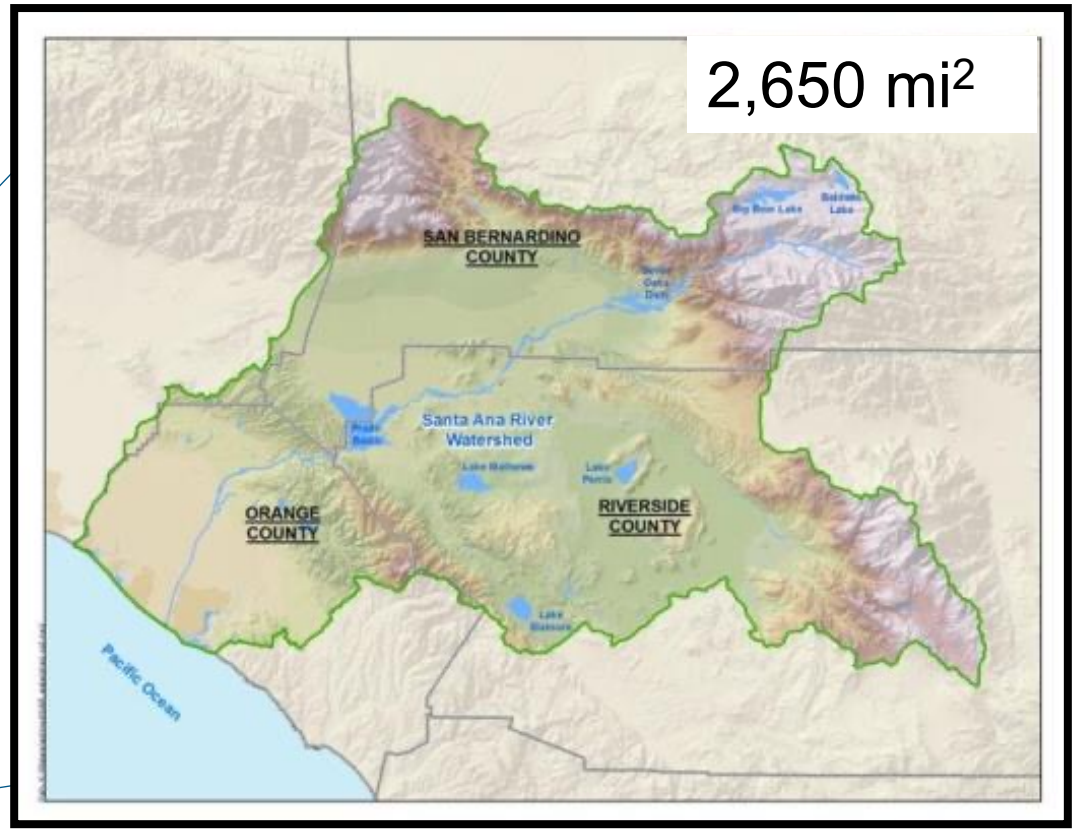
Forecast Informed Reservoir Operations: Local Resources Optimization

Lisa Haney
Executive Director of Planning and Natural Resources

Climate/Atmospheric Rivers/Climate Change Session
Multistate Salinity Coalition Annual Summit
February 29, 2024

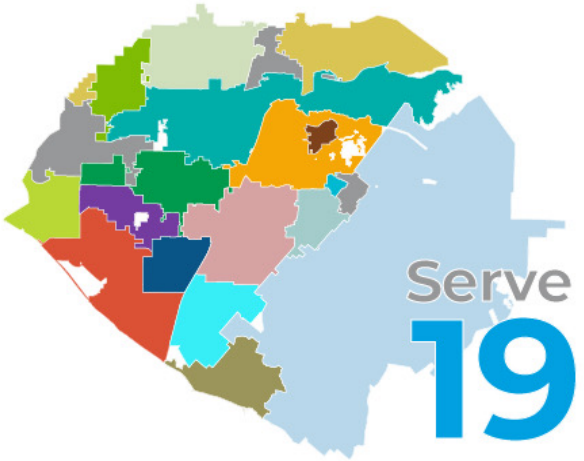
The Orange County, CA Groundwater Basin Lies at the Base of the Santa Ana River Watershed



