Northeast Napa Area: Special Groundwater Study

presentation to

Watershed Information & Conservation Council

January 25, 2018

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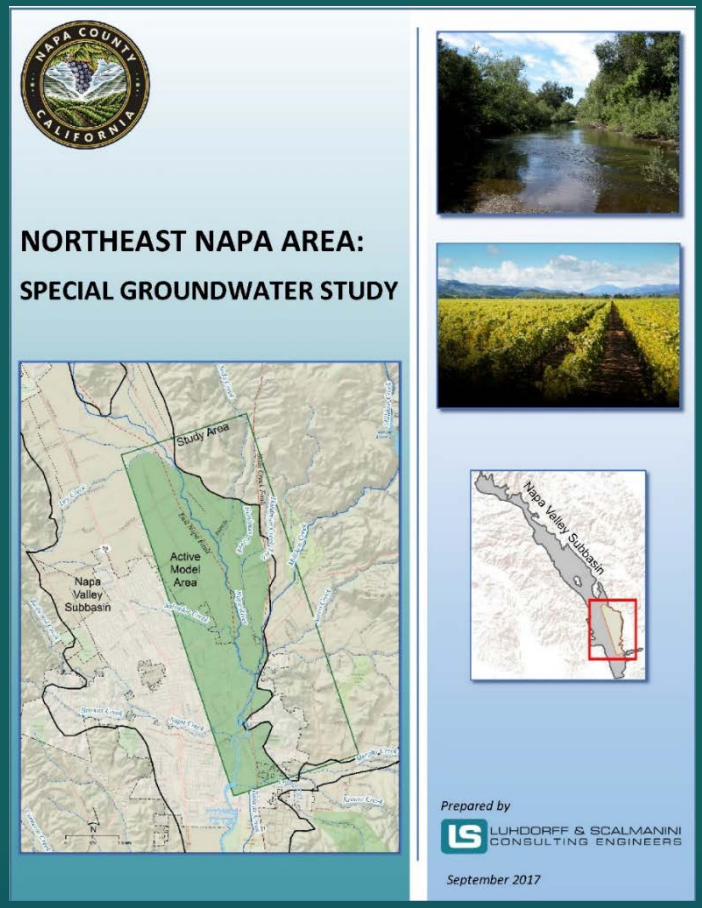
LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Overview

- Background
- NE Napa Study
- Findings
- Recommendations

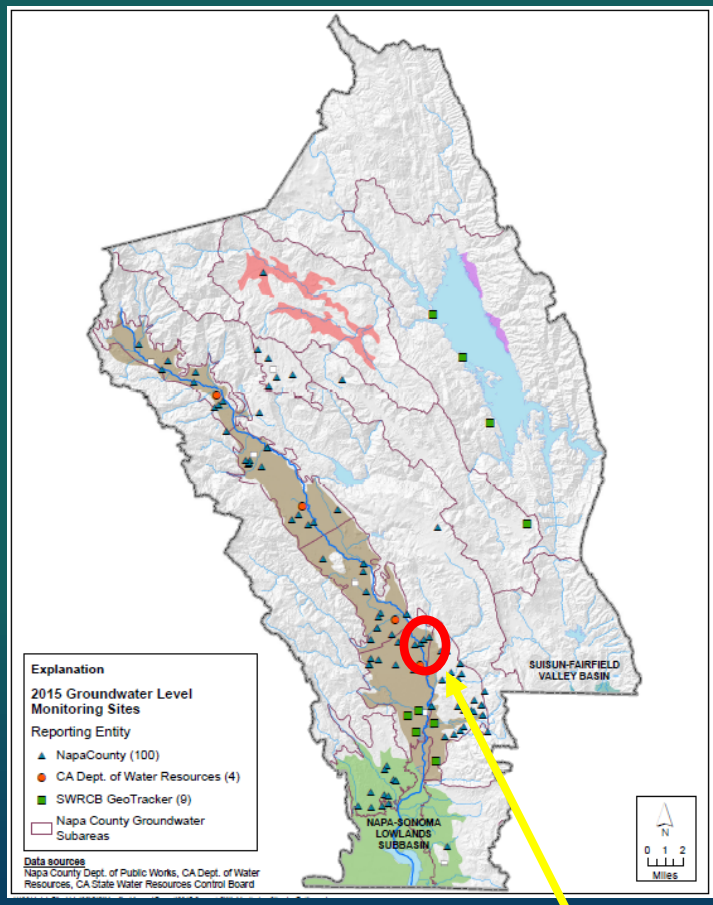


Acknowledgements LSCE Staff:

- Reid Bryson
- Barb Dalgish
- Jeevan Jayakody
- Ken Utley
- Andrew Francis

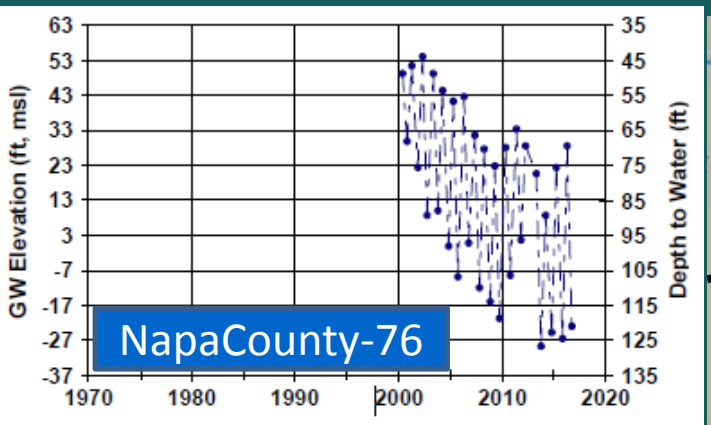
Background: Northeast Napa Area

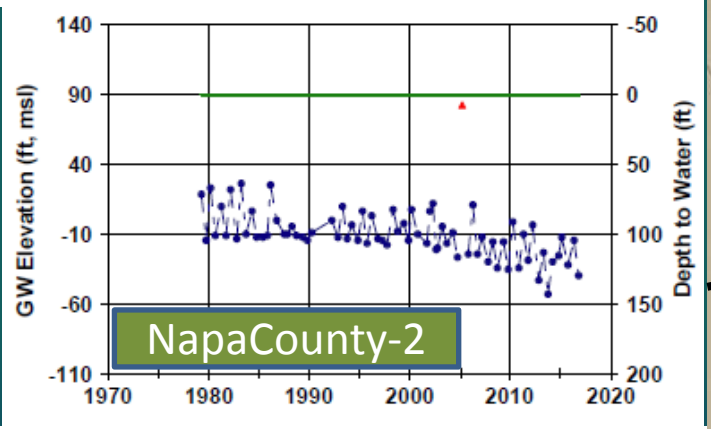
- **Dec 2015:** Review of GW data shows area of interest near MST Subarea
  - Historical declines in 2 wells
  - Levels stabilized since 2009
  - Petra Drive well replacements
- Several winery permit applications received by PBES in this area
- **April 5, 2016:** BOS Annual Report on the GW Monitoring Program
  - Recommends Northeast Napa Special Study Area

