

**Groundwater Briefing  
Stanislaus County WAC**

**2/26/2014**

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California Water Institute**

# Groundwater Basics

- Foundation and principles
  - Usufruct
  - Correlative right
  - Water use equity
- Groundwater science and problem-solving
- The tools for accomplishing the goals
  - The groundwater basin management groups
  - WAC represents the areas outside of the groups
  - Implementation of the ordinance

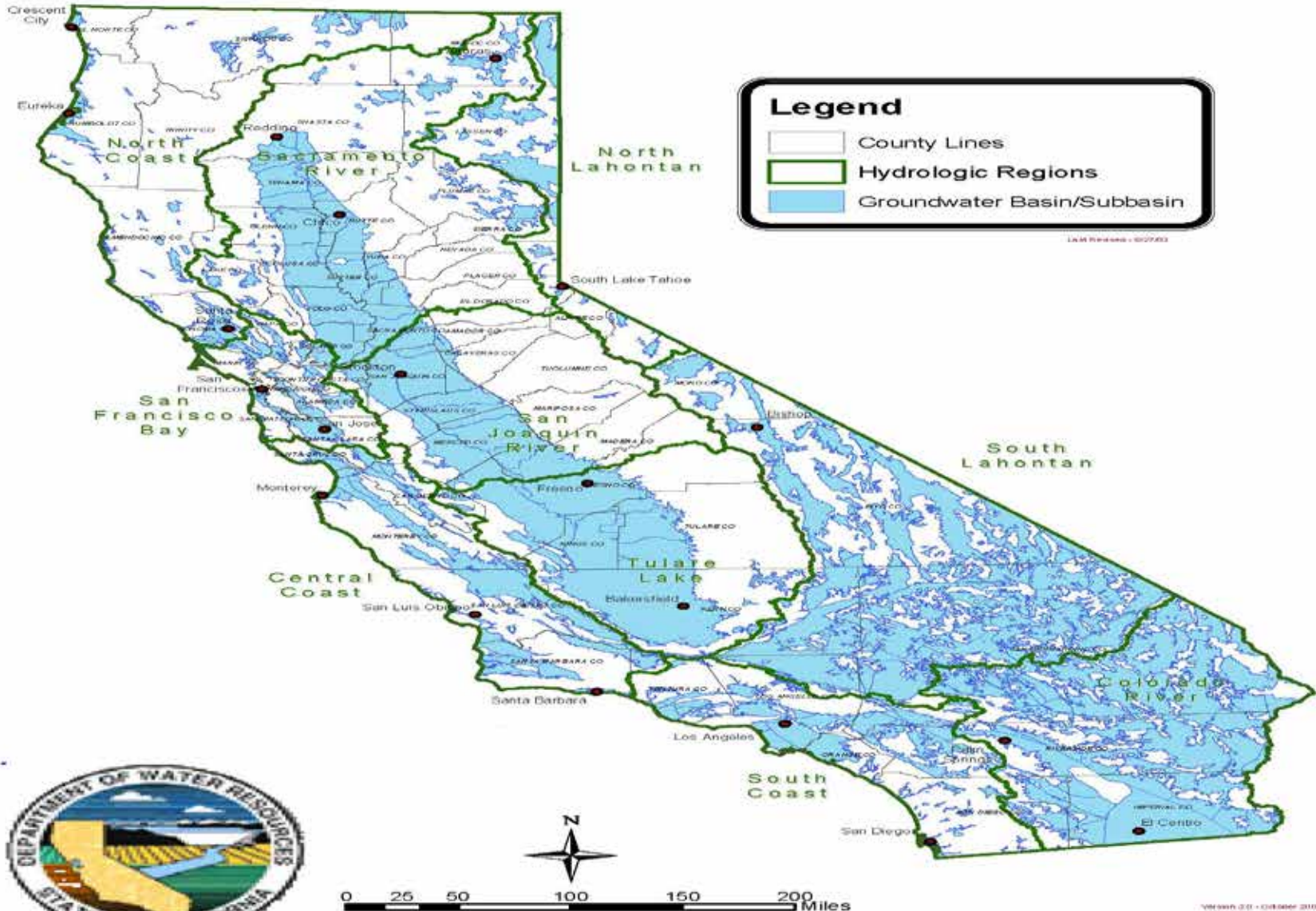
# Foundation

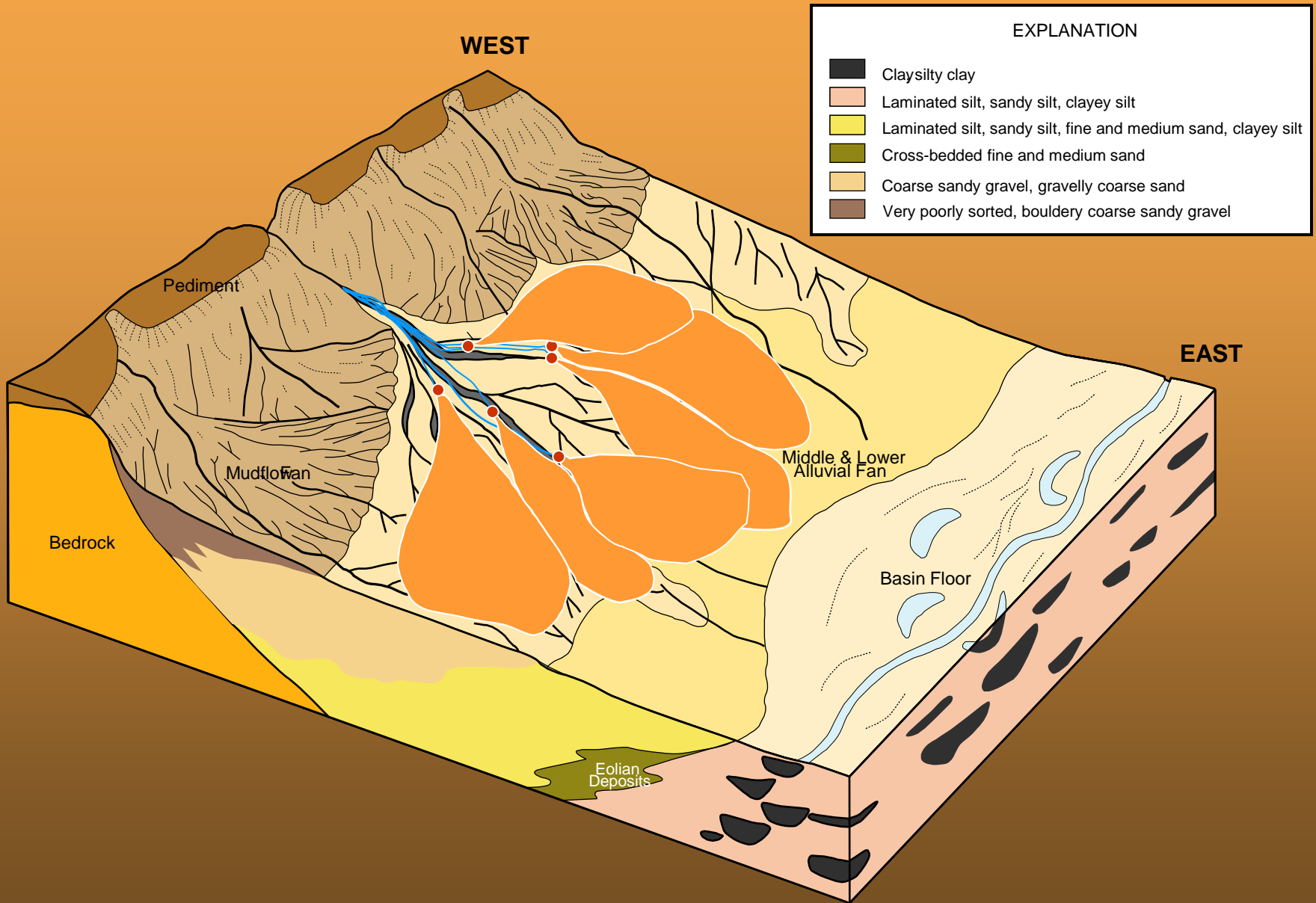
- Usufruct
- Correlative Right
- Water use equity

