Napa County Comprehensive Groundwater Monitoring Program 2016 Annual Report and CASGEM Update

April 18, 2017

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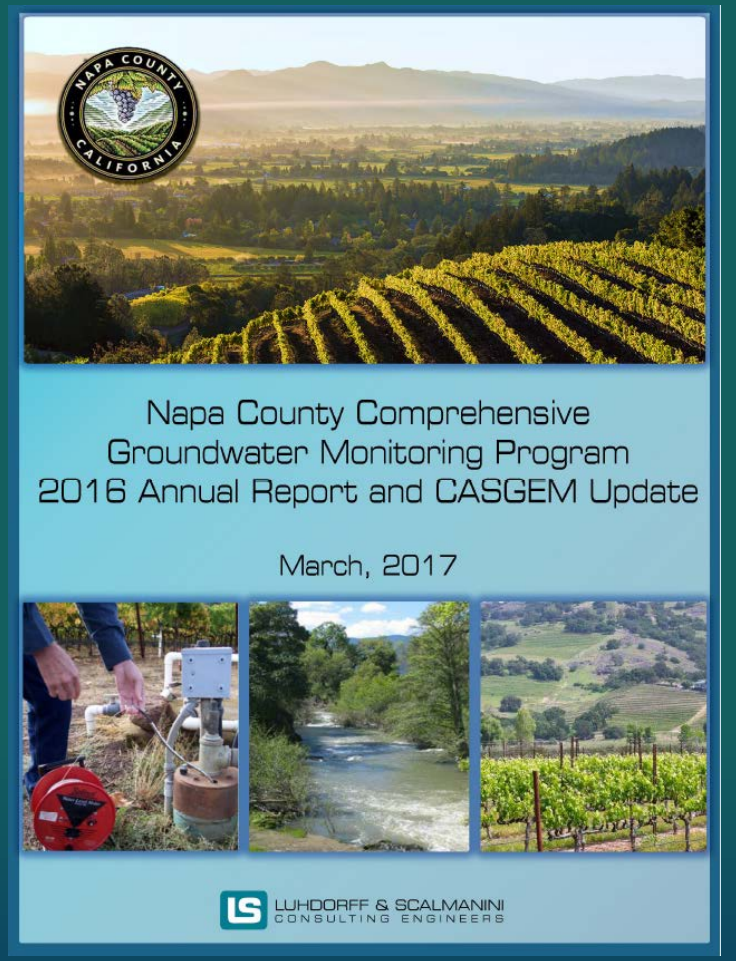
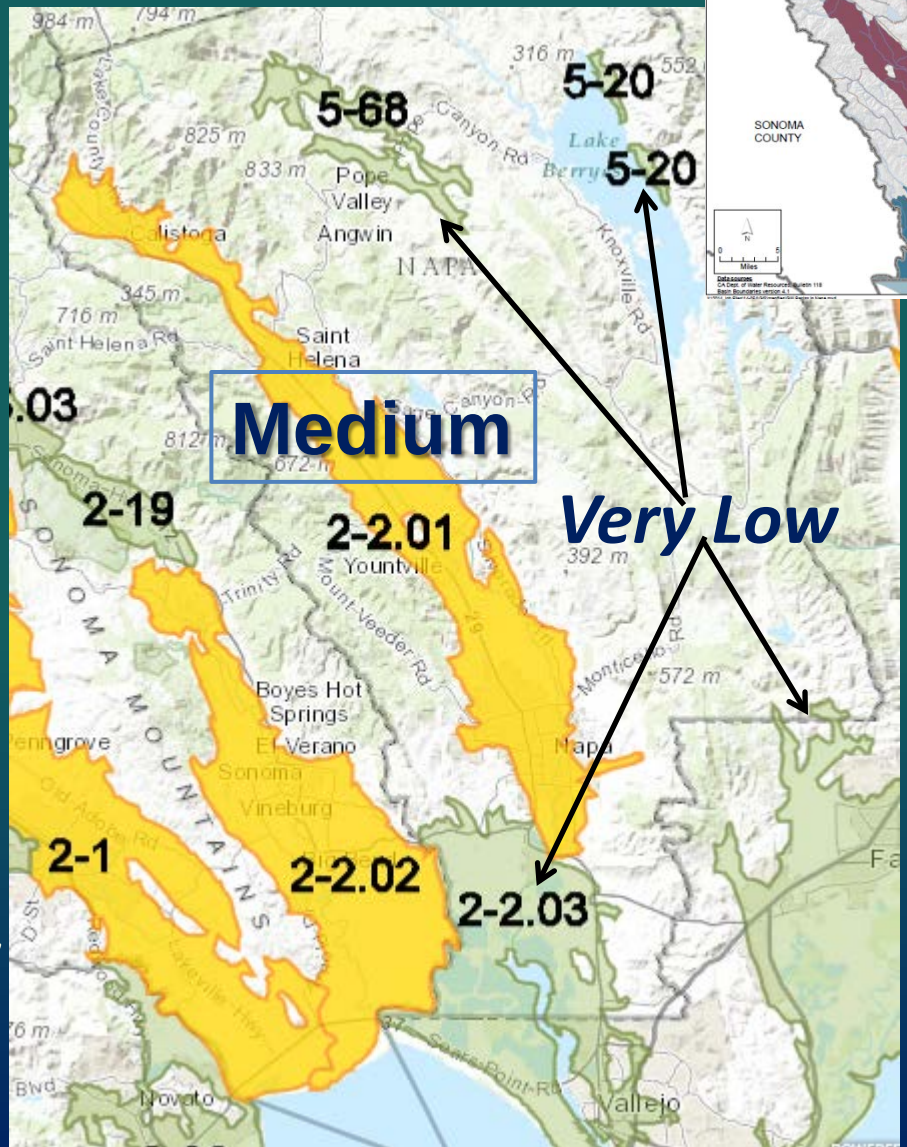
Overview

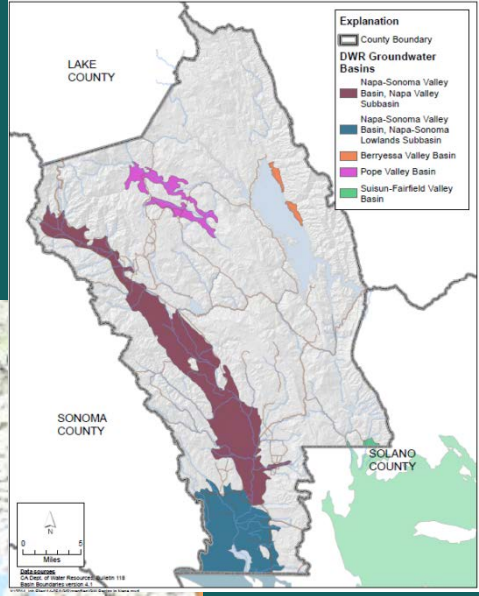
- Background
  - SGMA update
- Highlights 2016 Annual Report
- GW-SW interaction
- NE Napa study update
- Summary and Recommendations



Groundwater Basins: Initial SGMA Prioritization

- Napa Sonoma Valley Basin
  - **Napa Valley Subbasin (Med)**
  - **Napa-Sonoma Lowlands Subbasin (VL)**
- **Berryessa Valley Basin(VL)**
- **Pope Valley Basin(VL)**
- **Suisun-Fairfield Valley Basin(VL)**





SGMA Basin Analysis Report

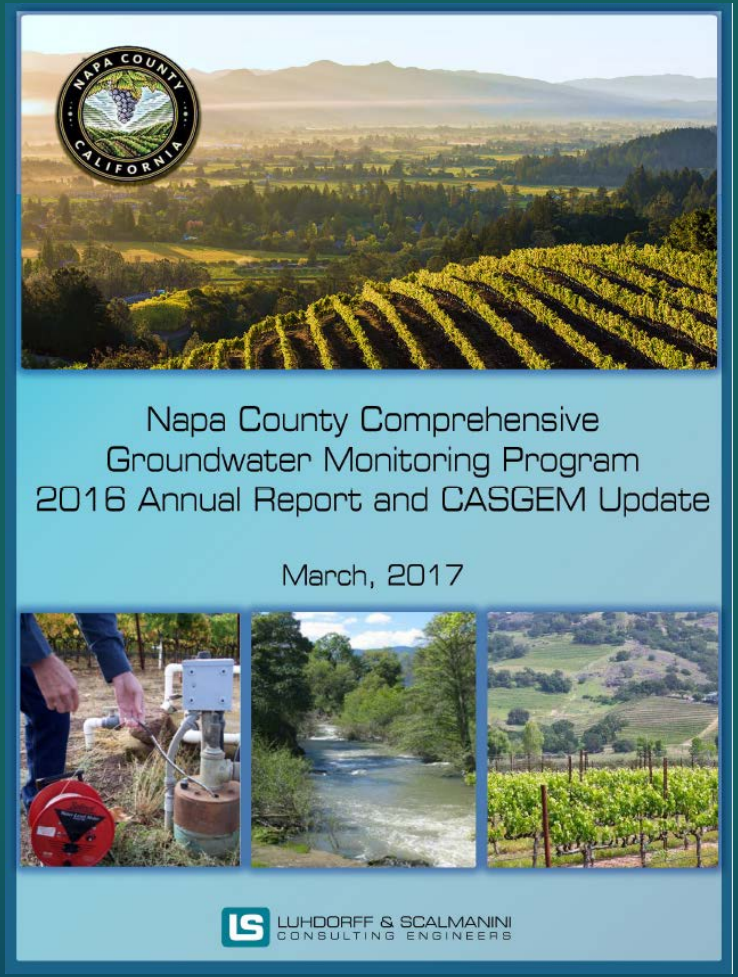
- **Submitted to DWR 12/16/2016**
  - Functionally equivalent to a GW Sustainability Plan
    - Report Table 1-2 shows comparison; plus Appendix M Elements Guide (template provided by DWR 12/05/16)
  - For basins operated sustainably for at least 10 years
    - Napa Valley Subbasin sustainability analysis → 28 years
  - Covers the whole DWR-designated Subbasin
  - Conditions typical throughout the basin
- **DWR comment period originally through 2/15/17; extended to 4/1/17**
  - County submitted responses to comments 4/1/17
  - Report under review by DWR
- **SGMA sustainability metrics used in 2016 Annual Report**

Key Comments Synopsis

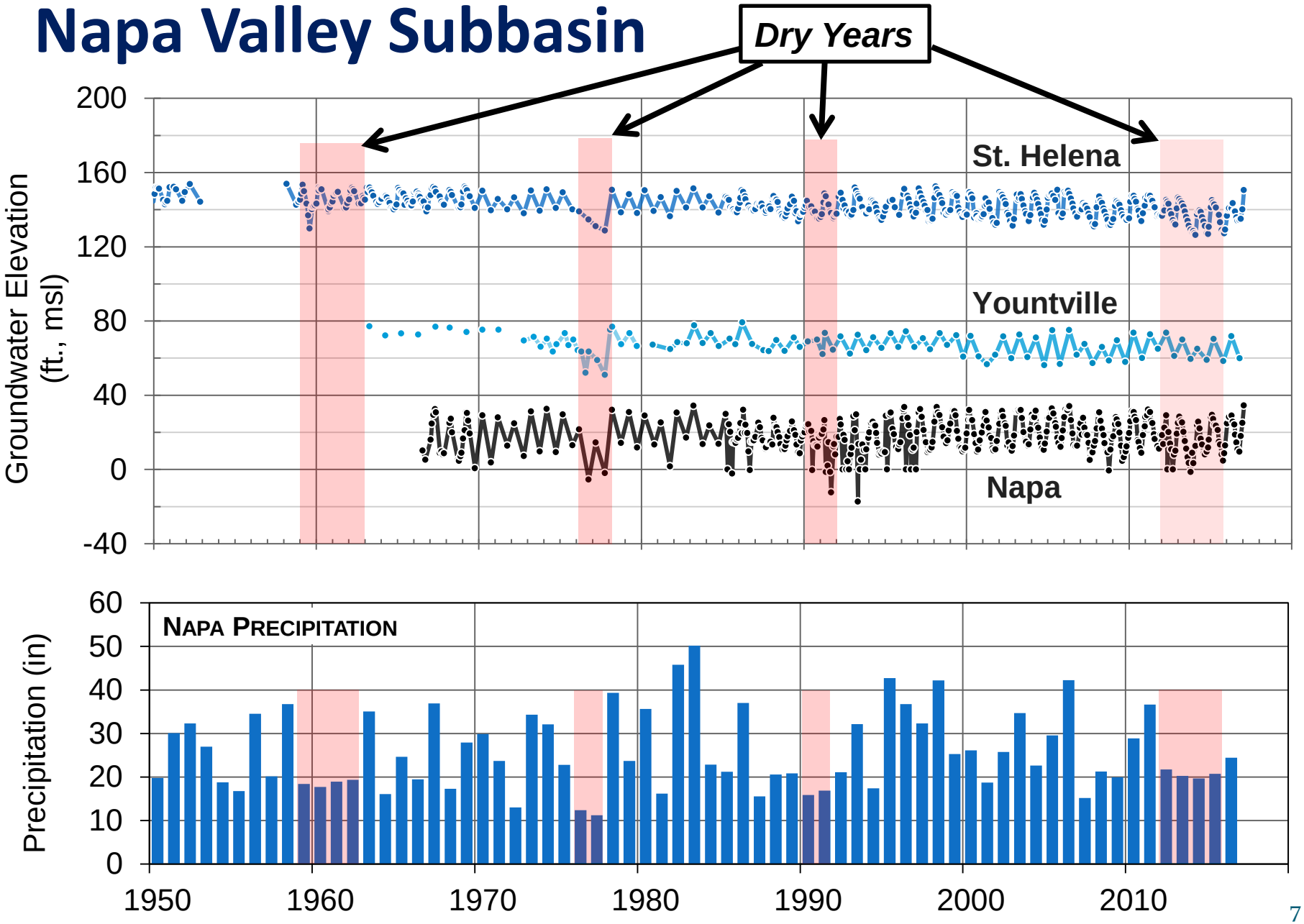
- Baseflow variation (dry years and seasonally) similar during 28-year study period (1988-2015)
- Streamflow temperatures not unusual
  - Napa River at Napa (same as Napa County SW/GW Site 3) similar temps in 2014-2016 compared with 1970-1993
- Groundwater quality is good; naturally occurring constituents locally present in groundwater
- No indication of subsidence
  - Higher resolution survey data measured at benchmarks for 2007 and 2012 do not indicate subsidence has occurred
- Main factor contributing to low baseflow is climate
  - Pumping is also a factor, but roughly 4 times less significant relative to climate
  - Quantification of streamflow effects in progress for NE Napa area study

