Napa County Comprehensive Groundwater Monitoring Program 2015 Annual Report and CASGEM Update

April 21, 2016

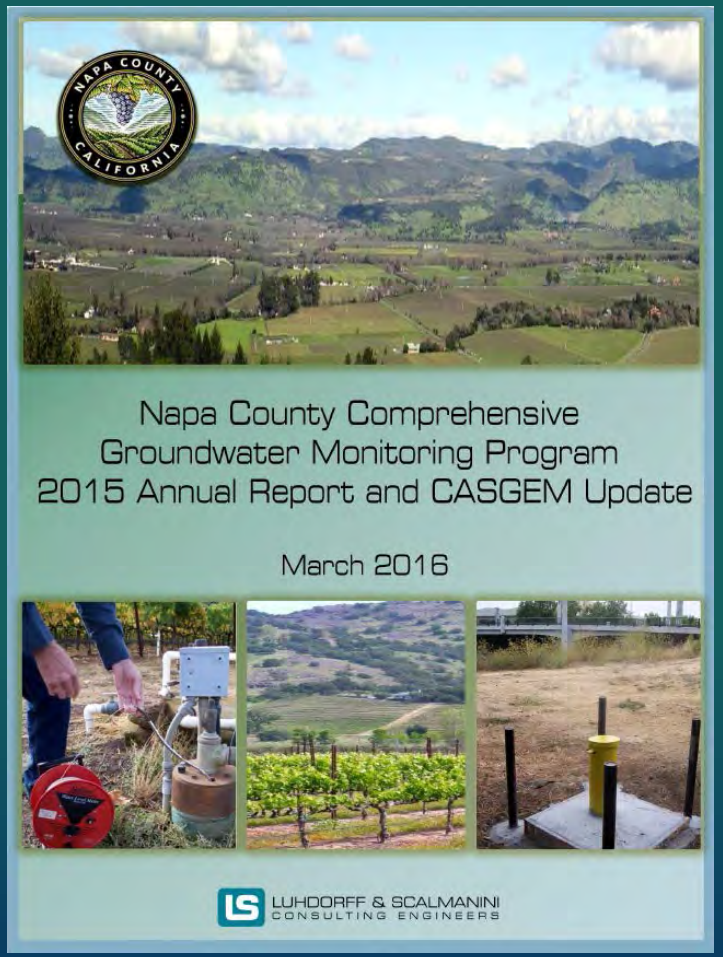
Watershed Information & Conservation Council

By Vicki Kretsinger Grabert

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Overview

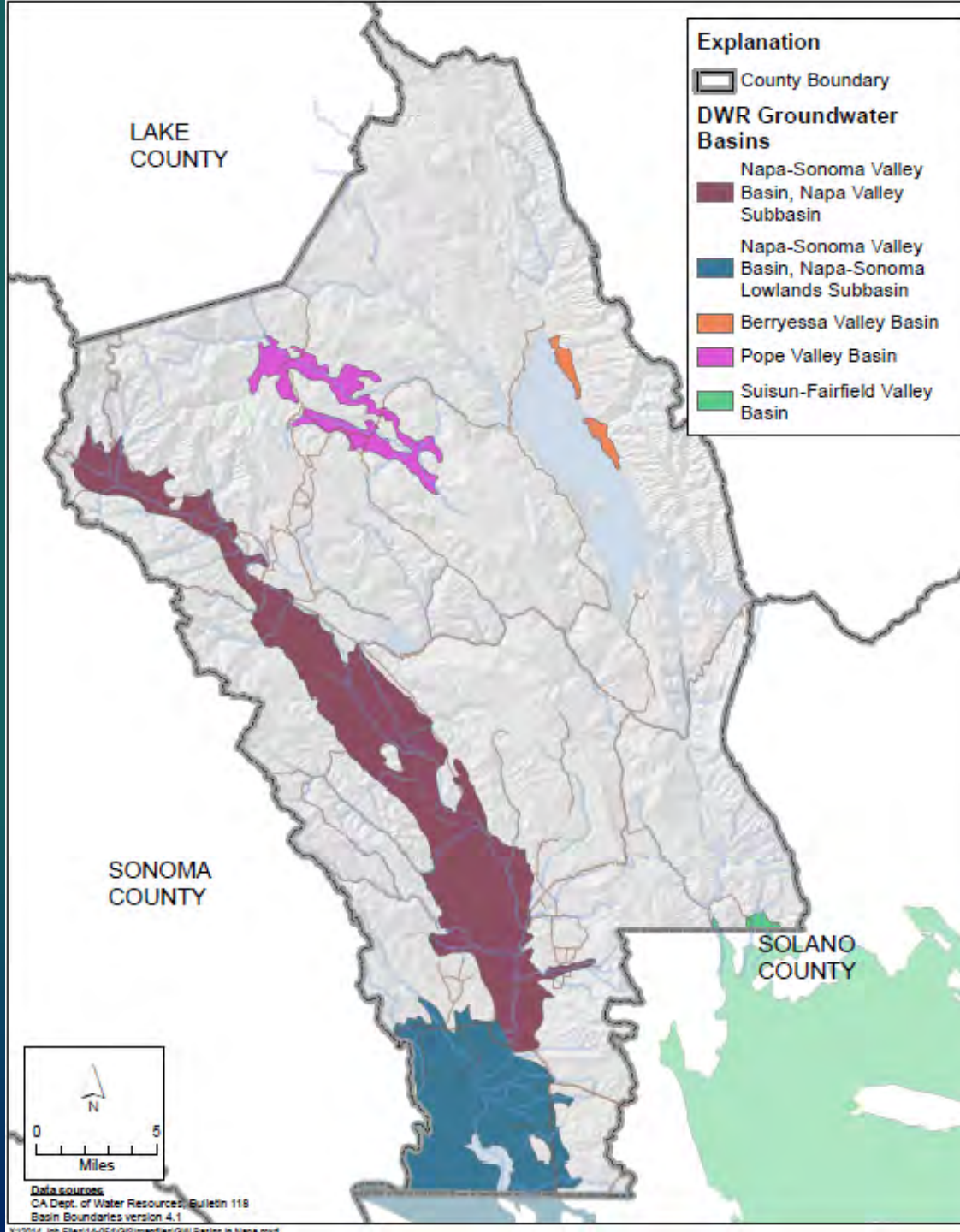
- Evolving groundwater monitoring program
  - Background
- Highlights 2015 Annual Report
- GW-SW interaction
- GW Quality
- Summary and next steps



Groundwater Basins

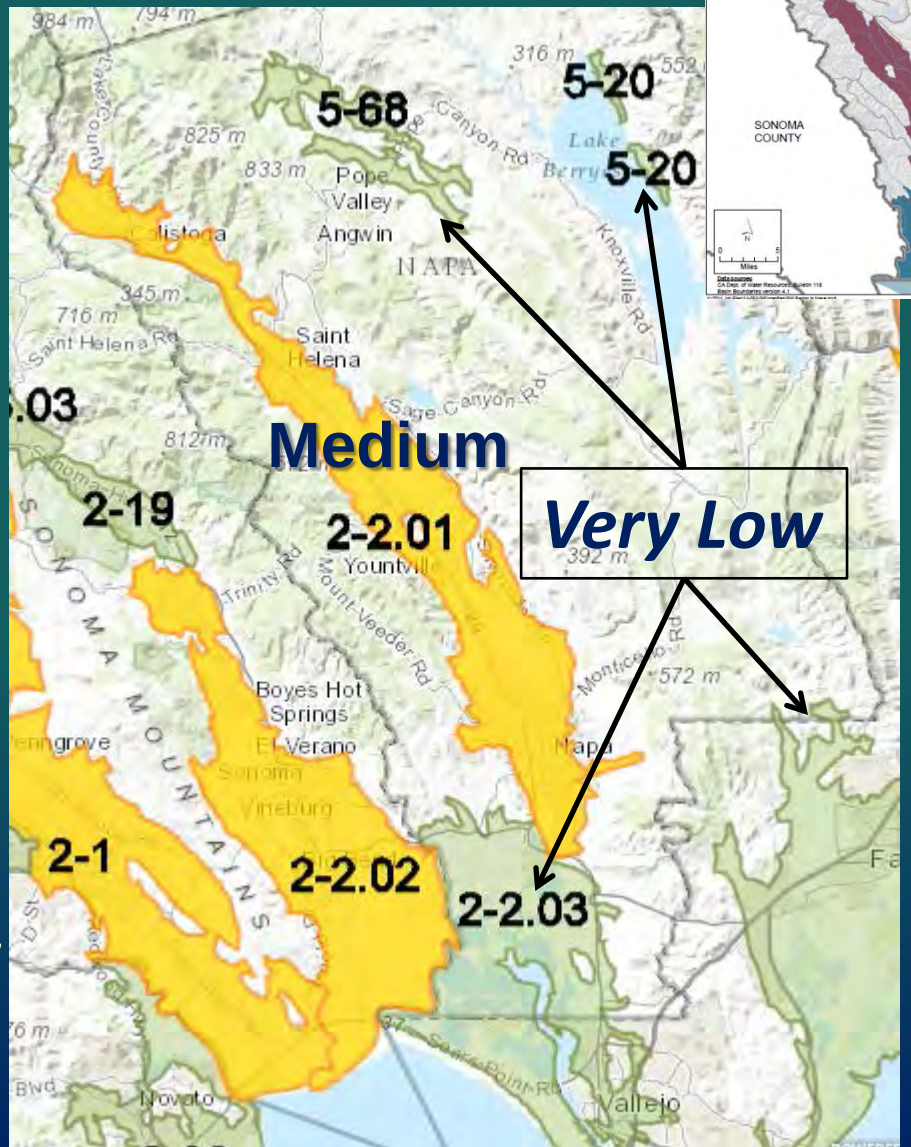
- Napa Sonoma Valley Basin
  - Napa Valley Subbasin
  - Napa-Sonoma Lowlands Subbasin
- Berryessa Valley Basin
- Pope Valley Basin
- Suisun-Fairfield Valley Basin

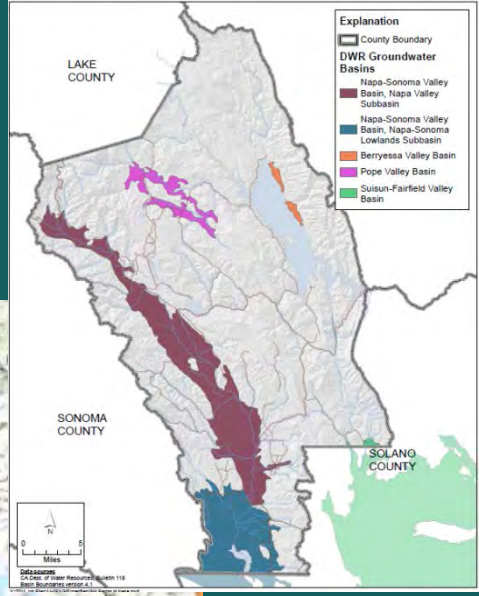
The MST is located largely outside of DWR-designated basins.



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)**





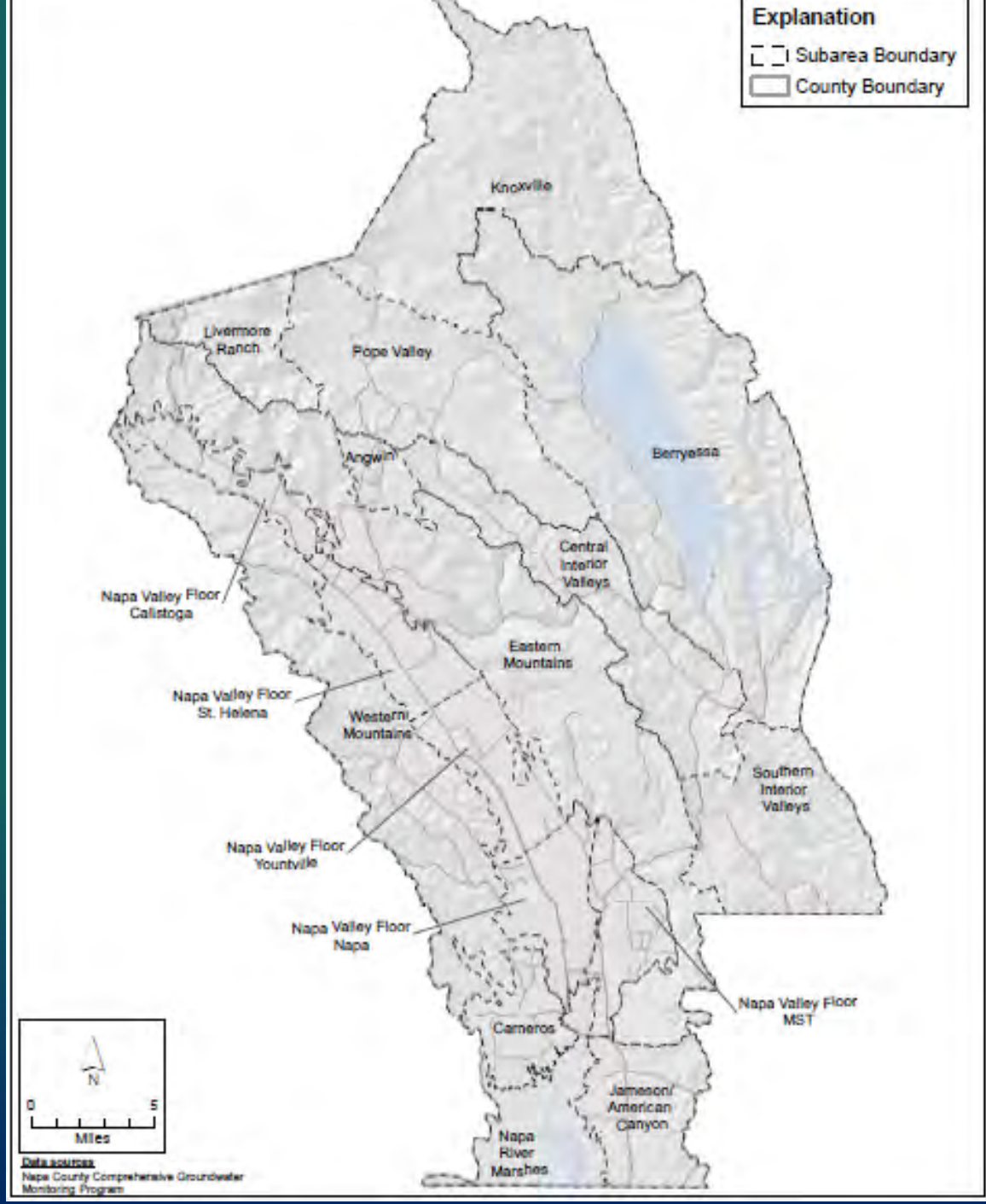
Napa Subareas

17 Subareas

- **Napa Valley Floor includes 5 Subareas**

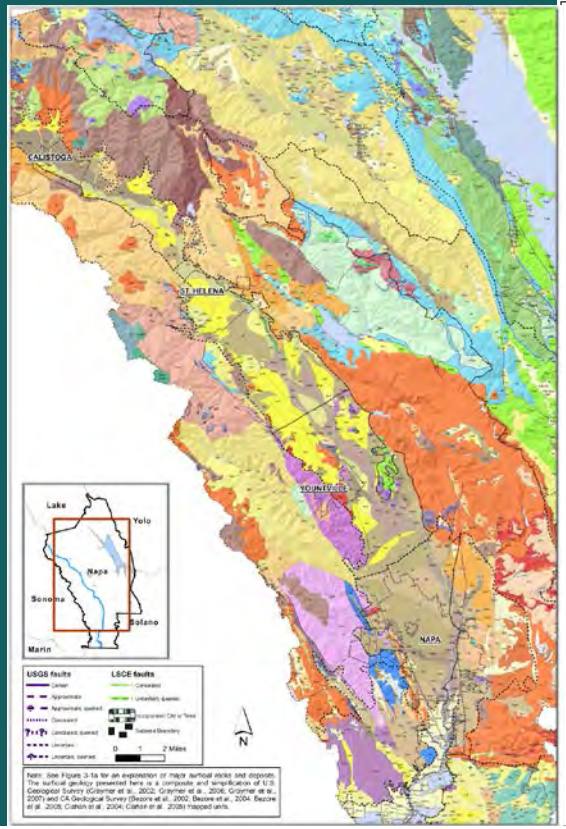
Based on:

