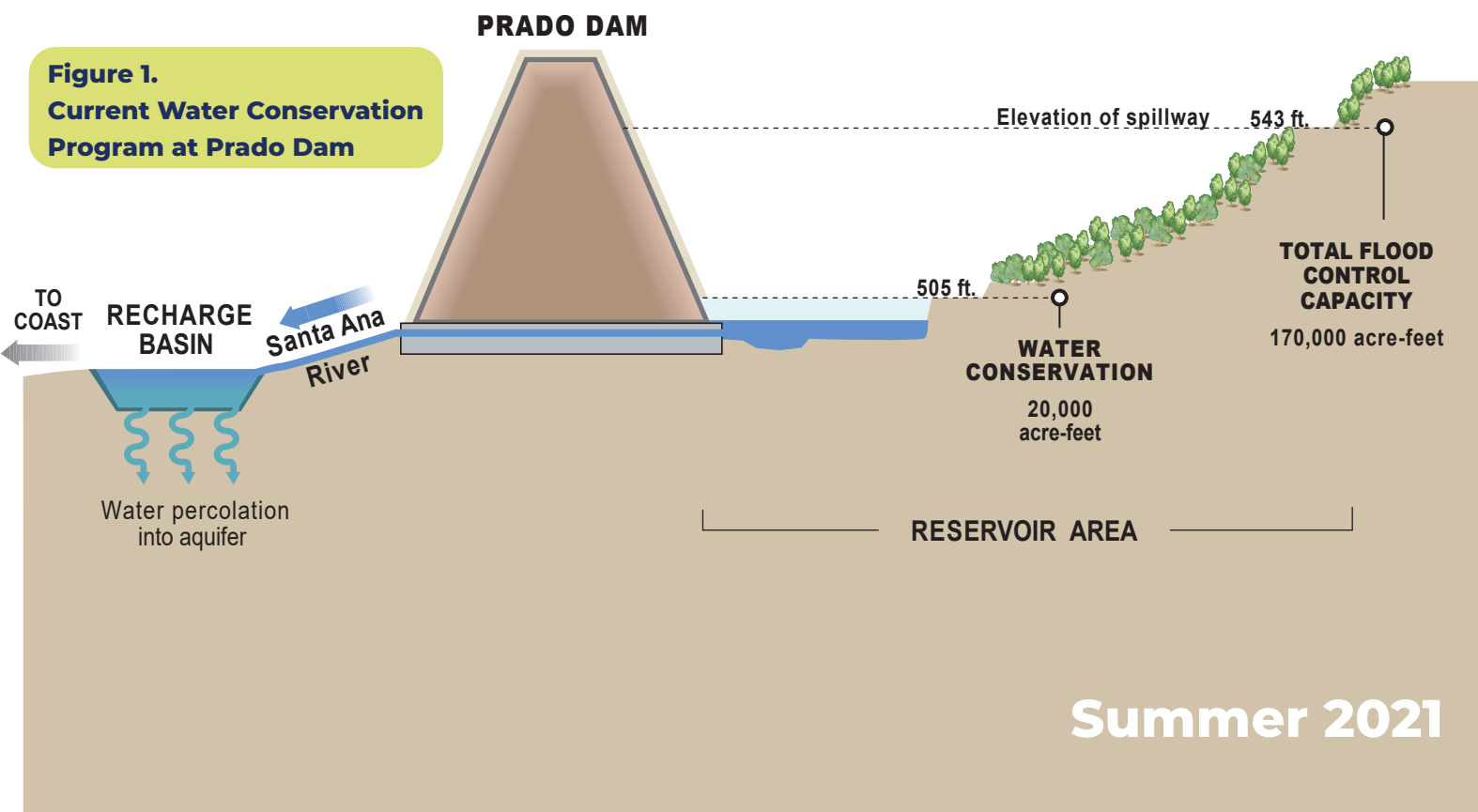
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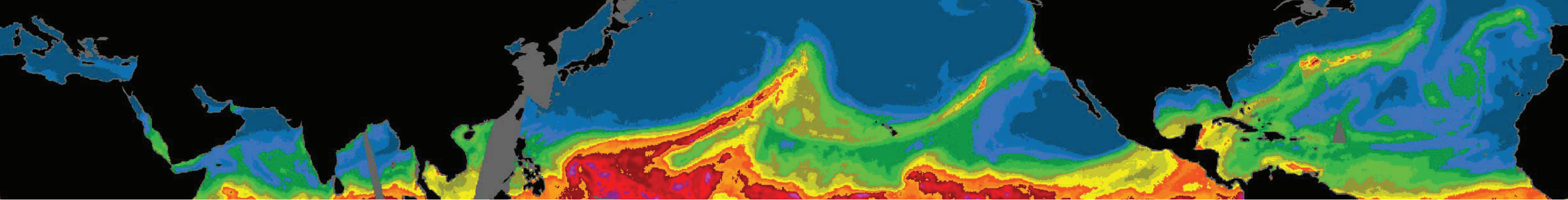
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A History of Capturing Stormwater

