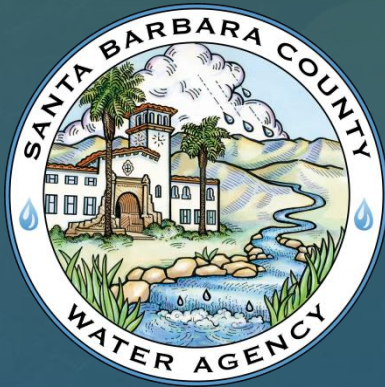


# Cuyama Groundwater Basin Water Availability Study 2008-2013



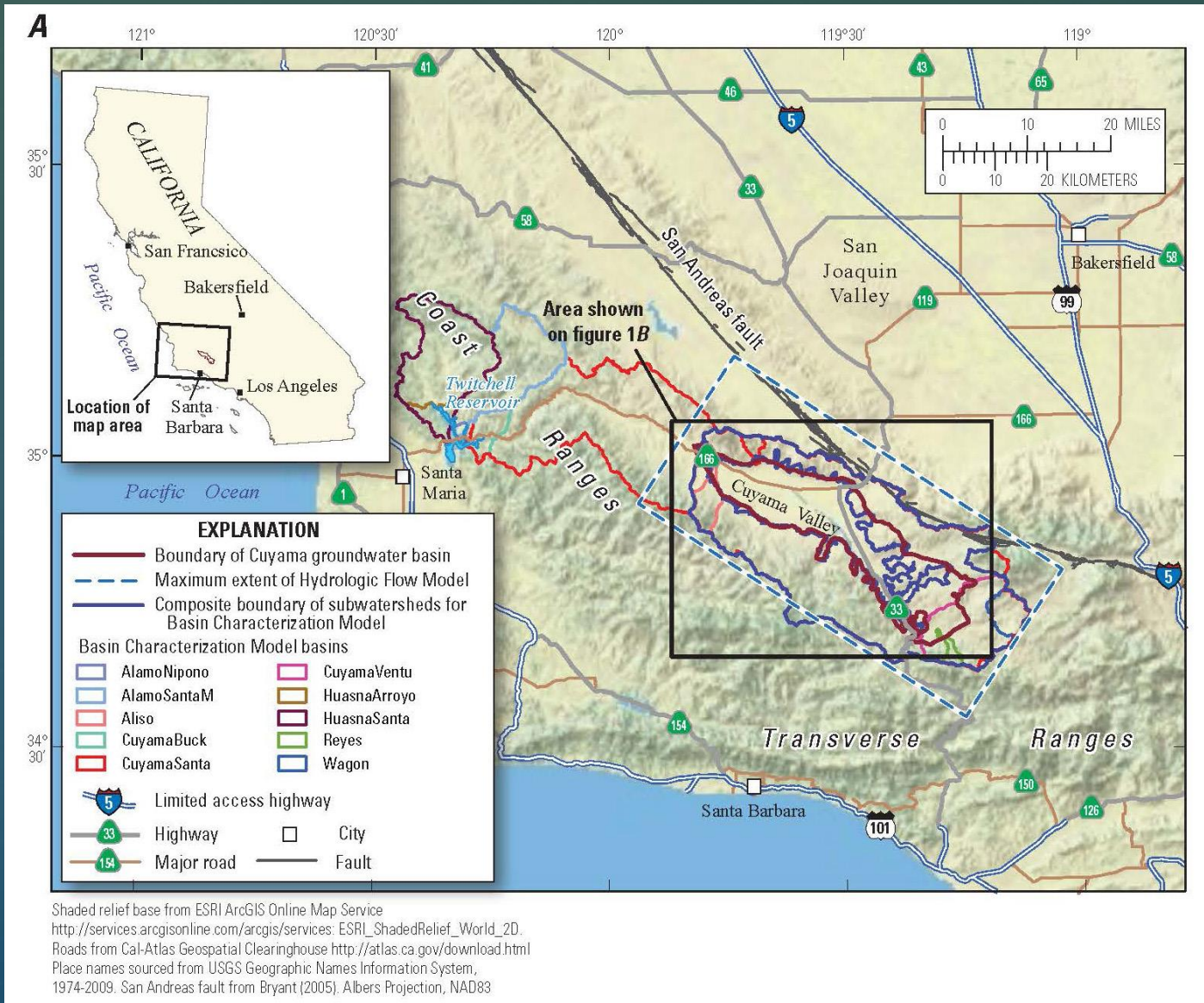
**Santa Barbara County Water Agency and  
the U.S. Geological Survey**

*Santa Barbara County Public Works Department*  
Thomas Fayram, Deputy Director Water Resources

*U.S. Geological Survey*  
Randall Hanson, Research Hydrologist



# Vicinity Map of the Cuyama Valley Area





# Need For Project

- The Cuyama Groundwater Basin is a sole source aquifer
- Water planning is important:
  - Land use changes
  - Periodic Droughts and other weather related cycles
- Past studies suggest that there is a basin imbalance
- Historic record of water level decline in many wells
- Pending State legislation would require groundwater management of the basin