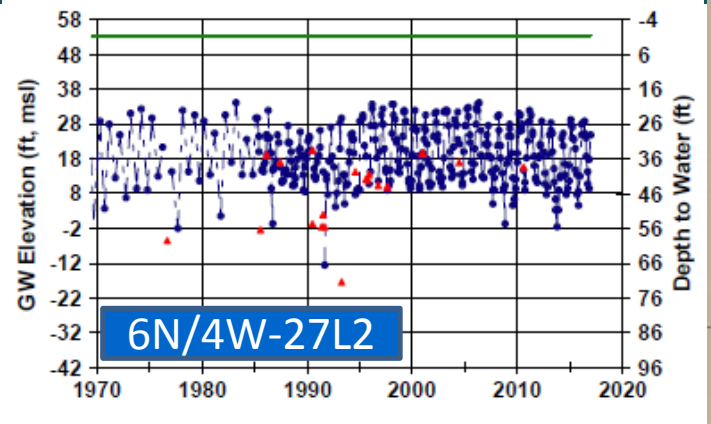


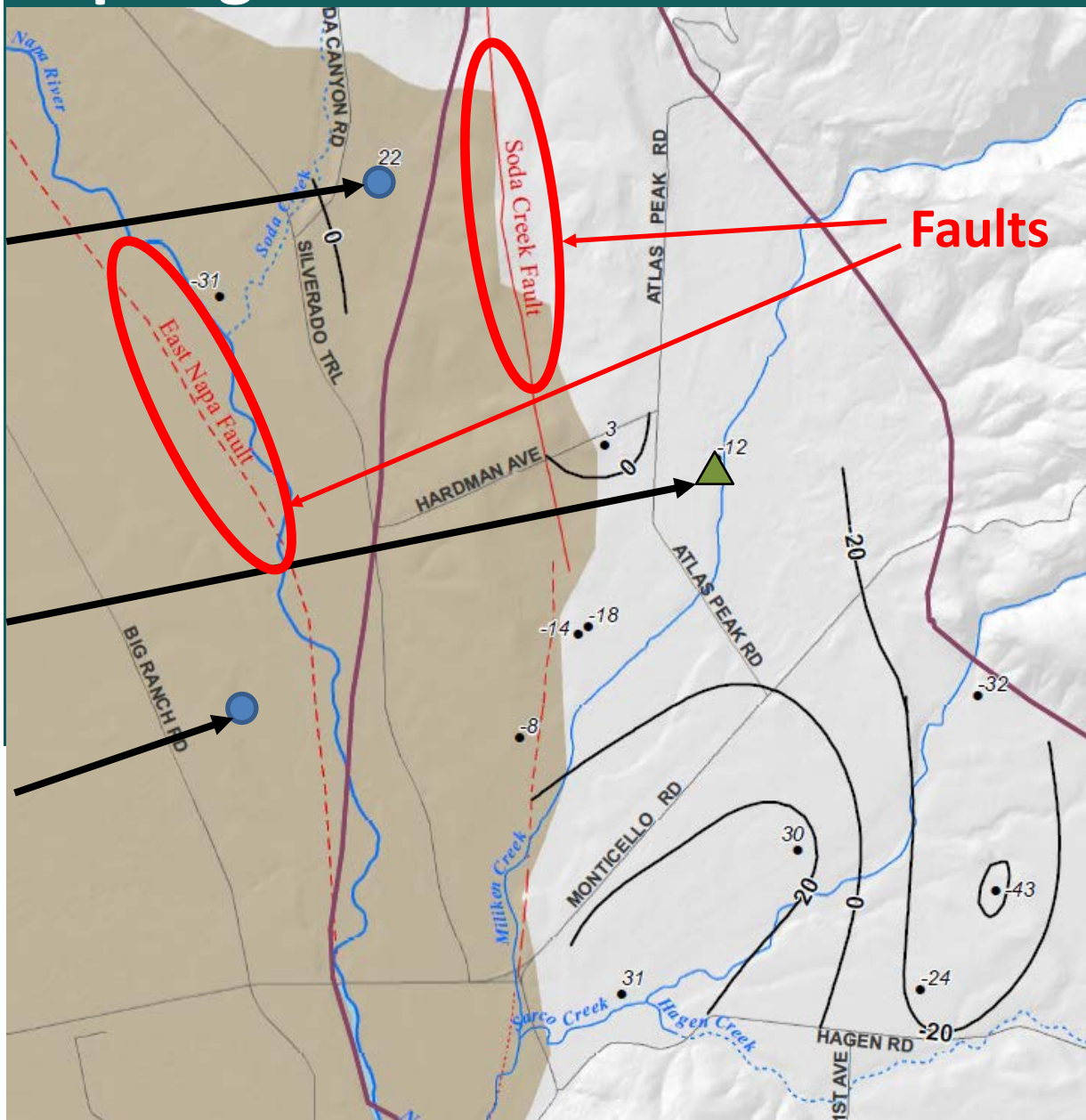
Area of Interest

NV Subbasin, Northeast Napa Area & MST: Spring 2016





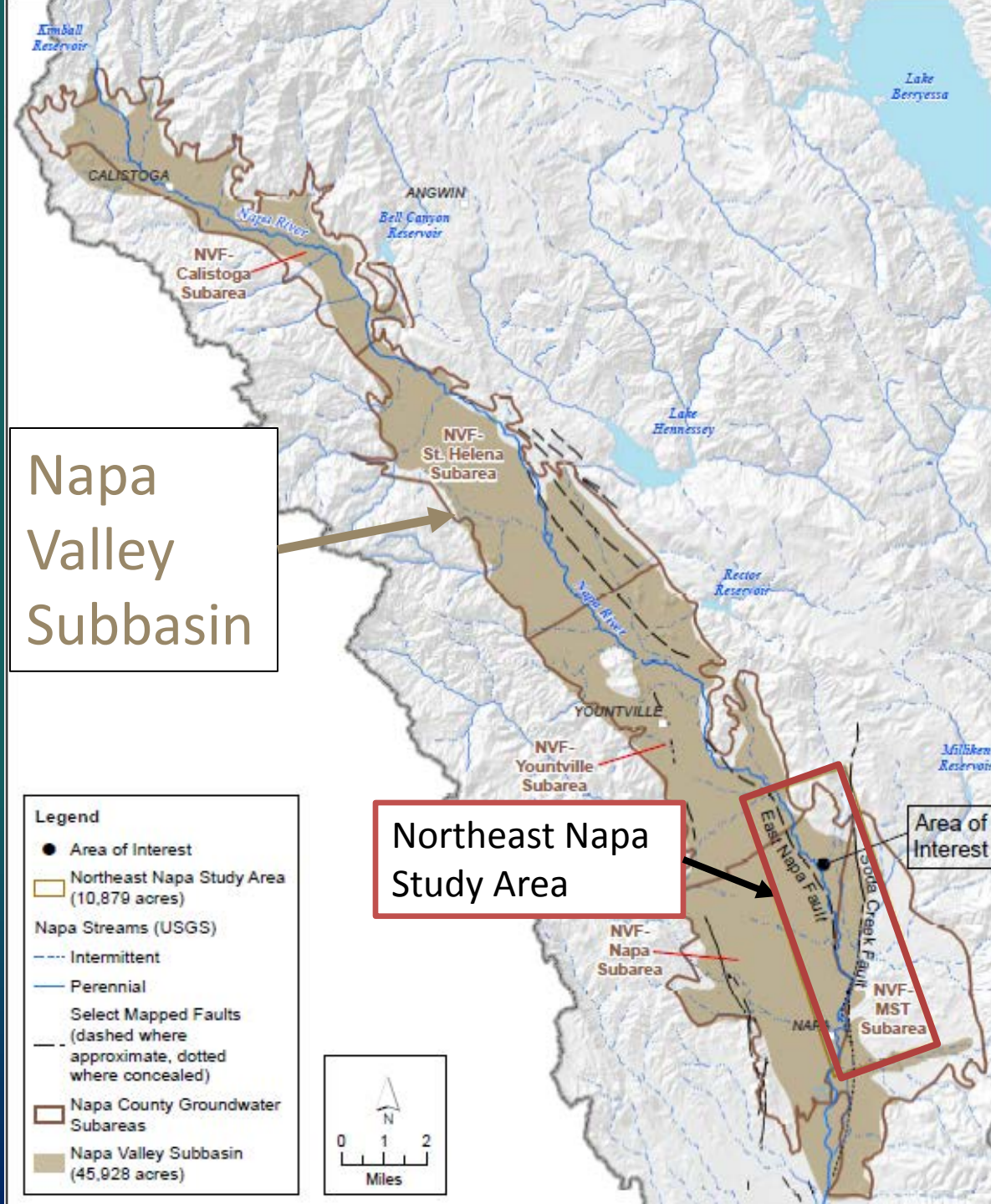




Northeast Napa Study

Study and GW Model to Evaluate:

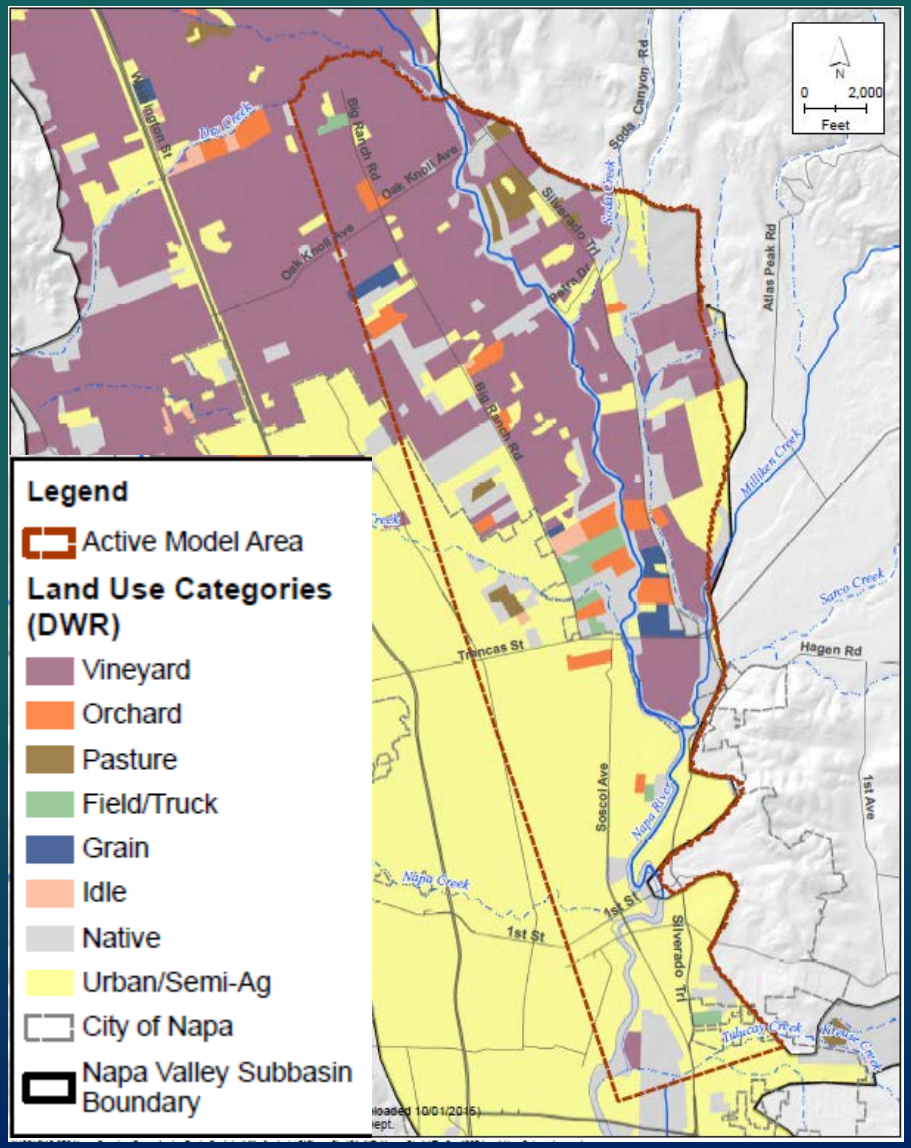
- Historical WL declines local area east of Napa River
- Mutual well interference
- Potential for affect from MST Subarea
- Potential effects of pumping on streamflow
- GW availability (esp. east of Napa River)



