

Source: The Nature Conservancy



Sacramento Valley Groundwater: A Brief Overview

Speaking of Education...

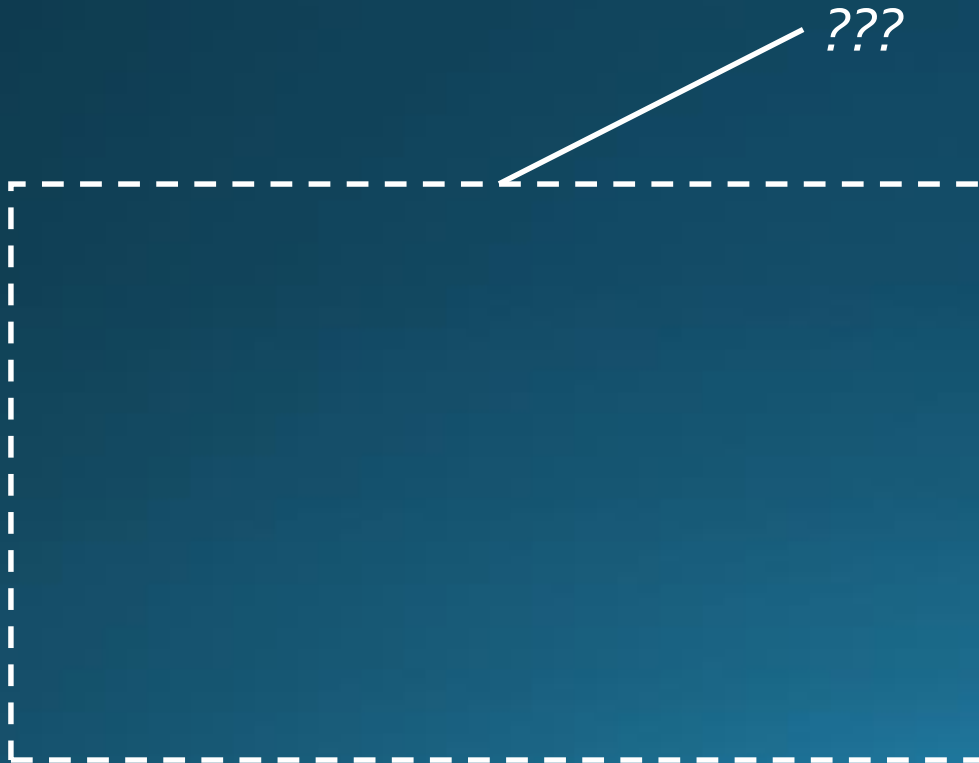
- The general public's view on water:

*I don't know much
about this part*



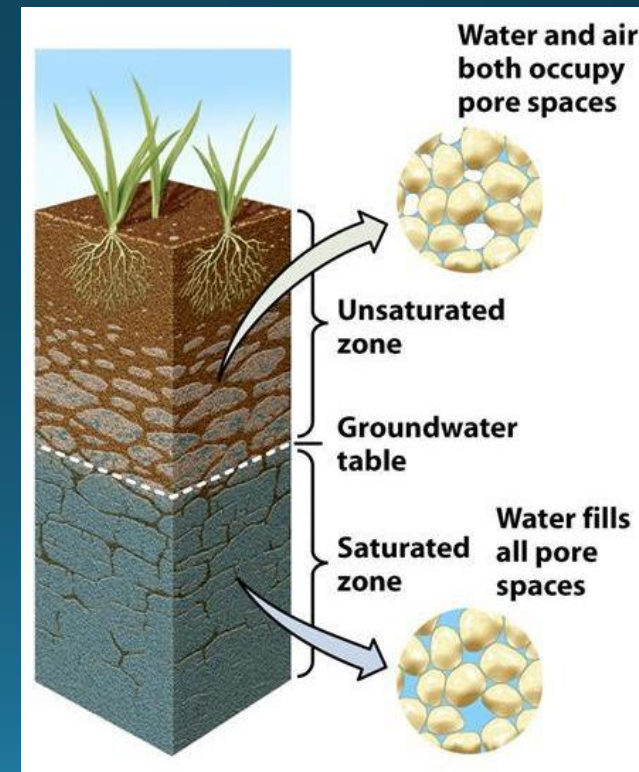
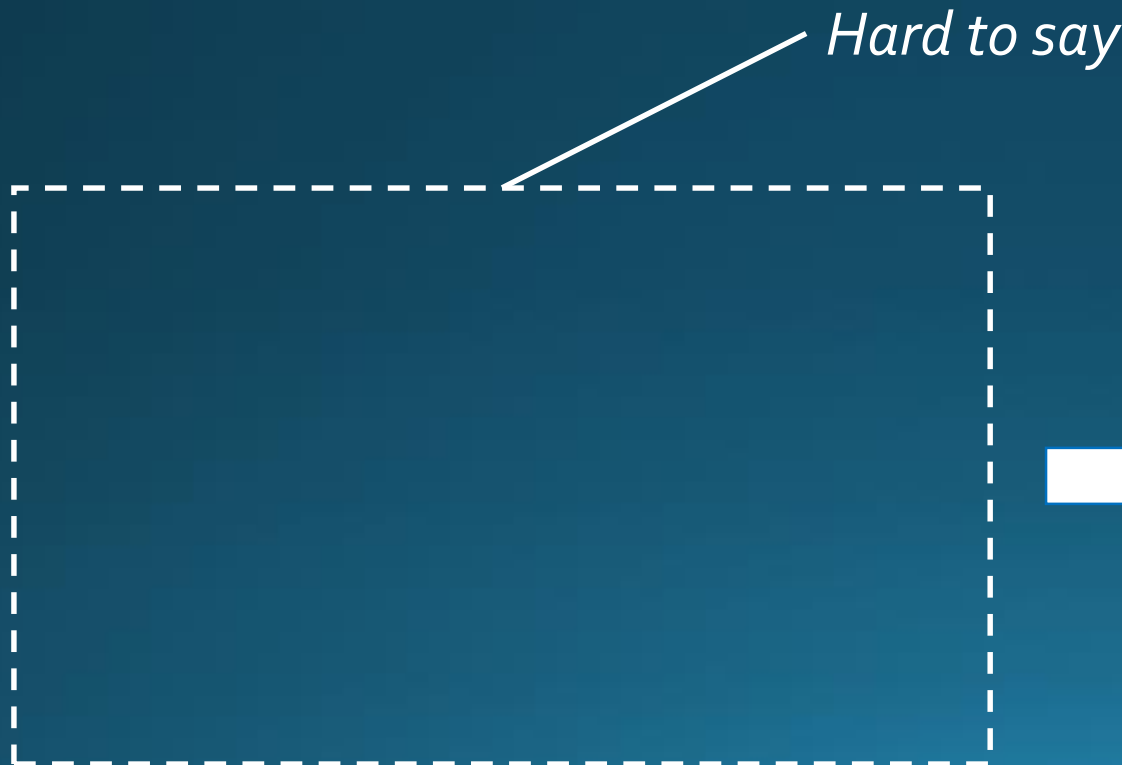
Speaking of Education...

- The general public's view on food:



Speaking of Education...

