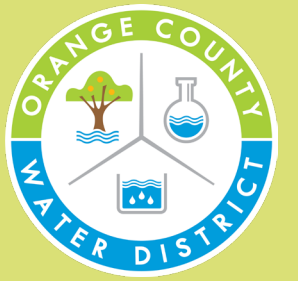
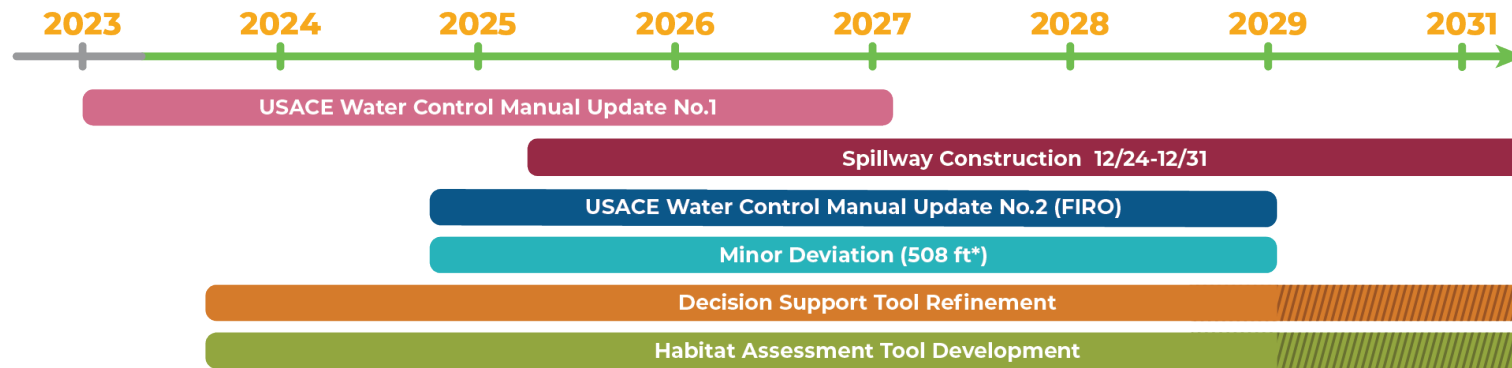




Implementing Forecast Informed Reservoir Operations (FIRO) at Prado Dam, CA



Prado Dam FIRO Timeline



A History of Capturing Stormwater

Stormwater is a crucial water supply source for Orange County. Since 1936, the Orange County Water District (OCWD) has been capturing and recharging stormwater from the Santa Ana River. Constructed in 1941 by the U.S. Army Corps of Engineers (USACE), Prado Dam has been pivotal in these efforts. In collaboration with USACE, OCWD is able to temporarily store up to 20,000 acre-feet (AF) of stormwater. The stored water is released at rates that allow OCWD to recharge the groundwater basin in facilities located ten miles downstream from Prado Dam. Figure 1 shows the current elevations and volumes of water that can be temporarily stored behind the dam.

Over the past 25 years, OCWD has managed to capture and recharge an average of 55,000 AF of stormwater annually, peaking at 117,000 AF in 1995. On average, stormwater provides enough water to meet the annual needs of 440,000 people. This local stormwater capture is critical as it reduces dependence on costlier, less reliable imported water sources affected by conditions in the Sacramento Delta, the Colorado River, and changing weather patterns.

*Steering Committee:

