# Groundwater Supplies for Agriculture – Status, Issues, and Management

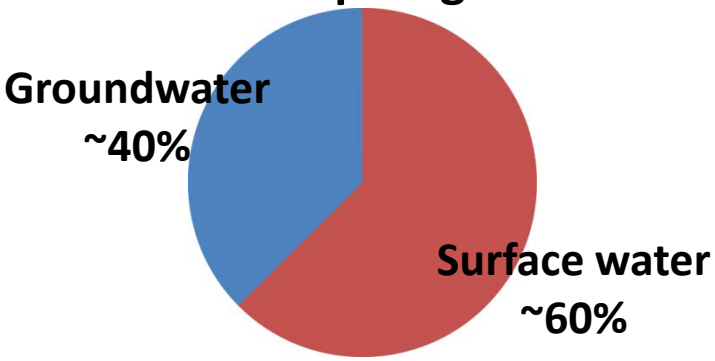
Steve Phillips, Groundwater Specialist

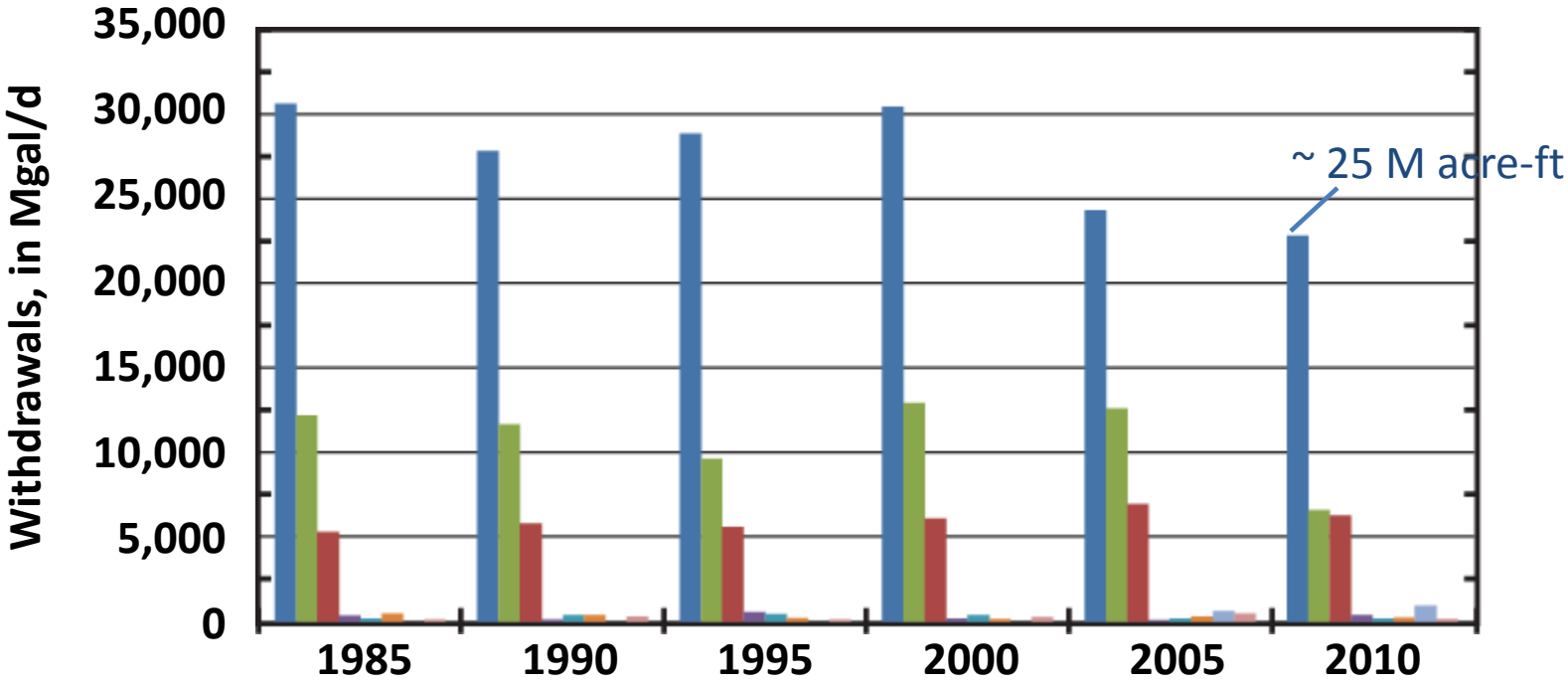
USGS California Water Science Center

# California Water Use

- Crop irrigation
- Thermoelectric
- Public Supply
- Industrial
- Livestock
- Mining
- Aquaculture
- Domestic Self-Supply

## 2010 Crop Irrigation

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# General groundwater trends in agricultural regions of CA

- **Desert basins – declining**
  - **Minimal natural recharge & alternative supplies**
- **Coastal basins – declining south, mixed north**
  - **More natural recharge & SW supplies in north**
- **Central Valley – steady north, declining south**
  - **More natural recharge & SW supplies in north**
  - **Declines severe in southernmost part of valley**

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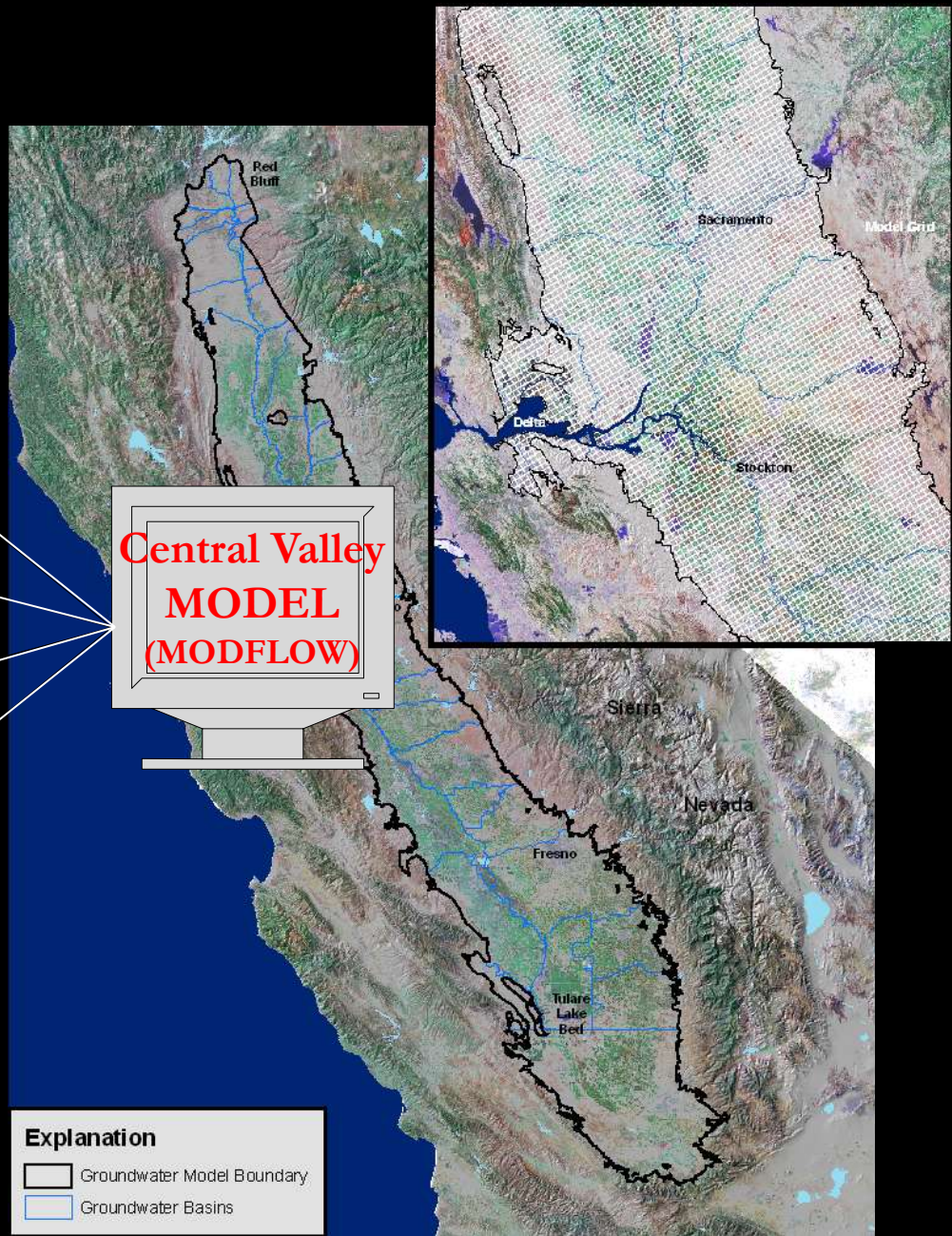
# Central Valley Model → Change in GW Storage

