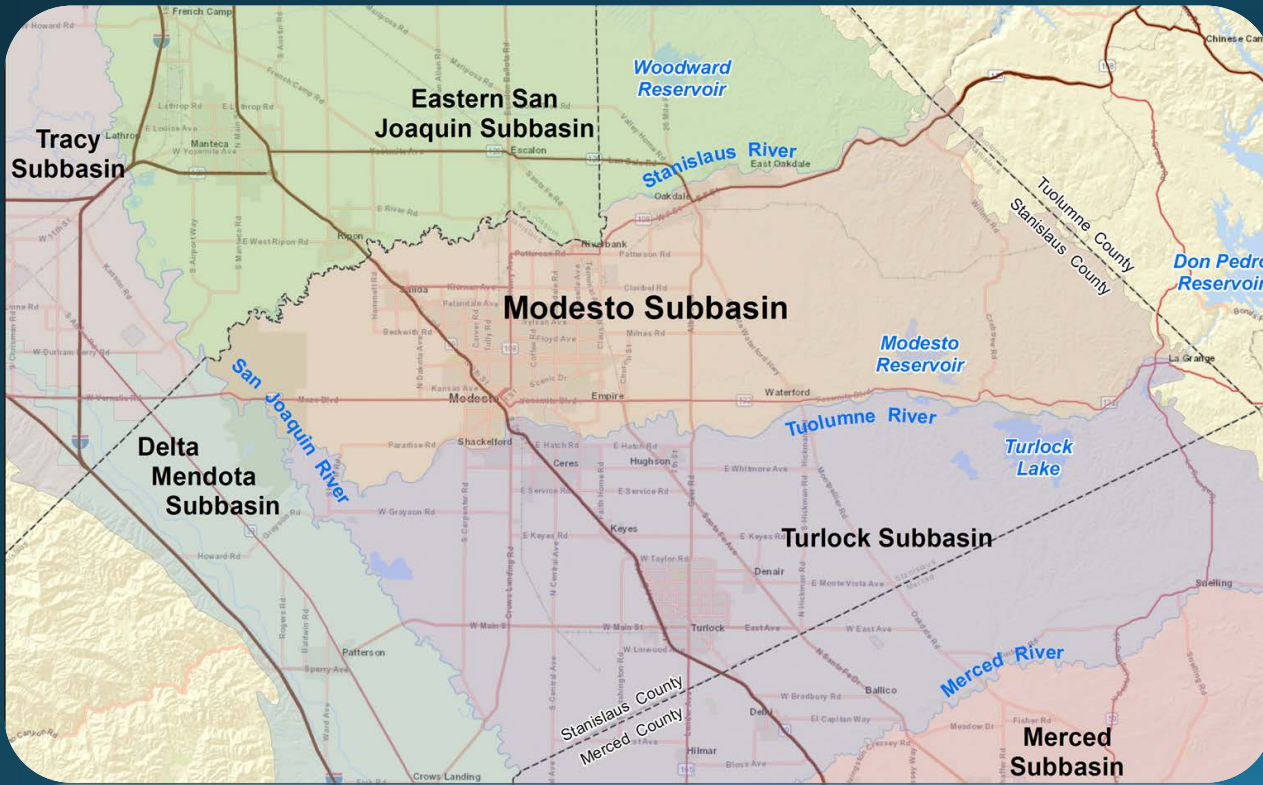




STRGBA Groundwater Sustainability Agency
Tuolumne Groundwater Sustainability Agency

Modesto Subbasin Groundwater Sustainability Plan (GSP) Technical Workshop No. 2

July 10, 2019



Where We Left Off

- April Workshop:
 - Discussed Plan Area
 - Preliminary Basin Setting Information
- Since the Workshop:
 - Draft GSP Sections 1 and 2 (Administrative Information and Plan Area) submitted at the end of April
 - Continued work on the Basin Setting
 - Began work on the Modesto Subbasin Model

Today's Focus  Basin Setting Update

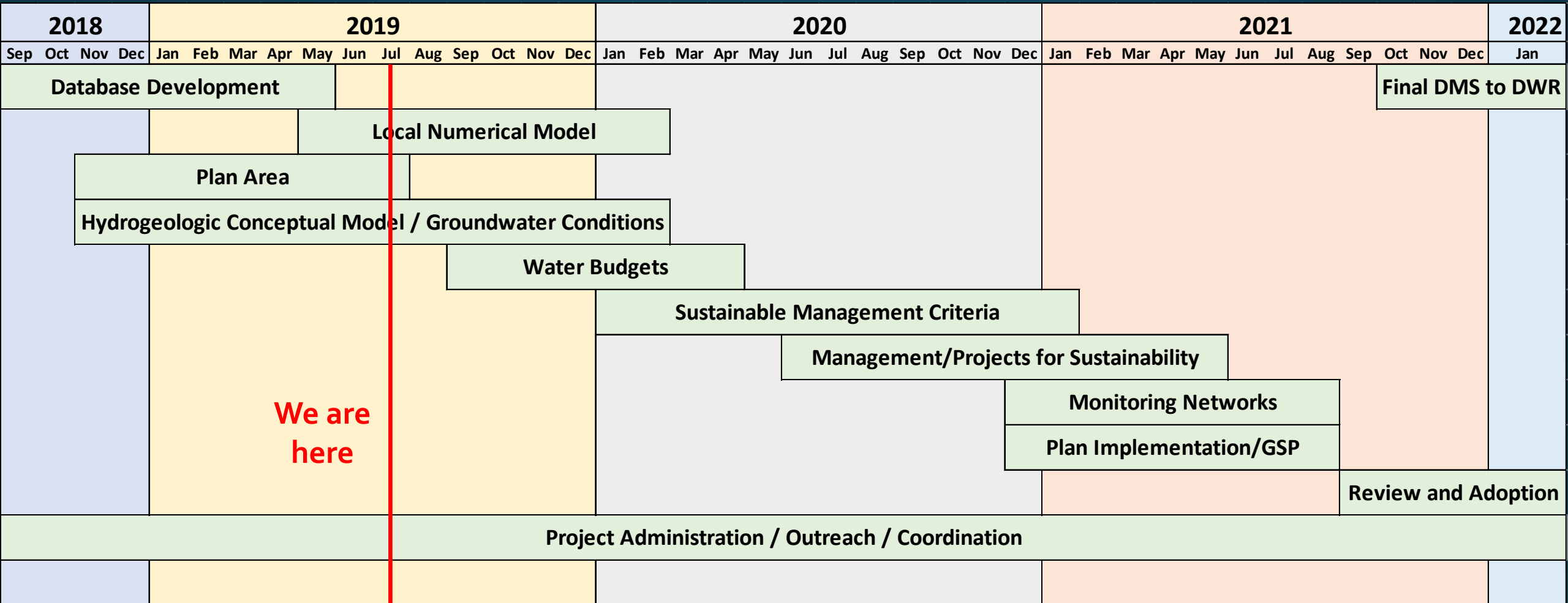
Presentation Outline

- Workshop Objectives
- GSP Process and Timeline
- Basin Setting Update
- Next Steps

TAC Workshop Objectives

- Provide an update on technical work to date using **draft work products**
- Allow TAC members to consider **how the technical work informs the GSP**
- Provide an opportunity for the TAC and stakeholders to **suggest data or other considerations** to incorporate into the analysis
- Provide information that the **TAC/GSA members can discuss and share with community stakeholders**

