Understanding Groundwater in Napa County

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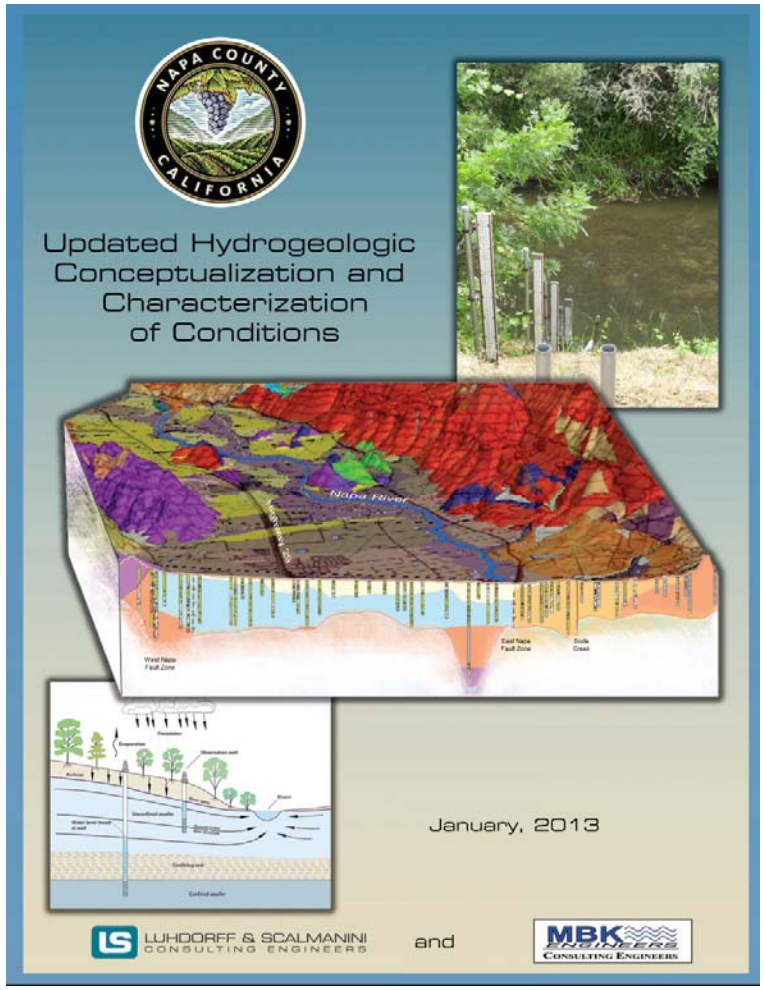
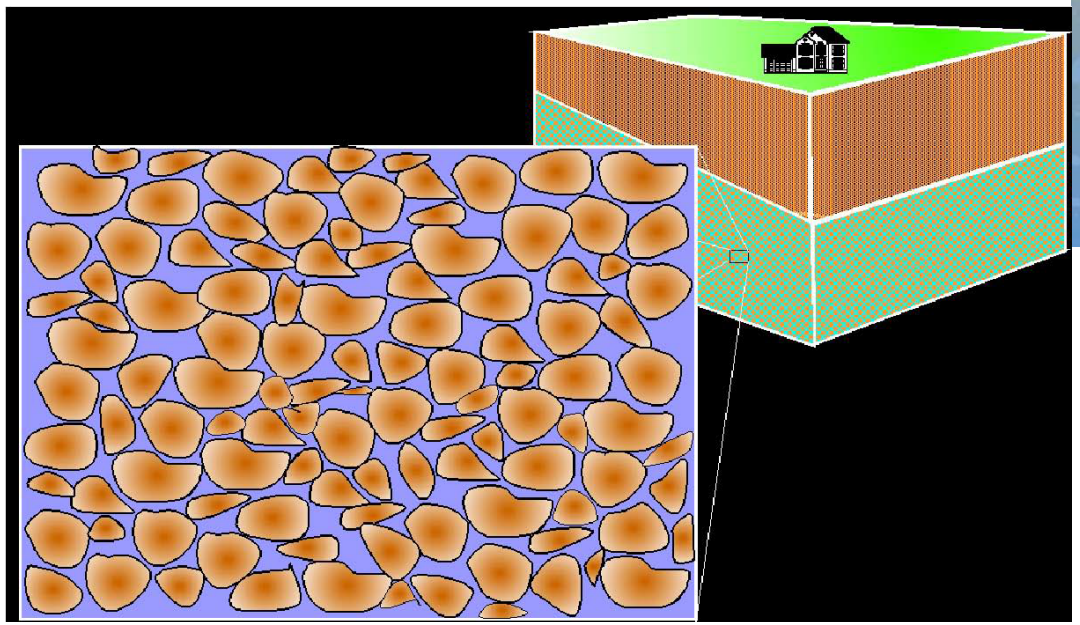
What We Have Learned

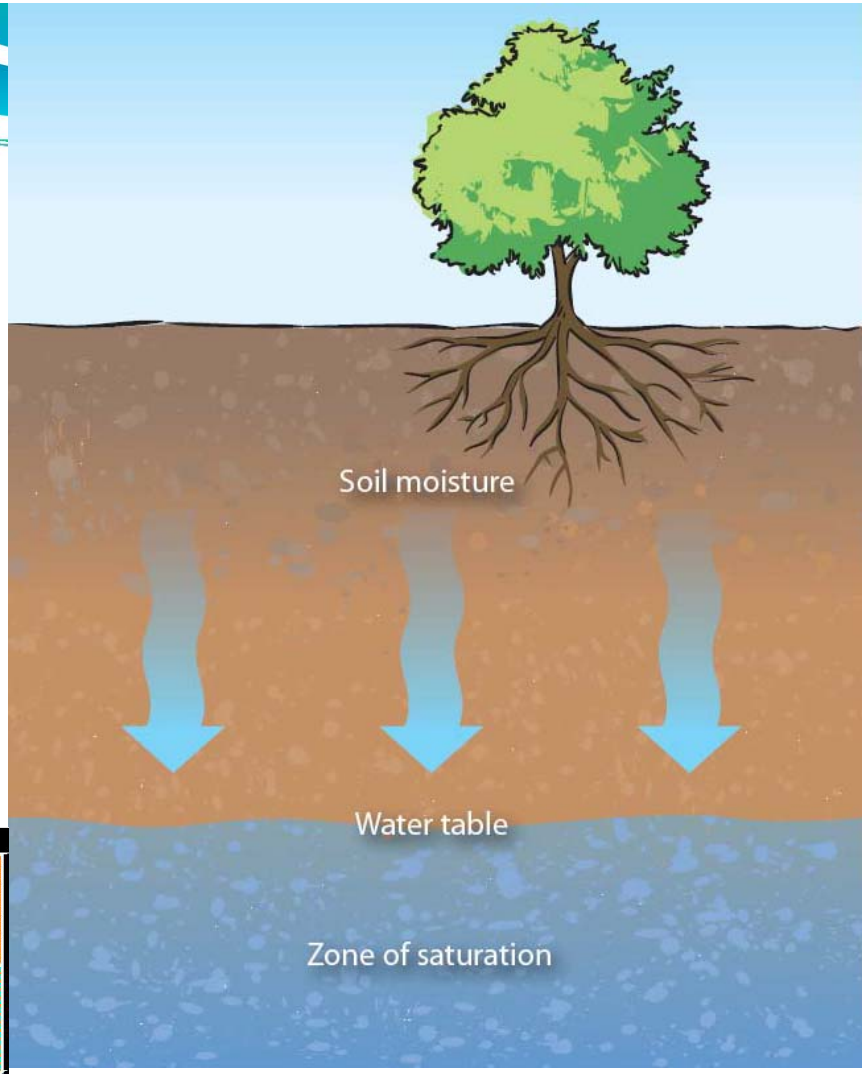
- Regional geology affects groundwater availability
- Groundwater conditions were broadly stable through 2013 in Napa Valley
- Data gaps exist
- SW/GW interaction is largely unknown



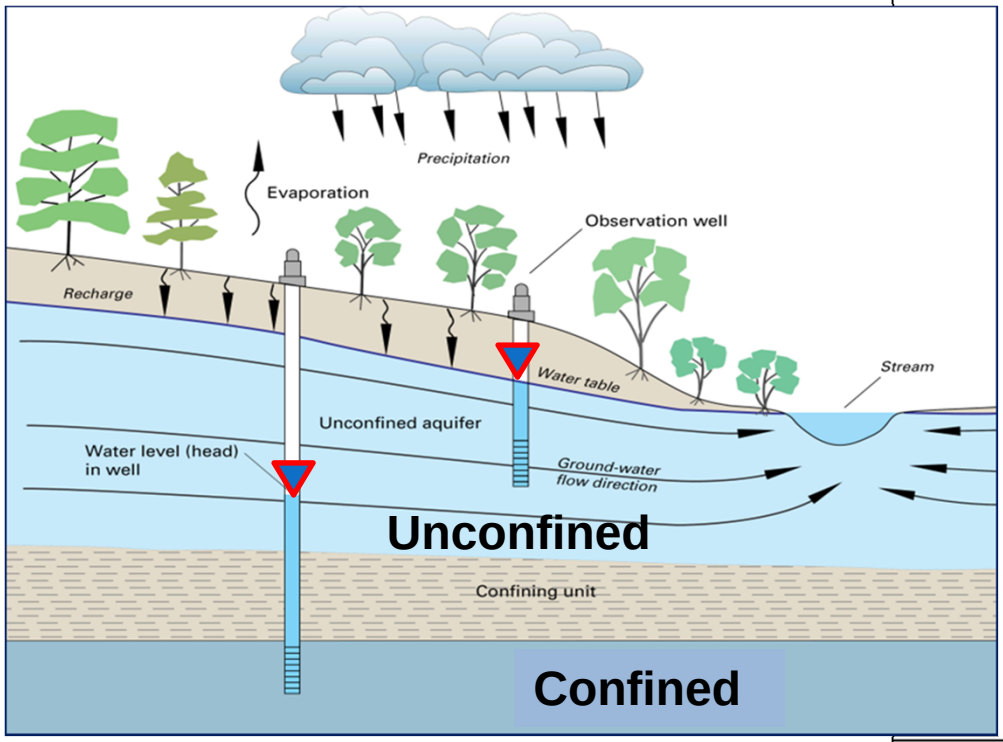
What is Groundwater

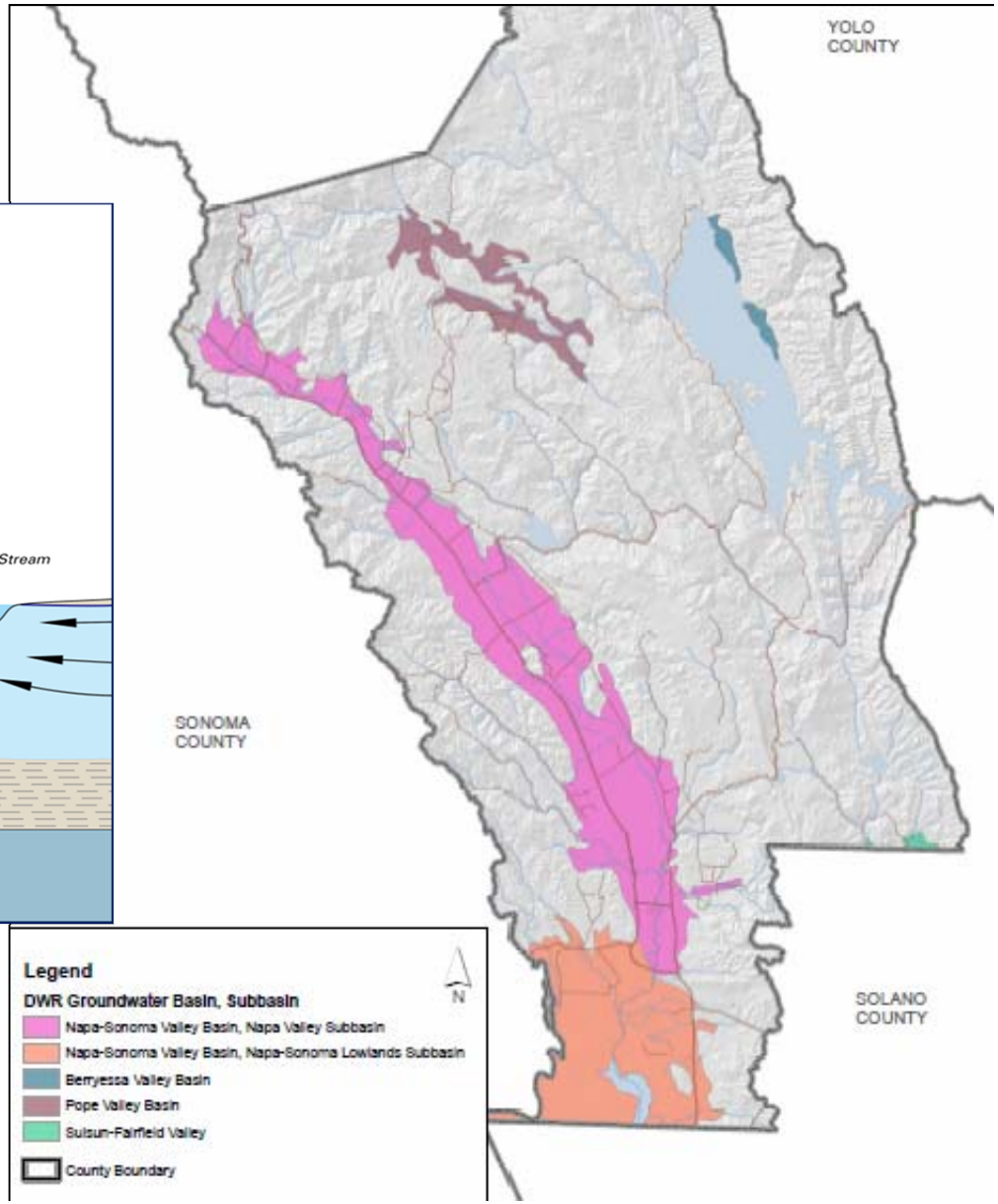
- **Water completely fills Pores/Fractures**