- The general public's view on groundwater:

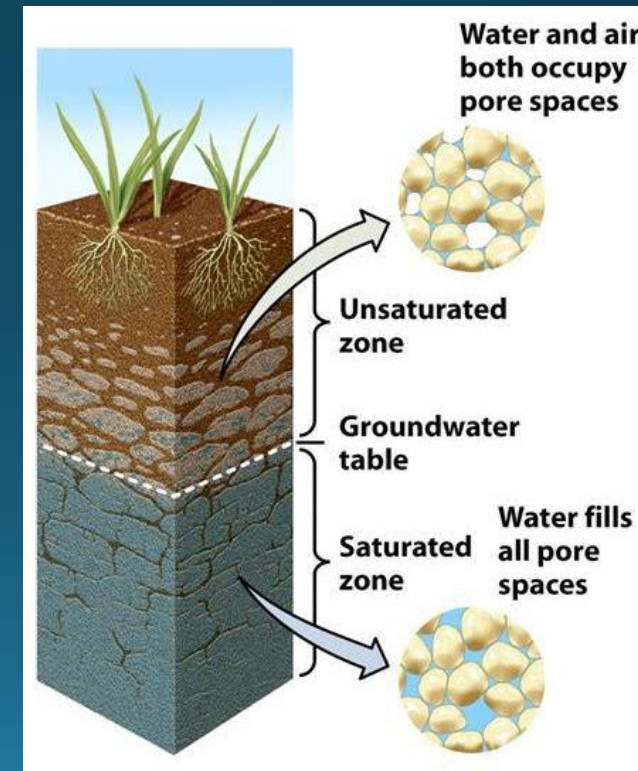


Speaking of Education...



- The general public's view on groundwater:

*Best Guess:
Dwarves???*



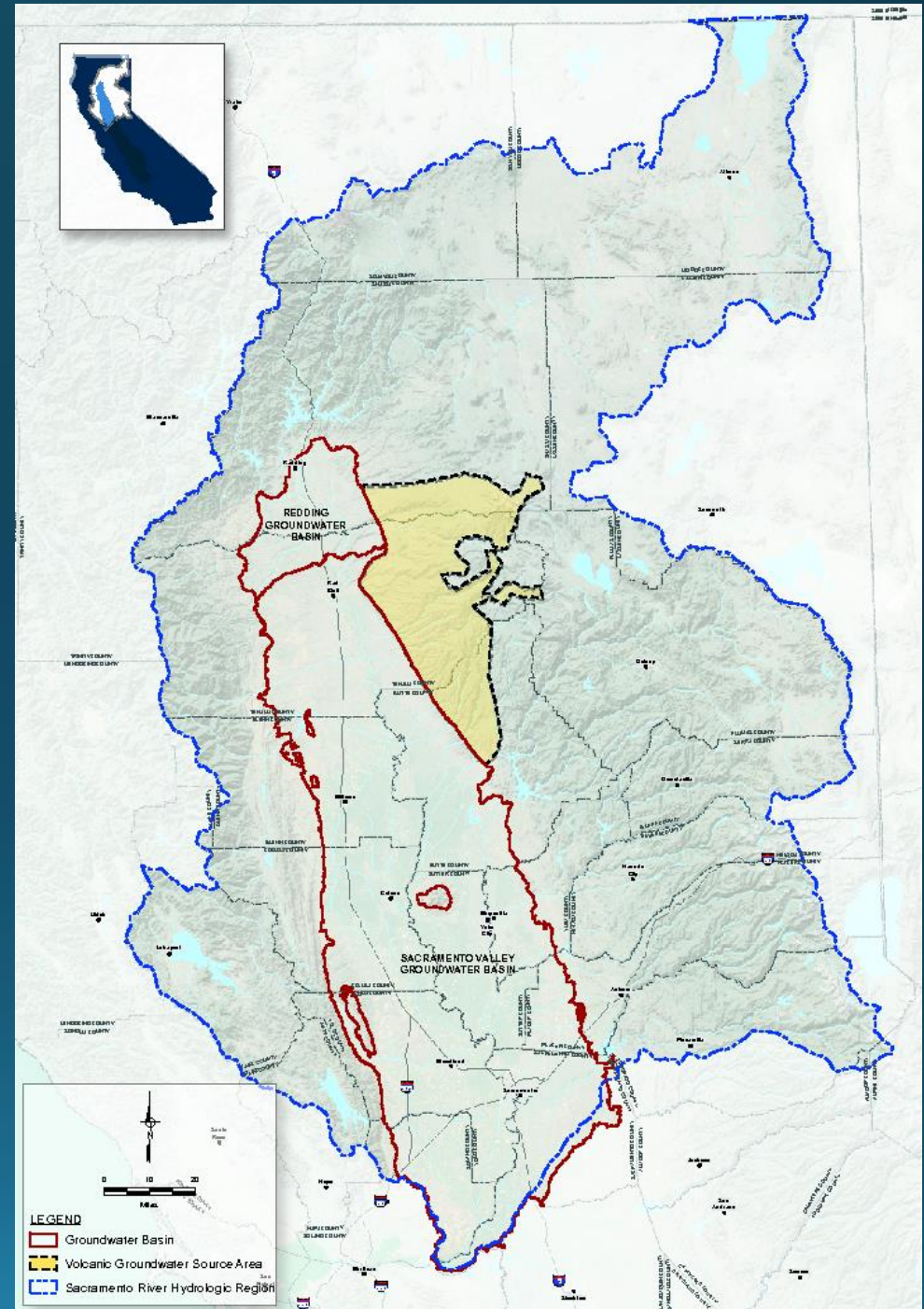
Outline

1. Sacramento Valley Setting and Historical Development
2. Examples of Existing Groundwater Management
3. Effects of Increasing Groundwater Use
4. 2014 Groundwater Legislation