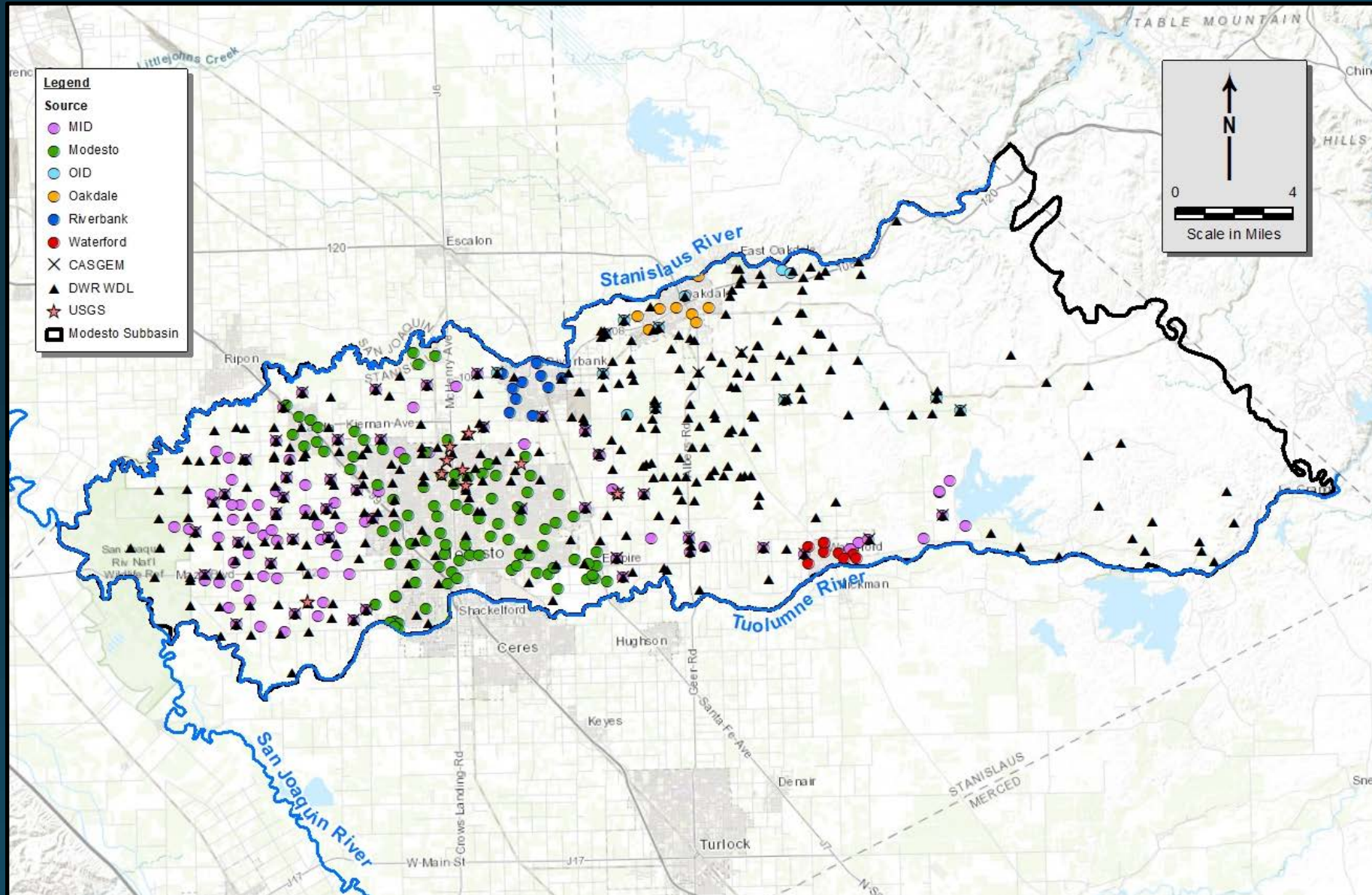
Modesto Subbasin GSP Timeline



GSP Overview

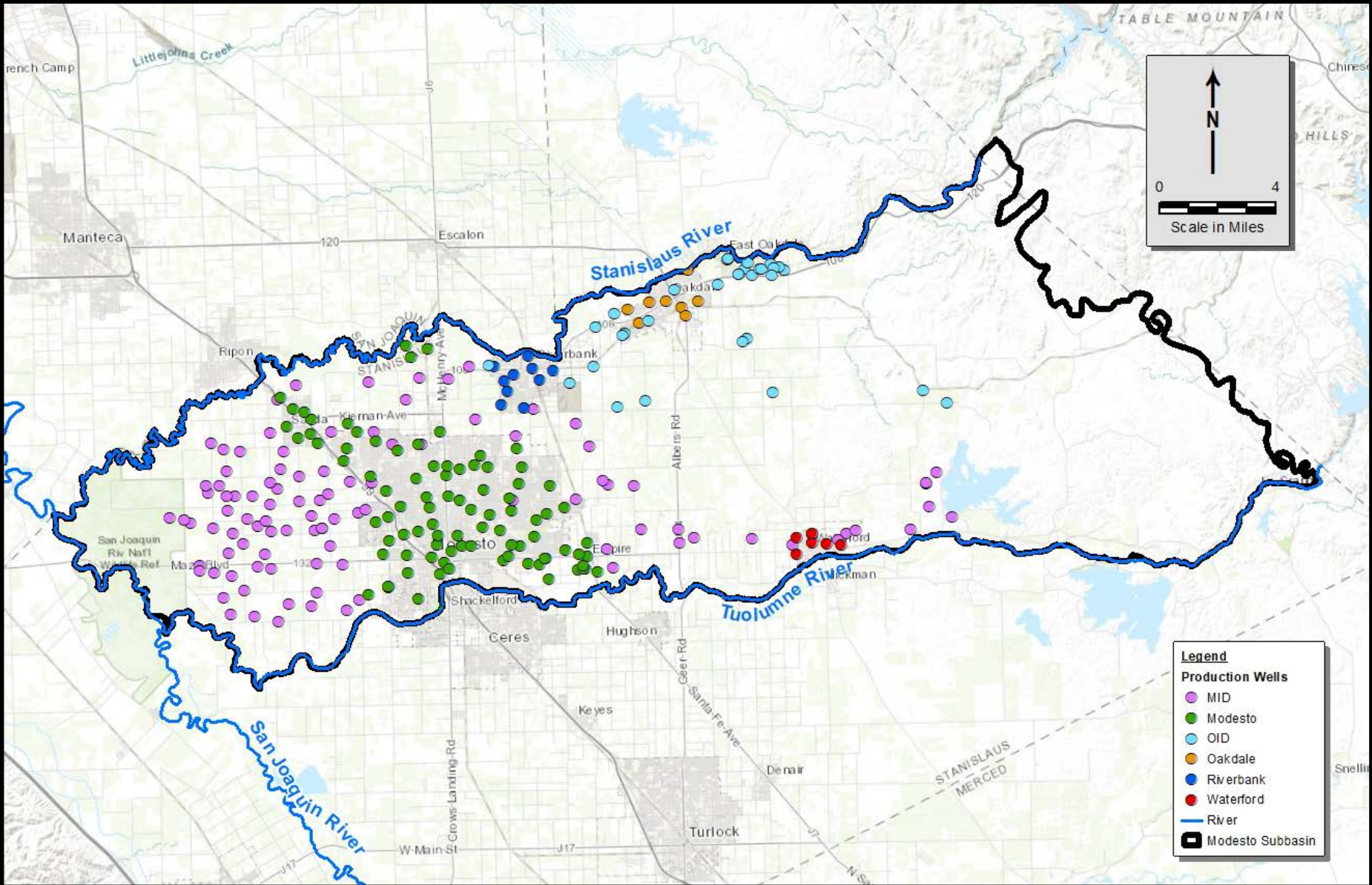


Wells with Water Level Data



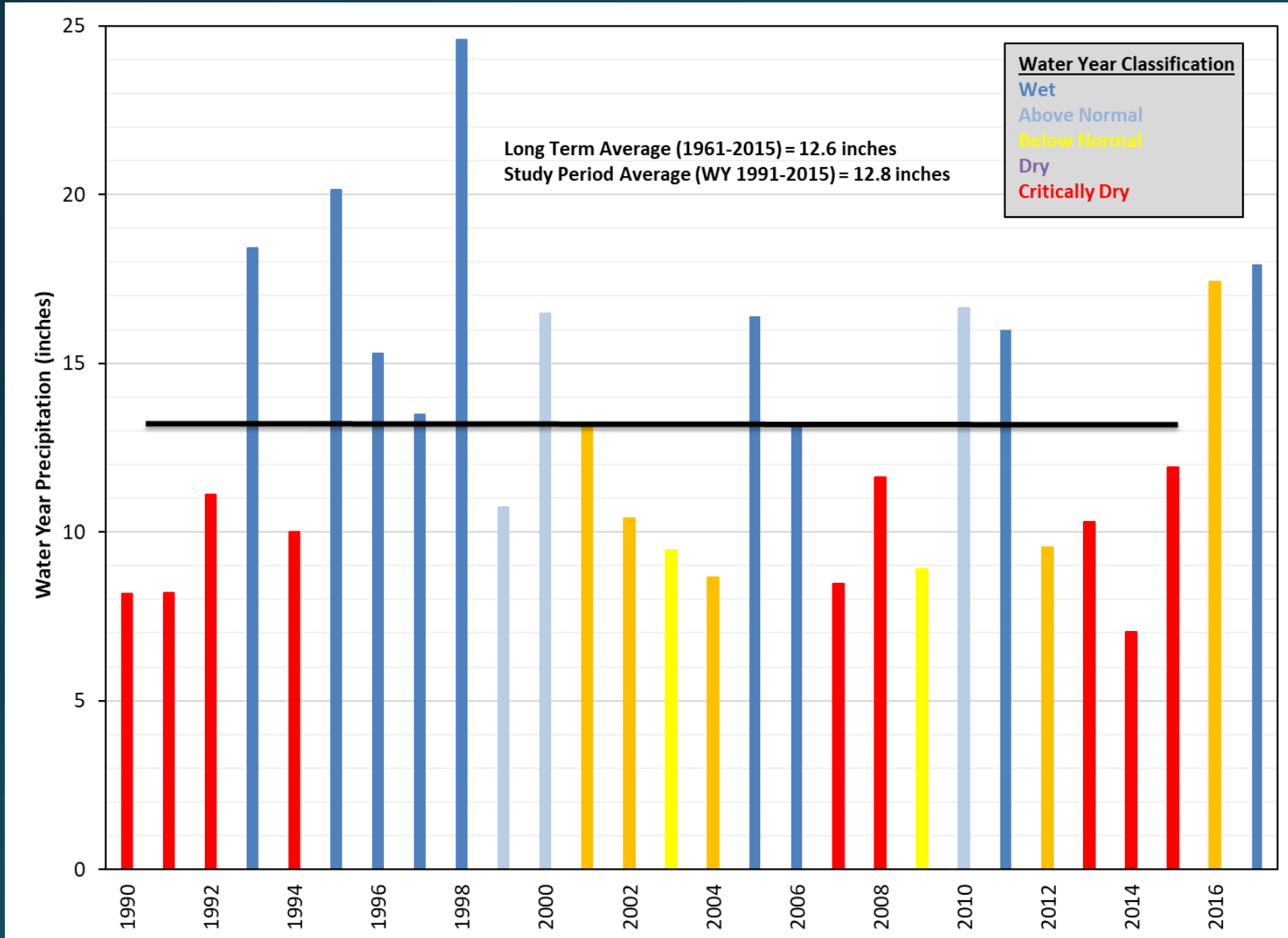
- >600 wells
- Data Sources:
 - Irrigation Districts
 - Municipalities
 - CASGEM
 - DWR Water Data Library
 - USGS
- Data gaps in east

Public Supply Wells



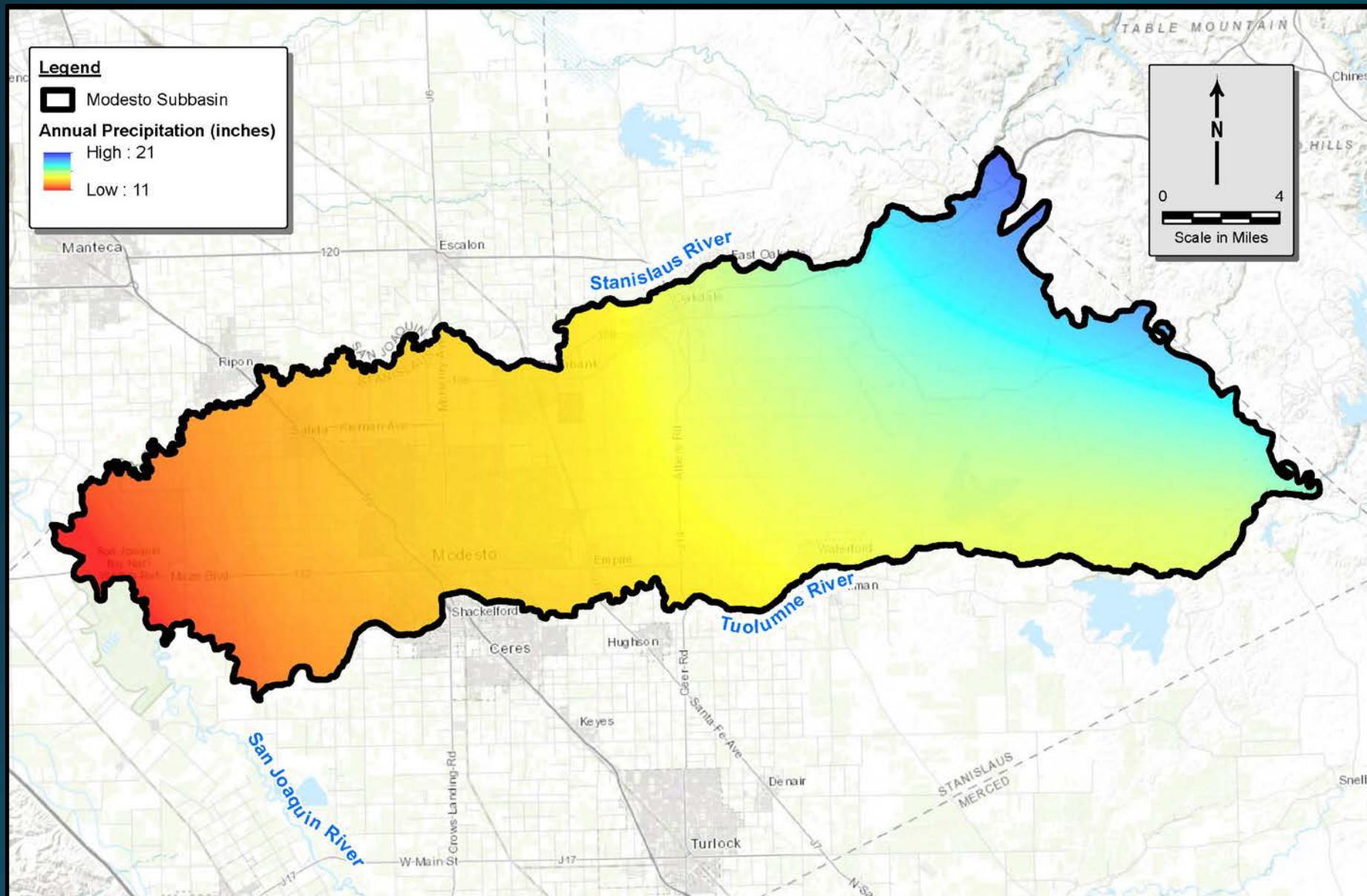
- ~250 wells
- Data Sources
 - Irrigation Districts
 - Municipalities