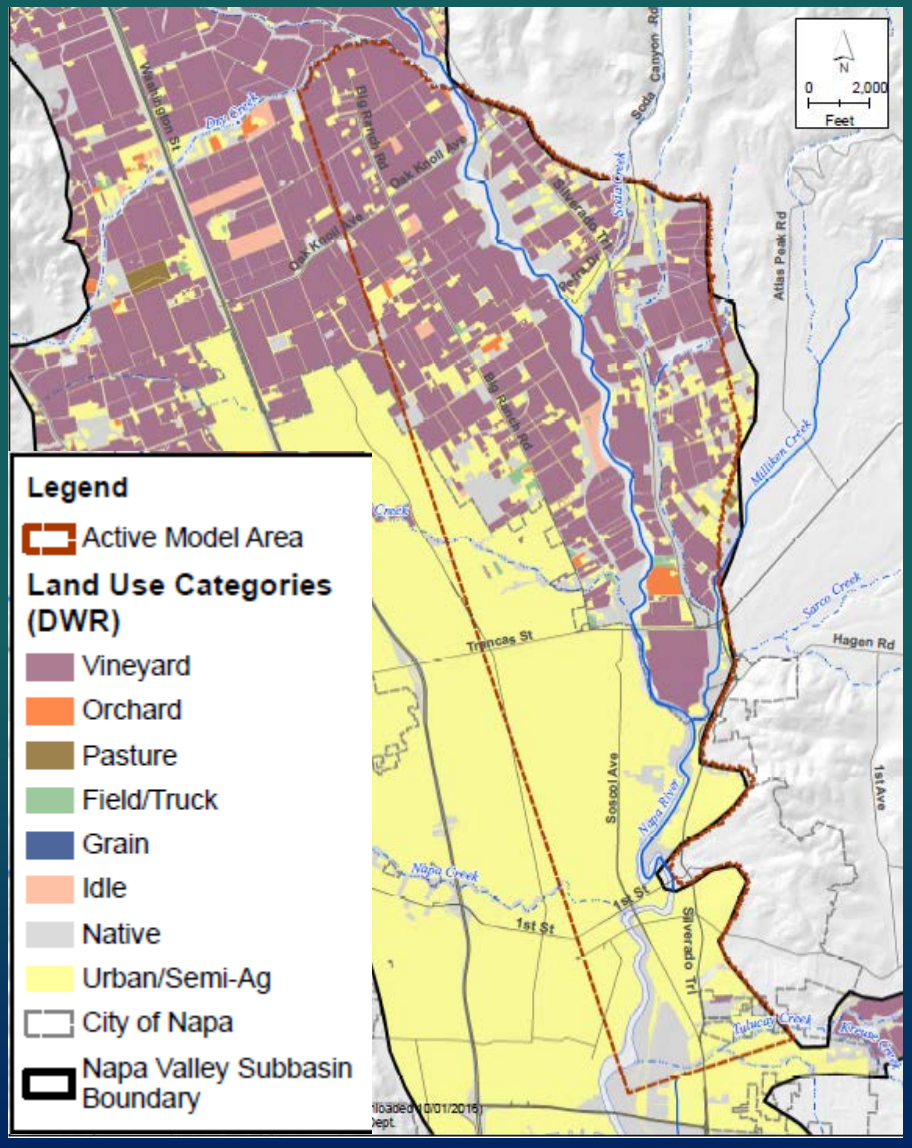
Land and Water Use

1987 and 2011 Land Use

1987

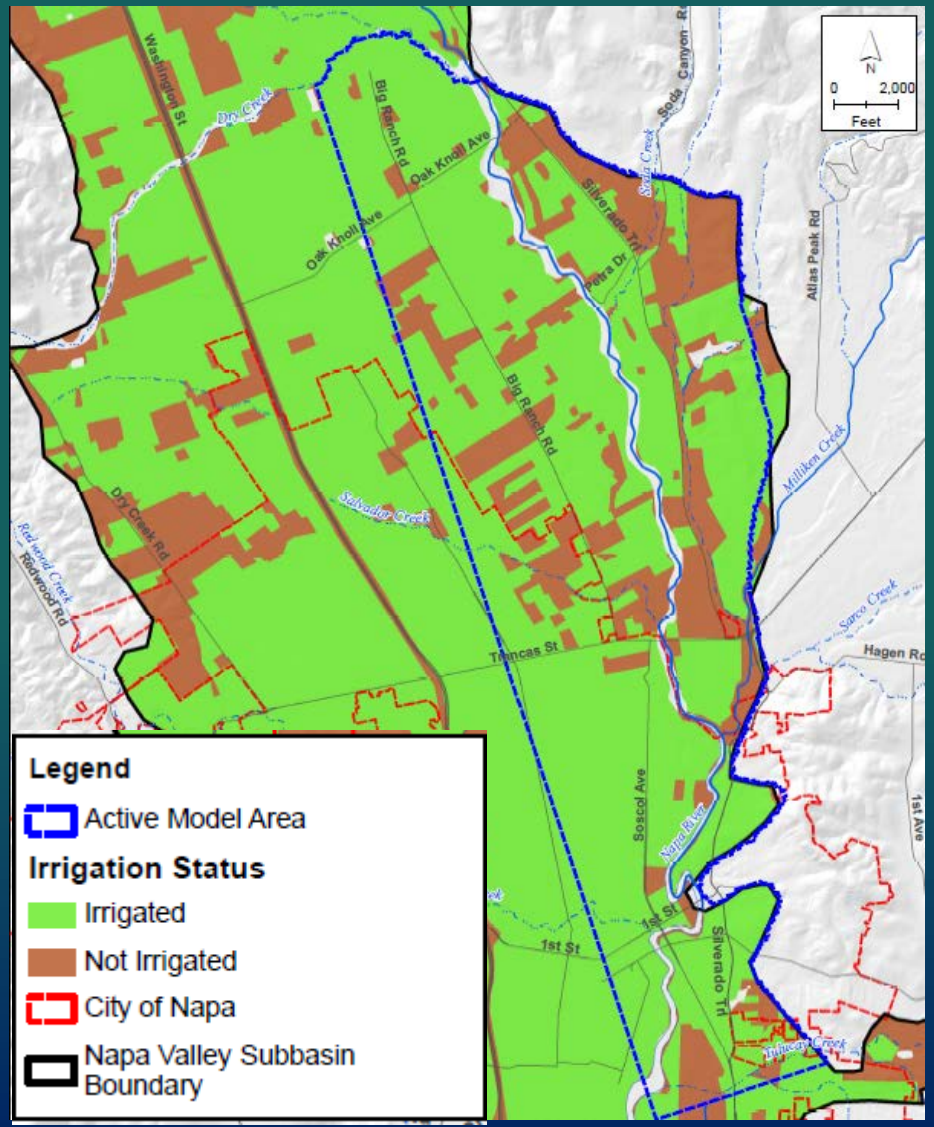


2011

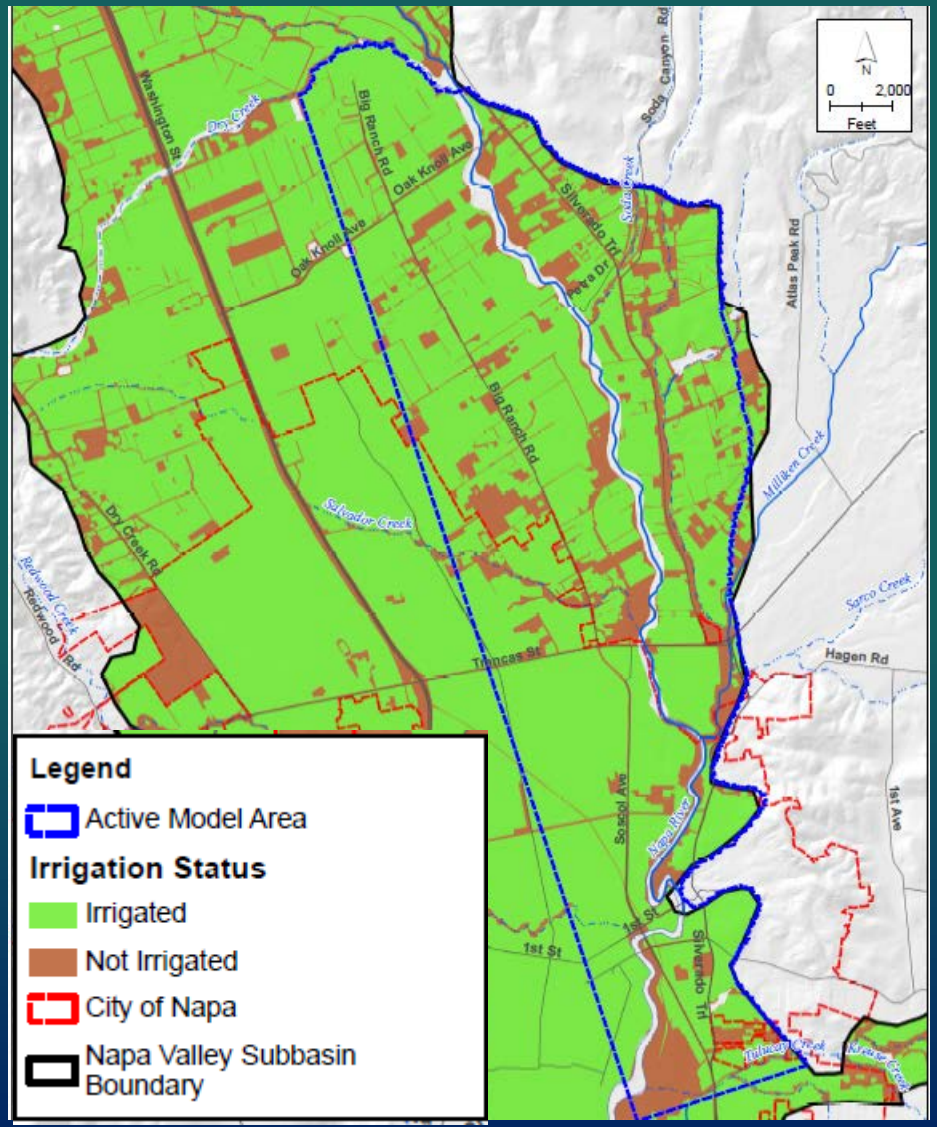


1987 and 2011 Land Use and Irrigation

1987