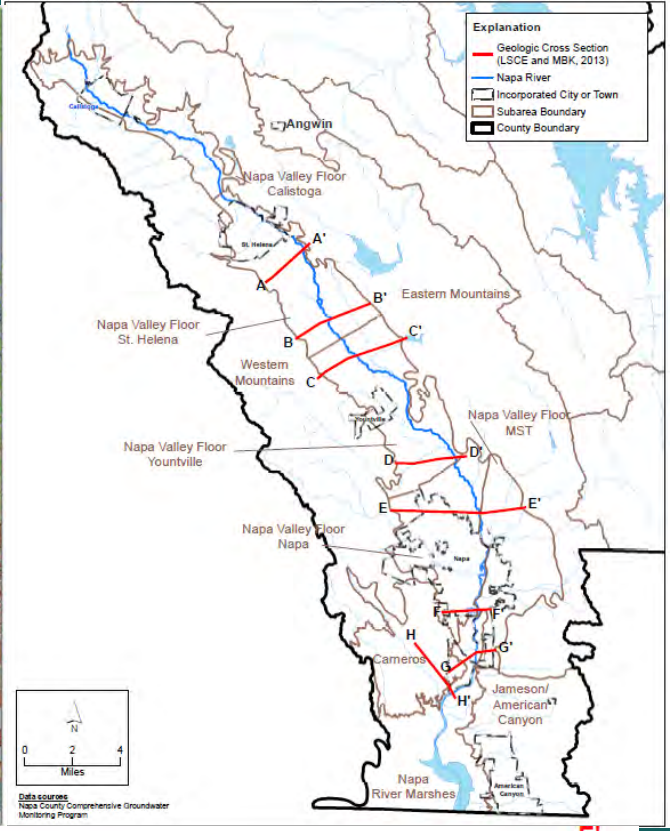
- **Watershed Boundaries**
- **Groundwater Basins**
- **Planning Subareas**

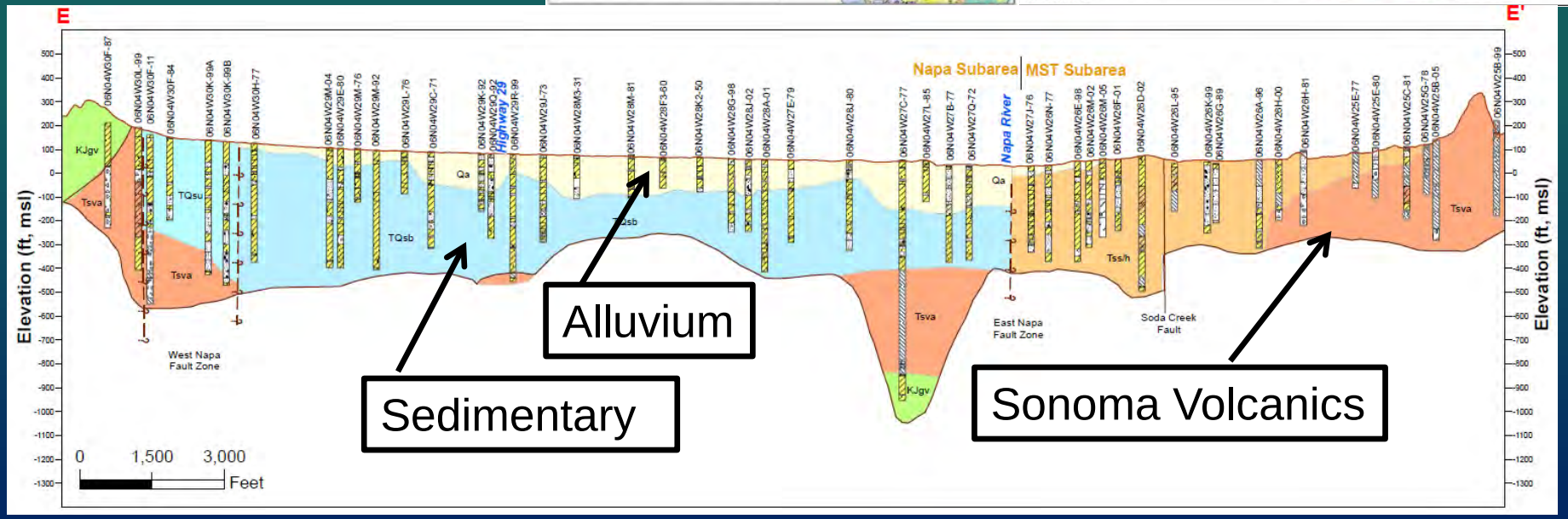


Subsurface Geology

Very Complex in Napa Valley Especially Complex in Hillsides

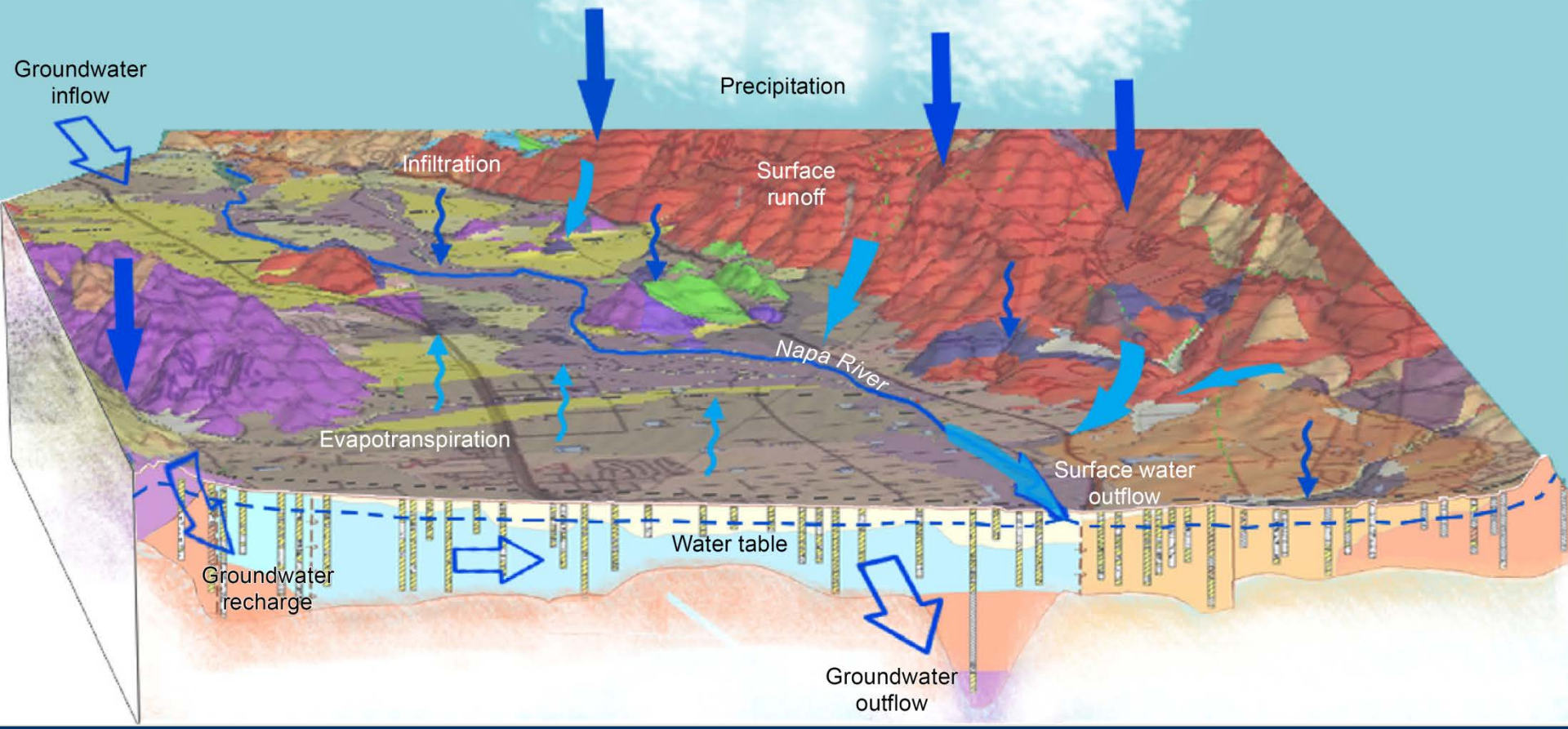






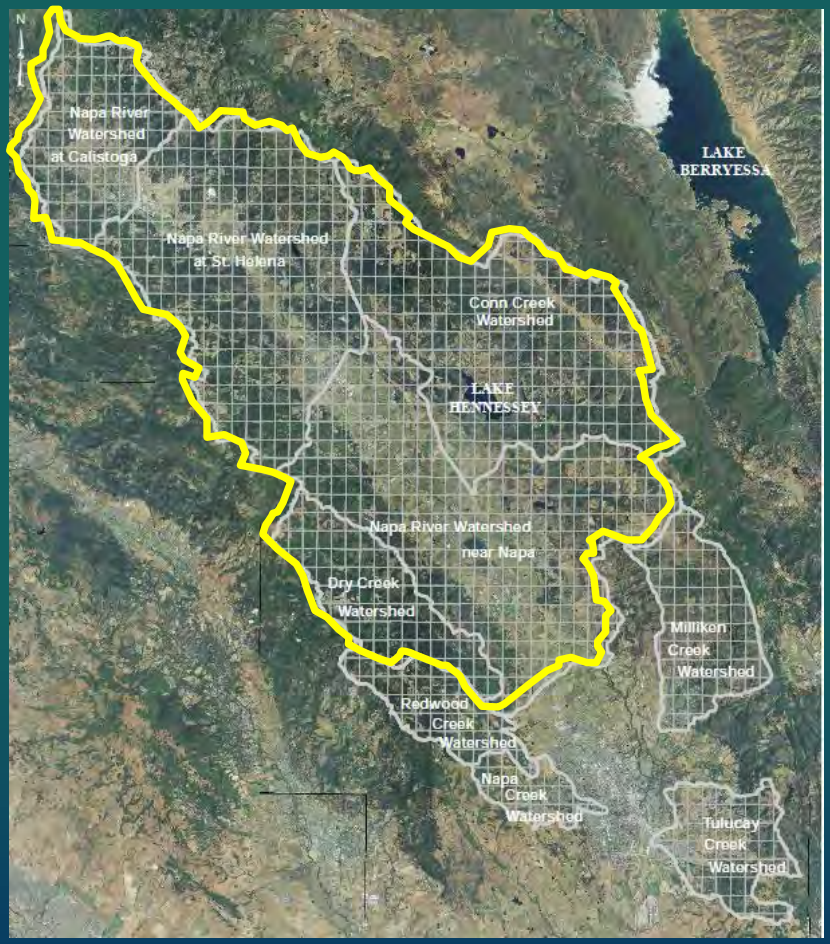
Water Budget:
Core Element of Groundwater Sustainability

Inflows – Outflows = ΔS *Change in GW Storage*



Water Budgets Involve More than the Groundwater Basin

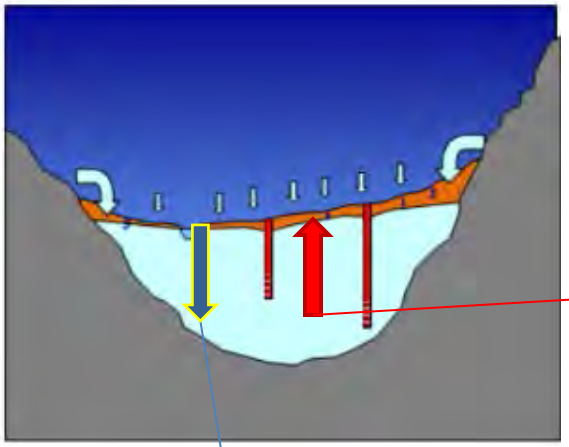
Precipitation: PRISM 800 Meter Grid



Watershed: Upper Napa River Near Napa

Watershed Water Budget:
Napa River Near Napa

- Precipitation: >400,000 AF/Yr (Avg.)
- Recharge: ~ 70,600 AF/Yr (Avg.)
- Pumping: ~21,300 AF/yr (2004)



Estimated Groundwater Pumping:

21,300 acre-feet

(2050 Study; Upper Napa Valley)

LSCE and MBK, Napa Hydrogeologic Characterization, 2013

	Average Annual (acre-feet)					Range (acre-feet)	Recharge (% of Precip.)
Watershed	**Precip.**	**Outflow**	**Infilt.**	**ET**	**Recharge**	**Recharge**	**Recharge**
Napa River near Napa	**418,500**	**146,800**	**271,700**	**201,900**	**70,600**	**8,300 - 185,900**	**17%**
- Conn Creek	98,200	24,600	73,600	52,200	21,100	4,300 - 40,700	21%
- Dry Creek	33,000	14,200	18,700	16,400	2,000	500 - 6,300	6%
- Napa River at St. Helena	161,400	67,000	94,400	72,500	22,000	2,500 - 60,900	14%
- Napa River at Calistoga	54,200	23,600	30,600	19,700	10,500	2,000 - 17,200	19%
Milliken Creek	**33,000**	**16,800**	**16,200**	**13,500**	**2,500**	**100 - 7,100**	**8%**
Tulucay Creek	**19,500**	**9,100**	**10,400**	**9,500**	**1,000**	**100 - 2,300**	**5%**
Redwood Creek	**19,300**	**7,800**	**11,500**	**9,500**	**1,900**	**400 - 5,000**	**10%**
Napa Creek at Napa	**32,100**	**14,800**	**17,300**	**13,700**	**3,600**	**600 - 6,900**	**11%**

New Climate Ready Study (including future scenarios) — Pepperwood Preserve (January 2016): Avg. Annual Recharge 76,678 AF

