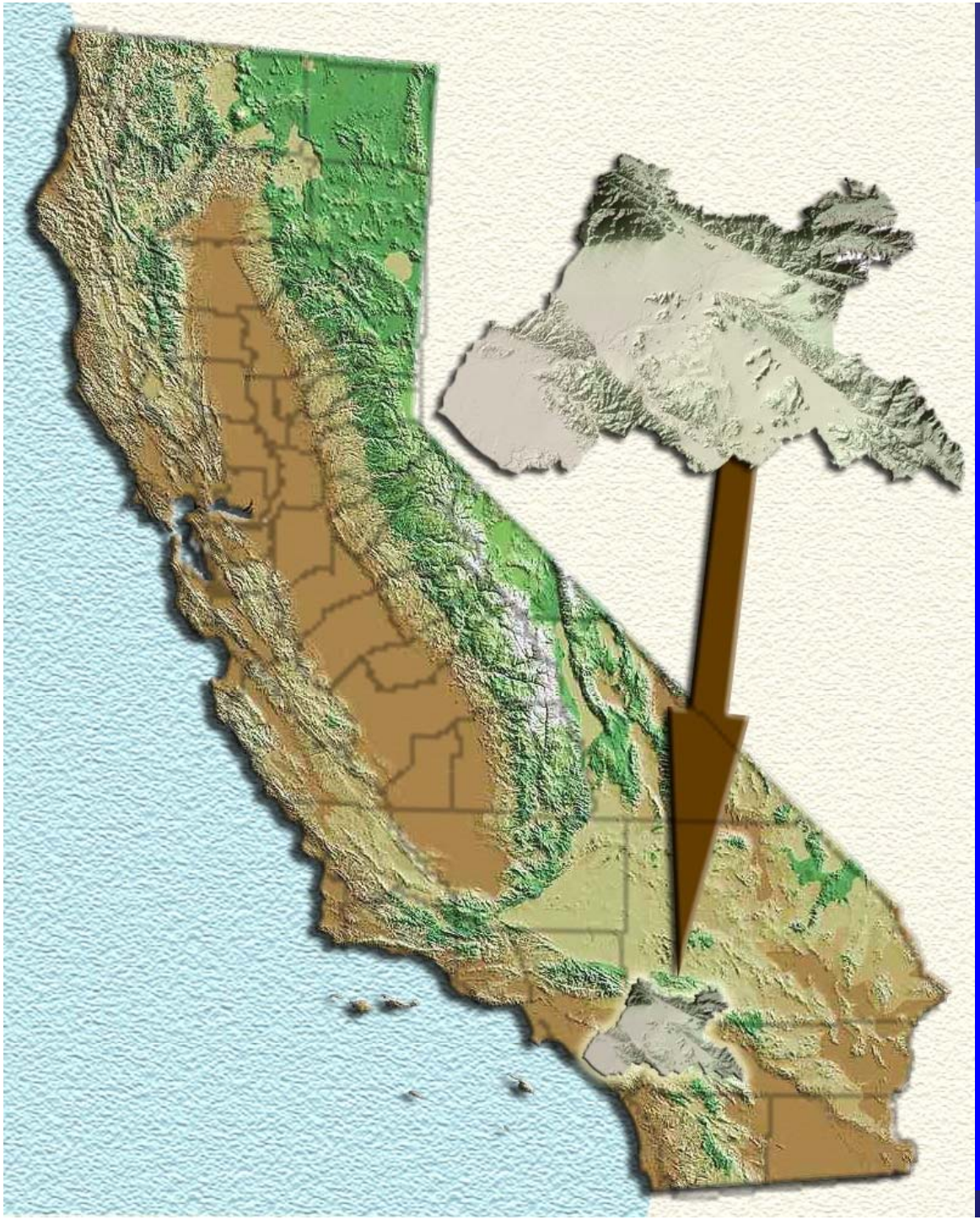
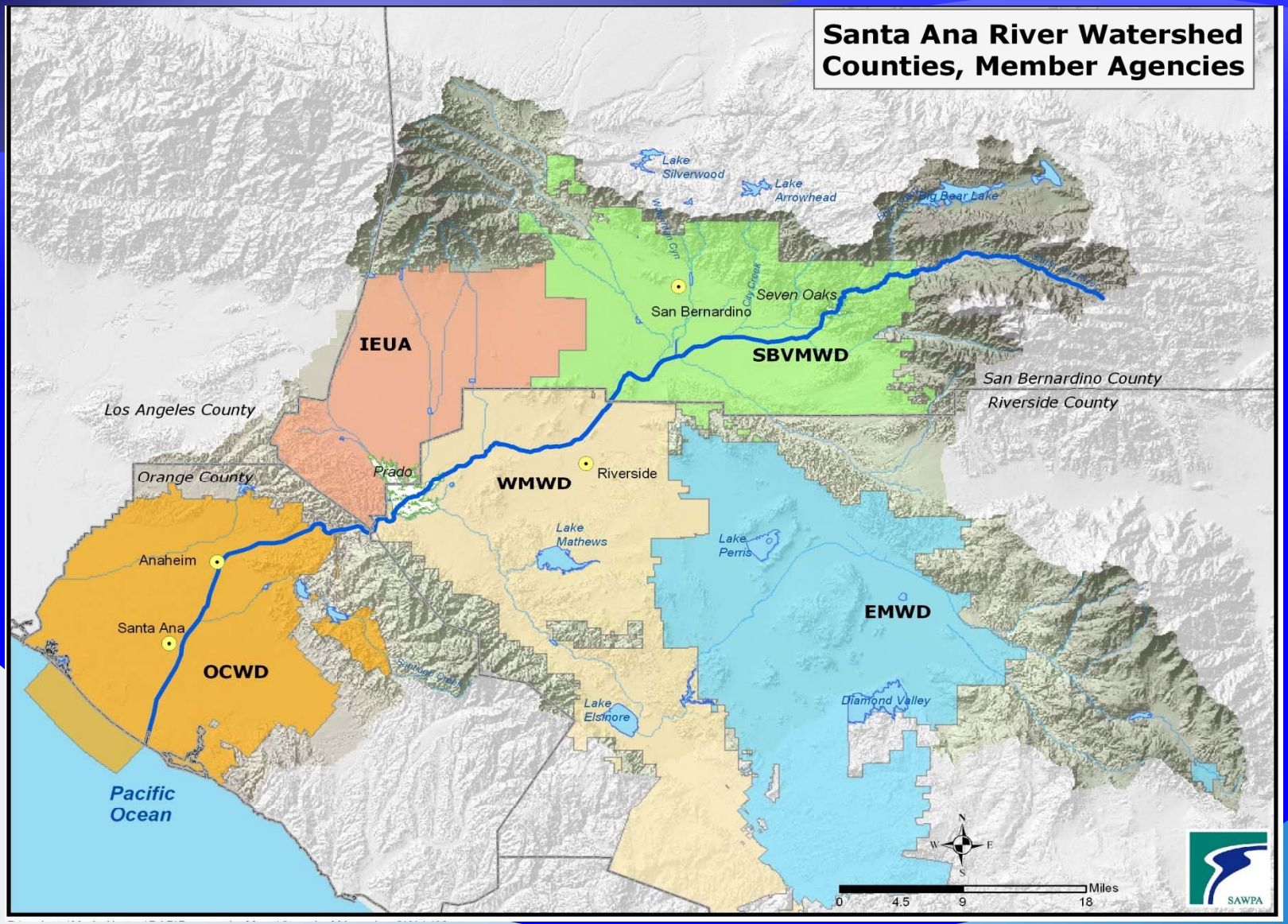


Santa Ana River Watershed

Integrated Regional Water Management Planning – An Approach to Climate Change

Southern California Groundwater & Climate Workshop
Mark R. Norton PE, LEED AP
February 24, 2012

Who is SAWPA?