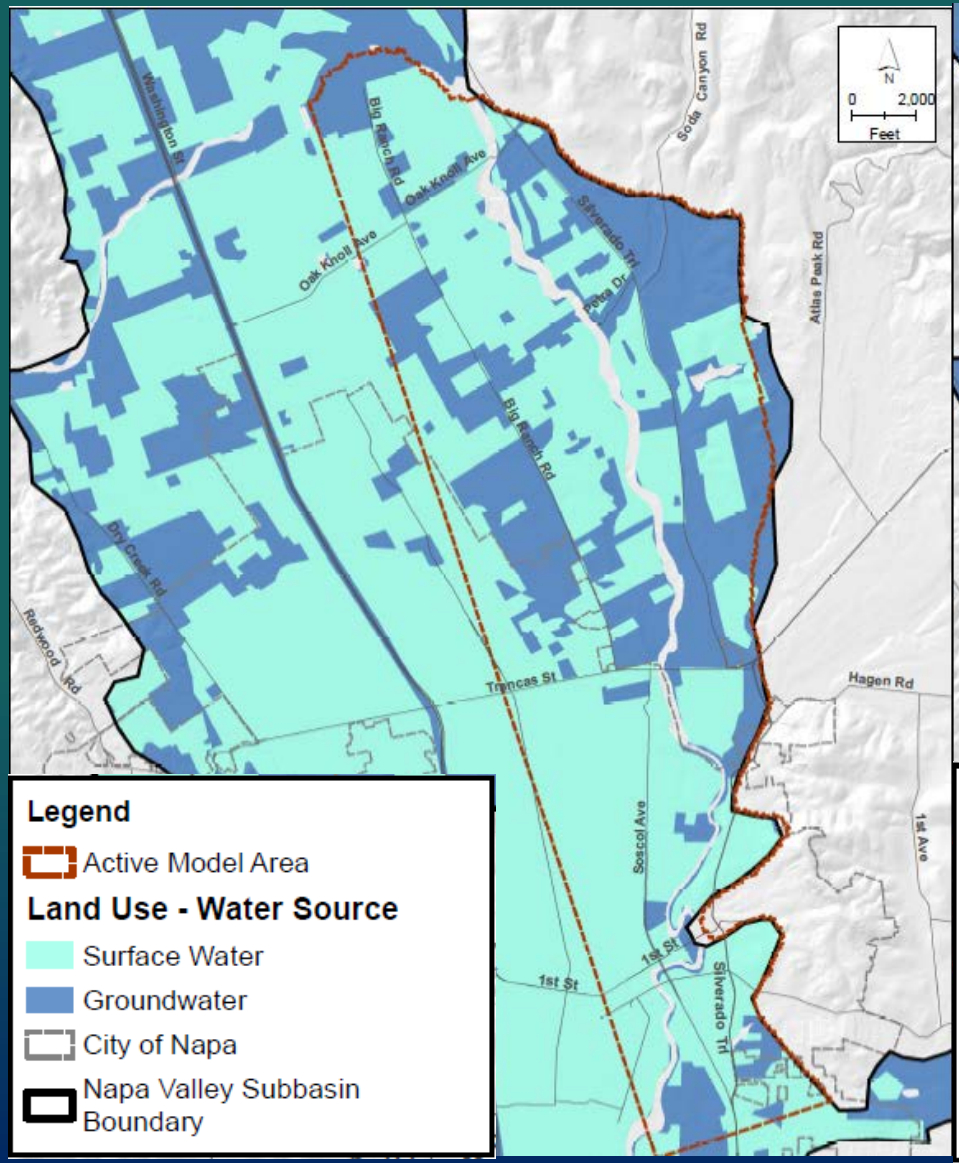


2011

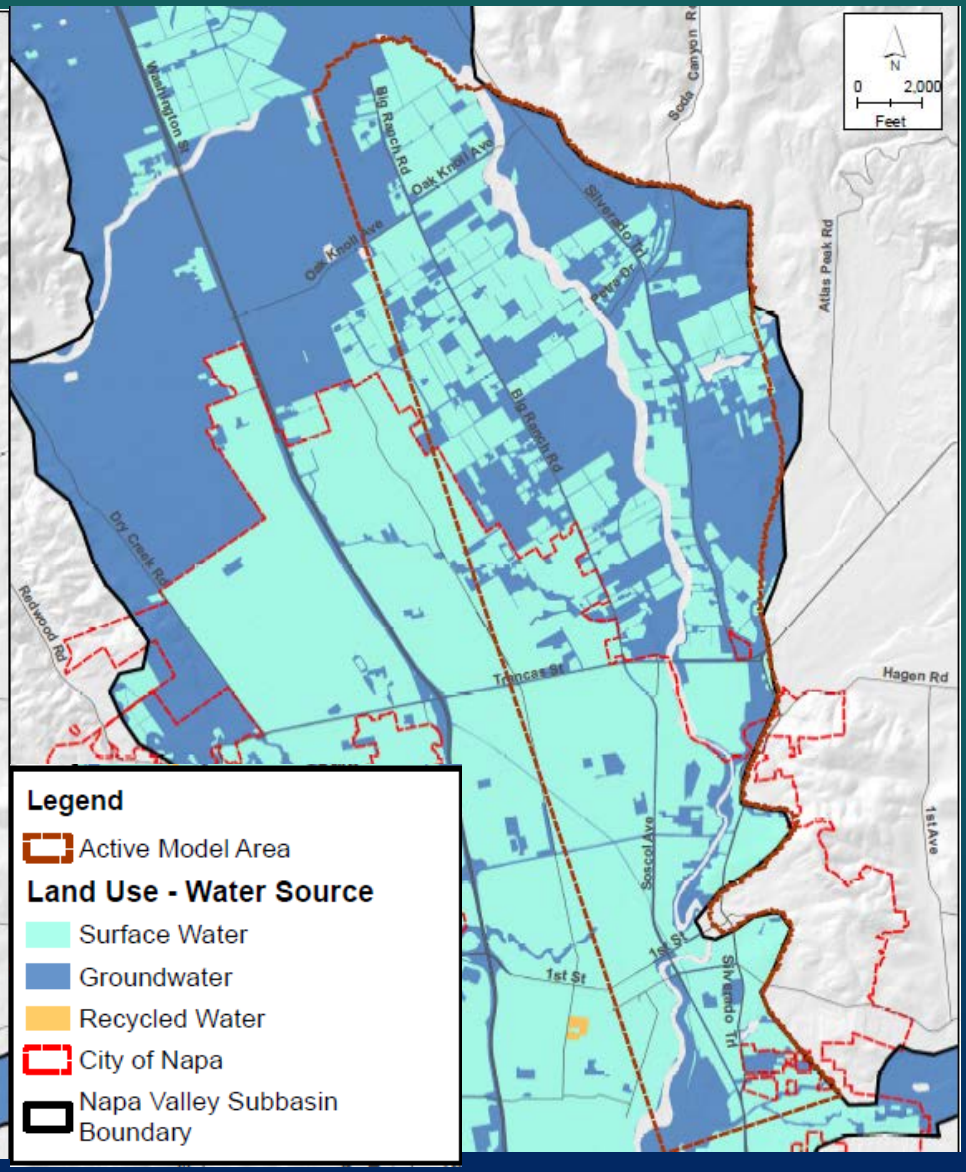


1987 and 2011 Land Use – Water Sources

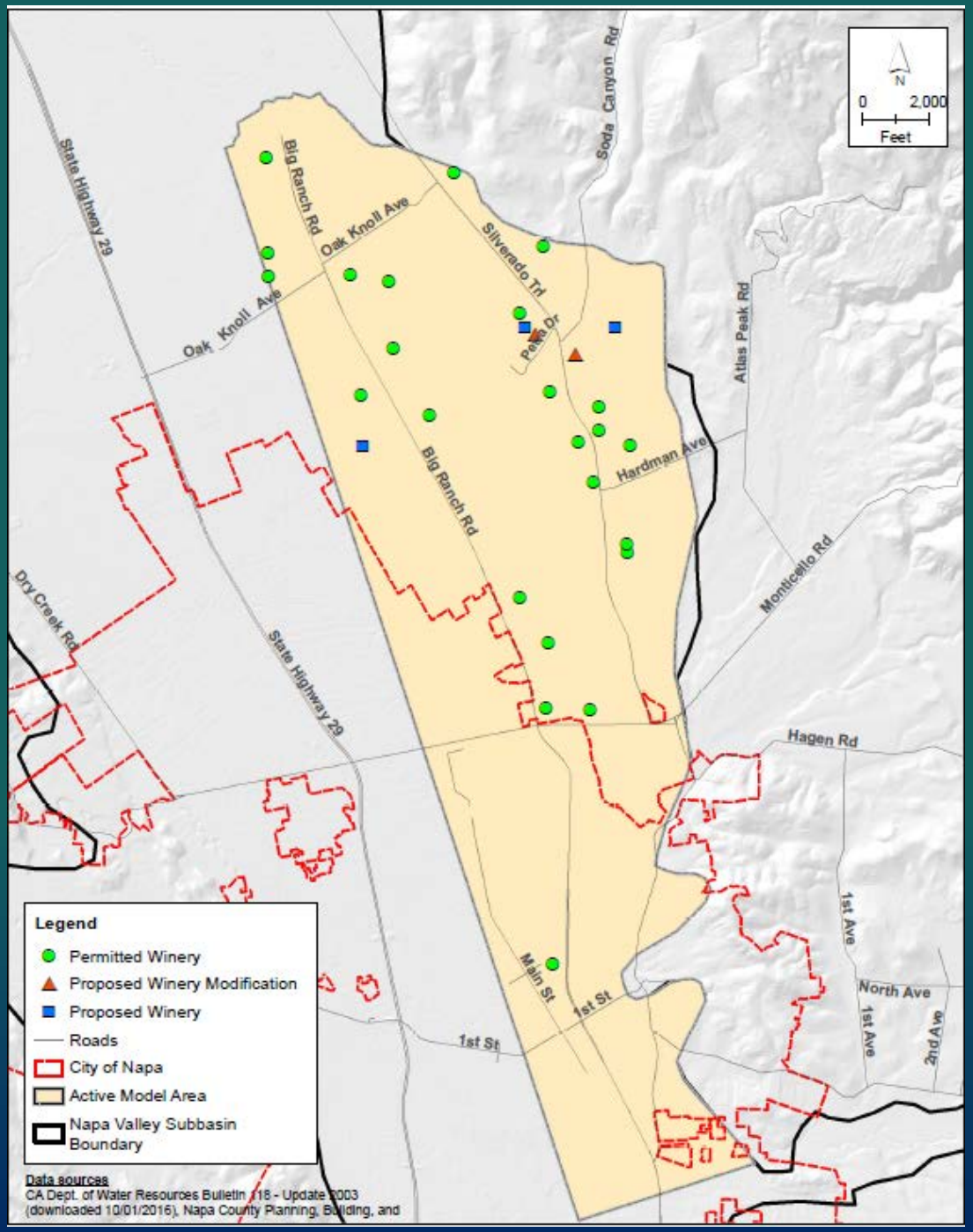
1987



2011



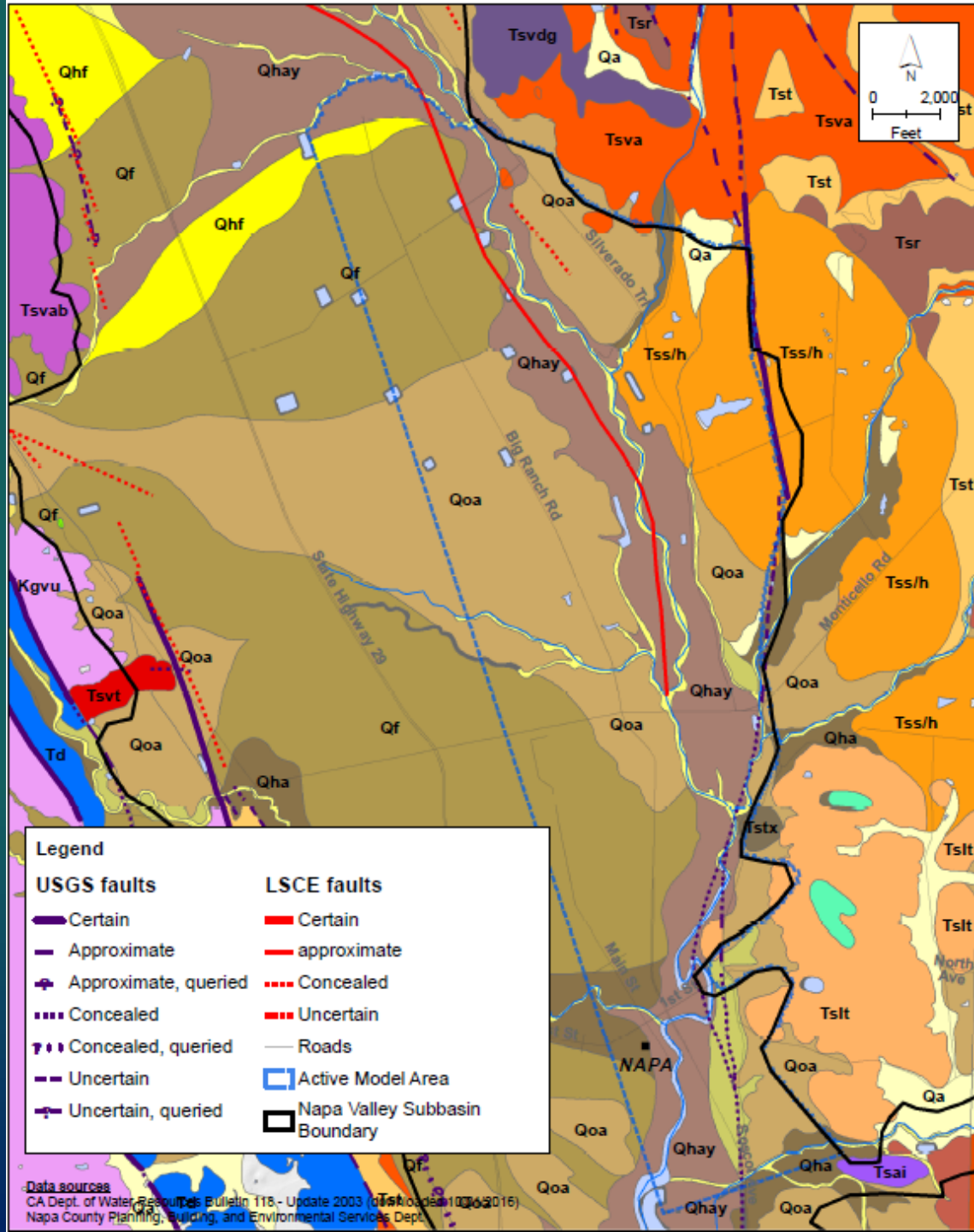
Permitted and Proposed Wineries