**FARM-WATER BUDGET**

**TEXTURE MODEL**
**(INTERNAL ARCHITECTURE)**

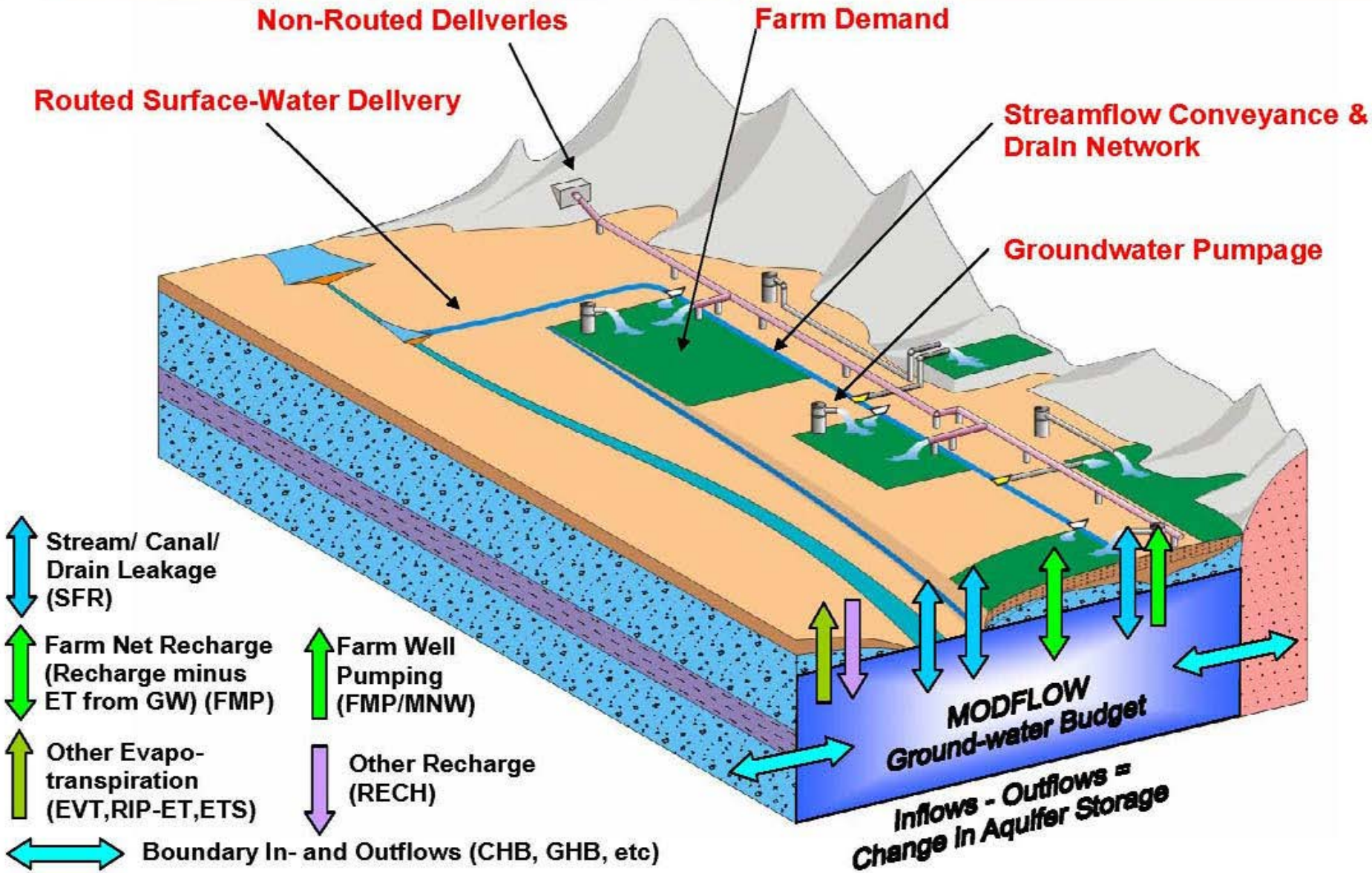
**WATER-LEVEL ANALYSIS**

**ANCILLARY DATA**
**(Subsidence, Climate, Pumping, etc.)**

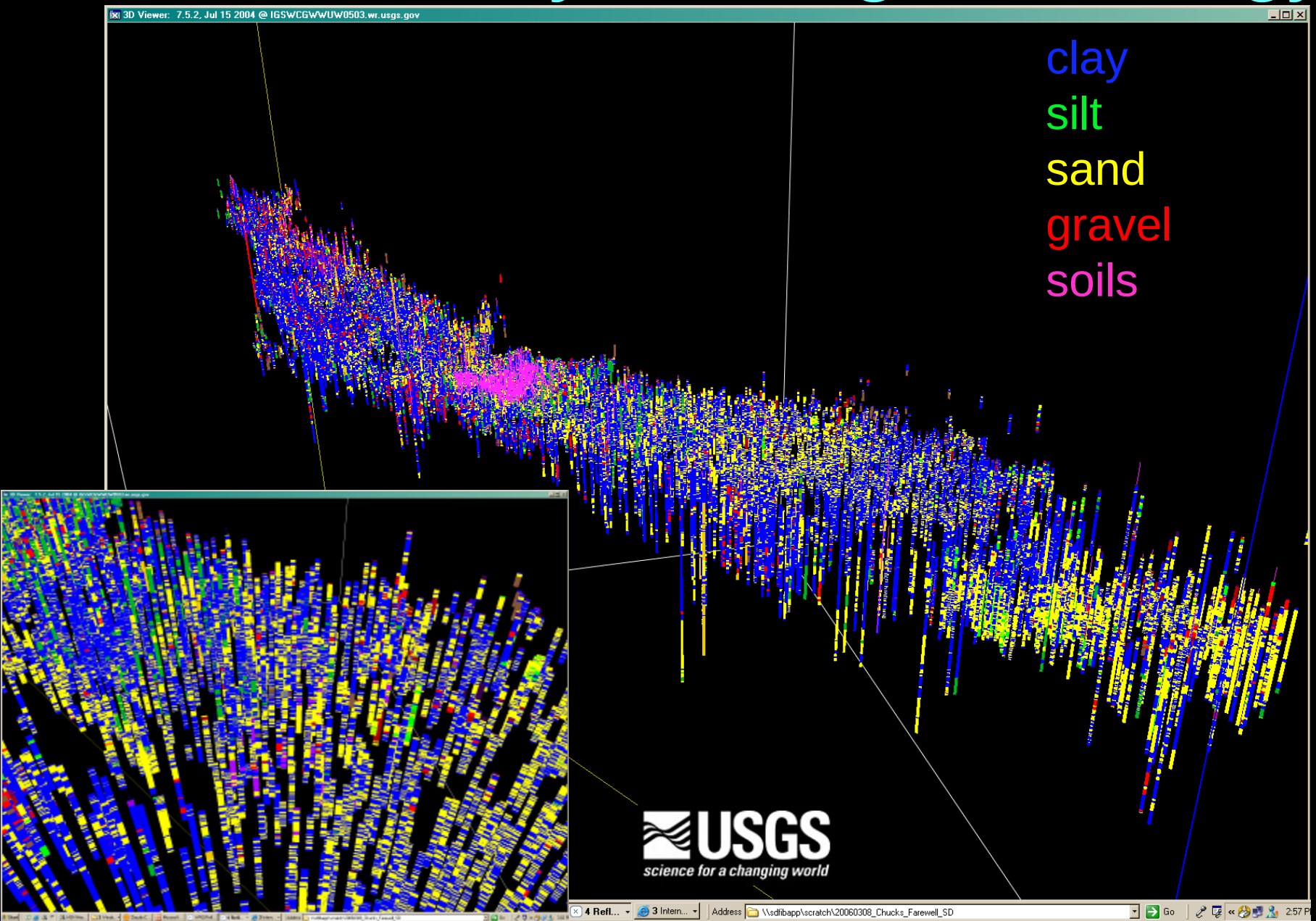


# Current Features of FMP

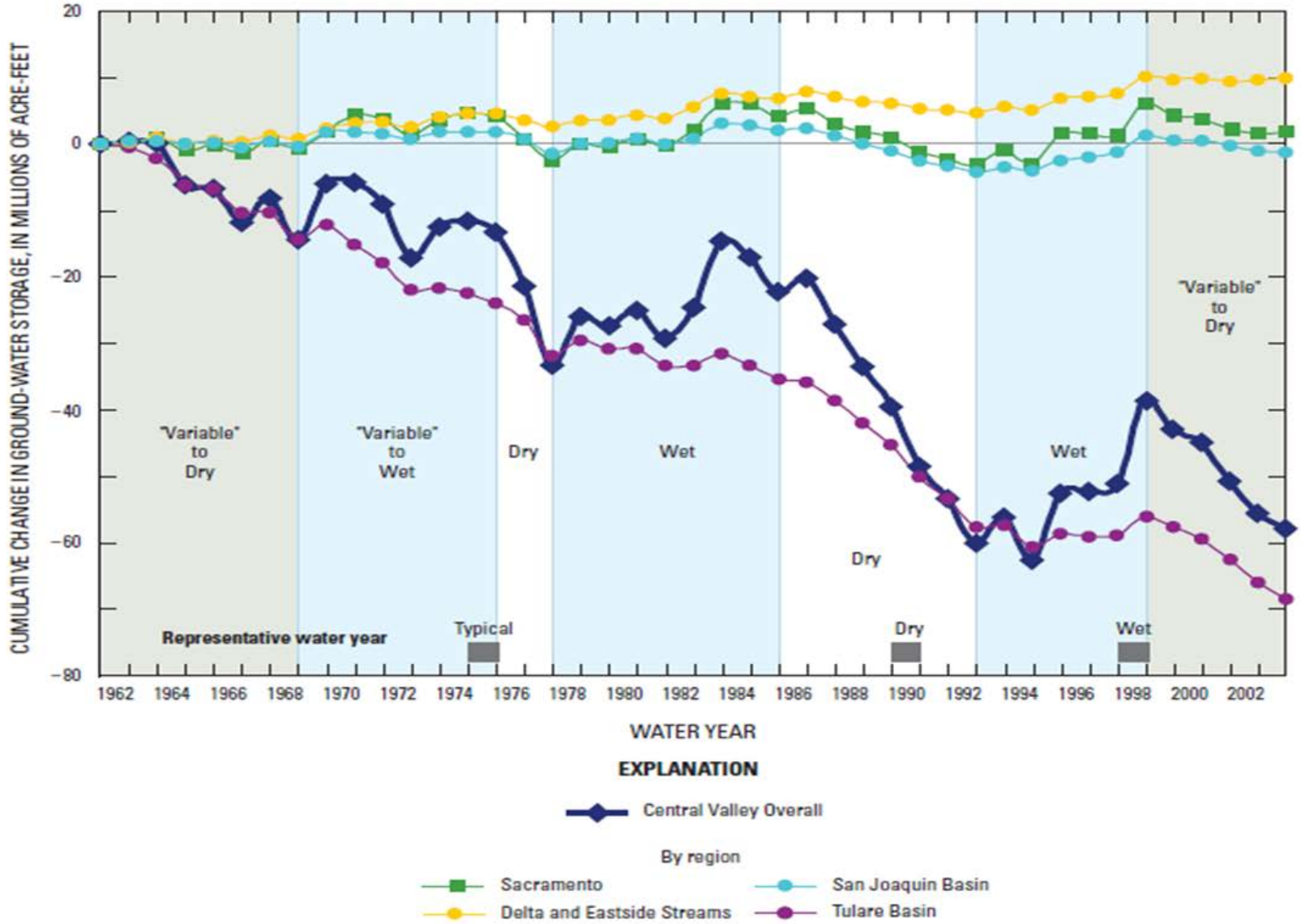
## Demand & Supply and Mass Balances



# Central Valley well logs - lithology



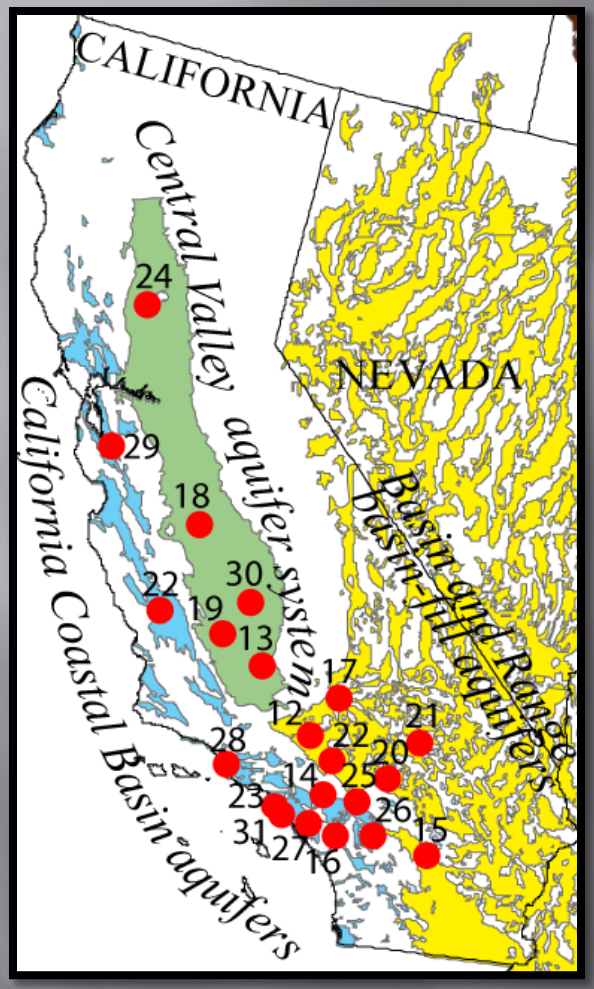
# Change in Groundwater Storage, 1962-2003



# Issues associated with declining groundwater trends

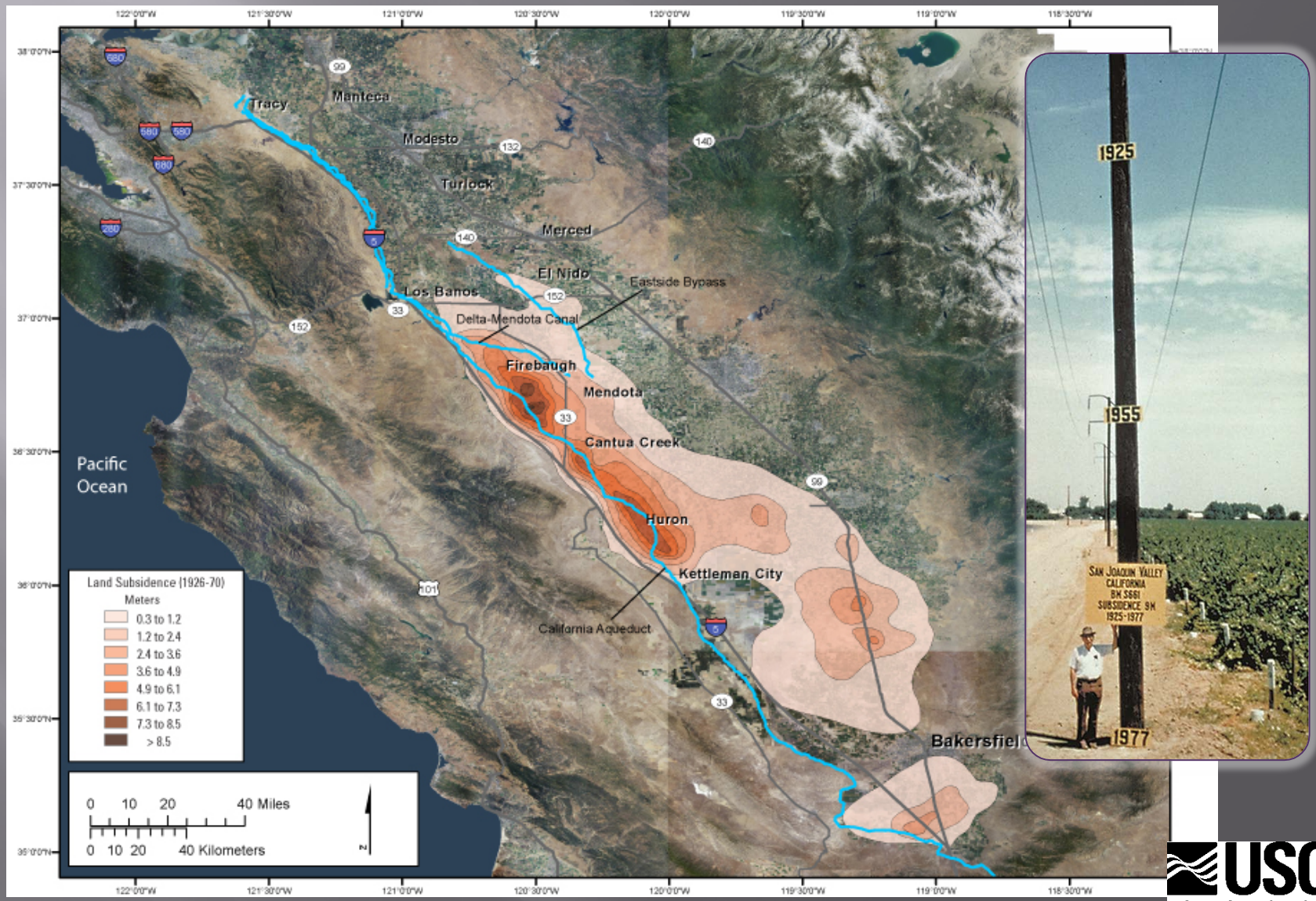