GROUNDWATER CONDITIONS:

Highlights 2016 Annual Report



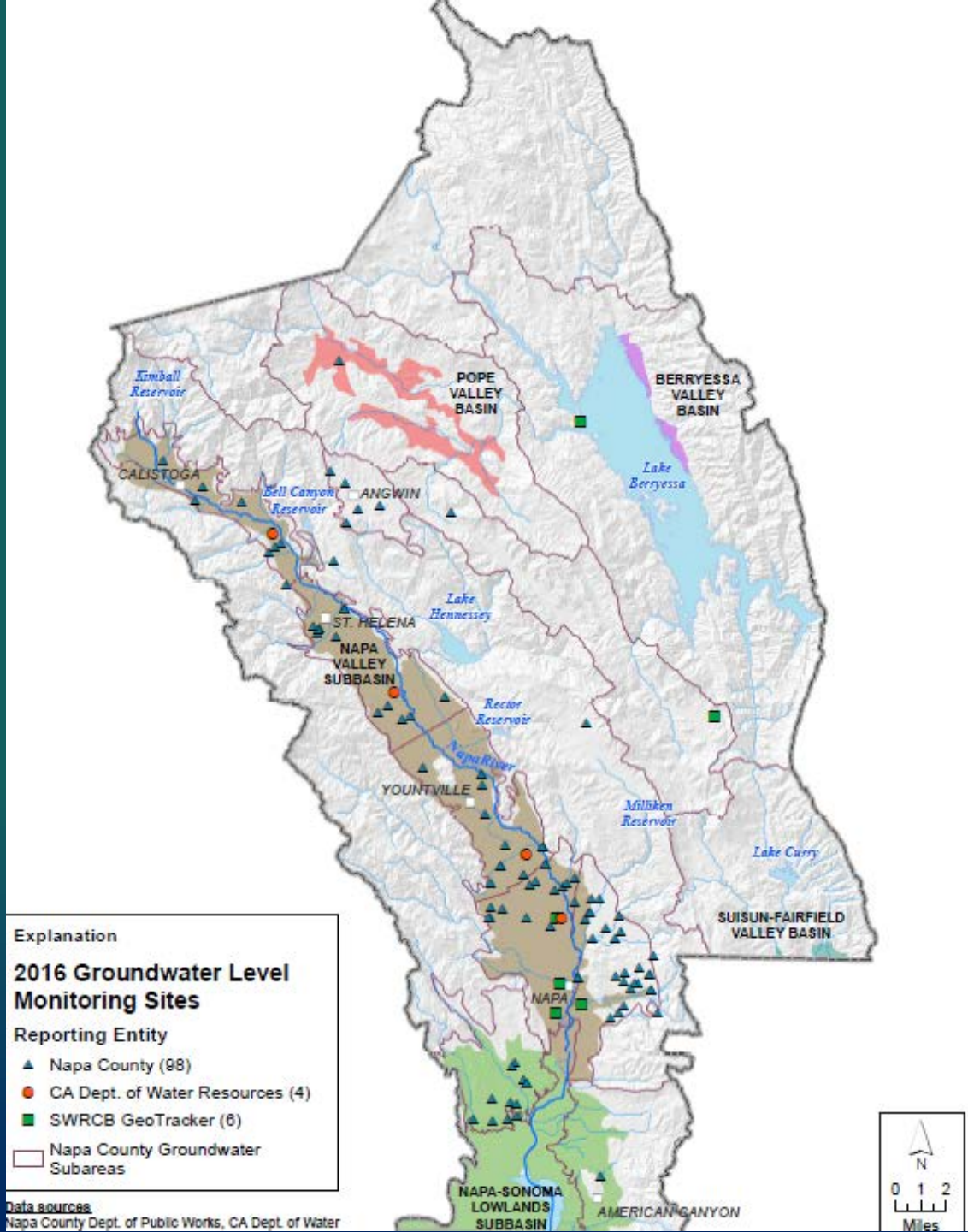
Groundwater Conditions: Napa Valley Subbasin



GW Level Monitoring, 2016

- Napa Co., 98 (including 10 SW/GW)
- DWR, 4
- GeoTracker, 6

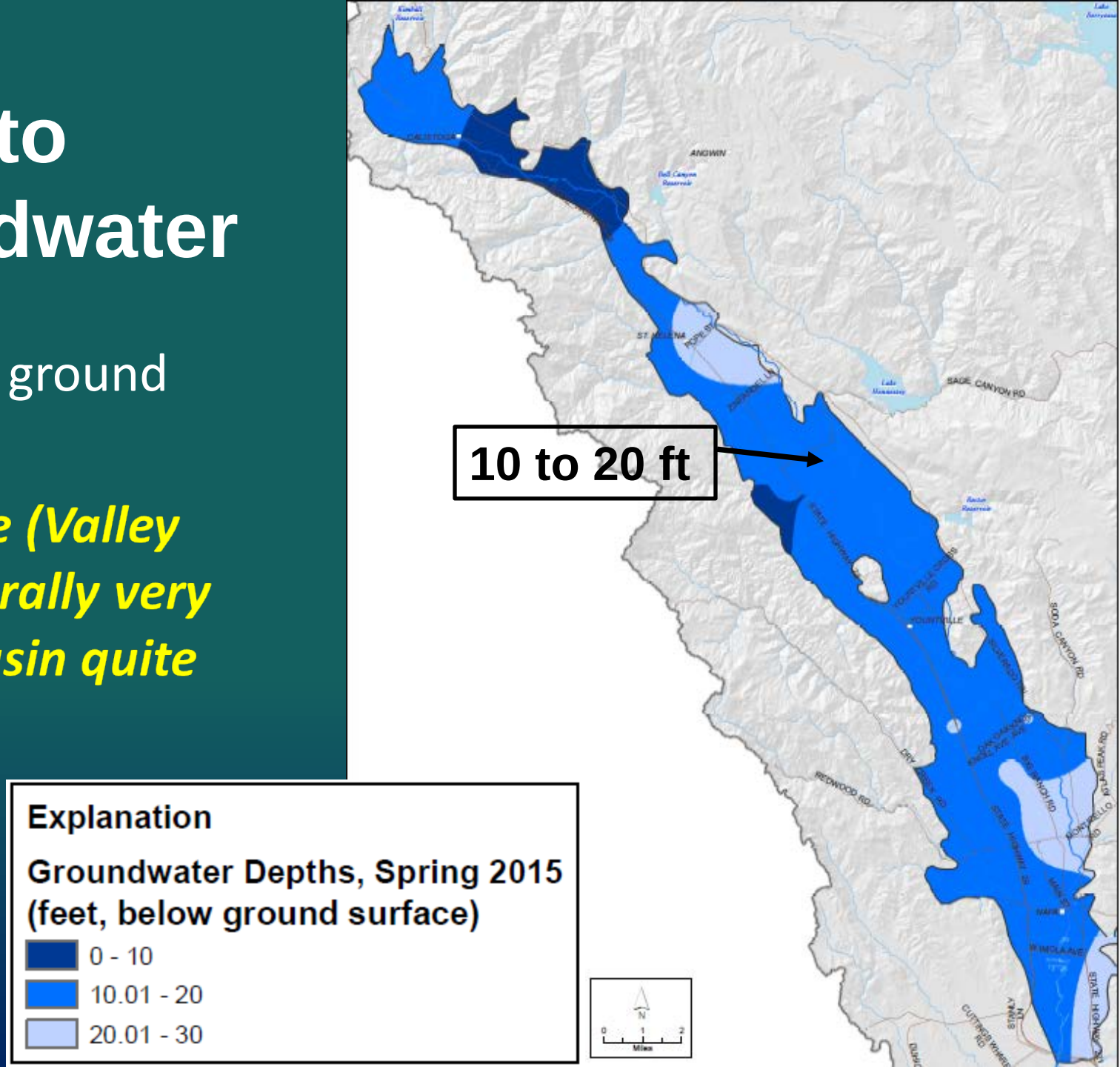
Total Wells = 108 Sites



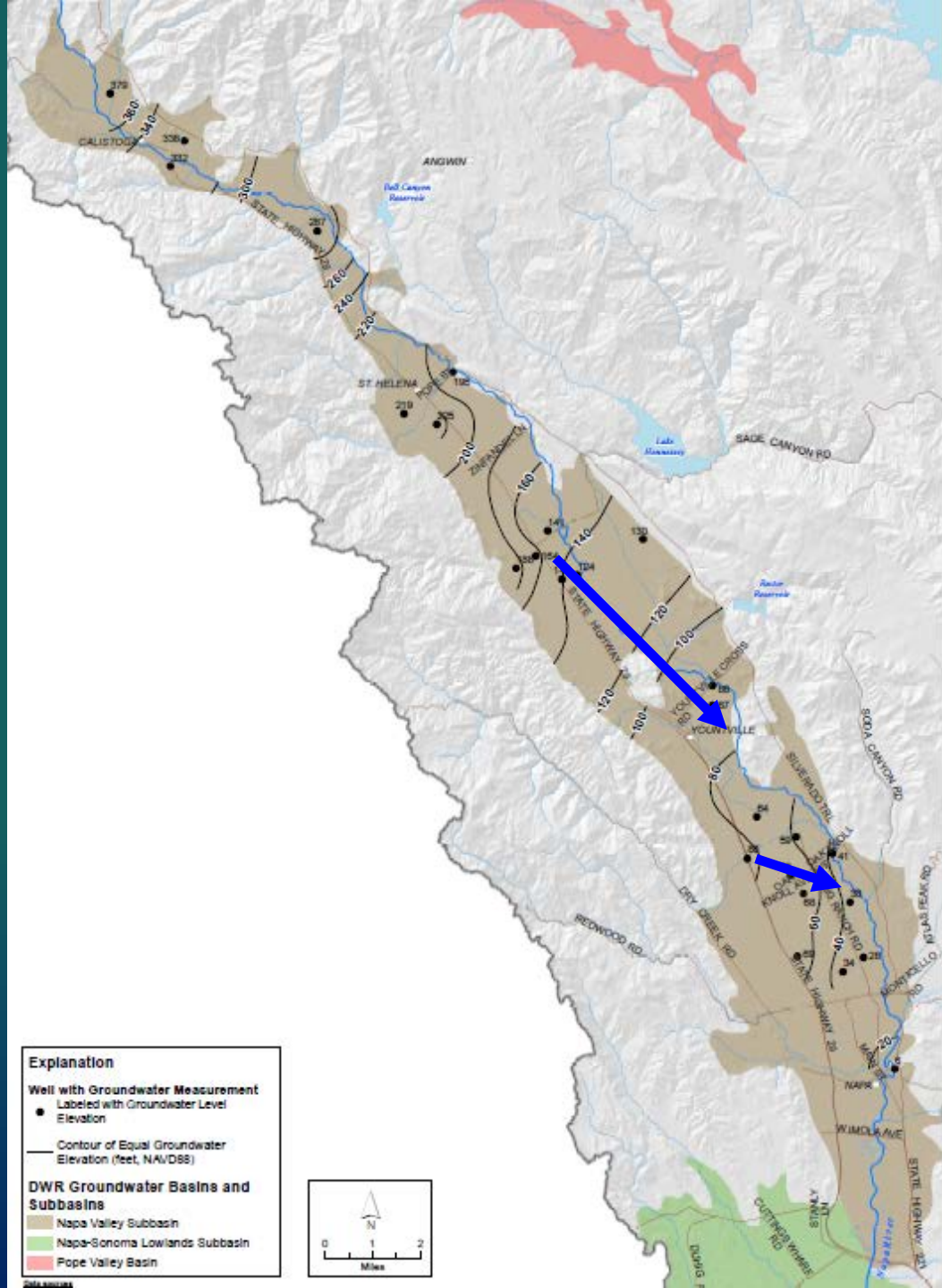
Depth to Groundwater

Feet below ground surface

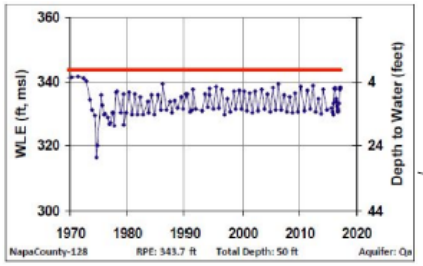
Water table (Valley Floor) generally very shallow; basin quite "full"