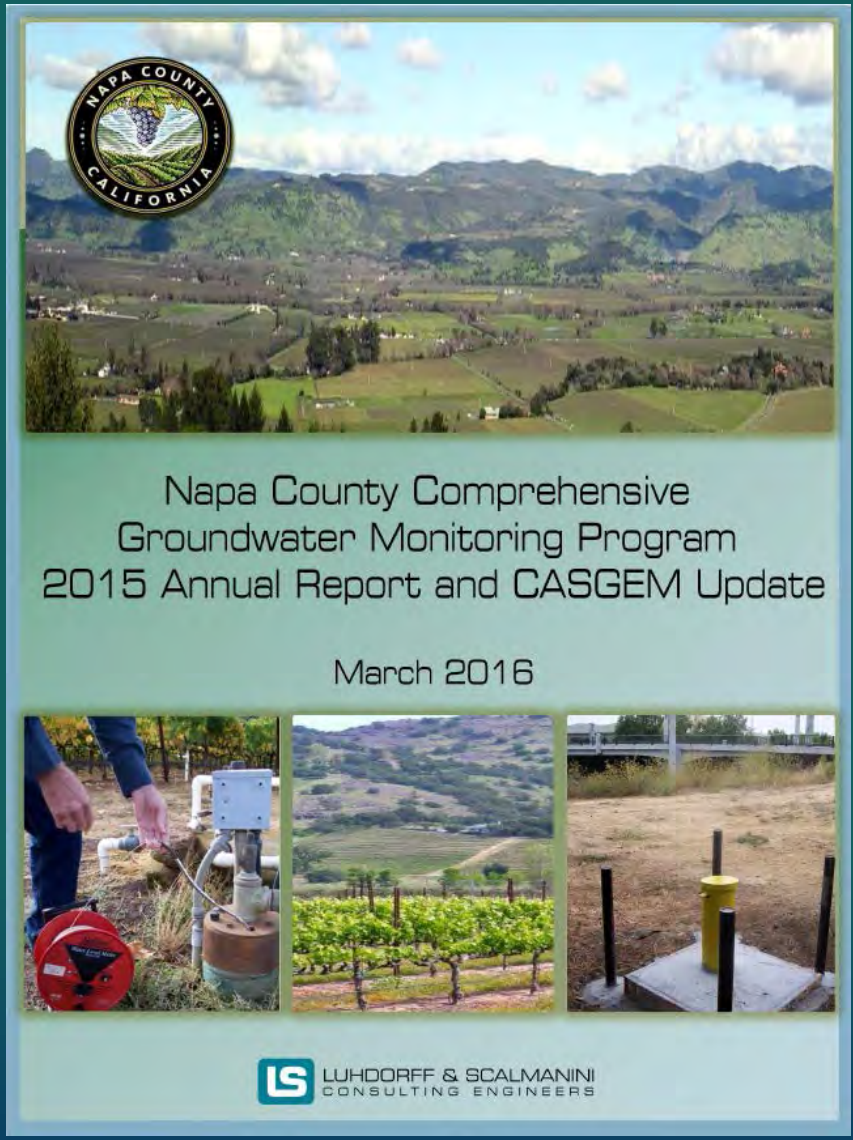
Water Budgets

- Sustainable Groundwater Management Act (SGMA) likely to require for Plans
- Updated water budgets already underway for Napa Valley Subbasin
  - Over hydrologic base period
    - Represent different water year types (drier, normal, wetter)
    - Current
    - Future

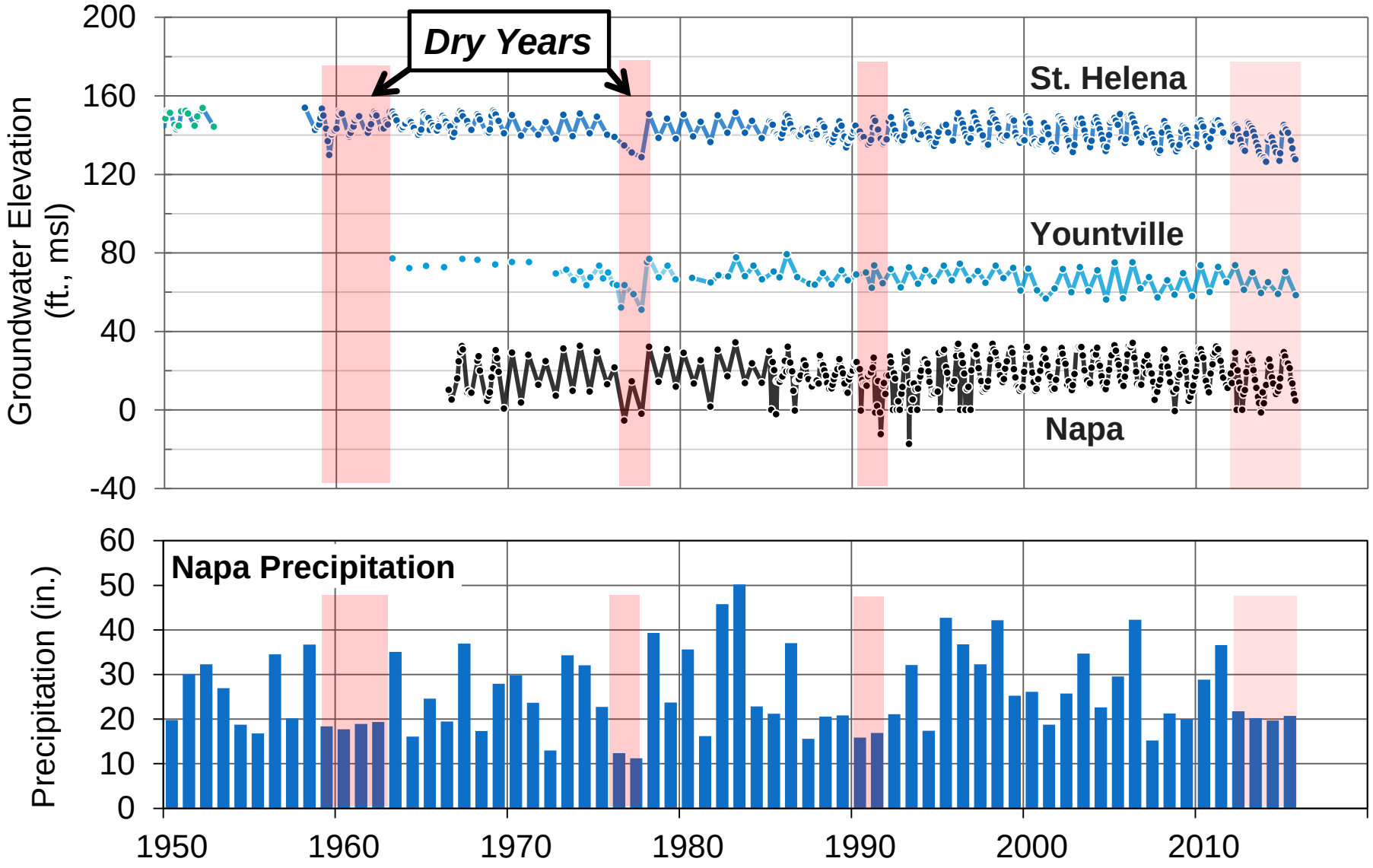
GROUNDWATER CONDITIONS:

Highlights 2015 Annual Report

- **Focus is on monitoring results**
- **Different from SGMA efforts**



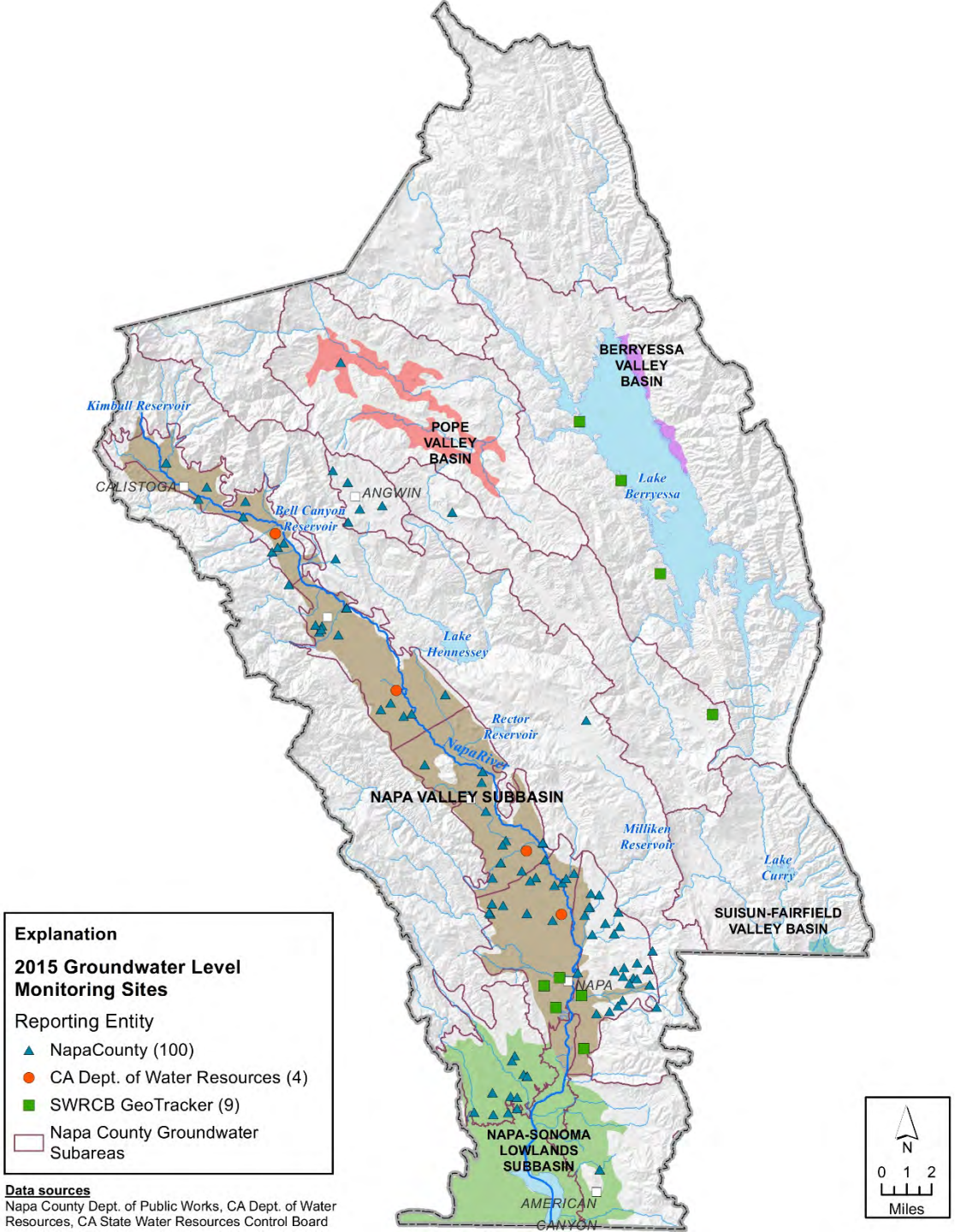
Groundwater Conditions: Napa Valley Subbasin