- Land subsidence
- Seawater intrusion
- Degradation of groundwater quality
  - e.g., reliance on older, more mineralized waters
- Environmental effects
  - e.g., drying of wetlands
- Increased cost of withdrawal

# Subsidence Regions in California




| ID | Location Name | Fluid |
|---|---|---|
| 12 | Antelope Valley | W |
| 13 | Arvin-Bakersfield-Maricopa area (San Joaquin Valley) | W, O&G |
| 14 | Chino Basin (and adjacent Claremont and Pomona basins) | W |
| 15 | Coachella Valley | W |
| 16 | Elsinore Trough (Elsinore, Temecula and Wolf valleys) | W |
| 17 | Fremont Valley | W |
| 18 | Los Banos-Kettleman City area (San Joaquin Valley) | W |
| 19 | Lost Hills-Belridge (San Joaquin Valley) | O&G |
| 20 | Lucerne Valley | W |
| 21 | Mojave River Basin | W |
| 22 | Paso Robles | W |
| 23 | Redondo Beach | O&G |
| 24 | Sacramento Valley | W |
| 25 | San Bernardino | W |
| 26 | San Jacinto Basin | W |
| 27 | Santa Ana Basin | W |
| 28 | Santa Clara-Calleguas Basin (Oxnard Plain) | W, O&G |
| 29 | Santa Clara Valley | W |
| 30 | Tulare-Wasco area (San Joaquin Valley) | W |
| 31 | Wilmington | O&G |