OCWD AT-A-GLANCE

Formed in
1933

Groundwater Basin provides
85%
drinking water supply



Serve
19
cities and retail water districts in north & central OC

2.5
million people served

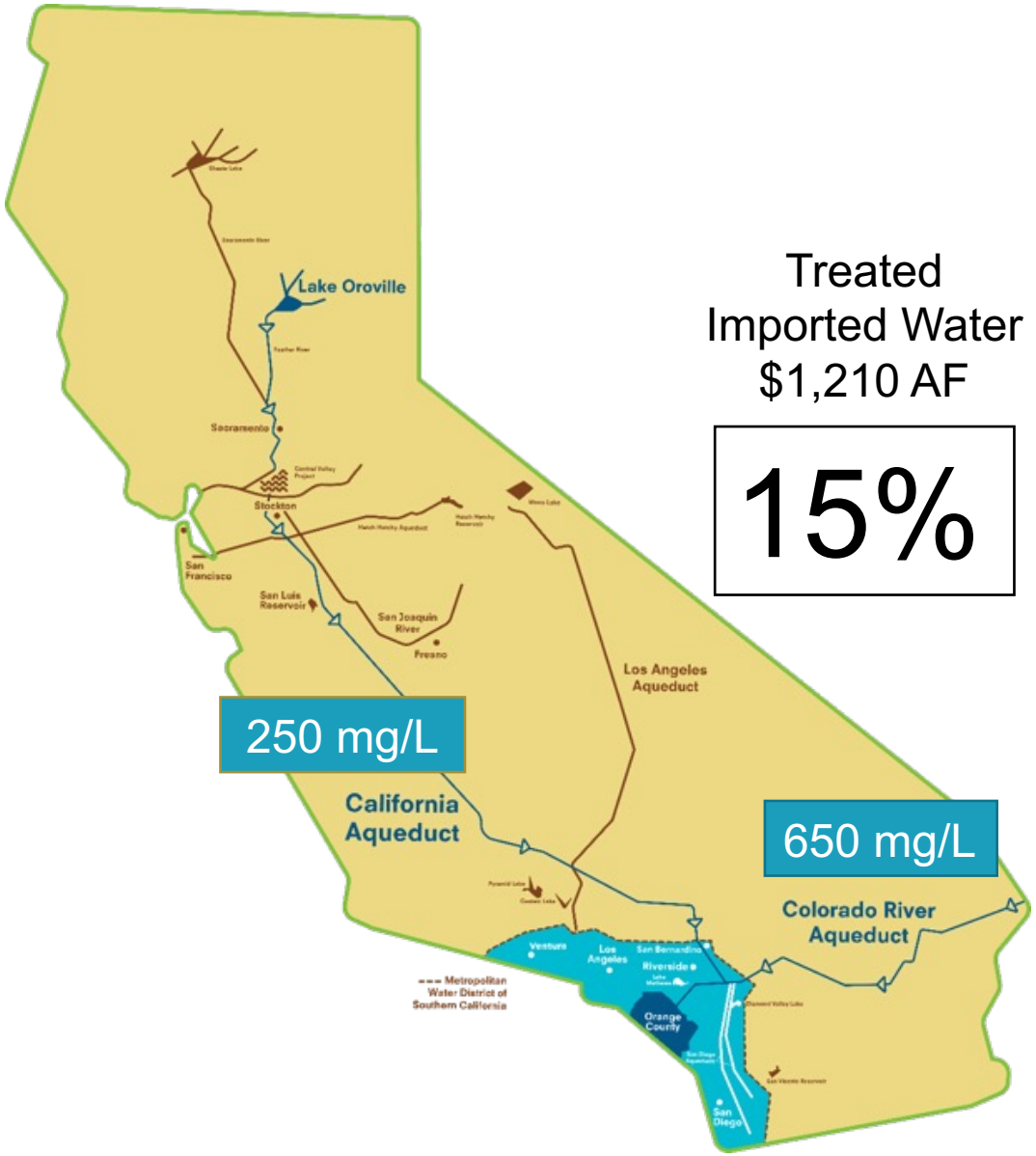
10 board members

Protect rights to Santa Ana River water

Where Does OC's Water Come From?