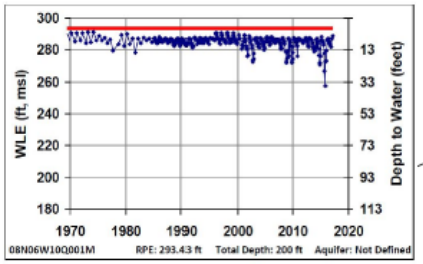


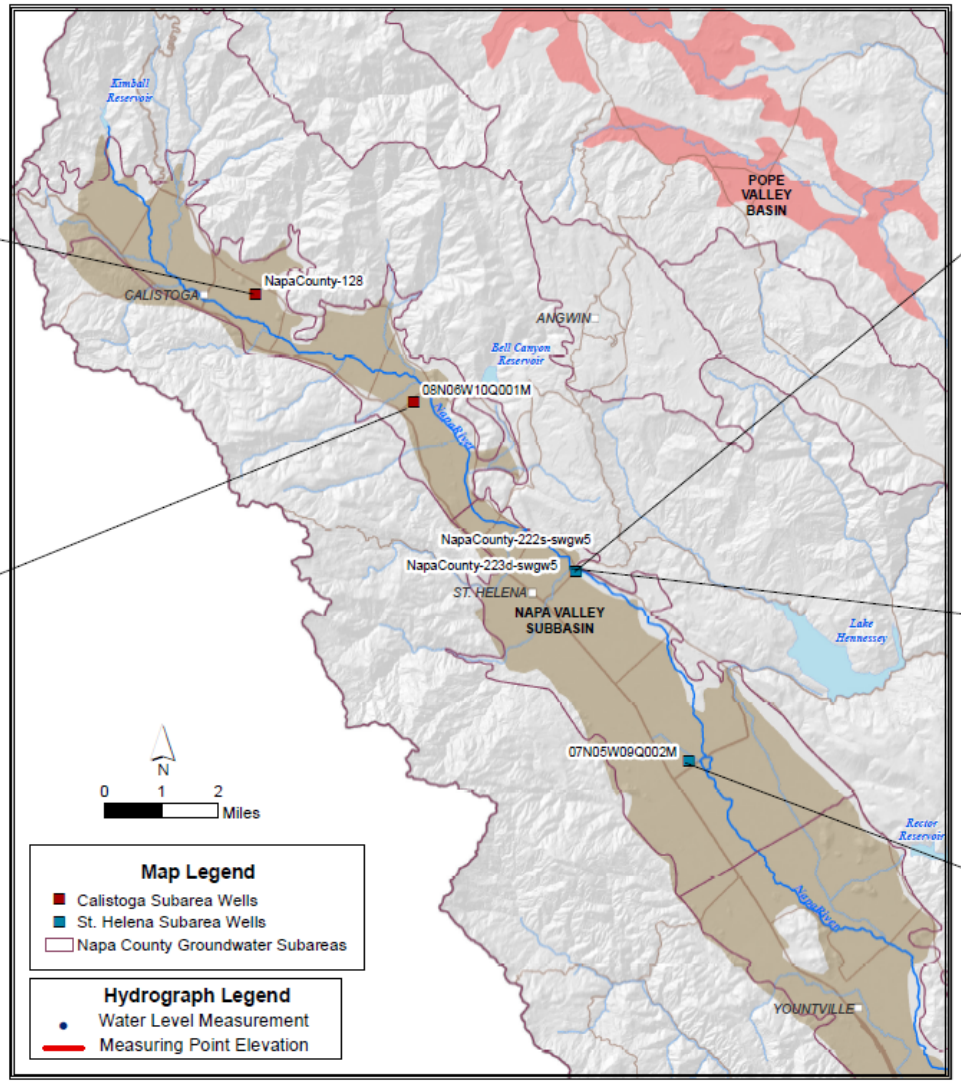
Spring 2016 GW Elevations

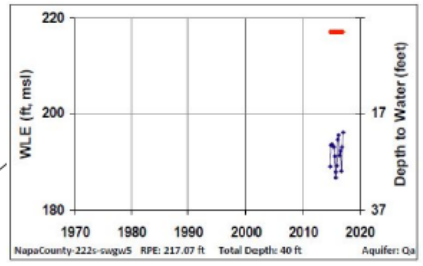


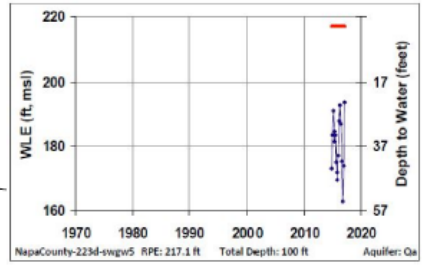
North Napa Valley Subbasin

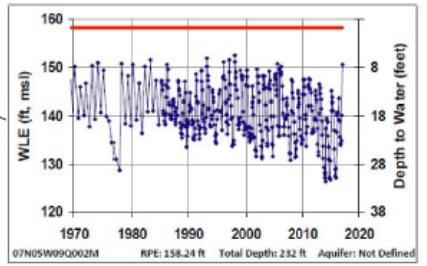




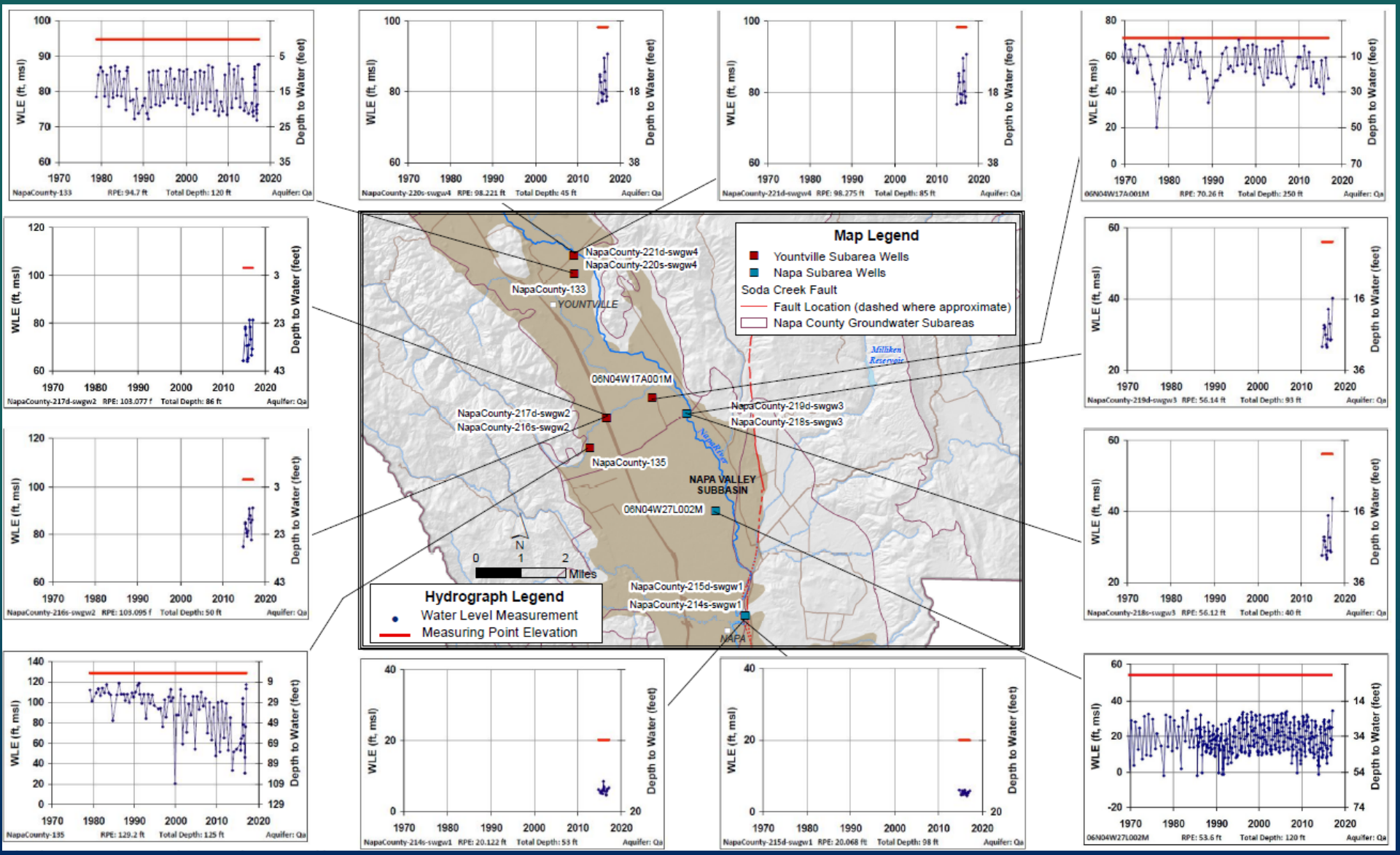




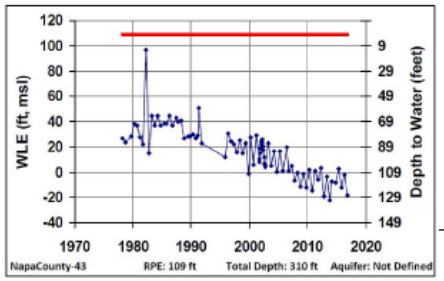


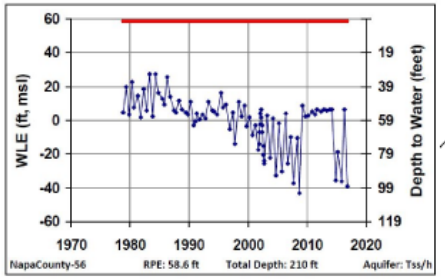


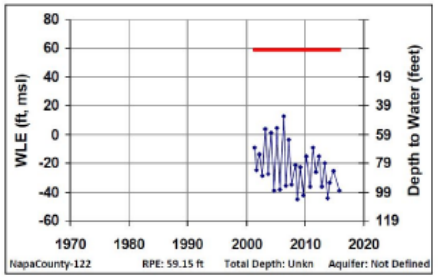
South Napa Valley Subbasin

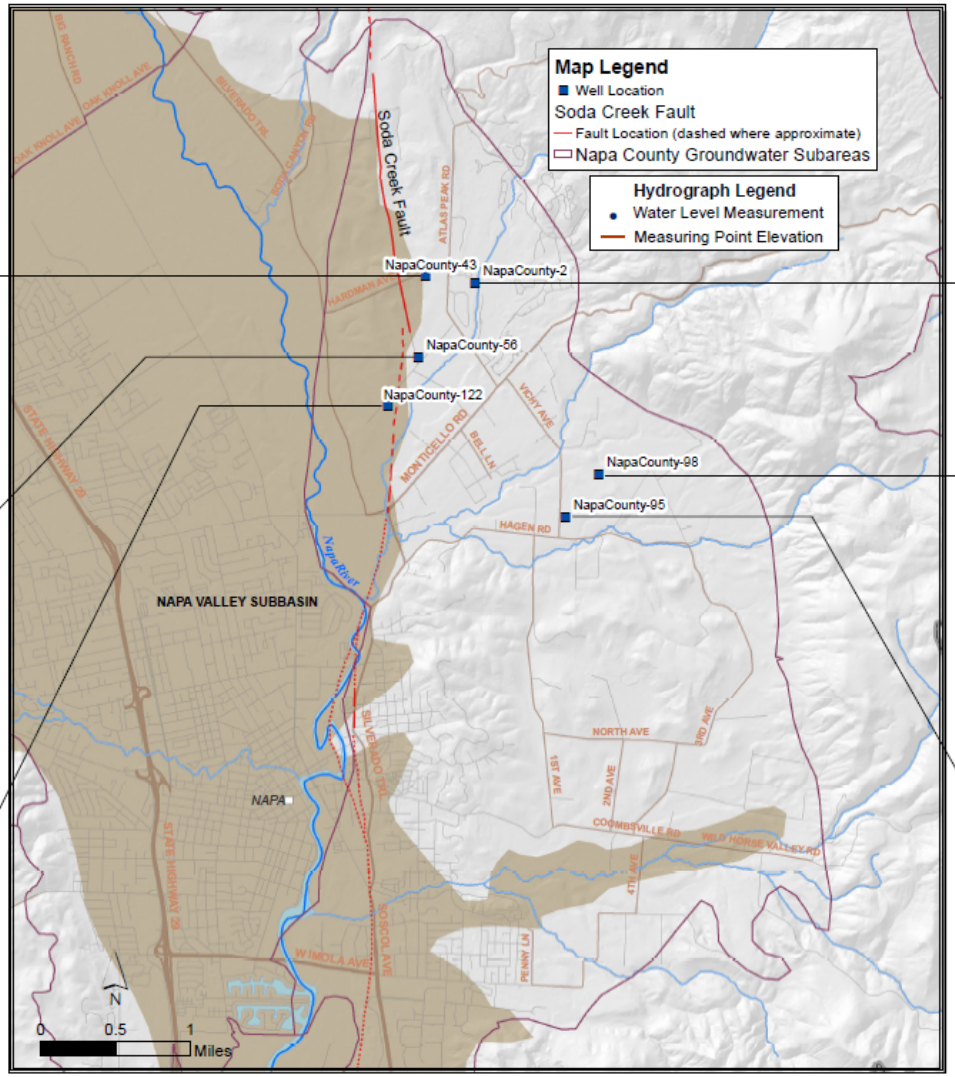


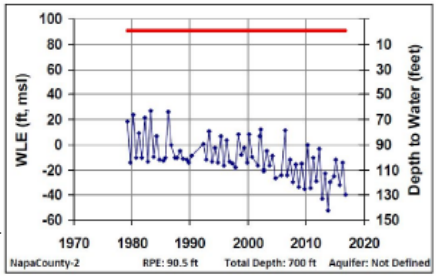
Northern MST Subarea

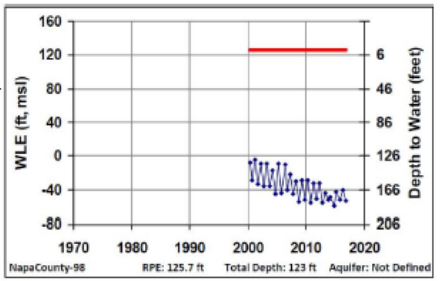


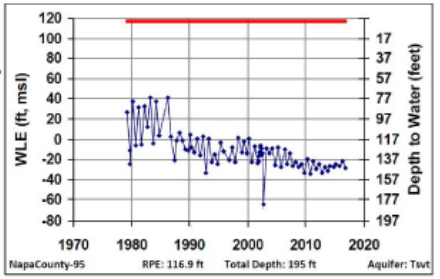




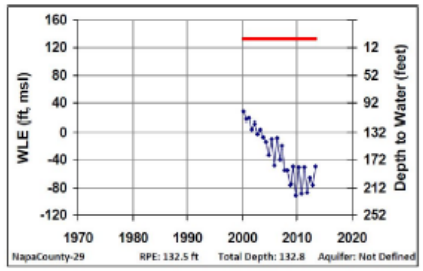


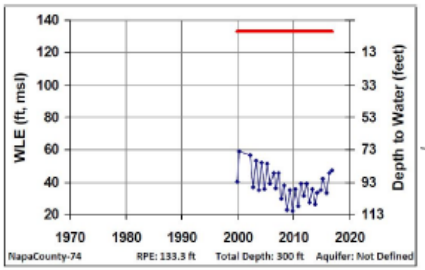


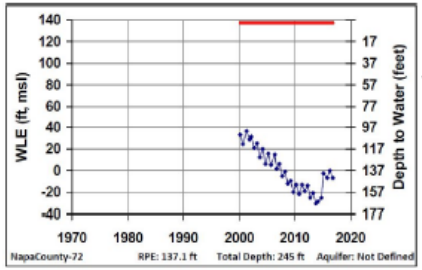


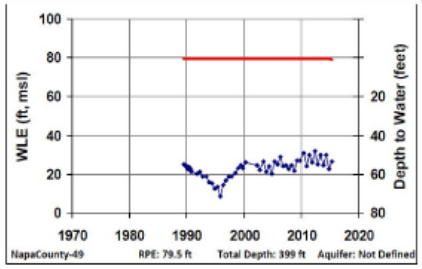


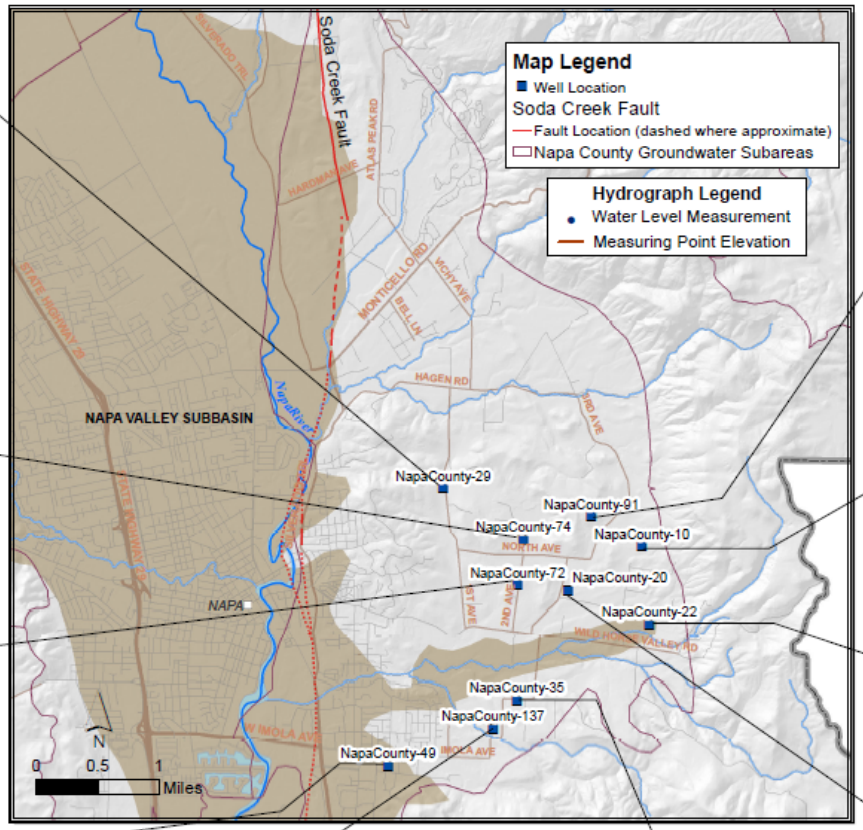
Southern MST Subarea

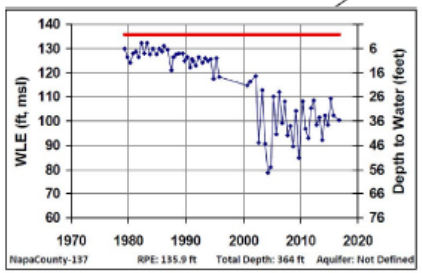


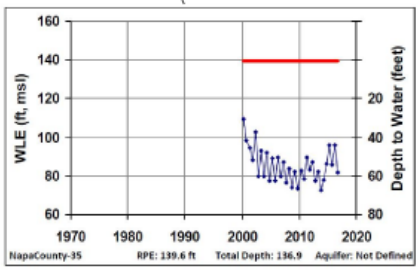