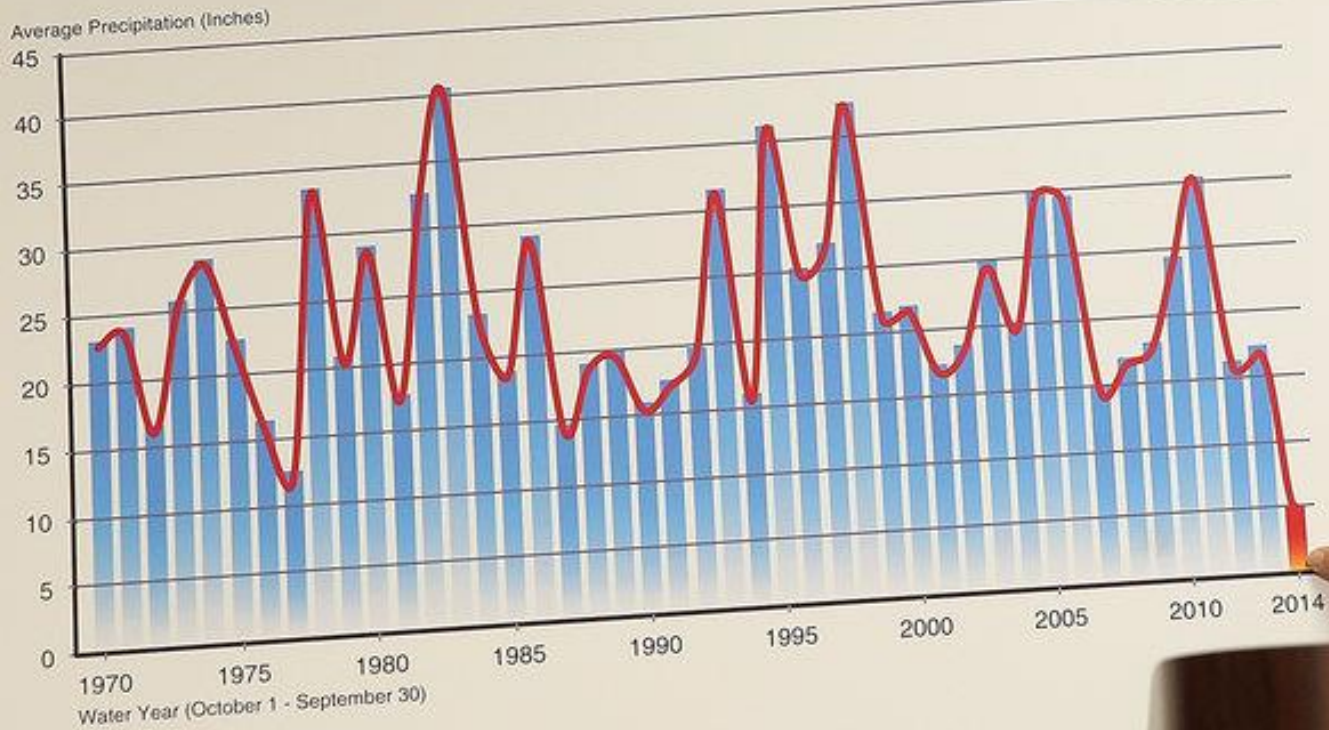


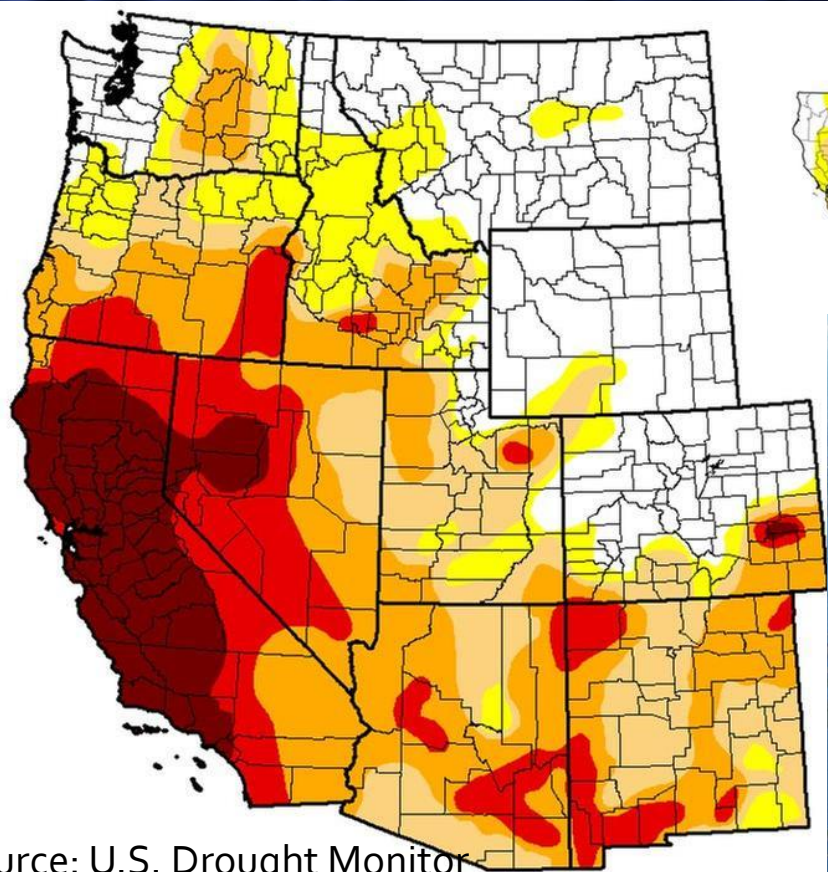
Sacramento River Basin

- 17.4 million acres
- 22 million acre-feet average unimpaired runoff
- 1/3 of State runoff
- Largest component of Bay-Delta inflow
- CVP and SWP projects