85%

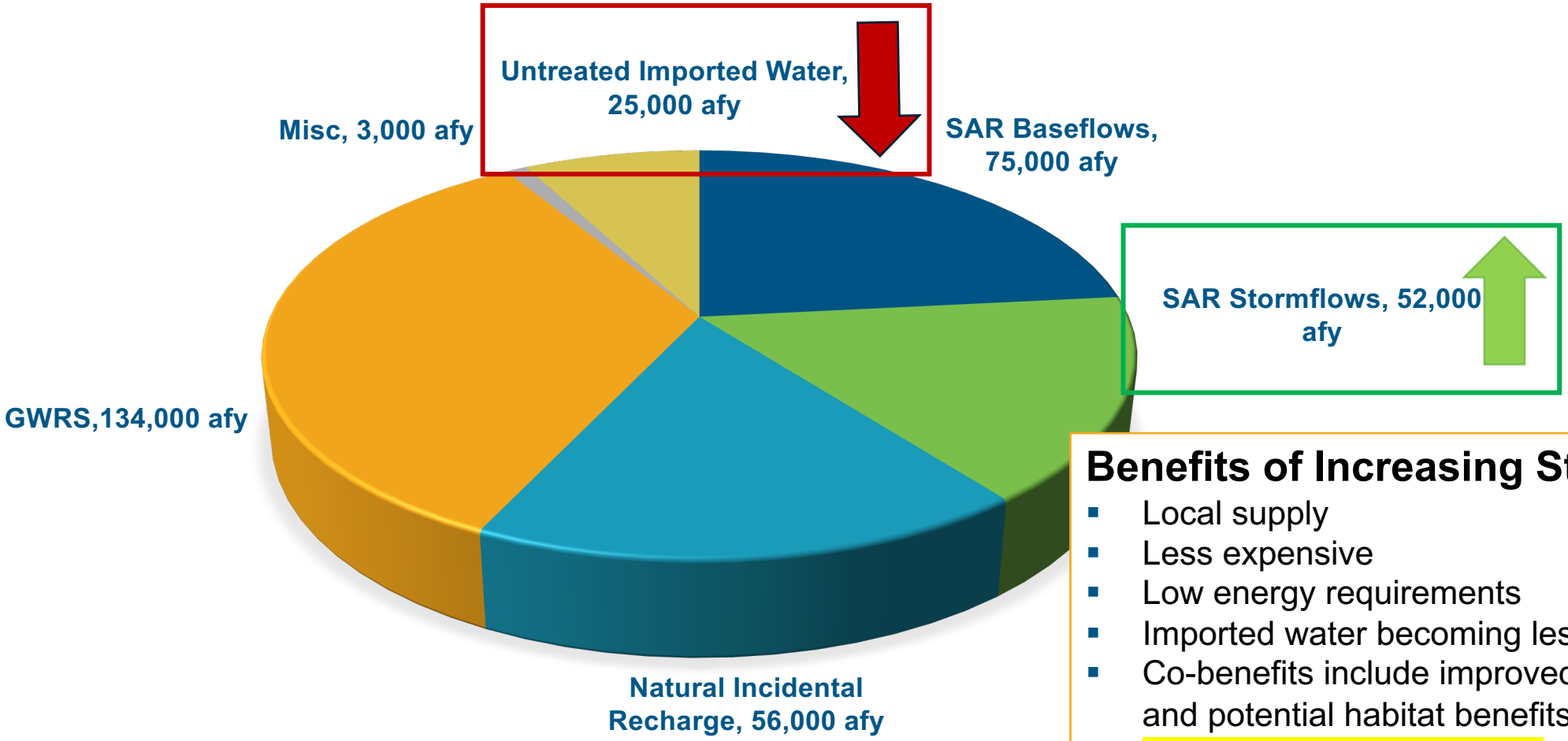
Groundwater
$650 AF



Treated
Imported Water
$1,210 AF

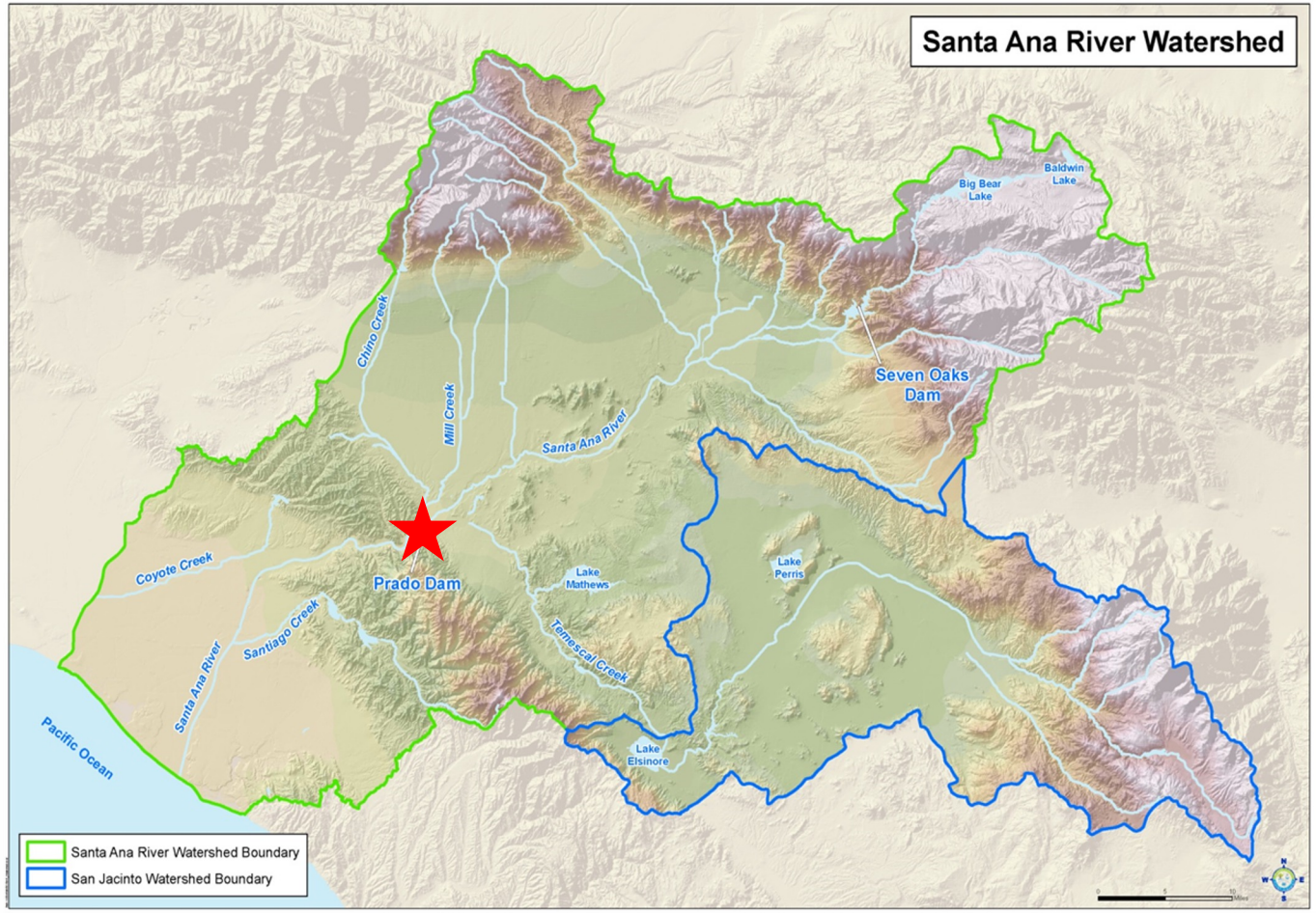
15%

Each Acre-Foot of Stormwater Recharged Directly Offsets Need to Import Water

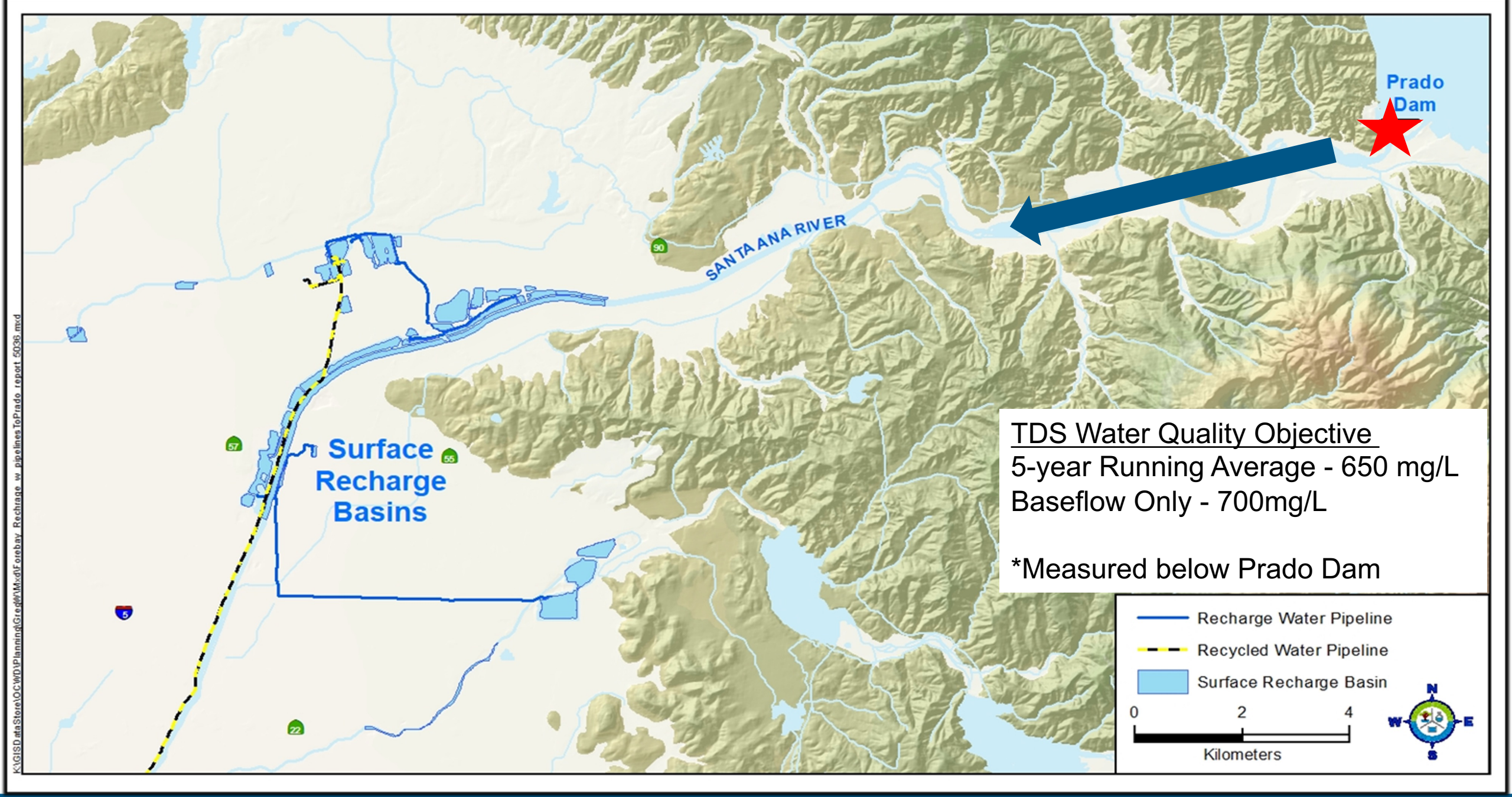


Benefits of Increasing Stormwater Capture

- Local supply
- Less expensive
- Low energy requirements
- Imported water becoming less reliable
- Co-benefits include improved flood risk management and potential habitat benefits
- Stormwater has lower TDS