Santa Ana River Watershed
Counties, Member Agencies
Lake Silverwood
Lake Arrowhead
Big Bear Lake
Seven Oaks
San Bernardino
IEUA
SBVMWD
San Bernardino County
Riverside County
Los Angeles County
Orange County
Prado
WMWD
Riverside
Lake Mathews
Lake Perris
Anaheim
Santa Ana
OCWD
EMWD
Lake Elsinore
Diamond Valley
Pacific Ocean
N
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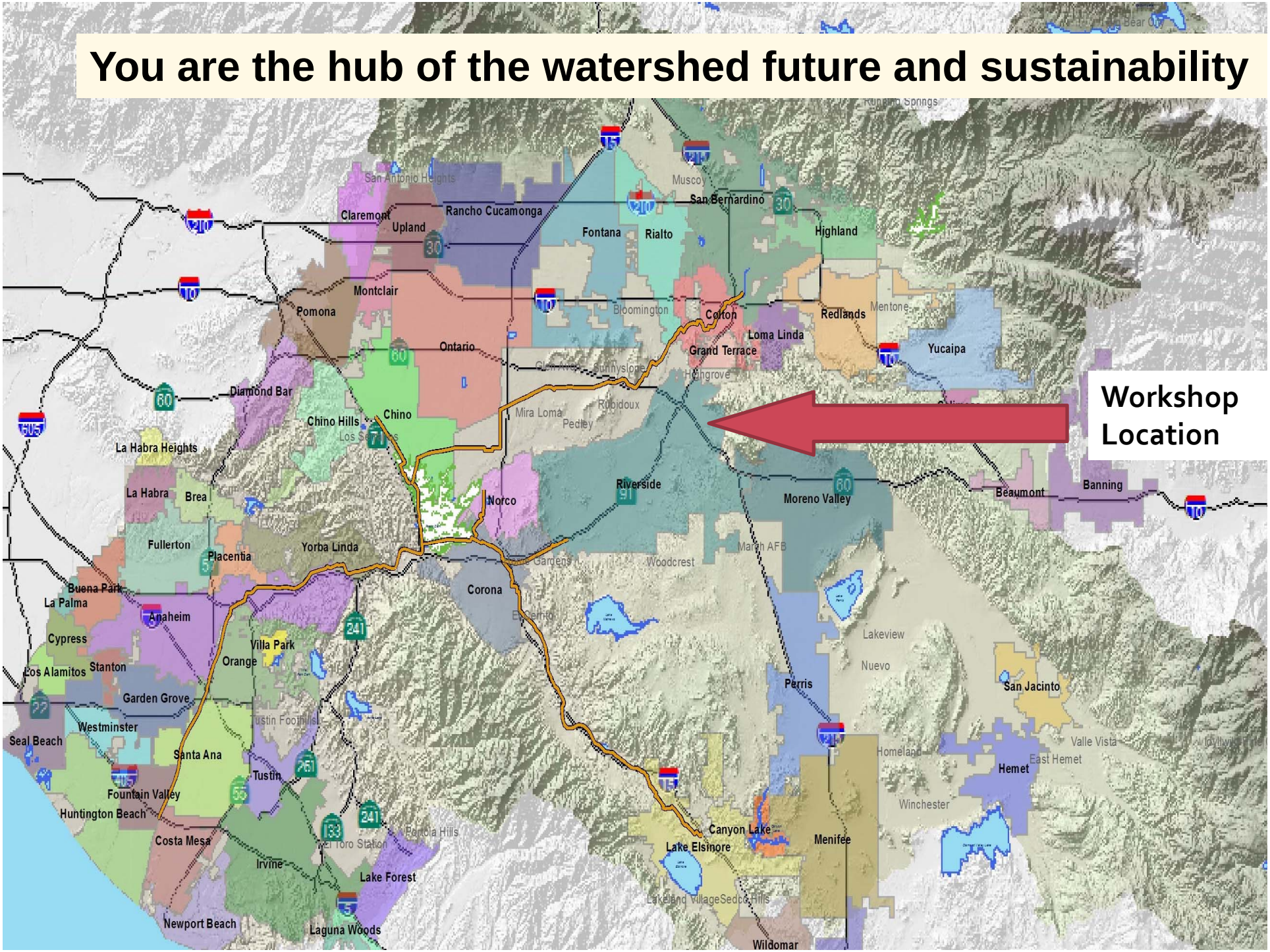
4.5
9
18
SAWPA

You are the hub of the watershed future and sustainability



What will be our legacy?

"This is an opportunity for greatness which has never been offered to any civilization, any generation in any civilization in human history before to act as a generation to do the right thing. If we fail to receive that opportunity, to act on it, then my feeling is that we will become the most vilified generation that has ever lived in human history."

Dr. Roger Payne, Ocean Alliance, President

Planning for the 4 Horsemen of the Apocalypse

Climate Change

Reduced Water from Delta

Colorado River Basin Drought

Urban Sprawl & Population growth

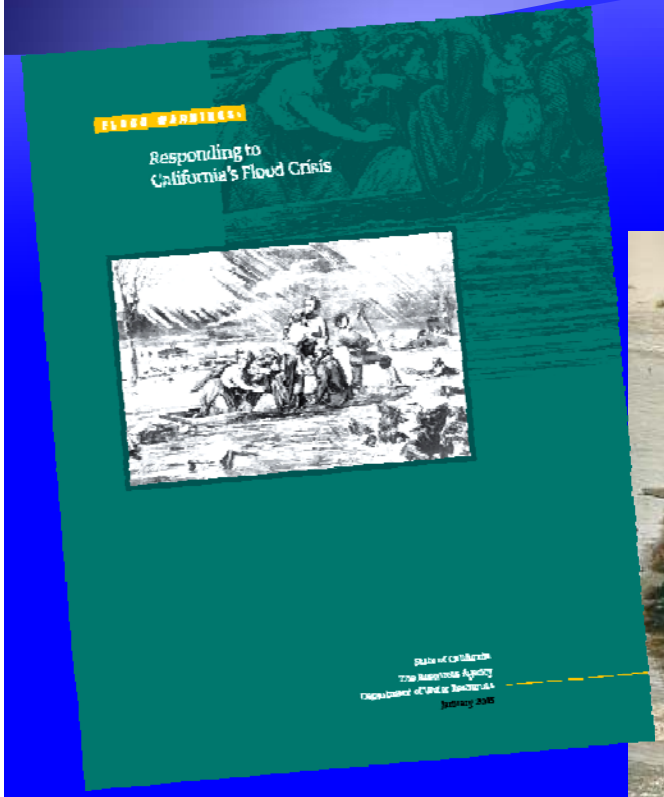
Santa Ana Watershed
Population Projections through 2050