# Historical Subsidence

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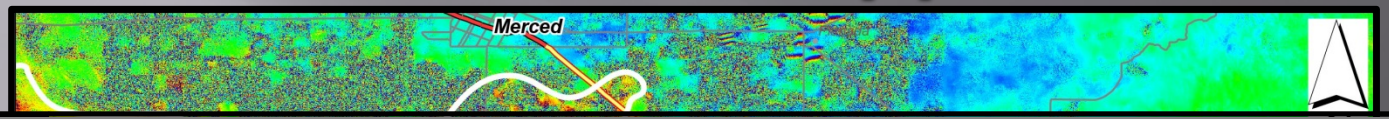
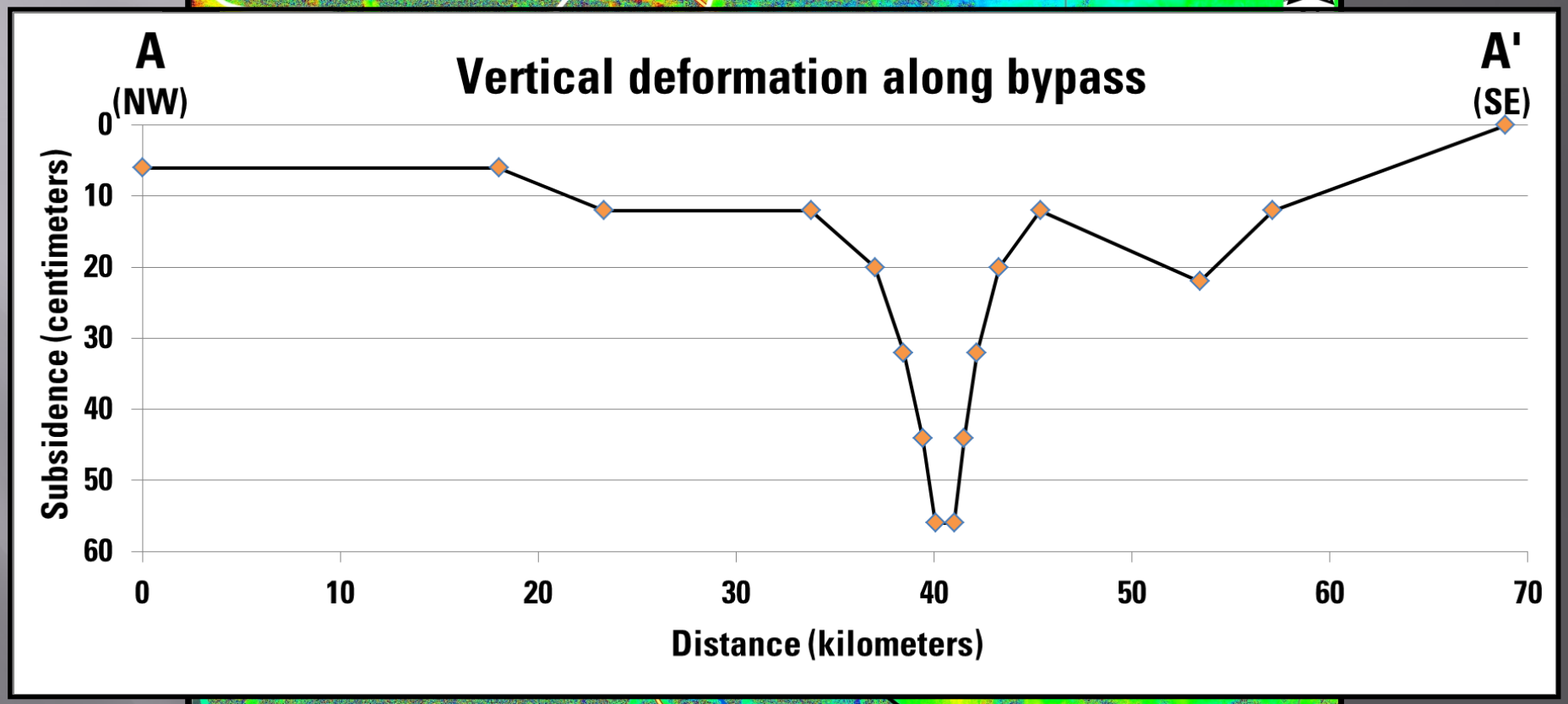
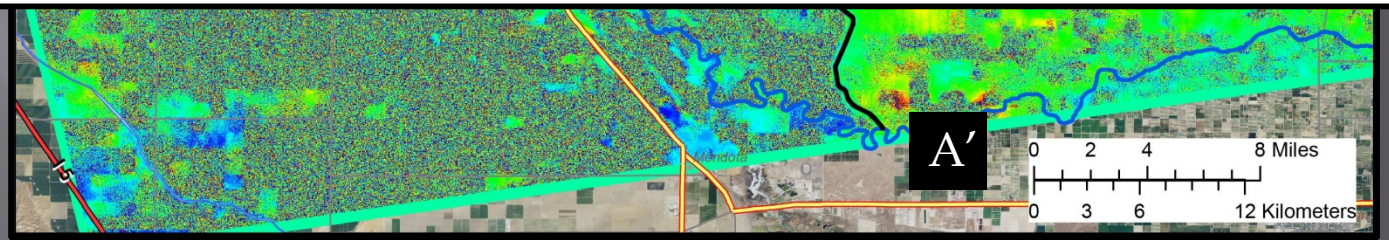
# Subsidence along the Eastside Bypass