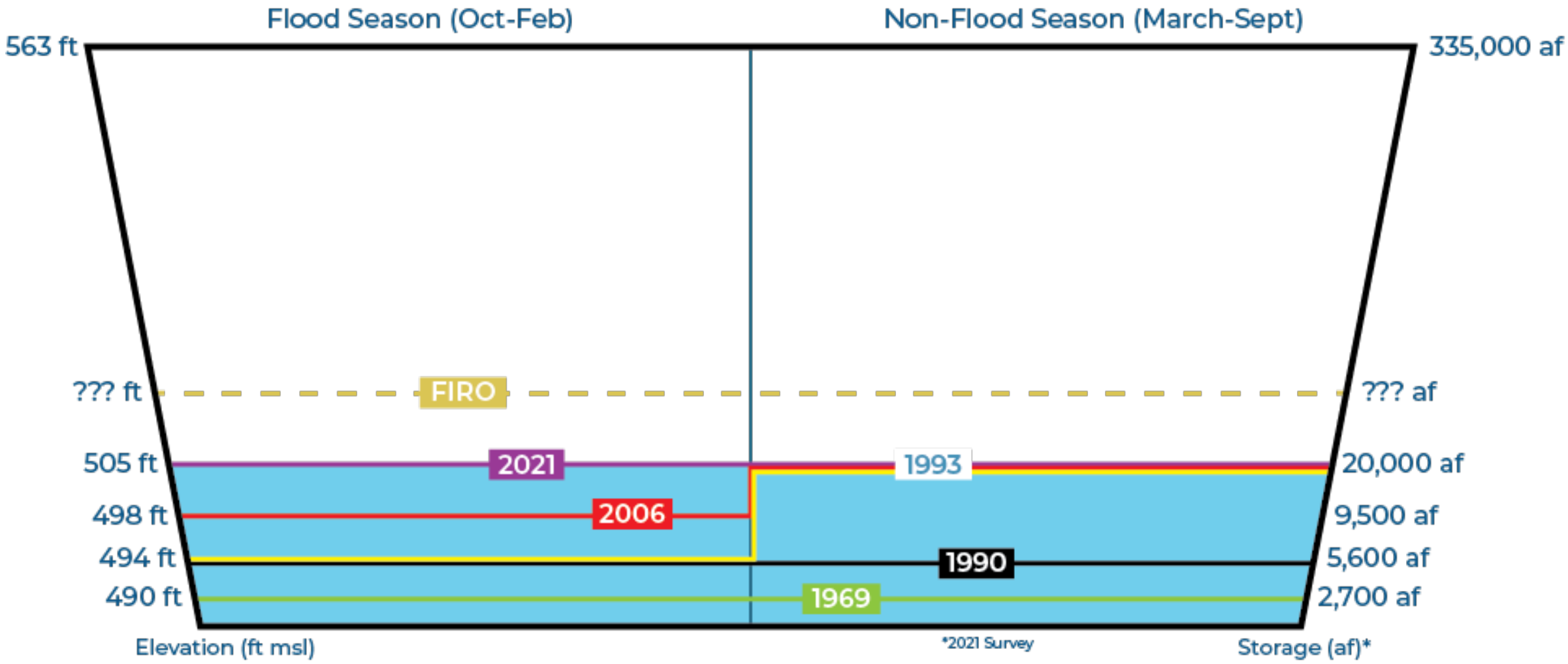


Prado Dam was constructed in 1941 to protect Orange County from flooding

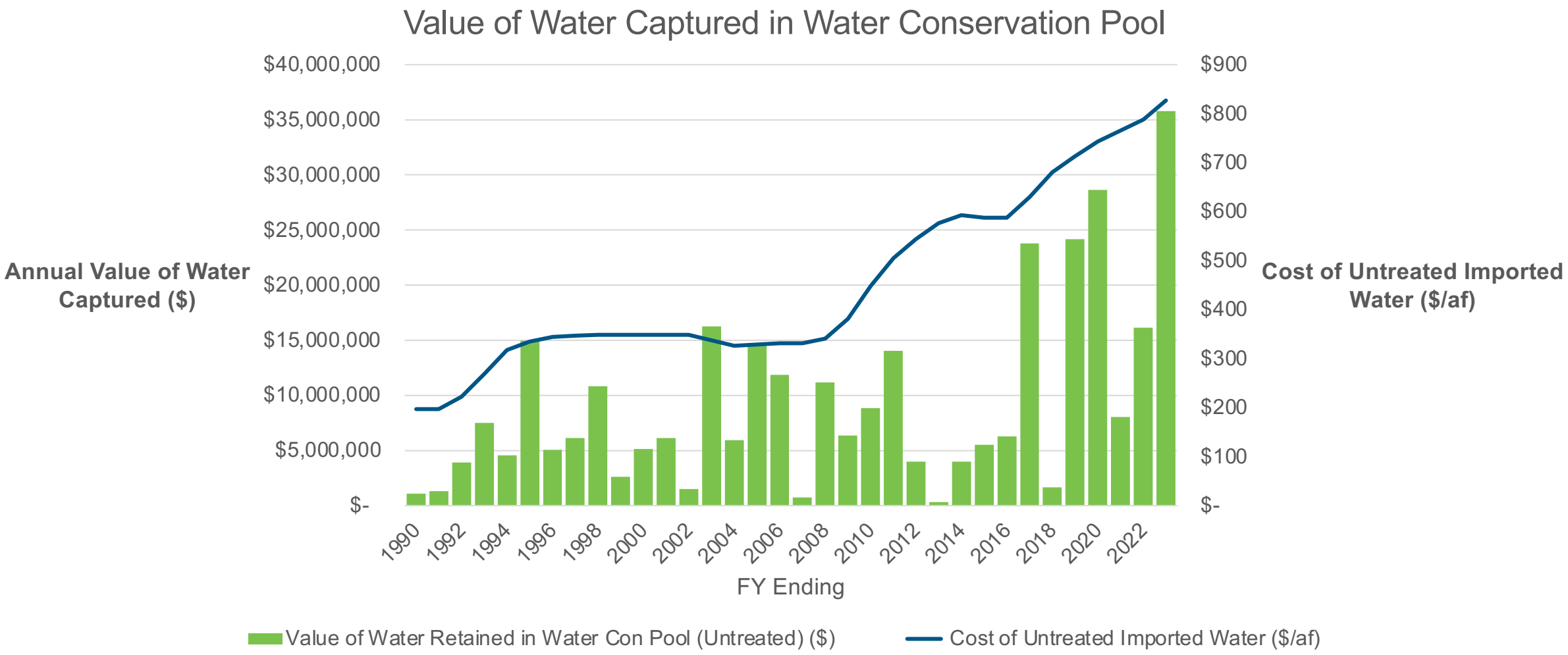


Stormwater captured at Prado Dam replenishes the Orange County Groundwater Basin

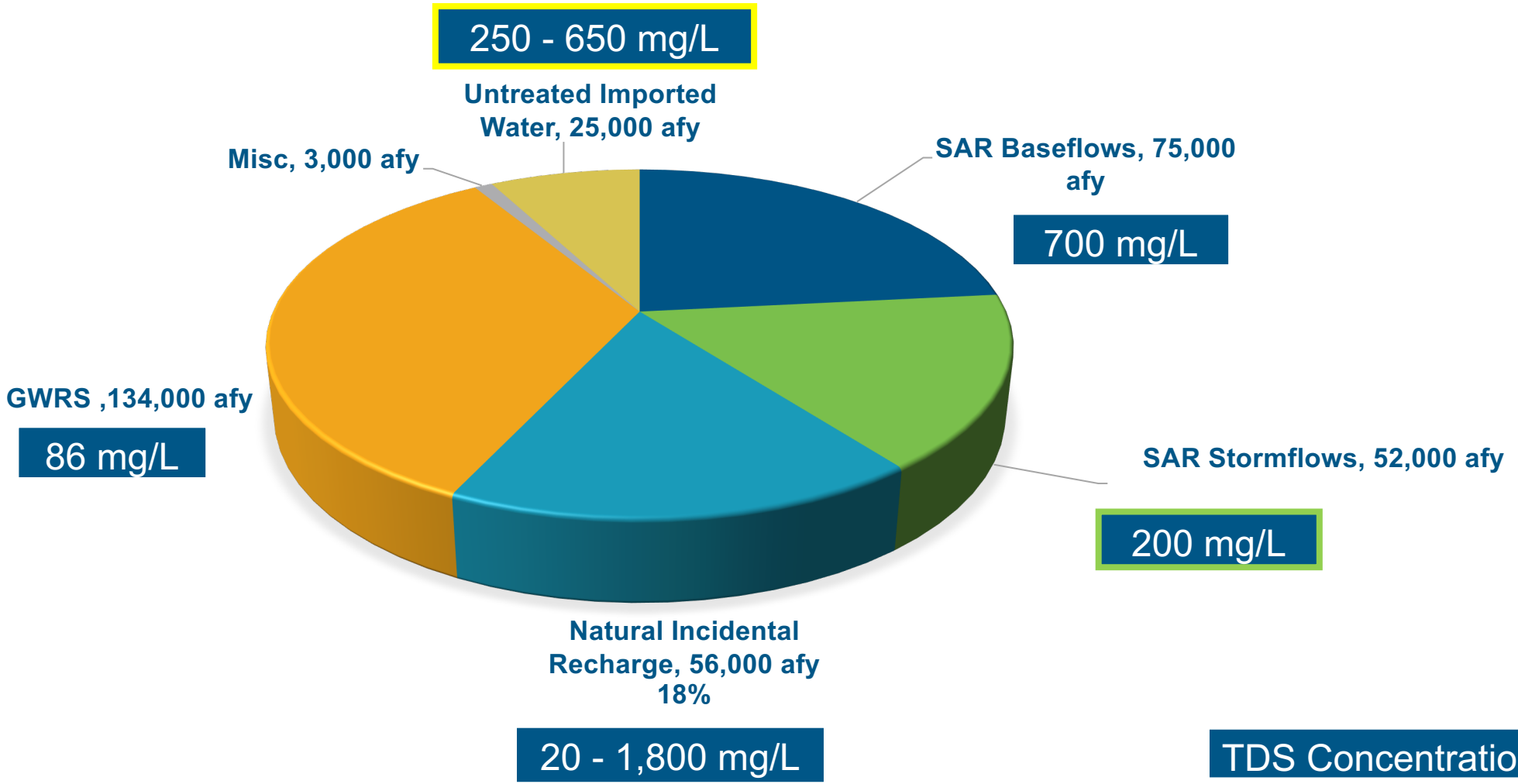
OCWD and USACE Have Steadily Increased Water Conservation at Prado Dam