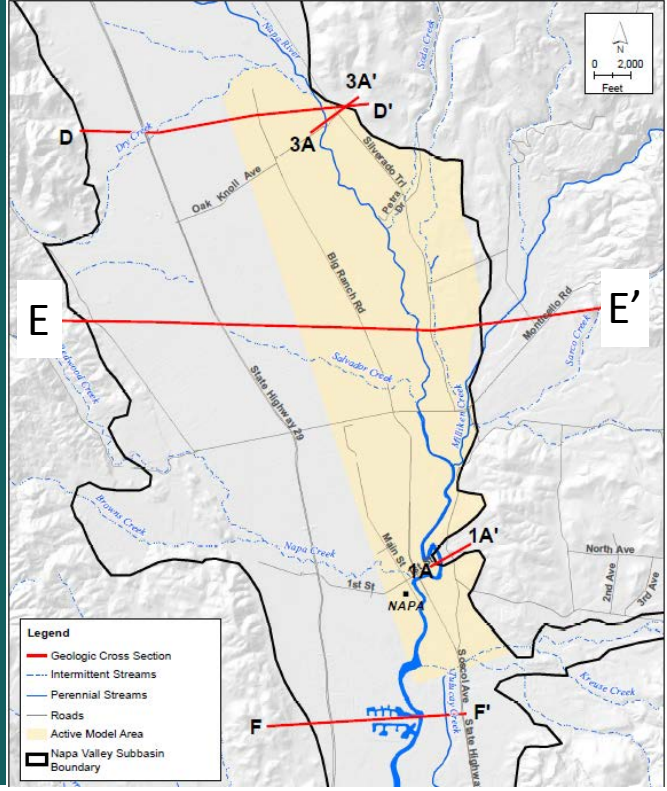
Groundwater Flow Model

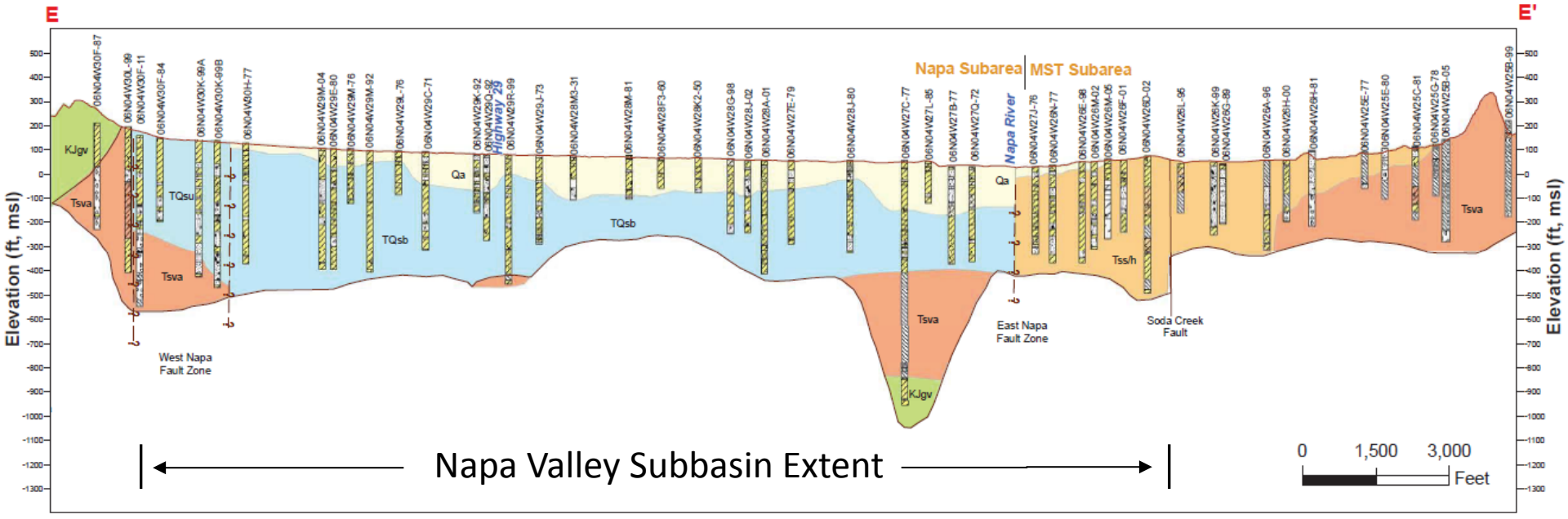
Geologic Setting

- Develop Hydrogeologic Conceptualization



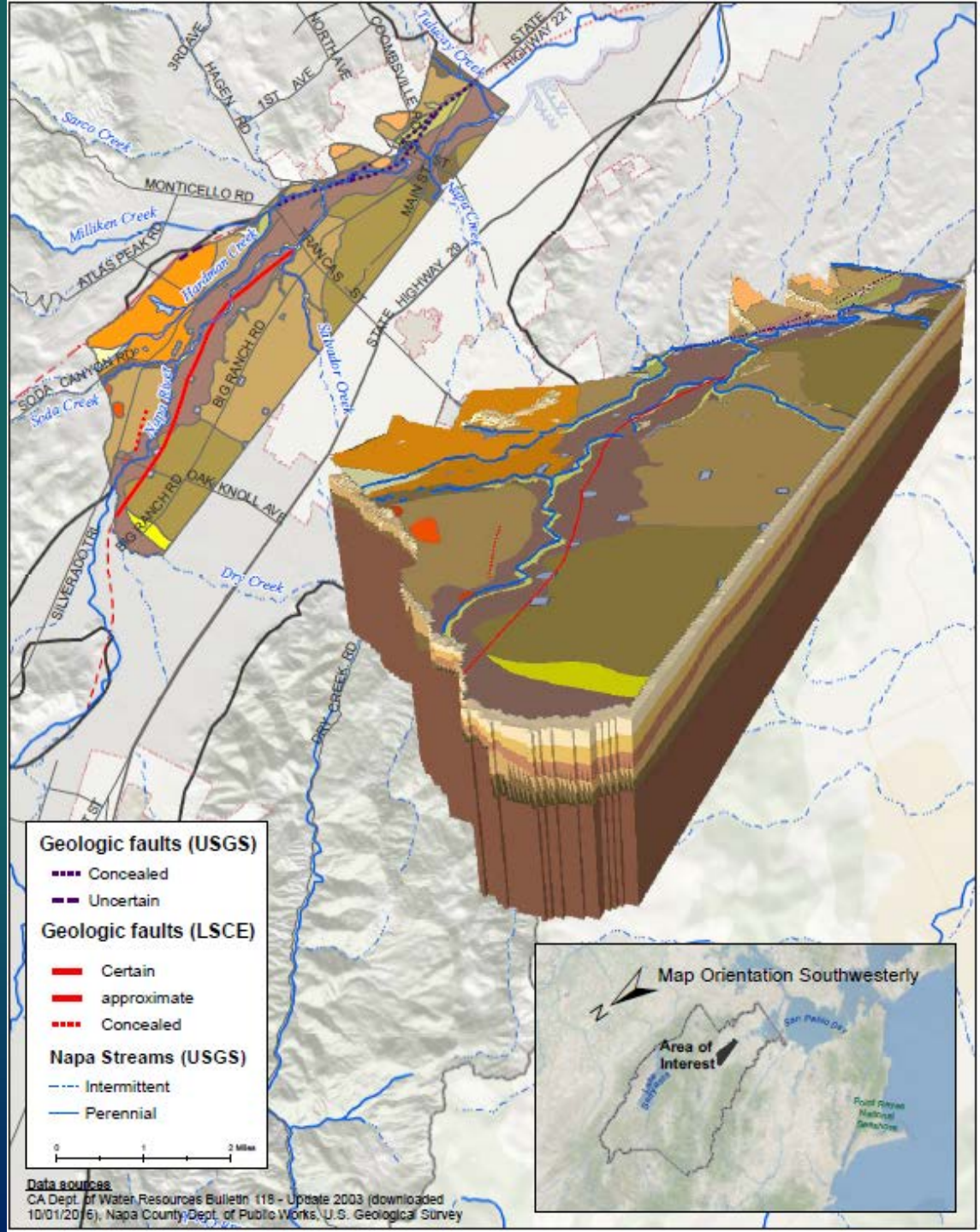
Geologic Cross Section E-E’