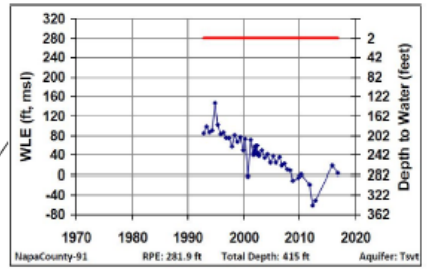


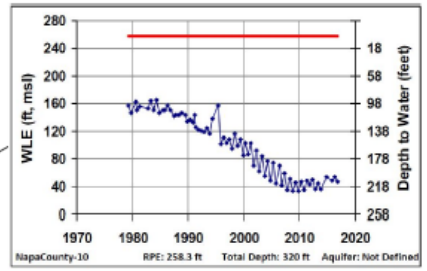


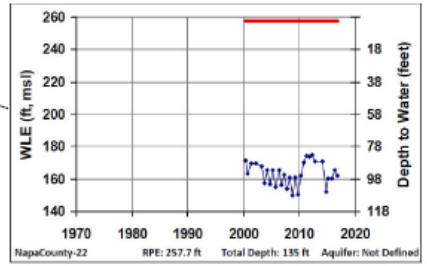


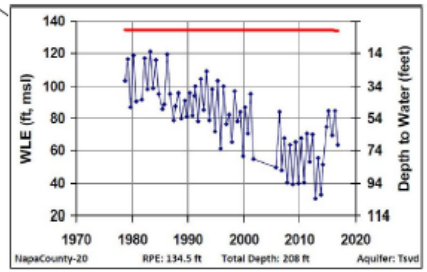




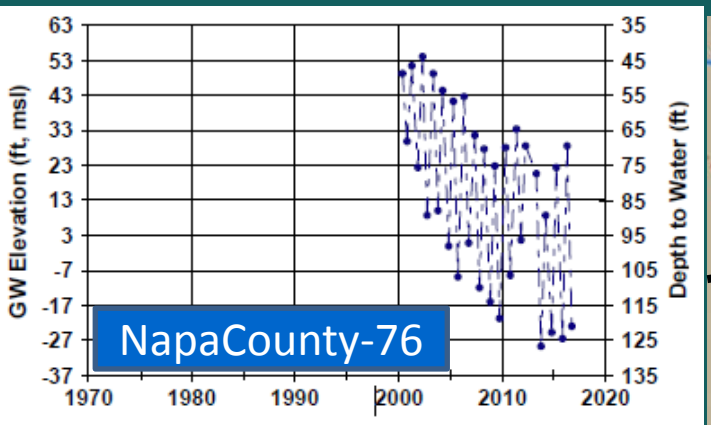


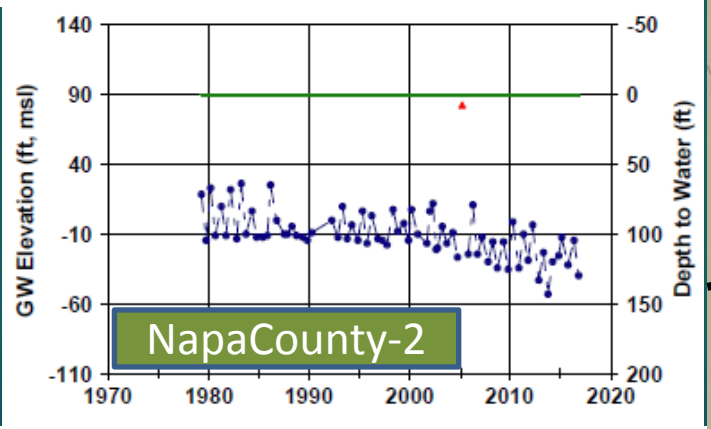


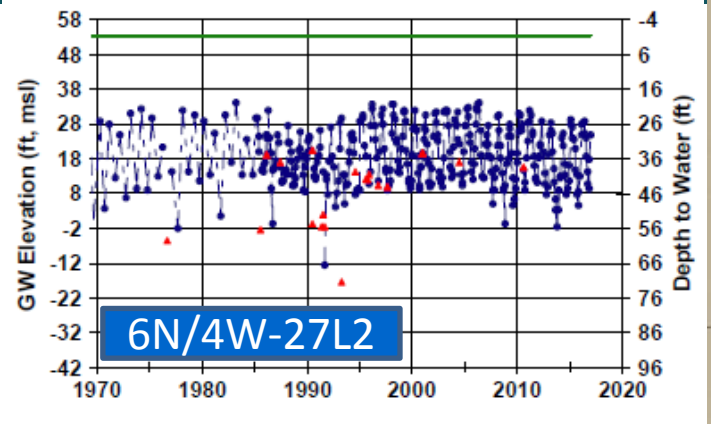


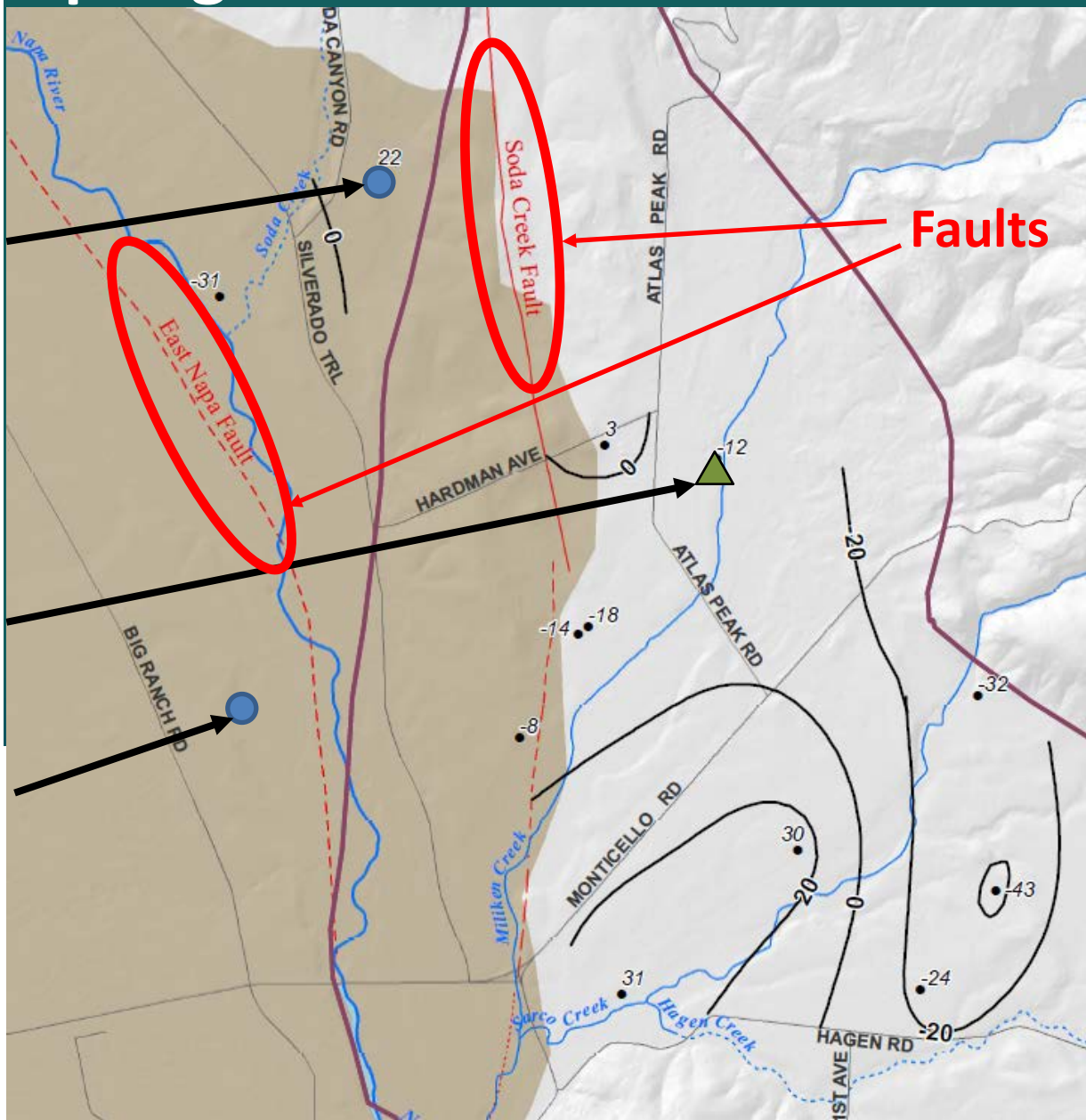


NV Subbasin, Northeast Napa Area & MST: Spring 2016



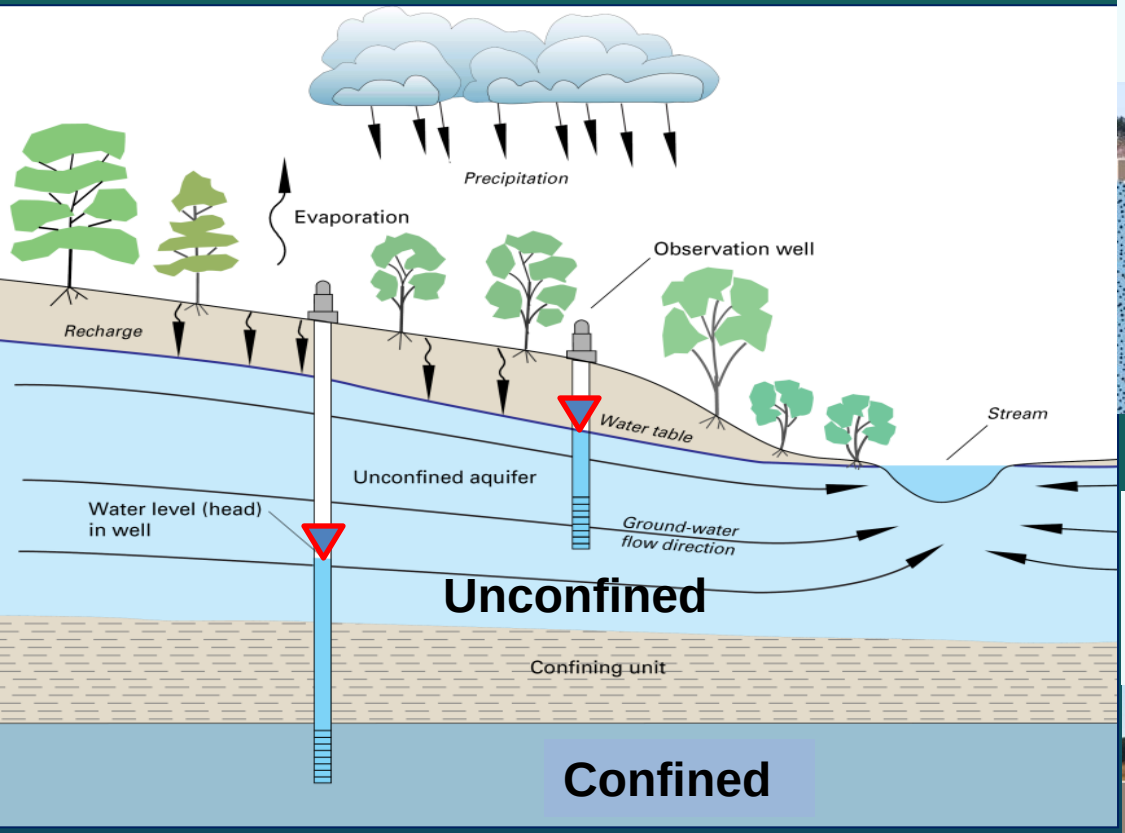




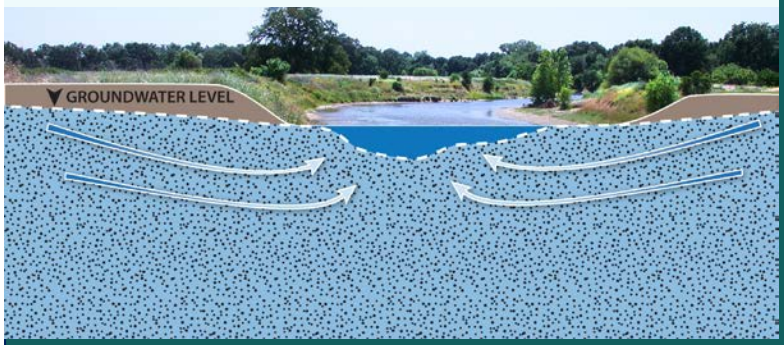


Groundwater/Surface Water Interaction

Groundwater Monitoring

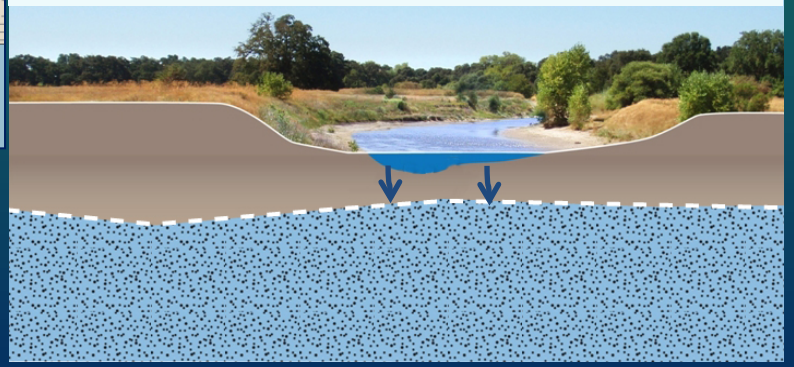


Direct Connection
Maintains/Recharges Stream



Courtesy TNC

Indirect Connection
Stream Seepage Independent of GW Levels

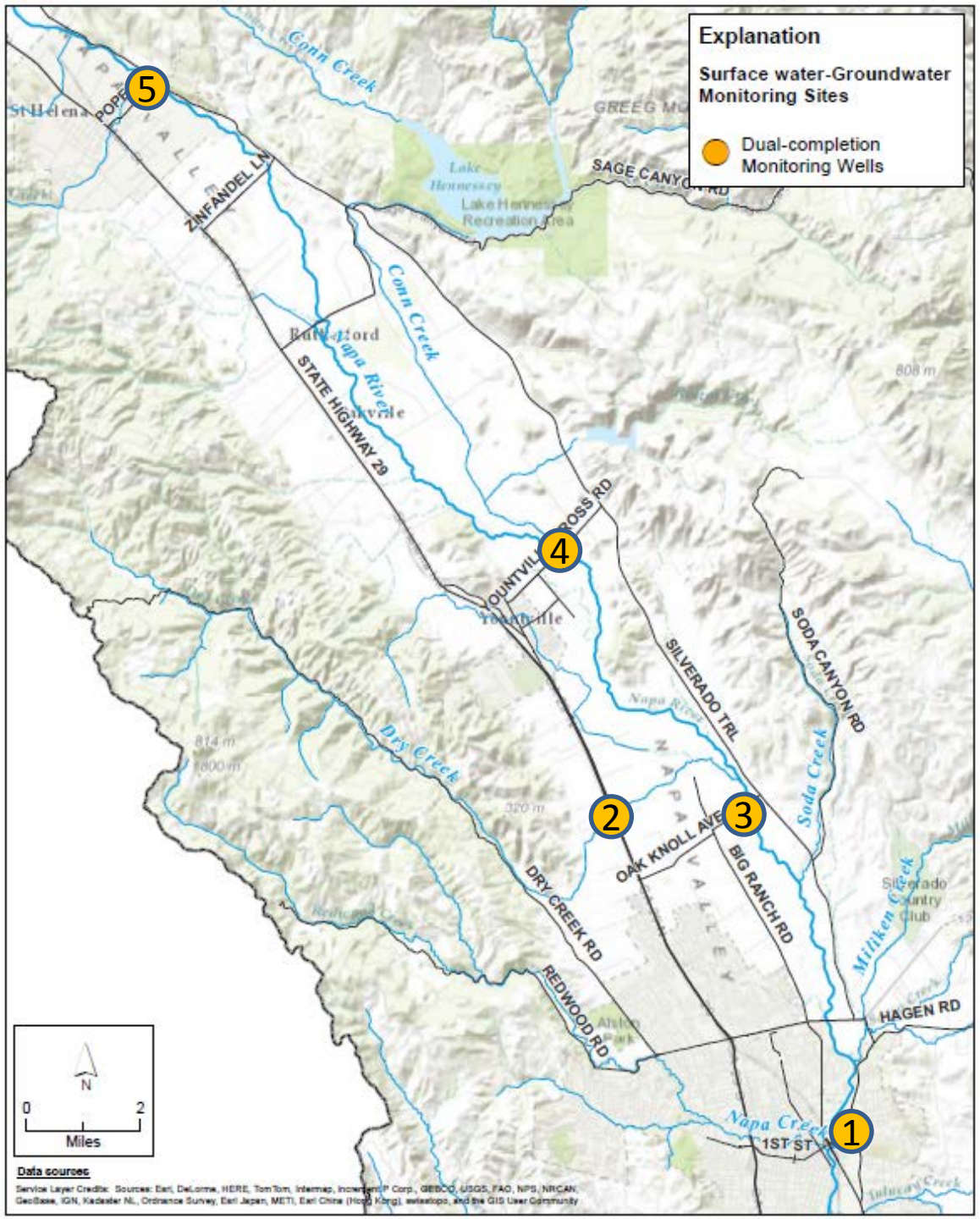


Courtesy TNC

Surface Water/ Groundwater

Monitoring at 5 Sites

- Shallow MWs each site
  - Levels & quality
- Stream gauge each site
  - Streamflow & quality
- Depths to water (when drilled) ranged from 16–34 ft [20ft at St. Helena]