Annual Precipitation



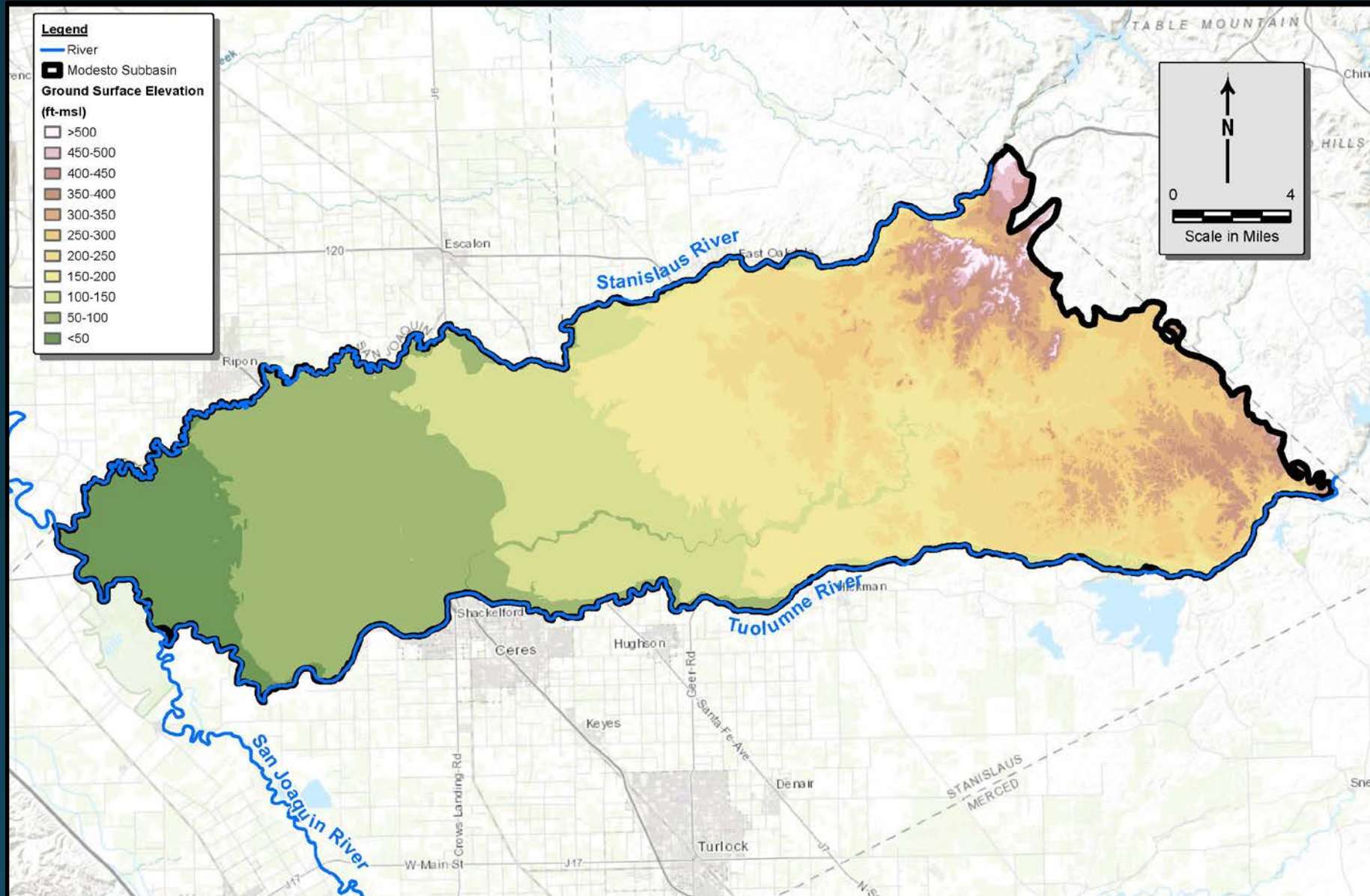
- Source: MID weather station (Modesto, CA)
- DWR Water Year Classification for San Joaquin Valley
- Long term average similar to study period average

Average Annual Precipitation (1981-2010)



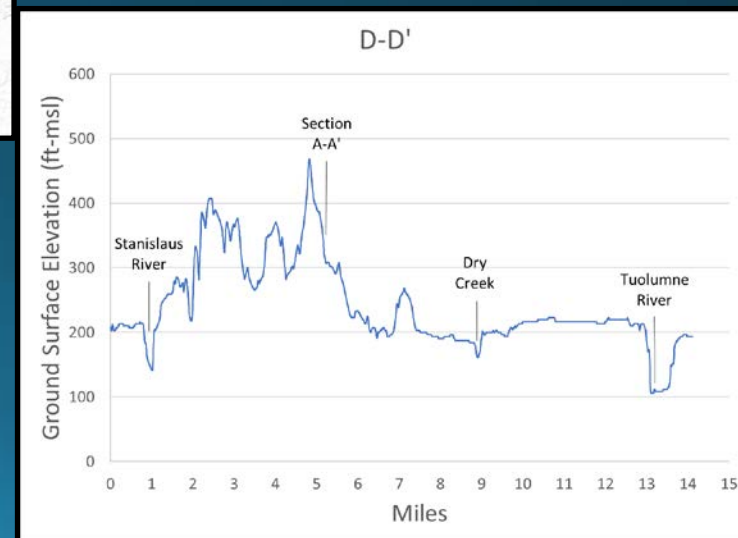
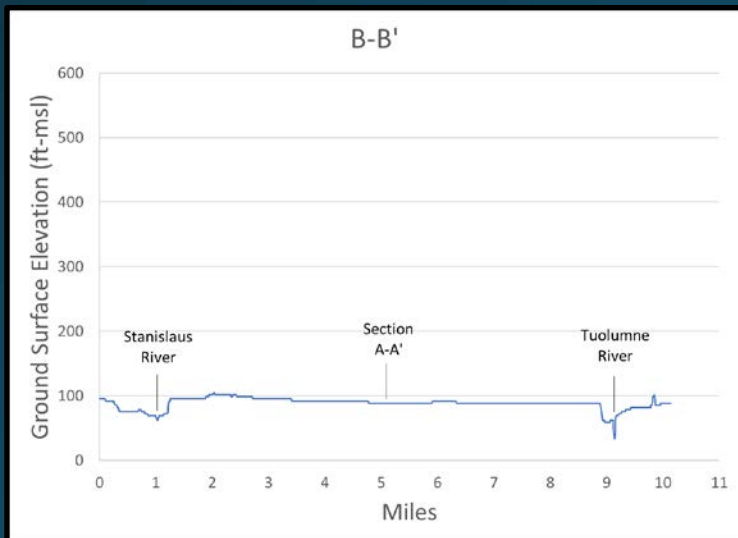
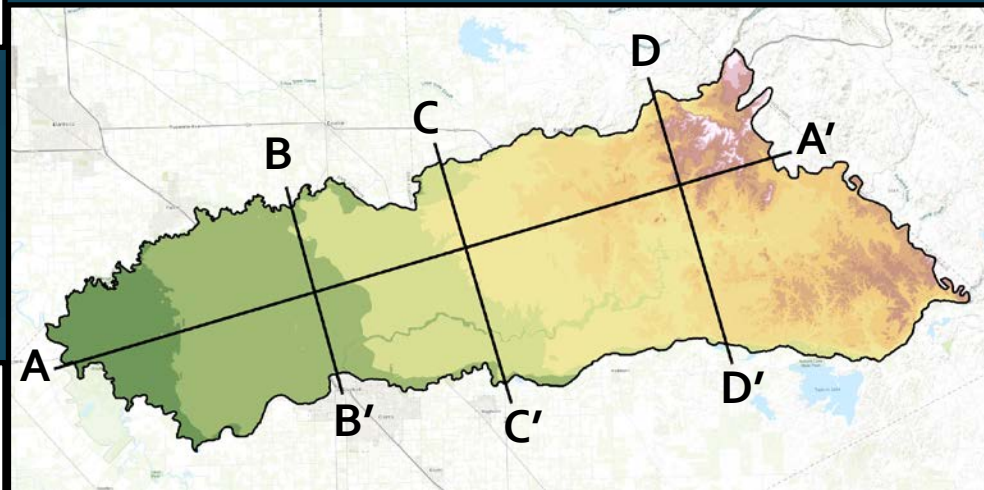
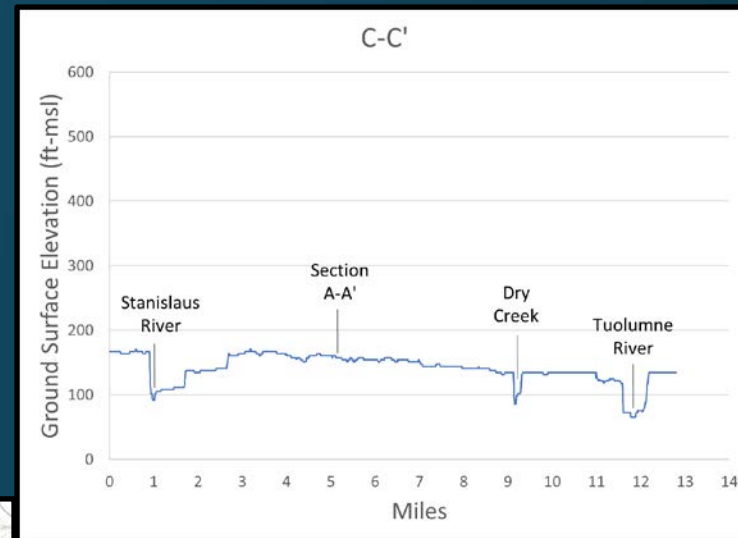
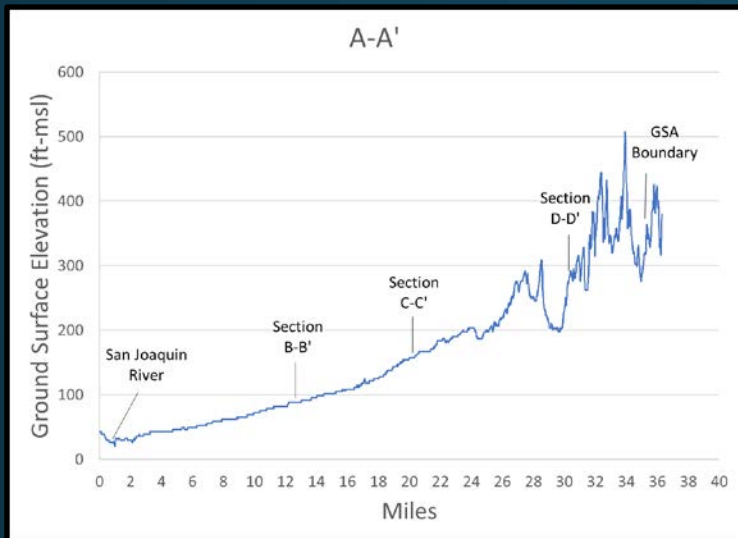
- Data from PRISM, 30-year average
- Ranges from 11 to 20 inches per year
- Precipitation data used in C2VSIM