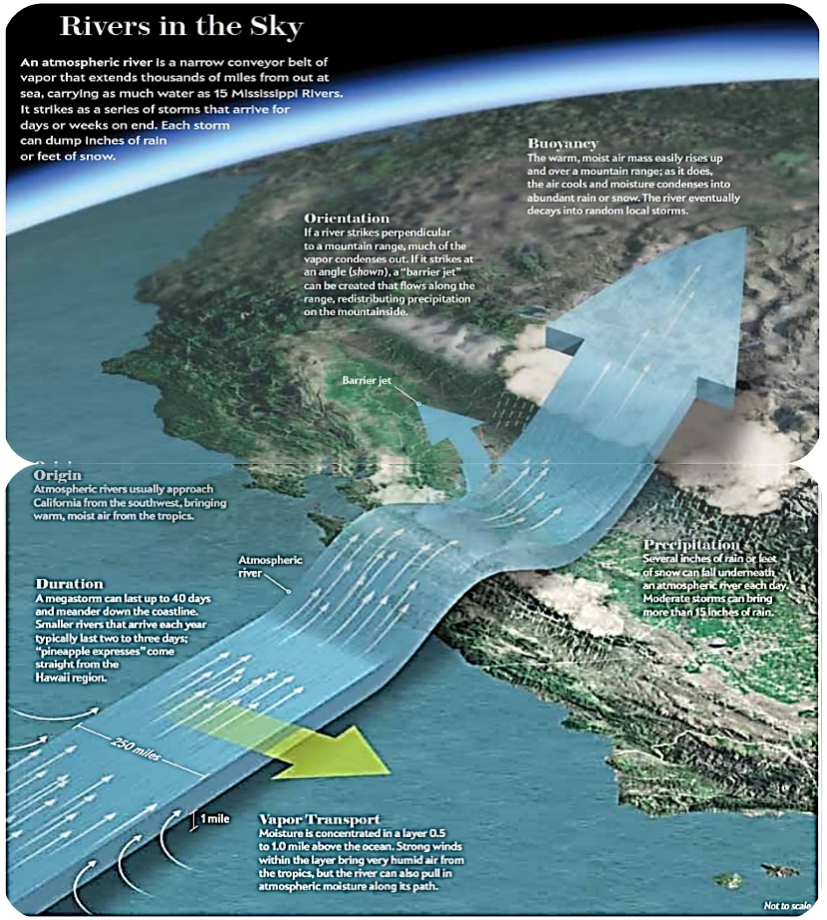
Since 1990, Value of Stormwater Captured is Estimated at >$300M



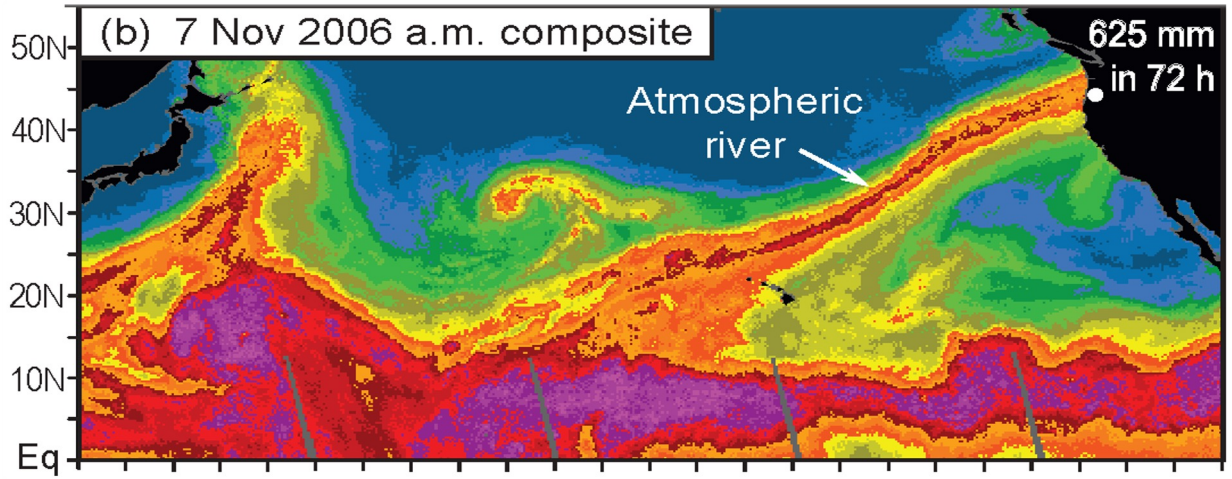
Salinity of Stormwater < Imported Sources



Atmospheric Rivers Rule California Precipitation



Atmospheric Rivers (ARs) are *Rivers in the Sky,* i.e., long narrow bands of airborne water vapor, carrying as much water as 25 Mississippi Rivers*.