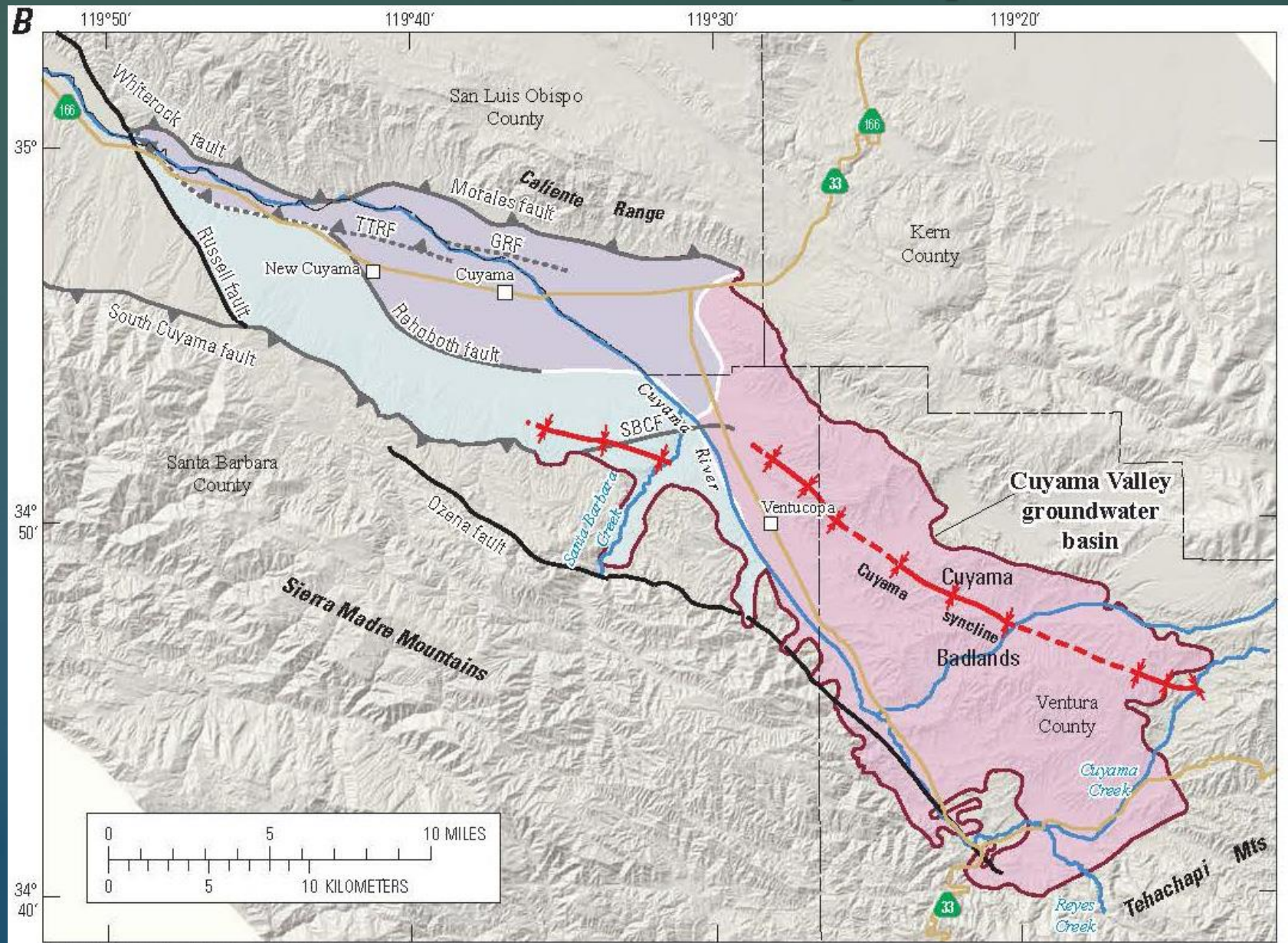
# Stakeholders

- Santa Barbara County Water Agency
- U. S. Geological Survey
- Agricultural Interests
- Overlying Land Owners
- New Cuyama Community Services District
- Residents of the Ventucopa Area










# Three Different Zones of the Aquifer; Main, Sierra Madre Foothills and Ventucopa Uplands

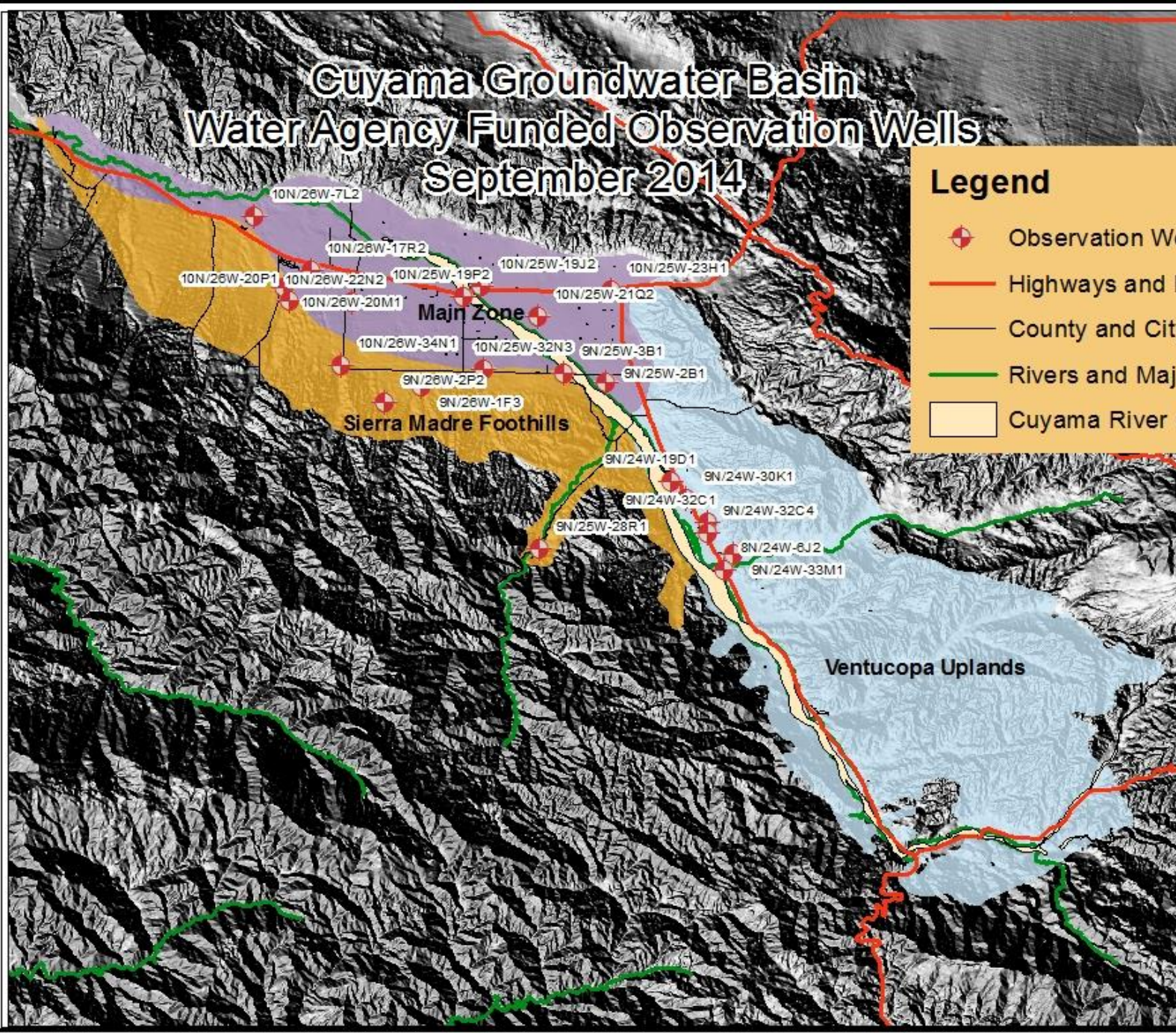




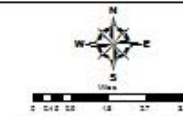
# Cuyama Groundwater Basin Water Agency Funded Observation Wells September 2014

## Legend

-  Observation Wells (22 sites)
-  Highways and Major Roadways
-  County and City Roads
-  Rivers and Major Creeks
-  Cuyama River Channel



This map is for reference only. Although every effort has been made to ensure the accuracy of the information, errors and omissions are possible. Santa Barbara County shall not be liable for any errors, omissions, or damages that result from using the information on this document. No warranty of accuracy is claimed for the information shown on this map and users should not be used to operate operations, release, liability or otherwise.



Copyright © 2014 Santa Barbara County of Santa Barbara  
Cuyama Groundwater Basin  
Observation Wells