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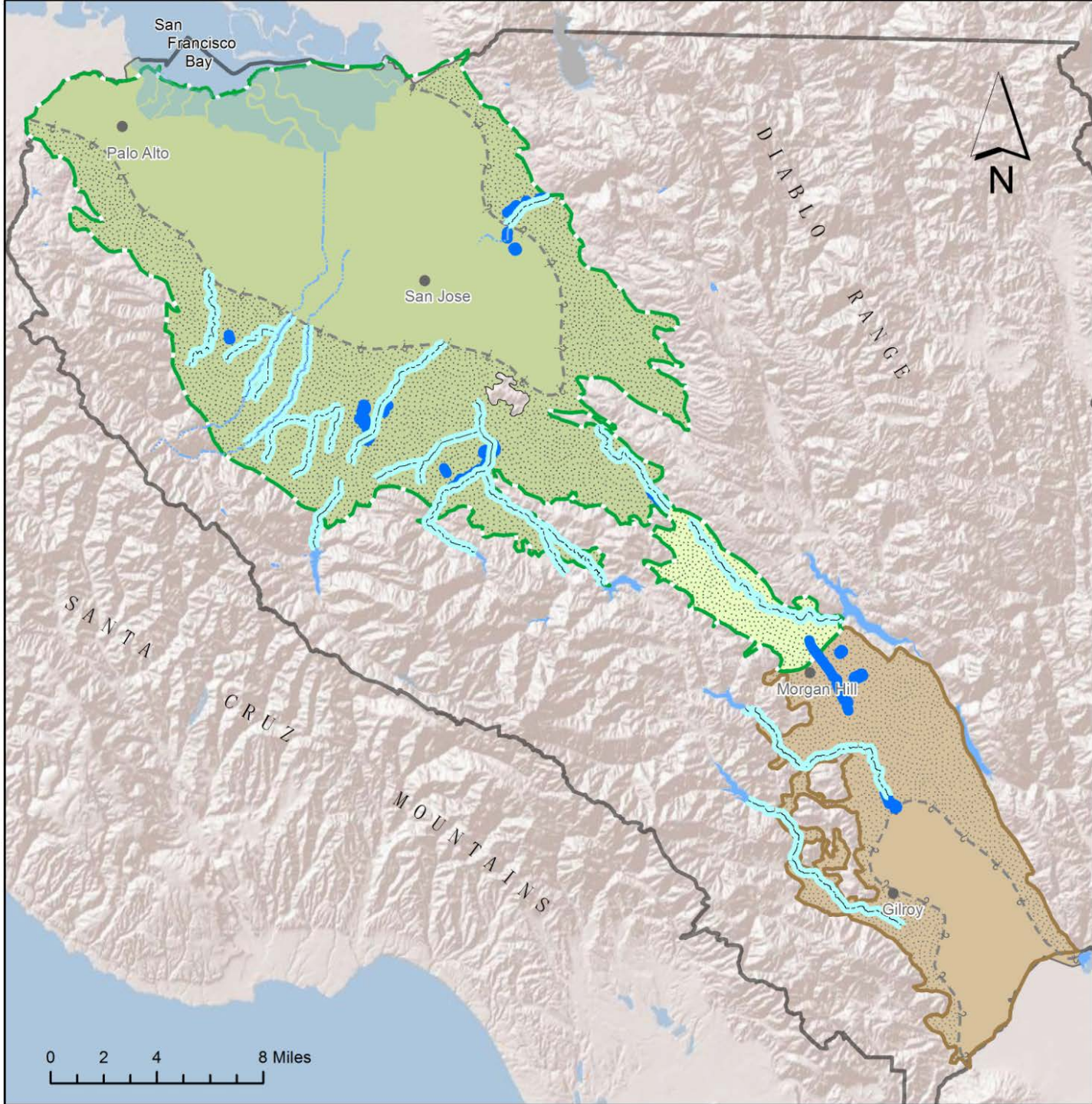
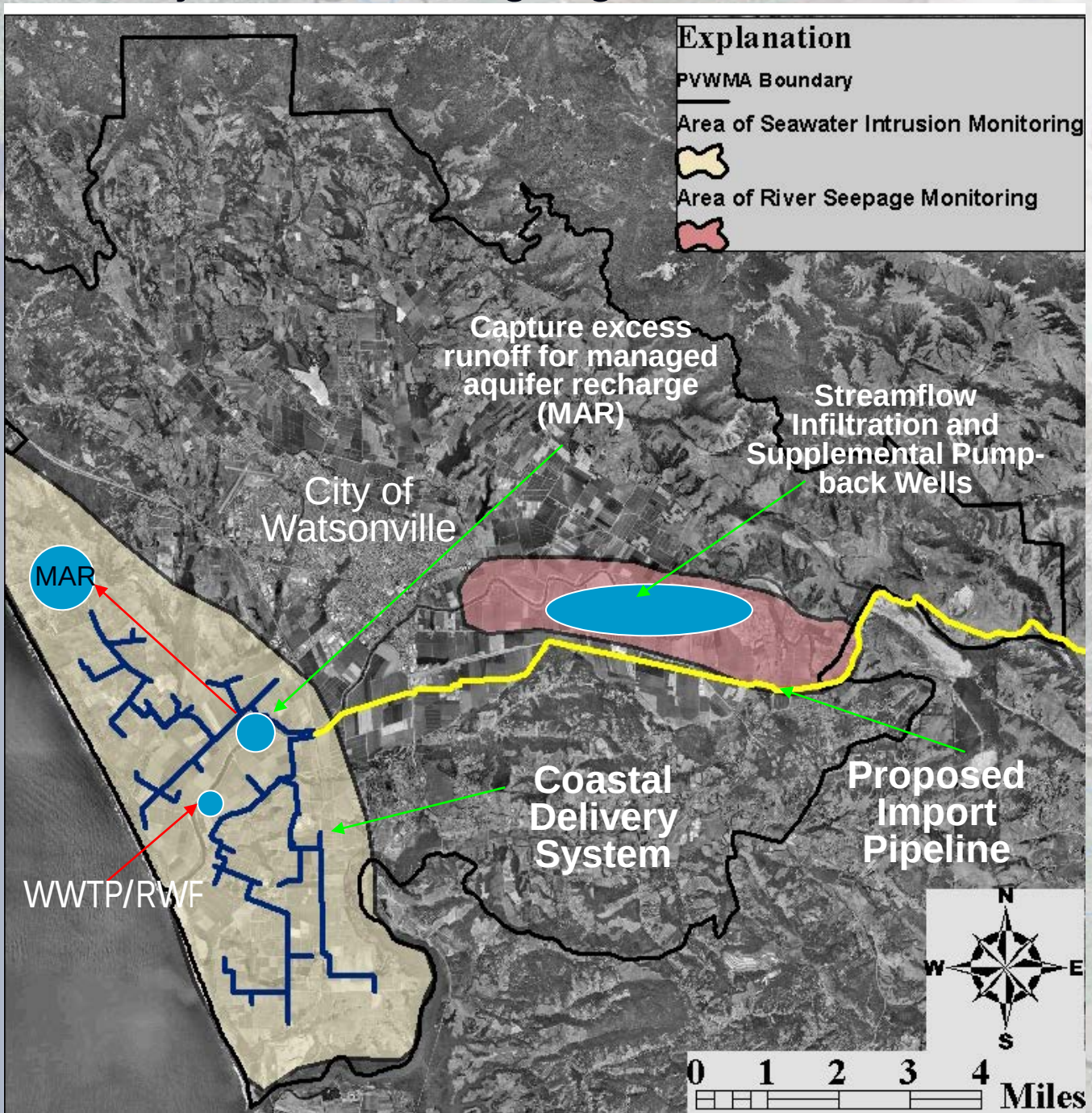
# Santa Clara Valley WD