Ground Surface Elevation



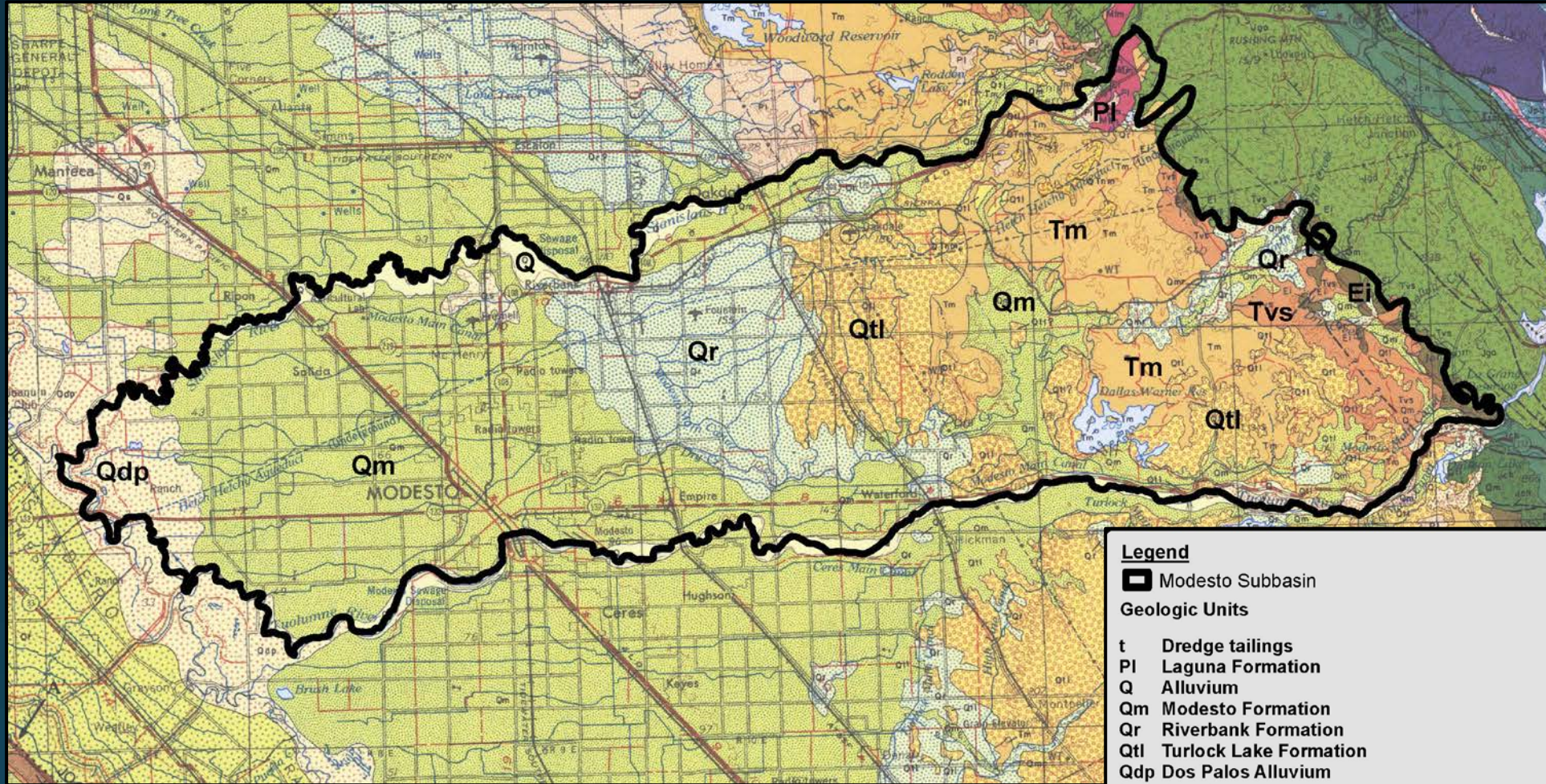
- Elevations range from 650 ft msl along northeastern Subbasin boundary to 20 ft msl along northwestern boundary
- Relatively flat in the west, hilly and dissected in the east

Topographic Profiles



DRAFT

Geologic Map



Legend

 Modesto Subbasin

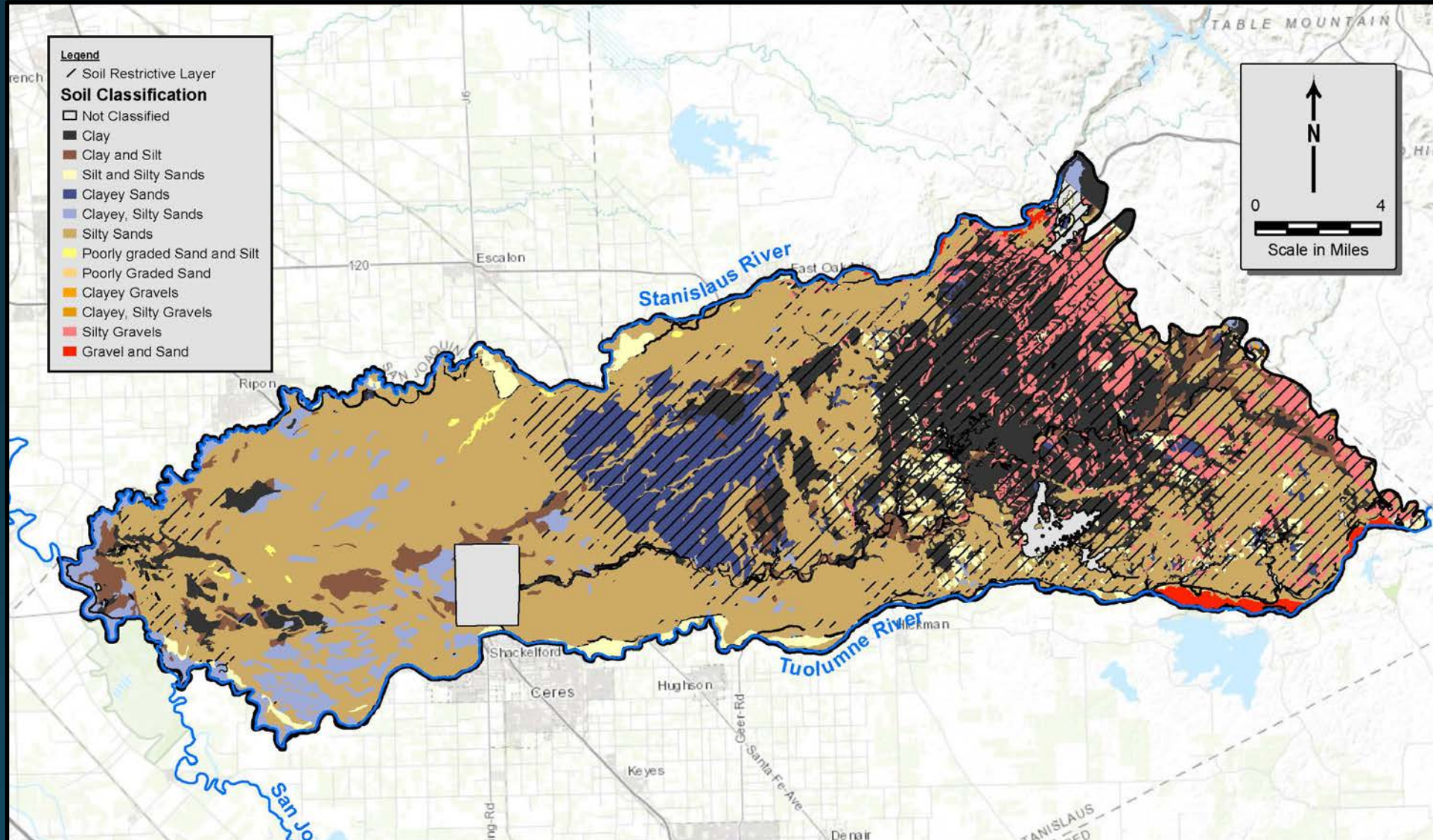
Geologic Units

t	Dredge tailings
PI	Laguna Formation
Q	Alluvium
Qm	Modesto Formation
Qr	Riverbank Formation
Qtl	Turlock Lake Formation
Qdp	Dos Palos Alluvium
Tm	Mehrten Formation
Tvs	Valley Springs Formation
Ei	Ione Formation

Source: Wagner, D.L., Bortugno, E.J., and McJunking, R.D., 1991, Geologic Map of the San Francisco-San Jose Quadrangle, California, 1:250,000.

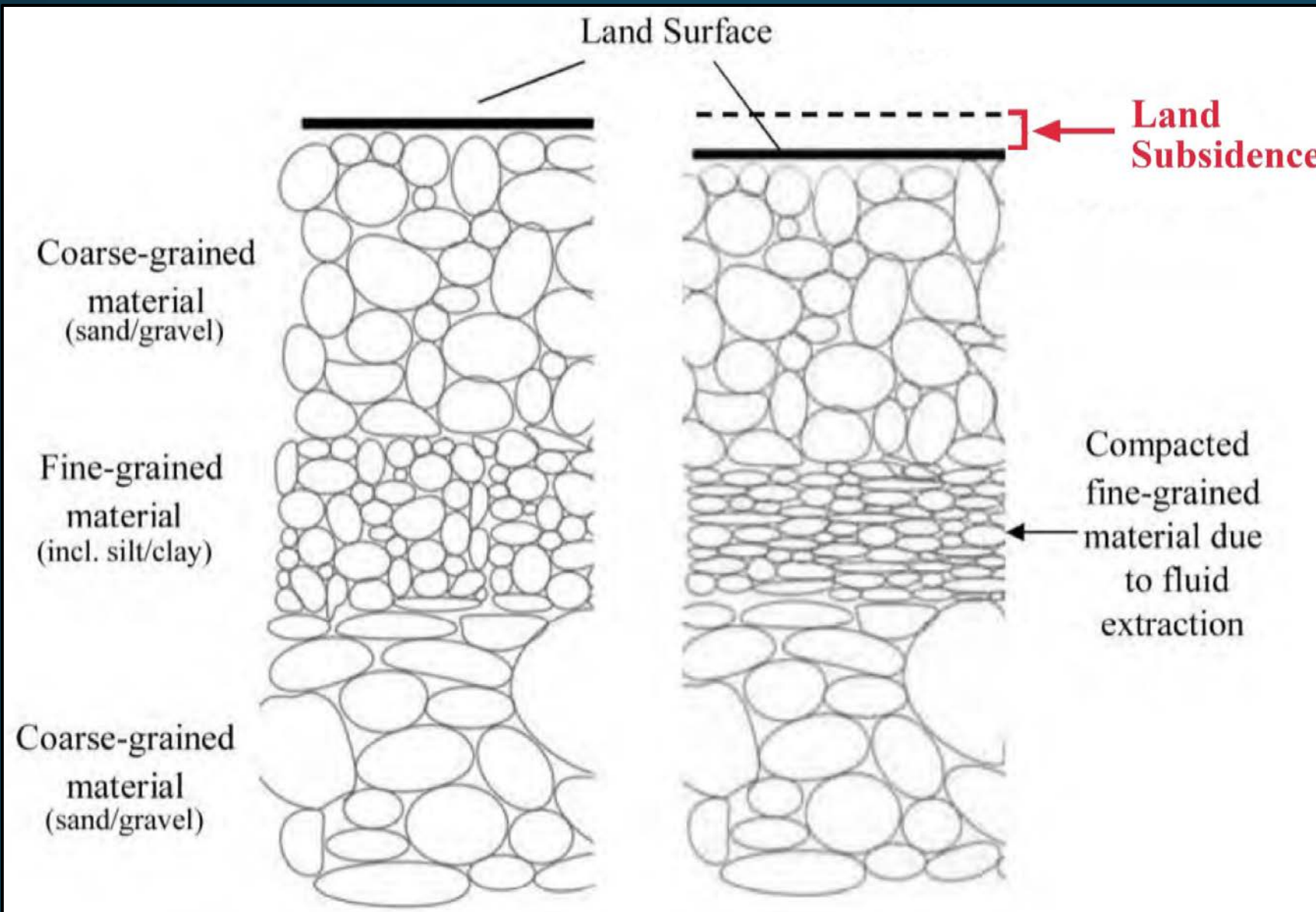
- Older sediments in east dip west into the valley below younger units
- Younger sediments in west

Soils and Restrictive Layers



- Subbasin dominated by clay and silt
- Coarser soils along rivers and in east
- Restrictive layers throughout much of eastern Subbasin, limit natural recharge
- Soils used in C₂VSIM