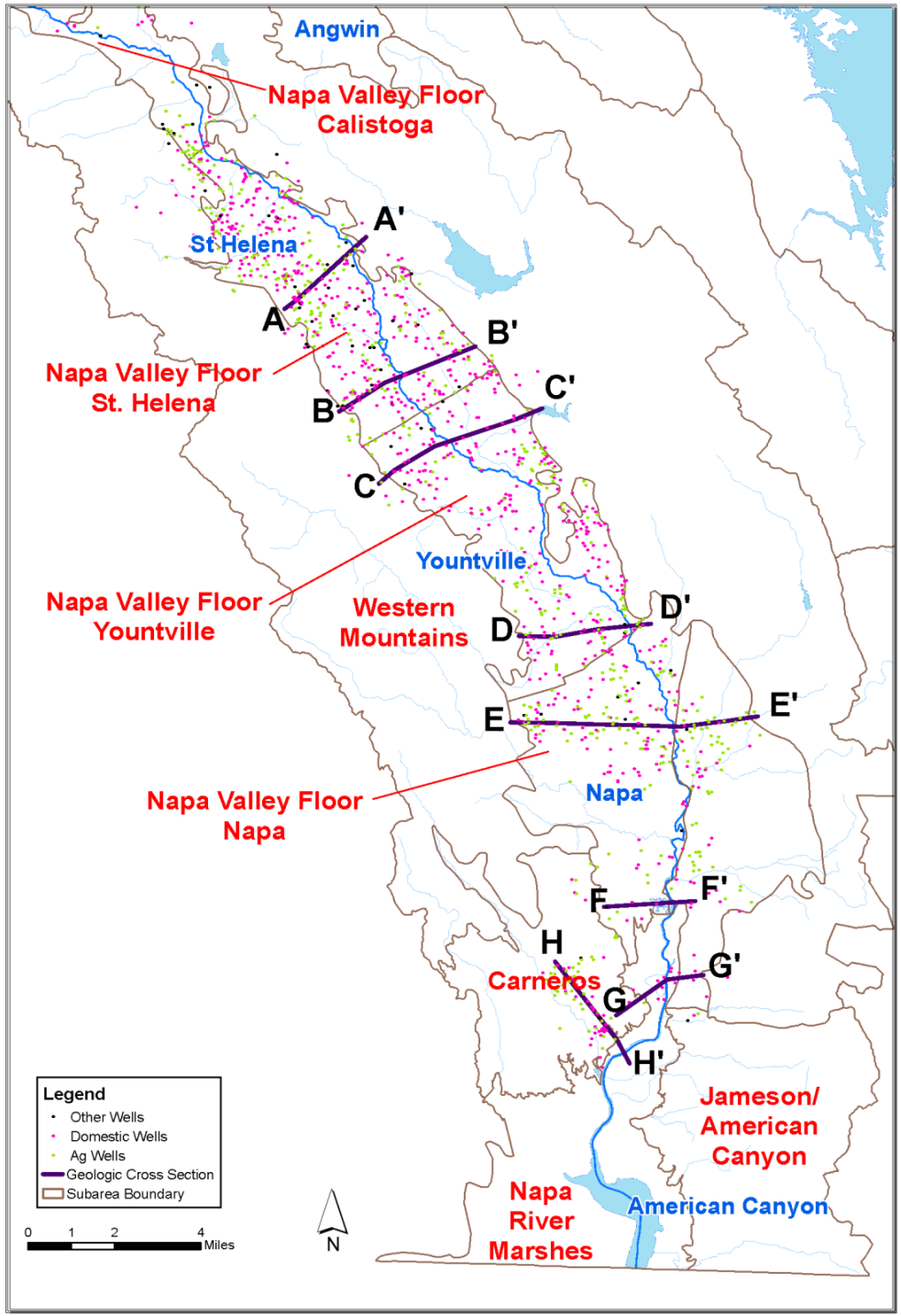
Groundwater Basins & Aquifer System





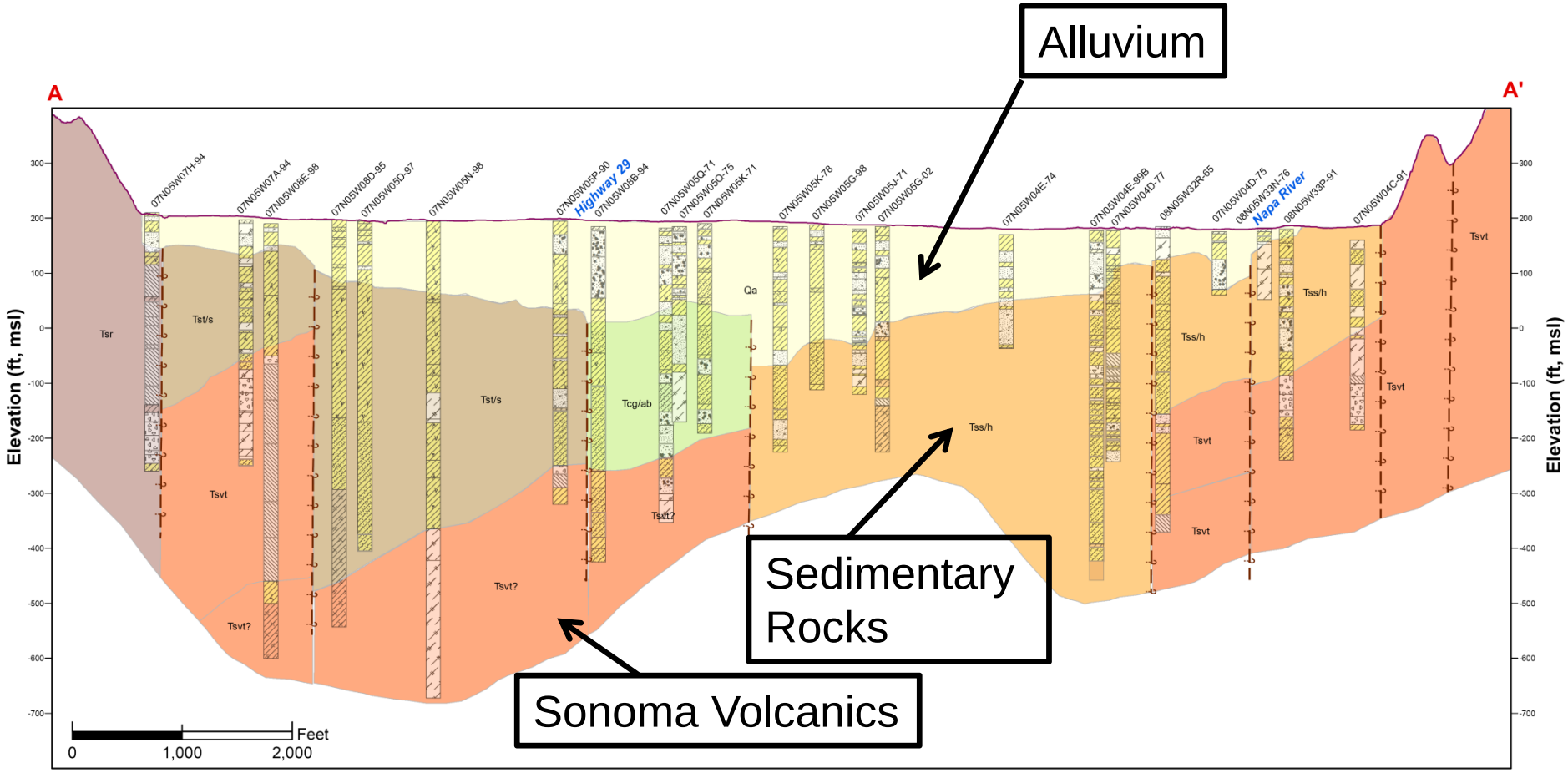
Geologic Data and Cross Sections

- **Update with decades of more recent geologic data**
- **1332 drillers' reports reviewed**
  - 770 Domestic
  - 501 Irrigation wells
  - Other (undesignated well type and/or testholes)
- **191 drillers' reports used for cross sections**



Subsurface Geology

Geologic Cross Section: St. Helena Subarea



Cross Section Comparison

Figure 5-1a Cross Section B-B' From Kunkel and Upson (1960)

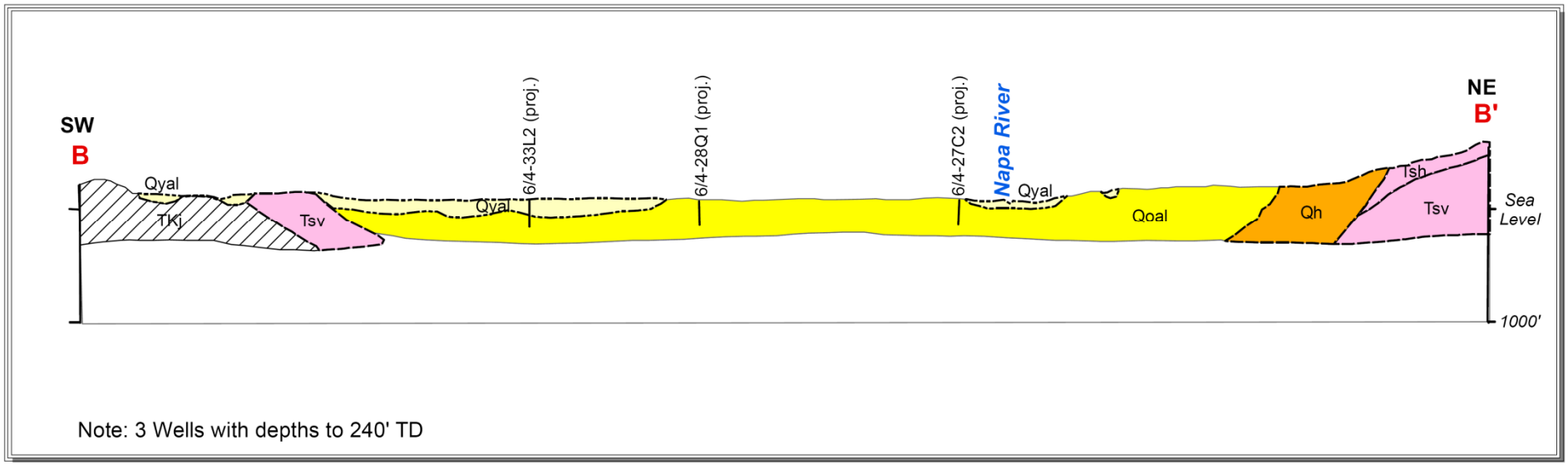
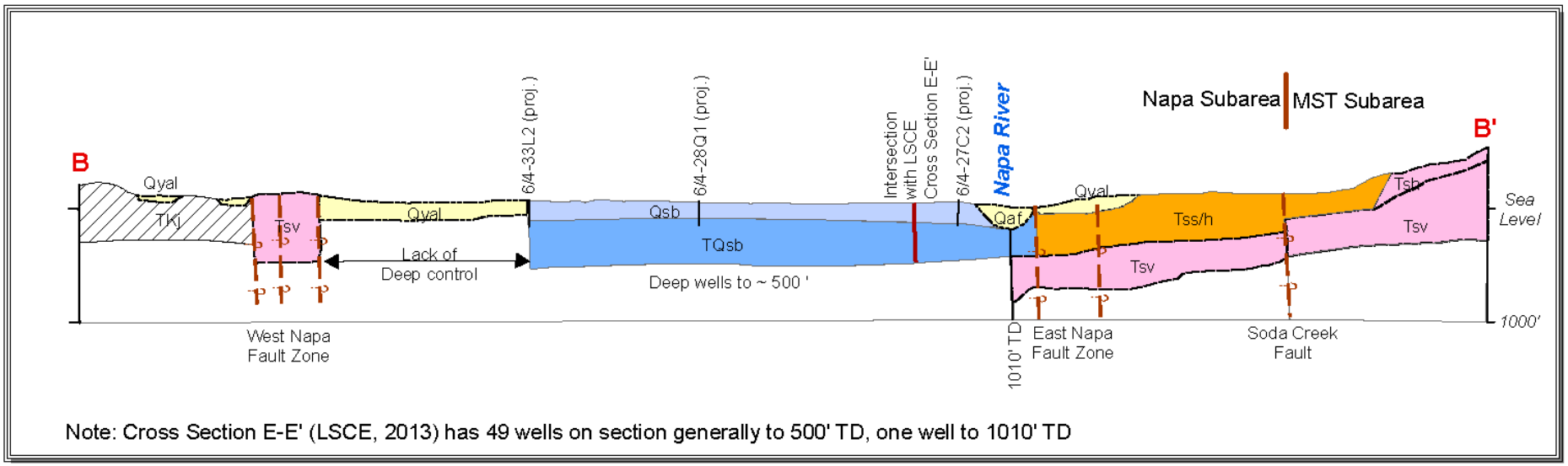