Source: Southern California Association of Governments

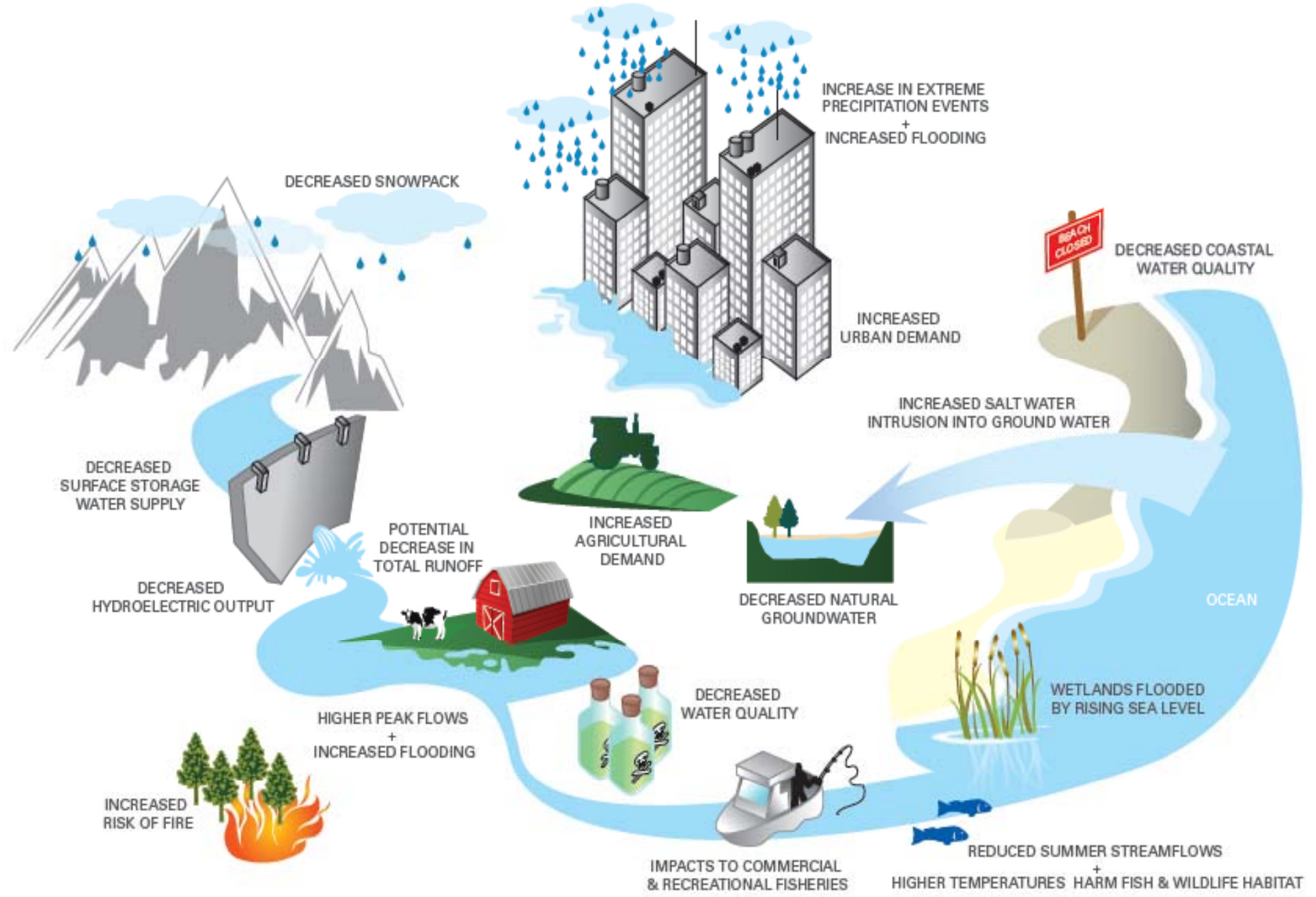
SPRAWL: The Number One Threat to Water Sustainability

Colorado River

Danger on the Delta



WATER RELATED IMPACTS OF GLOBAL WARMING



OWOW Vision

A sustainable Santa Ana Watershed that is drought-proofed, salt balanced, and supports economic and environmental vitality in the year 2030

What do we want?
Healthy Drinking Water!

We want Healthy Fisheries

Swimmable Rivers

Productive Agriculture

Water Wise Landscape

Smart Growth and Low Impact Development

Photo Simulation by Steve Price, Urban Advantage
(www.urban-advantage.com)

One Water One Watershed: The Promise of IRWMP

HARVARD Kennedy School
ASH CENTER
for Democratic Governance and Innovation

Watershed Level Thinking

OWOW Guiding Principles

1. ***Create Anew*** – OWOW shared vision and adopting a new water ethic

2. ***Collaboration Across Boundaries*** Citizens of watershed, multi-jurisdictional solutions

3. ***Adopt Systems Approach*** –Problems are interrelated, seek synergies, create catalysts

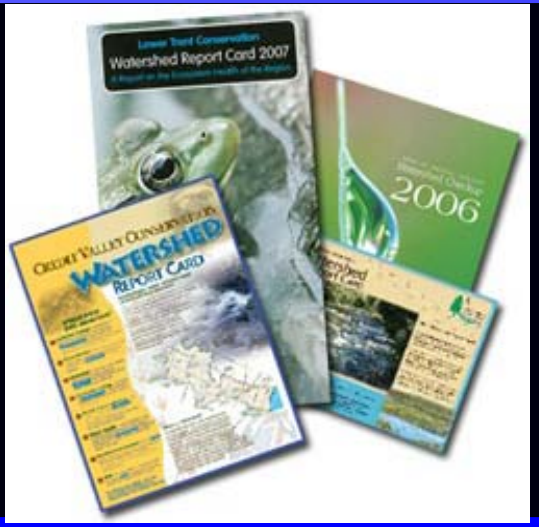
The Systems Approach

1. The Santa Ana River Watershed is a hydrologic whole
2. Working in concert with nature is cost effective
3. See each problem as interrelated, seek efficiencies and synergies

OWOW Plan 2.0

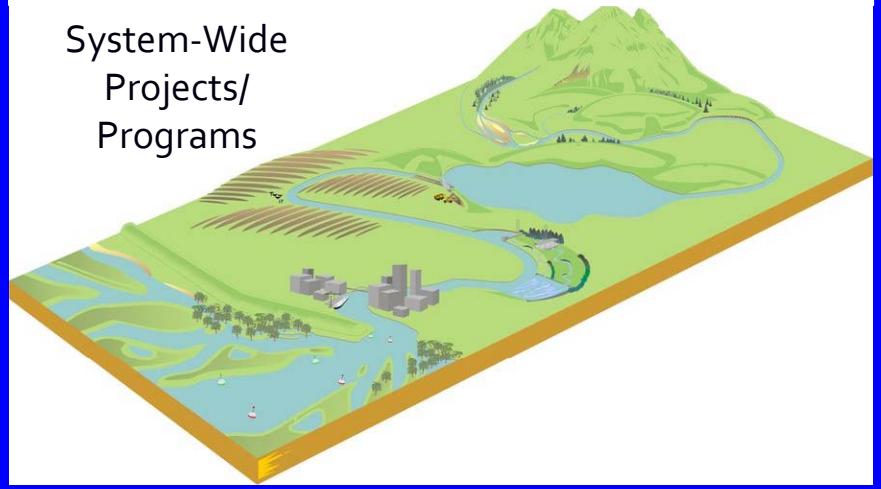
Web-based Tools

Watershed Assessment



Climate Change Adaptation/ mitigation

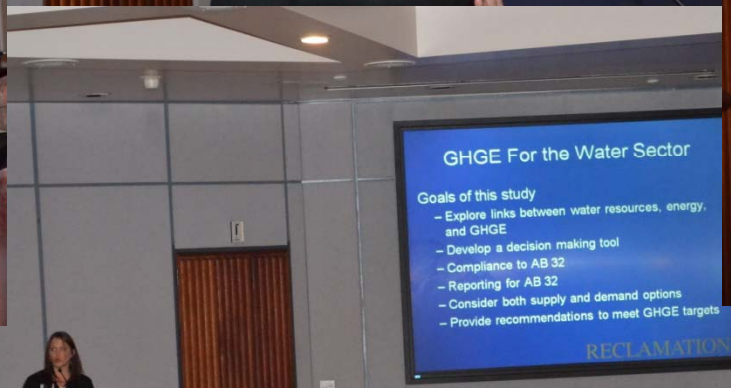
System-Wide Projects/ Programs



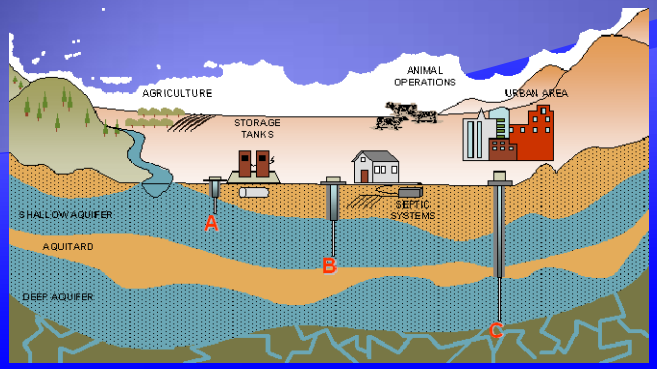
Climate Change Story

Adaptation and Mitigation

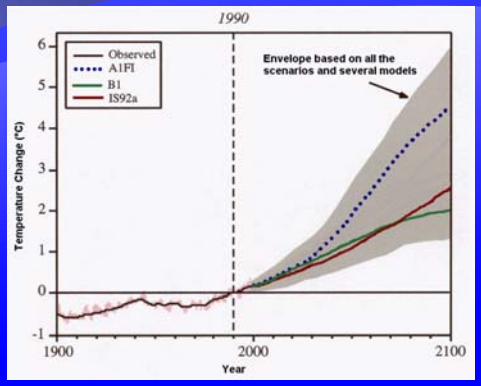
Climate Change Partnership – SAWPA -Reclamation-DWR