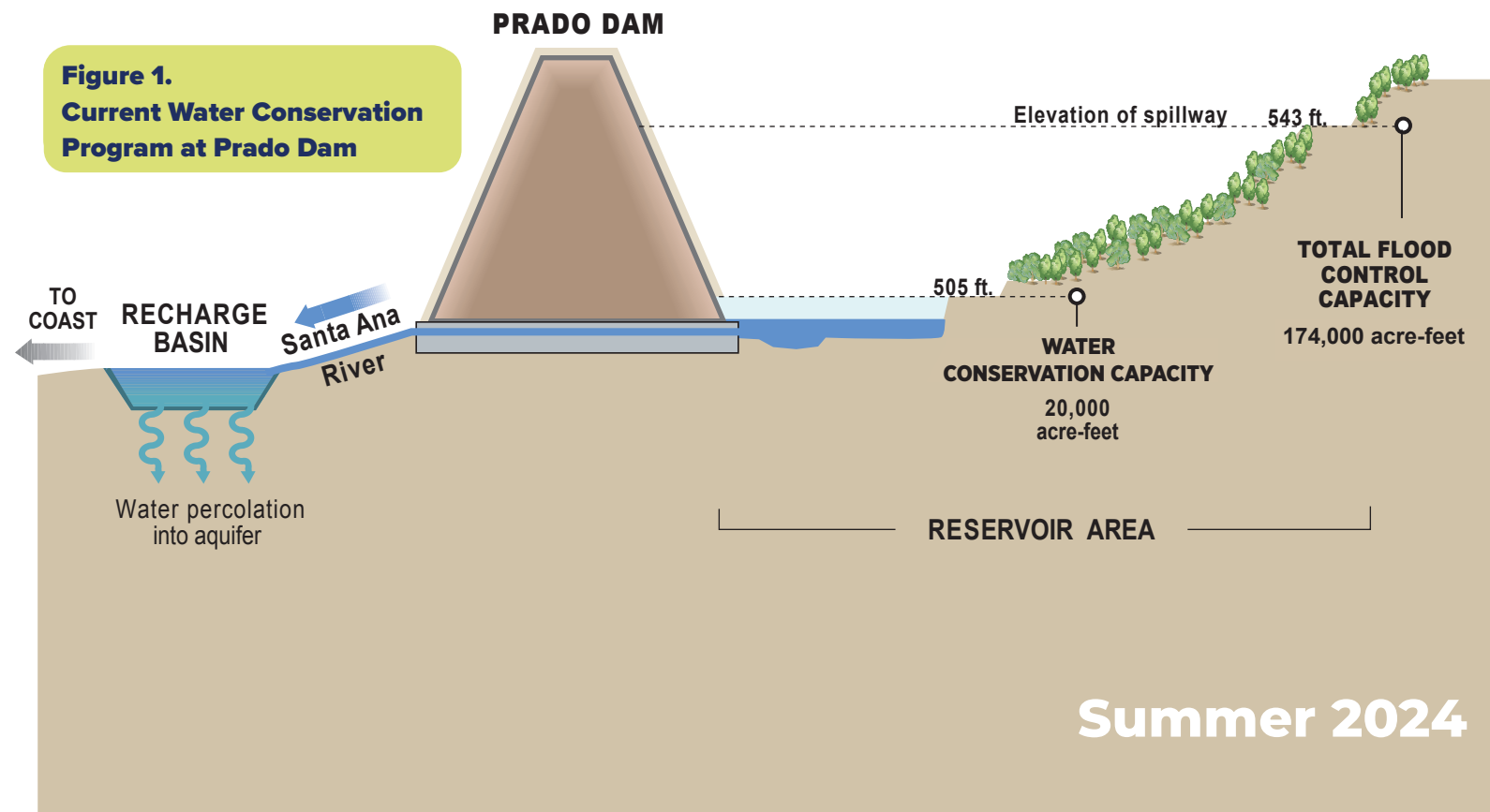
Lisa Haney, OCWD (Co-chair); F. Martin Ralph, CW3E (Co-chair); Michael Anderson, CA DWR; Cary Talbot, USACE Engineer Research and Development Center; Alan Haynes, NOAA National Weather Service; Tim Fairbank, USACE Los Angeles District; Jon Sweeten, USACE Los Angeles District; James Tyler, Orange County Public Works; Rollie White, USFWS.