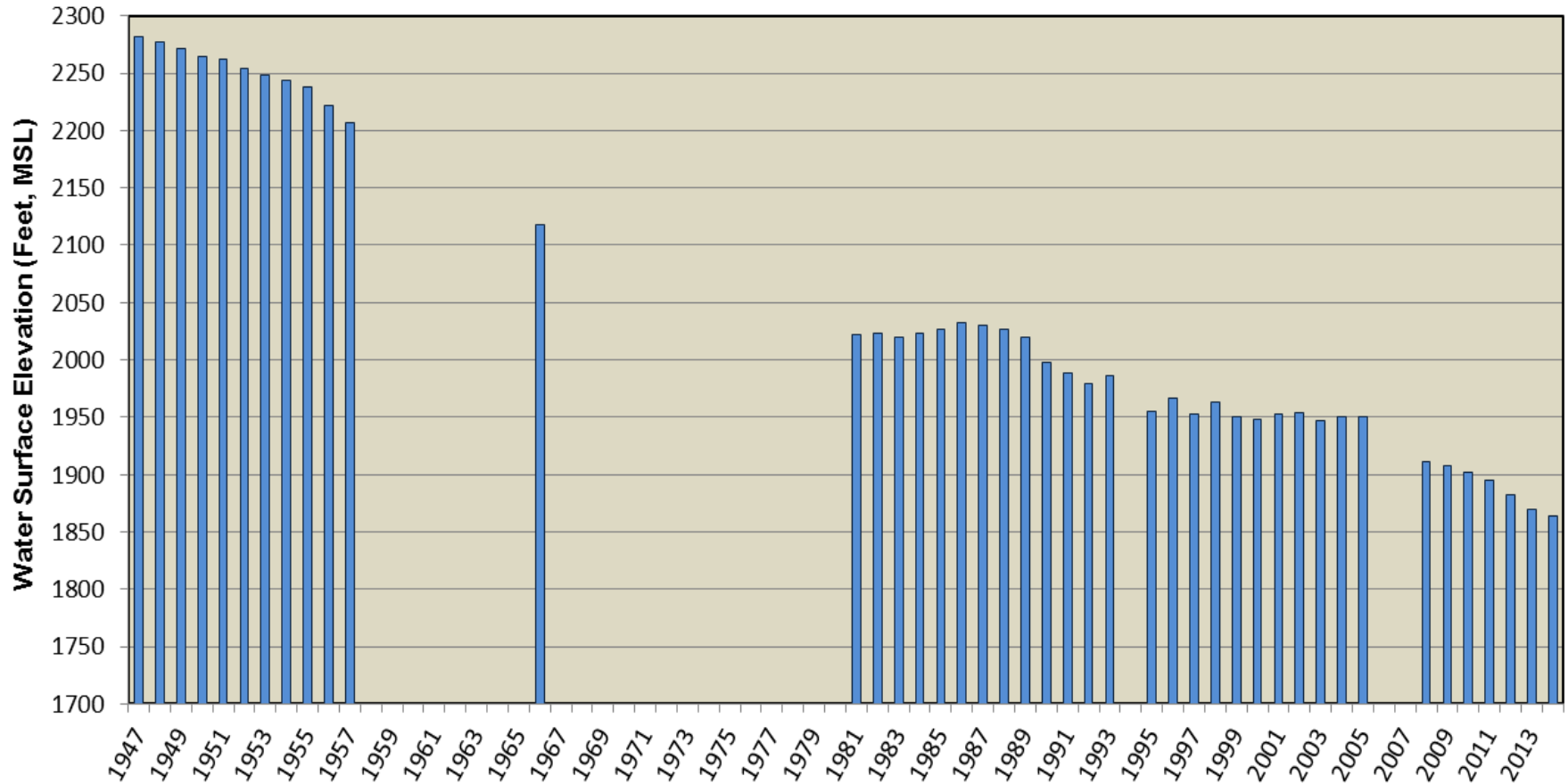




# Main Zone Representative Hydrograph depicting water level declines of up to 400' since around 1950

## State Well 10N/25W-21Q2 (2008-2014)

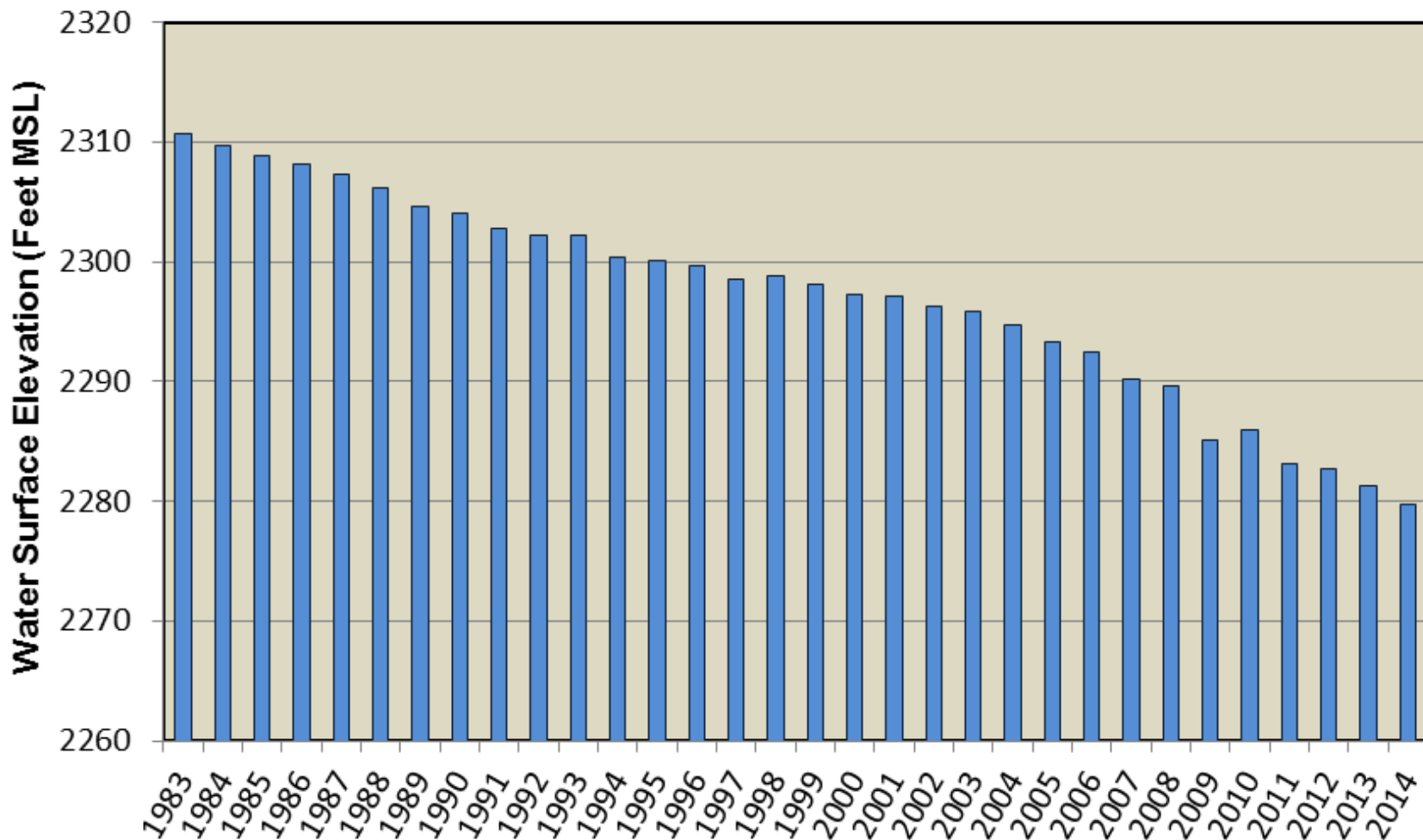
Land Surface Elevation 2,375'



State Well 10N/25W-23E1 (1966-2005); State Well 10N/25W-21G1 (1947-1957)