An AR that hit Washington & Oregon produced 25 inches of rain in 3 days.

ARs can produce extreme precipitation and flooding. However, ARs also provide up to half of annual precipitation and mountain snow that are key to water supply.

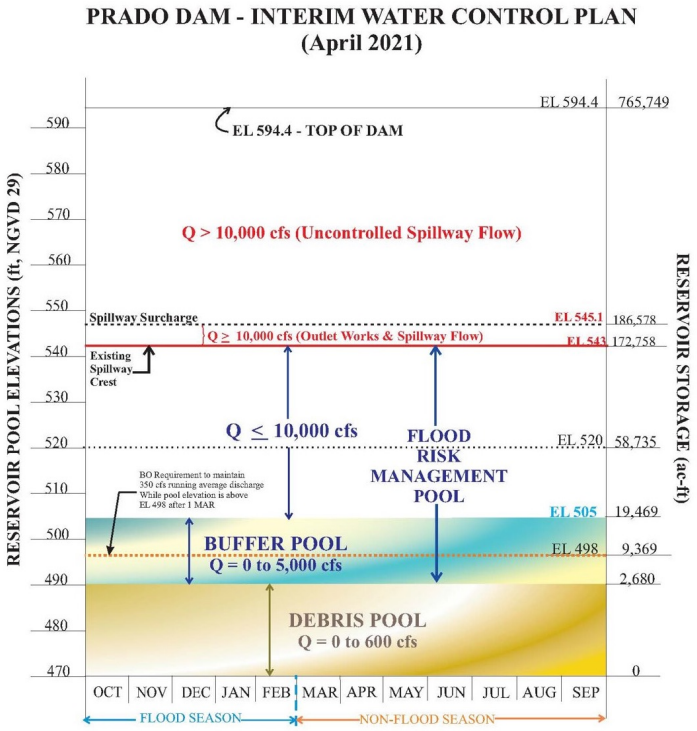
*Ralph et al. (2017)

Stormwater Capture 2.0 – FIRO Simplified

Historical Dam Operation

Formulaic

Dam releases dictated by the Water Control Plan (based on observed conditions)



Dam Operation with FIRO

Flexible

Uses advances in technology to more accurately predict weather and runoff. Creates operational flexibility to safely increase water storage while enhancing flood risk management.

What is FIRO or Forecast Informed Reservoir Operations?

Multiagency effort to use improvements in forecast skill and modeling to create operational flexibility to more effectively operate existing dams