Statewide Average Precipitation - by water year





Source: U.S. Drought Monitor

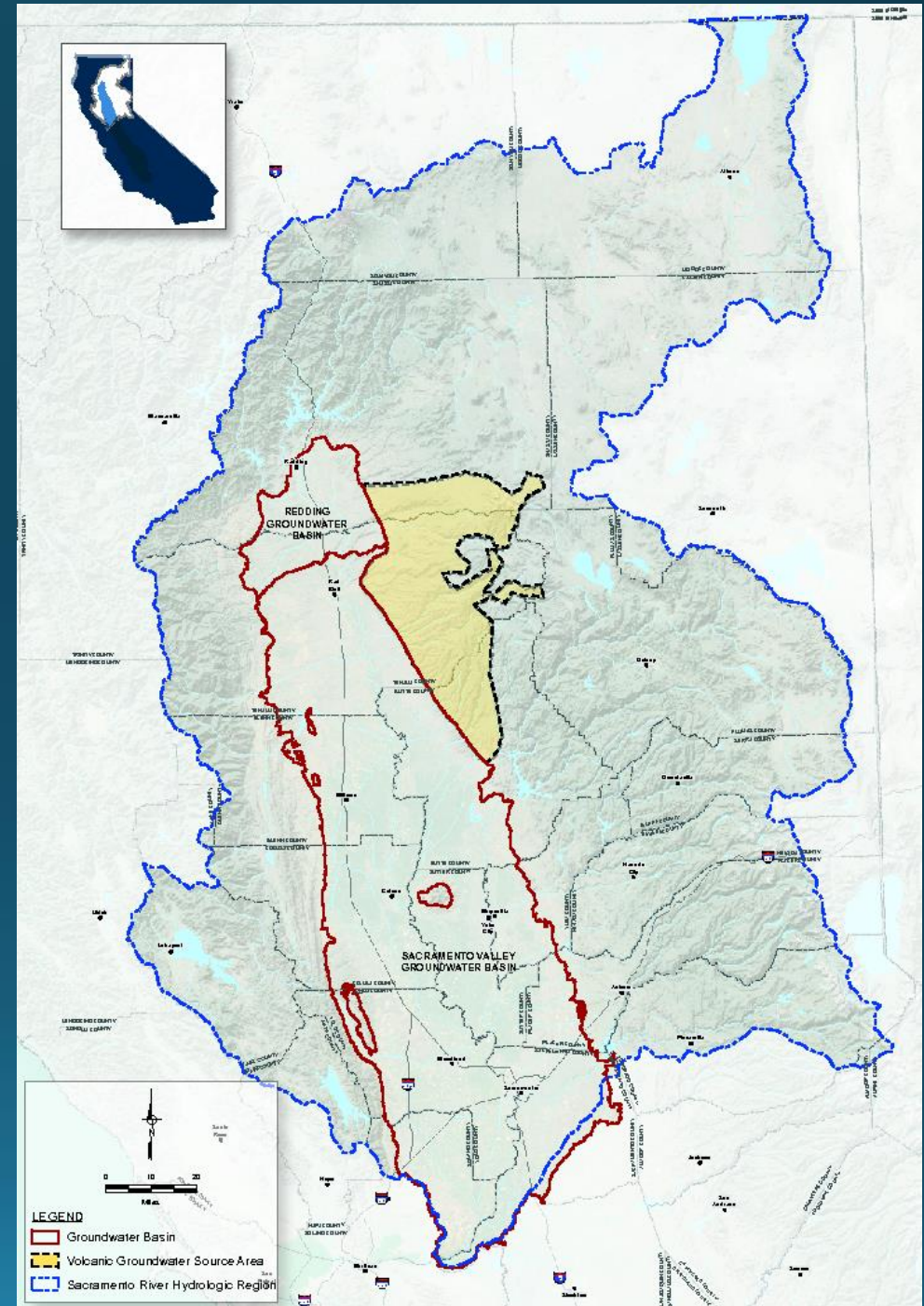


Source: U.S. Army Corp of Engineers

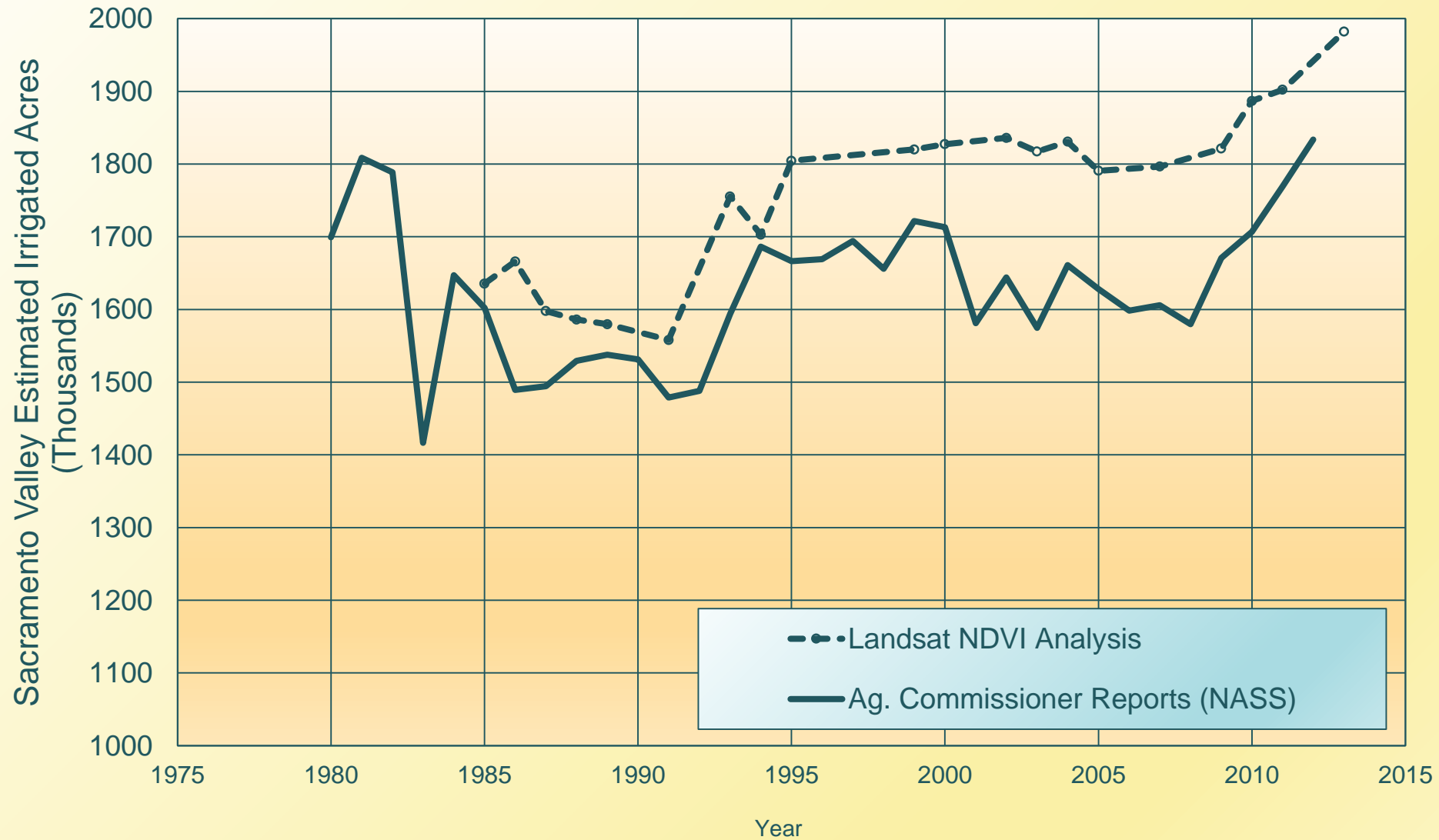
Source: Justin Sullivan/Getty Images

Sacramento and Redding Groundwater Basins

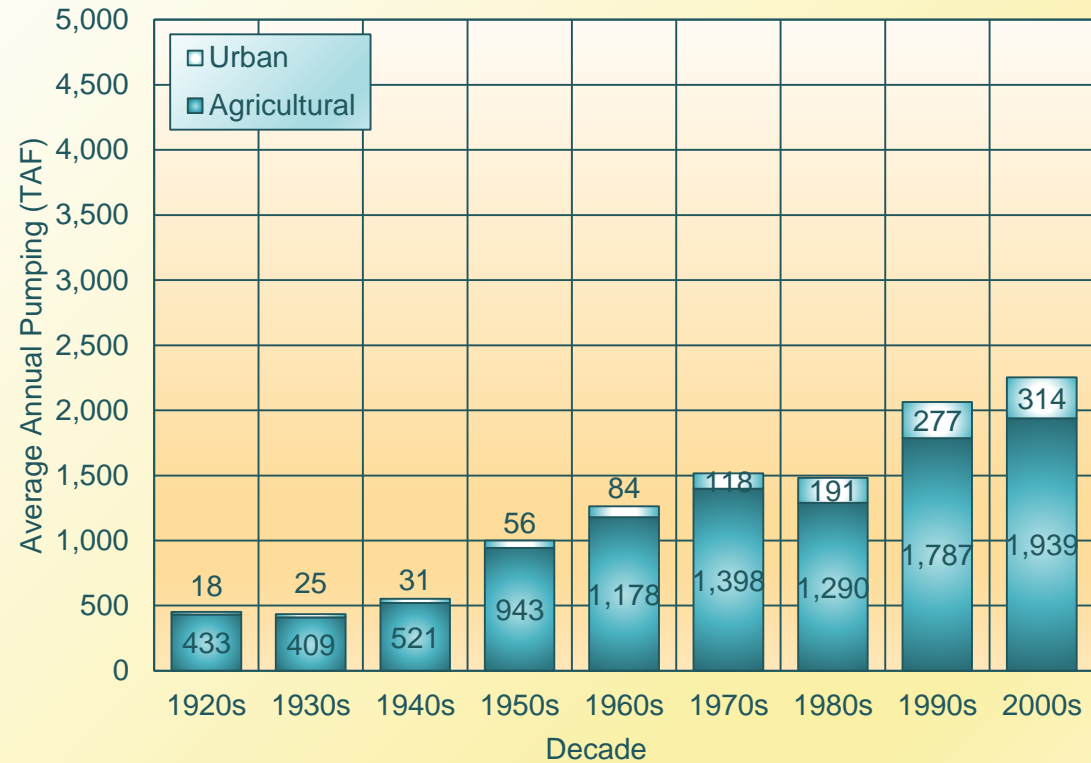
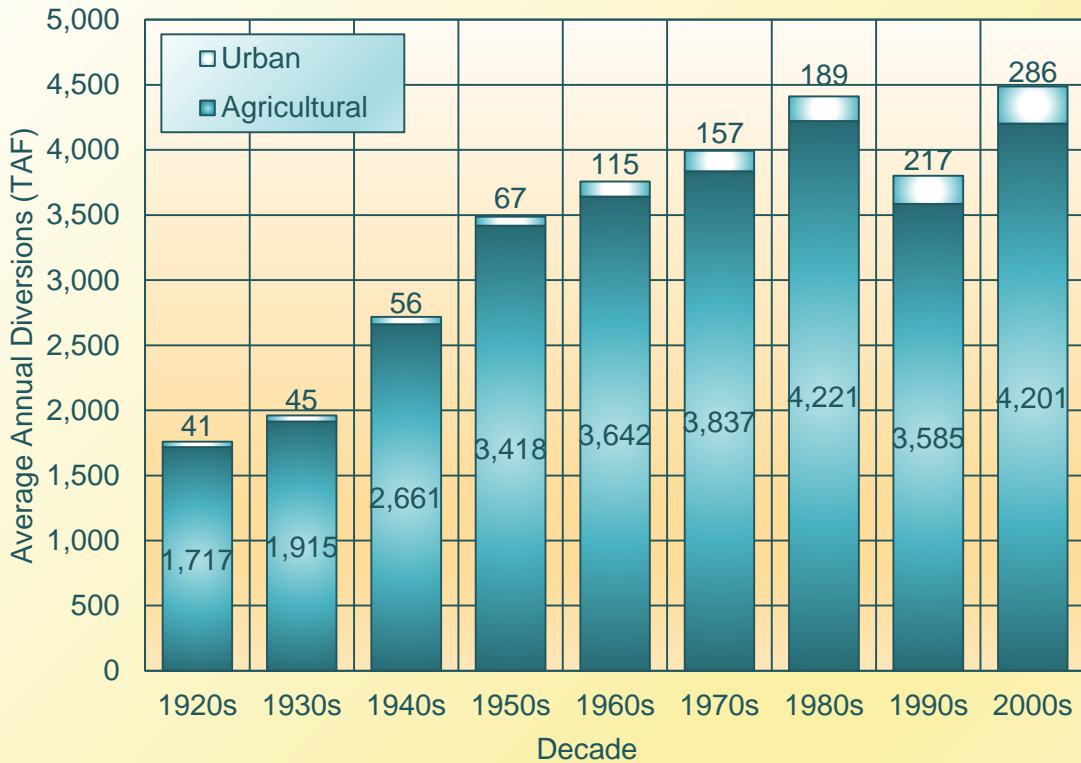
- 4.3M acres total area
 - Roughly coincident with “Valley floor”
 - About 1.8 M to 2.0 M acres irrigated agriculture
- ±50MAF in GW storage (DWR Bulletin 118)
- 8 MAF/yr applied water demand
 - 5.5 MAF surface water
 - 2.5 MAF groundwater
 - 6 MAF consumptively used
 - 2 MAF returns to system