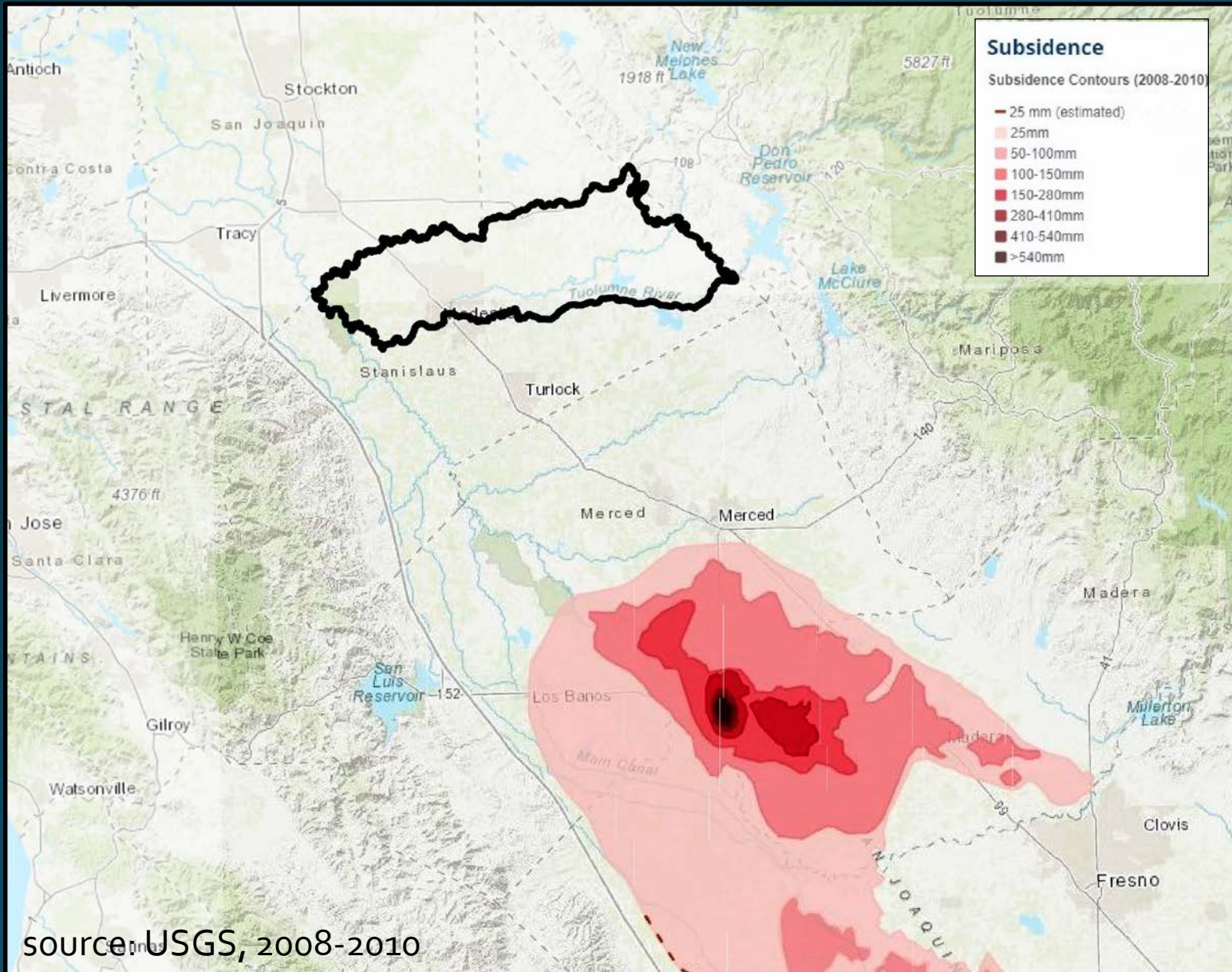
Conceptual Diagram - Land Subsidence



- Declining water levels decrease pore pressure
- Can lead to subsurface compaction
- Most of the deformation in the Central Valley occurs below the Corcoran Clay

Subsidence (2008-2010)

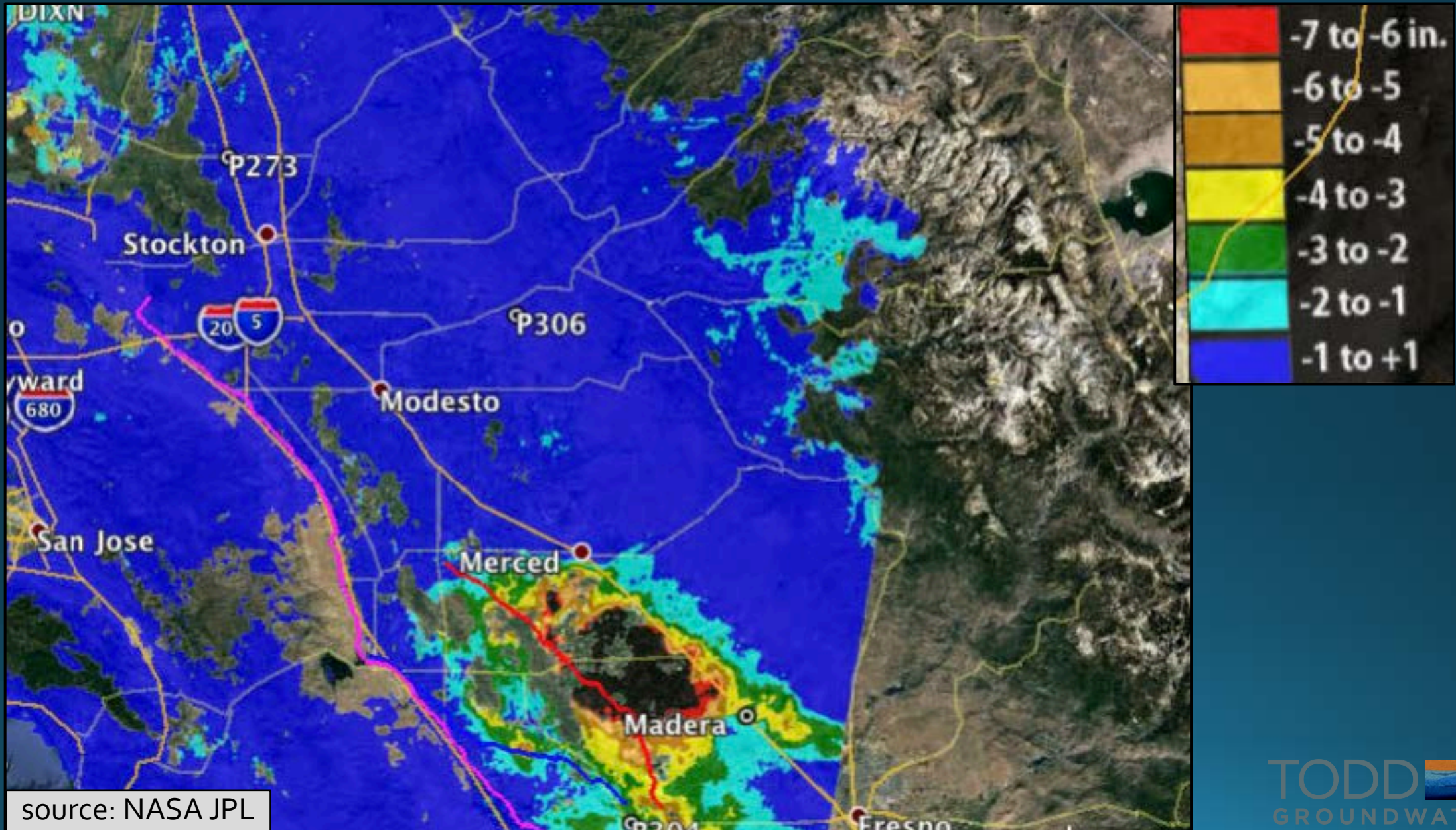
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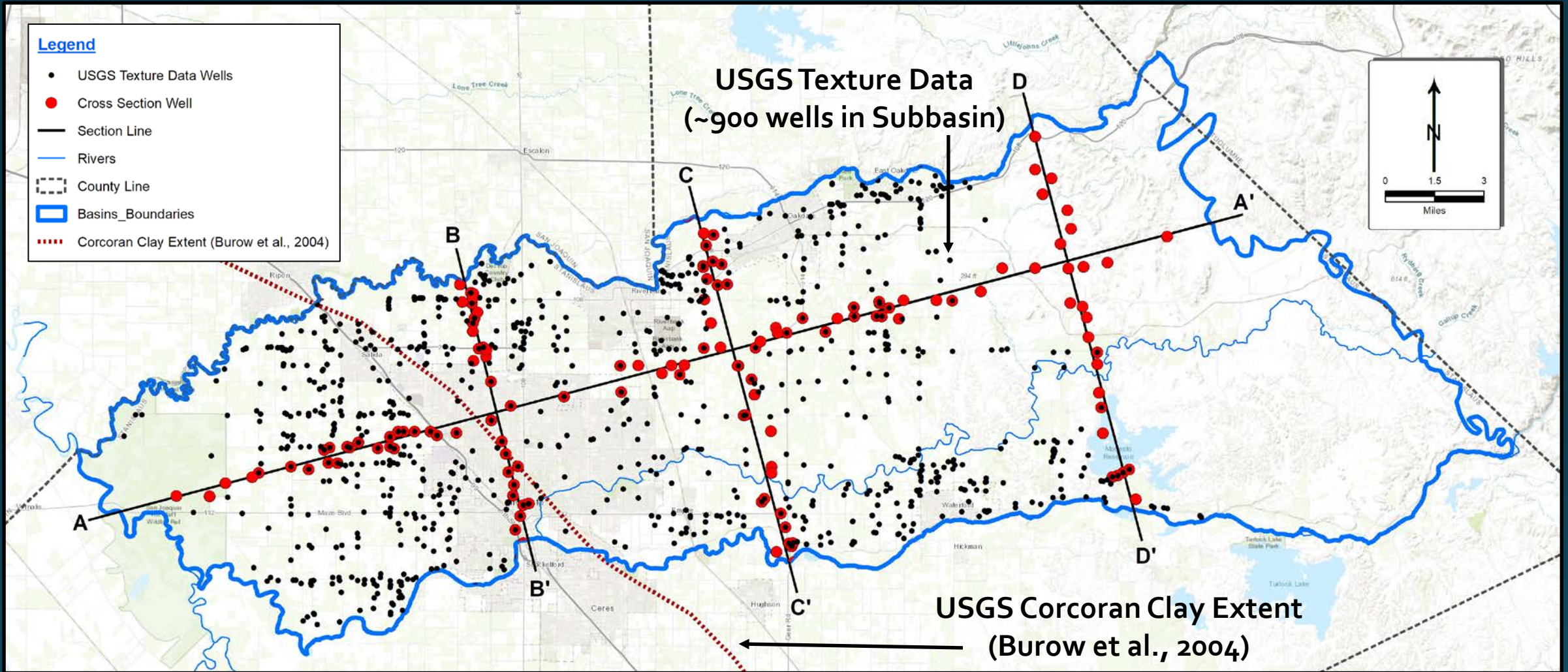
- Historical subsidence is not a significant issue in the Modesto Subbasin
- Lowering of water levels could cause subsidence in Modesto Subbasin
- Corcoran Clay extent and thickness important to understand