# Groundwater Science - Background

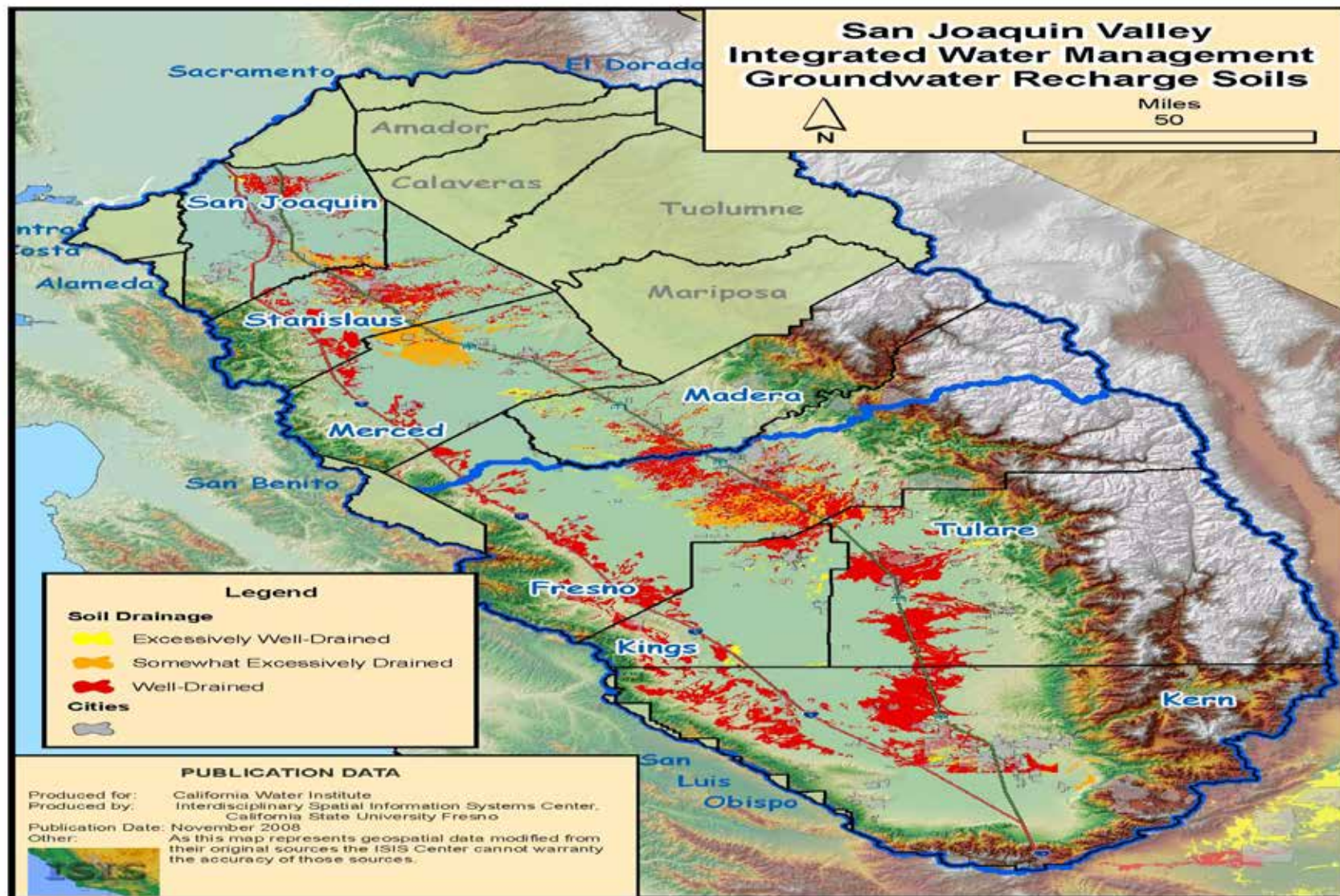
- Groundwater is about 42% of water supplies in the Valley
- Surface water is the source of groundwater replenishment
- Groundwater meets all demands in some locations