Ongoing Expansion of Irrigated Agriculture



Ag and Urban Diversions & Pumping



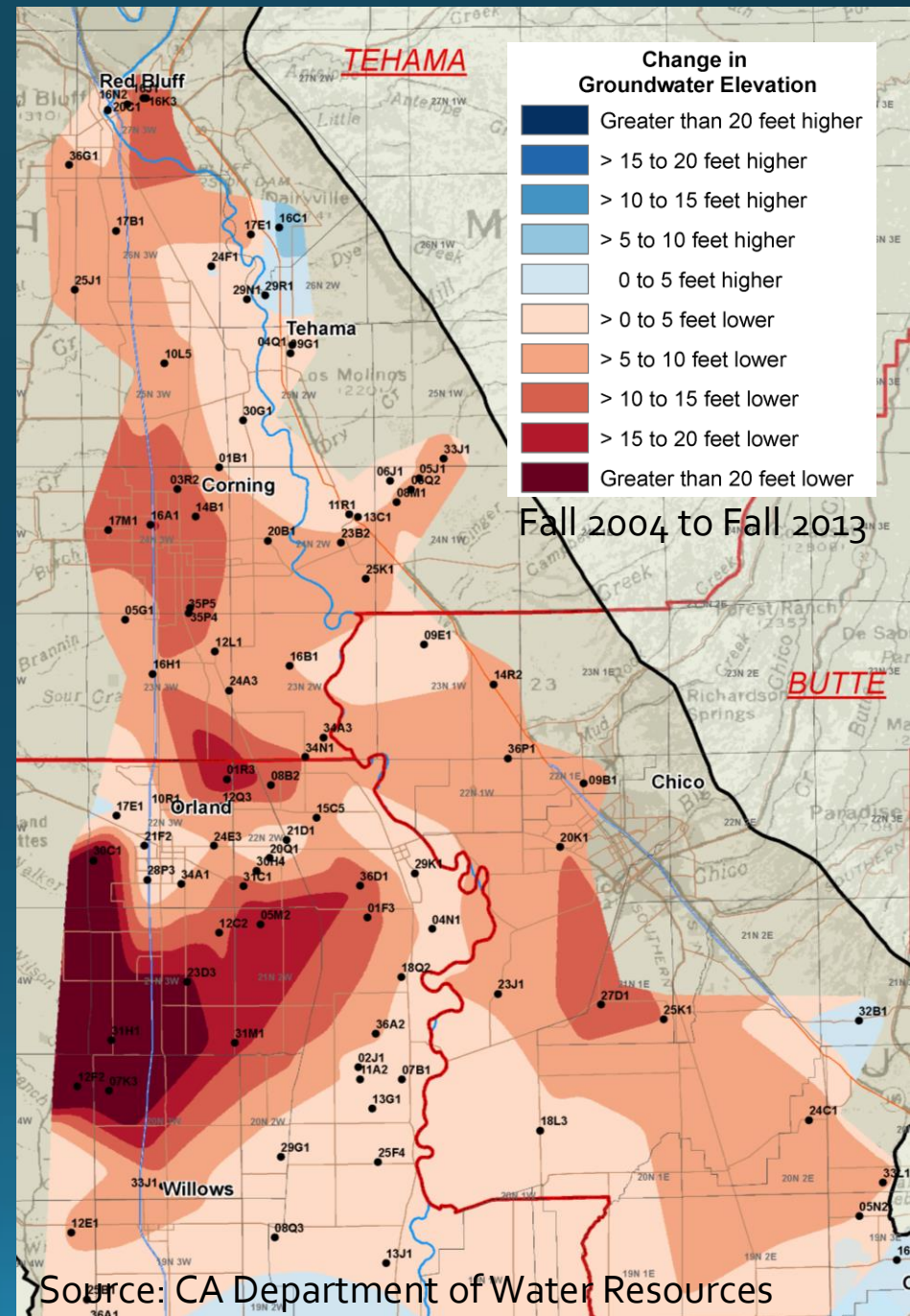
Surface Water Diversions

Groundwater Pumping

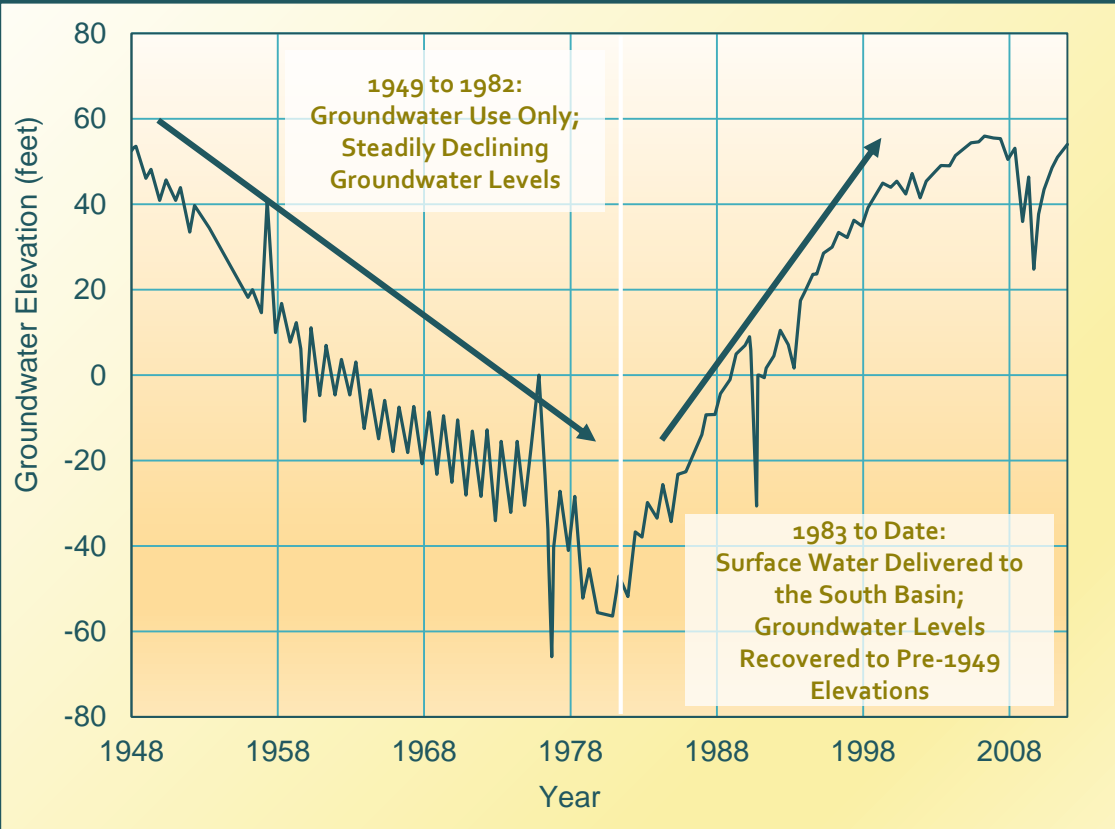
Sacramento Valley surface water diversions have leveled off while groundwater pumping has continued to increase, primarily to meet agricultural water demands.