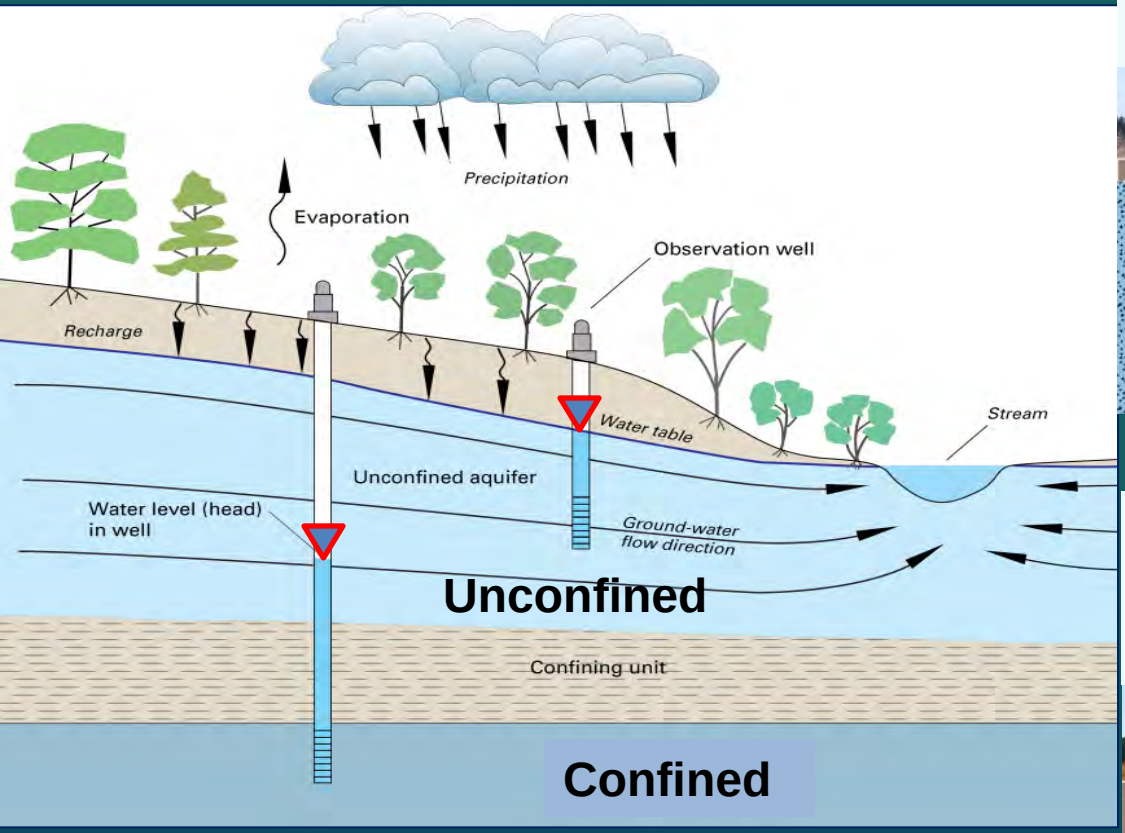
GW Level Monitoring, 2015

- Napa Co., 100 (incld. 48 volun., 10 SW/GW)
- DWR, 4
- GeoTracker, 9

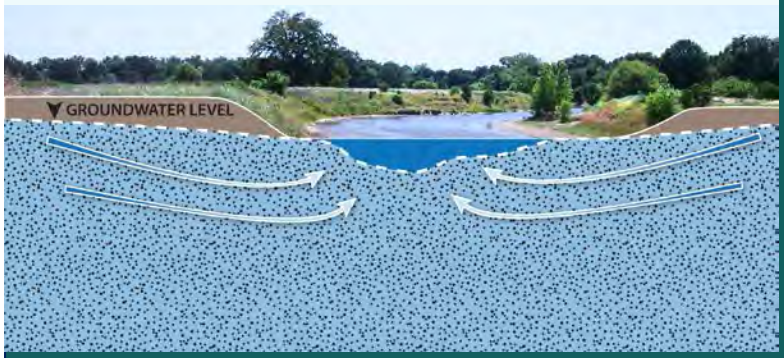
Total Wells = 113 Sites



Groundwater Monitoring

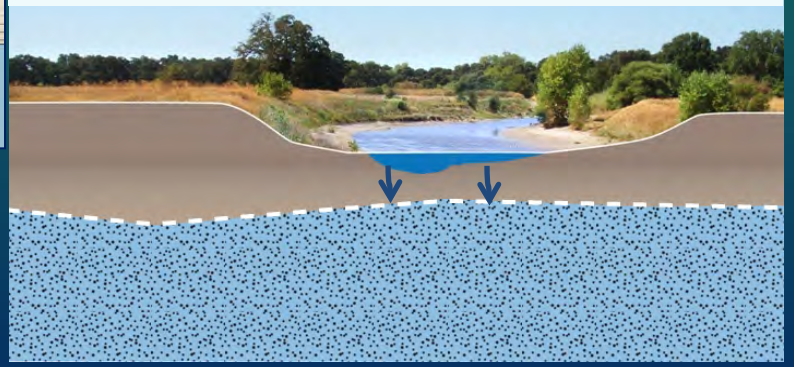


Direct Connection Can Contribute to Streamflow



Courtesy TNC

Indirect Connection Stream Seepage Independent of GW Levels



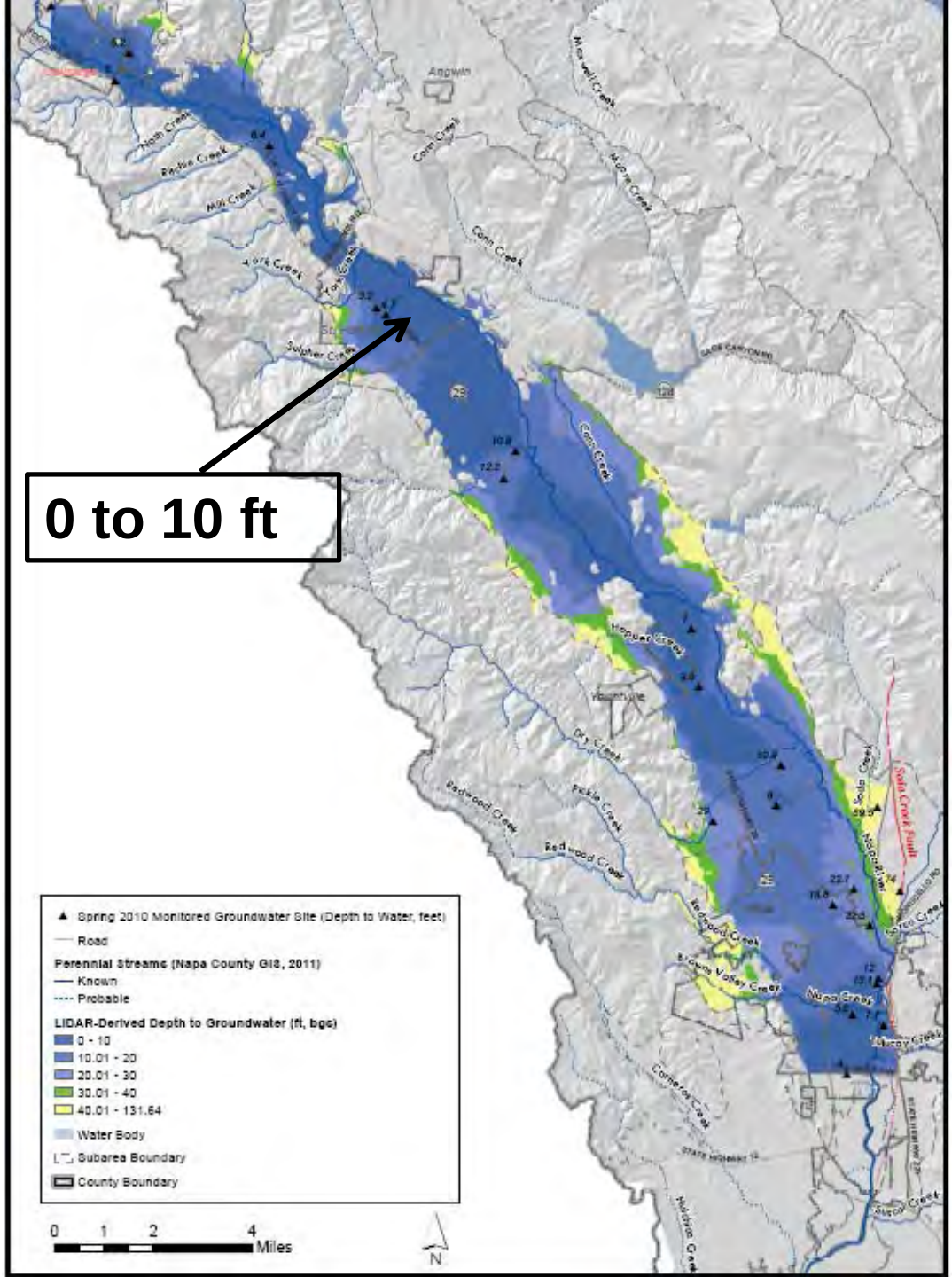
Courtesy TNC

Depth to Groundwater

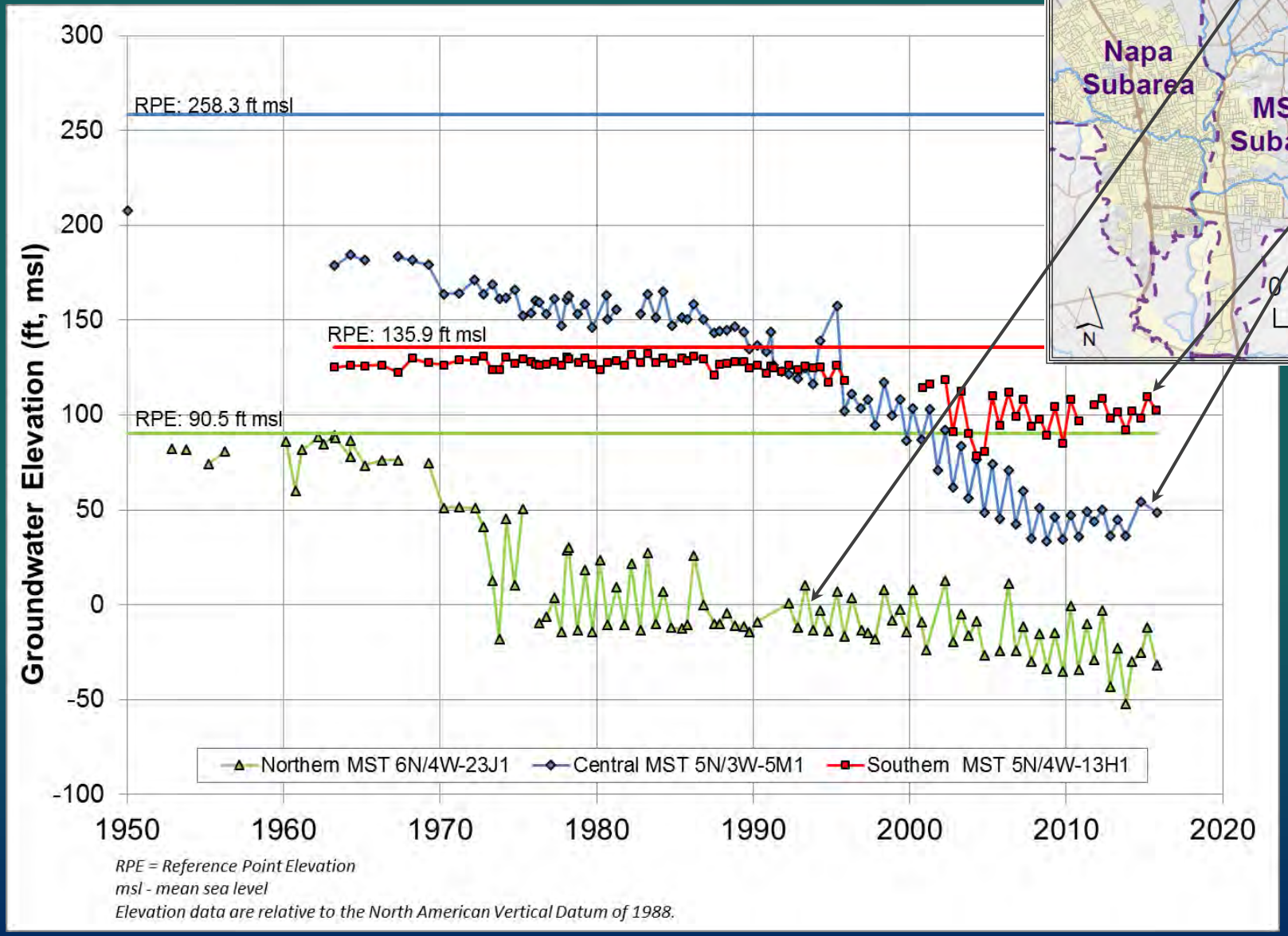
Feet below ground surface

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

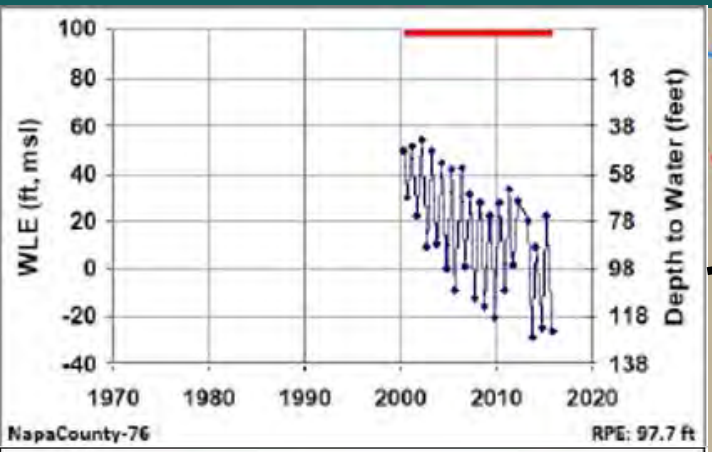
Water table (Valley Floor) generally very shallow; basin quite "full"

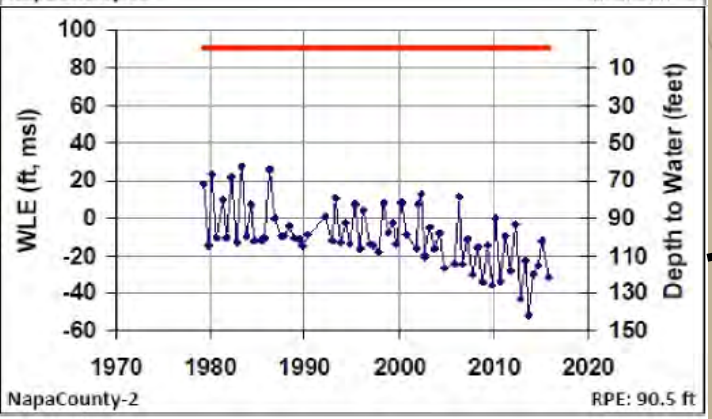


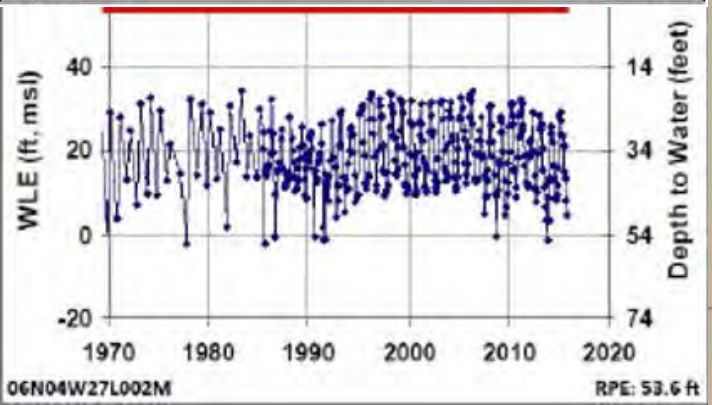
MST Subarea

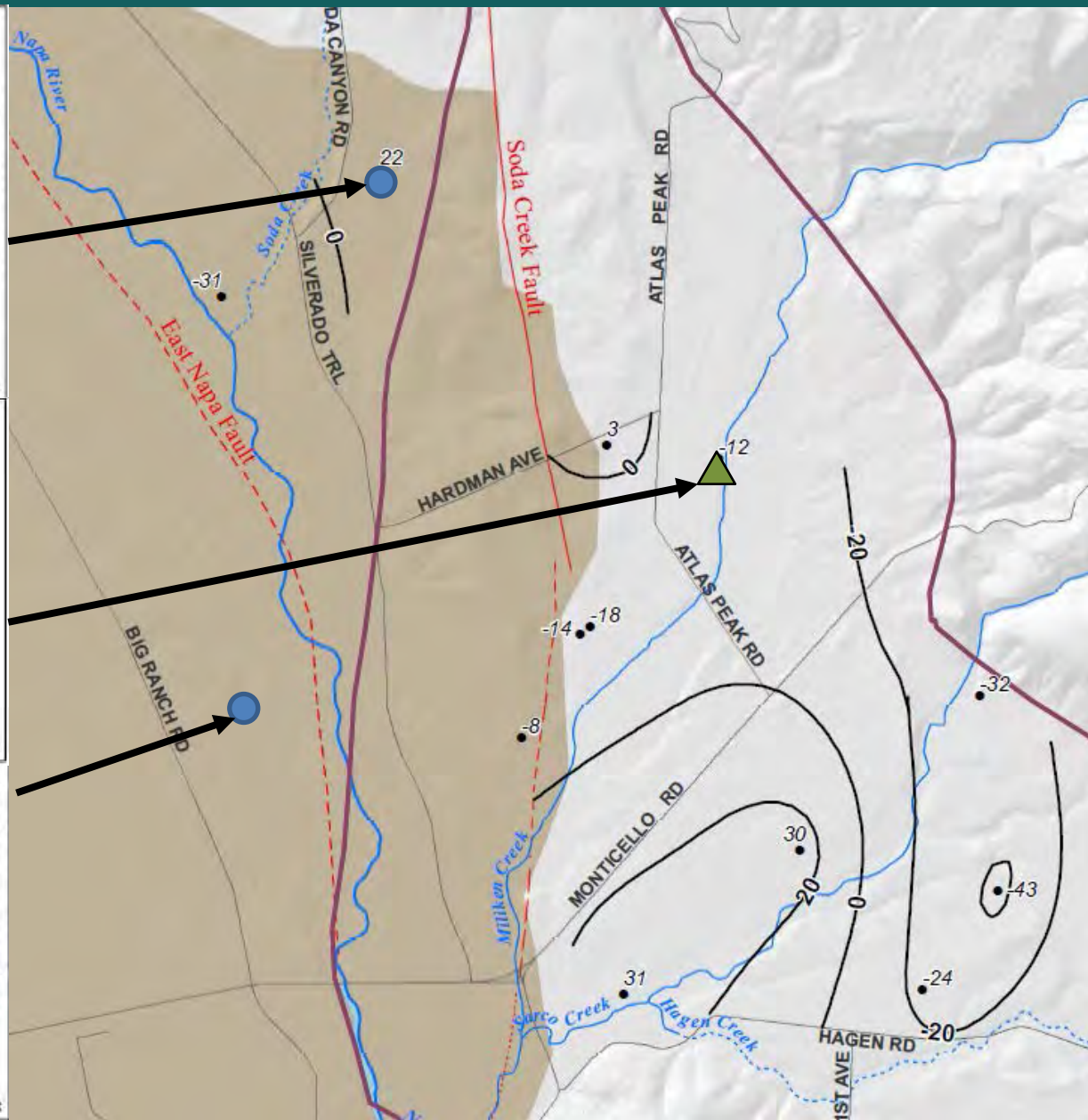

Groundwater Elevation (ft, msl)
300
250
200
150
100
50
0
-50
-100
1950
1960
1970
1980
1990
2000
2010
2020
RPE: 258.3 ft msl
RPE: 135.9 ft msl
RPE: 90.5 ft msl
Northern MST 6N/4W-23J1
Central MST 5N/3W-5M1
Southern MST 5N/4W-13H1
RPE = Reference Point Elevation
msl - mean sea level
Elevation data are relative to the North American Vertical Datum of 1988.
Napa Subarea
MST Subarea
N
0
2
Miles

Northeast Napa Area: Spring 2015









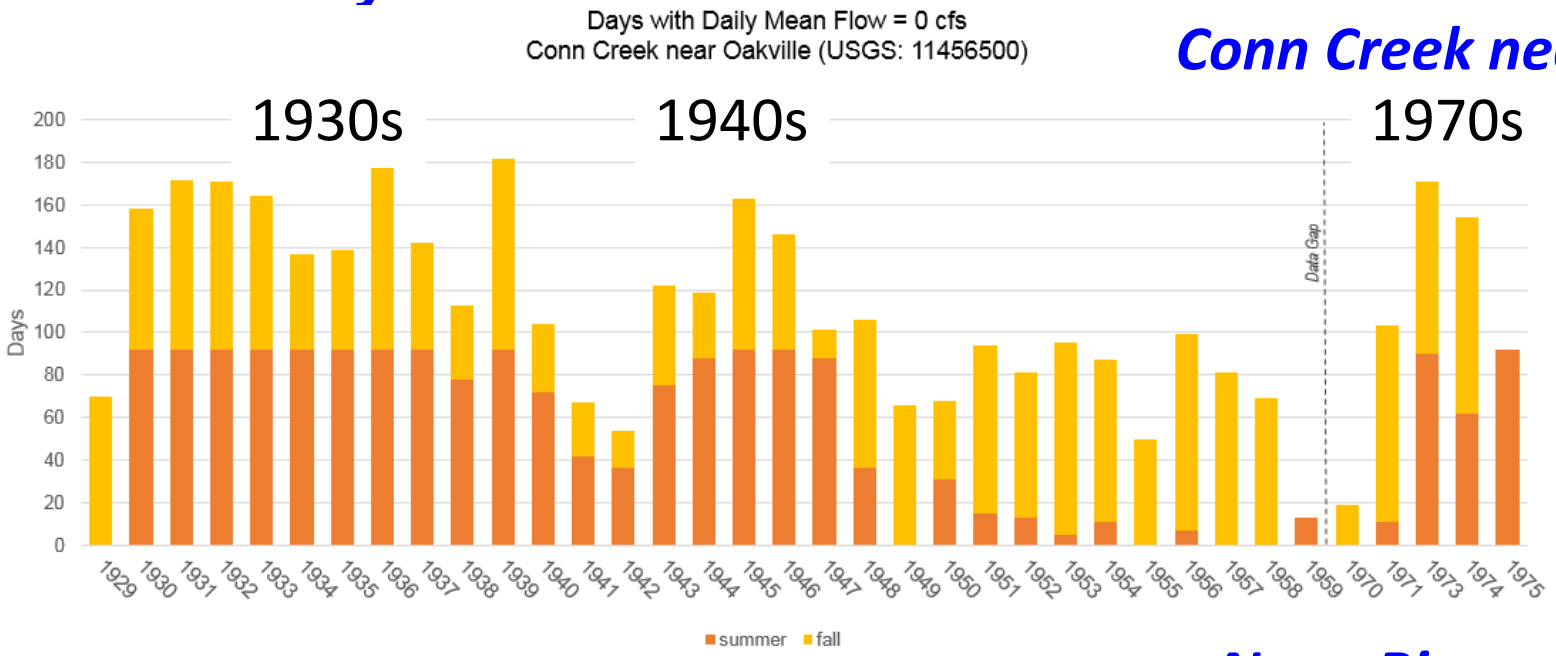
Groundwater/Surface Water Interaction

Historical Observations (USGS WRI 13-73, 1973)