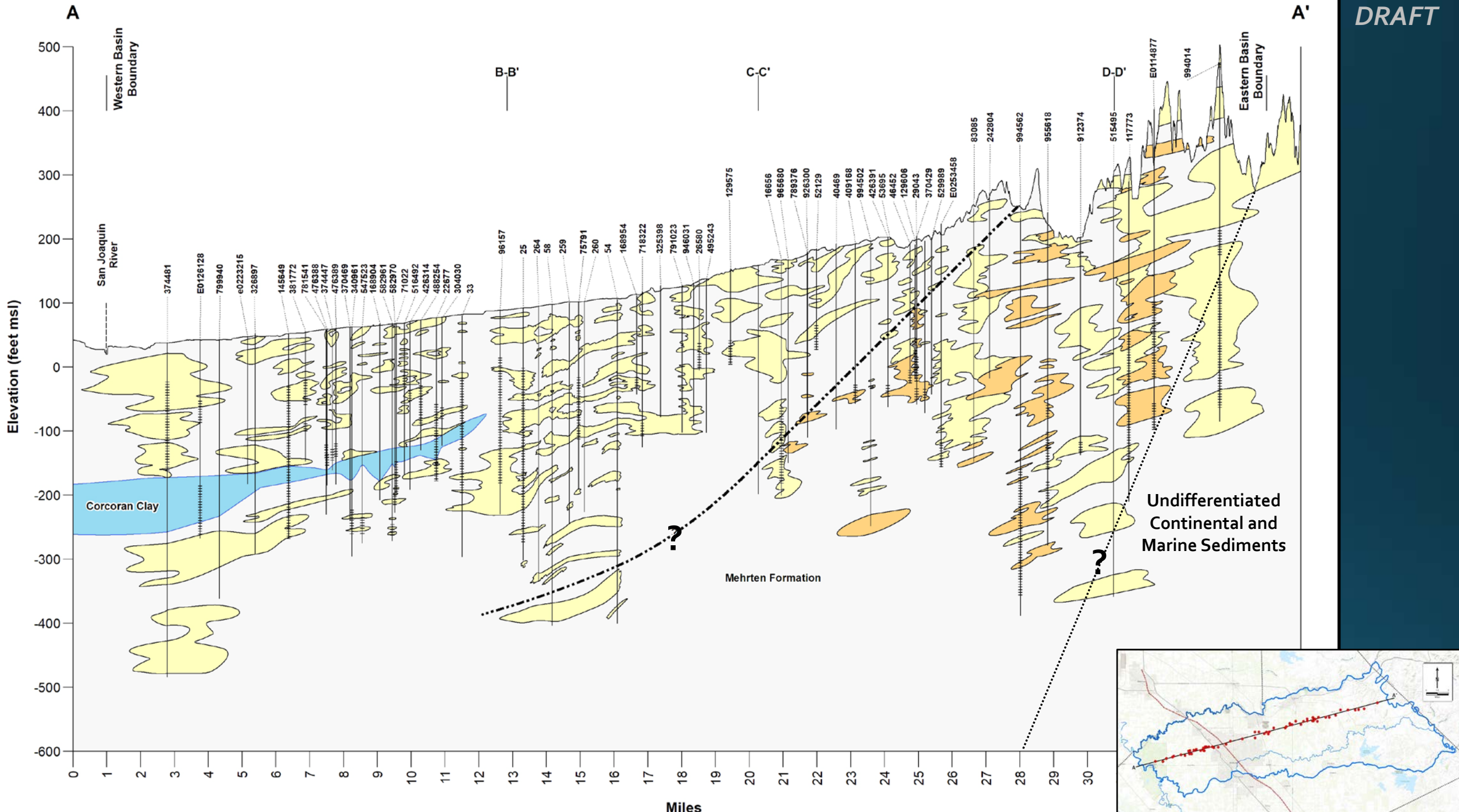
Subsidence (March 2015 – May 2016)

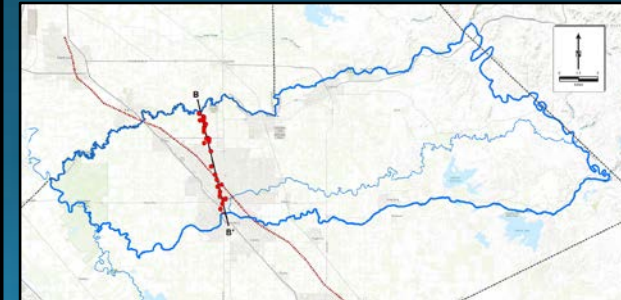
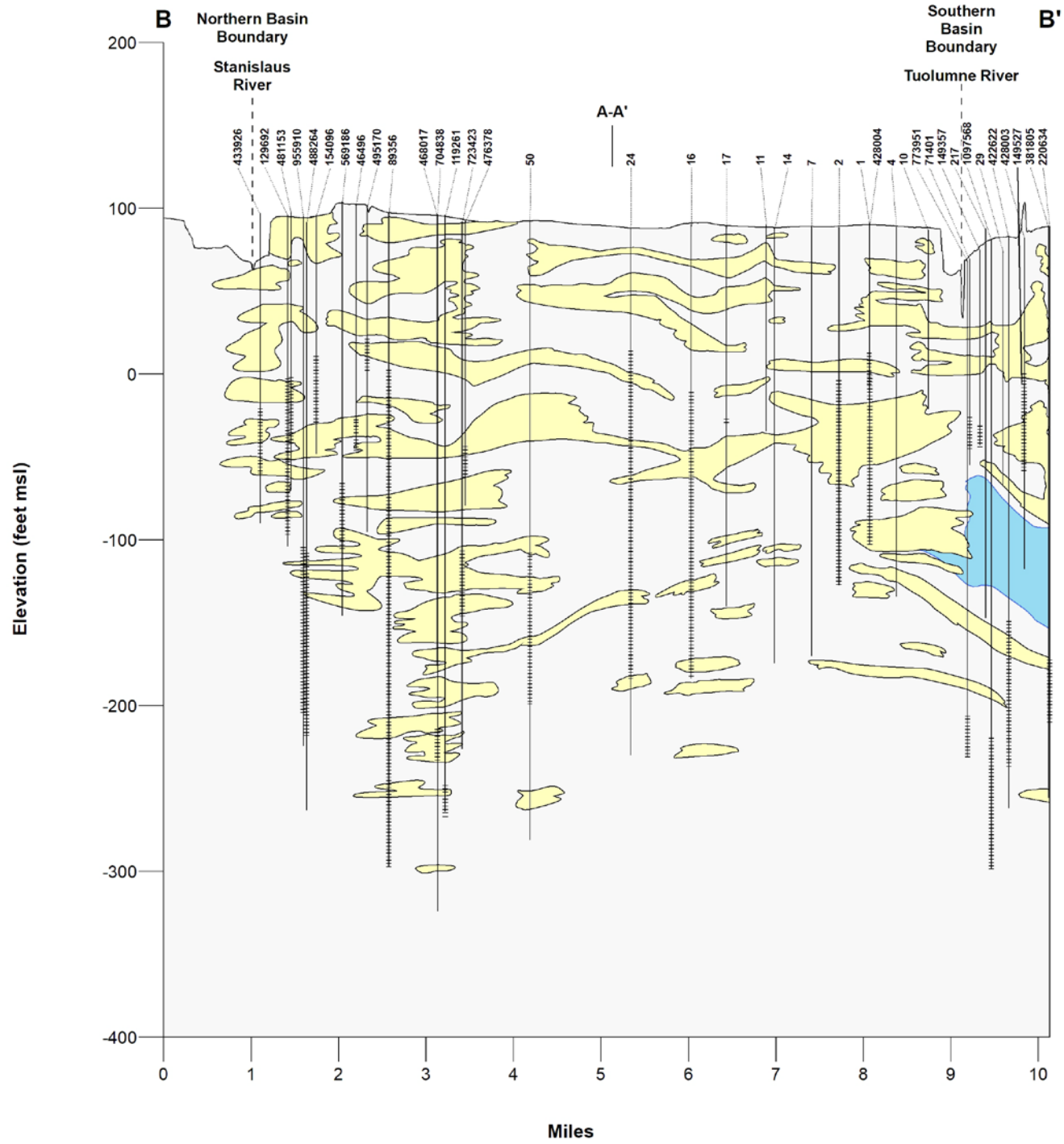
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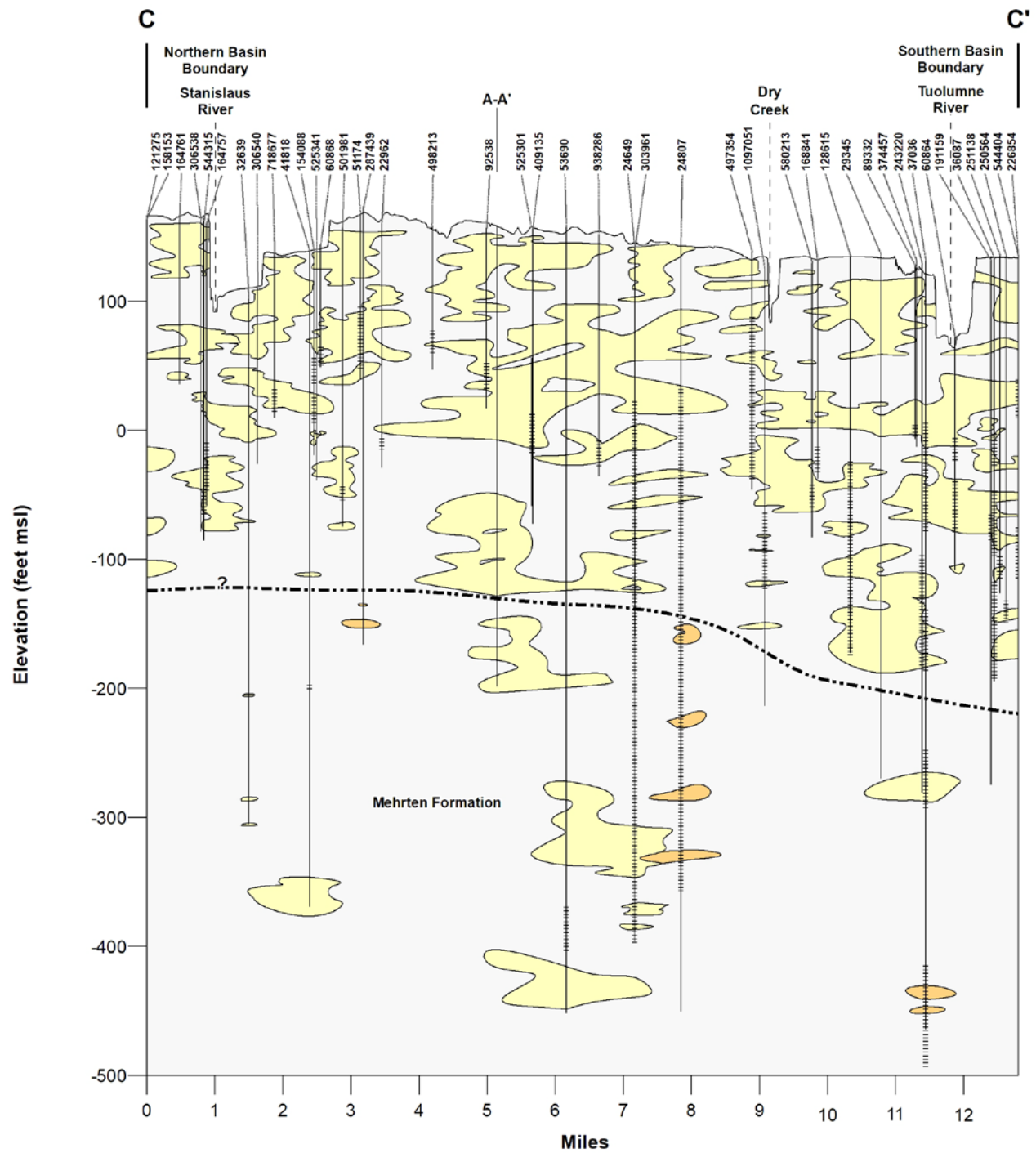