# Sierra Madre Zone Representative Hydrograph depicting declines of over 30' since 1983

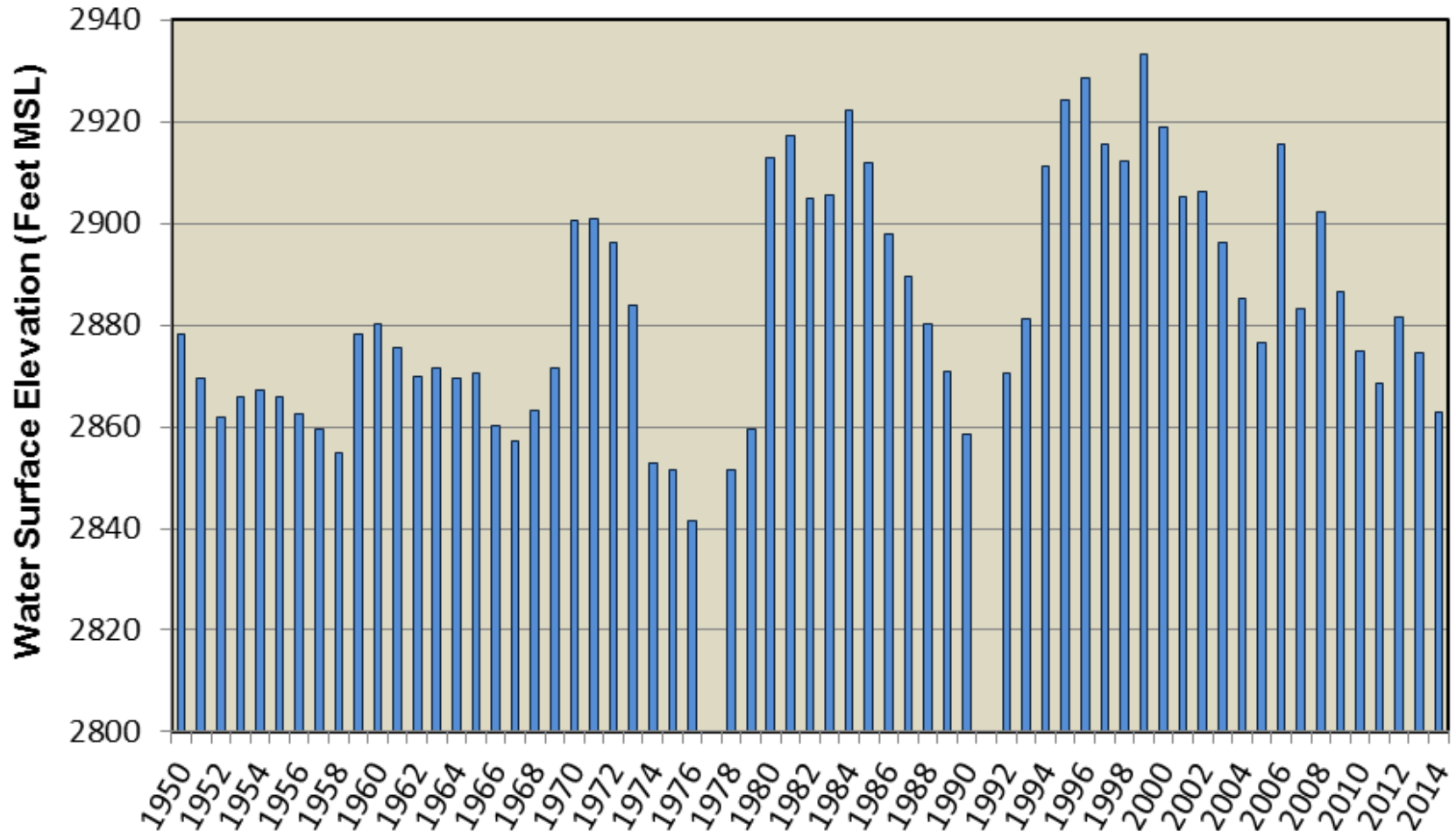
**State Well 9N/26W-1F3**  
**Land Surface Elevation 2,605' Well Depth 500'**





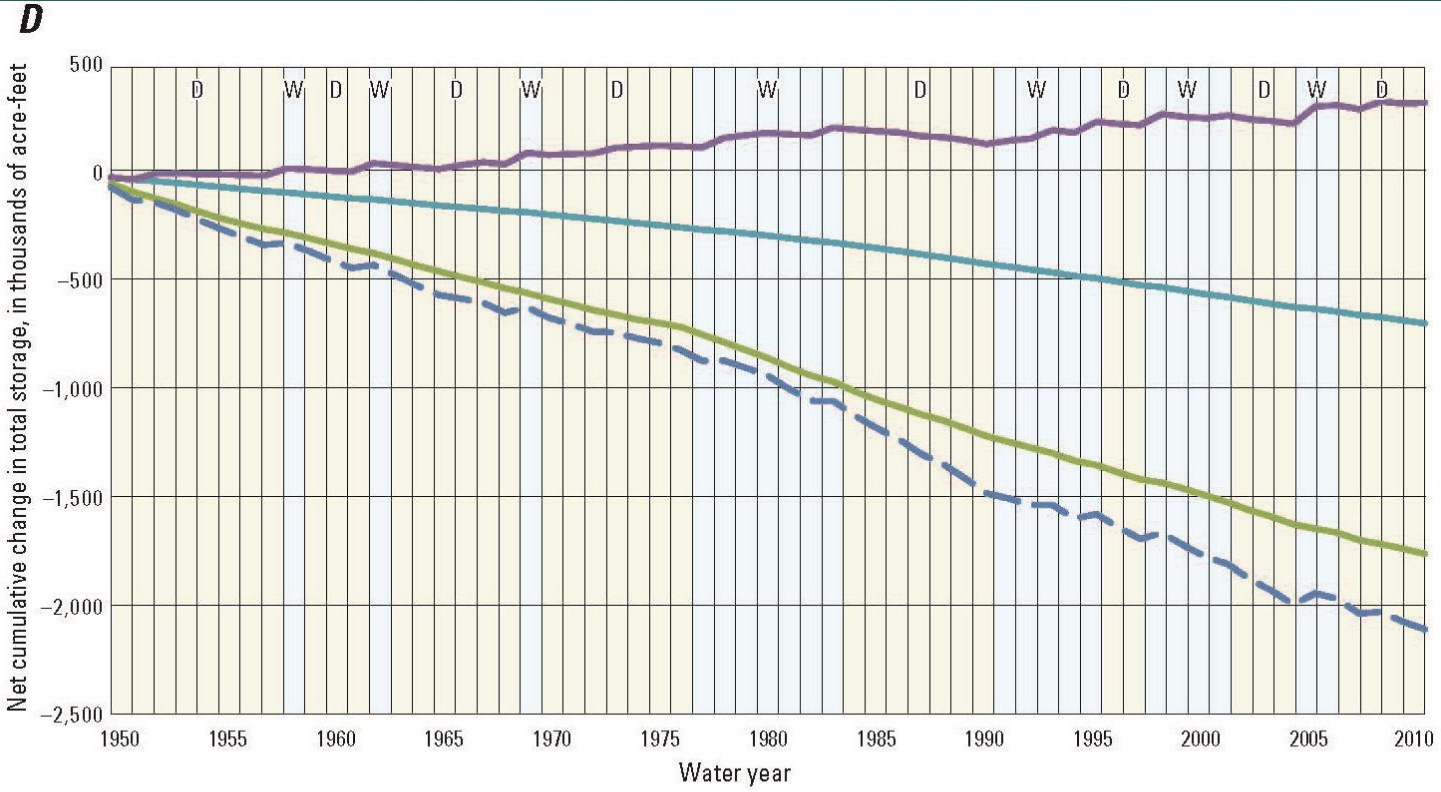
# State Well 9N/24W-33M1

Land Surface Elevation 3,049' Well Depth 233'



