

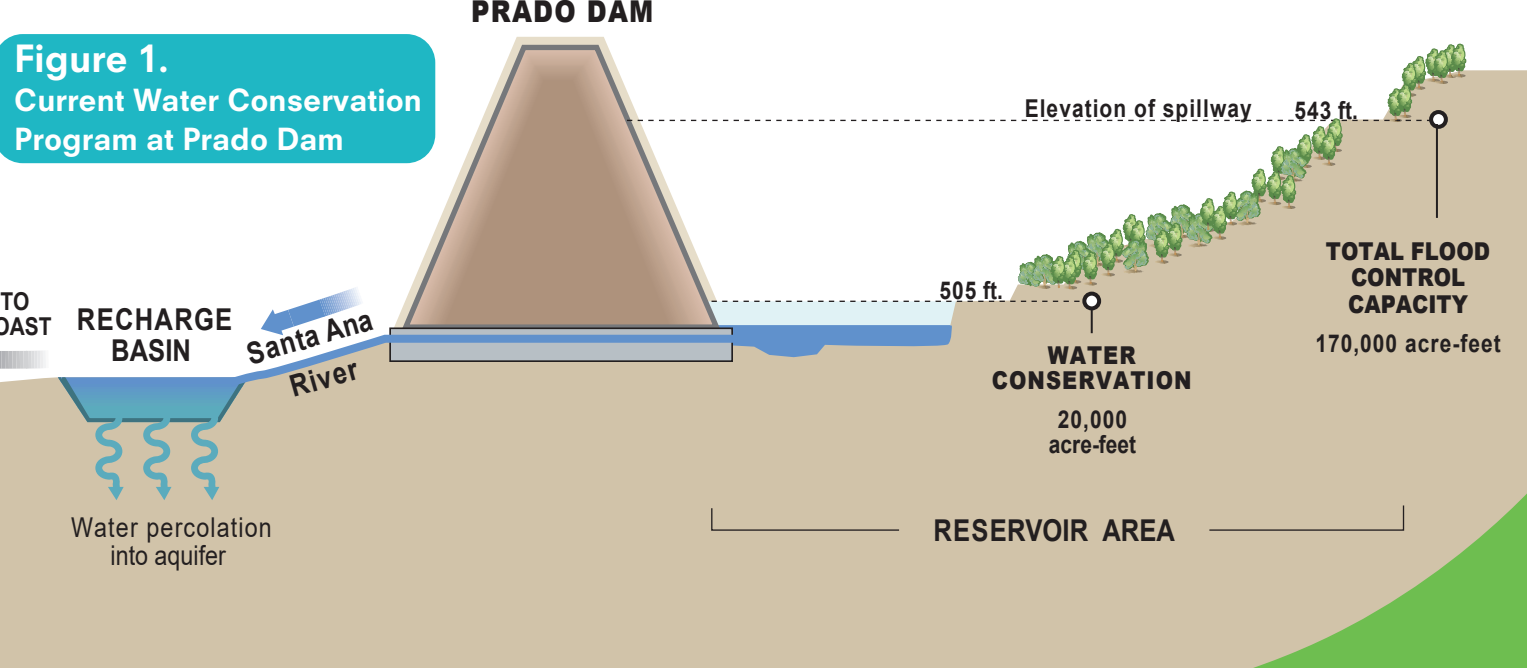
# Developing Forecast Informed Reservoir Operations (FIRO) at Prado Dam, CA