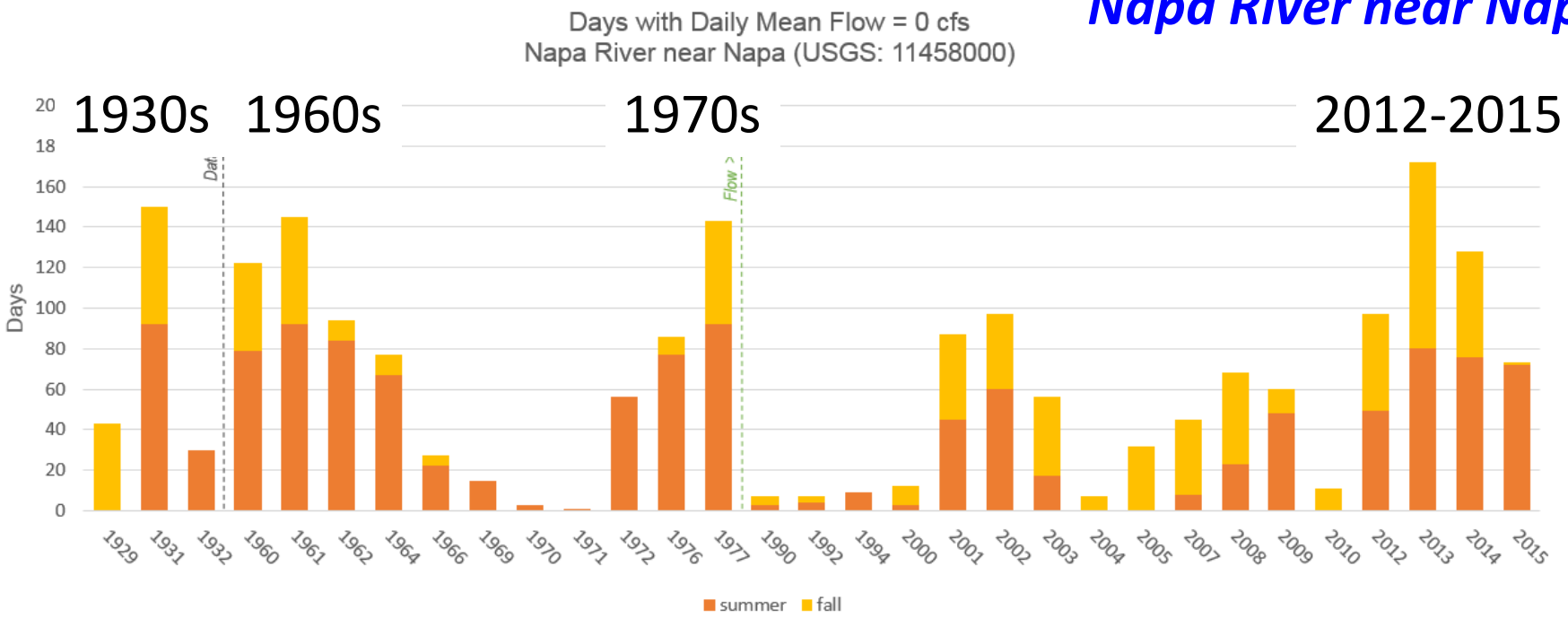
- Historically, streamflows in Napa Valley varied considerably season to season and year to year
- Changes relatively large because of large seasonal variations in rainfall
- GW levels not changed significantly over time
- During periods of limited precipitation, GW levels declined and stream discharges reduced significantly.

Historical Days of No Streamflow

Conn Creek near Oakville



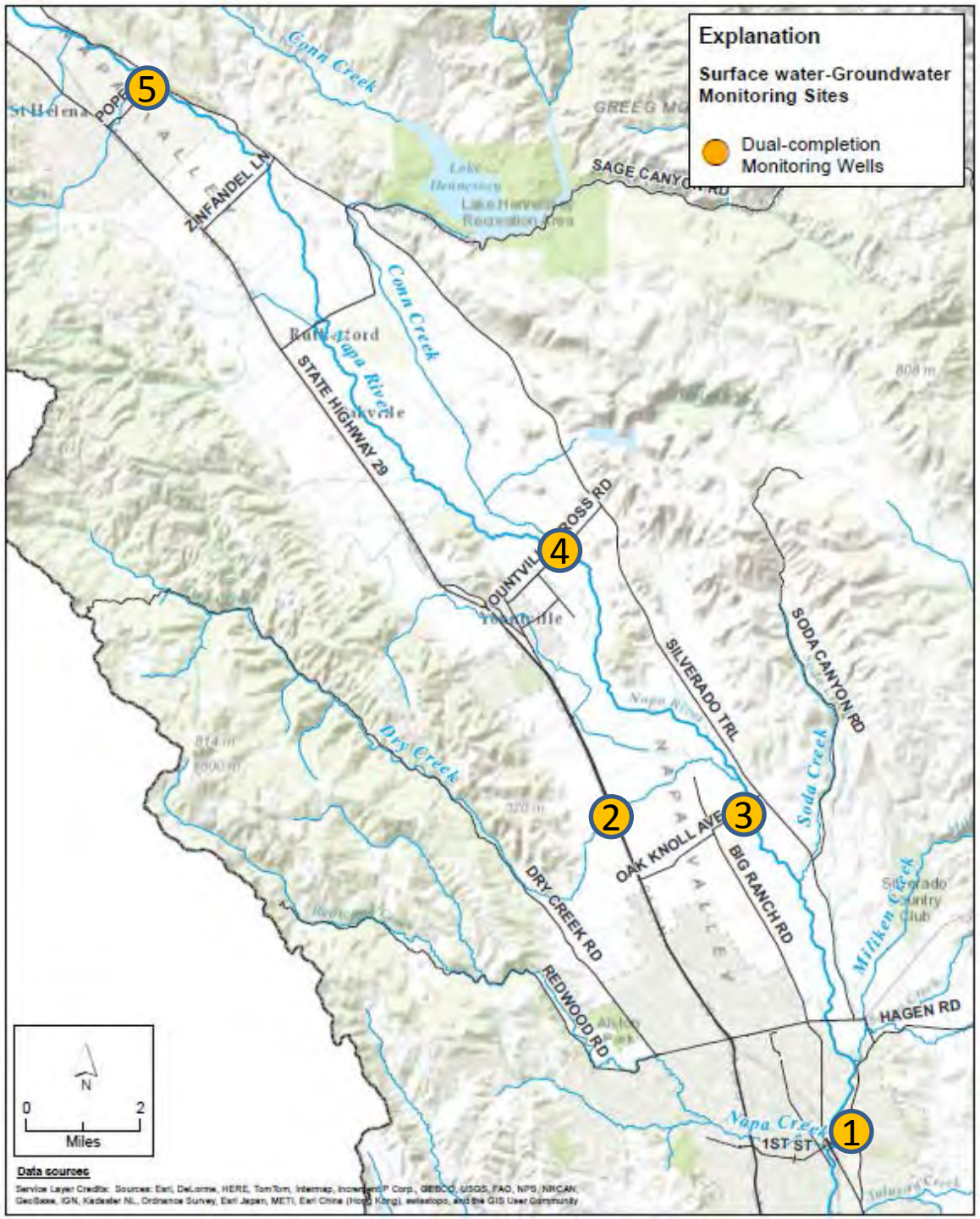
Napa River near Napa



Surface Water/ Groundwater

Monitoring at 5 Sites

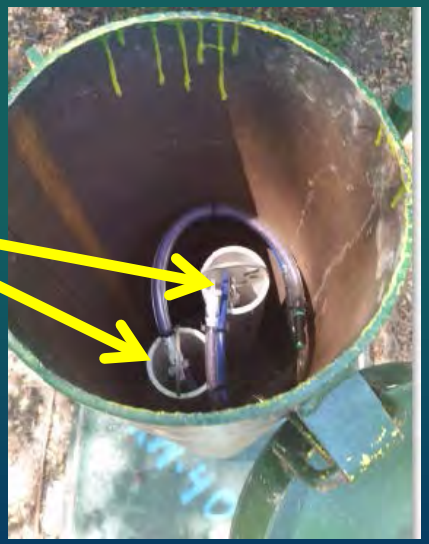
- Shallow MWs each site
  - Levels & quality
- Stream gauge each site
  - Streamflow & quality
- Depths to water (when drilled) ranged from 16–34 ft [20ft at St. Helena]



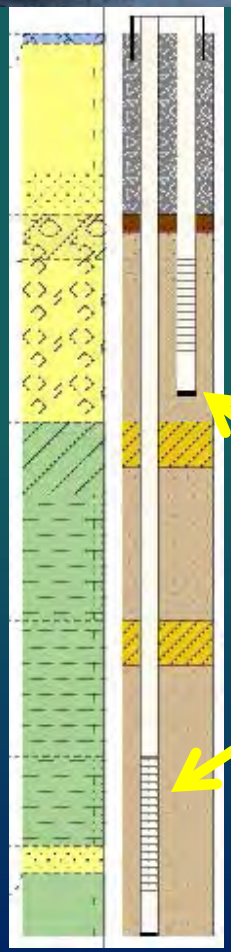
GW Monitoring Wells Near River

Above Ground
Locked Protection

Looking Down at MWs



2-inch dia. casings



Below Ground
"Nested" Monitoring Wells

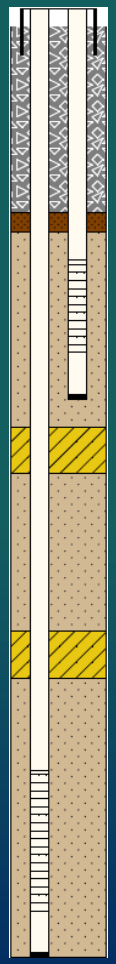
40 ft Deep

2-inch dia. casings

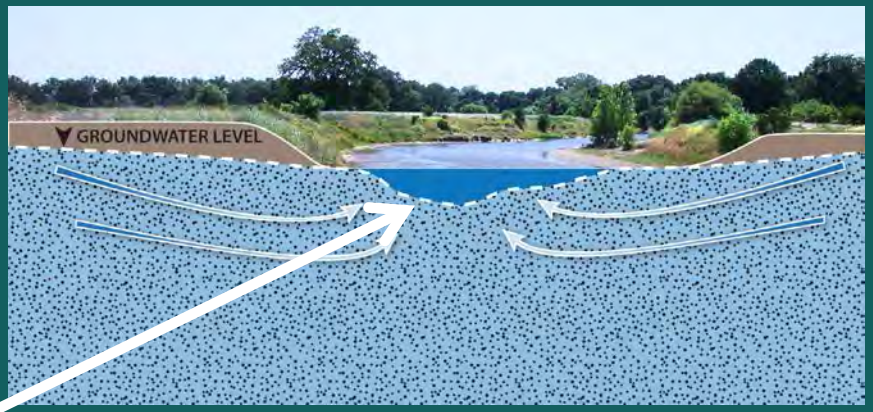
100 ft Deep

Not to Scale

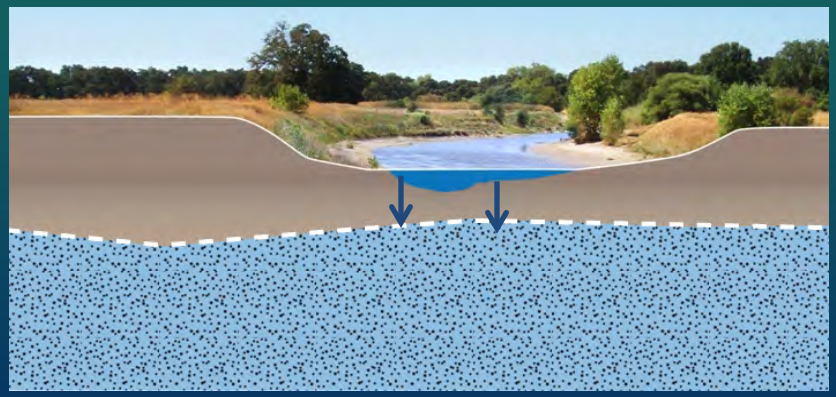
SW/GW Interaction:
Site 5: St. Helena, Oct. 2014 & Dec. 2014