OWOW Plan 2.0 - Reclamation Analysis Tasks



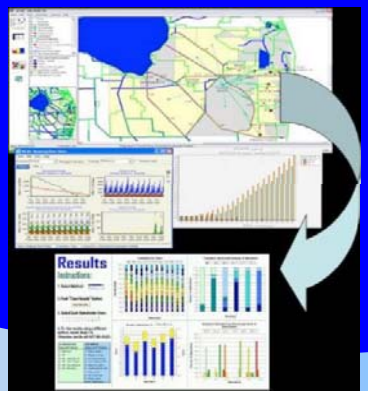
Groundwater Level Impacts



Review & Select Climate Change Model Forecast for Watershed

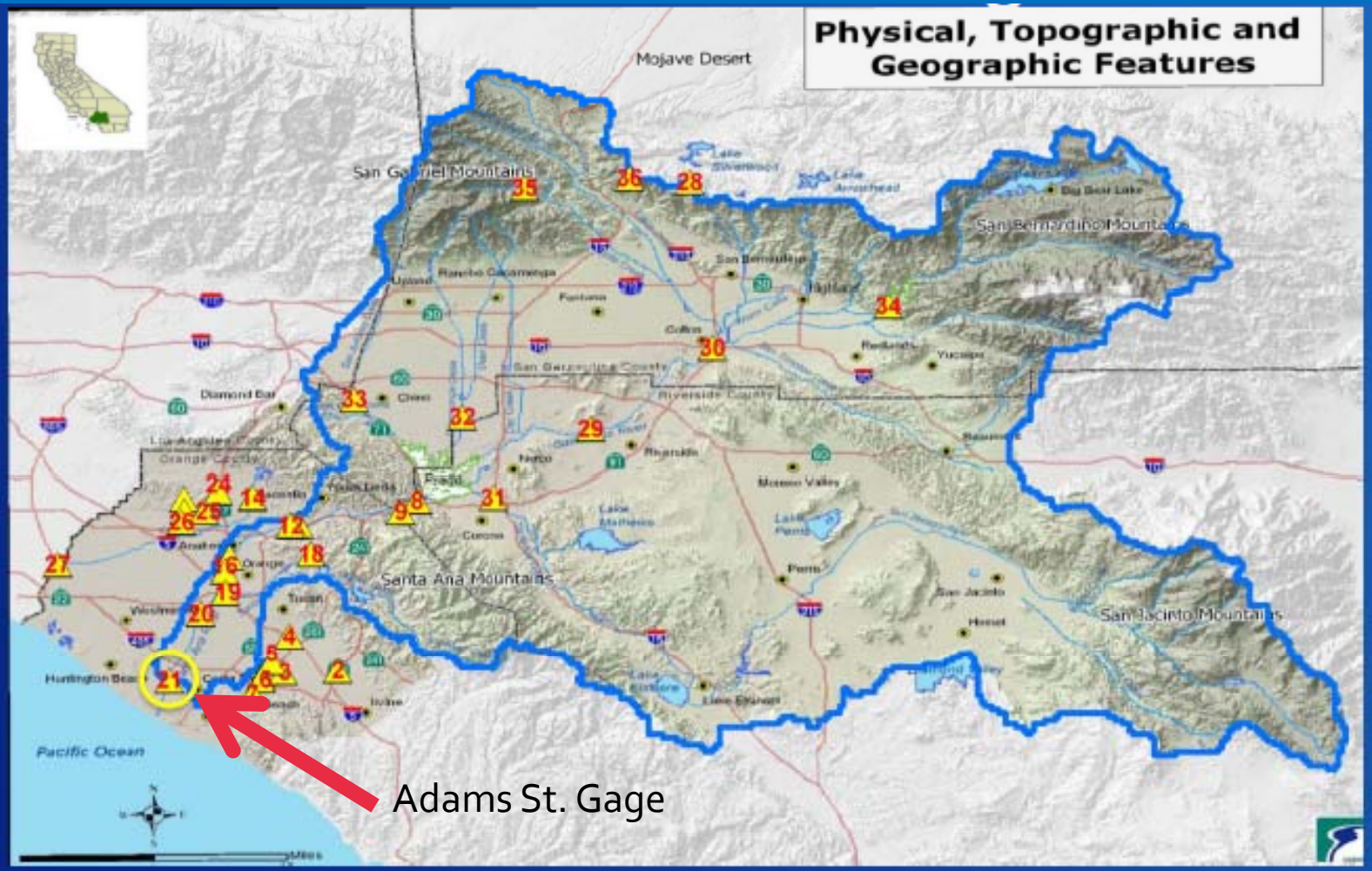
Greenhouse Gas Emission Calculation Tool

Sea Water Level Rise Impacts



Decision Support Tools to Manage Impacts

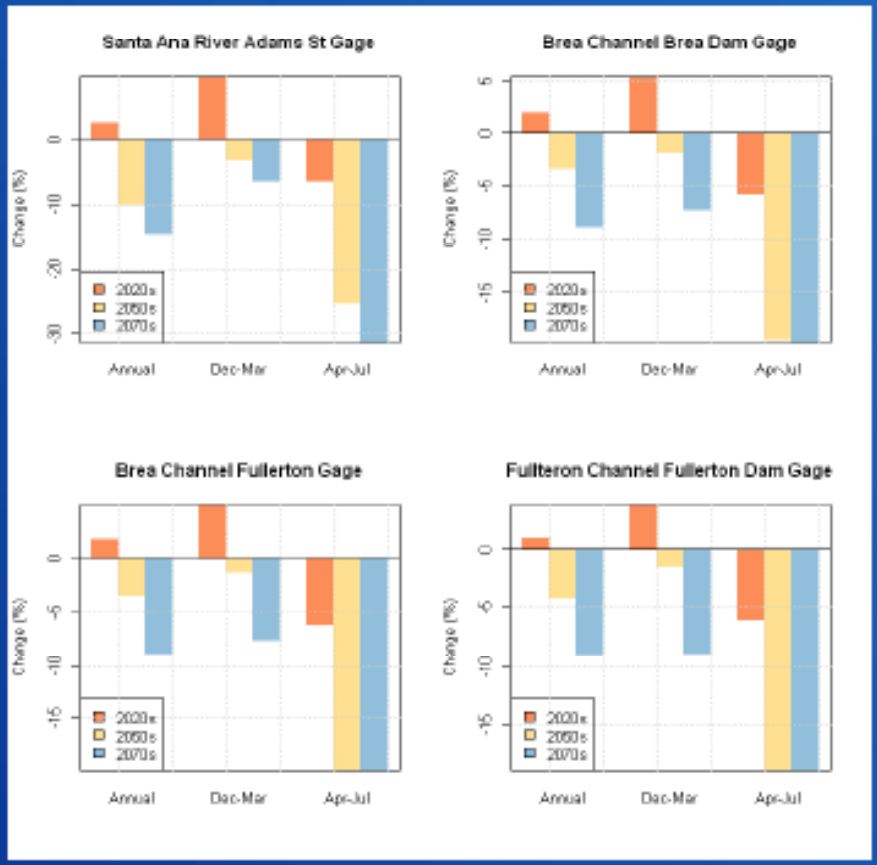
36 Key Locations in Watershed Analyzed For Hydrologic Impacts