Figure 5-1b annotated Cross Section B-B', Schematic Geologic and Well Information From LSCE (2013)



Aquifer Properties

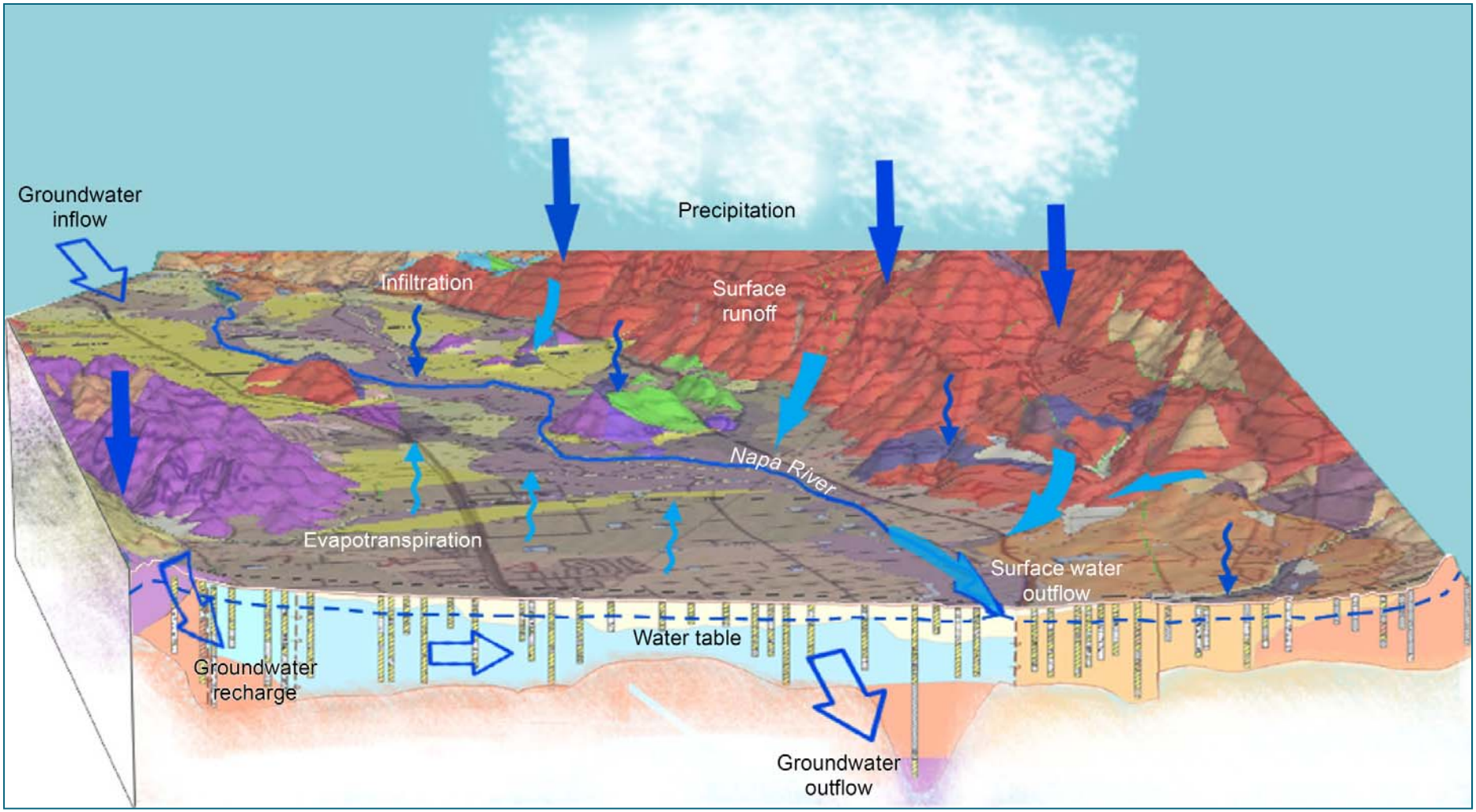
Alluvium

- Generally the most widely available and shallow aquifer in Napa Valley.
- Yields vary from low to high, with yields above 200 gallons per minute seen in limited areas.

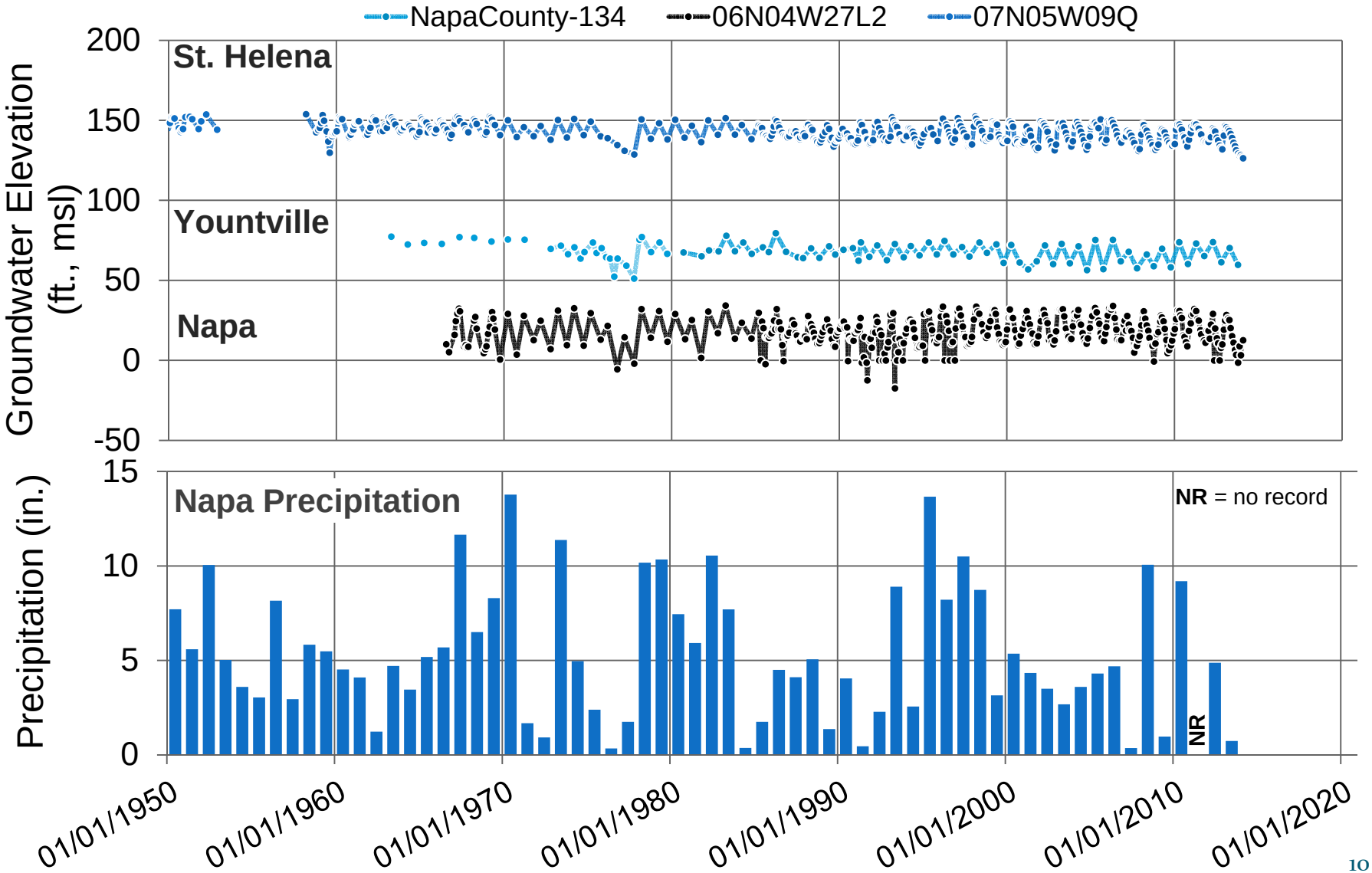
Sonoma Volcanics/ Tertiary Sediments

- Locally prominent (e.g., MST), but generally producing lower yields than the alluvial aquifer.
- Wells typically produce less than 50 gallons per minute.