Successful subsidence abatement using managed aquifer recharge



# Pajaro – Managing Seawater Intrusion




**Pajaro Valley Water Management Agency developed the Coastal Delivery System & related facilities**

**USGS simulations suggest that the existing improvements will reduce seawater intrusion by ~50% for the next 30 years**

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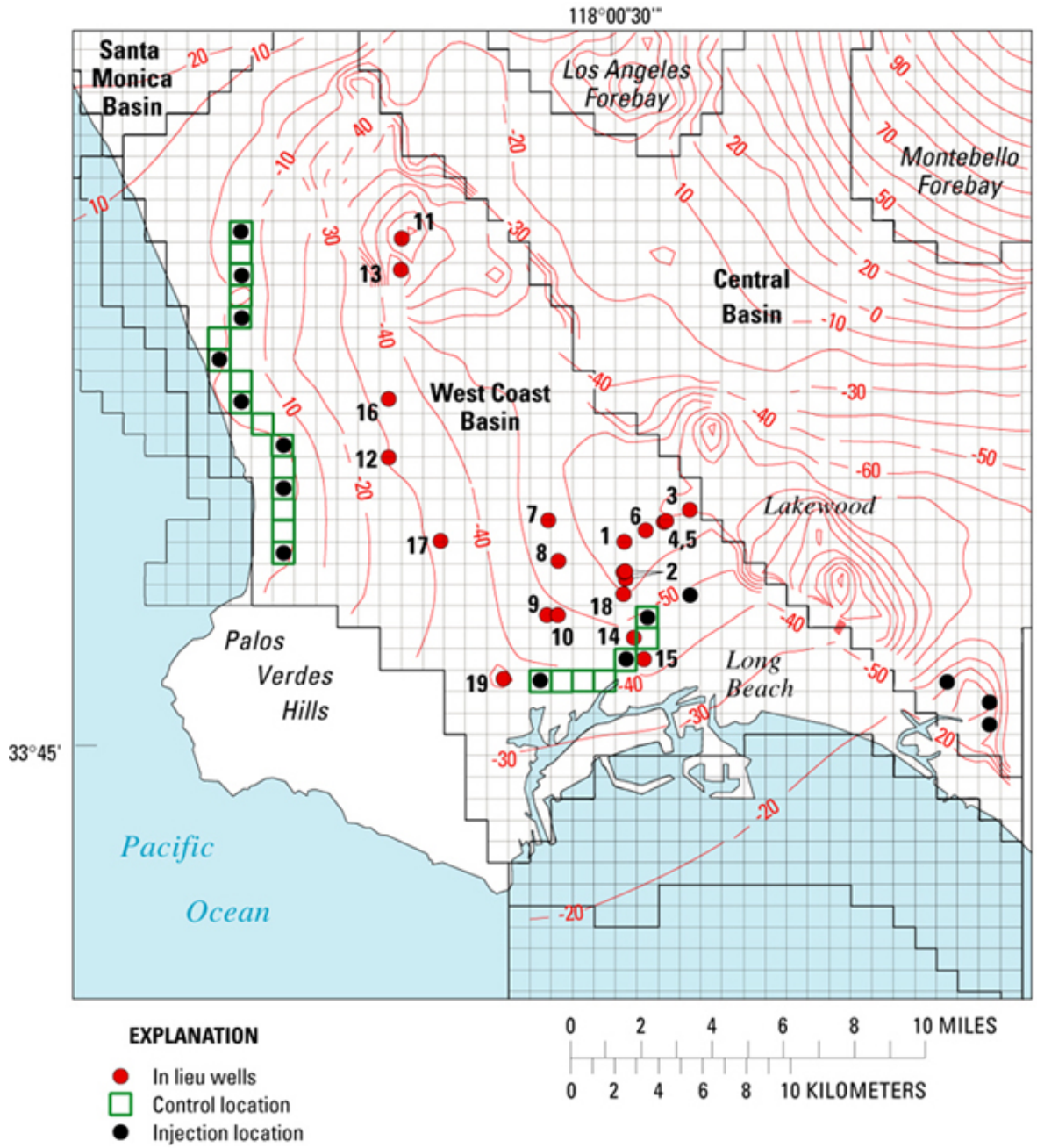
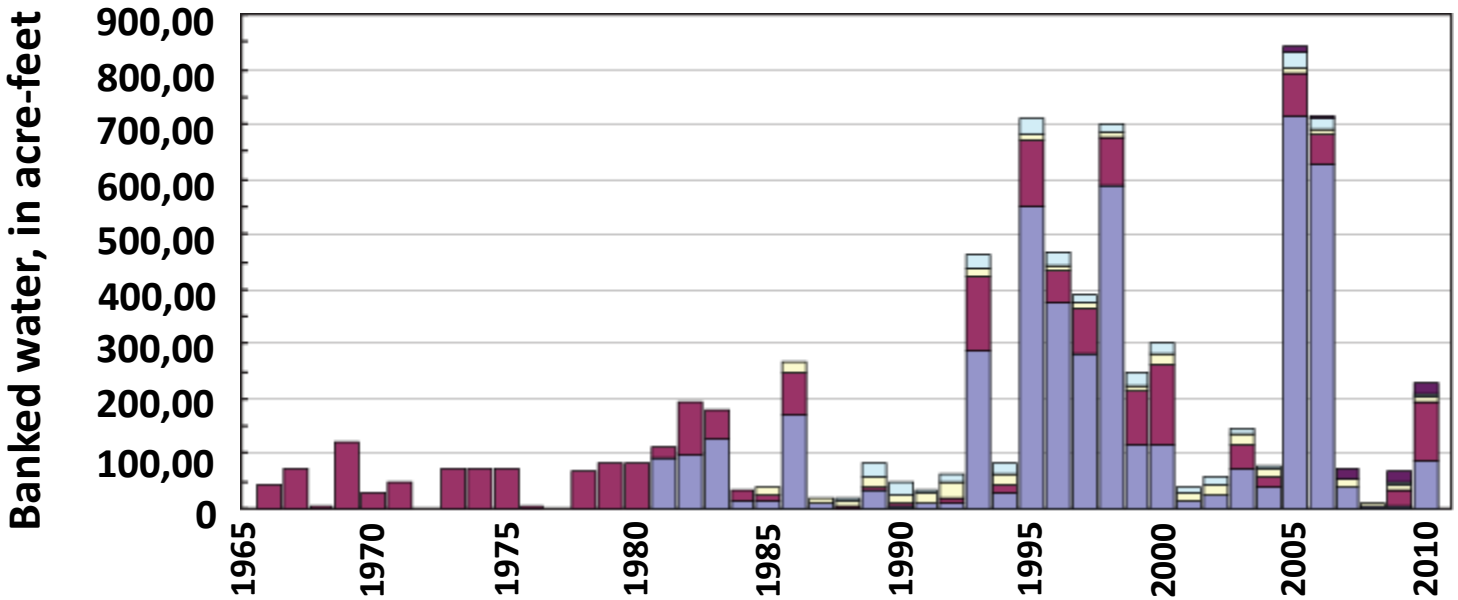
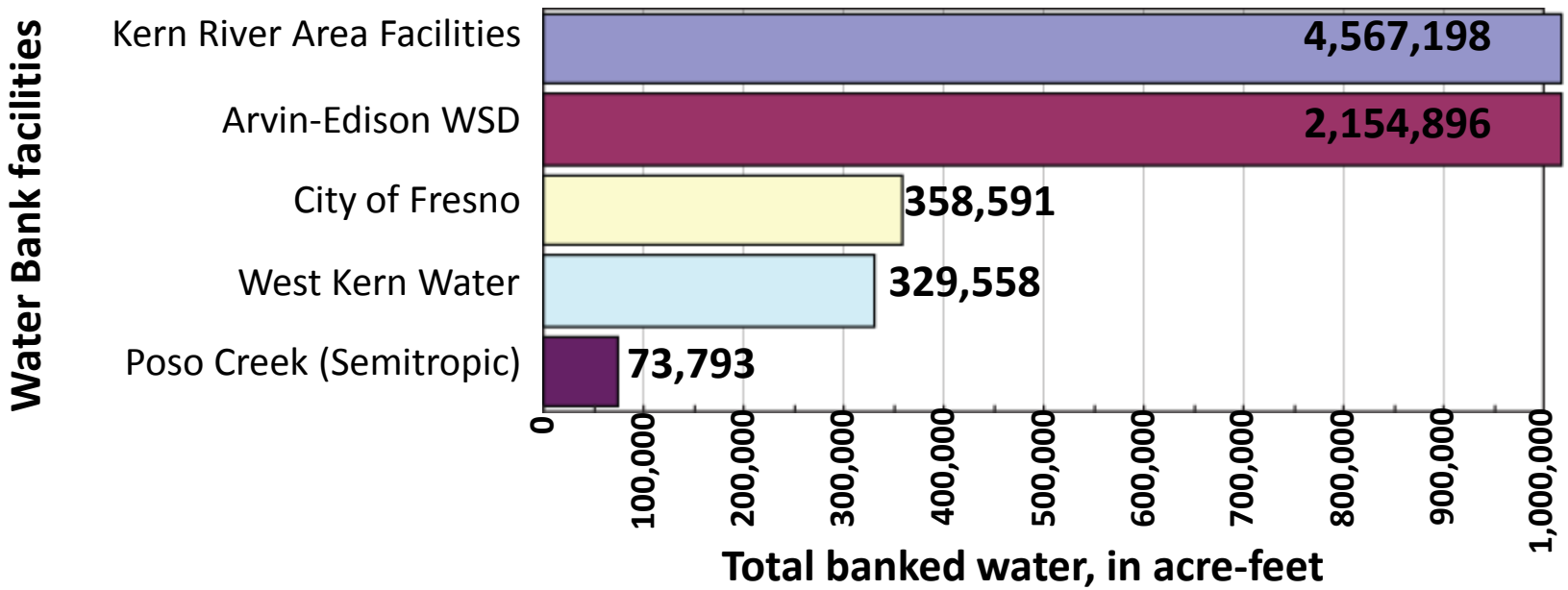
# Injection barriers for managing seawater intrusion