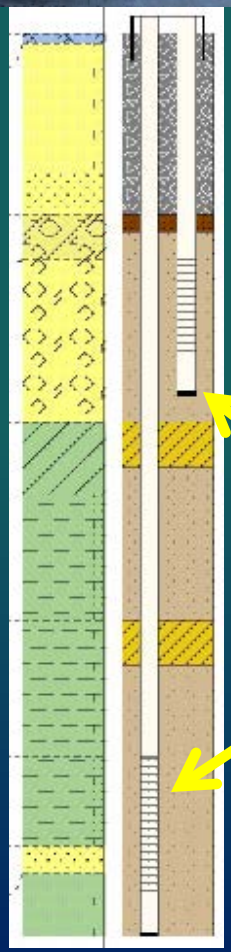


GW Monitoring Wells Near River

Above Ground
Locked Protection

Looking Down at MWs

2-inch dia. casings



Sand and Gravel

Sand

Below Ground
"Nested" Monitoring Wells

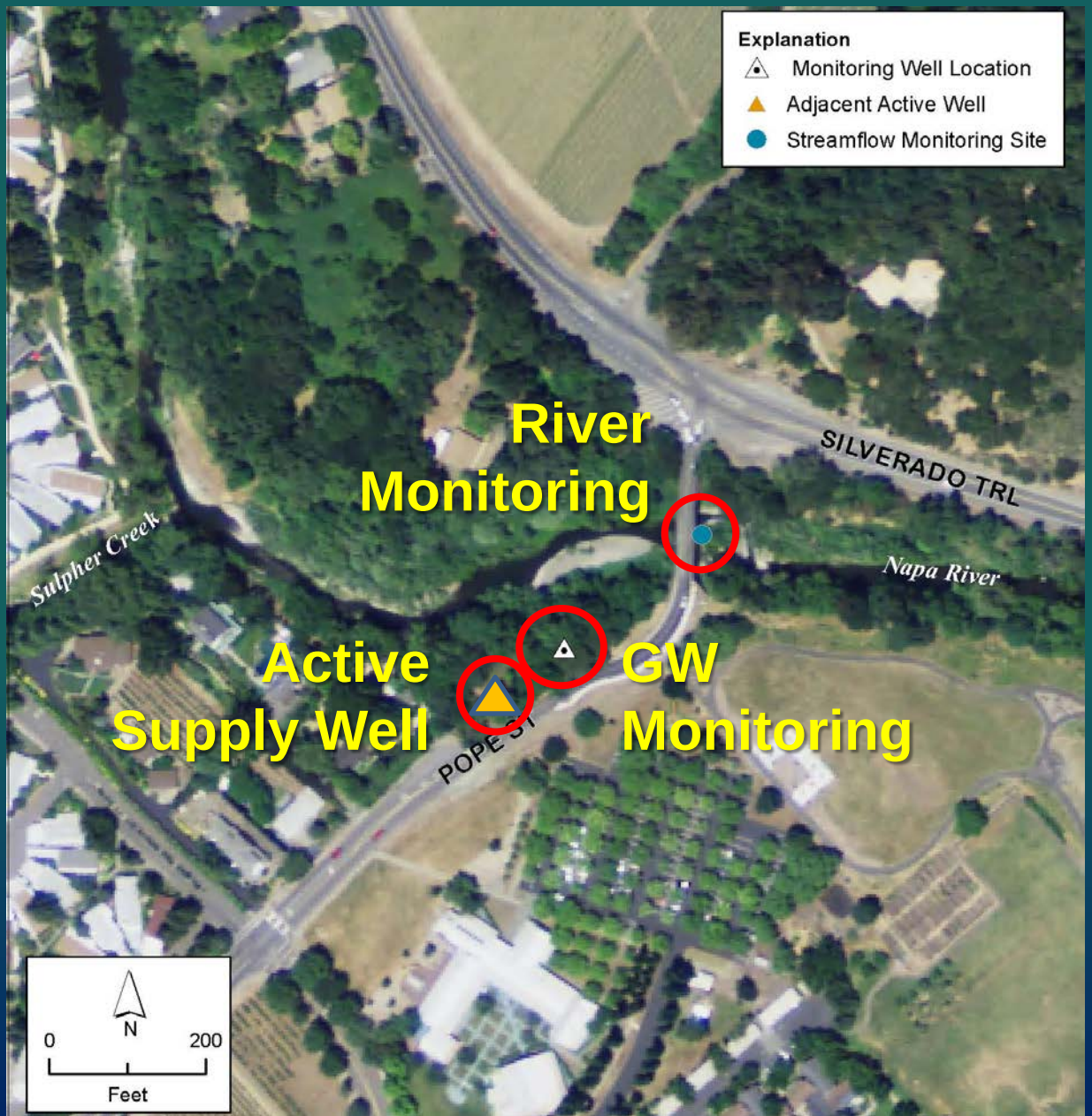
40 ft Deep

2-inch dia. casings

100 ft Deep

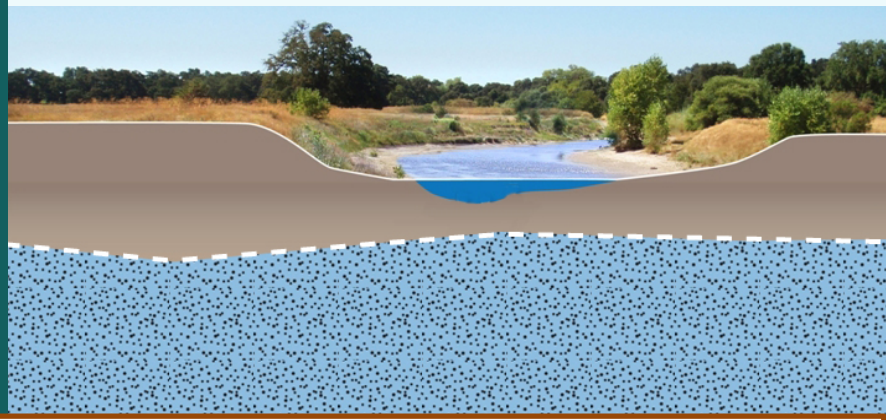
Not to Scale

SW/GW Interaction: Site 5 St. Helena

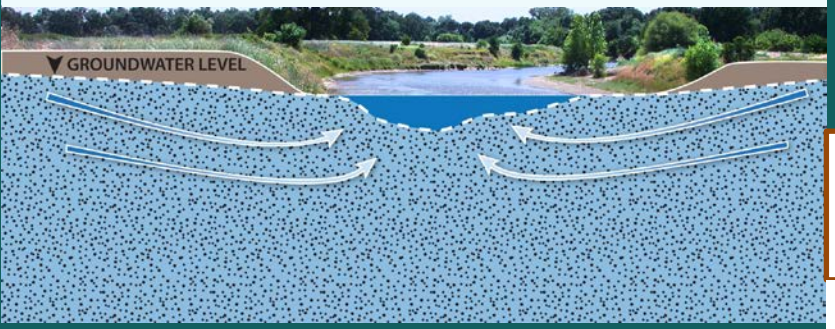


SW/GW Interaction

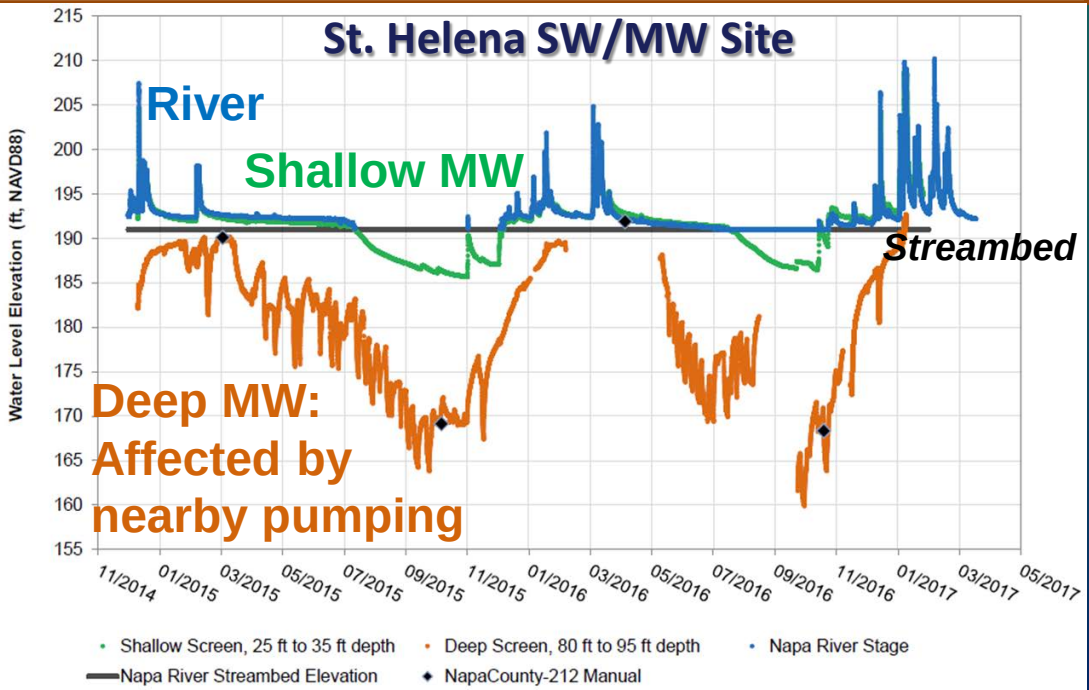
Indirect Connection
Stream Seepage Independent of GW Levels



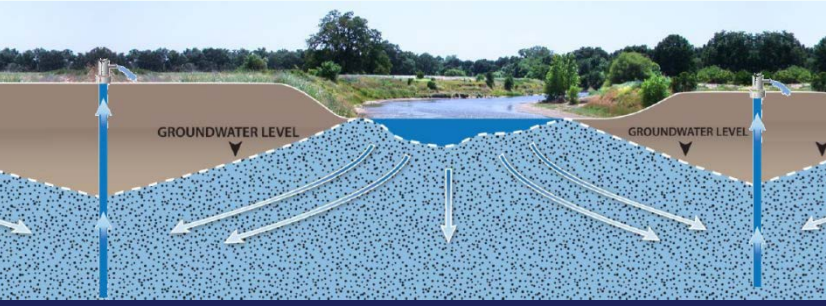
Direct Connection
Maintains/Discharges to Stream (Groundwater Baseflow)