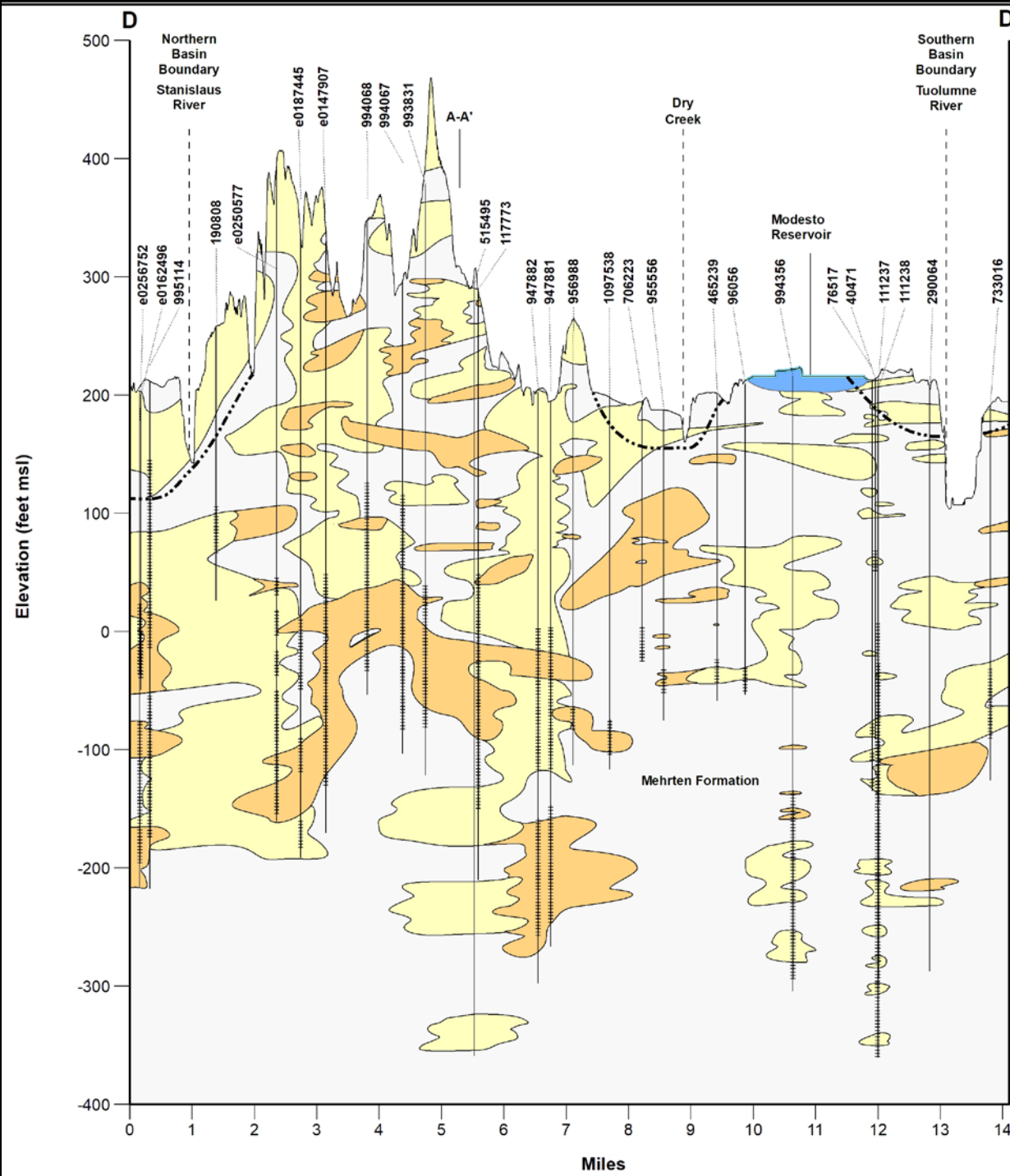
Cross Section Transects



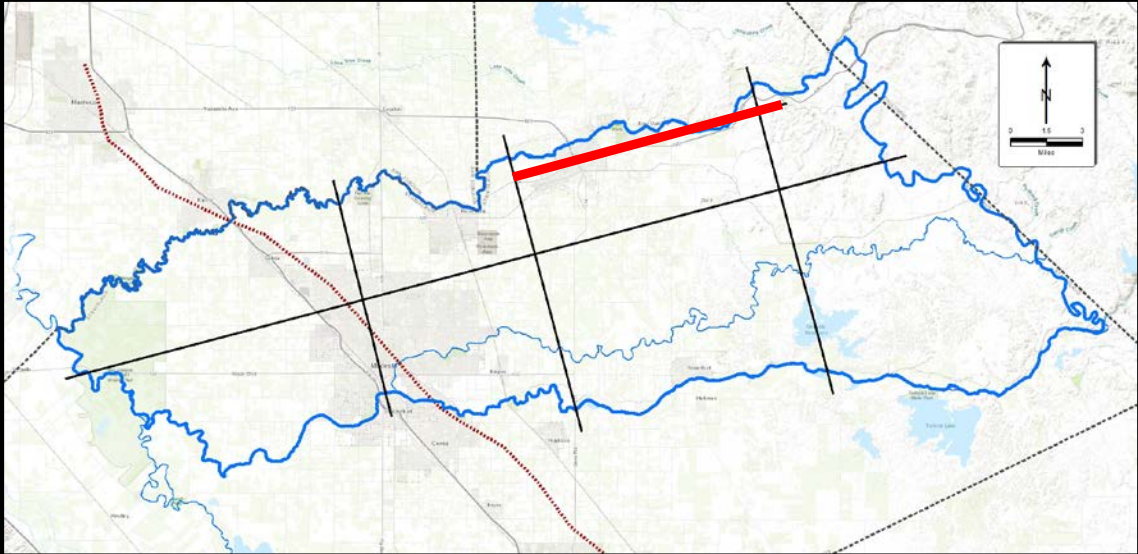
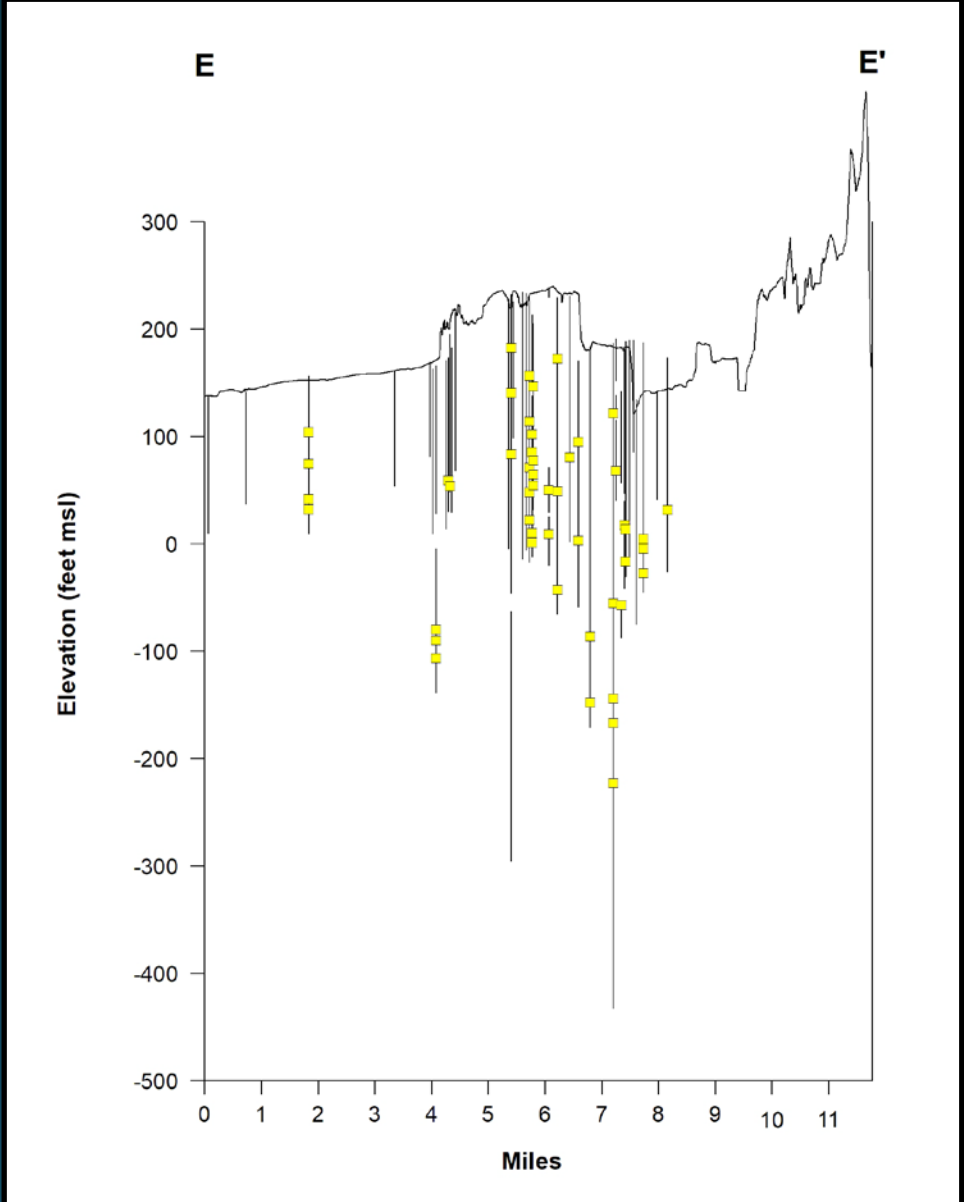




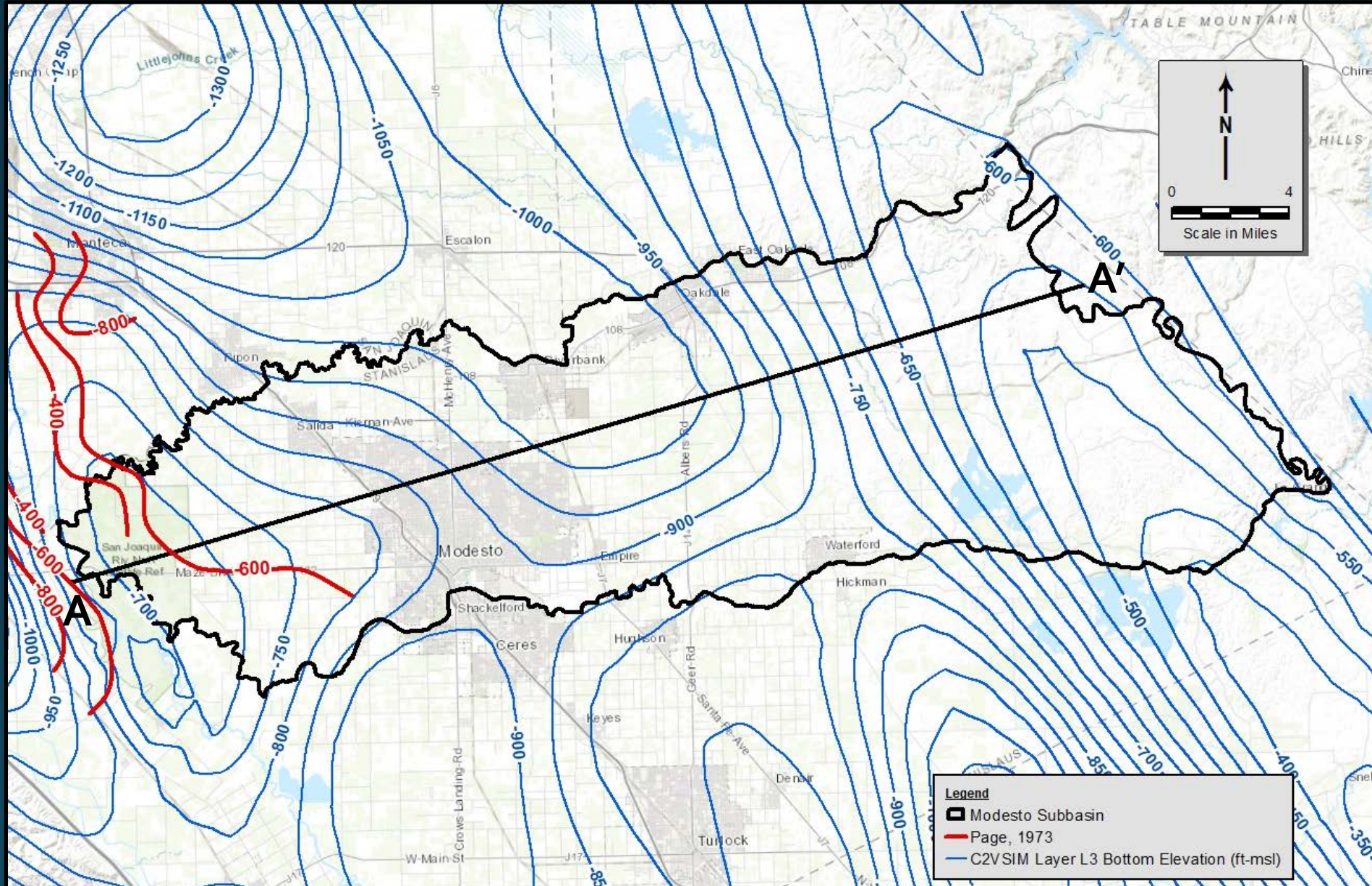




Additional Cross Section



Base of Fresh Water (C2VSIM)