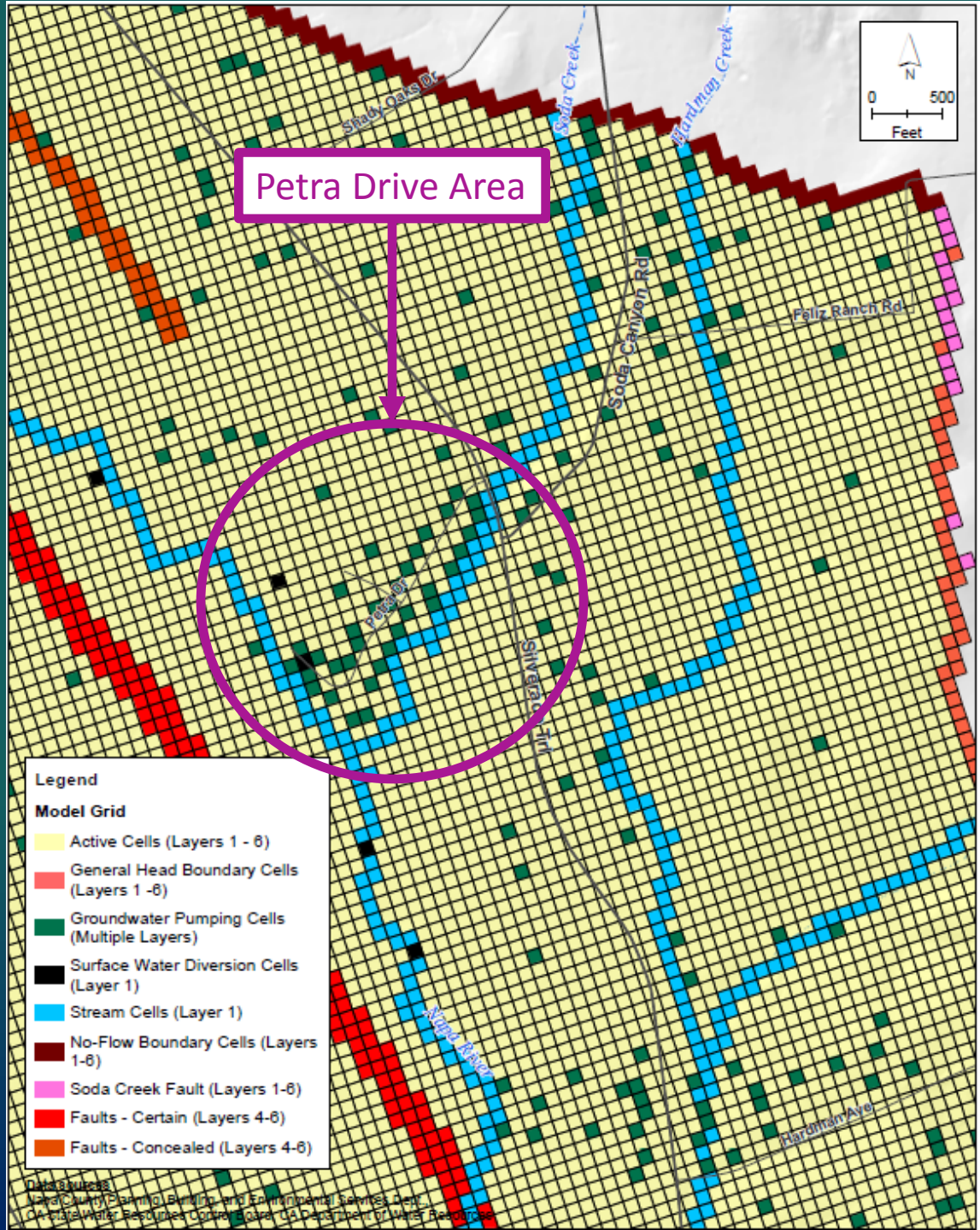


Geology and Layers 1-6

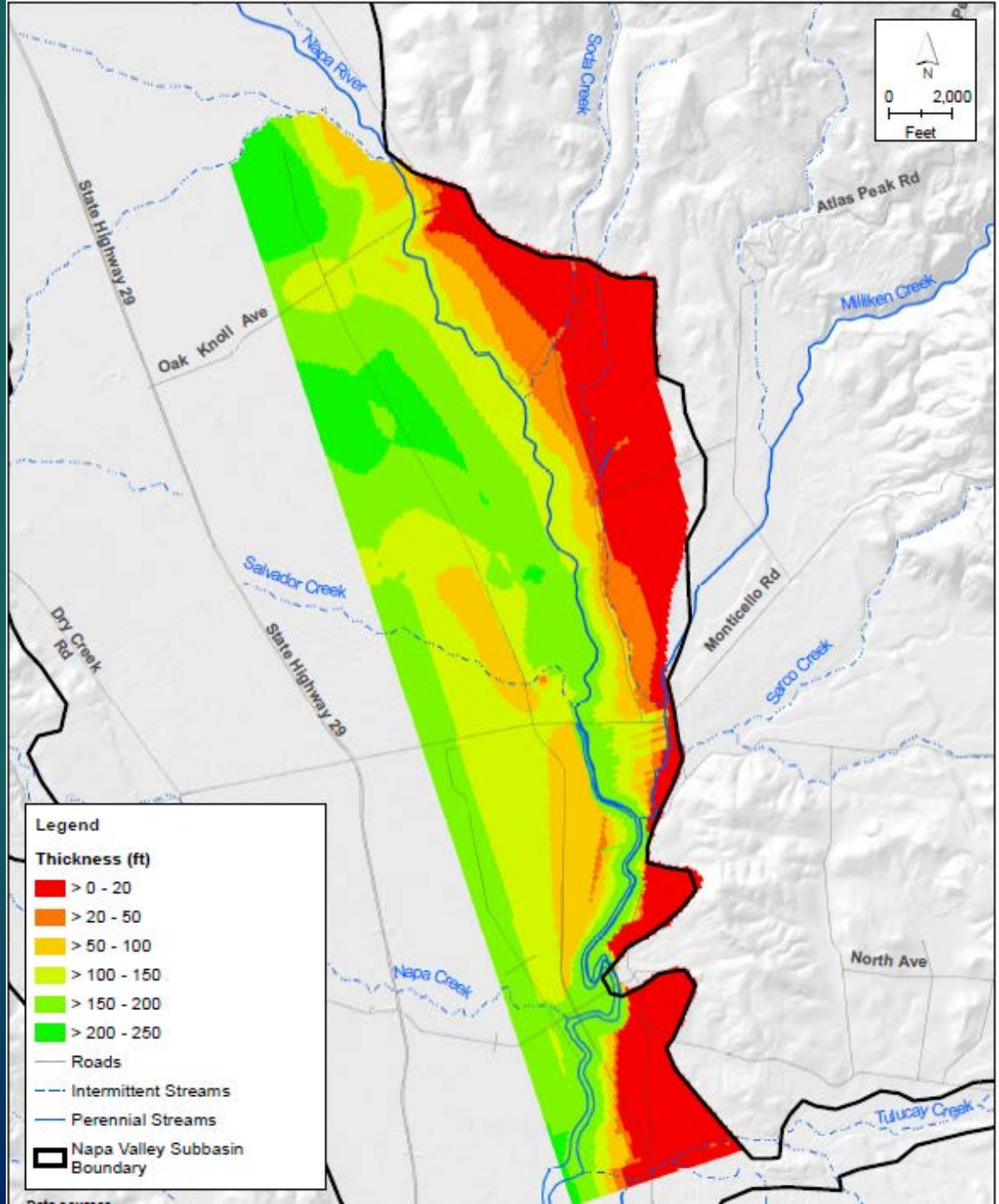
- Hydrogeologic Conceptualization
- Physical Basis for Model Structure
- Important Structural Features