River and Shallow MW not exhibiting short- term pumping effects

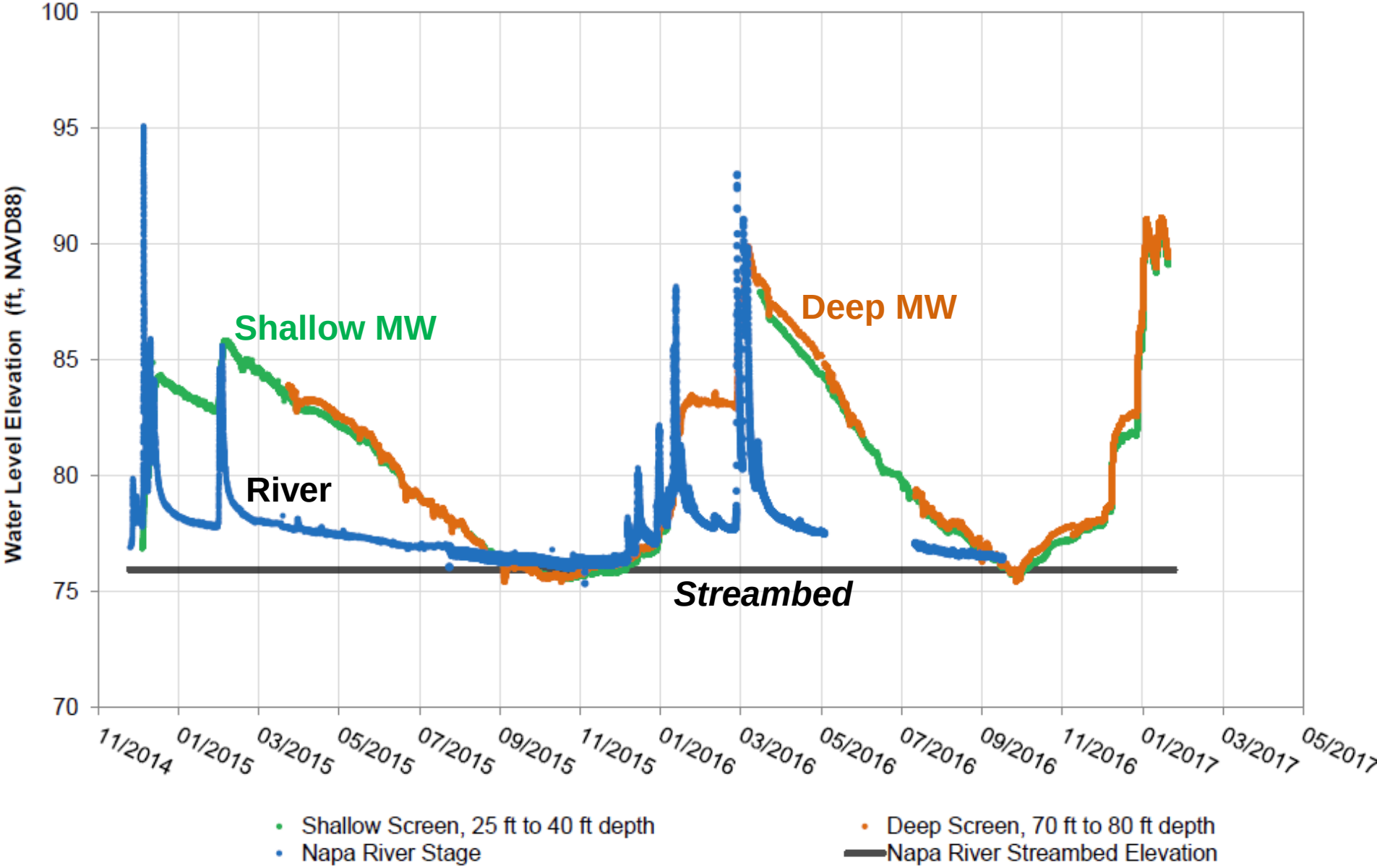


Groundwater Pumping
Stream Loses Water/ Recharge to GW

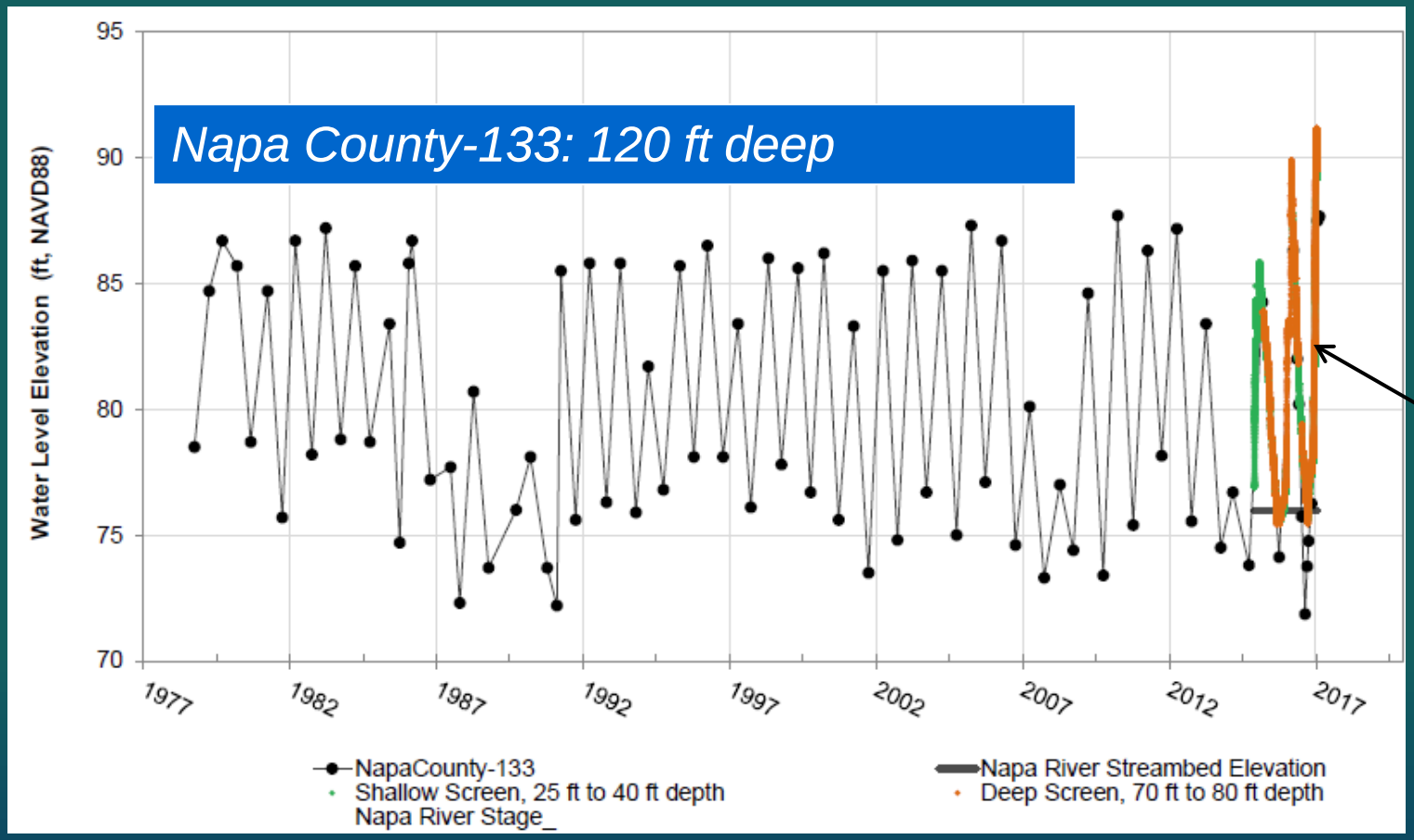


Courtesy TNC

SW/GW Interaction: Site 4 Yountville

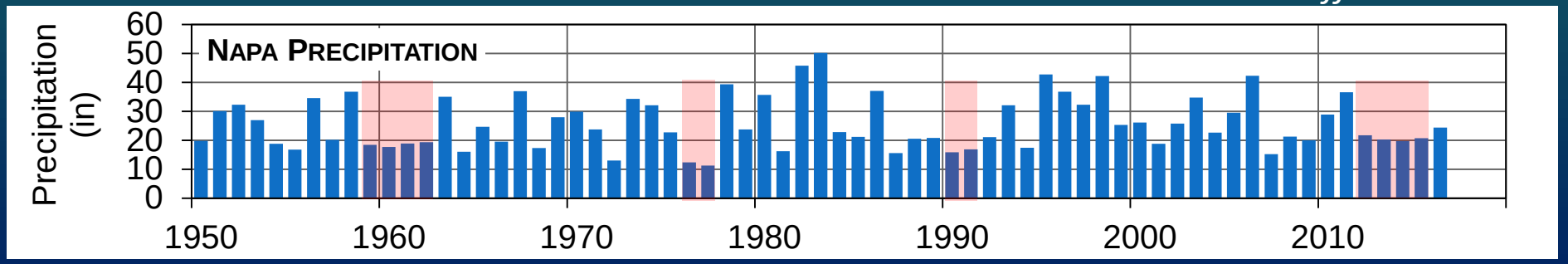


SW/GW Site 4 Compared to Historical GW Levels



Shallow & Deep MWs Near River

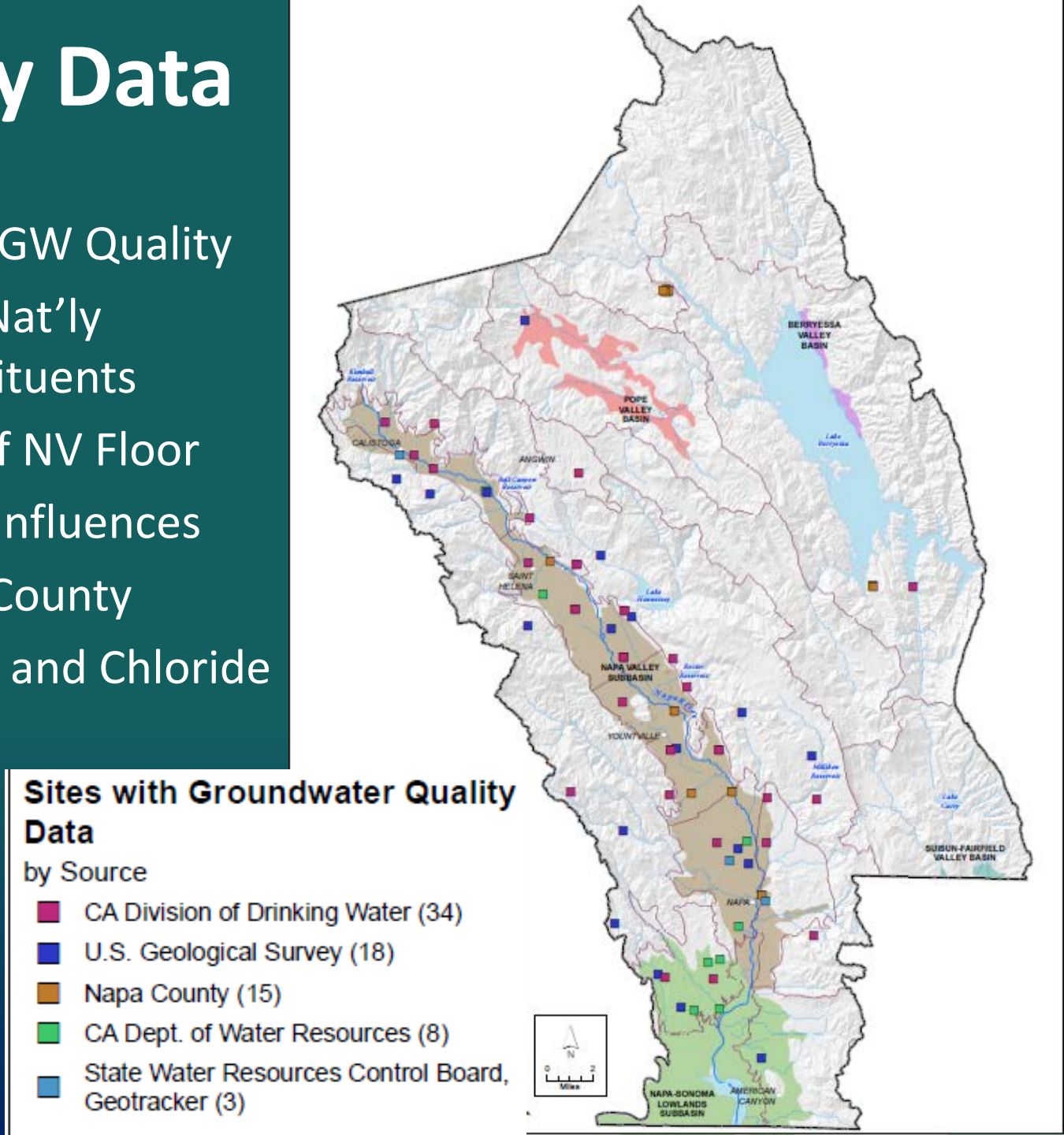
Different Scale



Groundwater Quality

GW Quality Data

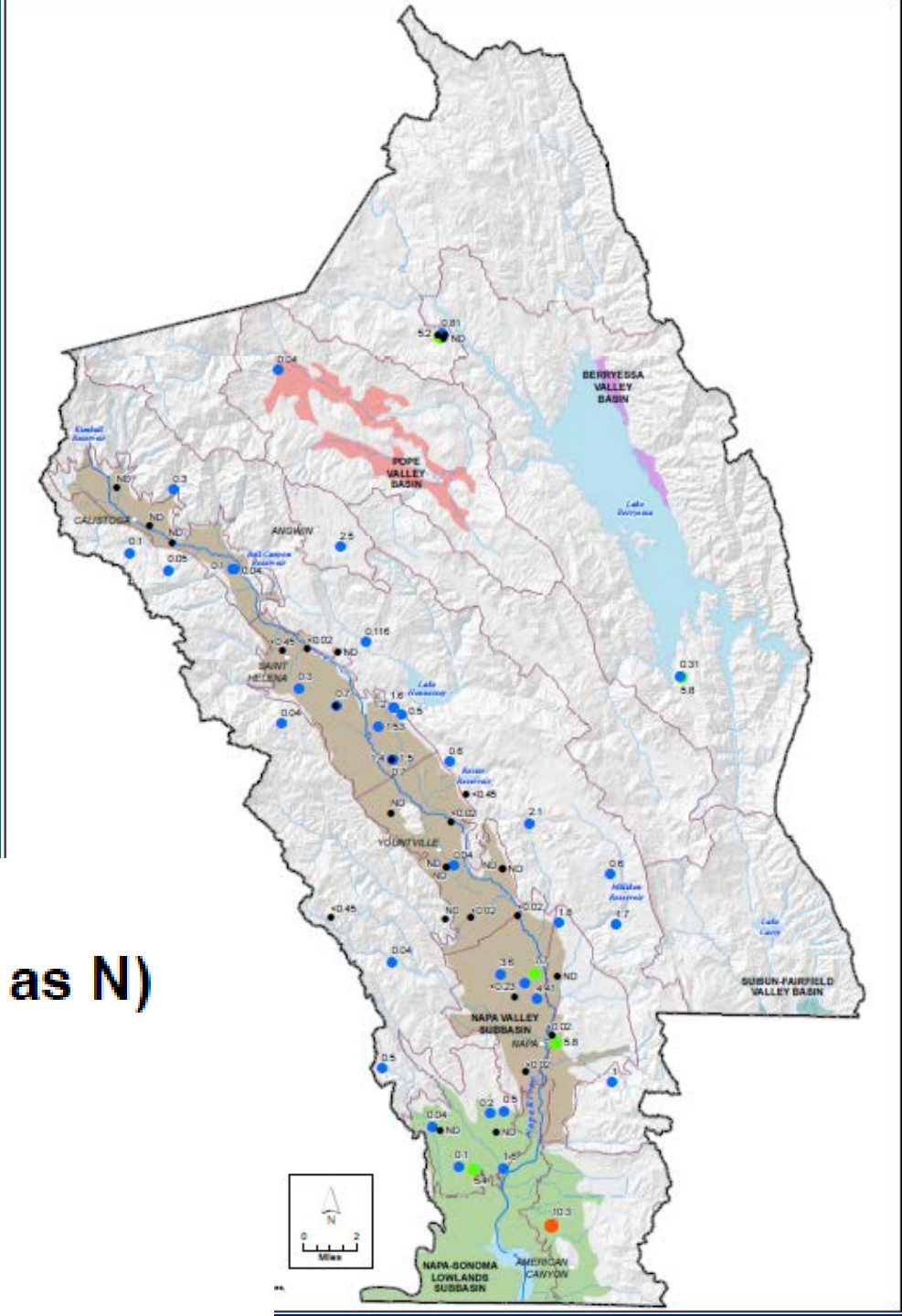
- 78 Sites
- Generally Good GW Quality
- Selected Areas Nat'ly Occurring Constituents
- Calistoga Area of NV Floor
  - Geothermal Influences
- Southern Napa County
  - Elevated TDS and Chloride



Nitrate

- Low NO_3-N conc.
- Sites in NV Subbasin below MCL (28 sites NO3 not detected)
- 1 site in Napa-Sonoma Lowlands above MCL

MCL = 10 mg/L



Maximum Nitrate Concentration (mg/L as N)

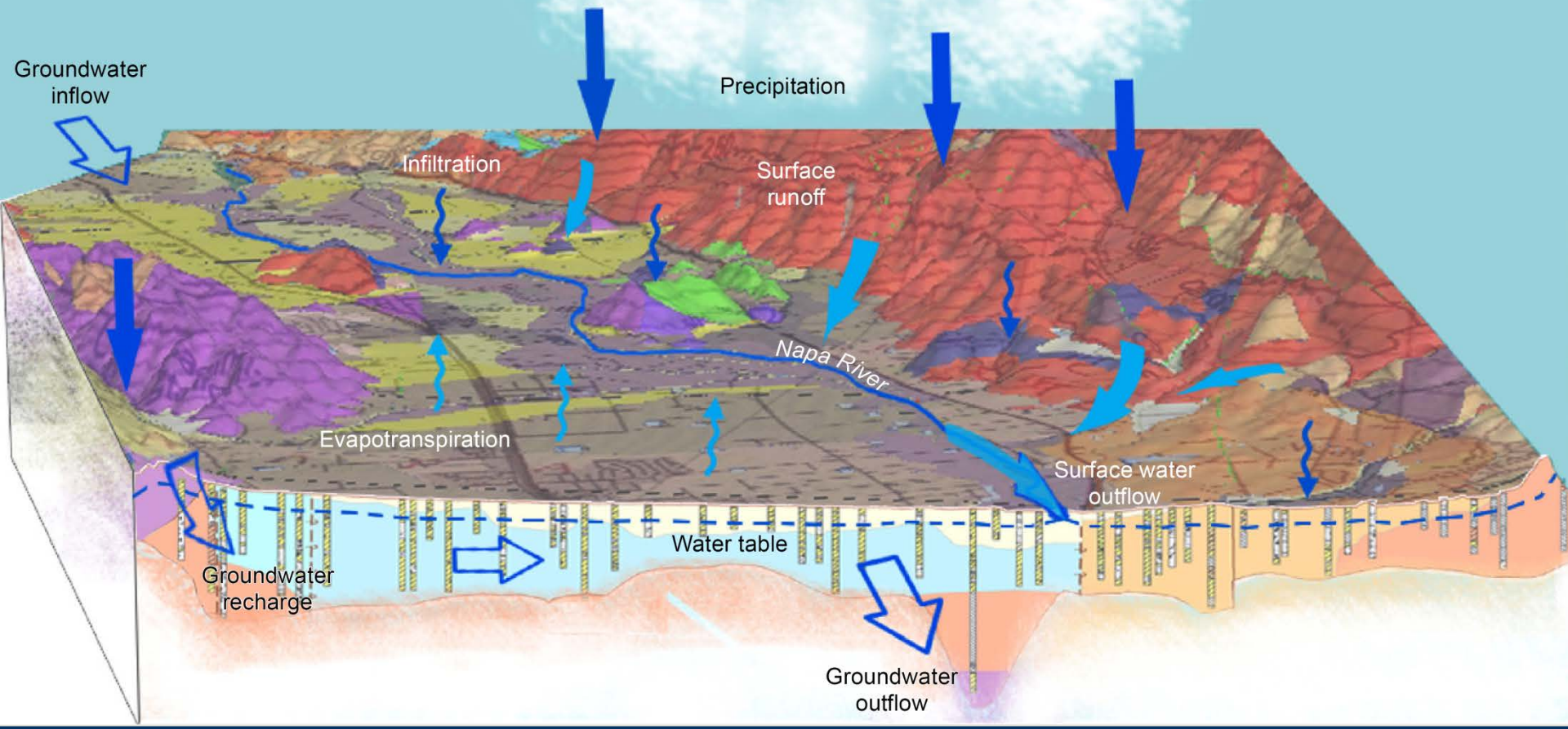
- Non-Detect (28)
- <5 (37)
- >5-10 (5)
- >10 (1)

Napa Valley Subbasin Sustainable Groundwater Management

Metrics and Tracking: Sustainability Indicators

Water Budget:
Core Element of Groundwater Sustainability

Inflows – Outflows = ΔS *Change in GW Storage*



Water Budget Results

Est. Inflows (1988-2015)	Avg. Annual Ac-Ft/Yr
Upland Runoff	*145,000*