Maximize Stormwater Capture

Improved Forecast

Improved Runoff Models

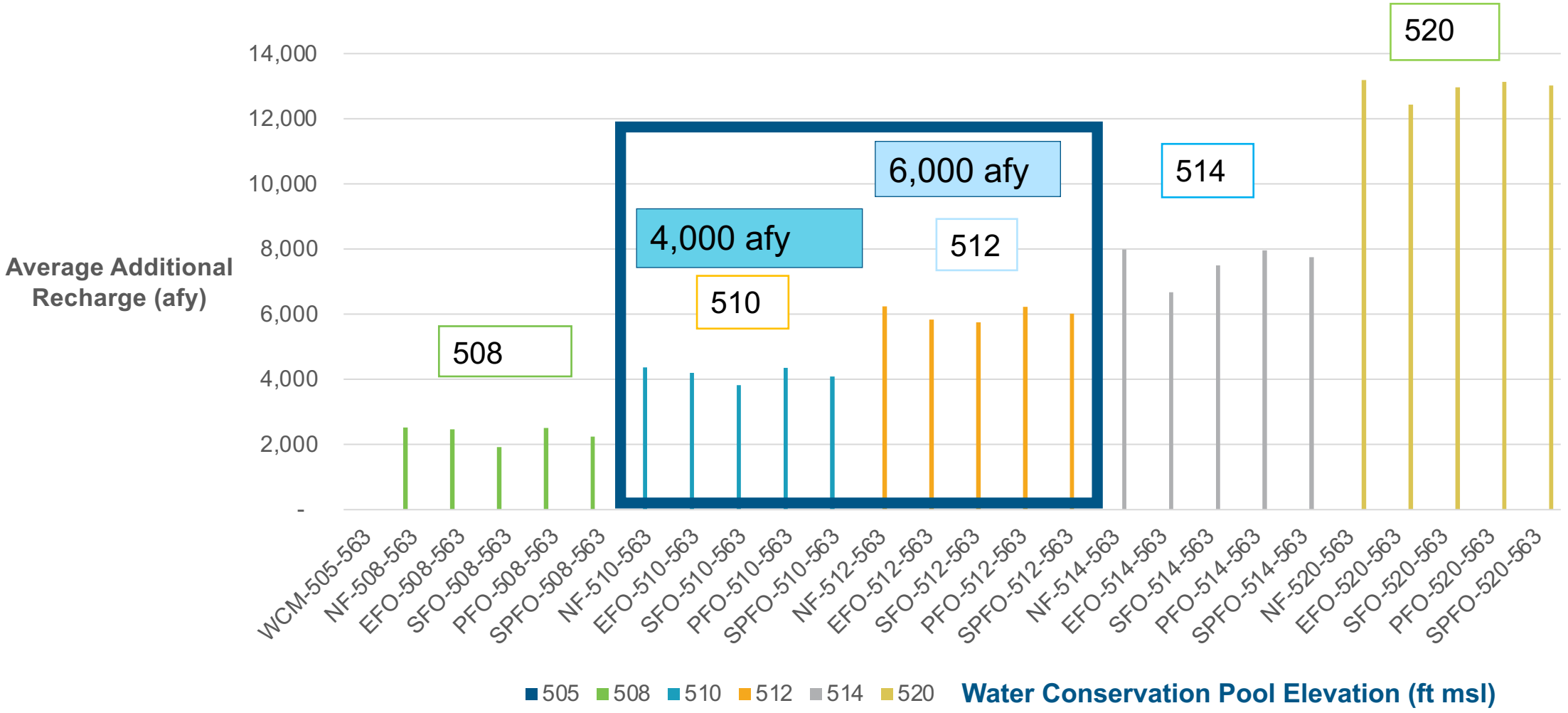
Effective Dam Operation

Reduced Downstream Flood Risk

Environmental Opportunities

Increased accuracy & decision time = Improved outcomes

FIRO is Anticipated to Produce Additional 4,000 to 6,000 afy on Average at Prado



Southern California Rarely Gets “Average Weather” - It Gets Extremes

NOAA

Record drought gripped much of the U.S. in 2022

Nation struck with 18 billion-dollar disasters

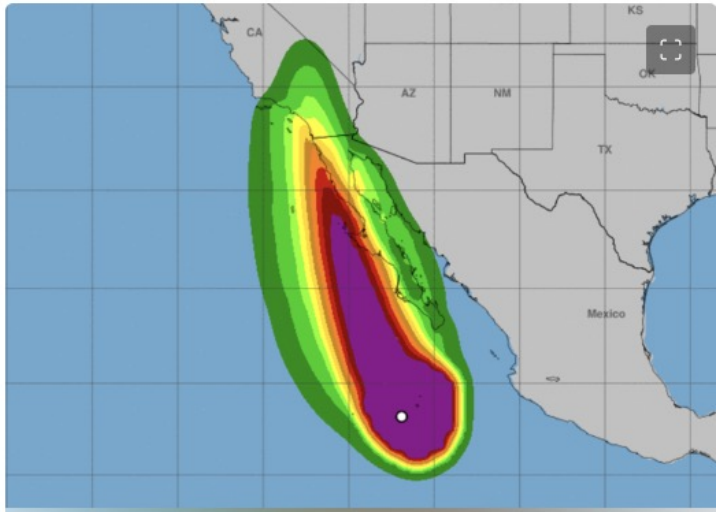
Focus areas: Climate, Satellites
Topics:
climate reports , climate data , climate change , Billion-Dollar Disasters , temperature rankings , drought
Share:

January 10, 2023

Pre-2023

Hurricane Hilary May Have Peaked As Cat. 4 With 145 mph Winds, Forecast To Hit L.A. Late Sunday; Tropical Storm Watch Issued For Much Of Southern CA

Story by Tom Tapp • 5mo



August 2023

California Storm Produces '1 in 1,000-Year' Rainfall Event

Story by Aliss Higham • 1d

Feb 2024

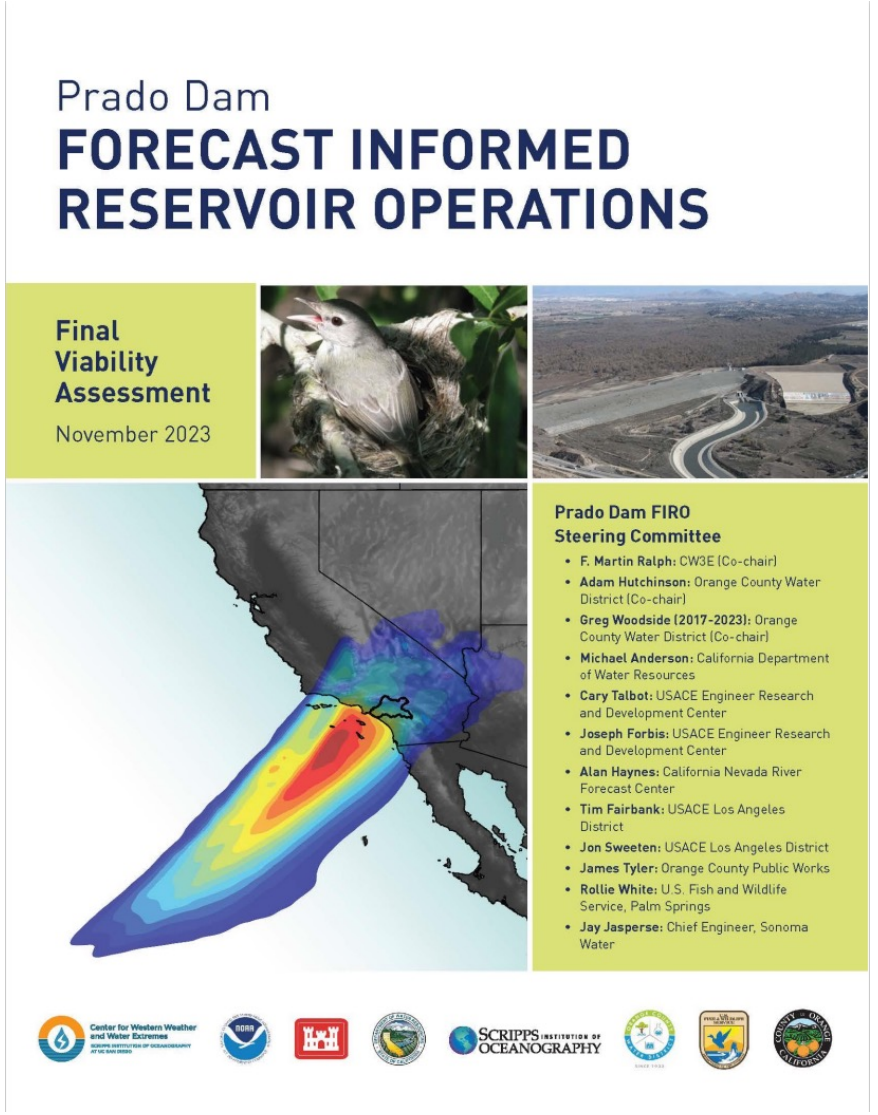
Value of FIRO for Water Resources

- Optimization of existing infrastructure and prior investments
- Operational flexibility to mitigate future weather uncertainties
- Beneficial use of local water supply
- Stormwater capture offsets imported water purchases
  - Reduced cost, lower energy requirements, & lower TDS
- FIRO benefits beyond water supply and quality
  - Improved flood risk management
  - Potential biological benefits (e.g. habitat enhancement, environmental flows)
  - Possible increase in hydropower generation
  - Enhanced recreation opportunities (e.g. boating, fishing, swimming)
  - Opportunity to reduce fire risk/severity

ALL POSSIBLE WITHOUT CONSTRUCTION!!!

Summary

- FIRO is a viable solution for creating a new local supply of low TDS water
- FIRO provides a mechanism to safely balance flood risk management and water conservation
  - Many additional co-benefits probable
- Improvements in weather forecasting support opportunities to mitigate weather extremes
- Not all new water supply projects require construction



Questions?