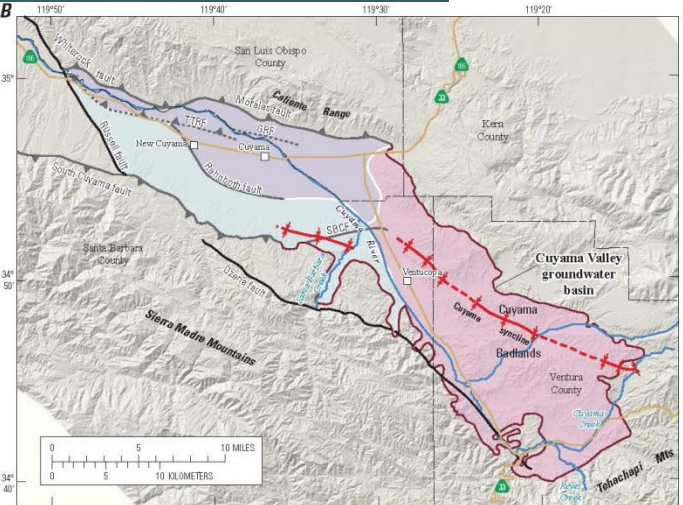
Ventucopa Uplands Representative Hydrograph depicting periodic rises and falls as a direct function of climate

# Modeled Changes in Historical Groundwater Storage in the Cuyama Valley



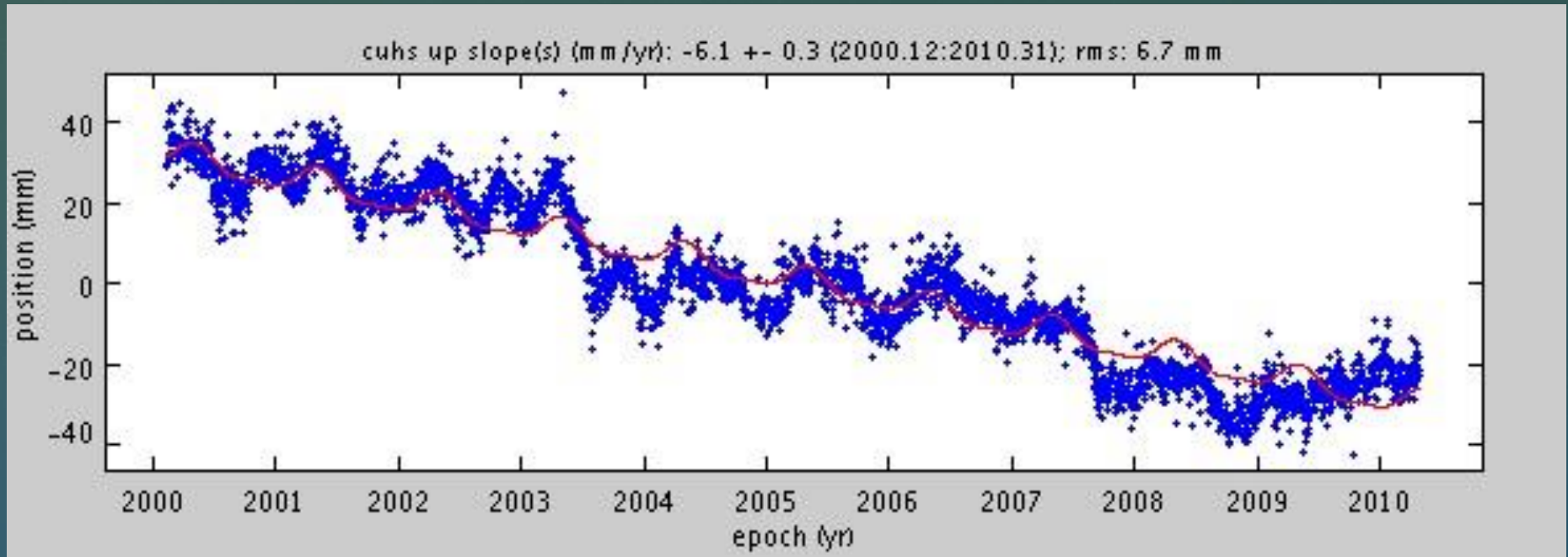
**EXPLANATION**

- Total change in storage
- Cumulative storage by area
  - Main zone
  - Ventucopa uplands
  - Sierra Madre Foothills
- Recent precipitation cycles
  - Dry
  - Wet





# Measured Subsidence Since 2000



Land subsidence may occur when groundwater is removed from the pore space between particles of the aquifer causing them to collapse

# Future Projections

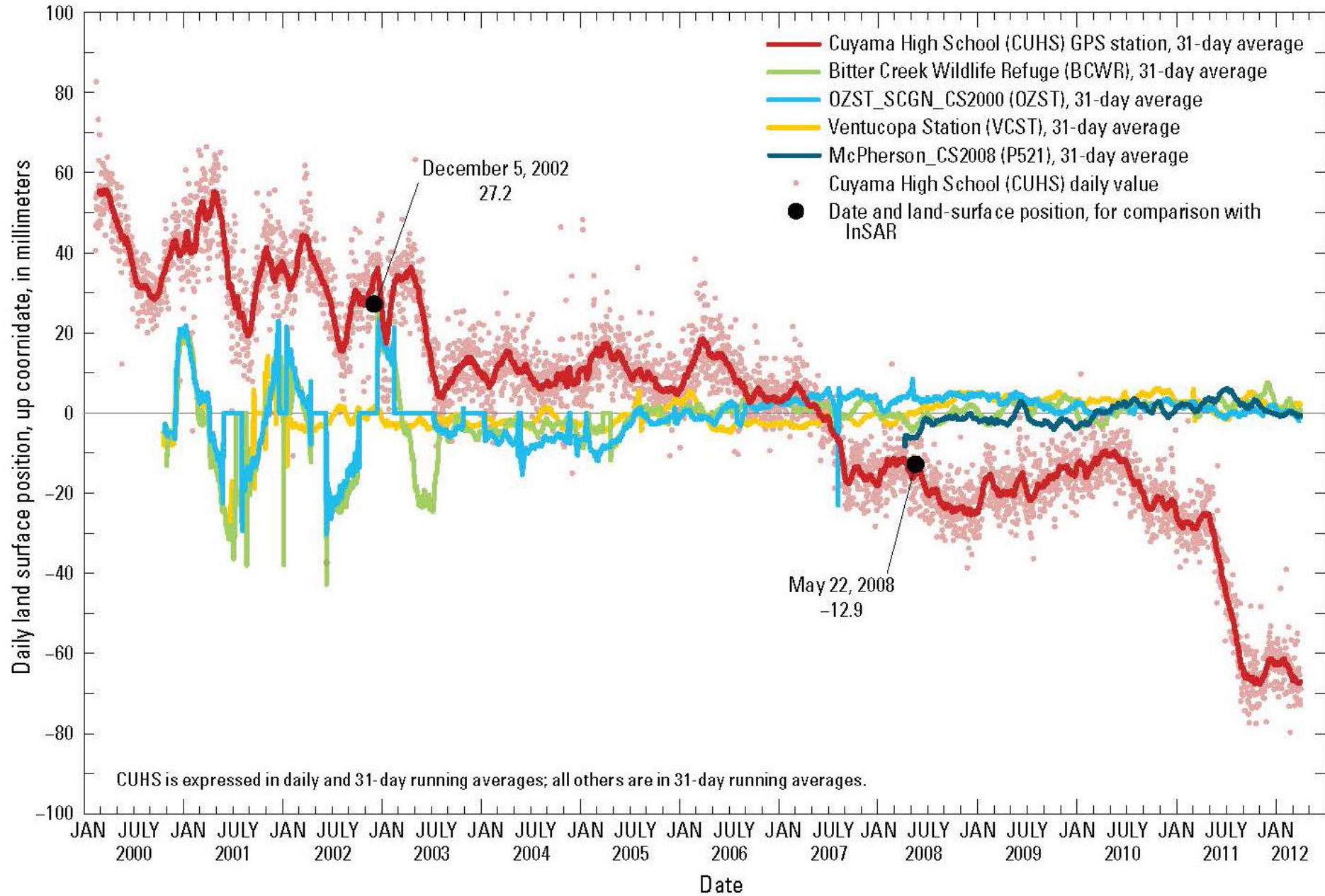
**Randall Hanson**, U.S. Geological Survey  
Research Hydrologist and Cuyama Water Availability  
Study Project Leader