GW Recharge	69,000
Imported SW Deliveries	17,000
Uplands Subsurface Inflow	5,000

−

Est. Outflows (1988-2015)	Avg. Annual Ac-Ft/Yr
SW Outflow and Baseflow	*176,000*
Net GW Use Net SW Use	13,000 14,000
GW Subsurface Outflow	19,000
Urban Waste-water Outflow	8,000

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Net Avg. Annual Change in Subbasin Storage ~ 6,000 Acre-Ft/Yr
(uncertainty in individual budget components; *italicized more uncertain*)

Sustainable Yield and Related Terms

Sustainable Yield (Definition; Water Code Section 10721(v)):

"*Maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually without causing an undesirable result*."

"Undesirable Result" – key term linked to accomplishing sustainability.

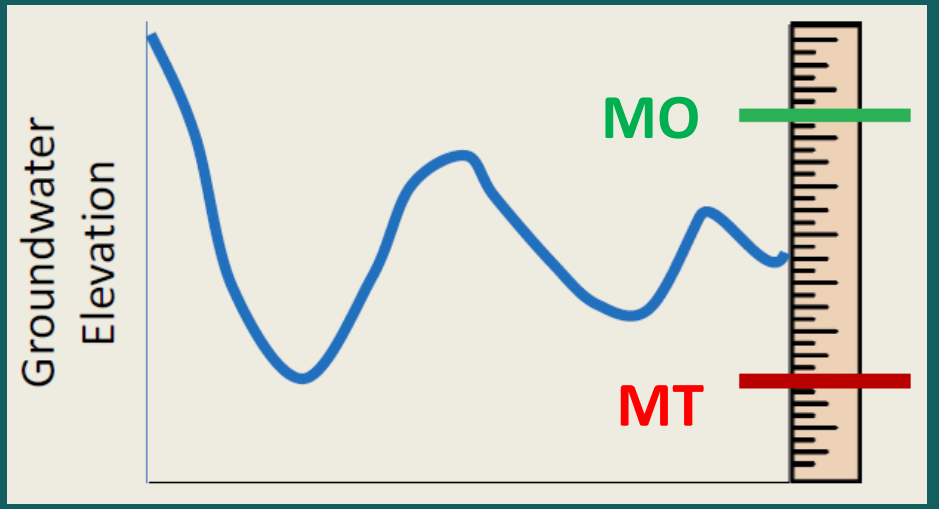
Groundwater Sustainability Indicators

Not Causing Undesirable Results:
Means Avoiding Significant and Unreasonable …

Lowering of GW Levels	**Reduction of GW Storage**	**Seawater Intrusion**
Water Quality Degradation	**Land Subsidence**	**Depletion of Surface Water**

Napa Valley Hydrogeologically Sensitive to this Indicator

Minimum Thresholds and Measurable Objectives



(DWR, March 2016)

- **Minimum Threshold (MT)**

"a numeric value for each sustainability indicator used to define undesirable results" (Section 351)