Elevation of
Thalweg
196.00ft, msl

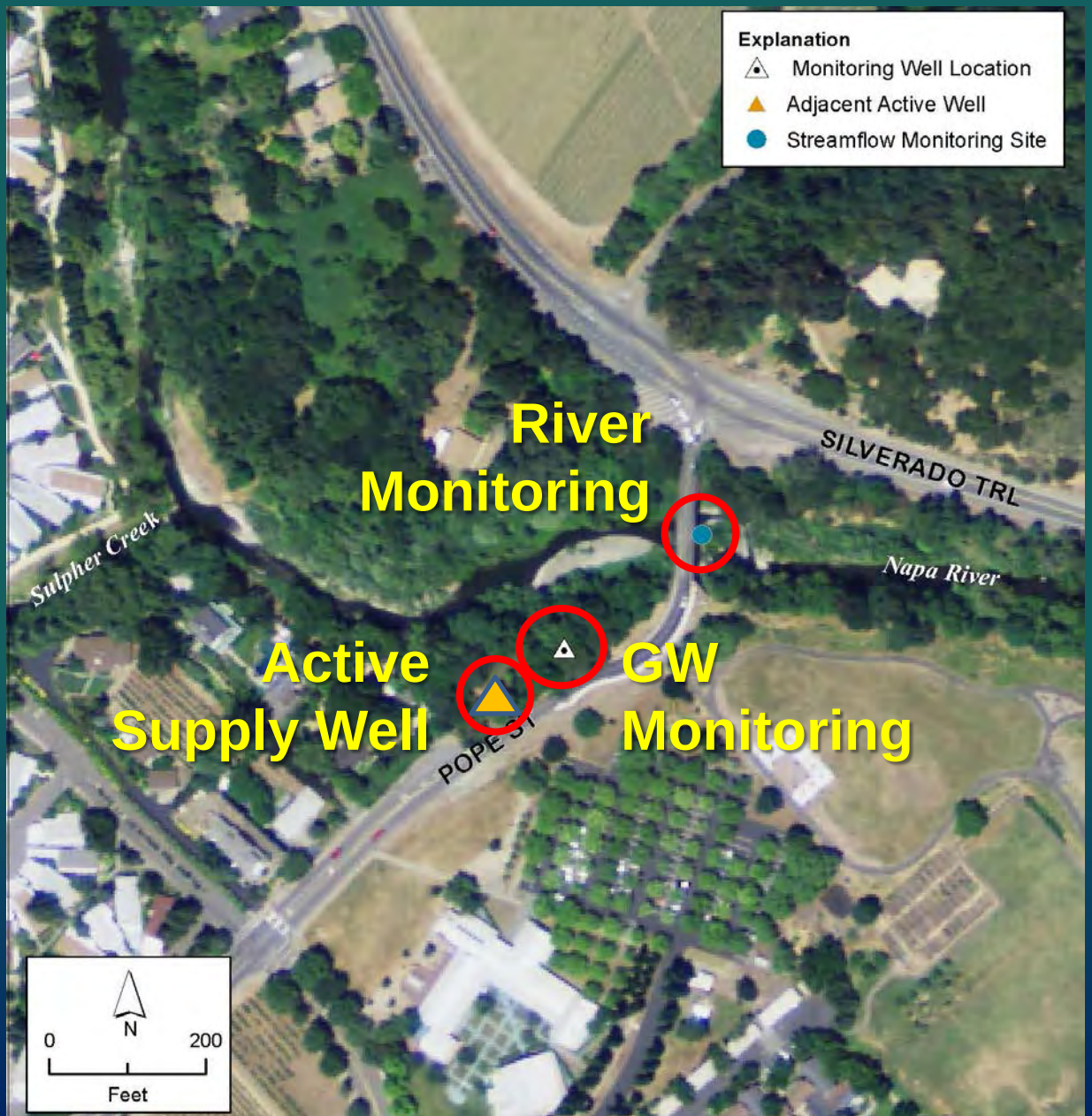


GW above in Dec. 2014

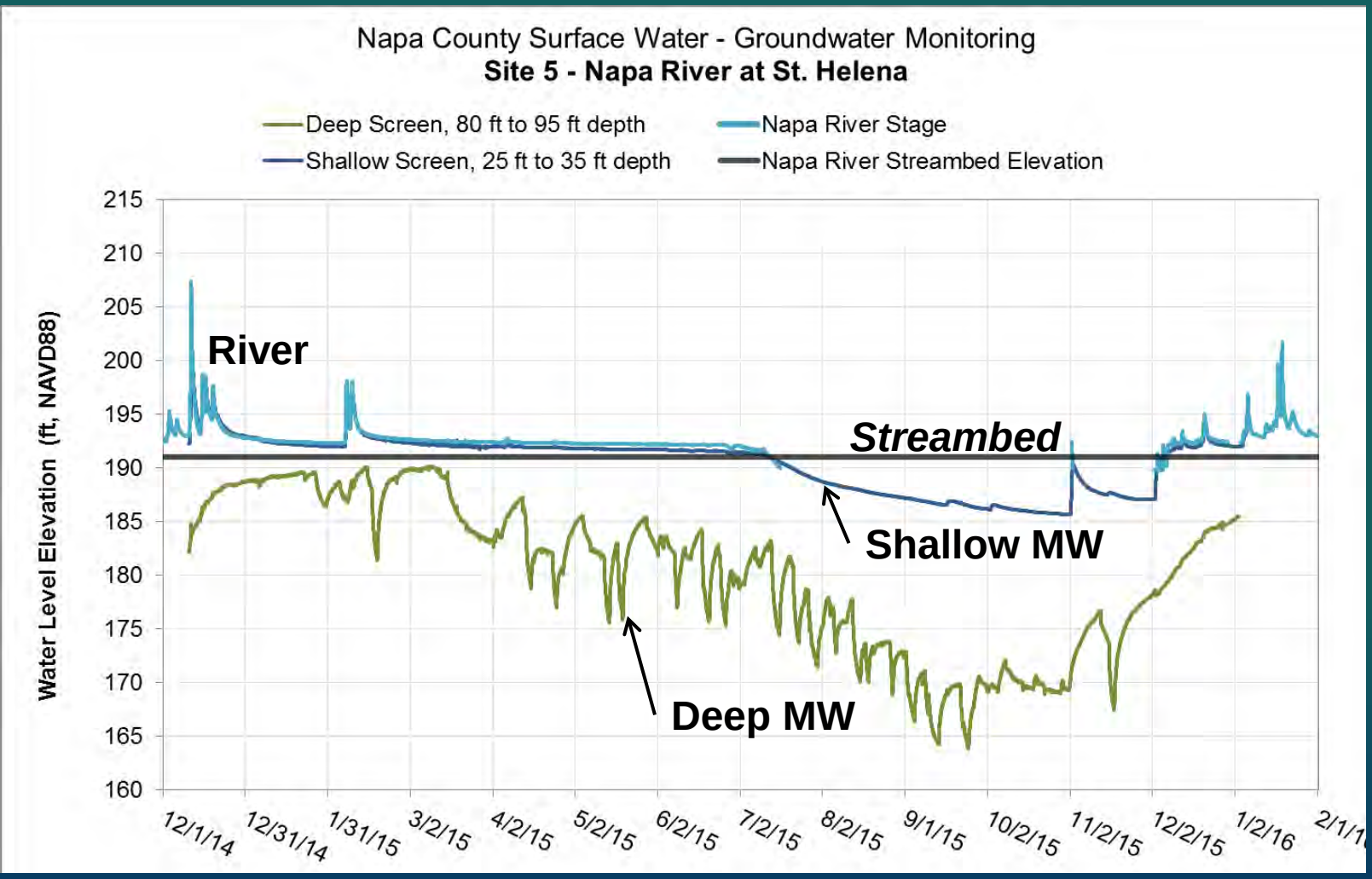


GW below in Oct. 2014

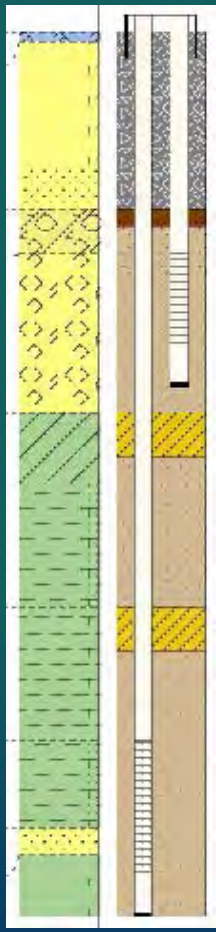
SW/GW Interaction: Site 5 St. Helena



SW/GW Interaction: Site 5 St. Helena

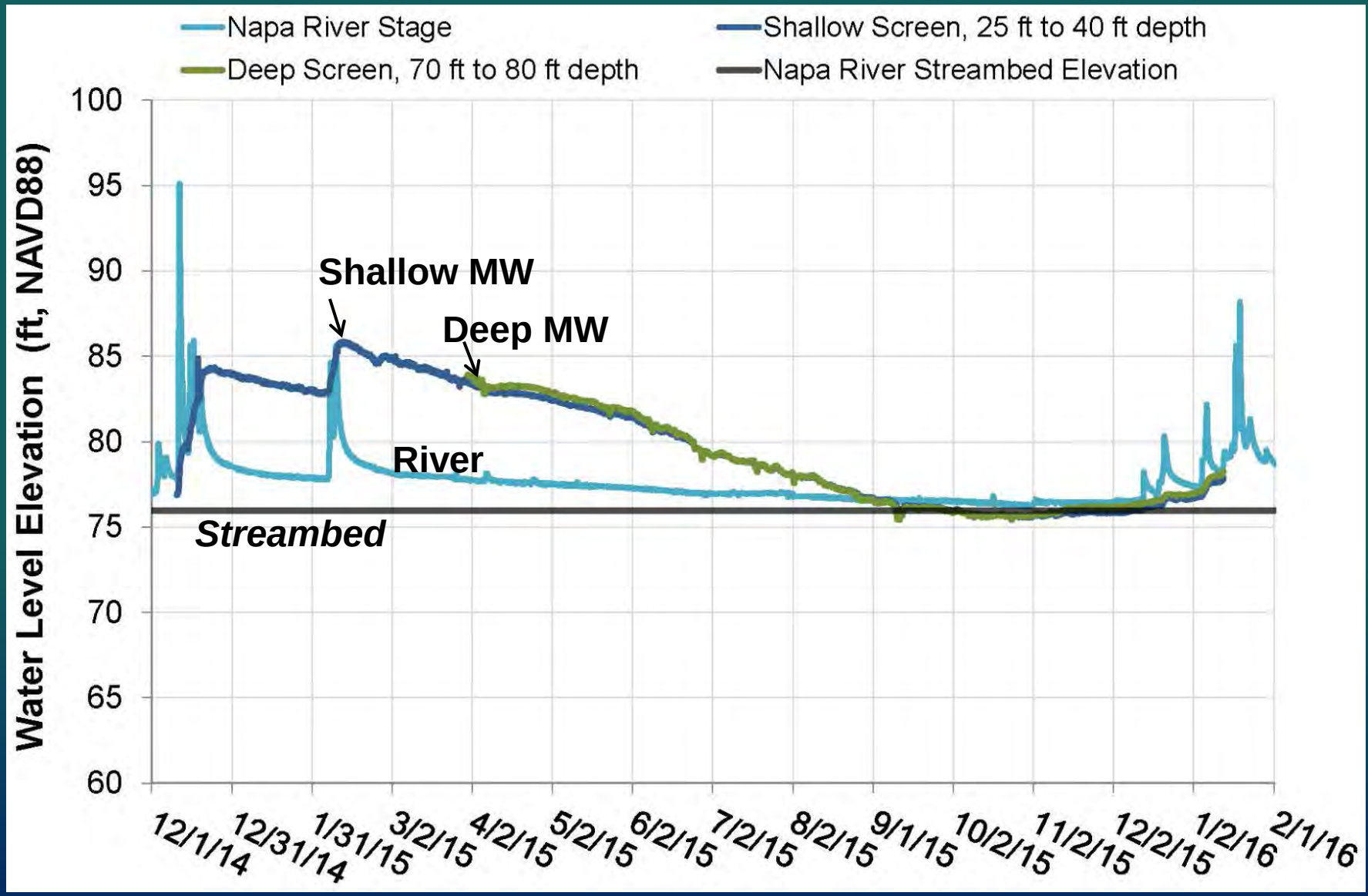


Not to Scale

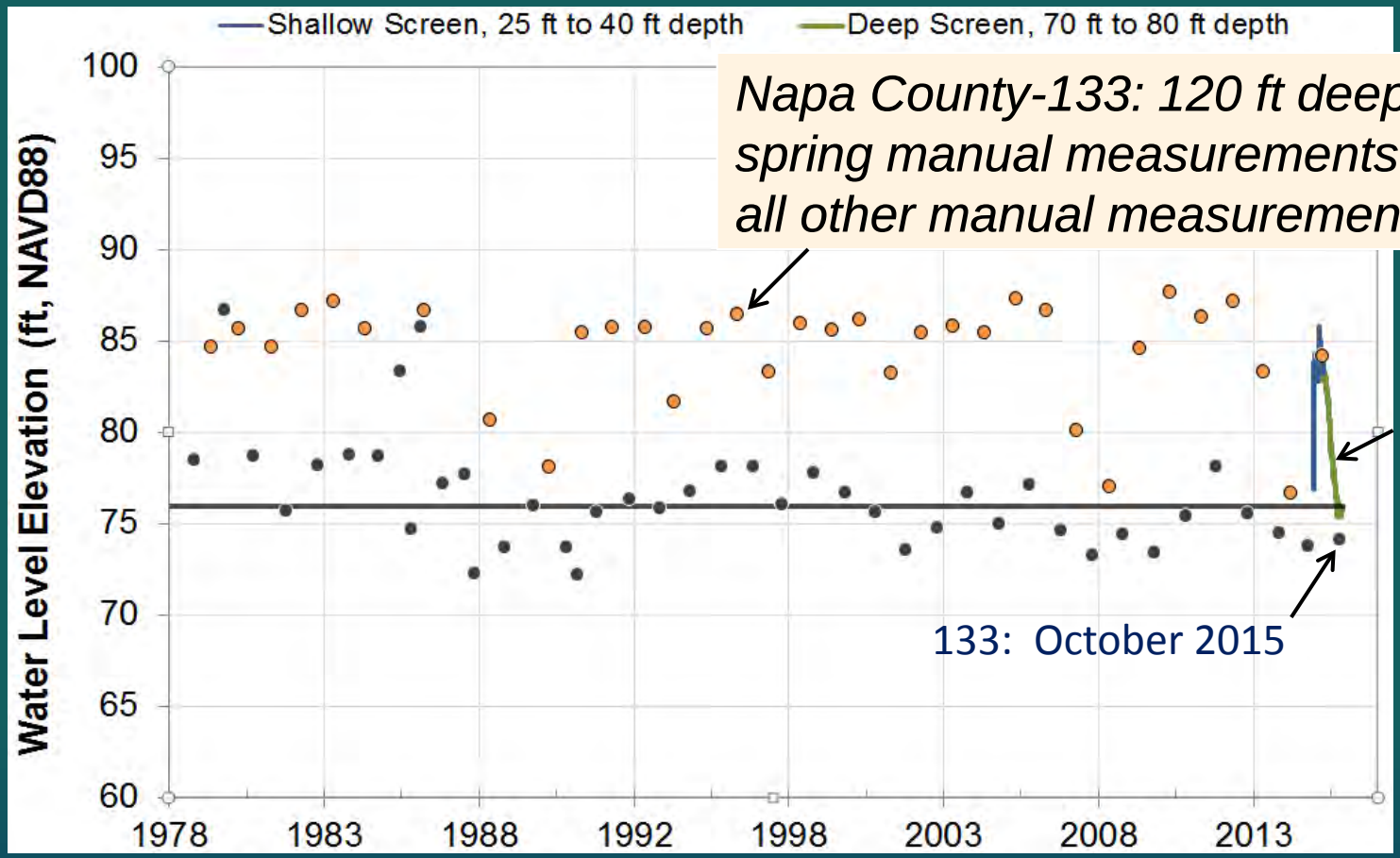


WL Difference Shallow and Deep Oct. 2015 = 17 ft.