Model Features: Detail Near Petra Drive

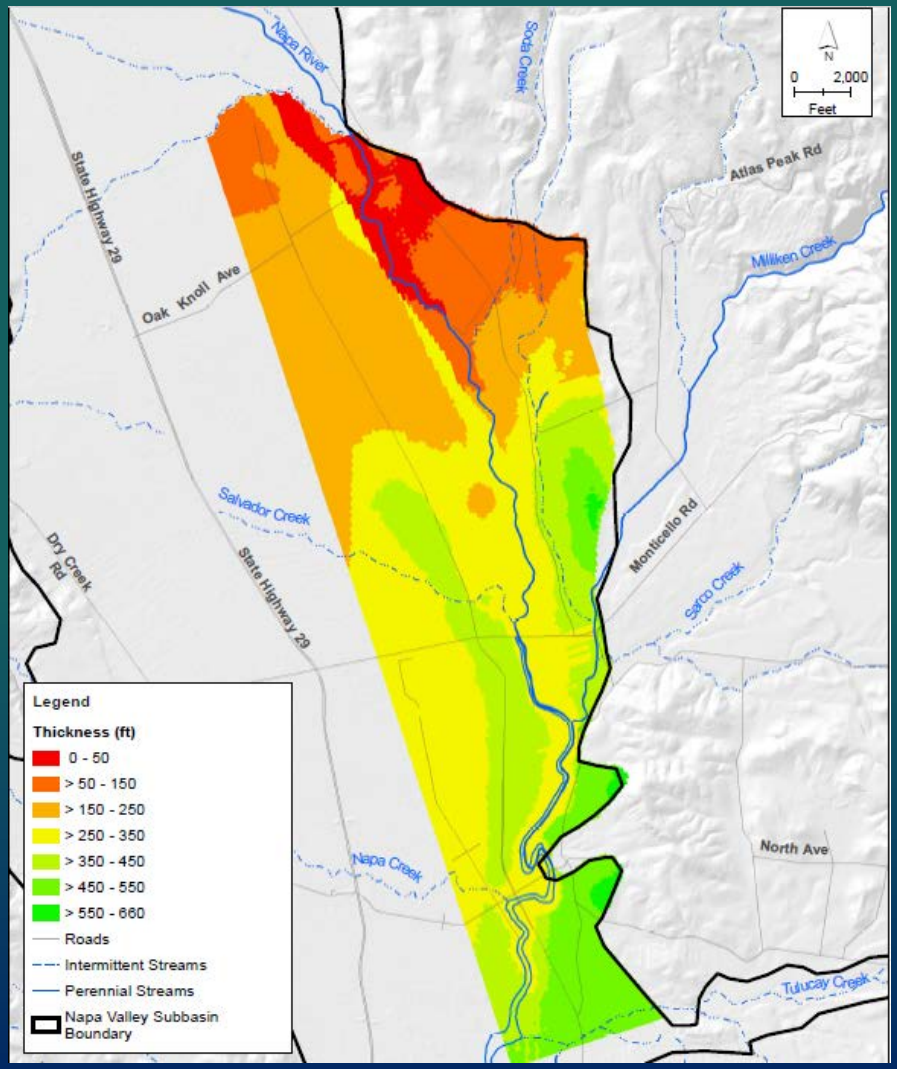


Alluvium Thickness: Layers 1-3

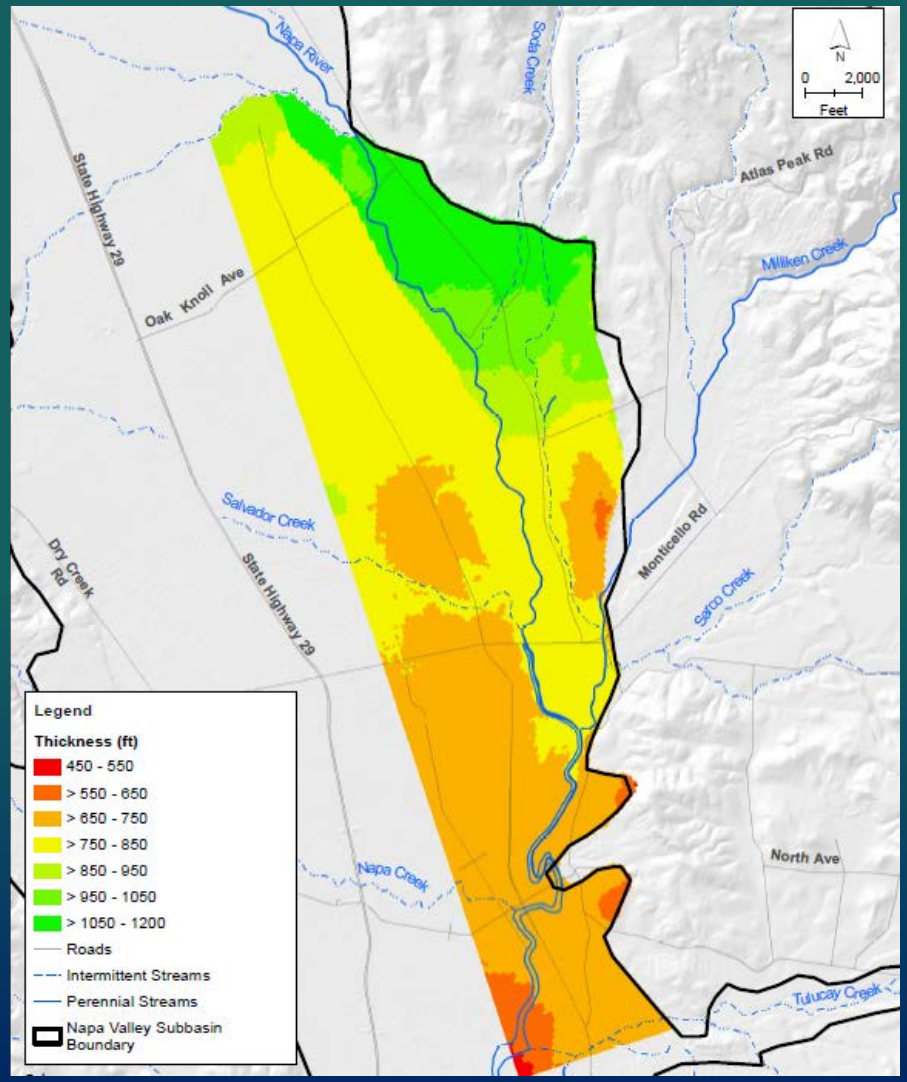


Thickness of Older Formations

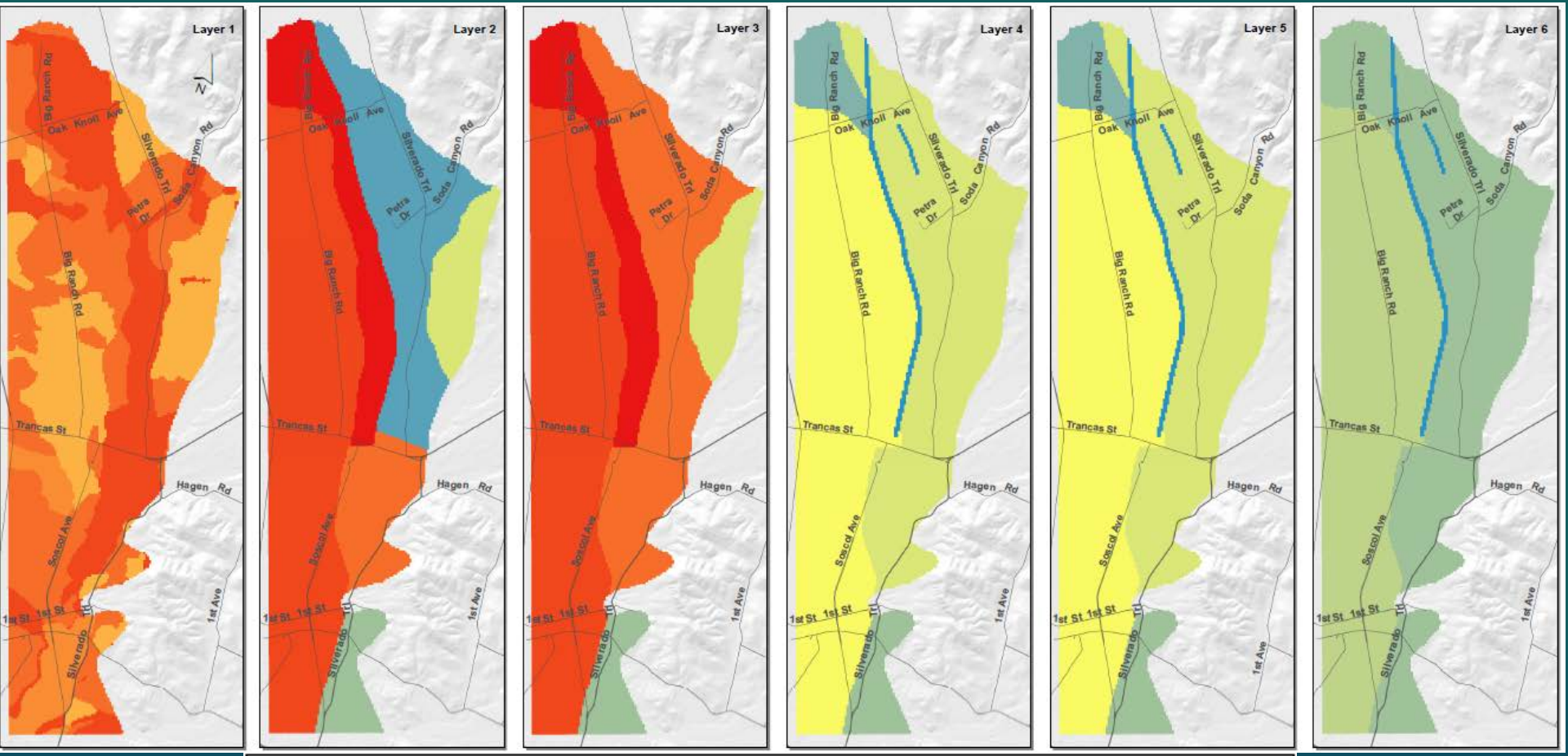
Tertiary/Quaternary Deposits: Layers 4-5



Sonoma Volcanics: Layer 6



Horizontal Hydraulic Conductivity



Lower Capacity to Transmit Water

Horizontal Conductivity
(ft/day)