# Groundwater Basins in California





# ILRP



# Corcoran Clay – location and importance

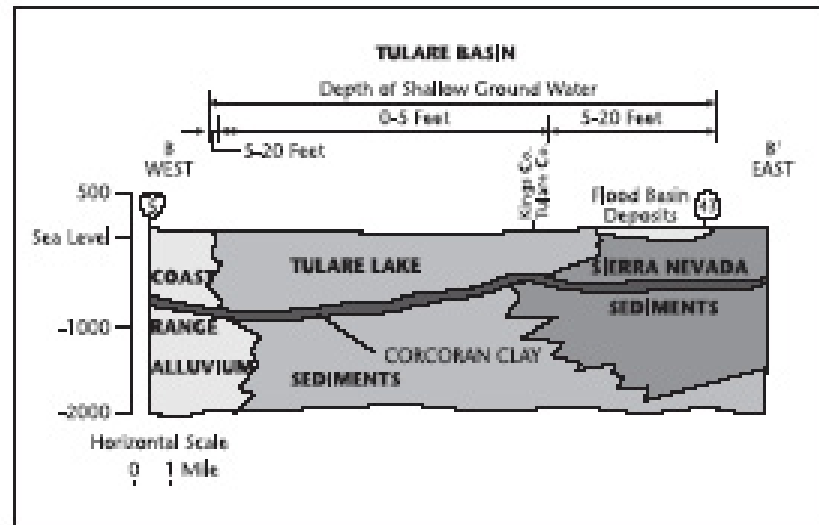
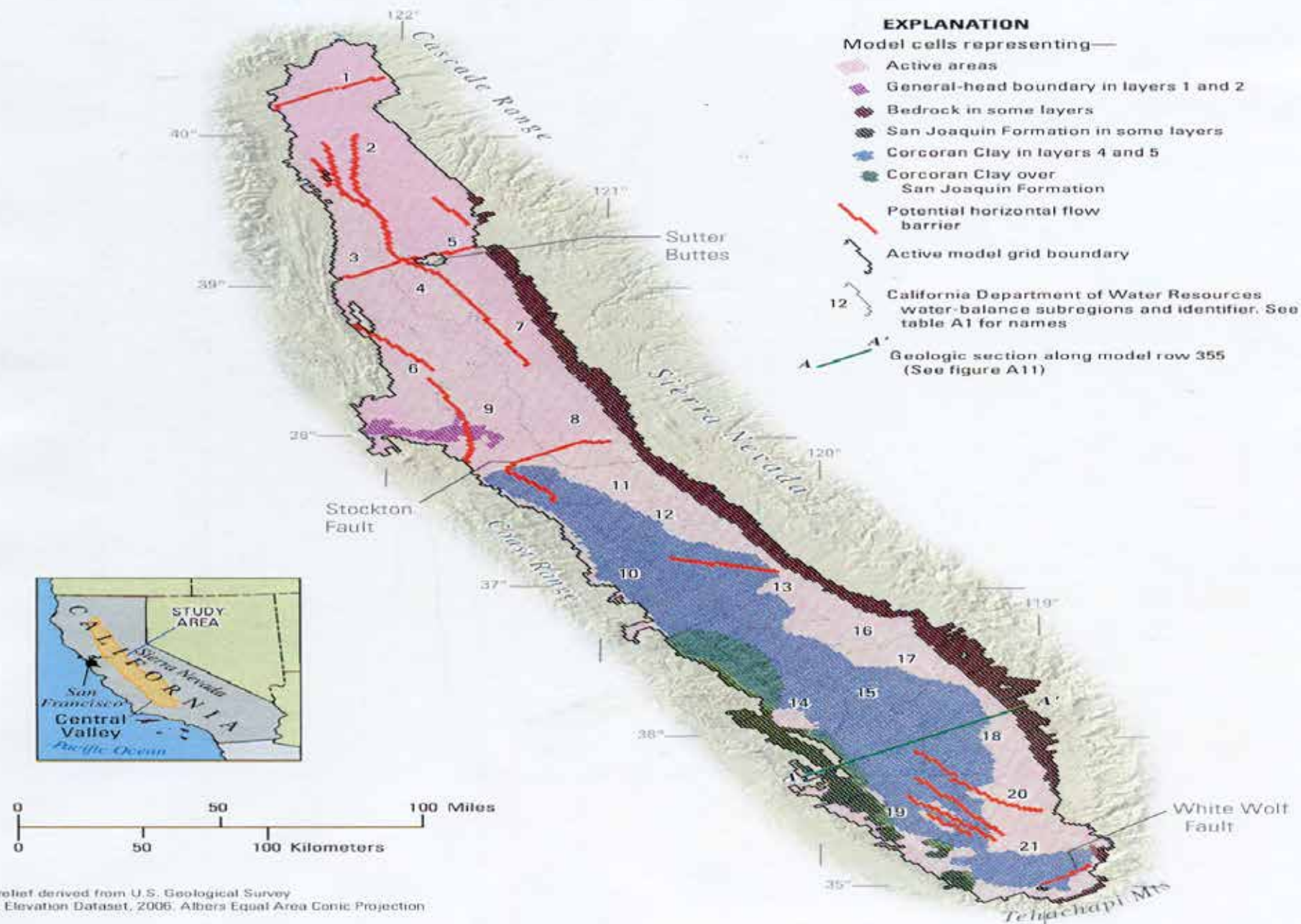