## A History of Capturing Stormwater

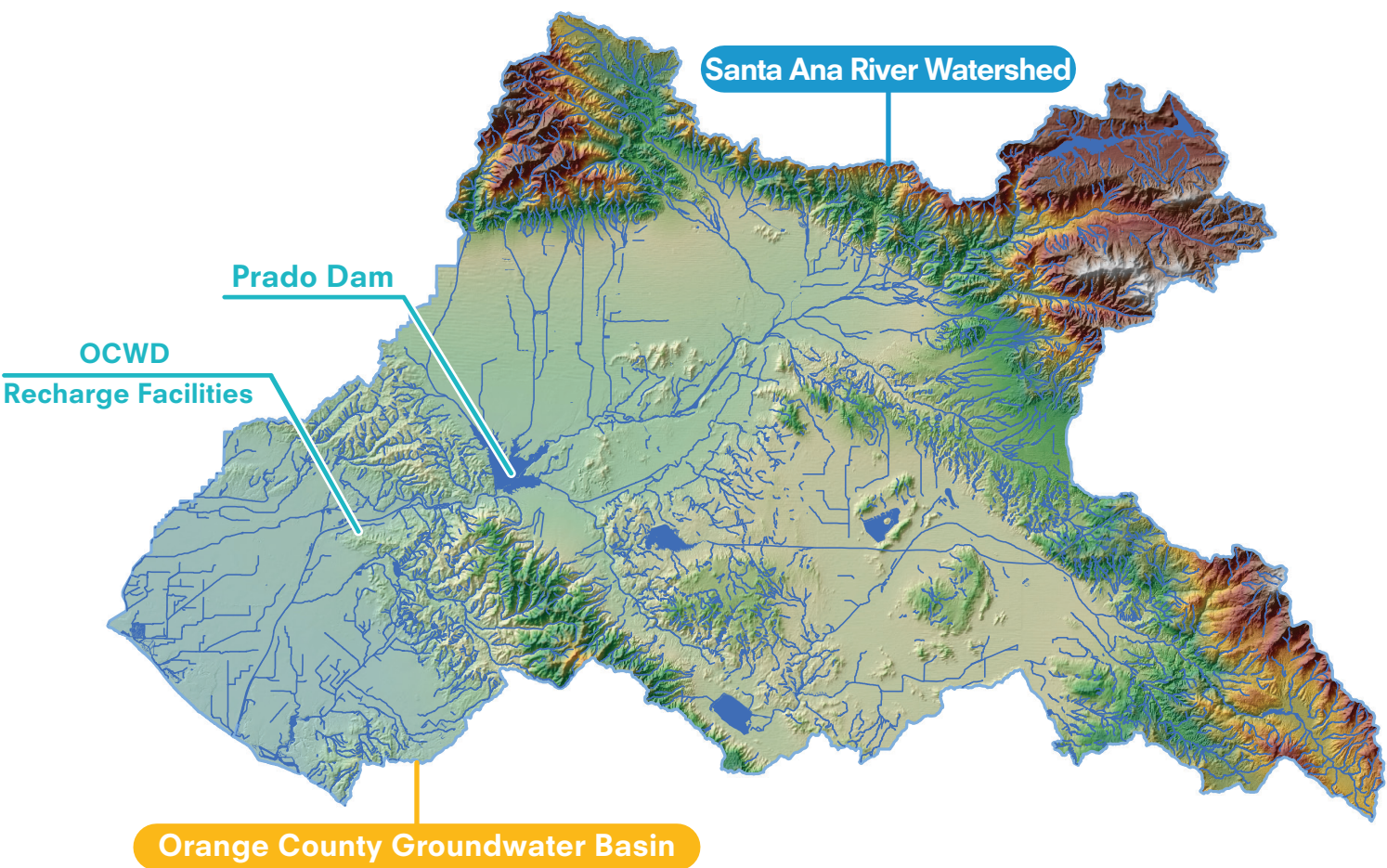
Stormwater is an important source of water supply for Orange County. The Orange County Water District (OCWD) has been capturing and recharging stormwater in the Santa Ana River channel since 1936. Since Prado Dam was constructed by the US Army Corps of Engineers (USACE) in 1941, OCWD and the USACE have 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.