RECLAMATION

Hydrology Projections
Flow Impacts

- Annual and seasonal streamflow impacts
- 2020s – increase in annual runoff and winter (Dec-Mar) runoff, decrease in spring-summer (Apr-Jul) runoff from the 1990s reference
- 2050s – decrease in annual, winter, spring-summer runoff from the 1990s reference
- 2070s - decrease in annual, winter, spring-summer runoff from the 1990s reference



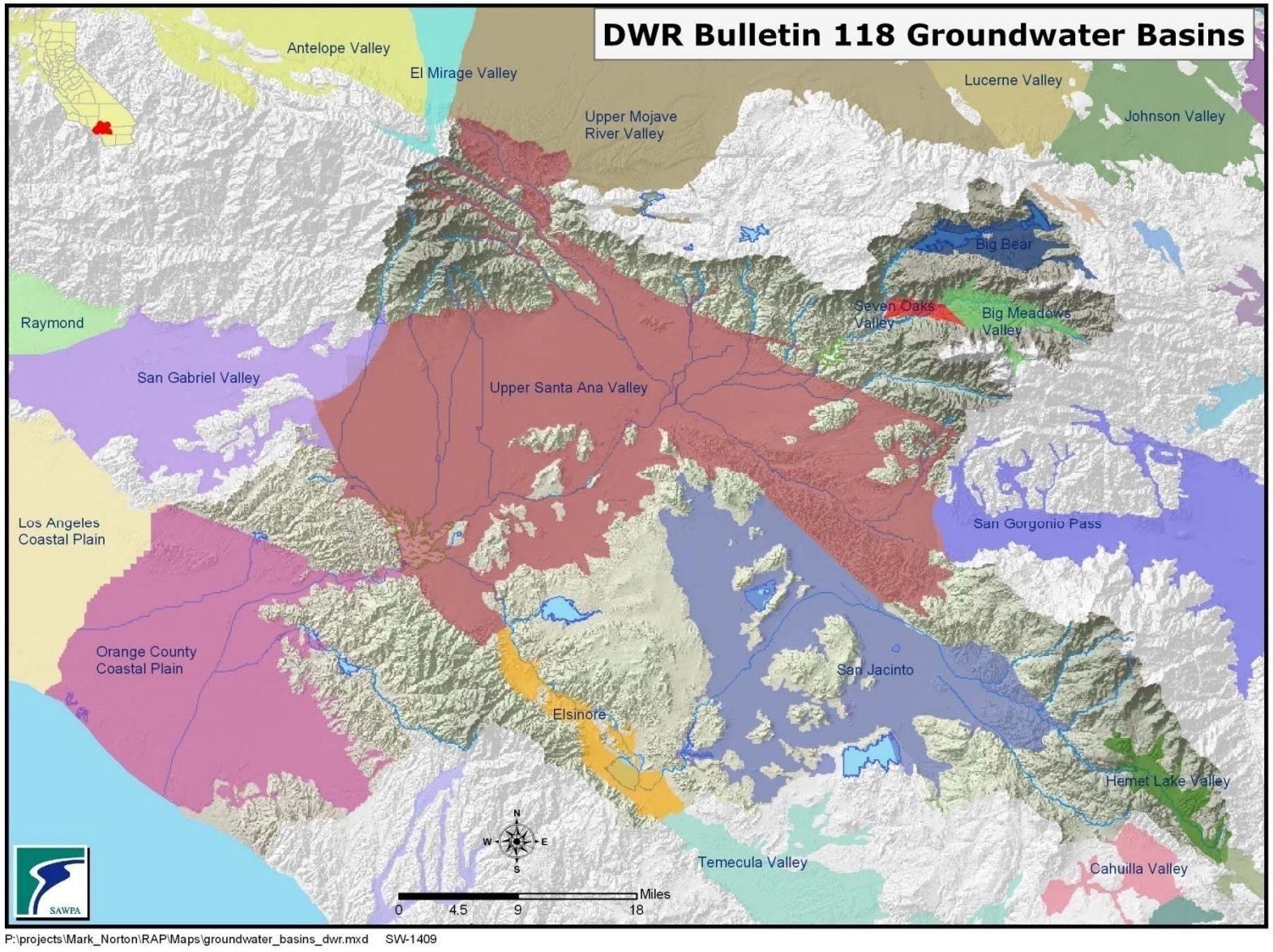
RECLAMATION

Summary of Impacts
Santa Ana River Adams St. Gage

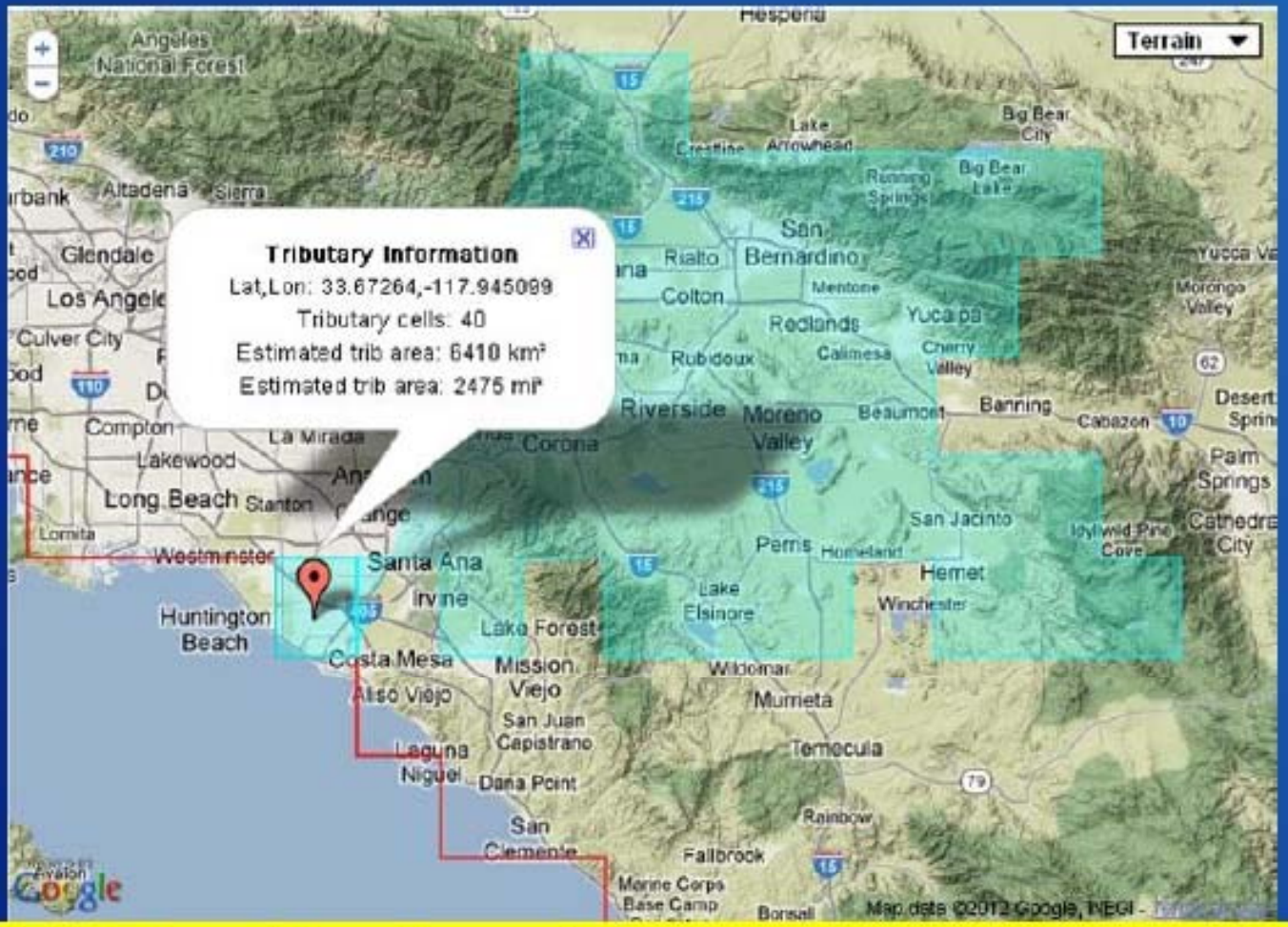
Hydroclimate Metric (change from 1990s)	2020s	2050s	2070s
Precipitation (%)	0.67	-5.41	-8.09
Mean Temperature (deg F)	1.22	3.11	4.10
April 1st SWE (%)	-38.93	-80.40	-93.07
Annual Runoff (%)	2.60	-10.08	-14.61
Dec-Mar Runoff (%)	9.82	-3.01	-6.38
Apr-Jul runoff (%)	-6.35	-25.24	-31.39