SW/GW Interaction: Site 4 Yountville

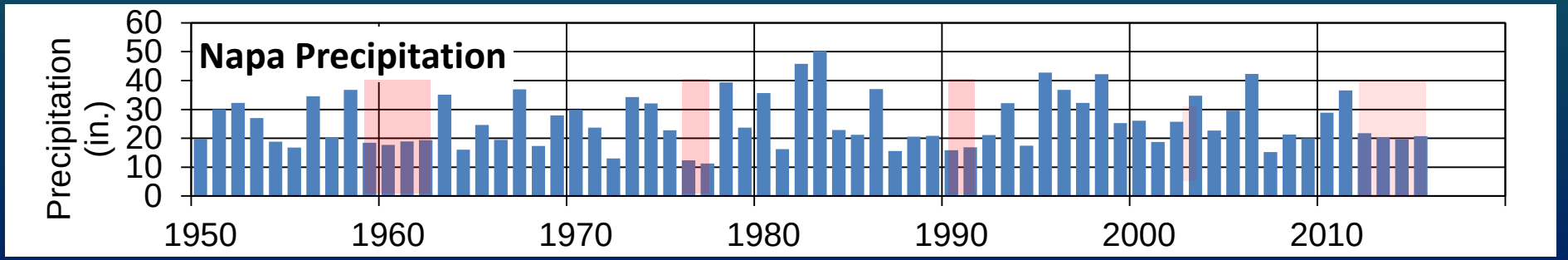


SW/GW Site 4 Compared to Historical GW Levels



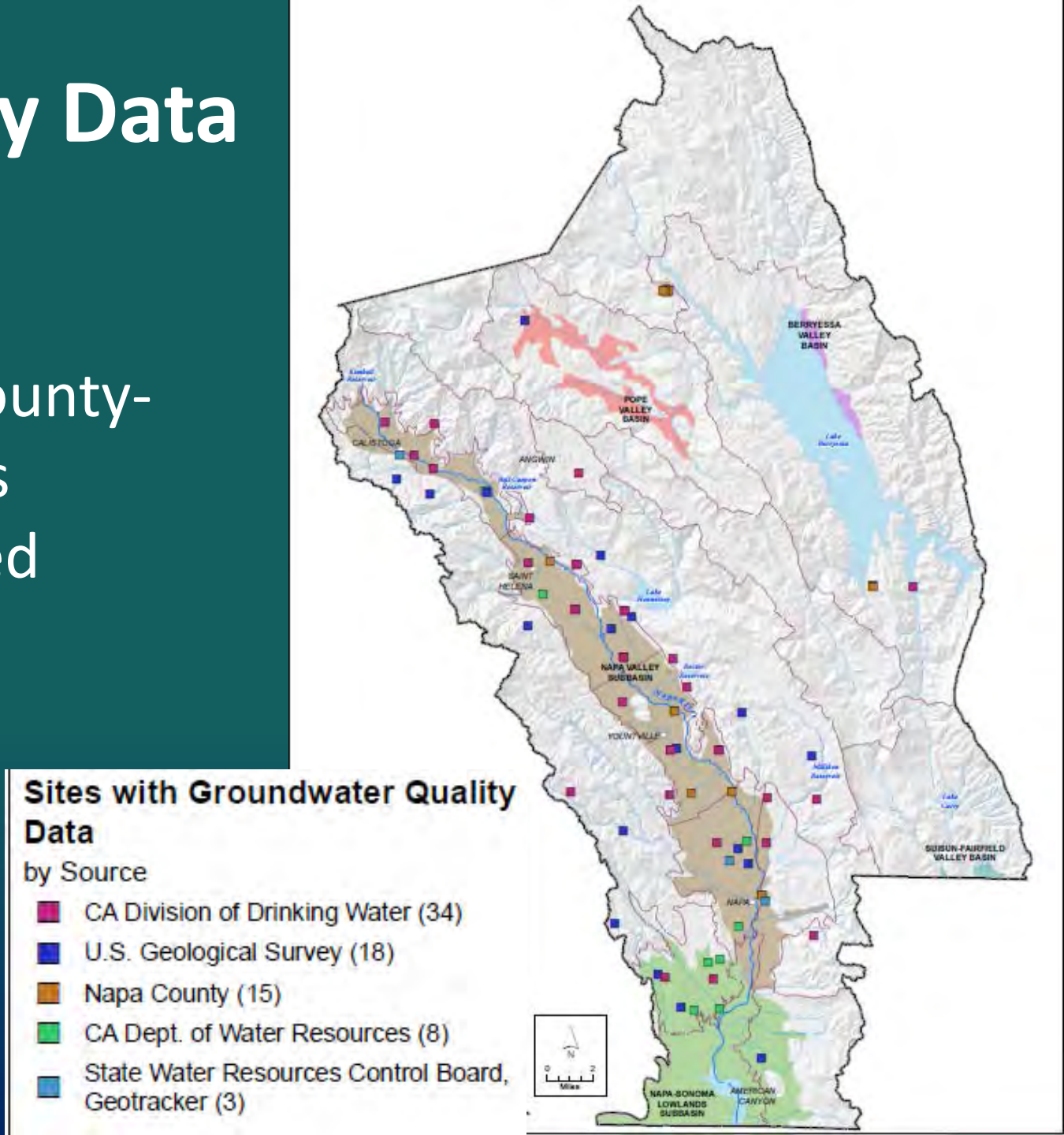
Shallow & Deep MWs Near River

Different Scale



GW Quality Data

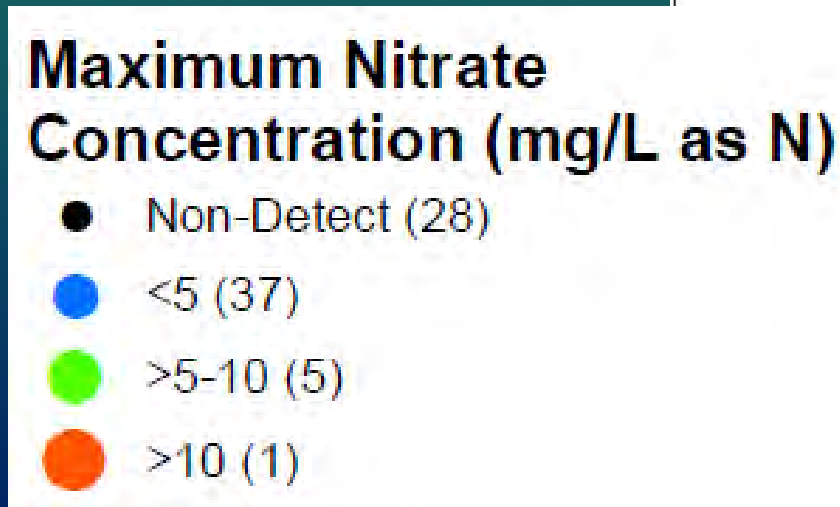
- 78 Sites
- Additional County-sampled sites recommended

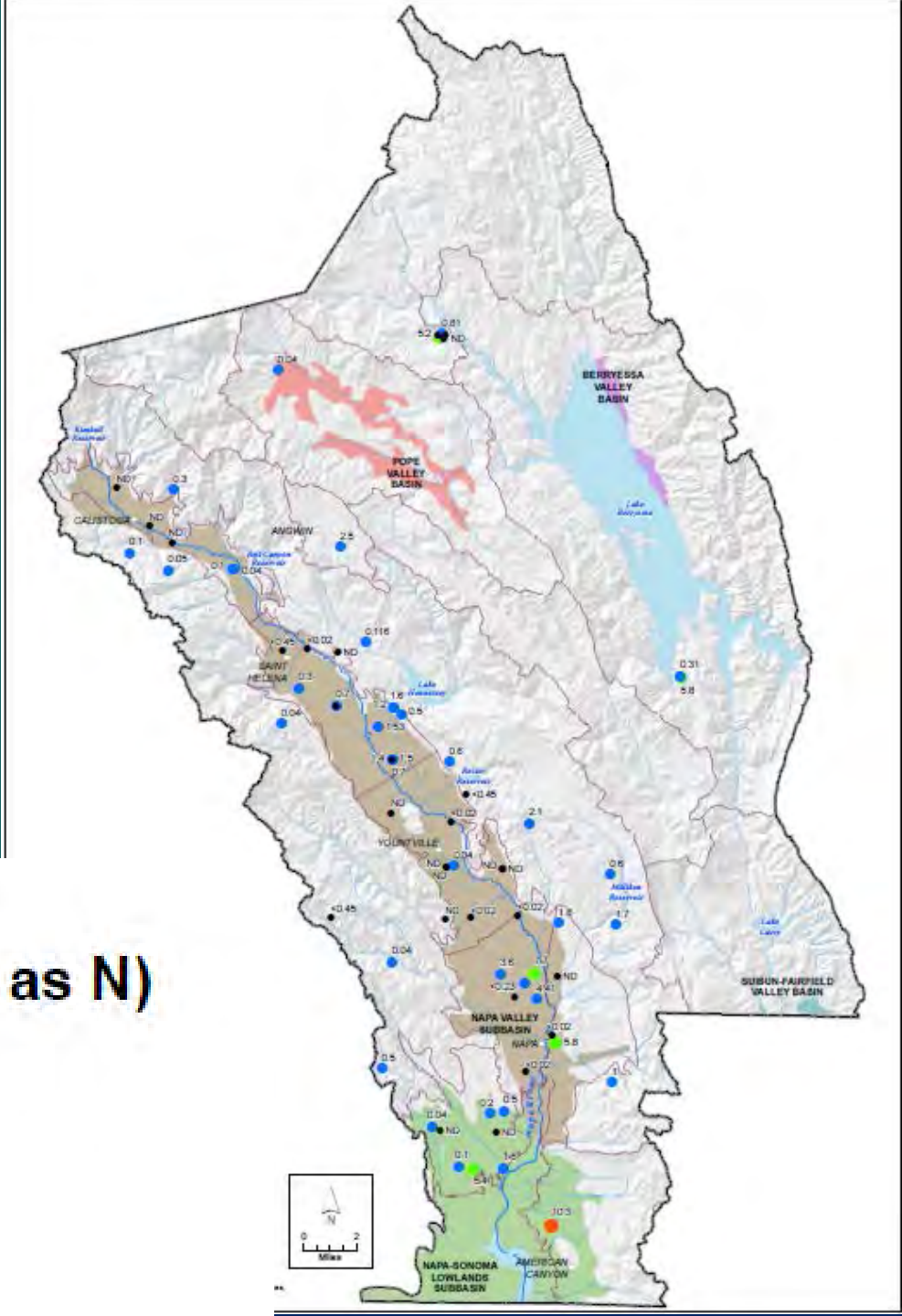


Nitrate

- Low NO_3-N conc.

MCL = 10 mg/L

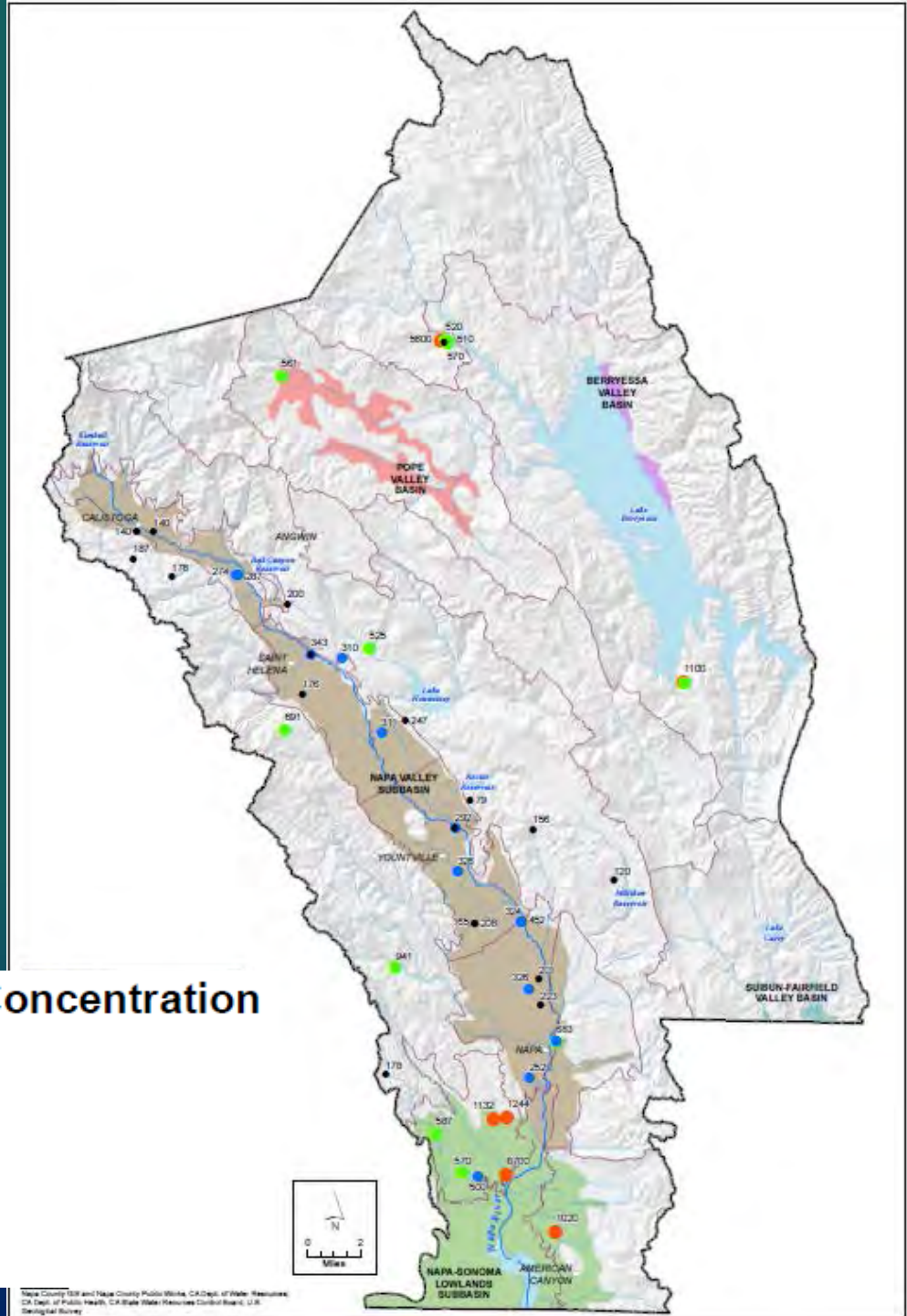




TDS

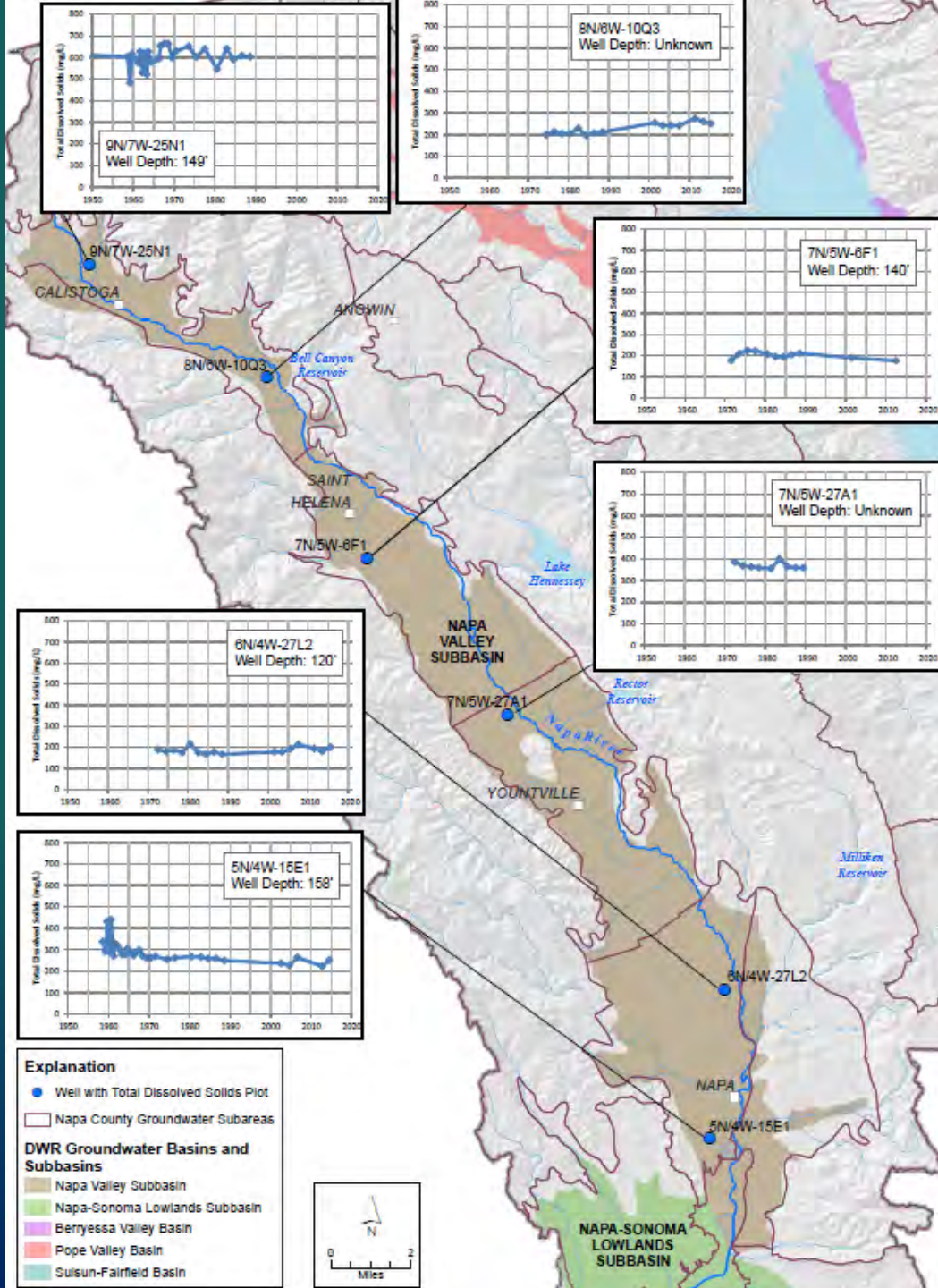
- Generally low TDS VF
- May be susceptible to seawater intrusion from San Pablo Bay
  - Elevated chloride, EC/TDS levels
- TDS much higher on avg south of VF than in the VF
  - Probably originates from connate water in marine rocks; tidal influence

Secondary MCL= 500/1,000 mg/L



TDS Trends

- Long historical records (from 1960/70s)
- Generally stable trends



Summary of GW Quality Conditions

- Generally Good GW Quality
- Selected Areas of Nat'ly Occurring Elevated Constituents
- Calistoga Area of the Napa Valley Floor
  - Geothermal influences
- Southern Napa County
  - Elevated TDS and Chloride; likely naturally occurring; need additional monitoring to evaluate trends

Summary

- GW level trends stable majority of wells Napa Valley Floor
  - Year-to-year declines observed in a few wells
  - DWR (Update 2013): GW levels in well on VF, *"stable trend is generally indicative of wells located within the Napa Valley area"*
- Some response to drought conditions
- GW level declines in MST mostly moderated since 2008

Overall, on a basin wide scale, groundwater conditions in the Napa Valley Subbasin are good and similar to conditions reported decades ago.