Declining GW Levels in Some Areas

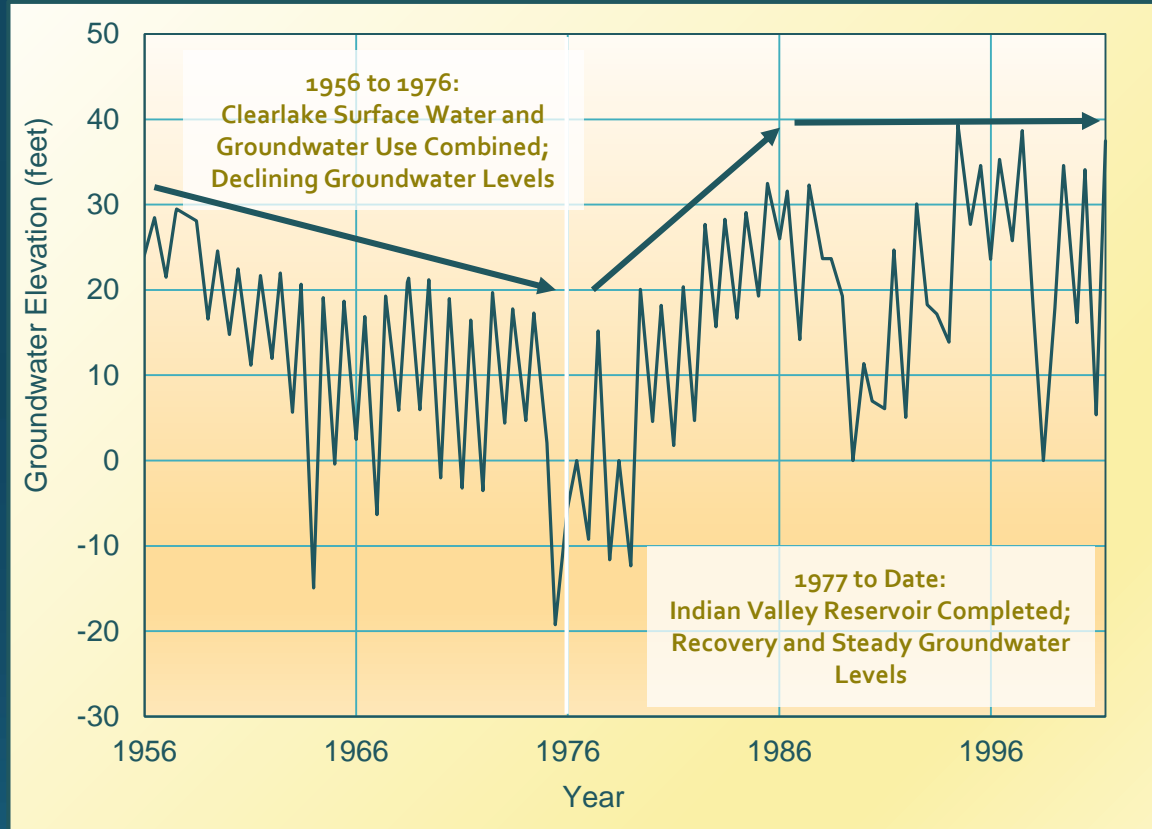
- Conventional wisdom: Sacramento Valley aquifers are drawn down seasonally but fully recover each spring
- Reality: recently, groundwater levels are not fully recovering in all areas
 - Reduced recharge
 - Increased pumping



Examples of Groundwater Management Successes in the Sacramento Valley



Yuba County



Yolo County

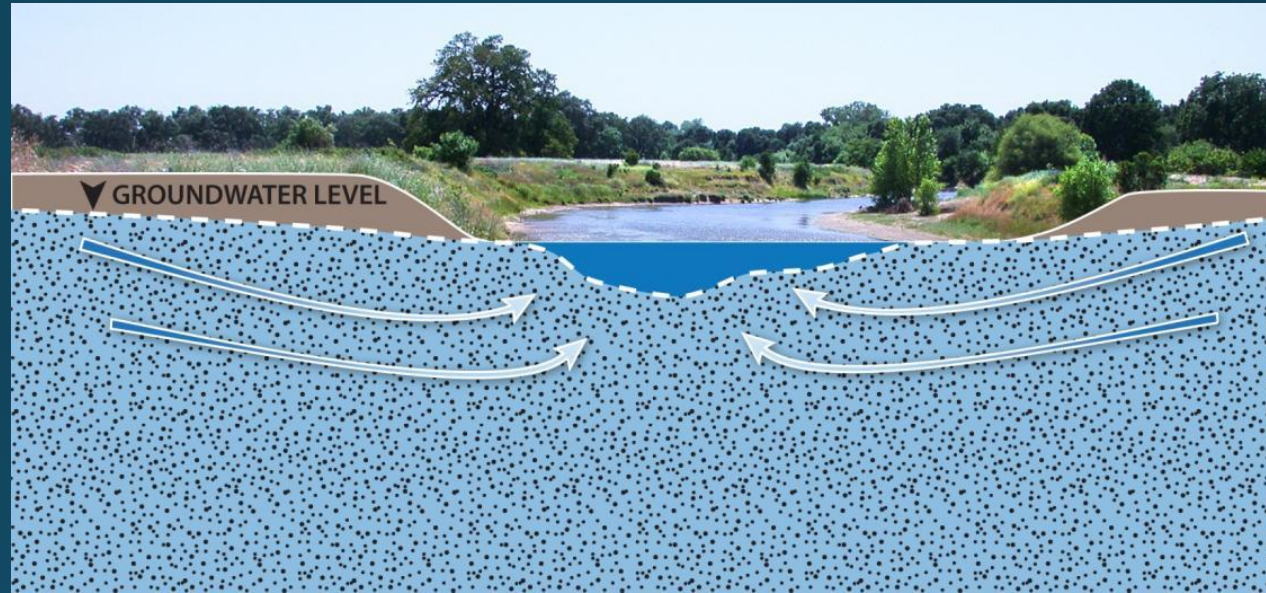
In both cases, sustainable groundwater levels have been achieved by increasing surface water supplies.

What Happens When You Pump a Well?

- Concept of Capture as formulated by Theis (1940) in his “The Source Of Water Derived From Wells.”
- Well water comes from a combination of:
 1. Change in Storage
 2. Induced Recharge
 3. Reduced Discharge
- “Time To Full Capture” (Bredehoeft and Durbin 2009) on the order of years to centuries; typically decades