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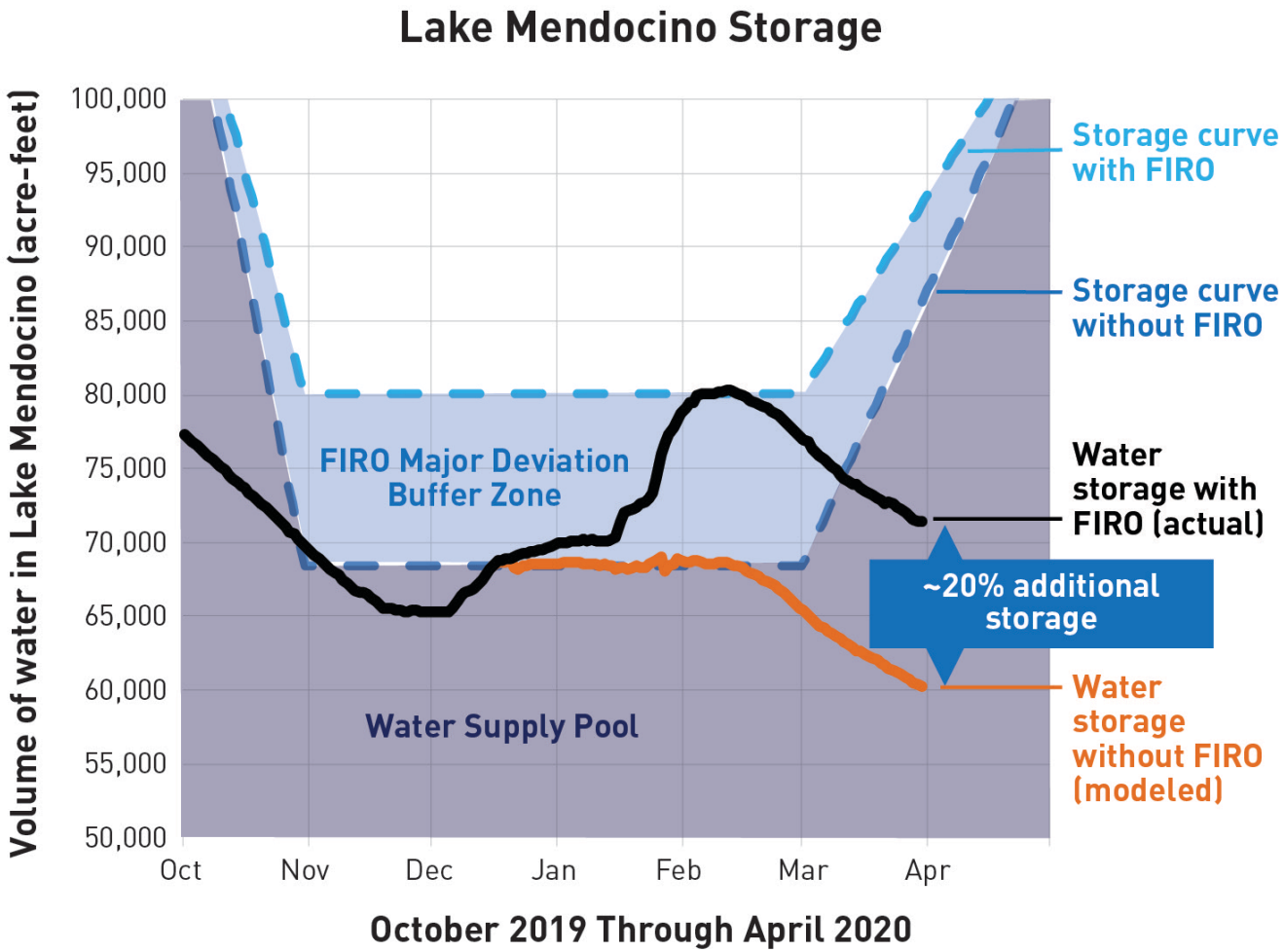
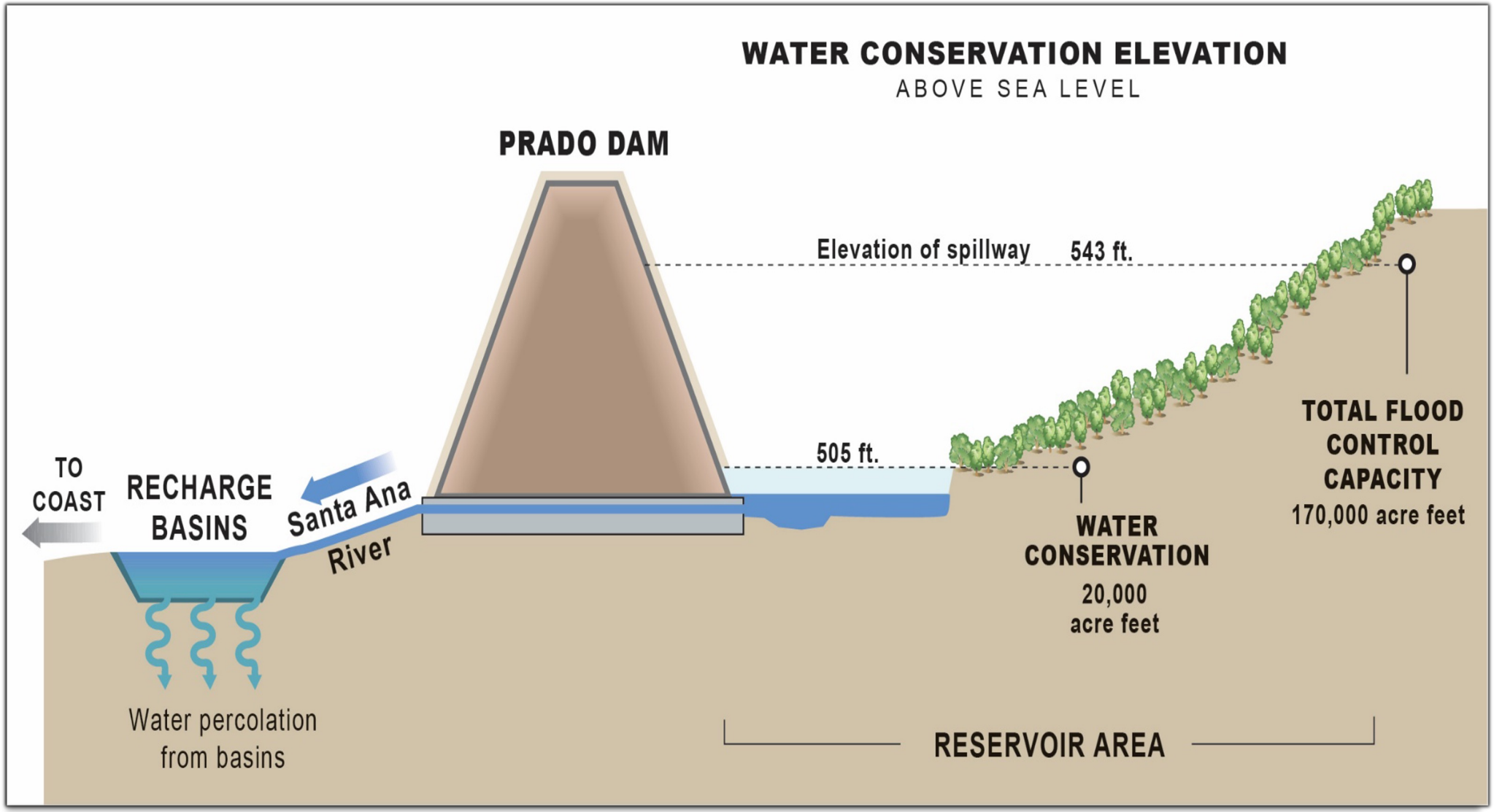
Extra Slides

FIRO Optimizes Dam Operation by Creating Flexibility

- Advanced forecast support coordination between agencies
- Improved forecast allow for “temporary borrowing” of dedicated dam storage capacity (water supply vs flood control)
- Win-win outcome




WATER CONSERVATION ELEVATION
ABOVE SEA LEVEL
PRADO DAM
Elevation of spillway
543 ft.
505 ft.
TOTAL FLOOD CONTROL CAPACITY
170,000 acre feet
WATER CONSERVATION
20,000 acre feet
TO COAST
RECHARGE BASINS
Santa Ana River
Water percolation from basins
RESERVOIR AREA