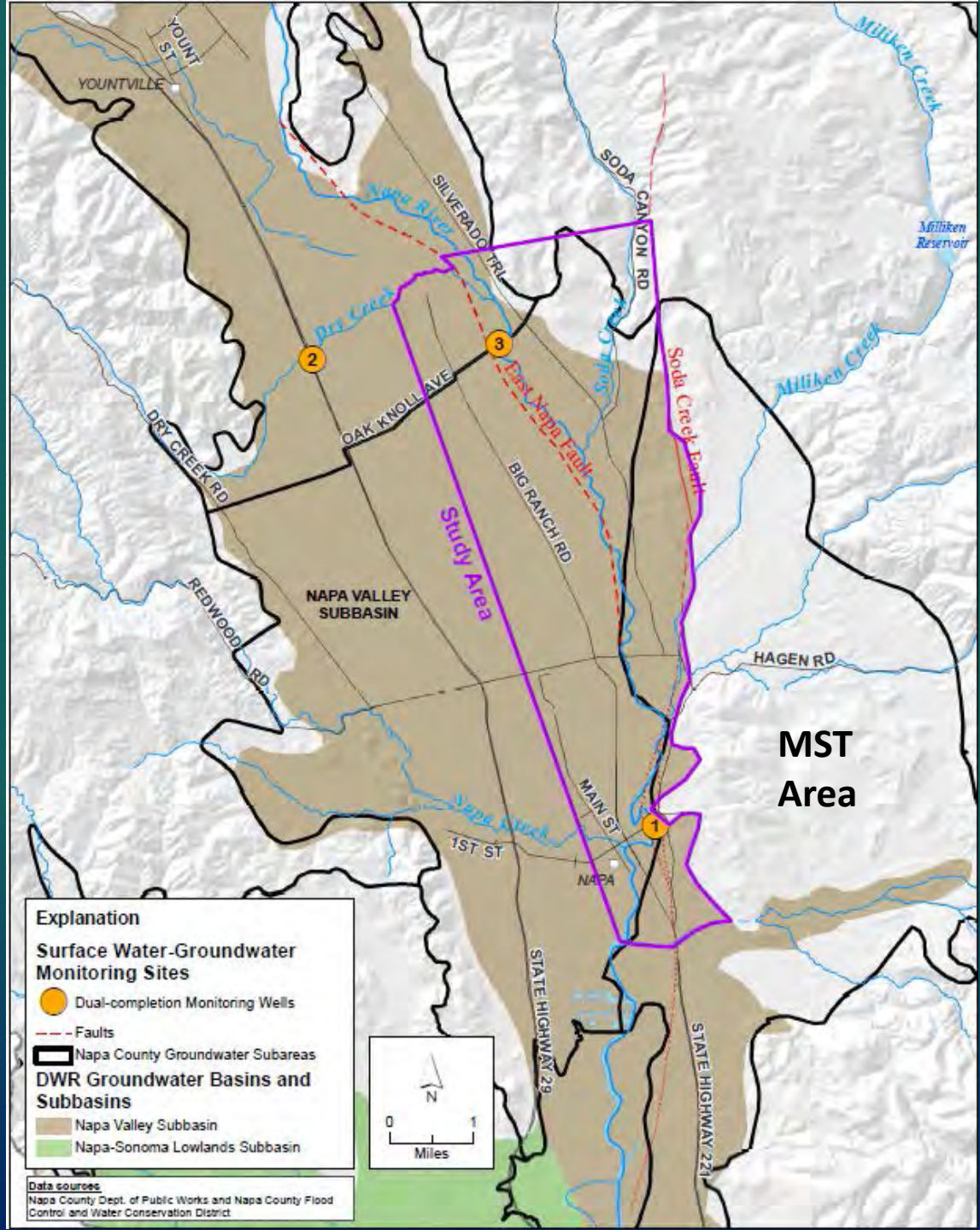
Napa County and Next Steps Towards Groundwater Sustainability

- Ongoing (and evolving) SW and GW monitoring
  - NE Napa area study
- Enhancing understanding of SW/GW interaction
- Conducting education and outreach
- Sustainable Groundwater Management Act, work in progress
  - Water budgets, different water year types

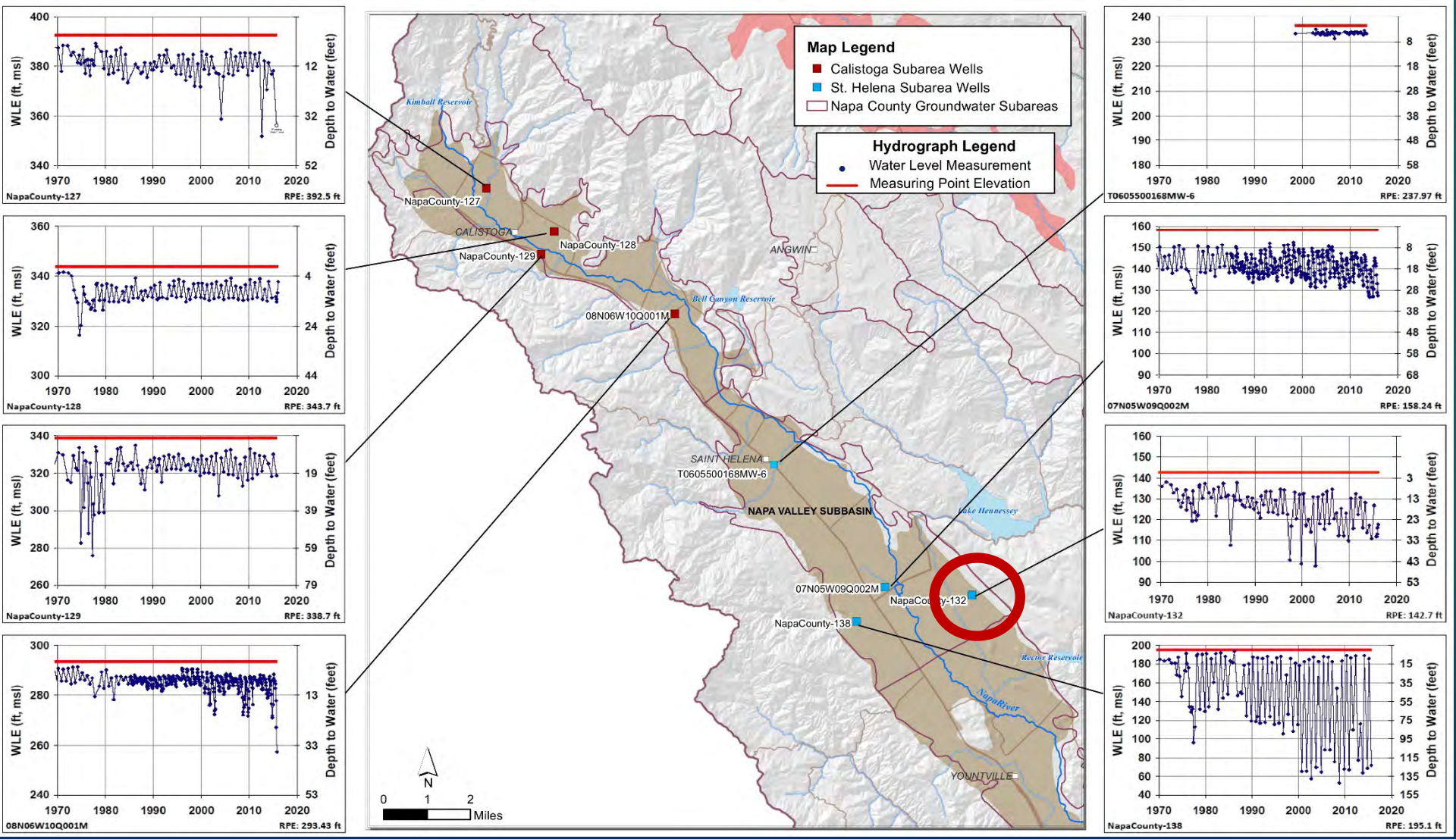
Water Education Foundation Groundwater Tour, Fall 2015

Thank You

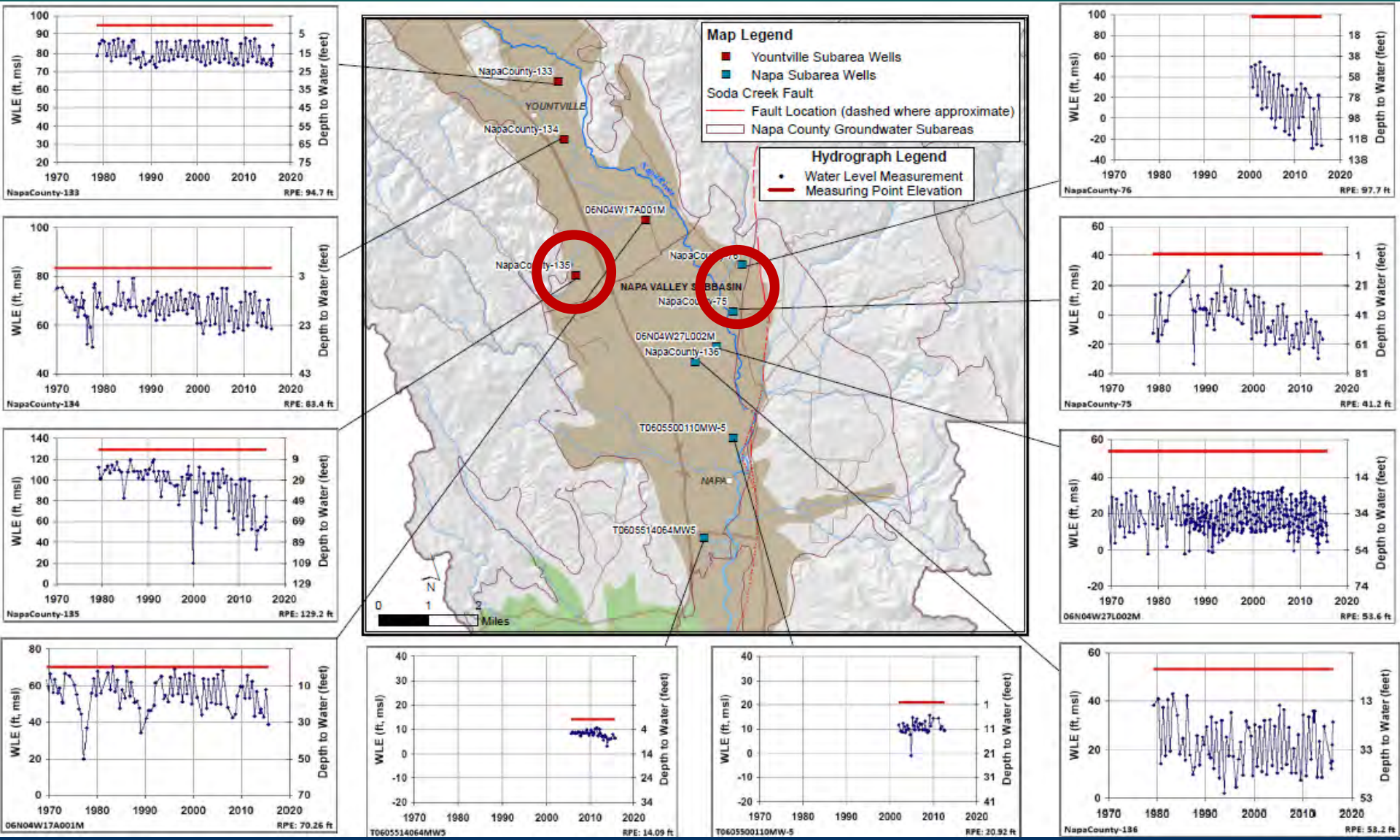
Northeast Napa Study Area



North Napa


Map Legend
Calistoga Subarea Wells
St. Helena Subarea Wells
Napa County Groundwater Subareas
Hydrograph Legend
Water Level Measurement
Measuring Point Elevation
NapaCounty-127
NapaCounty-128
NapaCounty-129
08N06W10Q001M
T0605500168MW-6
07N05W09Q002M
NapaCounty-132
NapaCounty-138
CALISTOGA
ANGWIN
SAINT HELENA
NAPA VALLEY SUBBASIN
YOUNTVILLE
Kimball Reservoir
Bell Canyon Reservoir
Lake Hennessey
Rector Reservoir
Napa River
N
0 1 2
Miles
WLE (ft, msl)
Depth to Water (feet)
NapaCounty-127 RPE: 392.5 ft
NapaCounty-128 RPE: 343.7 ft
NapaCounty-129 RPE: 338.7 ft
08N06W10Q001M RPE: 293.43 ft
T0605500168MW-6 RPE: 237.97 ft
07N05W09Q002M RPE: 158.24 ft
NapaCounty-132 RPE: 142.7 ft
NapaCounty-138 RPE: 195.1 ft

South Napa


Map Legend
Yountville Subarea Wells
Napa Subarea Wells
Soda Creek Fault
Fault Location (dashed where approximate)
Napa County Groundwater Subareas
Hydrograph Legend
Water Level Measurement
Measuring Point Elevation
NapaCounty-133
YOUNTVILLE
NapaCounty-134
06N04W17A001M
NapaCounty-135
NAPA VALLEY SUBBASIN
NapaCounty-75
06N04W27L002M
NapaCounty-136
T0605500110MW-5
NAPA
T0605514064MW5
N
0 1 2 Miles
WLE (ft, msl)
Depth to Water (feet)
NapaCounty-133
RPE: 94.7 ft
NapaCounty-134
RPE: 83.4 ft
NapaCounty-135
RPE: 129.2 ft
06N04W17A001M
RPE: 70.26 ft
T0605514064MW5
RPE: 14.09 ft
T0605500110MW-5
RPE: 20.92 ft
NapaCounty-76
RPE: 97.7 ft
NapaCounty-75
RPE: 41.2 ft
06N04W27L002M
RPE: 53.6 ft
NapaCounty-136
RPE: 58.2 ft