Figure 3: Cross-section diagram of the San Joaquin Valley showing the Corcoran Clay layer in the Tulare Basin. Adapted from: *A Management Plan for Agricultural Subsurface Drainage and related Problems on the Westside San Joaquin Valley*; September 1990.



A



**Figure C1.** Central Valley Hydrologic Model grid: **A**, Extent of San Joaquin Formation, Corcoran Member of the Tulare Formation, crystalline bedrock, and horizontal flow barriers. **B**, Upper-most active layer.

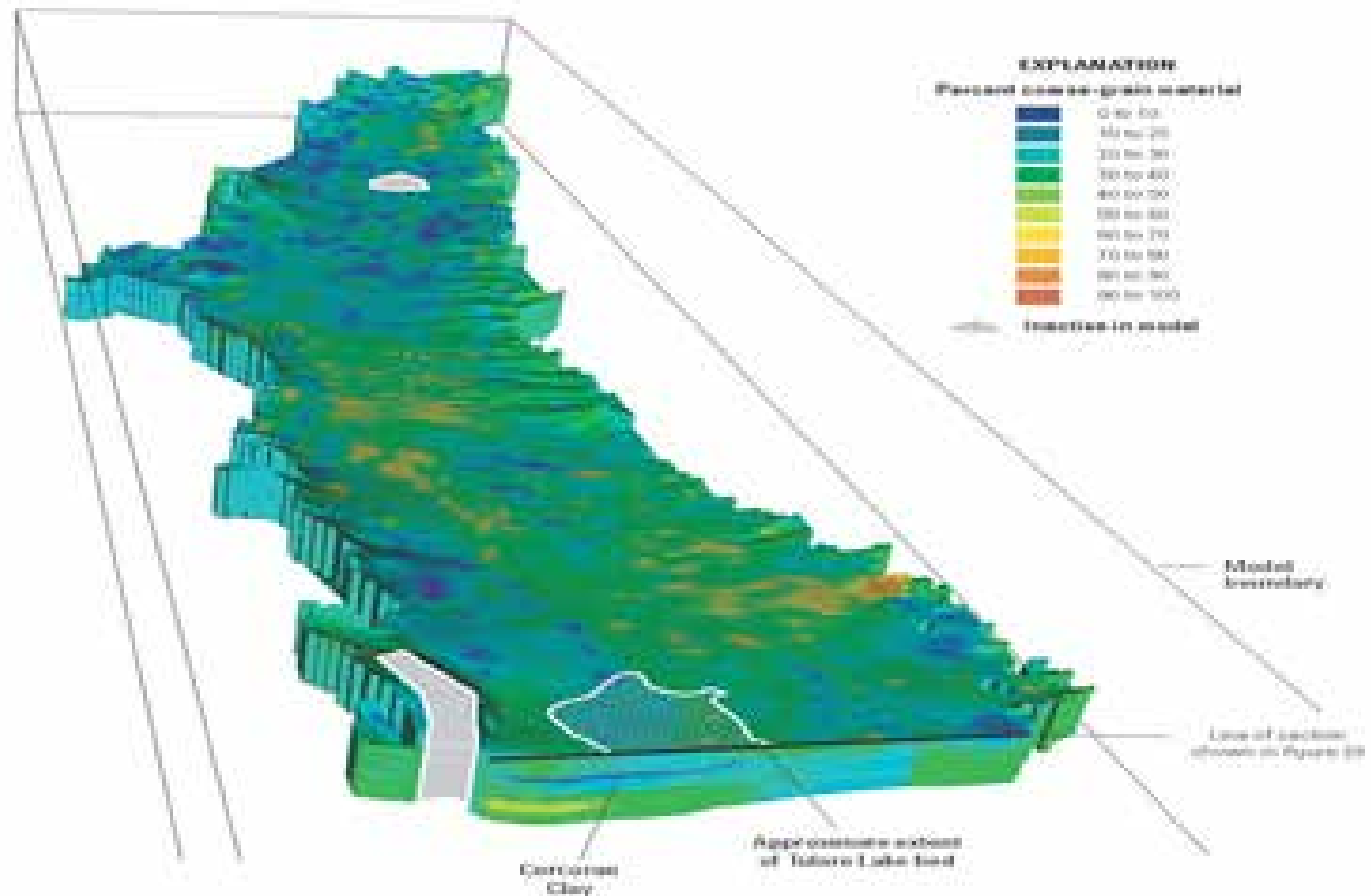