Similar analysis was done for all the 36 sites in the Santa Ana Basin

Groundwater Basins



Example: Runoff Impact
Santa Ana R. Adams St. Gage



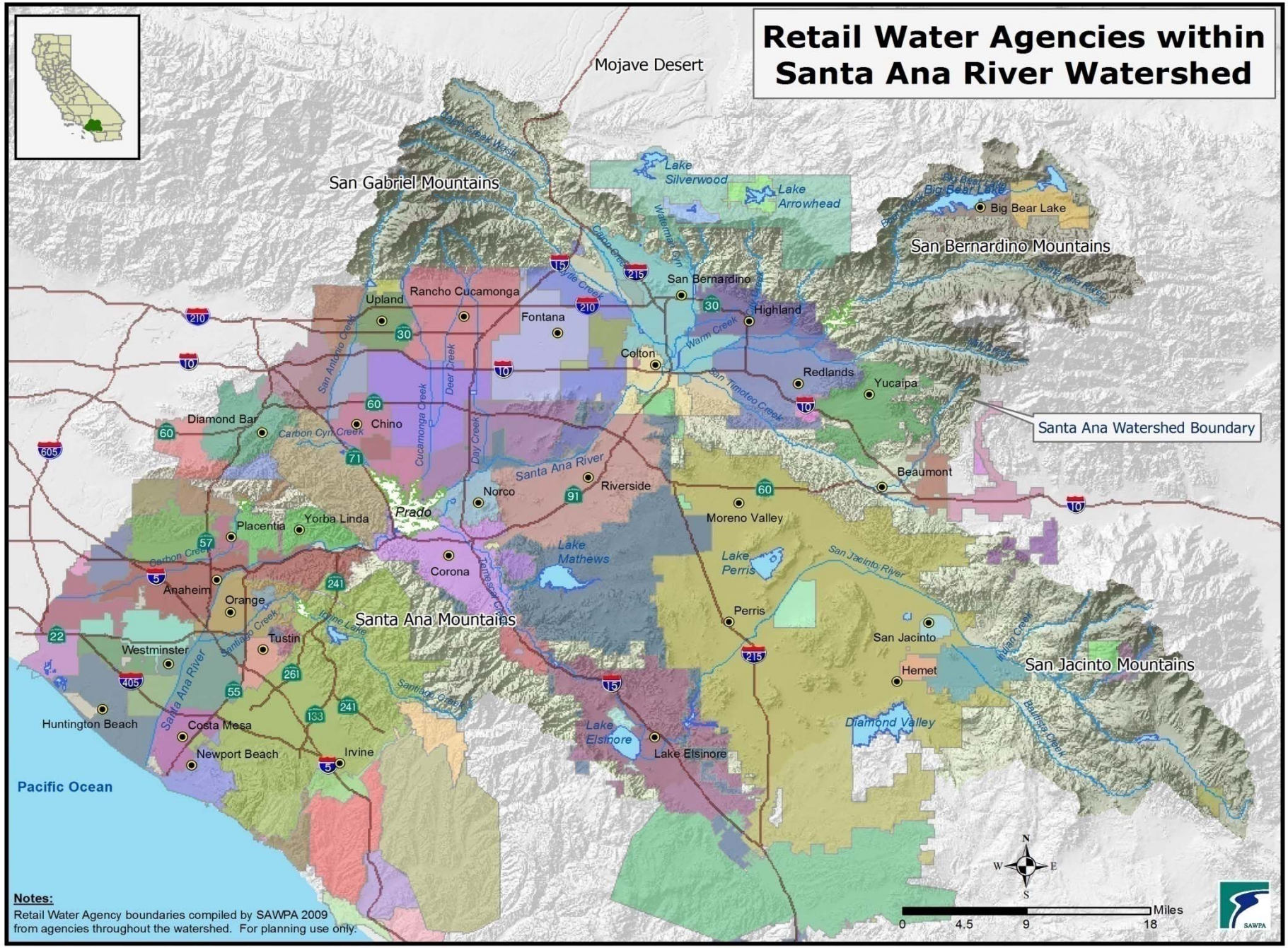
http://gdo-dcp.ucllnl.org/downscaled_cmip3_projections/dcpInterface.html

RECLAMATION

Moving Forward on Sustainability – not the next grant

Water Budget-Based Rate Structure

Additional 10% Water Savings – 150,000 AF/yr



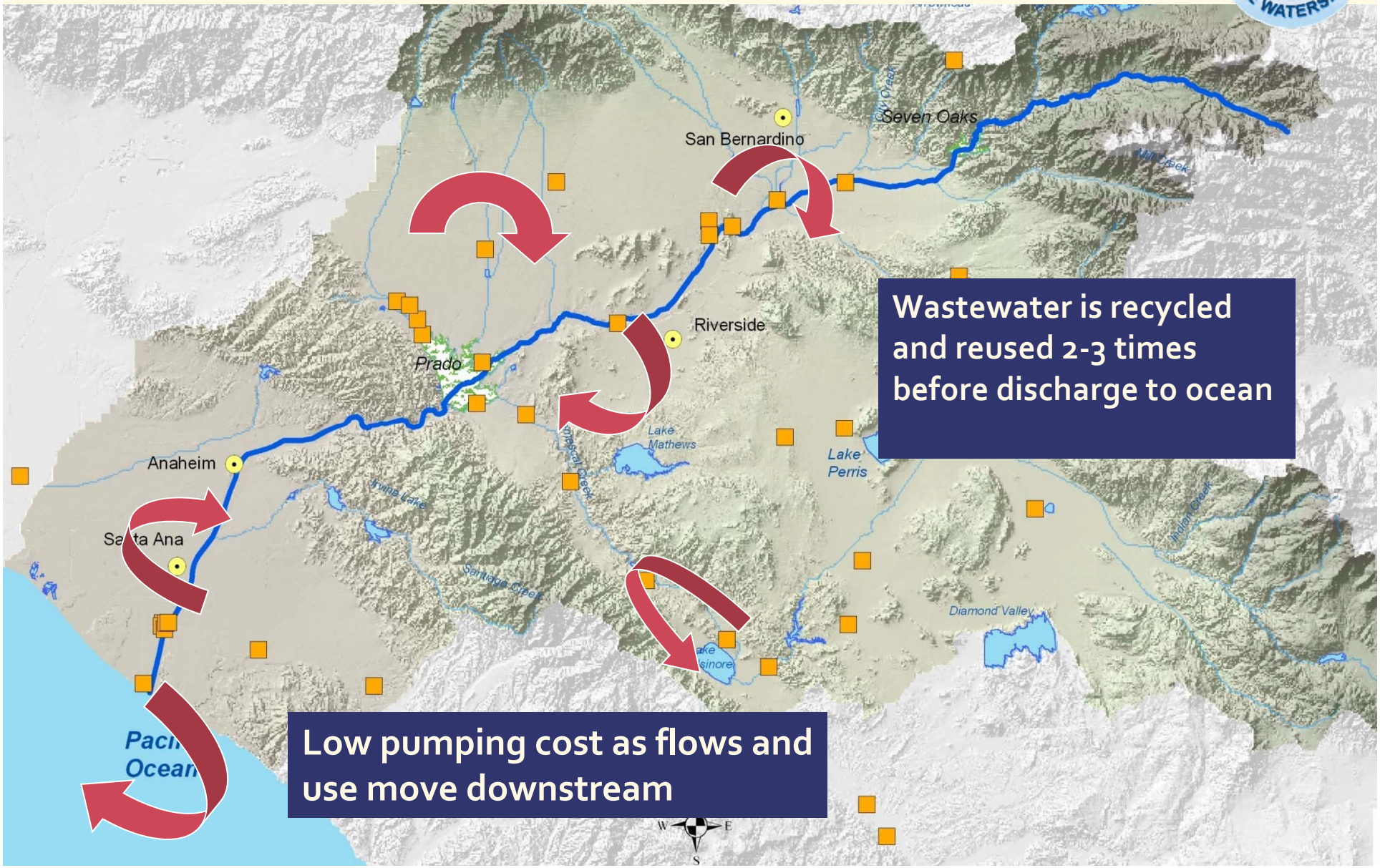
P:\projects\datarequest_2011\SteveMains\RetailWaterAgencies.mxd SW-2036