Example from Los Angeles Basin – USGS optimization modeling for barrier efficiency



# Water Banking facilities in the Central Valley



# Intentional flooding of fields for flood control & recharge of aquifer

A flooded field at Terranova Ranch (courtesy of Phil Bachand and Don Cameron, Terranova Ranch), near King's River

**How Flooding Fields Could Alleviate Water Supply Stress**
*Audio Report by Sasha Khokha for KQED Science on Mar 29, 2013;* http://science.kqed.org/quest/audio/how-flooding-fields-could-alleviate-water-supply-stress/

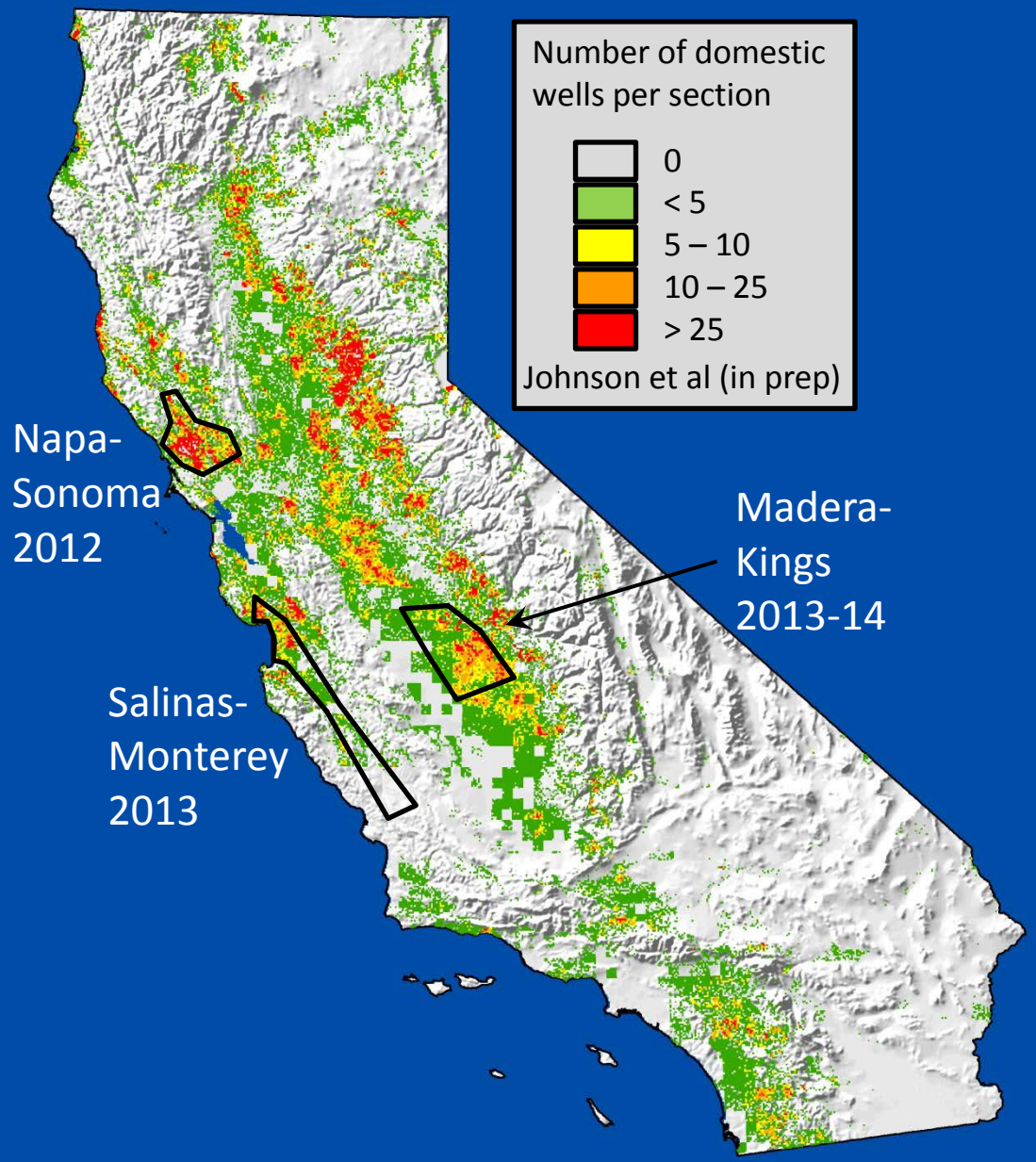
# GAMA Priority Basin Project: Proposal for Shallow Aquifer Assessment

Shallow aquifer commonly used by domestic drinking-water supply wells

Sample existing wells, primarily domestic, also MW and irrigation wells

Integrate studies with other monitoring programs

First 3 studies funded by current GAMA Prop 50 – future funding unknown

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Water Boards

# Questions?

*Contact Steve Phillips for more information:*
*sphillip@usgs.gov 916-278-3002*