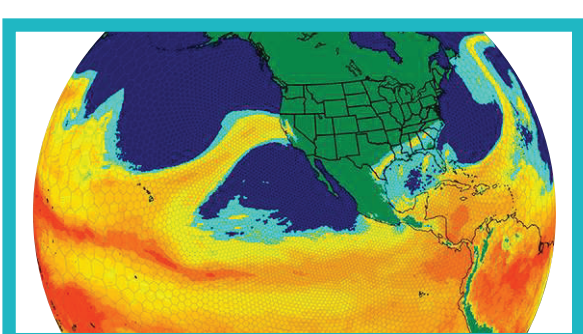
Winter 2019

**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 20,000 AF of additional water for groundwater recharge in a wet year over current operations.**



## Atmospheric Rivers

Atmospheric rivers (ARs) 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)

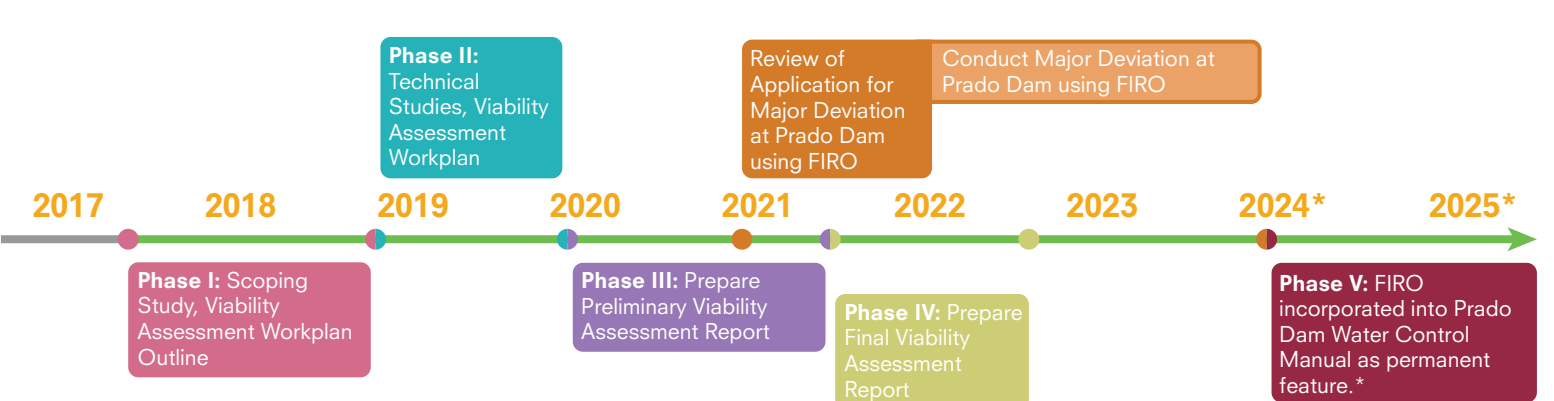
To increase the efficiency of stormwater capture at Prado Dam, OCWD is collaborating with the USACE, United States Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA) and the Center for Western Weather and Water Extremes (CW3E) at the Scripps Institution of Oceanography to assess the viability of Forecast Informed Reservoir Operations (FIRO) in the Santa Ana River Watershed. FIRO is currently being tested in a similar collaborative effort on Lake Mendocino in northern California.

FIRO's utilization of modern science and technology can 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.

Prado Dam's primary purpose is flood risk management. Stormwater capture for downstream groundwater recharge in Orange County is a secondary purpose. It is estimated that applying FIRO at Prado Dam could provide up to 20,000 AF of additional water for groundwater recharge in a wet year.

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. Recently, the steering committee completed the FIRO Viability Assessment (VA) workplan, which synthesizes existing information and identifies additional work needed. The next step is executing the VA, which is slated for completion in early 2021. If FIRO is found to be a viable approach, the VA will support application for a deviation to the water control manual to test FIRO at Prado Dam.

## Timeline



\*Timeline dependent on hydrology and completion of the Santa Ana River Mainstem Project

## Steering Committee:

Greg Woodside: OCWD (Co-chair); F. Martin Ralph, Center for Western Weather and Water Extremes, Scripps Institution of Oceanography, University of California, San Diego (Co-chair); Jay Jasperse: Sonoma Water; Michael Anderson: DWR; Cary Talbot: USACE Engineer Research and Development Center; Alan Haynes: NOAA National Weather Service (NWS); Rene Vermeeren: USACE, Los Angeles District ; Jon Sweeten: USACE, Los Angeles District ; James Tyler: Orange County Public Works (OCPW); Karin Cleary-Rose: U.S. Fish and Wildlife Service (USFWS), Palm Springs.

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