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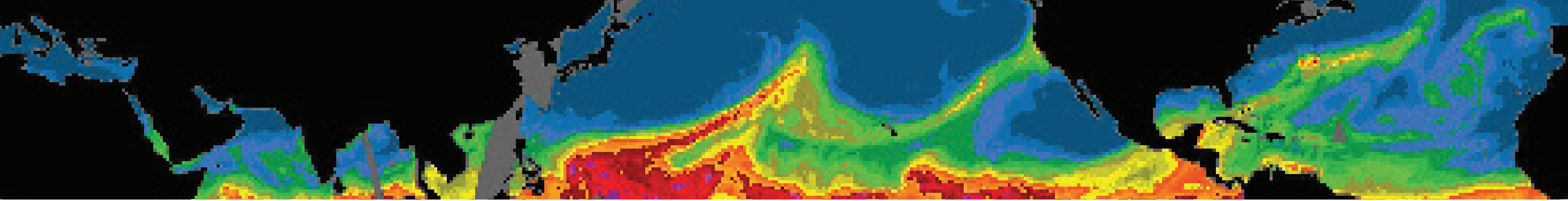
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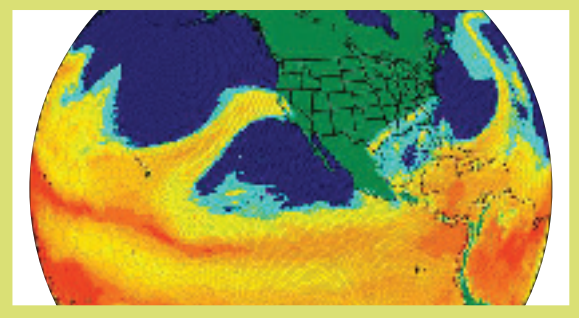
Summer 2024



Prado Dam’s primary purpose is flood risk management. Stormwater capture for downstream groundwater recharge in Orange County is a secondary purpose. Once approved, full utilization of FIRO at Prado Dam could potentially provide as much as 23,000 AF of additional water for groundwater recharge in a wet year over current operations and an overall average increase of up to 6,000 AF per year.

Atmospheric Rivers

Atmospheric rivers (ARs) significantly influence California’s water supply. These long, narrow corridors of concentrated moisture traverse the Pacific Ocean, carrying up to 20 times the volume of the Mississippi River. Upon making landfall, they release substantial quantities of rain and snow, while their absence often leads to drought conditions.



Prado Dam’s Dual Purpose

Primarily, Prado Dam serves as a flood risk management structure. Its secondary function involves stormwater capture for groundwater recharge. With the full implementation of FIRO, Prado Dam could potentially enhance groundwater recharge by up to 23,000 AF in wet years, with an average increase of approximately 6,000 AF annually compared to current operations.

Forecast Informed Reservoir Operations (FIRO)

FIRO at Prado Dam harnesses advanced science and technology to optimize water resource management and adapt to the unique precipitation variability of the U.S. West Coast. Applying FIRO at Prado Dam aims to enhance water supply reliability and environmental outcomes without compromising flood risk management.

In collaboration with USACE and the Center for Western Weather and Water Extremes (CW3E) at the Scripps Institution of Oceanography, OCWD adopted a phased viability assessment approach under a Steering Committee’s* guidance. This committee includes key stakeholders across various sectors. Similar collaborative FIRO projects are in progress throughout California, including at Lake Mendocino, Lake Sonoma, Lake Oroville, New Bullards Bar Dam, the American River watershed, Seven Oaks Dam, and Howard Hanson Dam in Washington.

The Final Viability Assessment, completed in November 2023 (<https://escholarship.org/uc/item/13091539>), concludes that FIRO could offer an additional 4,000 to 6,000 AF of stormwater recharge annually, depending on the final elevation (between 510 ft and 512 ft). This volume could serve 32,000 to 48,000 people each year. Steps are now underway to integrate FIRO operations into the Prado Dam Water Control Manual (WCM), with USACE currently preparing its first update to accommodate structural changes at the dam. A minor deviation in the WCM will test FIRO capabilities by allowing the conservation pool to rise to elevation 508 ft for a trial period of five years. Concurrently, OCWD, CW3E and the USACE will be developing decision support tools needed to operationalize FIRO and a habitat assessment tool to better understand the effects of holding more water on habitat. The final FIRO WCM update is scheduled for completion in 2029.