- 35 Years experience in all aspects of hydrogeology
- Expertise in Groundwater Flow Systems
- Expertise in Modeling and Computer Simulations
- Previous work nationally and internationally

*“The USGS is a science organization that provides impartial information on the health of our ecosystems and environment, the natural hazards that threaten us, the natural resources we rely on, the impacts of climate and land-use change, and the core science systems that help us provide timely, relevant, and useable information.”*

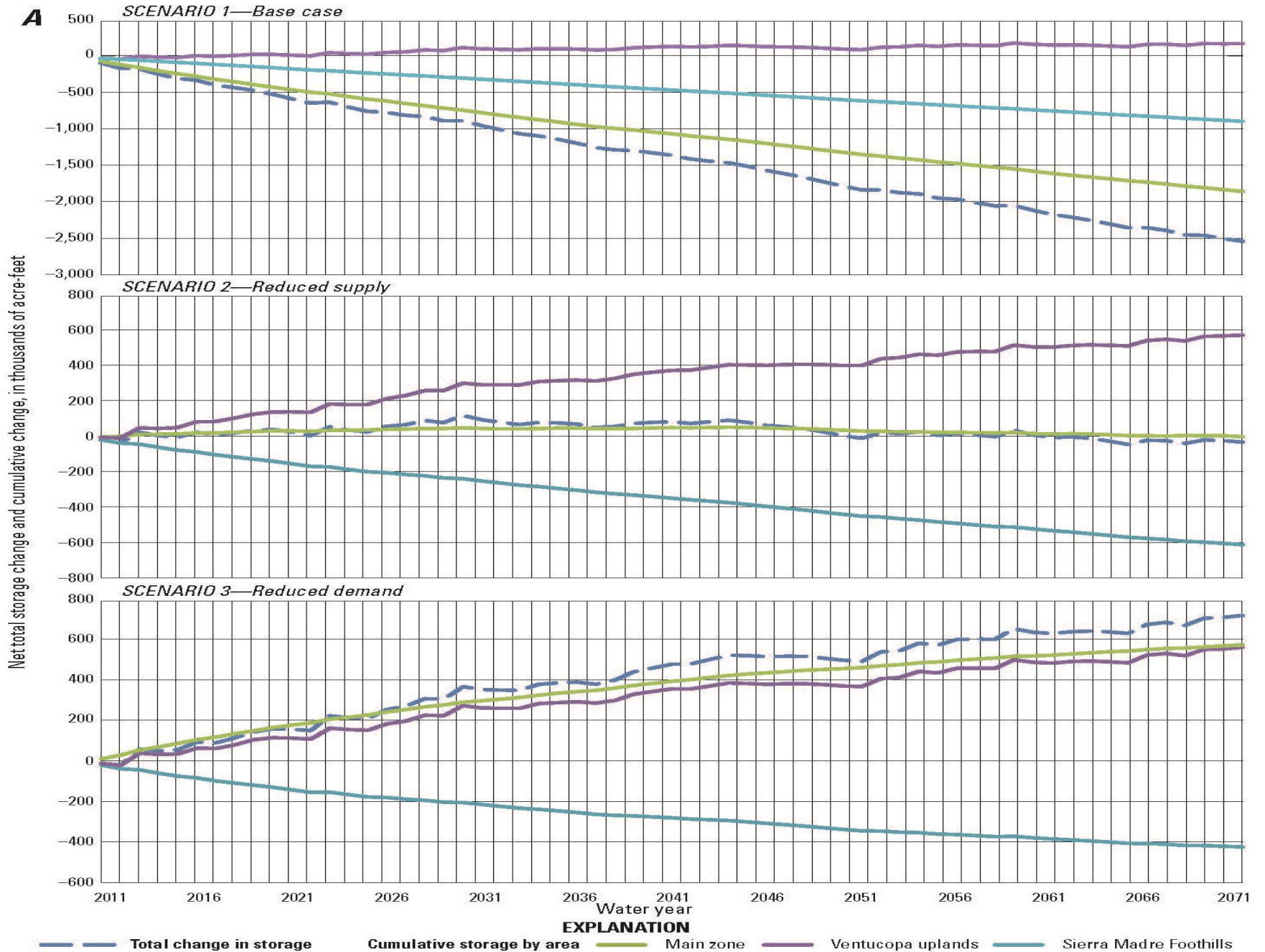






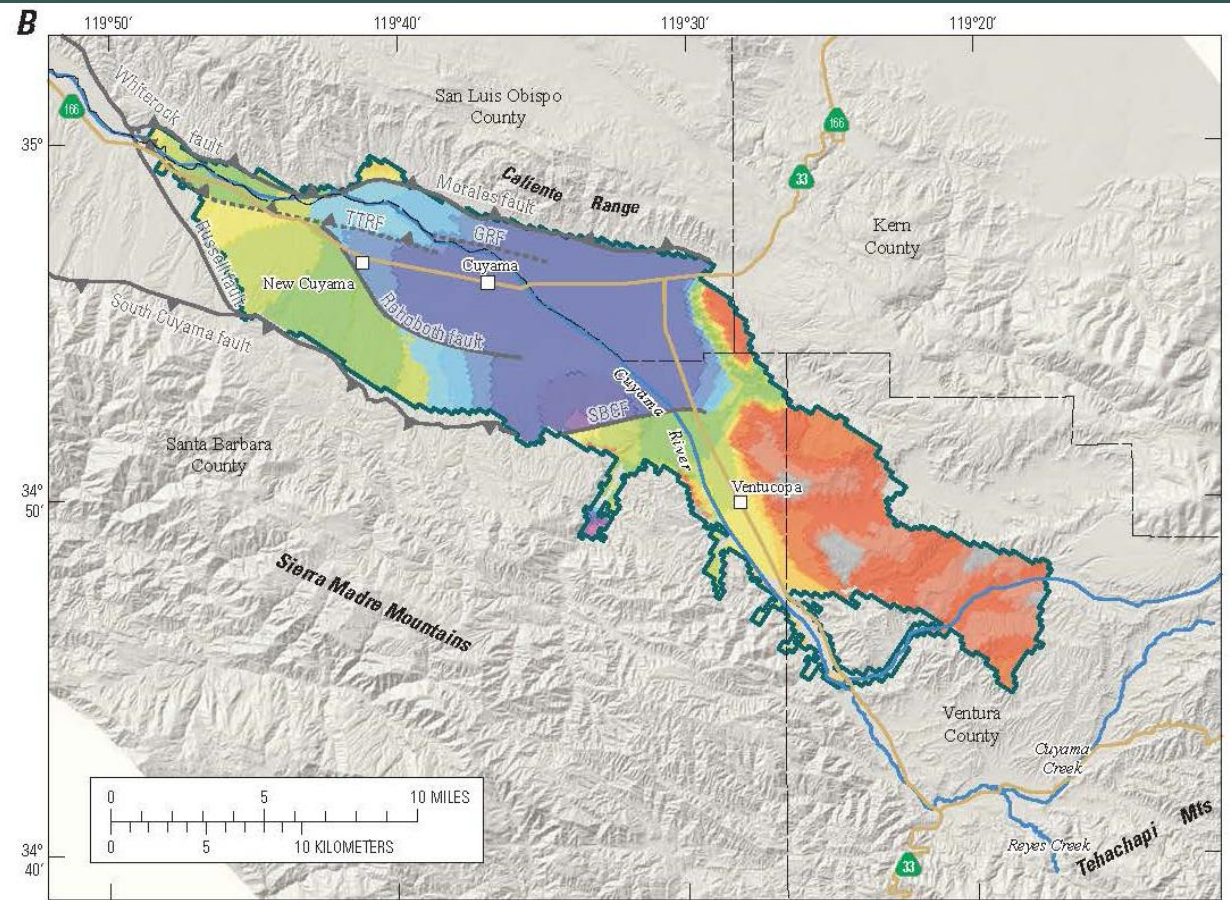
**Figure 26.** Land-surface position, up coordinate, in millimeters, for the GPS stations Cuyama High School (CUHS), Ventucopa Station (VCST), McPherson\_CS2008 (P521), Bitter Creek Wildlife Refuge (BCWR), and OZST\_SCGN\_CS2000 (OZST), Cuyama Valley, Santa Barbara County, California.