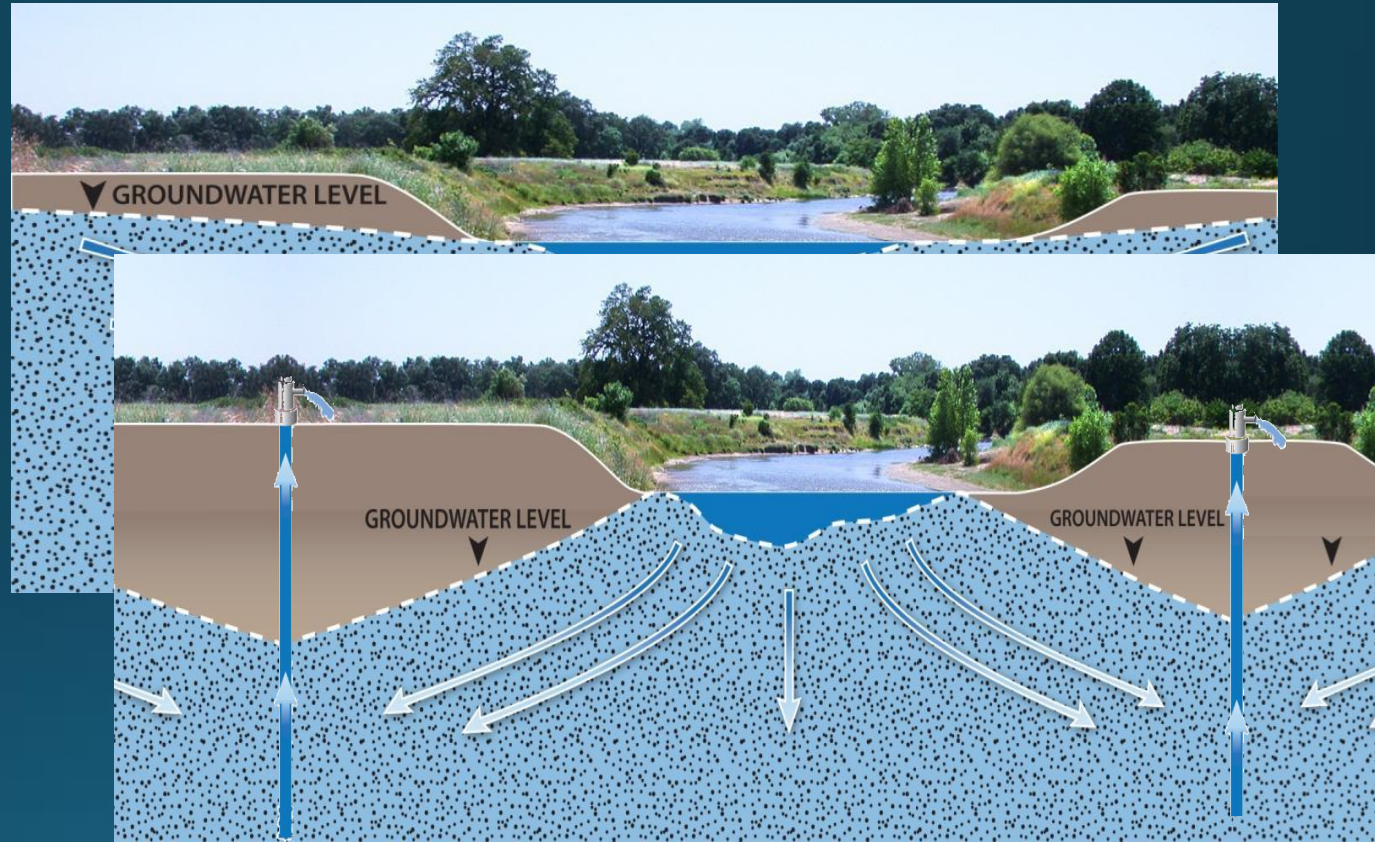
Interactions between Aquifers and Streams

- Groundwater levels impact interactions between aquifers and streams
- The uppermost groundwater sustains rivers and streams
- Delayed effects: challenge to adaptive management
- Lake Tahoe analogy



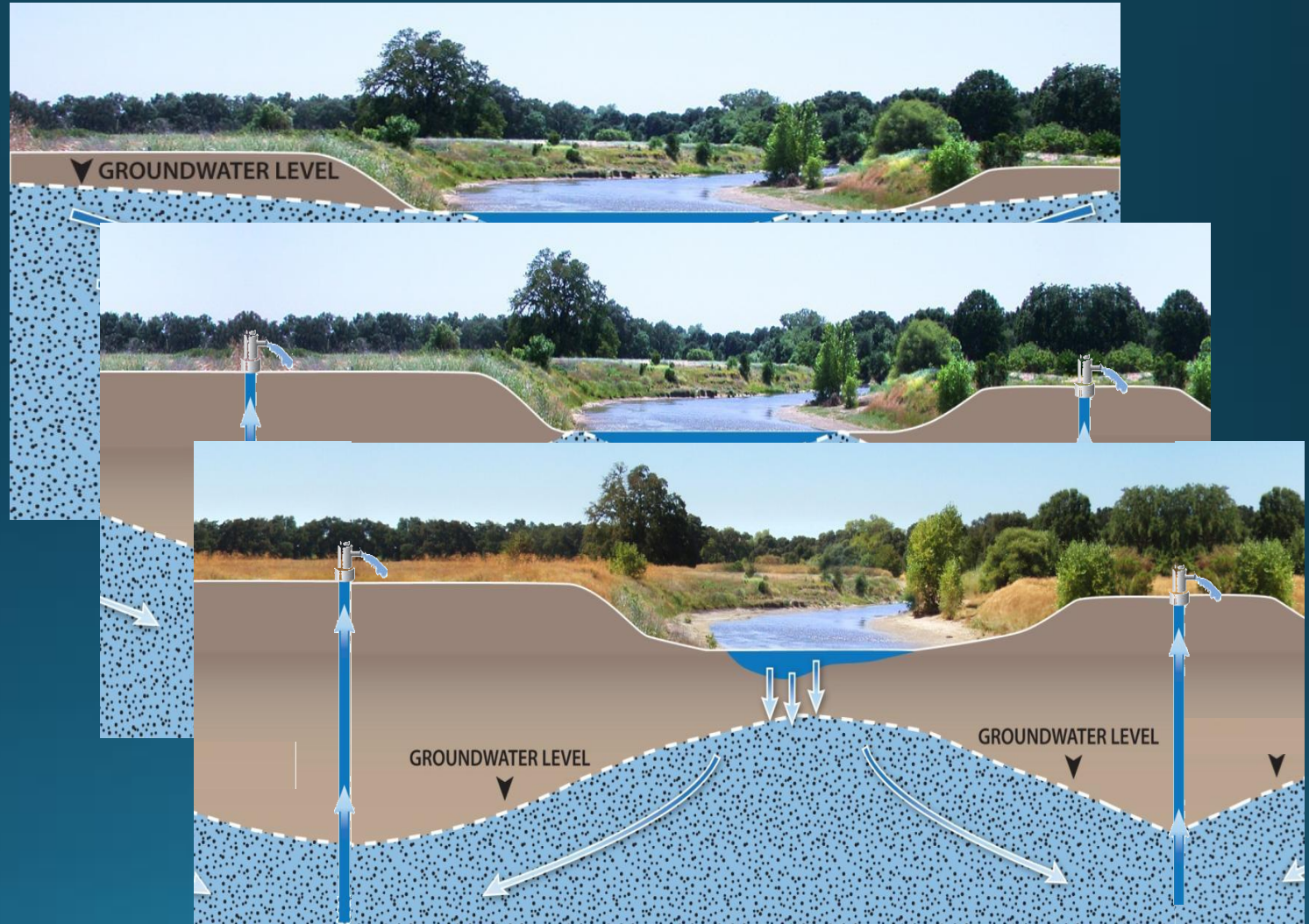
Interactions between Aquifers and Streams

- Groundwater levels impact interactions between aquifers and streams
- The uppermost groundwater sustains rivers and streams
- Delayed effects: challenge to adaptive management
- Lake Tahoe analogy