Updated Understanding of Water Balance, or Hydrogeologic Conceptualization



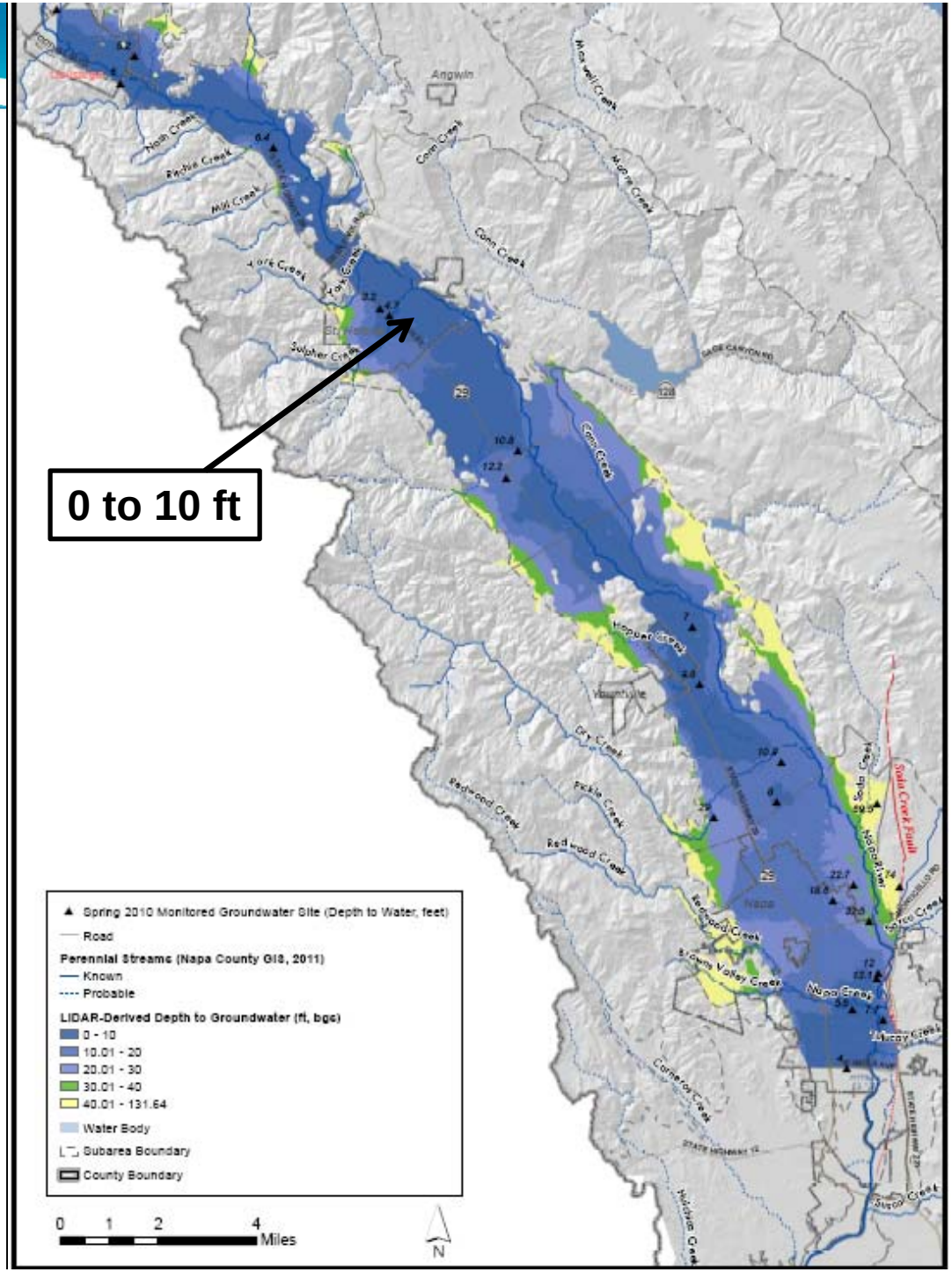
Groundwater Conditions



Depth to Groundwater

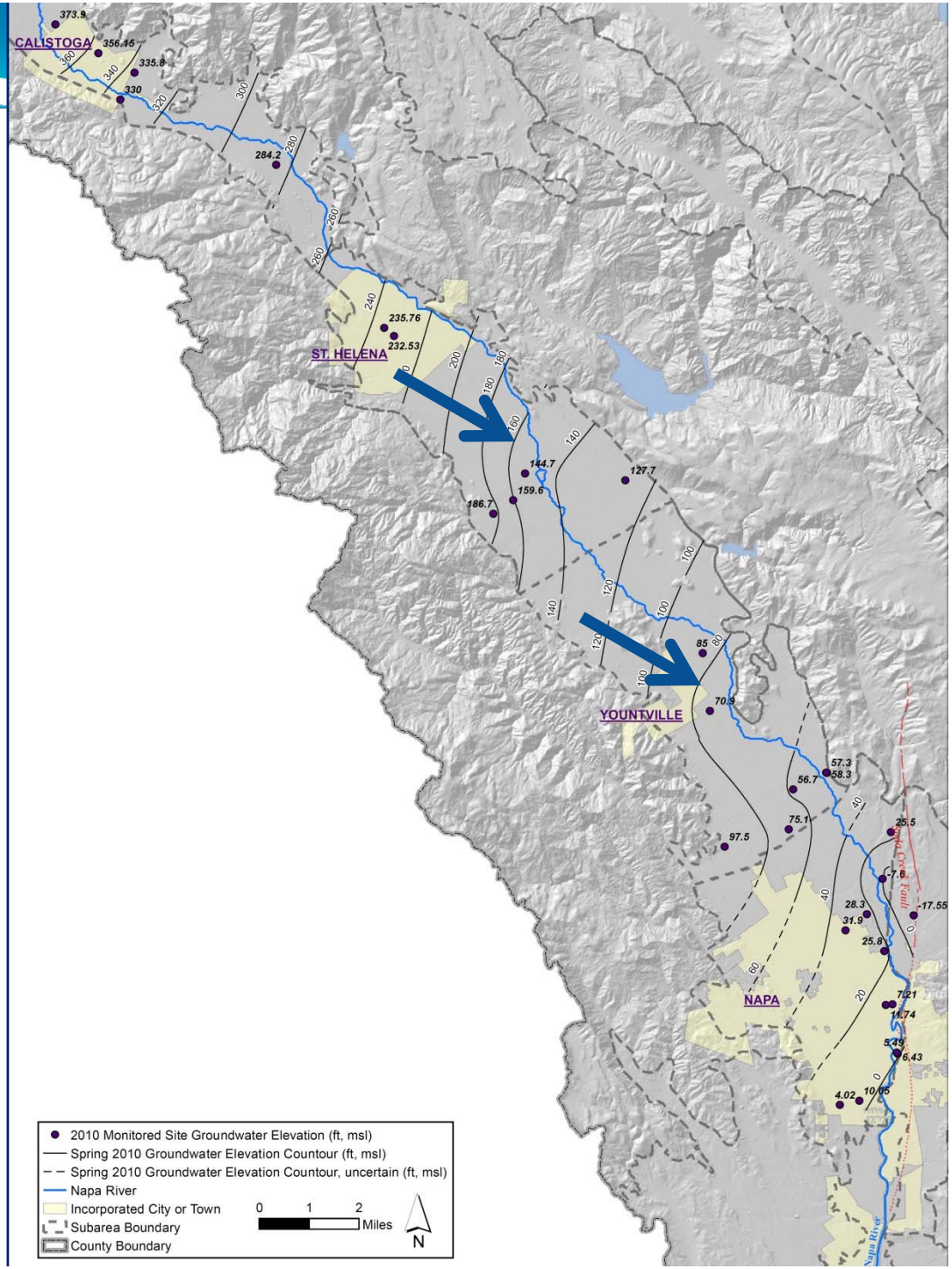
Feet below ground surface

- 0 - 10
- 10.01 - 20
- 20.01 - 30
- 30.01 - 40
- 40.01 - 131.64



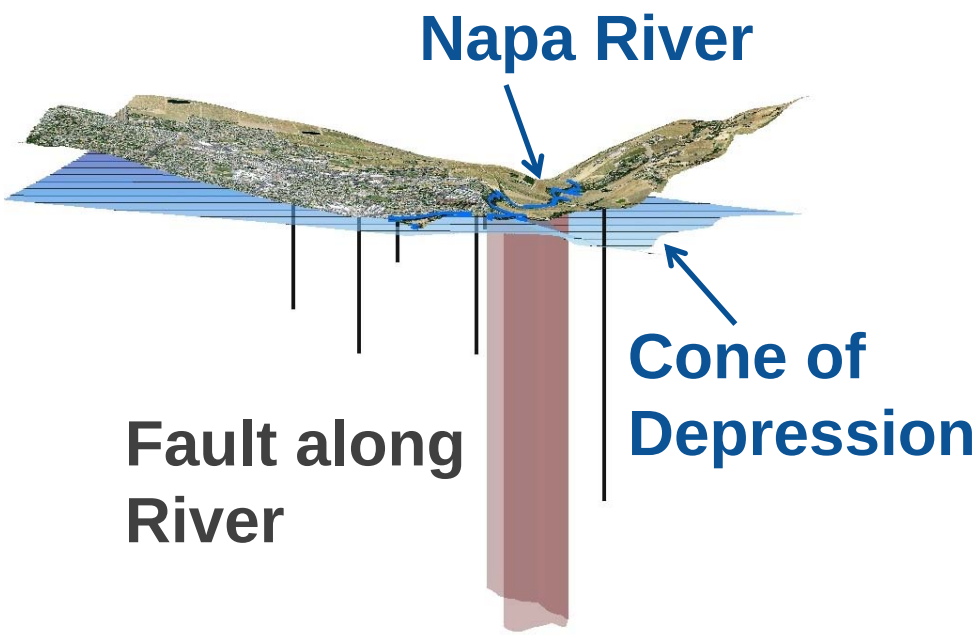
Groundwater Elevations

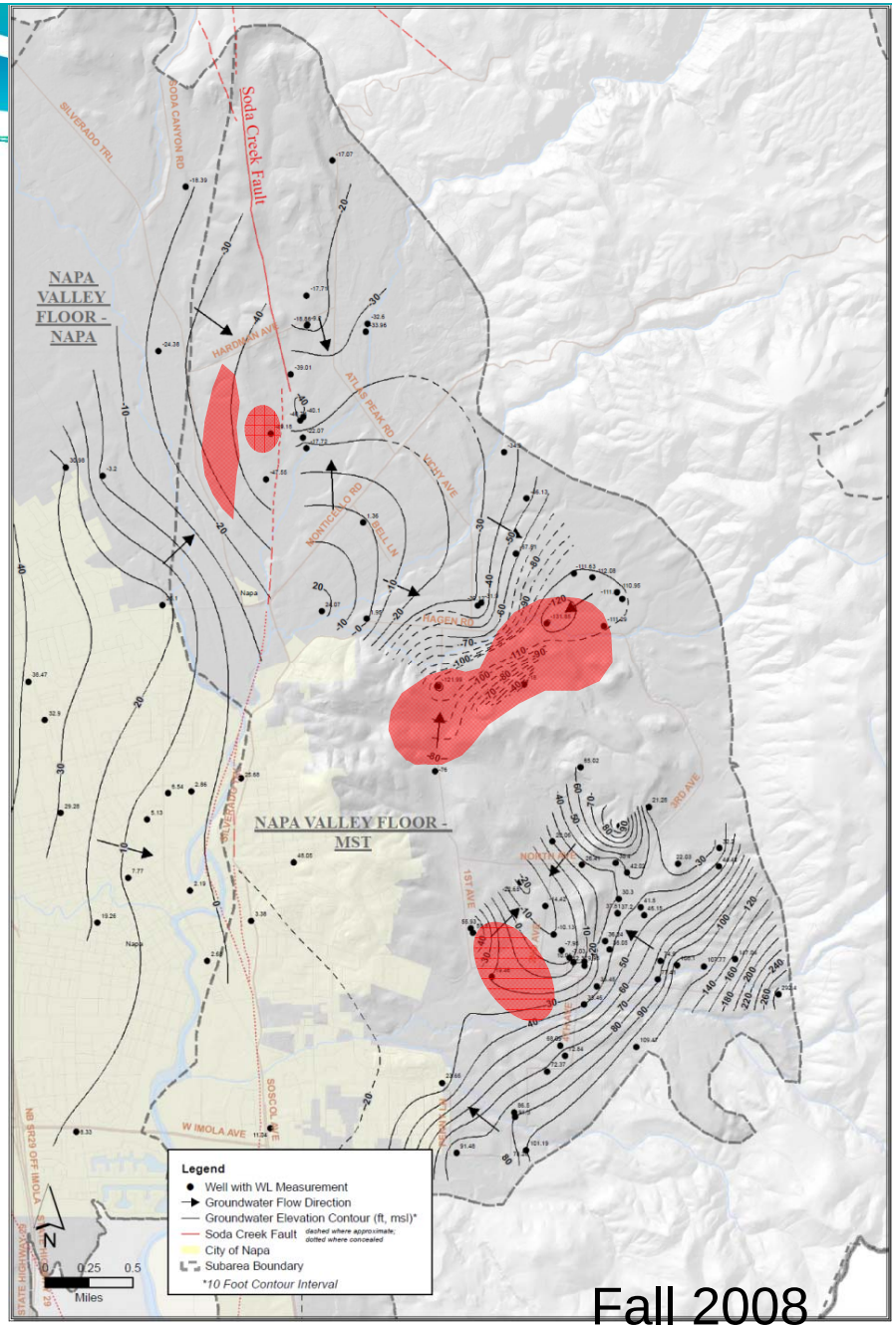
- **Spring 2010 GW Elevations (ft, msl)**