Biggest Bang for Buck: Water Use Efficiency

Recycled Water

- Reliable source of regular supply
- Low comparative energy costs
- Accessible to most urban communities
- More sustainable than other alternative water sources

Wastewater Reuse in the Santa Ana River Watershed



Groundwater Desalination

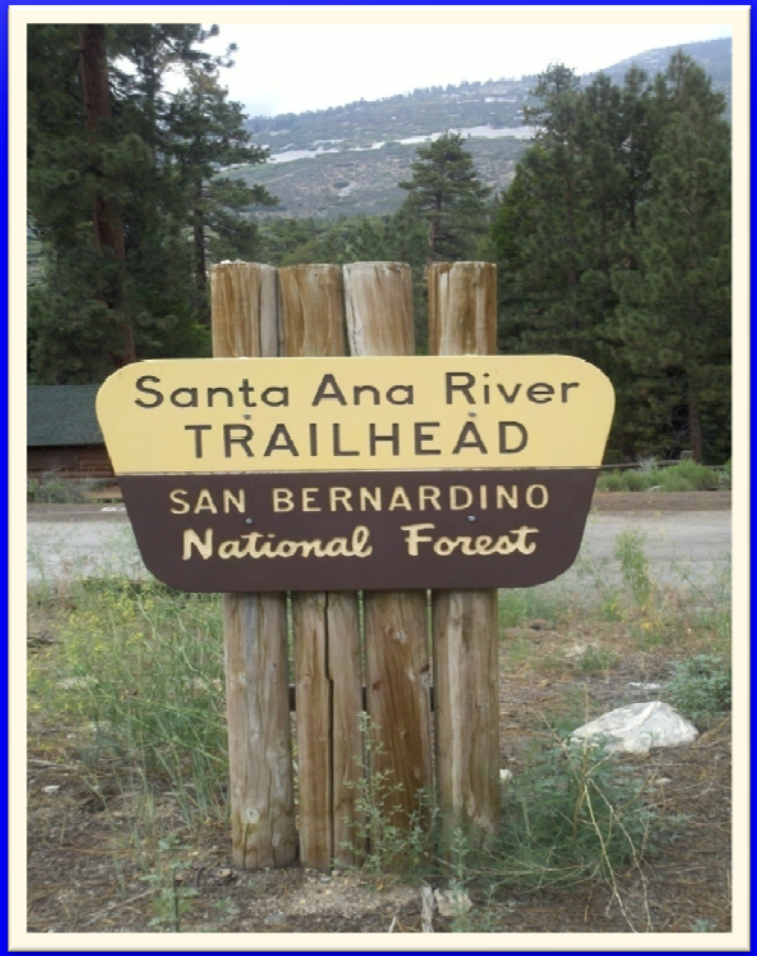
Avg. Cost $700 - 800/AF

Additional 5% Water Savings – 75,000 AF/yr

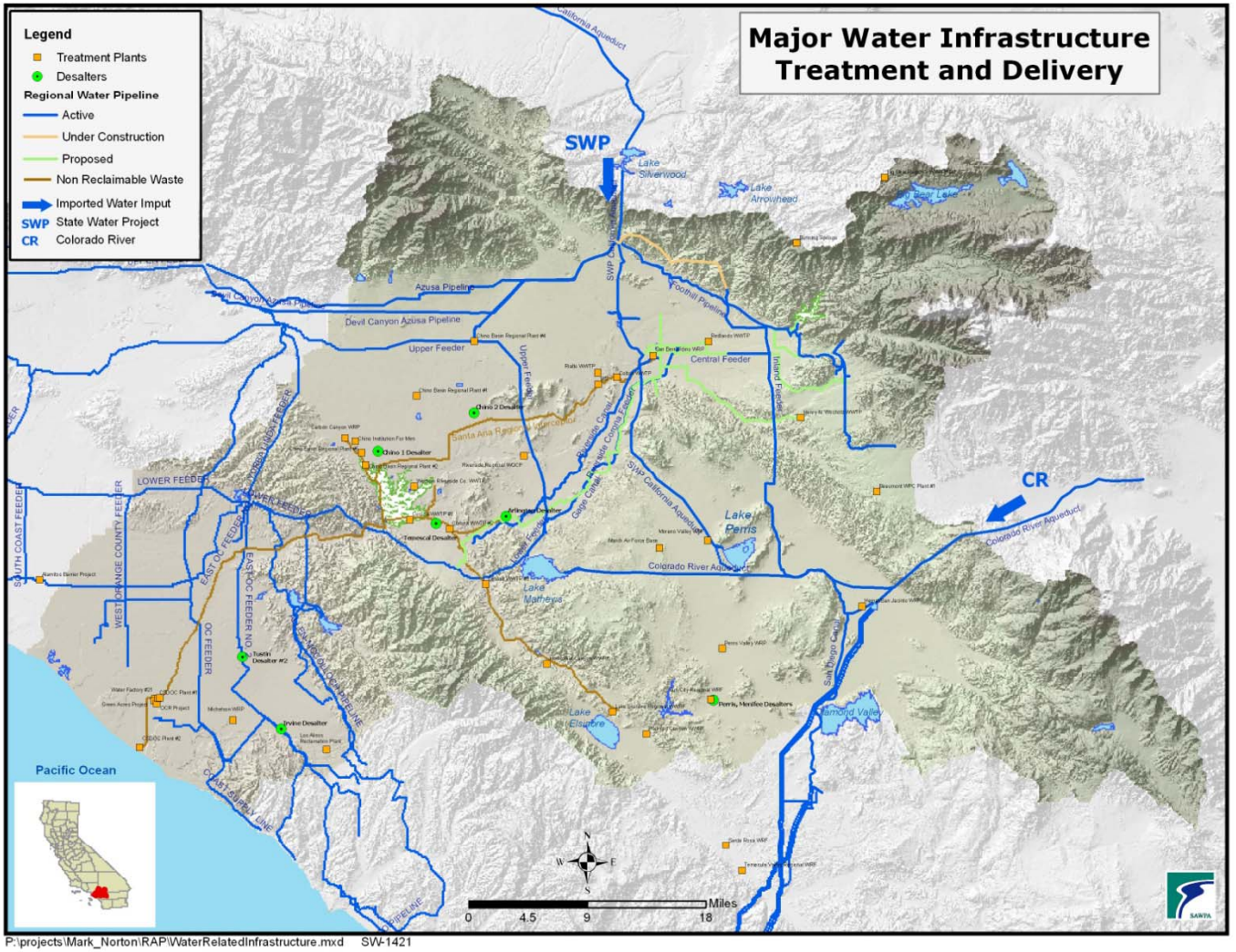
Manage Rainfall as a Resource

- Maximize use of rain water