- **Measurable Objective (MO)**

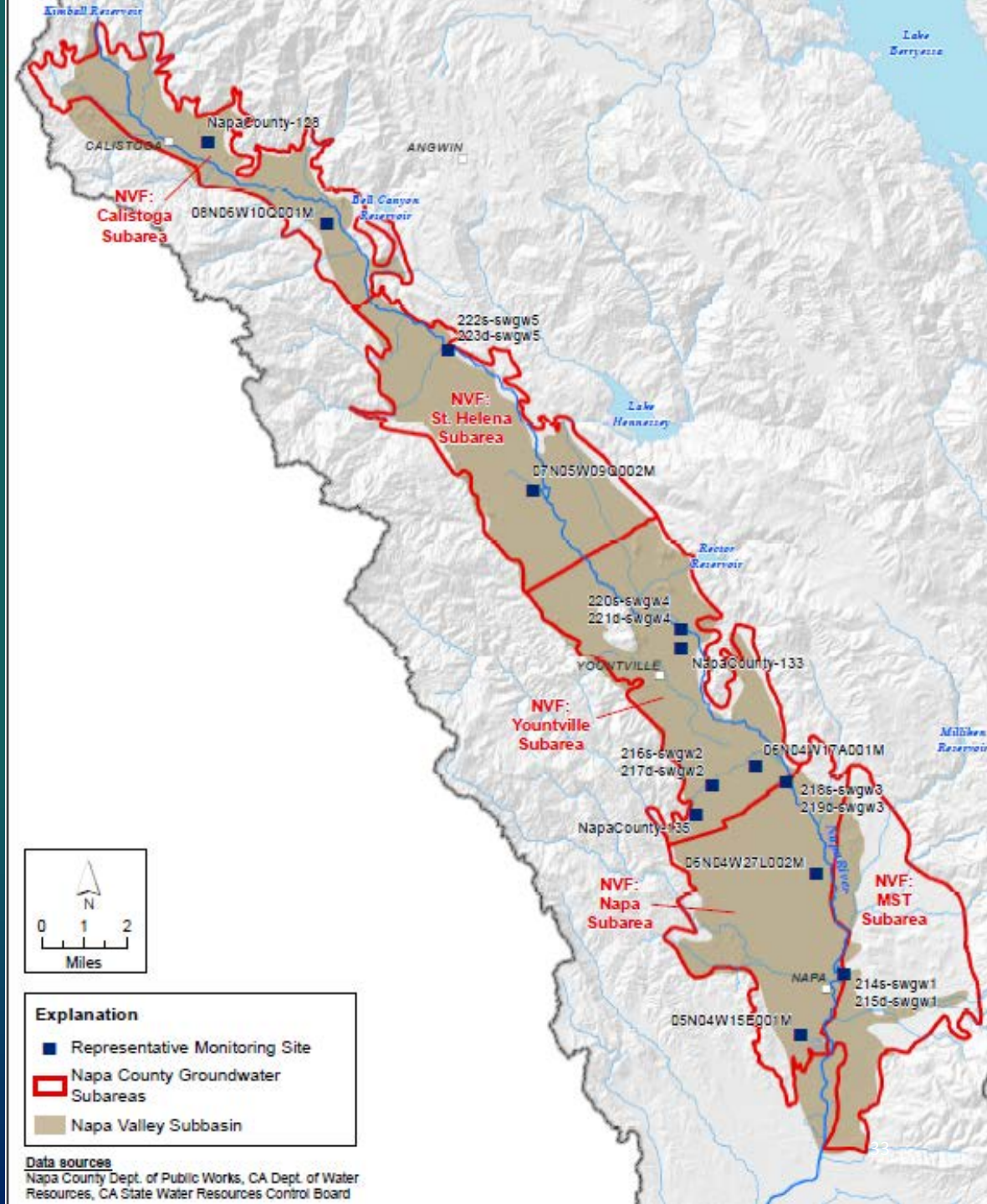
"specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions" (Section 351)

Measurable objectives and minimum thresholds are established to ensure GW sustainability or improve GW conditions.

Representative Monitoring Sites

- Representative wells to ensure sustainability
- 18 locations
- Metrics for each sustainability indicator, as applicable

Ongoing: Other Countywide GW Data (108 wells) to be Analyzed, Updated, & Reported



Sustainability Indicators: Streamflow

Representative Monitoring Sites Well ID	Date	Measured Minimum 2016 FALL WLE (Feet, AMSL)[1]	Streamflow Depletion	
			Minimum Threshold (Fall GWE, Feet AMSL)	Measurable Objective (Fall GWE, Feet AMSL)
06N04W17A001M	10/18/2016	47	37	50
06N04W27L002M	11/16/2016	18	-2	12
07N05W09Q002M	9/8/2016	134	127	135
08N06W10Q001M	10/17/2016	282	269	281
NapaCounty-128	10/11/2016	331	320	331
NapaCounty-133	9/26/2016	74	72	76
NapaCounty-135	10/12/2016	31	-	-
Napa County 214s-swgw1	9/25/2016	2	2	4
Napa County 215d-swgw1	10/19/2016	3	2	4
Napa County 216s-swgw2	10/8/2016	72	61	76
Napa County 217d-swgw2	9/23/2016	63	61	76
Napa County 218s-swgw3	11/16/2016	32	29	32
Napa County 219d-swgw3	10/5/2016	31	29	32
Napa County 220s-swgw4	10/4/2016	76	75	77
Napa County 221d-swgw4	10/4/2016	75	75	77
Napa County 222s-swgw5	10/14/2106	186	185	190
Napa County 223d-swgw5	10/1/2016	160	164	175

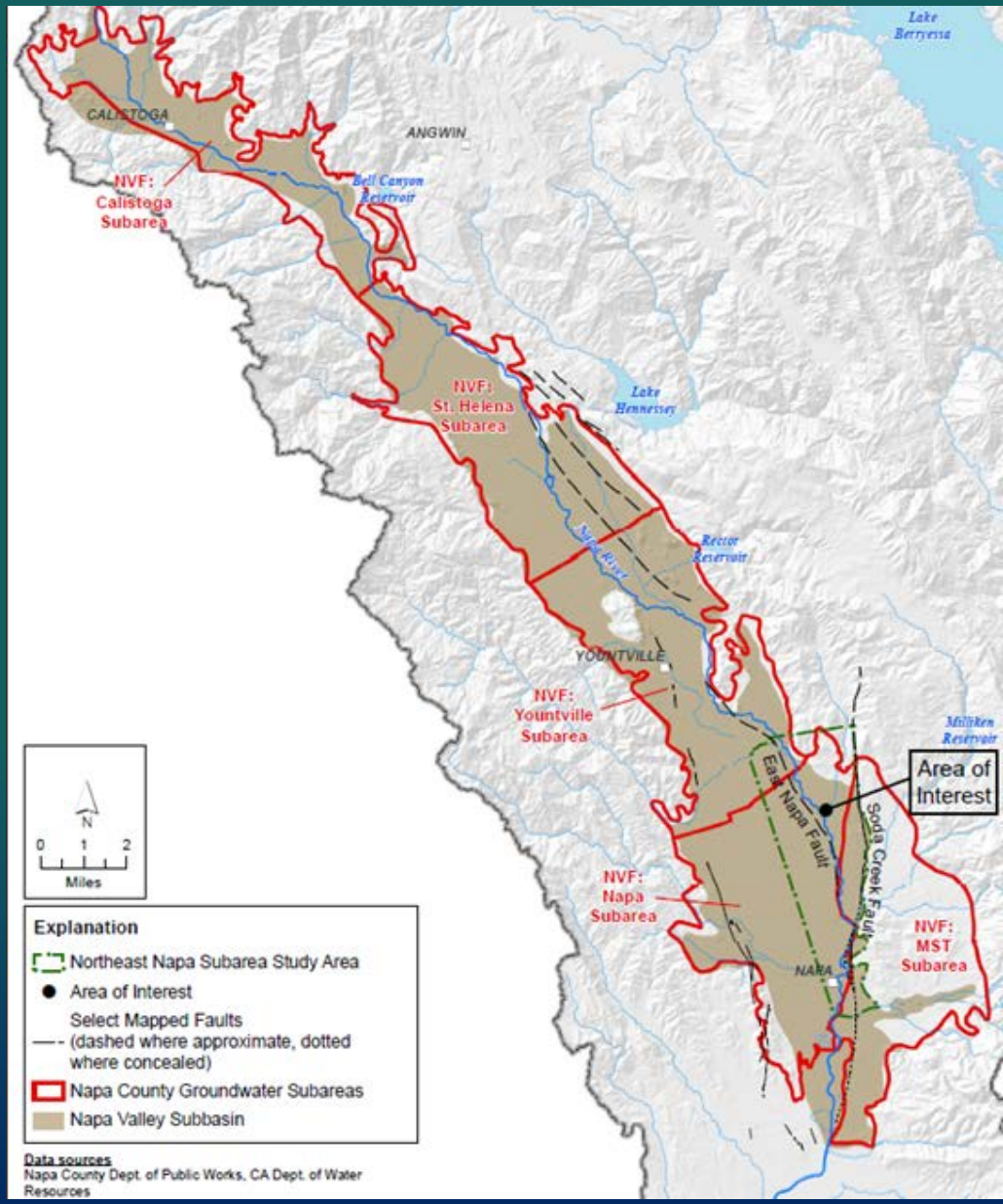
One site had minimum threshold exceedances: 9/27- 10/3 in deeper MW Site 5(swgw5); but levels in shallow MW Site 5 were stable and 27 ft above levels in the deeper MW.

Northeast Napa Groundwater Study Area

Study and GW Model to Evaluate:

- Historical WL declines local area east of Napa River
- Mutual well interference
- Potential for affect from MST
- Potential effects of pumping on streamflow
- GW availability (esp. east of Napa River)

Results: May 2017 BOS



2016 Annual Report: Summary

- GW level trends stable majority of wells Napa Valley Floor
  - Year-to-year declines observed in a few wells (SE St. Helena area; SW Yountville area; NE Napa area)
  - Some response to drought conditions
- Early 2017 WLs show drought recovery
- GW level declines in MST moderated
  - Some wells since 2008/2009
  - Some wells in more recent years

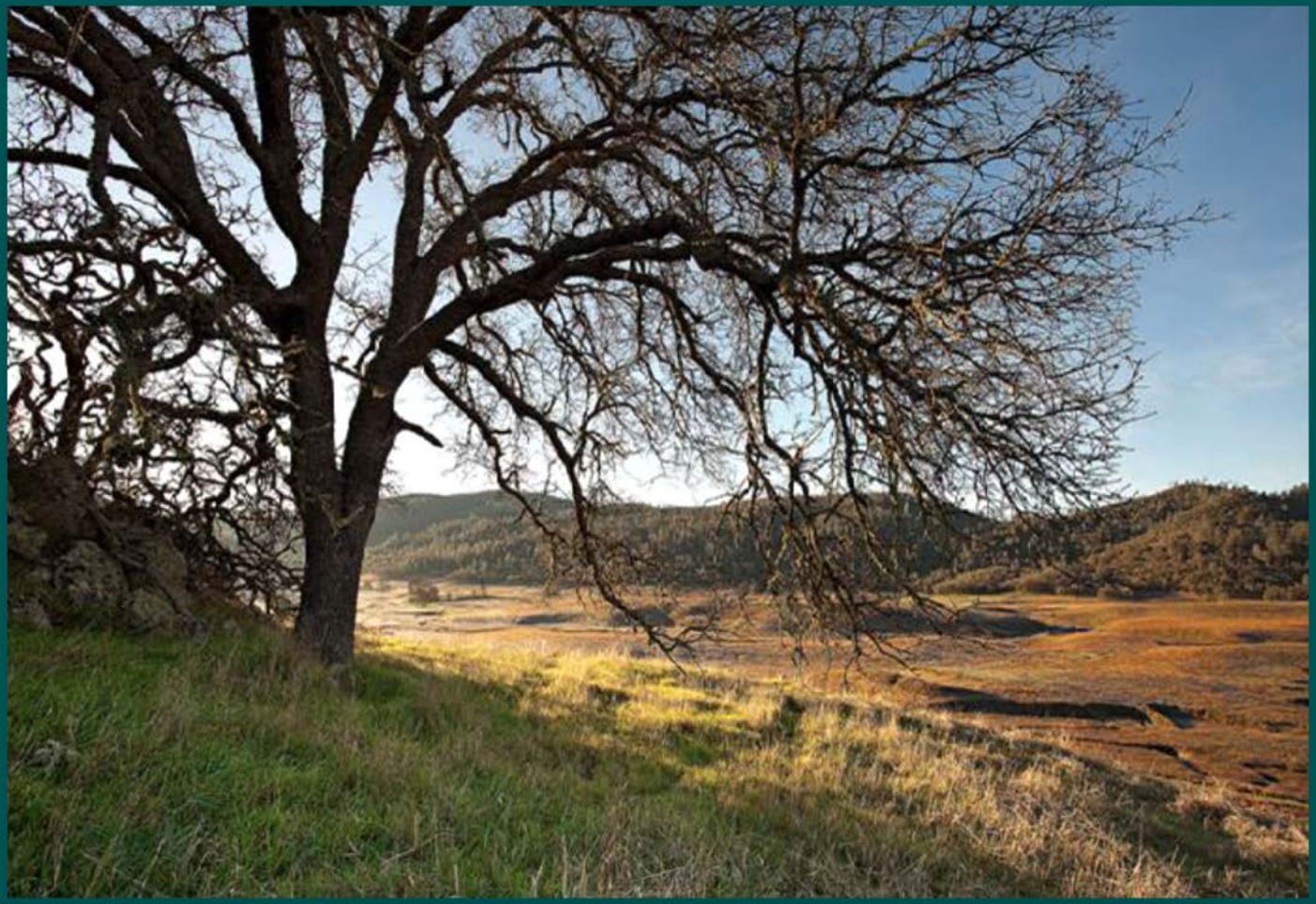
2016 Annual Report: Recommendations

- Refine MW Distribution
  - Address data gaps
- Expand SW/GW Locations
- Frshwtr/Saltwtr Interface
  - MWs for WLs and WQ; south end of Napa Sonoma Valley GW Basin
- Implement DWR BMPs
- NE Napa Study
- Baseline WQ Sampling
- Coordinate with other Monitoring Efforts (cities)
- MST Subarea
  - More properties connect to recycled water pipeline

Plus…..

Basin Analysis Report

- Recommendations (13 new)



Thank You