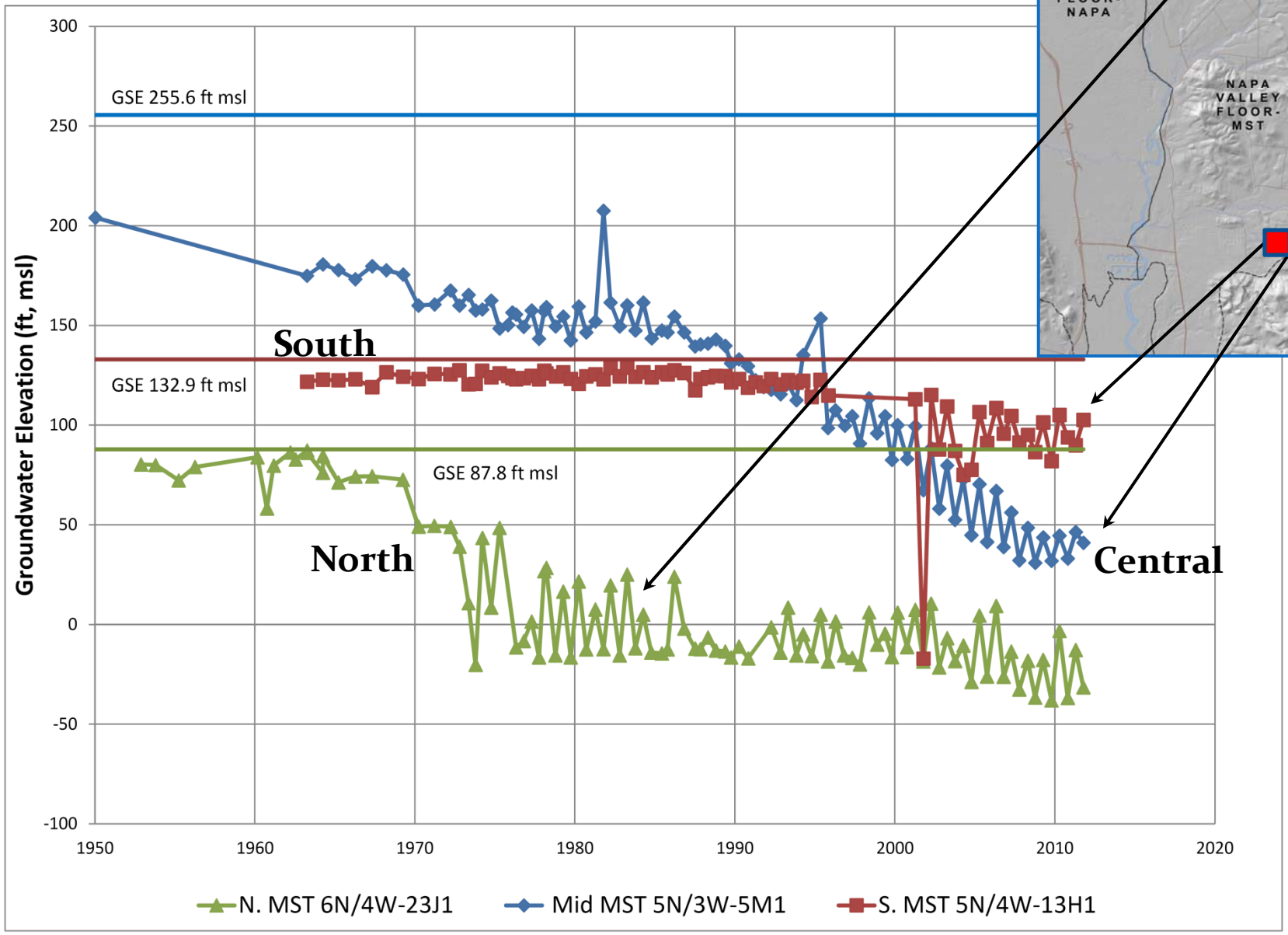
MST Subarea
GW Elevation Contours

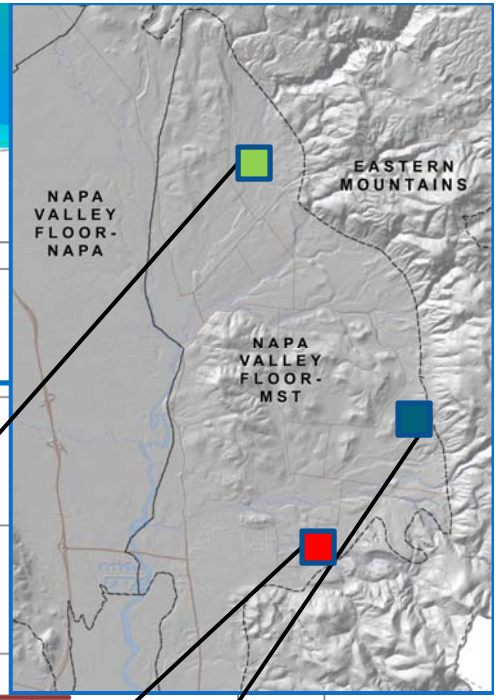
- **Local pumping depressions**



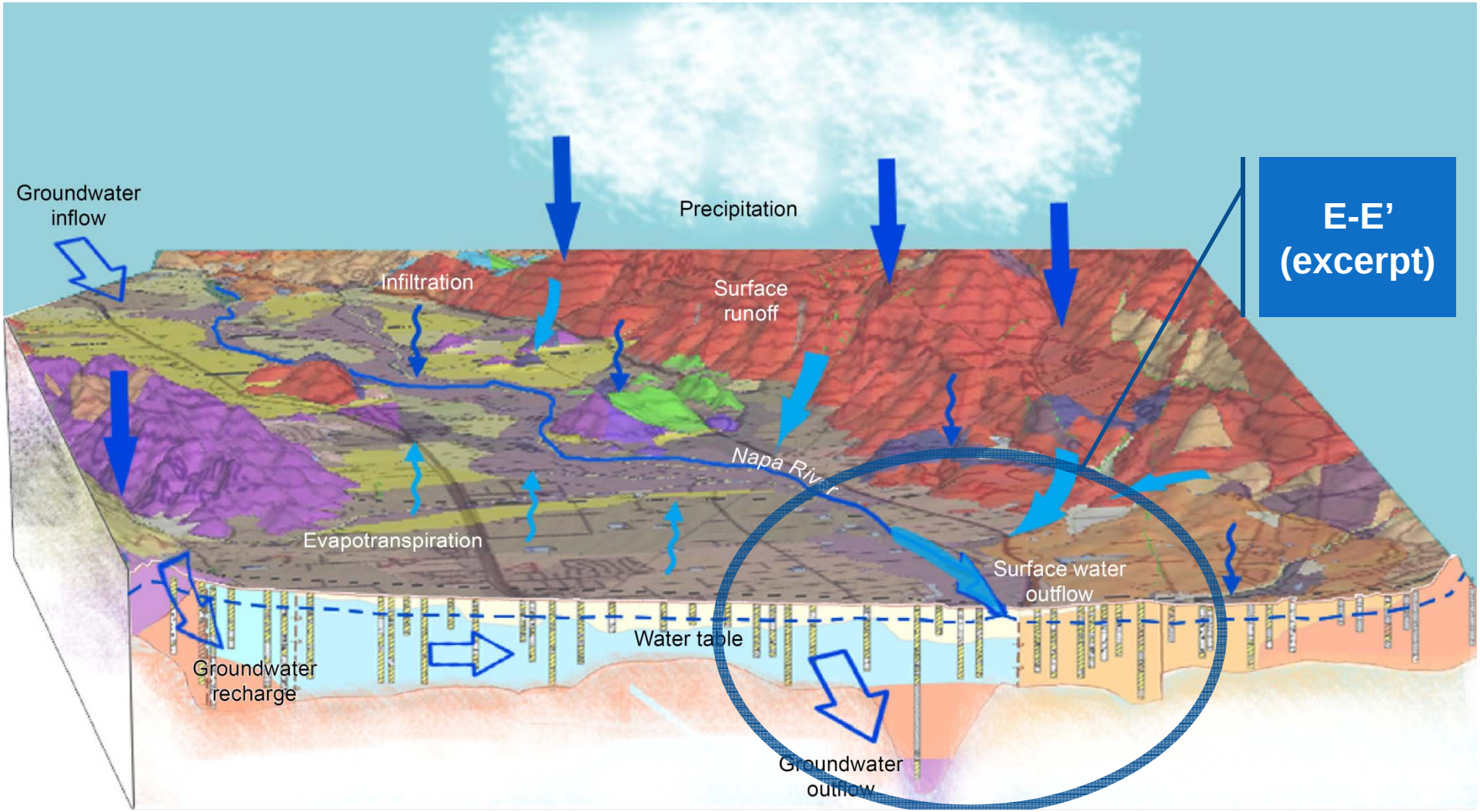


MST Subarea

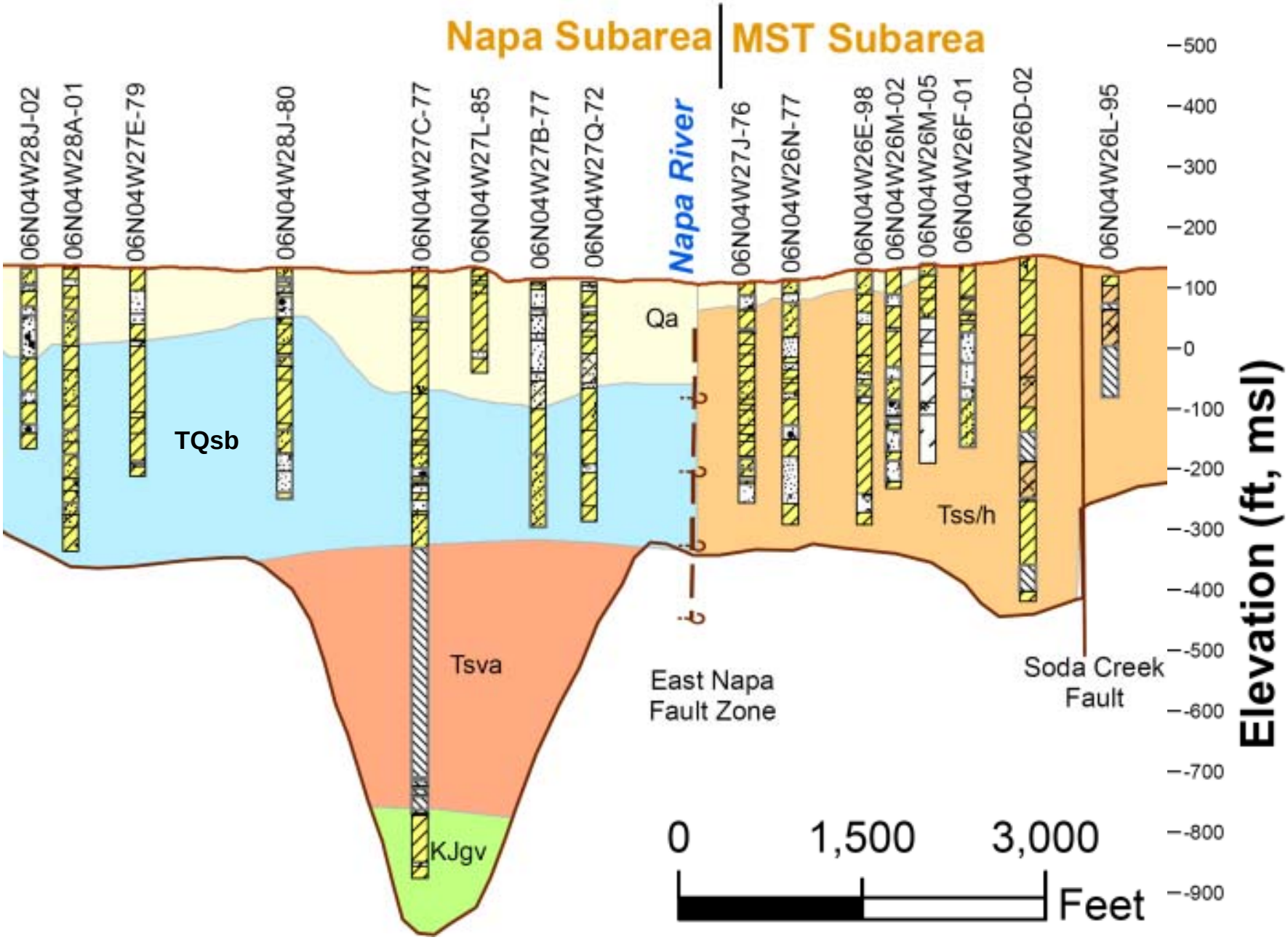

GSE 255.6 ft msl
GSE 132.9 ft msl
GSE 87.8 ft msl
South
North
Central
Groundwater Elevation (ft, msl)
300
250
200
150
100
50
0
-50
-100
1950
1960
1970
1980
1990
2000
2010
2020
N. MST 6N/4W-23J1
Mid MST 5N/3W-5M1
S. MST 5N/4W-13H1


NAPA VALLEY FLOOR-NAPA
EASTERN MOUNTAINS
NAPA VALLEY FLOOR-MST

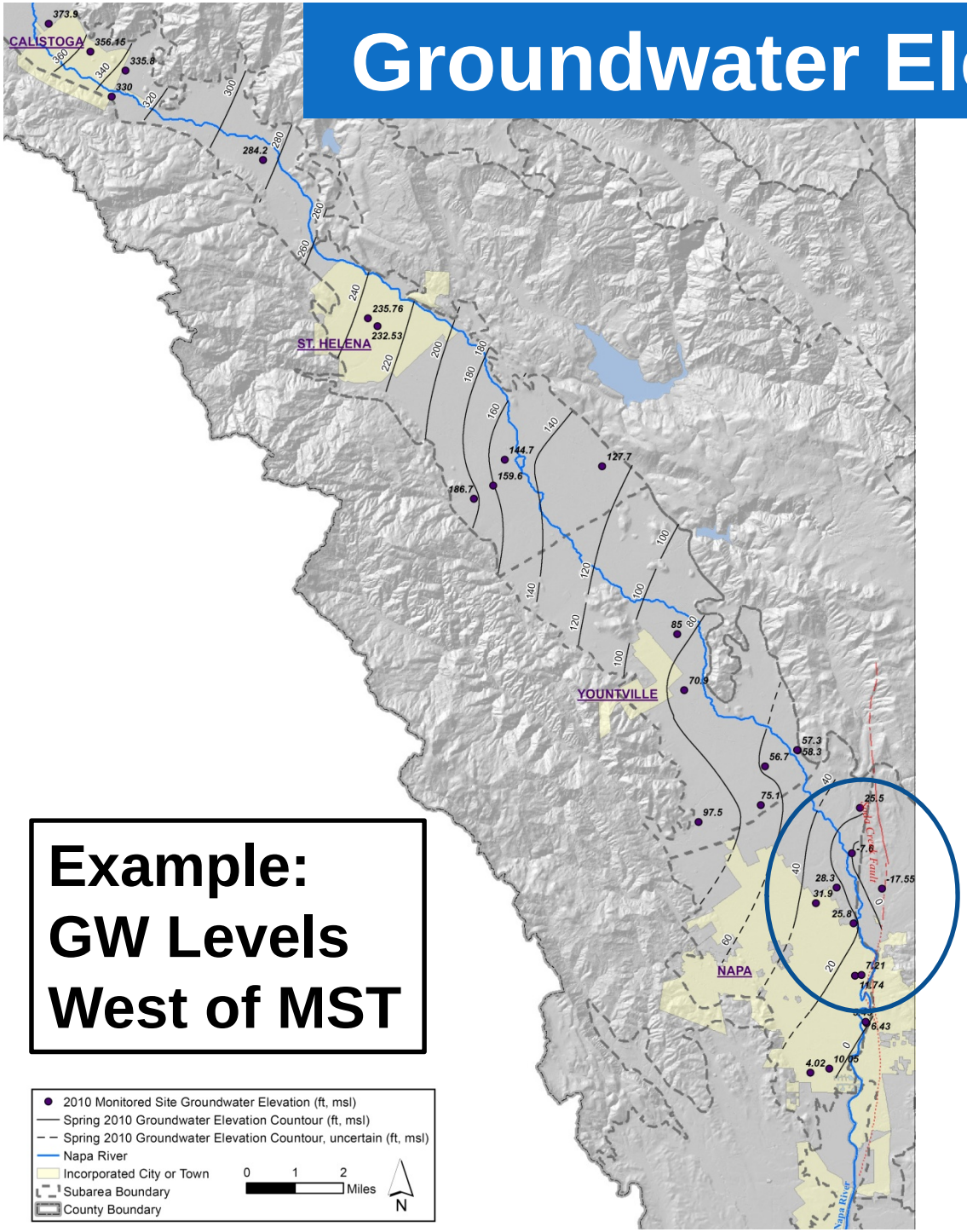
Example GW Monitoring Needs: Focus on NE Napa Subarea/MST