Figure 20. Block diagram of fracture model for the Central Valley aquifer from Claudia C. Farnet, U.S. Geological Survey, *wellbore connection*, 2001/1.

# Groundwater Conditions

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GIS Presentation of Valley Groundwater

# Contemporary Groundwater Issues

- Subsidence
- Irrigated Lands Program, water quality assessments
- “Fracking”
- Land conversion

# Subsidence



# “Fracking”

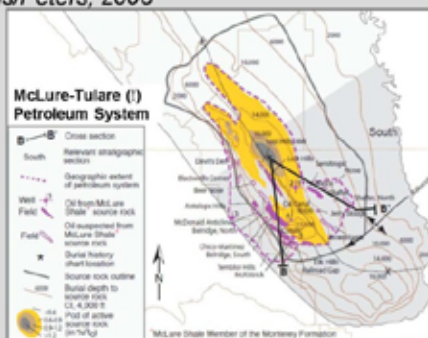
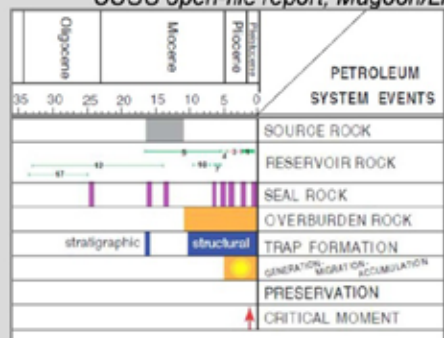