# Scenarios of Future Storage Simulation 2010-2071





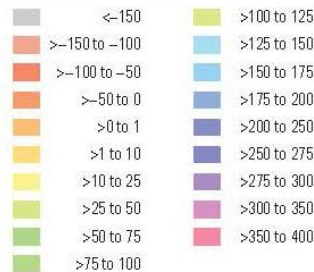
# Simulated Water Level Declines of an additional 300' in the Main Zone from 2010 to 2071



Shaded relief base created from 30-m digital elevation model from USGS National Elevation Dataset (NED); North America Vertical Datum 1983 (NAVD83). Hydrology sourced from 1:24,000-scale National Hydrography Dataset, 1974-2009. Place names sourced from USGS Geographic Names Information System, 1974-2009. Albers Projection, NAD83.

## EXPLANATION

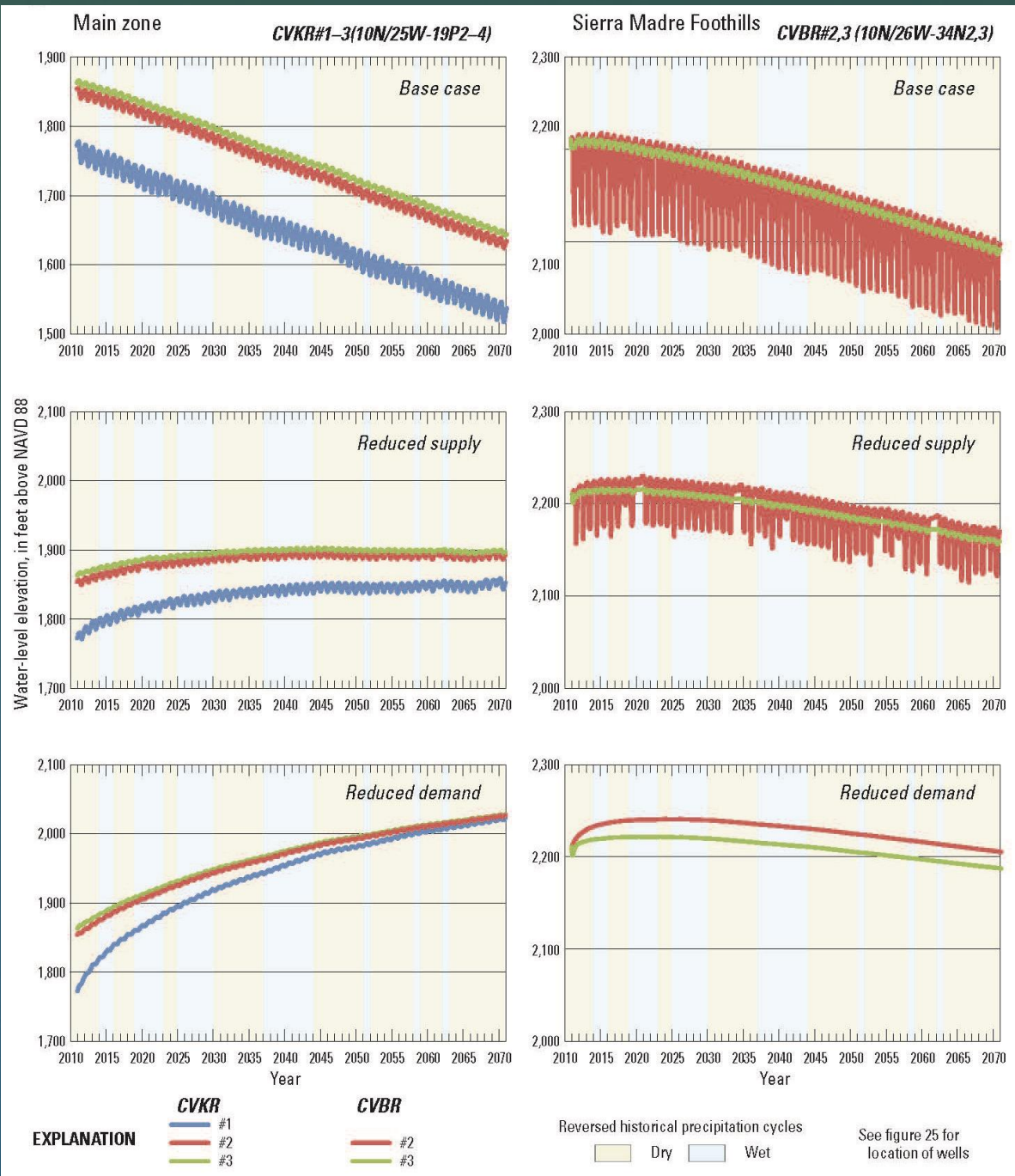
Simulated difference in water-level altitude, in feet, summer 2010 minus summer 2071; interval varies