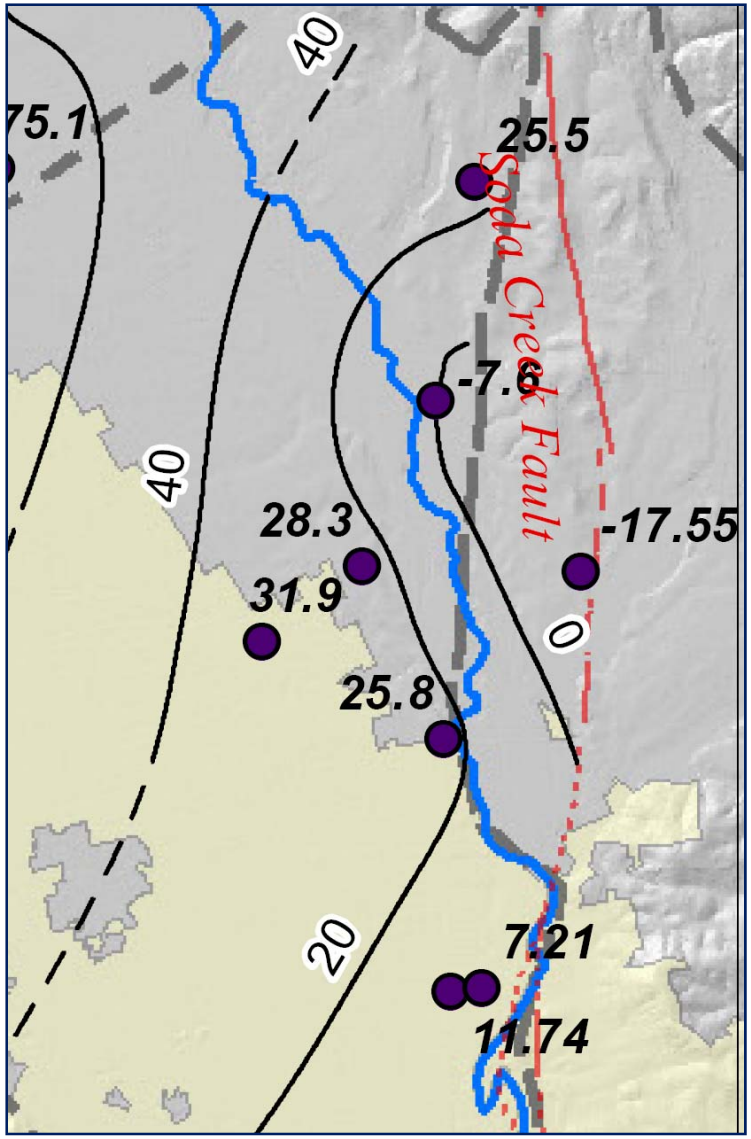
Cross Section E-E' (excerpt)