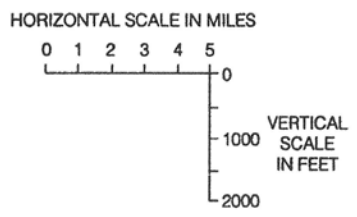
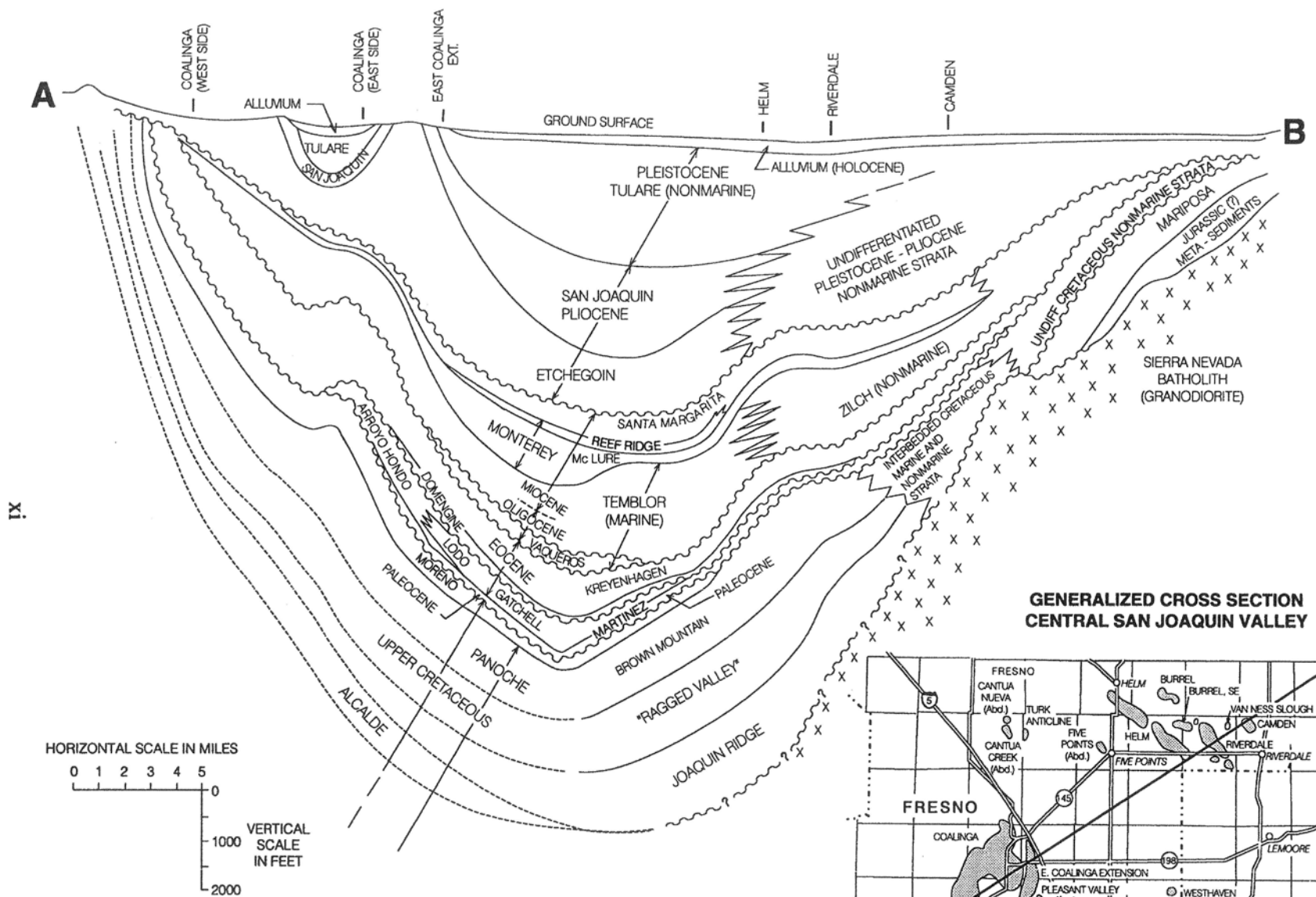
## Petroleum Systems -- Belridge Field