Stormwater is an important source of water supply for Orange County. The Orange County Water District (OCWD) has been capturing and recharging stormwater in the Santa Ana River channel since 1936. Since Prado Dam was constructed by the US Army Corps of Engineers (USACE) in 1941, OCWD and the USACE have worked together to maximize the capture of stormwater behind the dam. Currently, OCWD is allowed to temporarily conserve up to 20,000 acre-feet (AF) of water. Figure 1 shows the elevation and volume of the current conservation pool. USACE releases water temporarily captured at Prado Dam at a rate that OCWD can recharge the water into the groundwater basin ten miles downstream of Prado Dam.

Over the past 25 years, OCWD has captured and recharged an average of 55,000 AF per year of stormwater with an annual maximum of 117,000 AF in 1995. For planning purposes, OCWD assumes that 40,000 AF of stormwater will be captured and recharged in an average year, which is enough water for 320,000 people annually. Local stormwater capture is important because it lessens demands on imported water supplies, which are increasingly unreliable due to the fragile Sacramento Delta, oversubscribed Colorado River and changes in weather patterns.

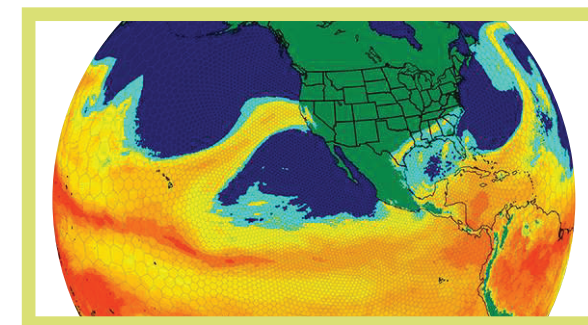




Prado Dam's primary purpose is flood risk management. Stormwater capture for downstream groundwater recharge in Orange County is an authorized secondary purpose. Once approved, full utilization of FIRO at Prado Dam could potentially provide as much as 25,000 AF of additional water for groundwater recharge in a wet year over current operations and an overall average increase of up to 7,000 AF per year.

Atmospheric Rivers

Atmospheric rivers have a profound impact on water supply in California. Long narrow bands of concentrated moisture, atmospheric rivers stretch thousands of miles across the Pacific Ocean carrying up to 20 times as much water as the Mississippi River. When atmospheric rivers make landfall, they can release a staggering amount of rain and snow. The absence of atmospheric rivers can lead to drought.



Forecast Informed Reservoir Operations (FIRO)

Forecast Informed Reservoir Operations (FIRO) utilizes modern science and technology to optimize the use of limited water resources and represents a viable option to adapt to extreme weather events and precipitation variability unique to the U.S. West Coast. The ultimate goal of FIRO is to update water conservation and flood control guidelines in order to improve water supply and environmental outcomes without diminishing (and possibly improving) flood risk management or dam safety.

To increase the efficiency of stormwater capture at Prado Dam, OCWD is collaborating with the USACE, United States Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA), and the Center for Western Weather and Water Extremes (CW3E) at the Scripps Institution of Oceanography, California Department of Water Resources (DWR), and the Orange County Public Works (OCPW), to assess the viability of FIRO in the Santa Ana River Watershed. FIRO was tested in a similar collaborative effort on Lake Mendocino in northern California where it was found to increase reservoir storage by 20 percent. The Lake Mendocino Water Control Manual (WCM) is being updated to incorporate FIRO operations.

To explore the viability of implementing FIRO at Prado Dam, OCWD and CW3E are co-chairing a steering committee with regional and national partners on a multi-phase study. Phase III, preparation of a Preliminary Viability Assessment (PVA) was completed in August 2021 (<https://escholarship.org/uc/item/13091539>). The PVA found that FIRO could yield an average of up to 7,000 AF per year of additional stormwater for recharge to the Orange County groundwater basin without compromising flood risk management; this is enough water to supply 60,000 people. Work has started on the Final Viability Assessment to inform application of FIRO in the next update to the Prado Dam WCM. In tandem, work has started through the USACE's deviation process to assess FIRO at Prado Dam on a short-term basis.