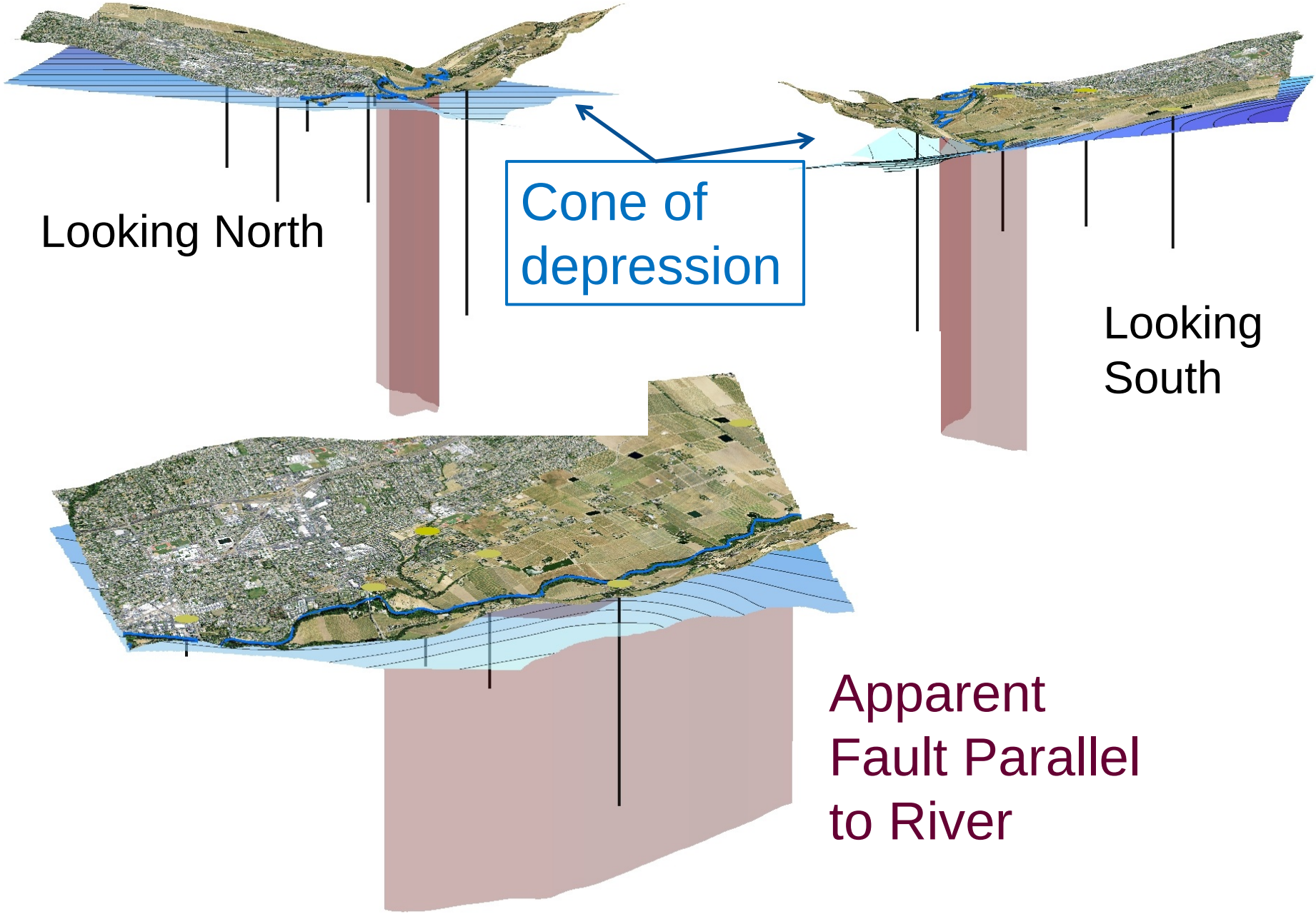


Groundwater Elevations

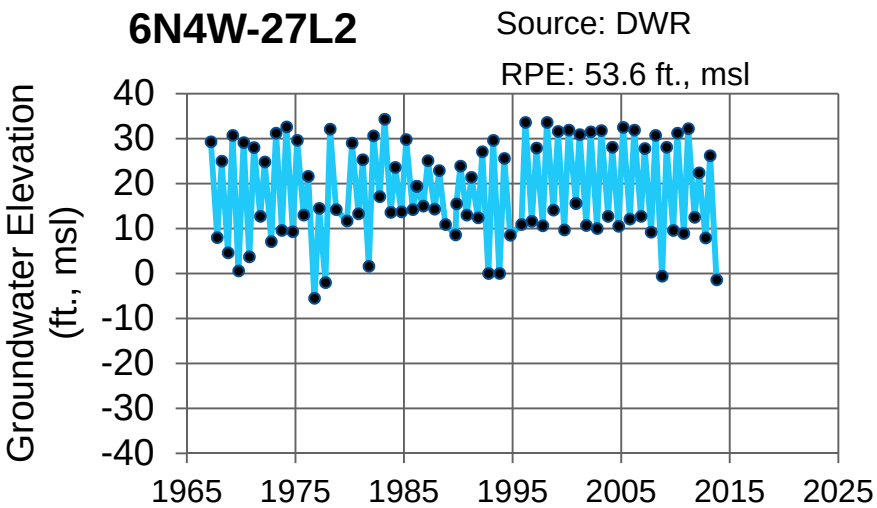


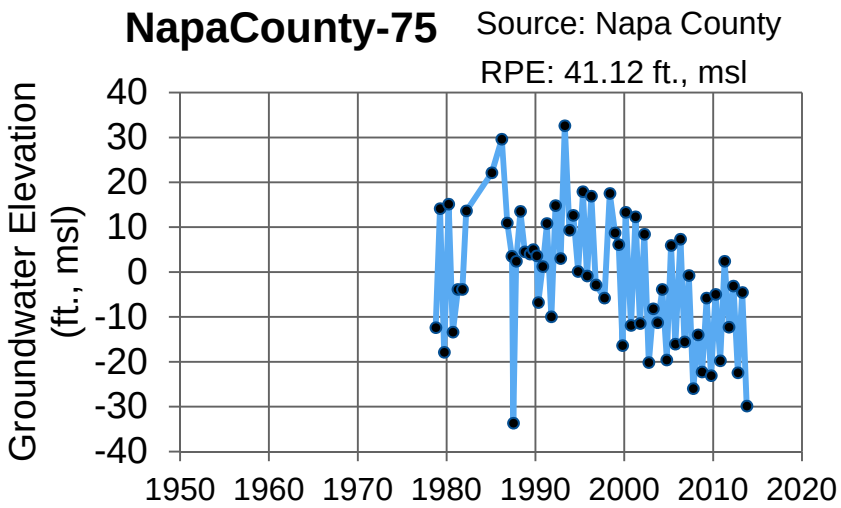
Example: GW Levels West of MST

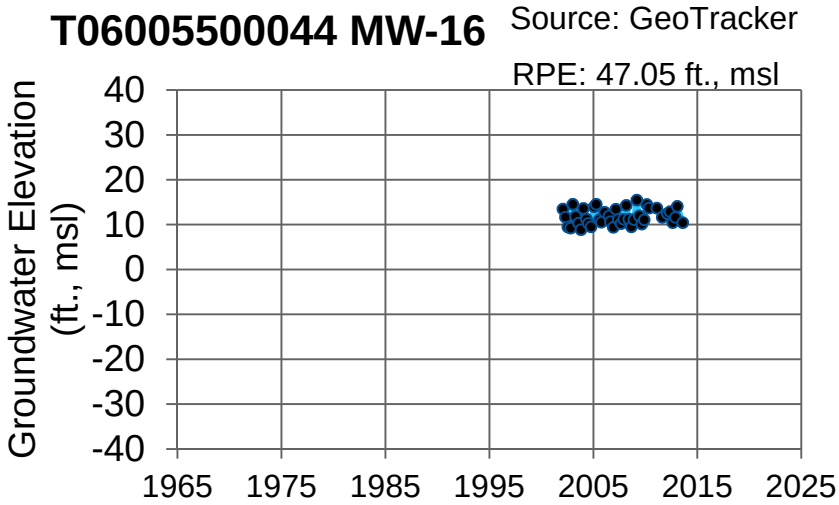


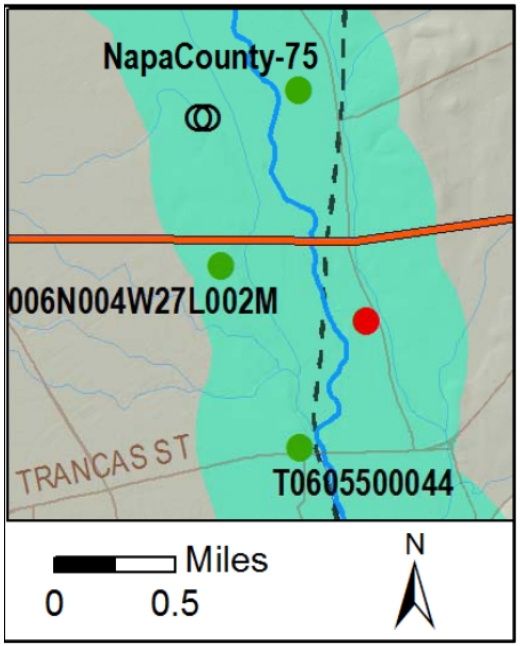

Looking North
Cone of depression
Looking South
Apparent Fault Parallel to River

Groundwater Levels: Northeast Napa Subarea





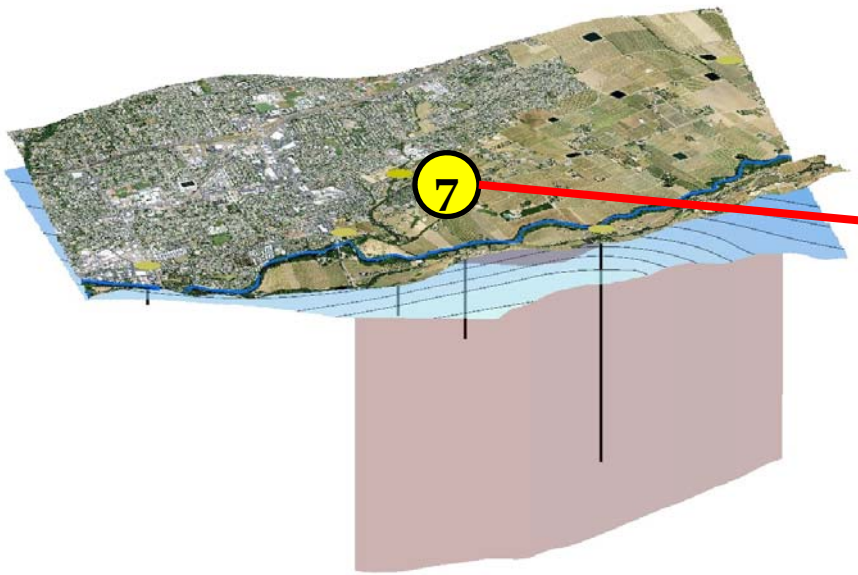


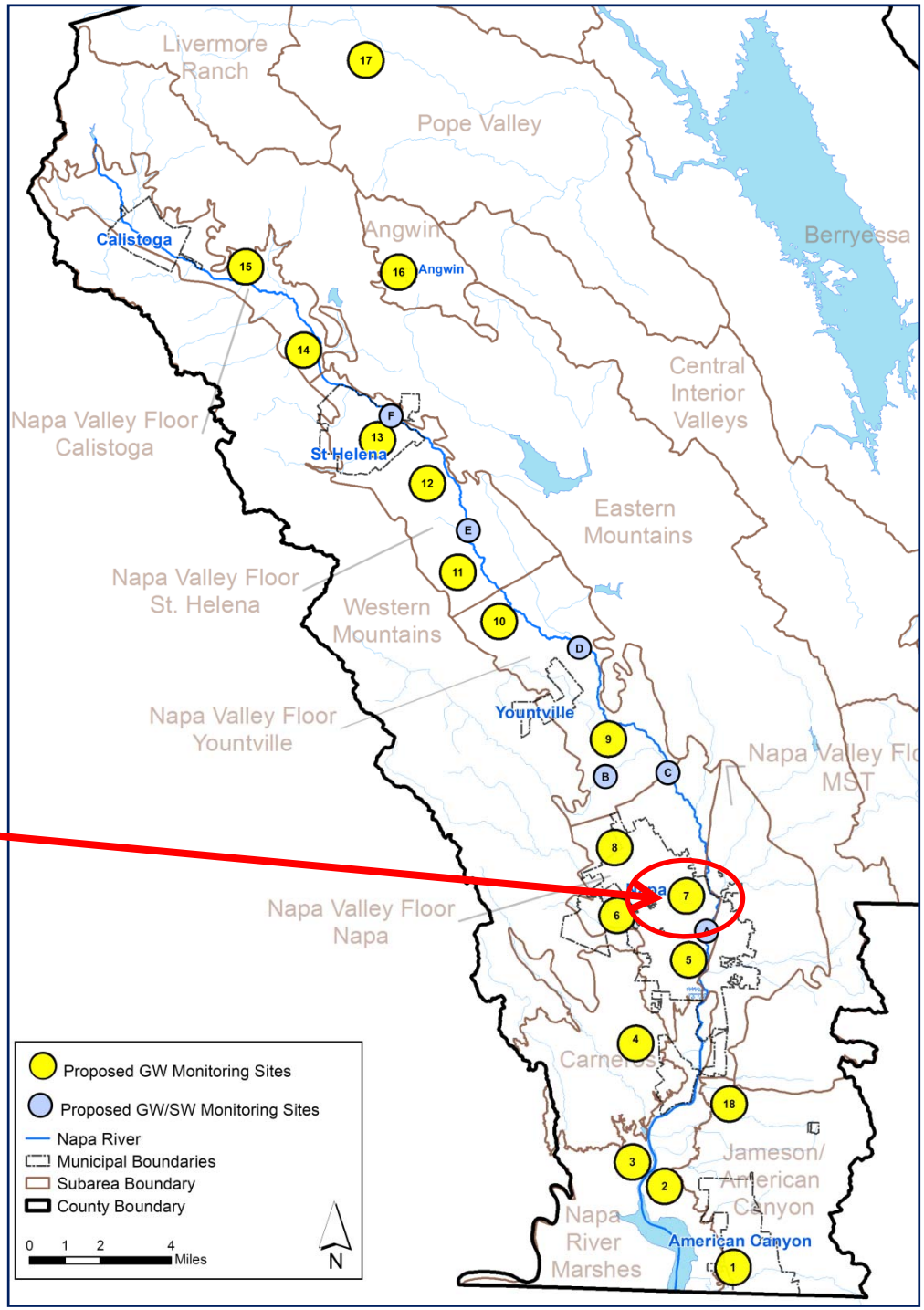


- Cone of depression east of River
- Fault parallel to River

Example Data Gap

Proposed GW Level Monitoring Site: AOI 7, include deeper completion well

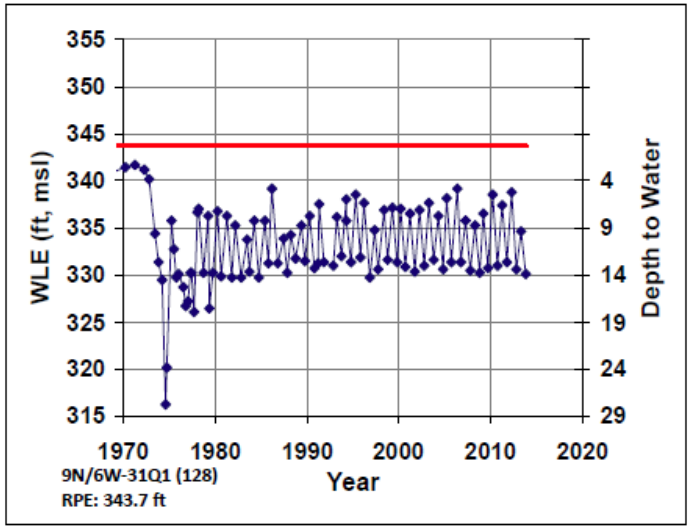


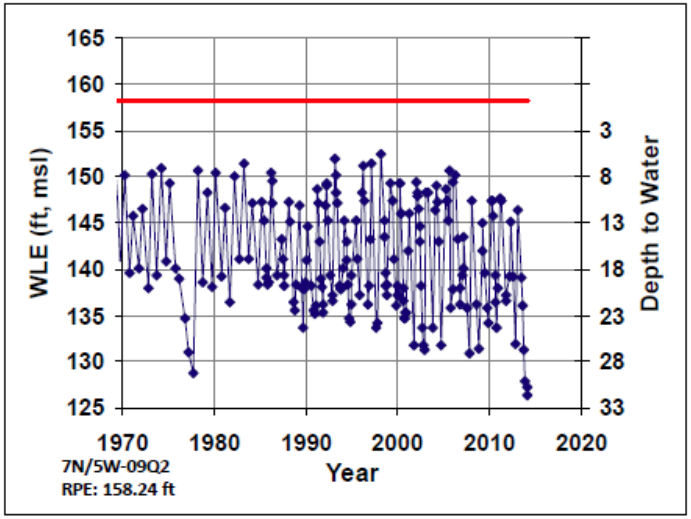


Napa Valley Floor – Calistoga & St. Helena

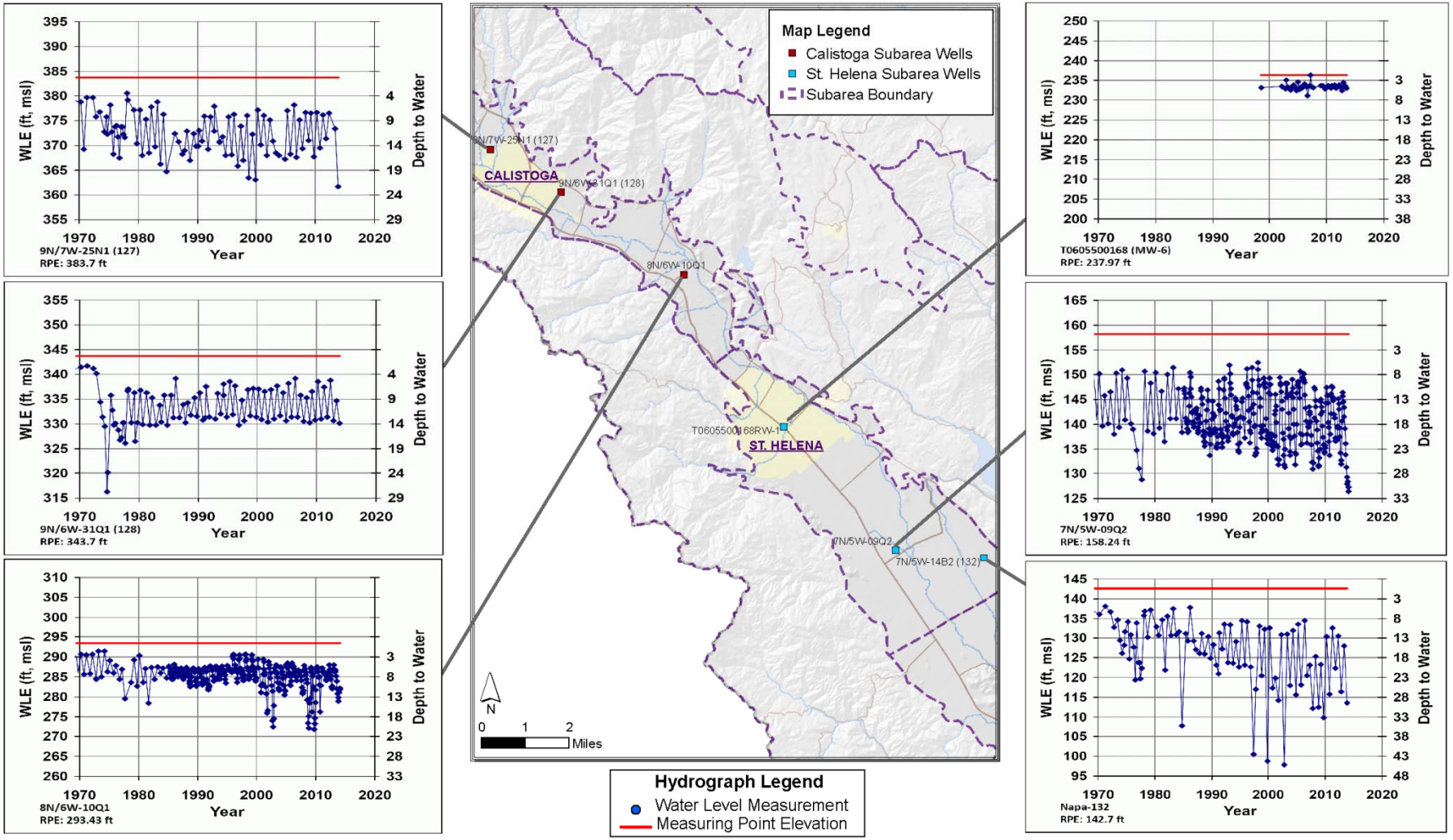
Groundwater Levels

- Generally Stable Trends
- Shallow Depth to GW (<10' bgs)
- Minor Seasonal Declines (~10')
  in Calistoga/north part of St. Helena
  - Other locations in St. Helena ~25' seasonal fluctuation
  - SW boundary of St. Helena has seen ~100' seasonal fluctuation





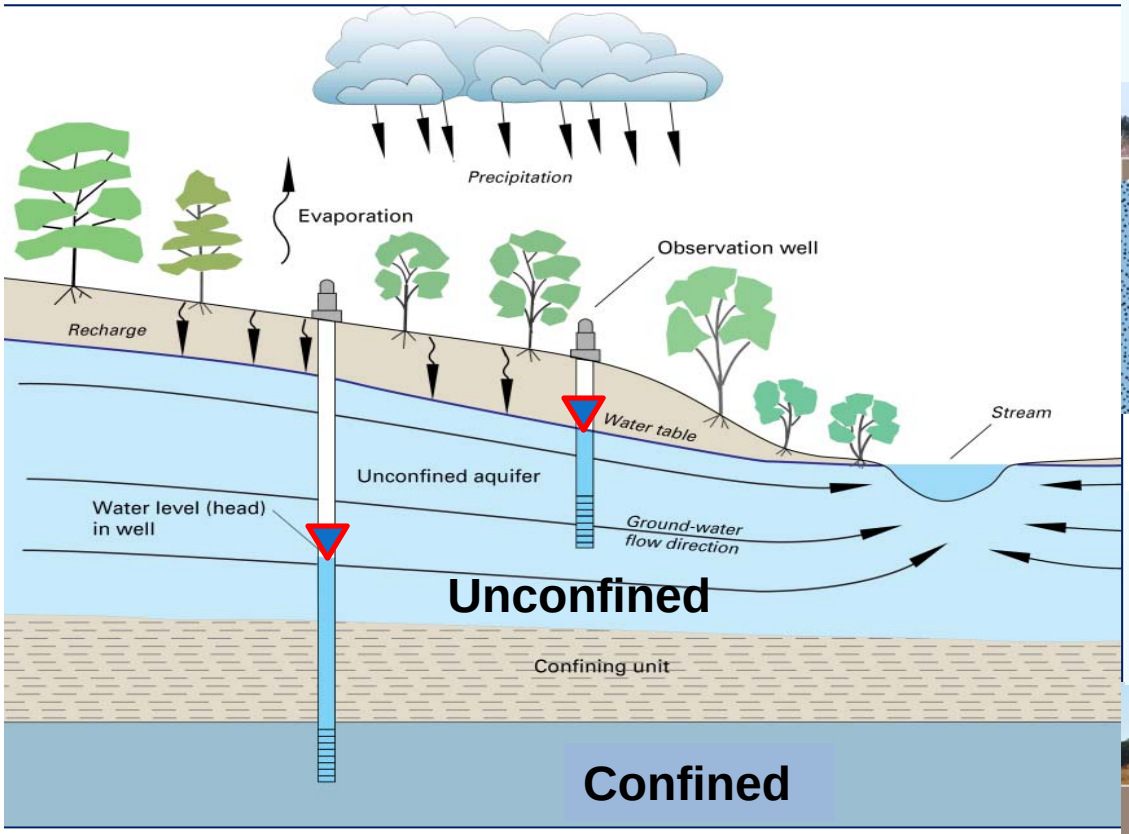
Representative Hydrographs – Northern Napa Valley



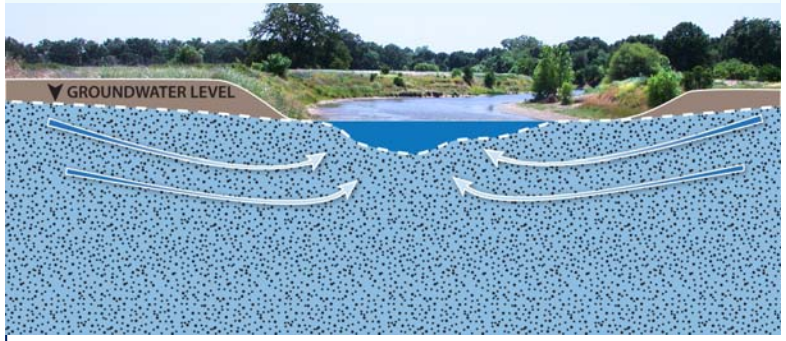
Steps Toward Groundwater Sustainability

- Expanded GW level and quality network
- Fill data gaps and meet monitoring objectives
- Better understanding what the data represent
- Enhanced understanding of SW/GW interaction
- Reports: Regular updates on groundwater conditions, including quality and level trends
- Recommendations re interagency data coordination