Parameter	Sub-Monterey Formations	Diatomite (Reef Ridge Shale & Antelope Shale)	Tulare Formation
Plate Tectonic Setting	Fore-arc setting and probably underlain by oceanic ophiolitic crust. Anticline began in Eocene due to stress fields set up by right lateral strike-slip movement along the San Andreas fault to the west.		
Reservoir Interval Age	Oligocene to Lwr Miocene	Upper Miocene	Pleistocene
Depositional Environment Reservoir Lithology	Marginal marine Shelf sands	Inland sea with 600-1000 ft water depth (cf. present-day Sea of Cortez). Seasonally laminated diatomite	Fluvio-deltaics in filling basin. Loose sands and gravels
Trapping Mechanism	Elongated anticline, fault compartments	Elongated anticline Still not in hydrodynamic equilibrium	Updip sand pinchout to west, downdip OWC to east
Seals	Overlying shales and lateral sand pinchouts	Layered clay-rich zones at base of diatomite cycles form partial seals	Interbedded clays & mudstones as well as fault baffles and tar seals
Hydrocarbon Source	Low sulfur oil & gas from Eocene source rocks	Oil from mature Monterey shales to east that are basinal equivalents of reservoir units.	Oil leaked across basal unconformity from underlying diatomite. Now biodegraded and degassed.

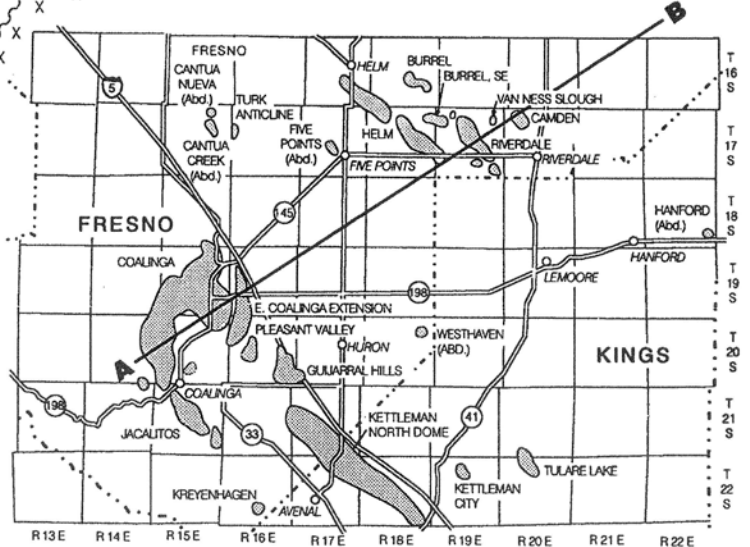
*Paleogeography in late Miocene (± 5-1 Ma) e.g. Diatomite time by Ron Blakey at U. of N. Arizona*

USGS open-file report, Magoon/Lillis/Peters, 2008





**GENERALIZED CROSS SECTION  
CENTRAL SAN JOAQUIN VALLEY**



# Summary

- Apply the principles
- Get the science such as conditions assessments and for coordinated management opportunities
- Support implementation efforts that solve problems
- Use the ordinance to manage for equity when appropriate