- Provide flood control capacity

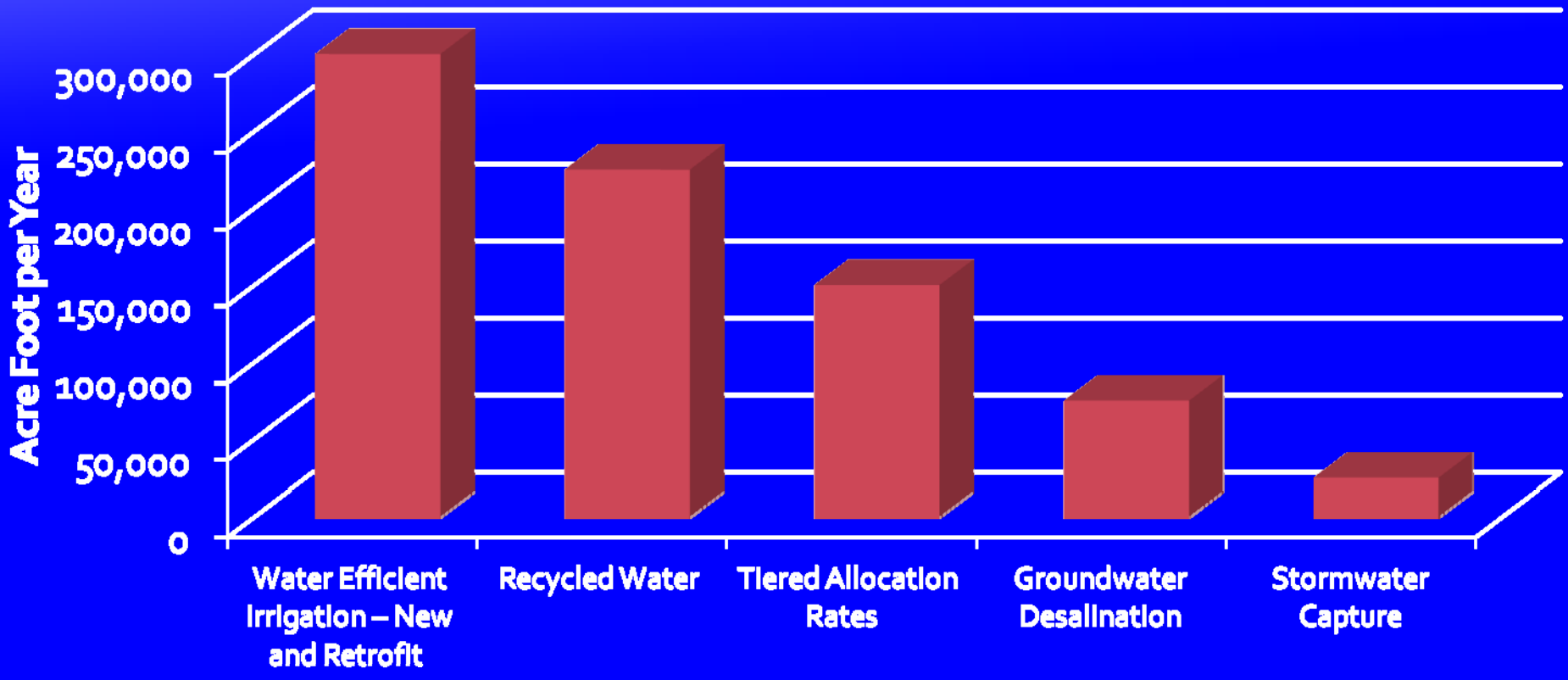
Forest First



Operational Efficiency and Water Transfers



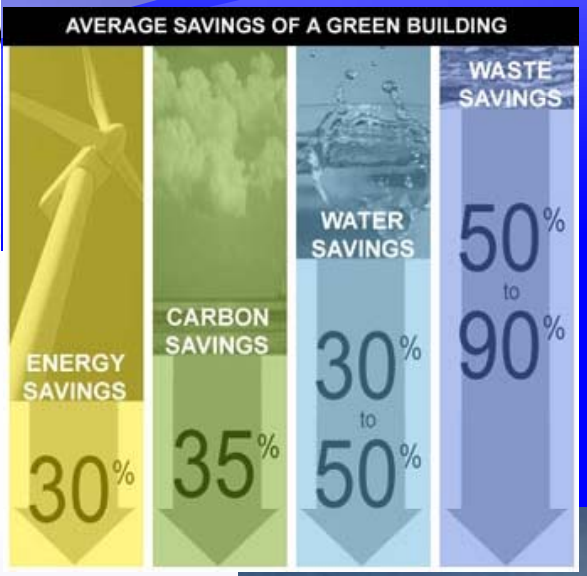
Cumulative Benefit of Expanded Watershed Water Supply Development – 775,000 AFY

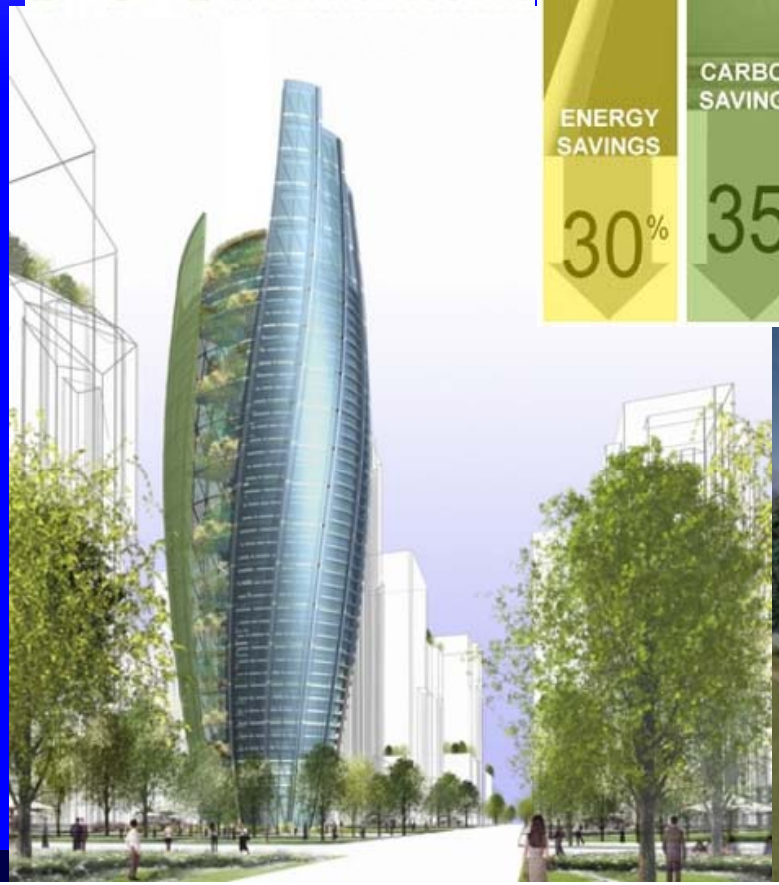


Components of Ideal Project

Water Sustainability Moving Forward – "Beyond LEED" Example

envision™
INSTITUTE FOR SUSTAINABLE INFRASTRUCTURE
I S I





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