- C2VSIM elevation of the bottom of groundwater basin (contour interval = 50 ft)
- Limited data from Page, 1973 (red contours)

A

A'

- 1 – Western Upper Principal Aquifer
- 2 – Western Lower Principal Aquifer
- 3 – Eastern Principal Aquifer

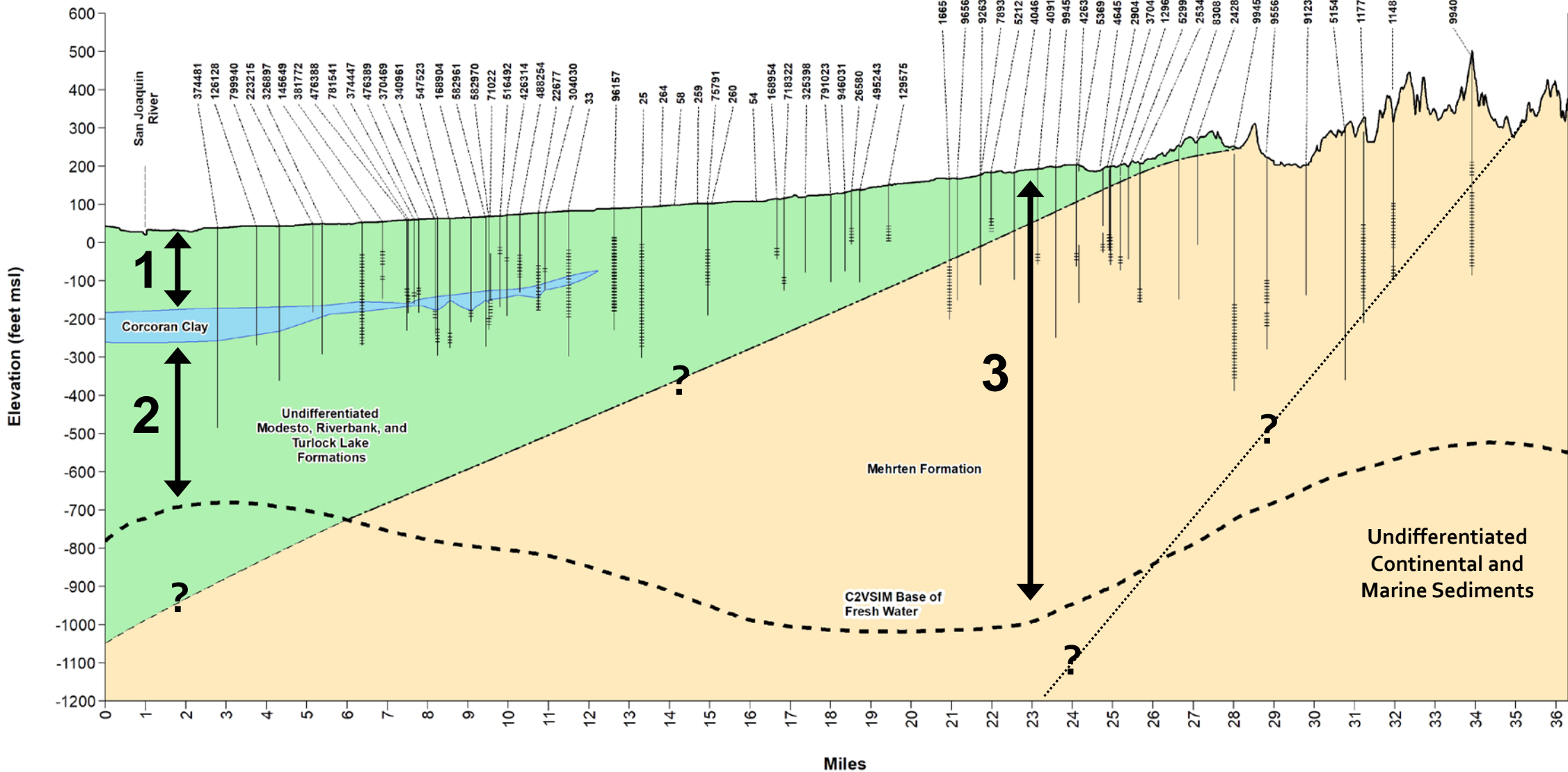
Western Basin Boundary

Eastern Basin Boundary

B-B'

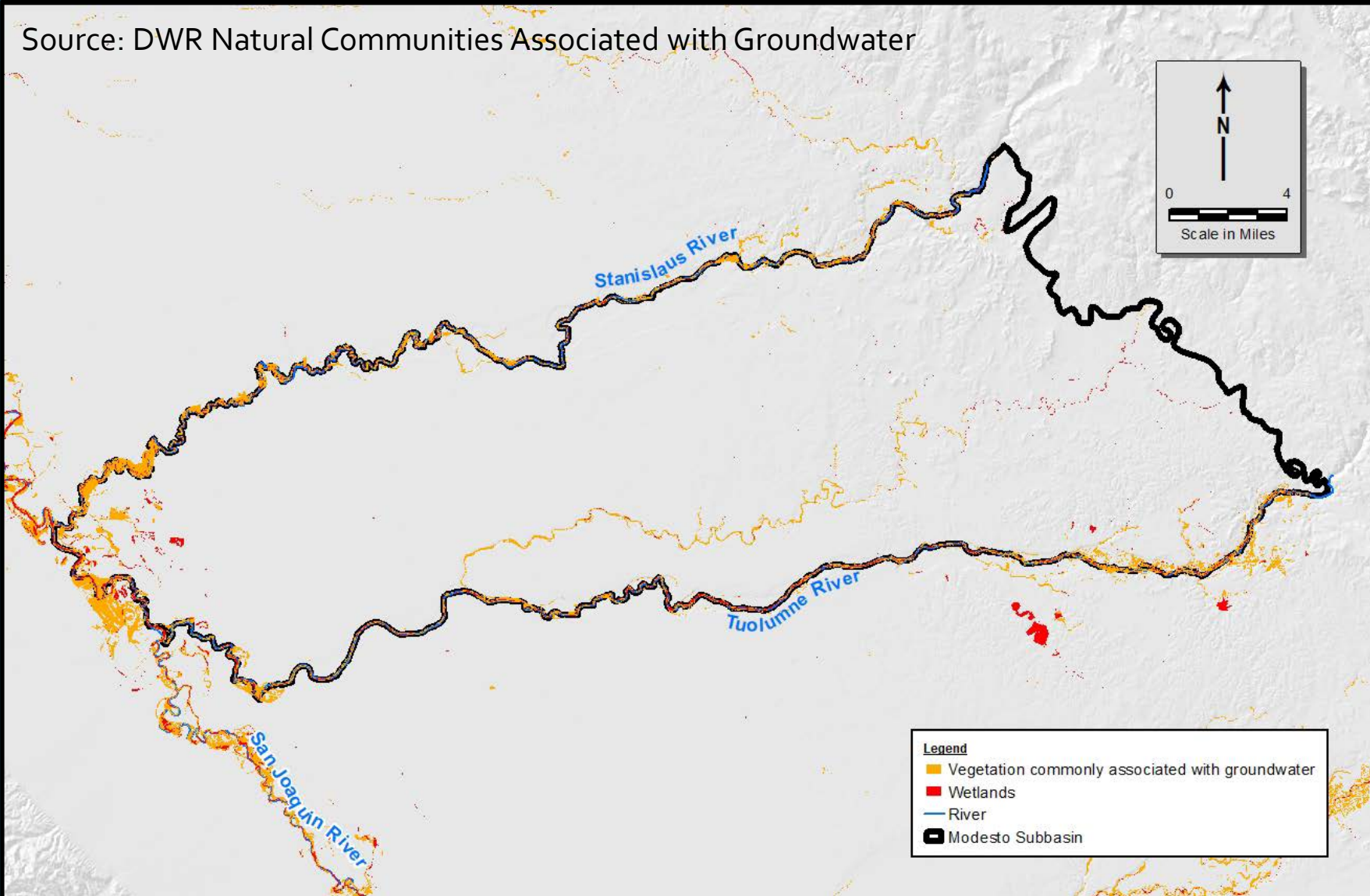
C-C'

D-D'



Miles

Vegetation and Wetland Mapping



- Vegetation and Wetlands primarily along rivers, Dry Creek and within San Joaquin River National Wildlife Refuge
- C2VSIM model will be used to identify gaining and losing stretches of the rivers and help us understand interconnected surface water

The presence of vegetation does not necessarily indicate a GDE

Water Quality: Data Sources

- Data Request to GSA Member Agencies:
 - City of Modesto, City of Oakdale, City of Riverbank, City of Waterford, Modesto Irrigation District, Oakdale Irrigation District, Stanislaus County, and Tuolumne County
- Eastern San Joaquin Water Quality Coalition
- Central Valley Salinity Alternatives for Long-term Sustainability (CV-SALTS), includes:
 - RWQCB Waste Discharge Requirements (WDR), Dairy CARES program
 - California Department of Public Health (CDPH)
 - Department of Water Resources (DWR)
 - US Geological Survey (USGS), National Water Information System (NWIS)
 - GeoTracker Groundwater Ambient Monitoring and Assessment (GAMA) program
- GeoTracker

Water Quality: Constituents

Constituents of concern (7):

- Arsenic
- Dibromochloropropane (DBCP)
- Nitrate
- Tetrachloroethylene (PCE)
- 1,2,3-Trichloropropane (TCP)
- Total Dissolved Solids (TDS)
- Uranium

Water Quality Database:

- Microsoft Access
- >35 water quality constituents (select physical, majors, nutrients, and metals)
- Period of record: mid-1920s to present

Water Quality: Planned Analysis

- Focus on the 7 Constituents of Concern:
 - As, DBCP, NO₃⁻, PCE, TCP, TDS, U
- Analysis of the three Principal Aquifers:
 - Western Upper (above Corcoran)
 - Western Lower (below Corcoran)
 - Eastern (east of Corcoran)
- Summary statistics:
 - Comparison to MCLs and irrigation requirements
 - Water quality conditions versus well and screen depth (where available)
- Spatial and temporal analyses for each of the Principal Aquifers:
 - Maps of median and maximum concentrations
 - Historical trend analysis (1920 to 1995 and 1995 to 2014)
 - Present trend analysis (2015 to 2019)
- This analysis will support decisions for future monitoring networks.

GSP Next Steps

- Continue Technical Analysis
 - Hydrogeologic Conceptual Model
 - Water Quality
 - Groundwater Conditions
 - Modesto Subbasin Model
 - Water Budgets
- Upcoming Meetings
 - Coordination with Eastern San Joaquin Subbasin (today)
 - Model Development (July 22nd)