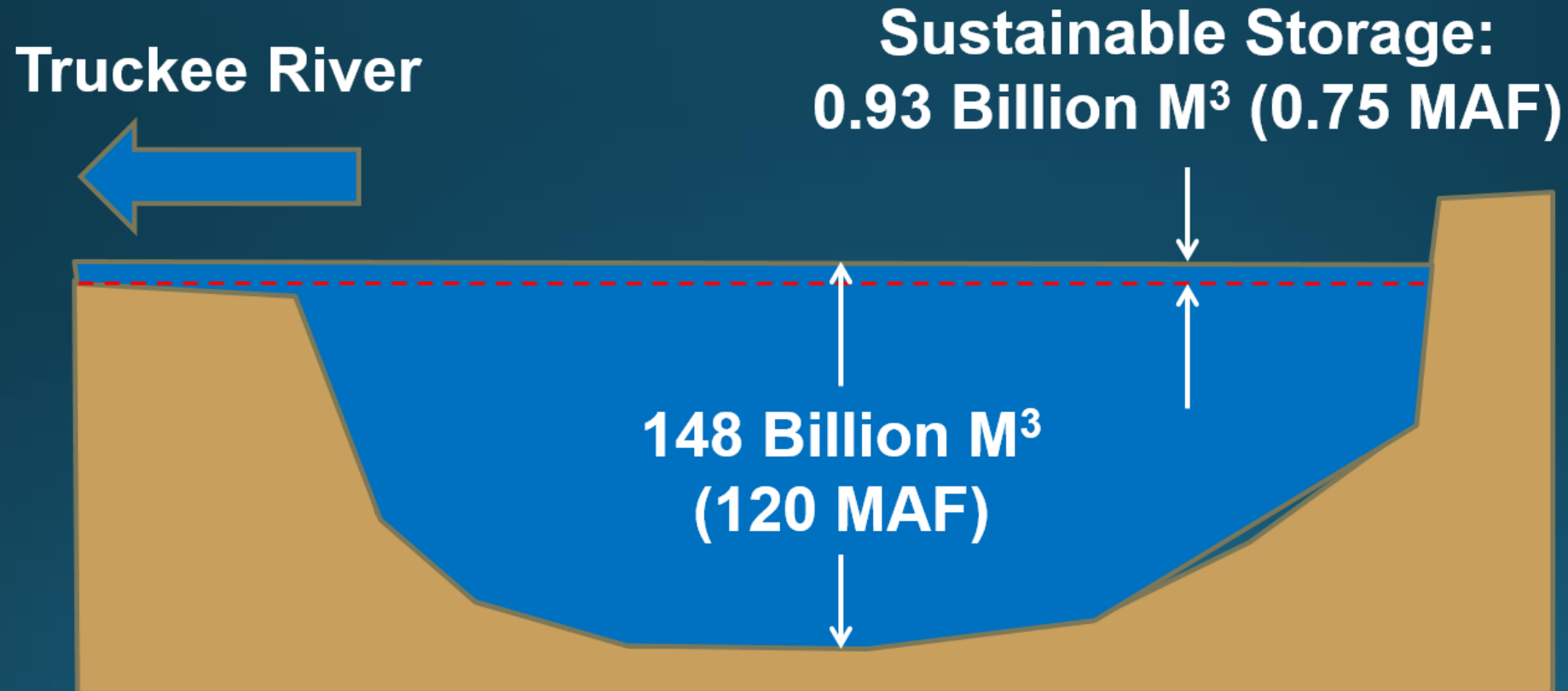


Interactions between Aquifers and Streams

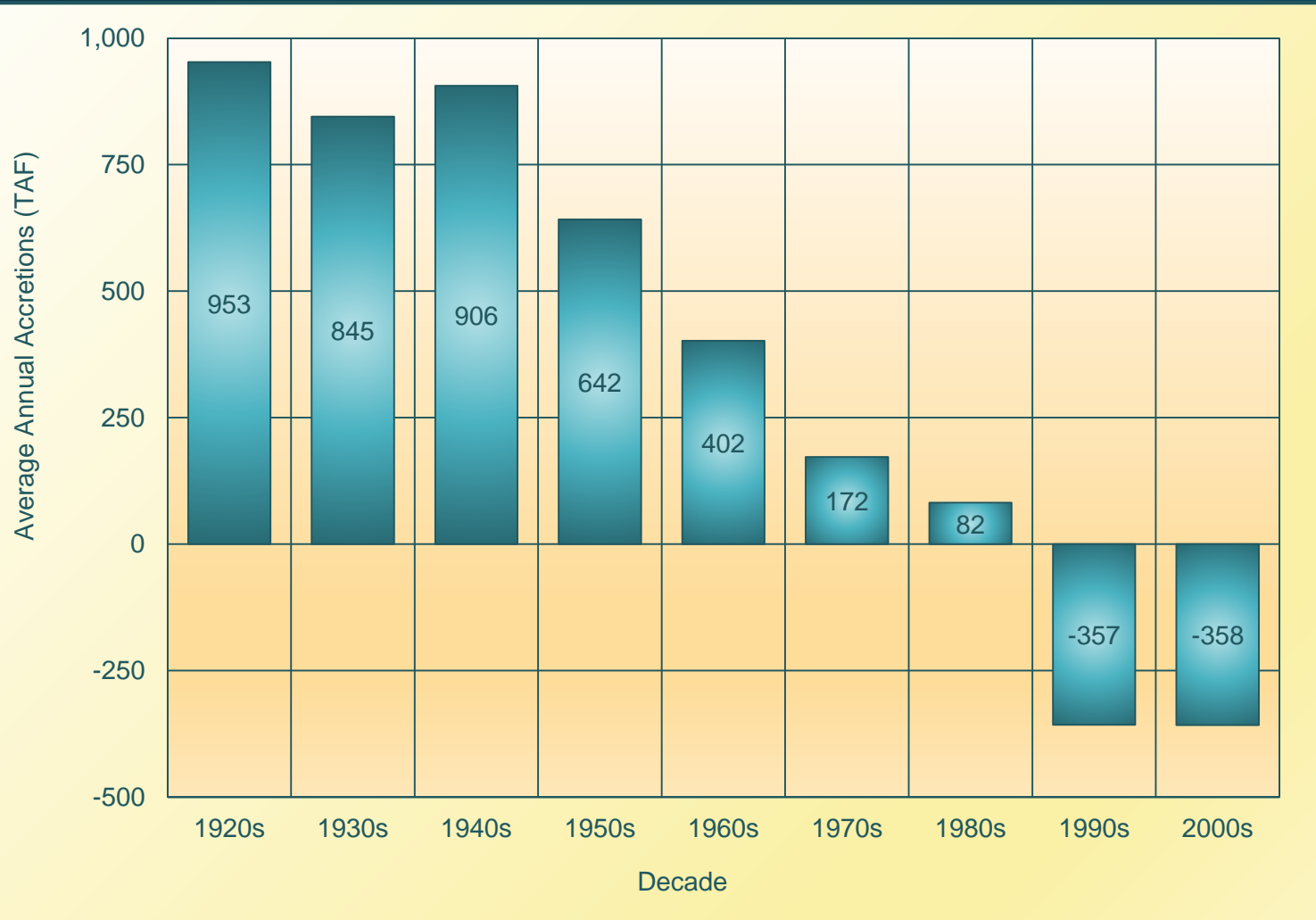
- Groundwater levels impact interactions between aquifers and streams
- The uppermost groundwater sustains rivers and streams
- Delayed effects: challenge to adaptive management
- Lake Tahoe analogy



Lake Tahoe Analogy



Sacramento Valley Stream Gains from Groundwater



According to DWR's C2VSim model, Sacramento Valley streams have gone from net "gainers" to net "losers" over recent decades.

New Groundwater Legislation

- “Sustainability” as a management principle
 - Sustainable yield = quantity of withdrawal over time without “undesirable results”
- New Groundwater Sustainability Agencies with broad authorities
- Groundwater Sustainability Plans by 2022 for most Sacramento Valley sub-basins
- Many details and lots of room for interpretation and local adaptation

Challenges in Complying with New Legislation

- How will Groundwater Sustainability Agencies be formed?
- How to define “sustainability” with sensitivity to interconnected streams?
- Can recharge keep up, or will groundwater pumping restrictions be needed? Supply augmentation or demand management?
- Soon enough or too little too late?

Thank You!