Active model-grid boundary

Normal fault  
Thrust fault  
Thrust fault, concealed

# Scenarios of Future Water Levels Simulation 2010-2071 for the Main Zone and Sierra Madre Foothills Zone

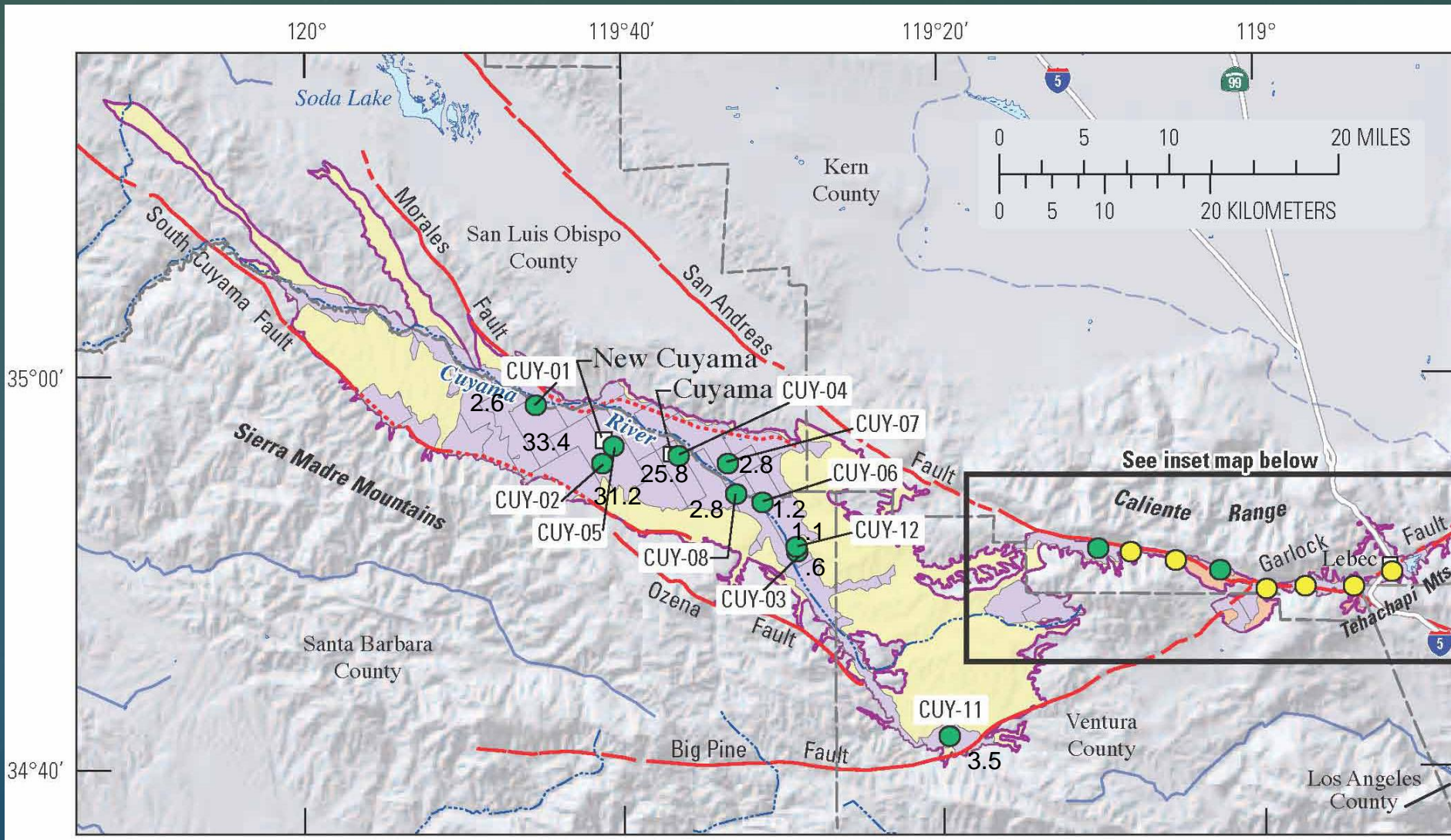




# Water-Quality Monitoring

- Major chemistry, TDS
- Nutrients, Trace Elements
- Source and age of ground water (500 - >33,000 years before present)
- Future Trends

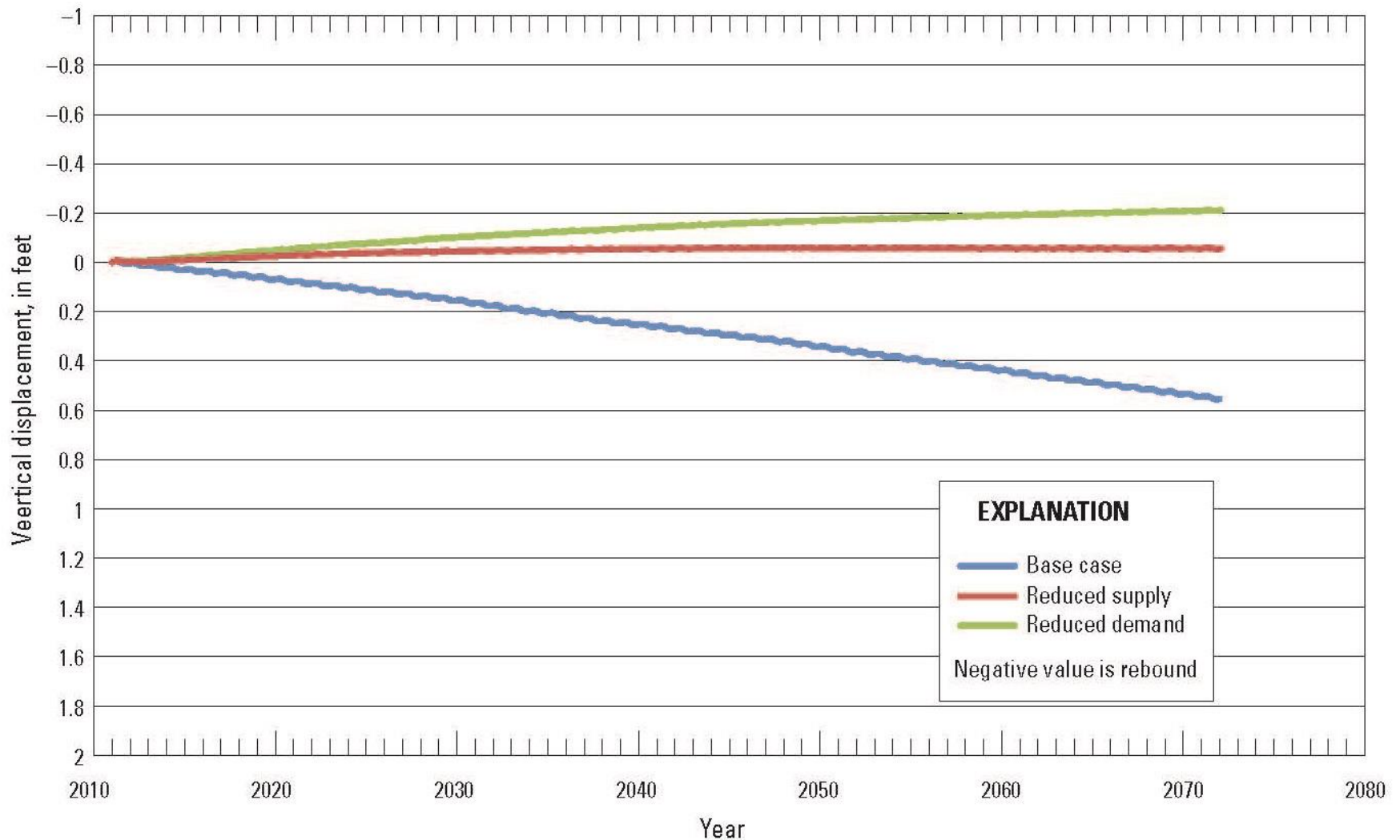
# Uncorrected Age Dates of Groundwater in Cuyama Valley Aquifers in Thousands of Years before Present



Almost all Samples have little to no Tritium except in Ventucopa Area → Little to No Modern Recharge (Last 50 -60 years)



# Projected Main Zone Subsidence to 2071



# Summary of Findings

- Three different major zones of the Basin
- Demand greater than replenishment of 29,900 Acre-Feet per year
- Poor water quality



# County Authority

- **California State Law**
  - SB 1168 (Pavley)
  - AB 1739
- **Comprehensive Plan**
- **County Code**

# QUESTIONS