GW Monitoring: SW/GW Interaction

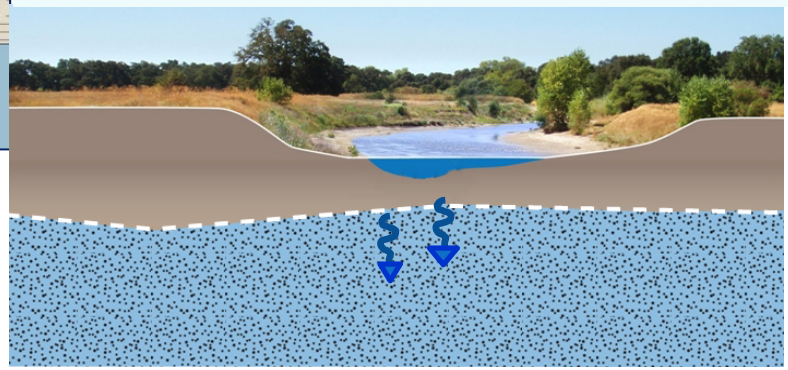


Direct Connection
Maintains/Recharges
Stream



Courtesy TNC

Indirect Connection
Stream Seepage
Independent of GW Levels

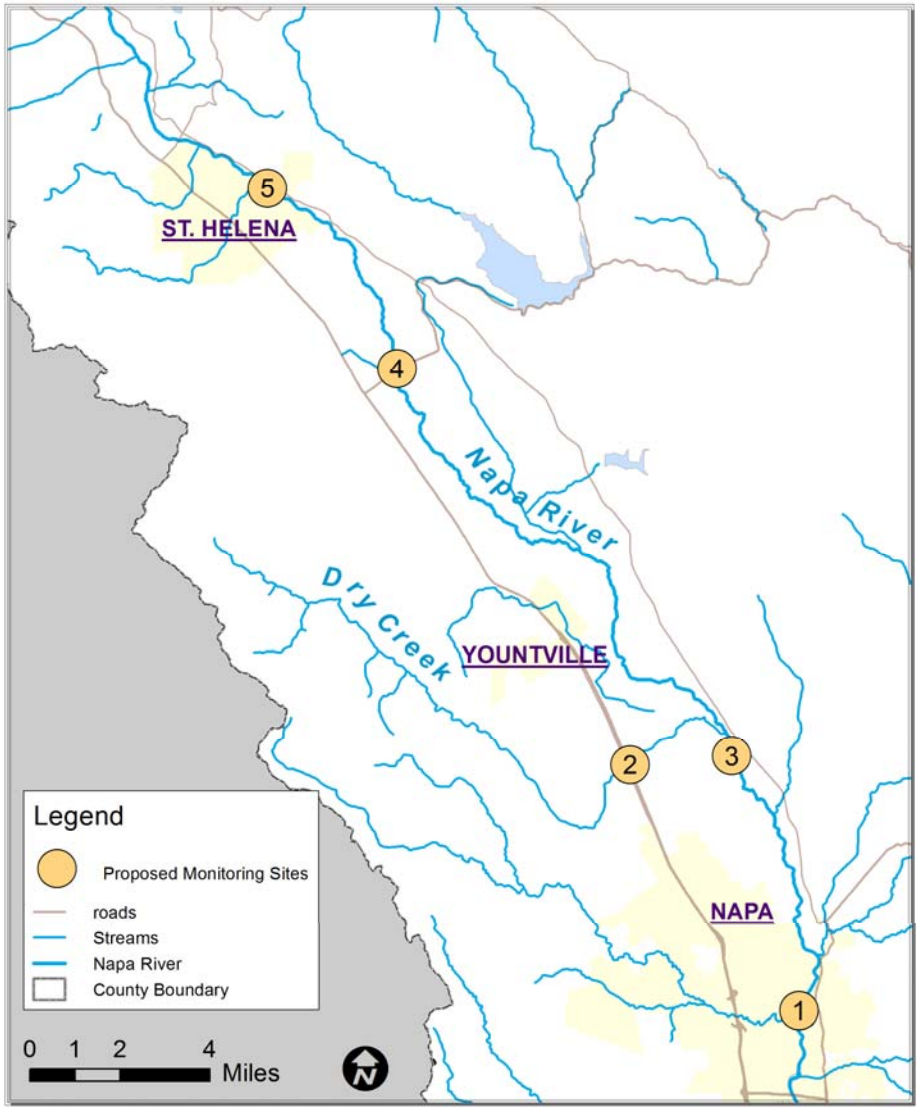


Courtesy TNC

SW-GW Interaction

GW & SW Monitoring at 5 Sites

- Shallow MWs each site
  - Levels & quality
- Stream gauge each site
  - Streamflow & quality



Thank You

Napa Valley Floor – Yountville & Napa

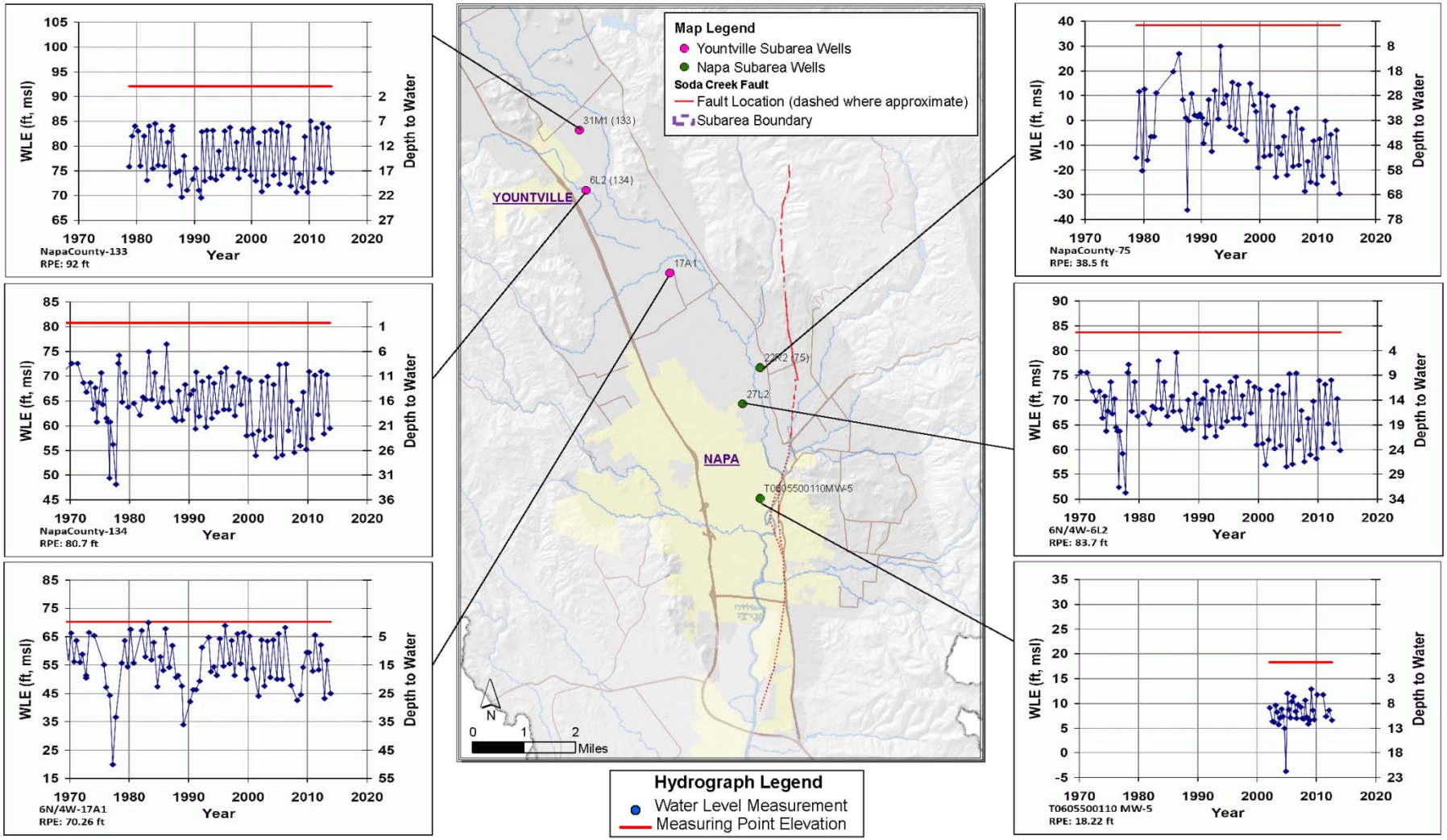
Yountville

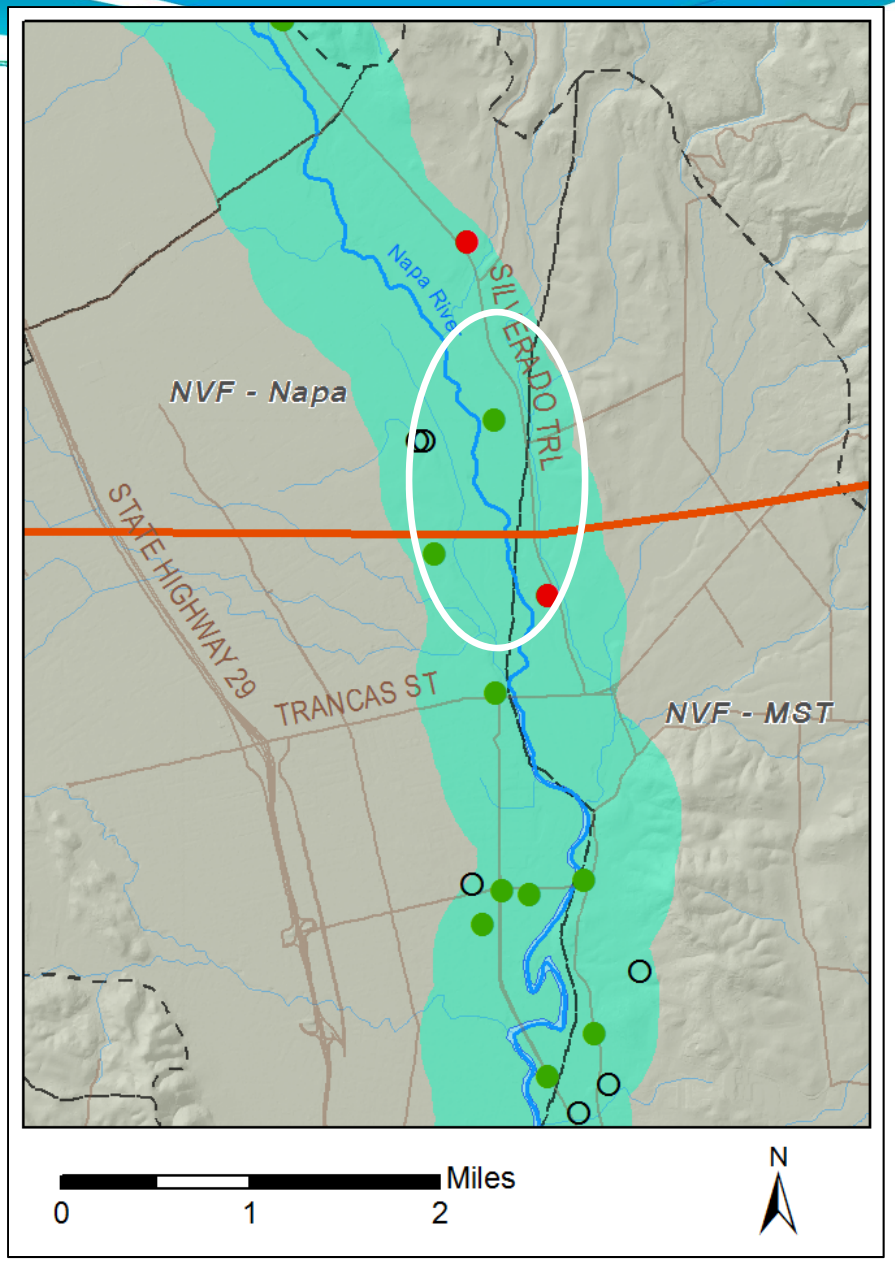
- Stable except in the SE where declines in 2007 & 2008 & recently due to dry water years
- Depth to GW <10' bgs
- Seasonal fluctuations greater along the west and east edges of the subareas
  - Center of the Valley Floor fluctuates 10-25'
  - Near Valley edge: 25-35'

Napa

- Stable except in NE where 10-30' declines have occurred over the past 10 years
- Slightly deeper depths to GW of ~20-50'
- Seasonal fluctuations between 10-40 feet
- Apparent hydraulic connection to MST Subarea; declines on NE border of subarea

Representative Hydrographs – Southern Napa Valley



Napa Subarea near MST: Comparing WL Data and Well Construction

- Sites with Recent (post 2005) water level data and construction info
- Sites with Historical (pre 2005) water level data and construction info
- Sites with water level data and no construction info