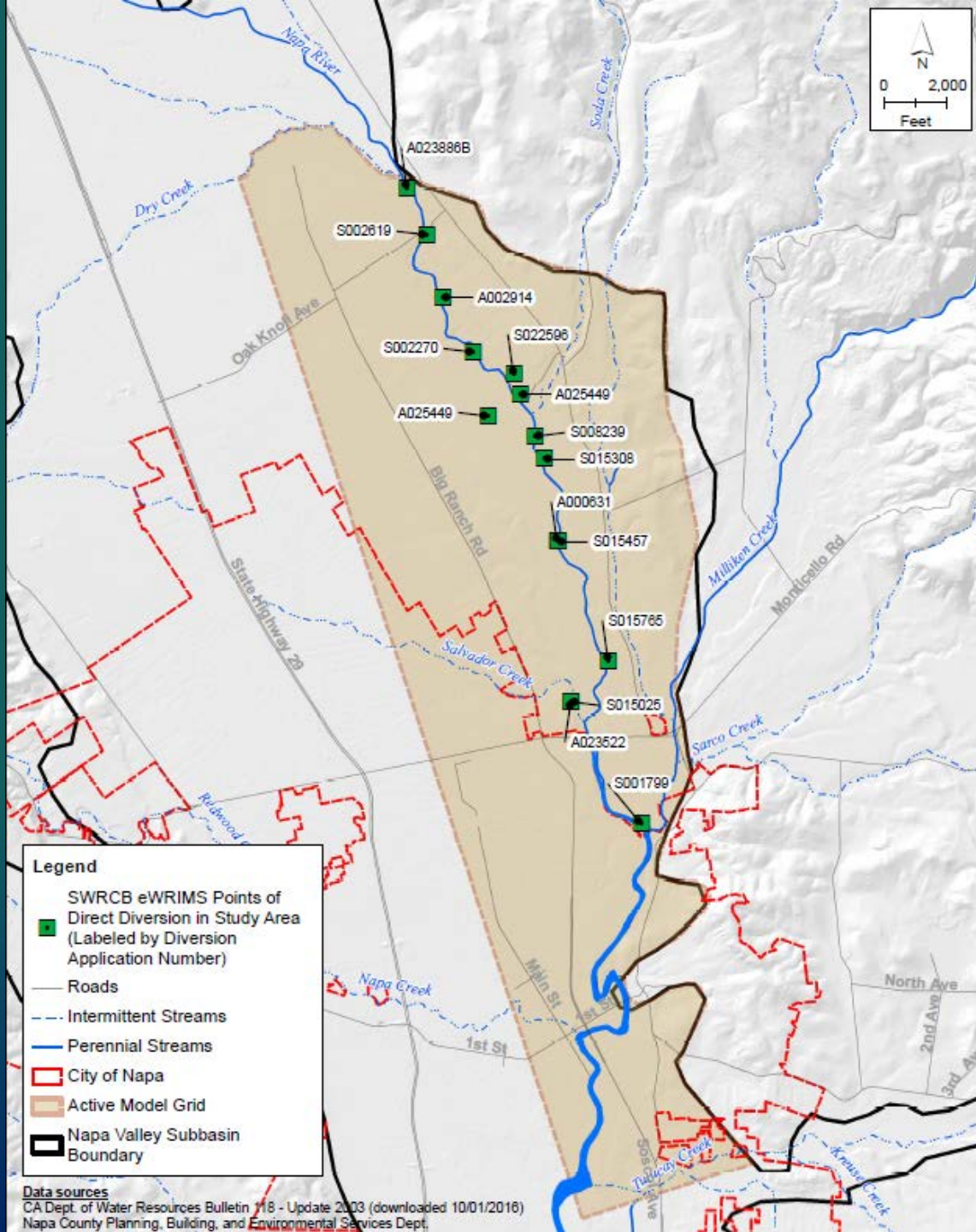
0.001	1
0.5	2
0.75	10
	15
	20

Low

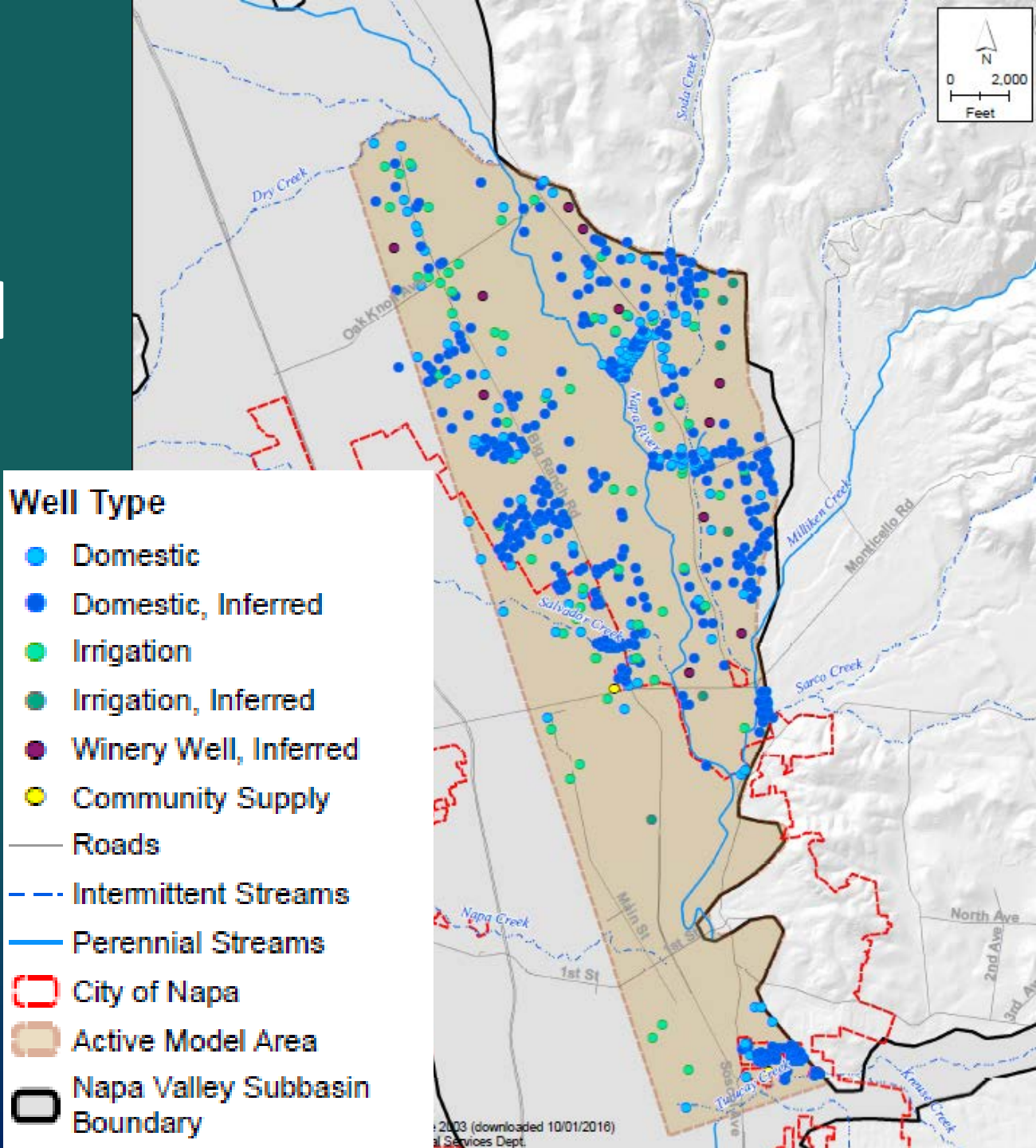
30
40
50
80
100

Moderate Capacity to Transmit Water

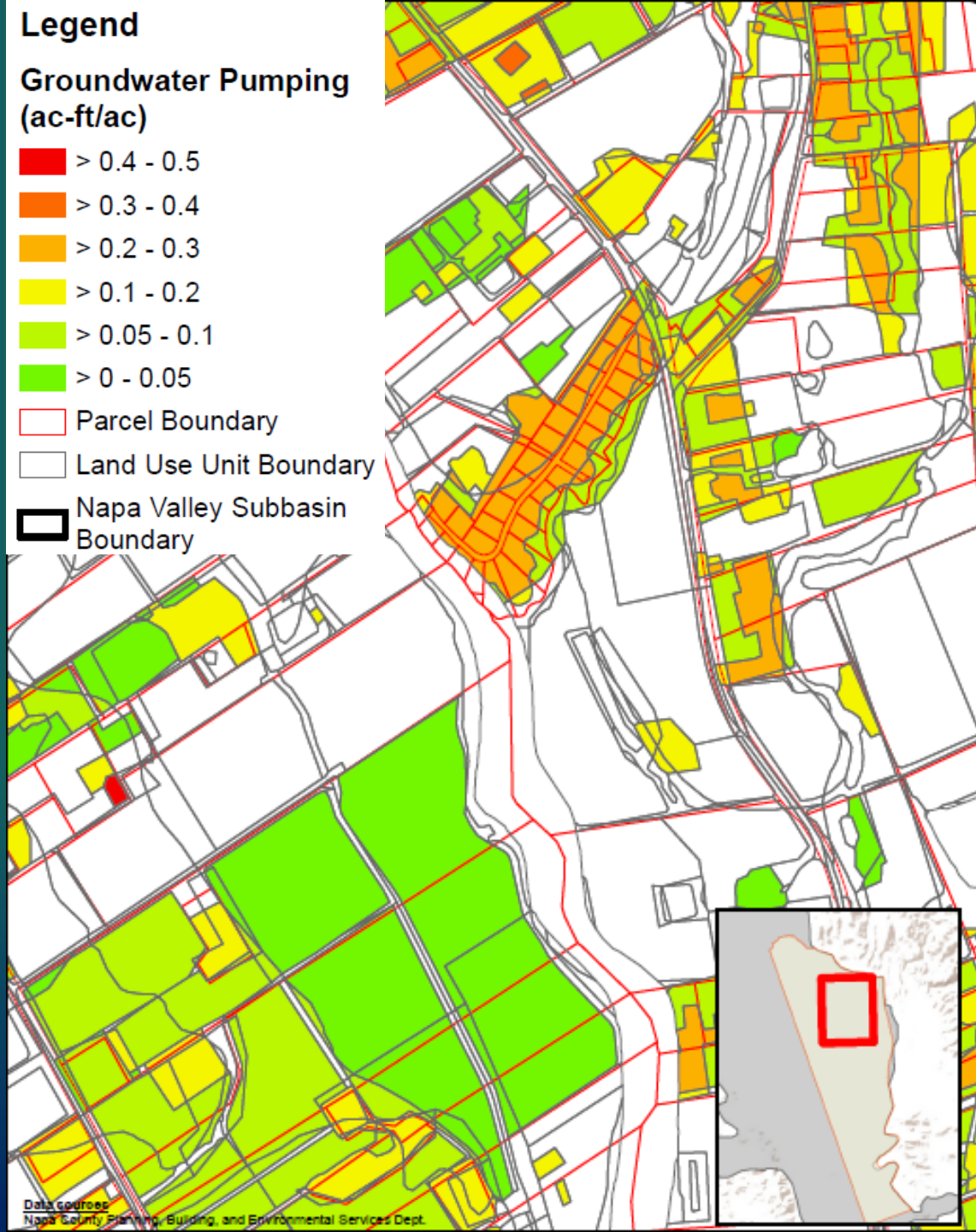
Permitted Surface Water Diversions



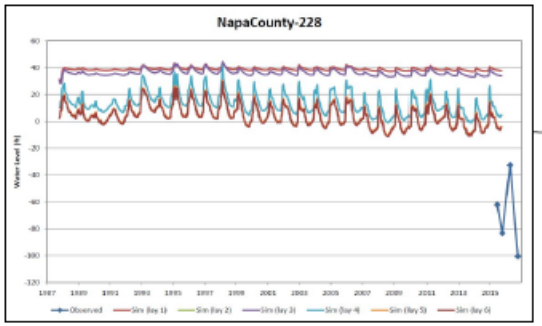
Well Locations: Actual and Inferred

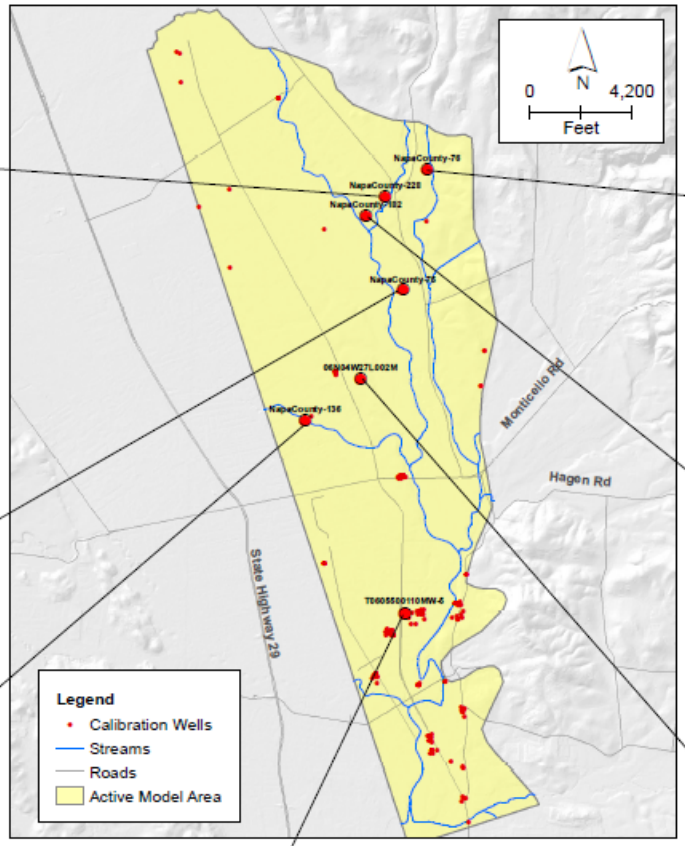


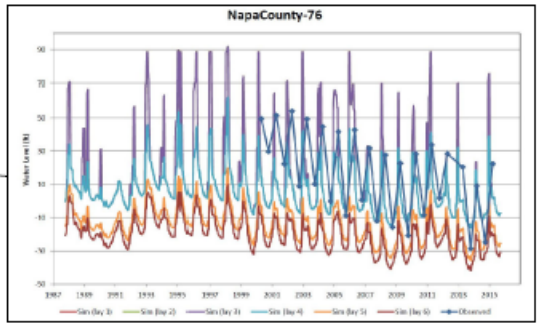
Groundwater Demand: Example July 2003

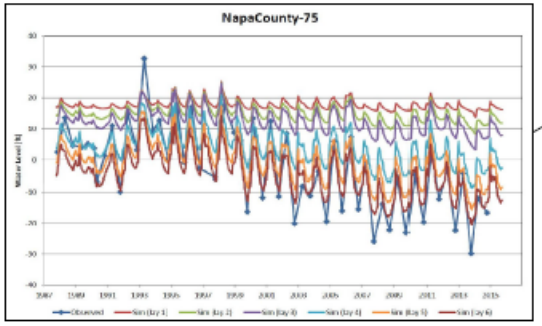


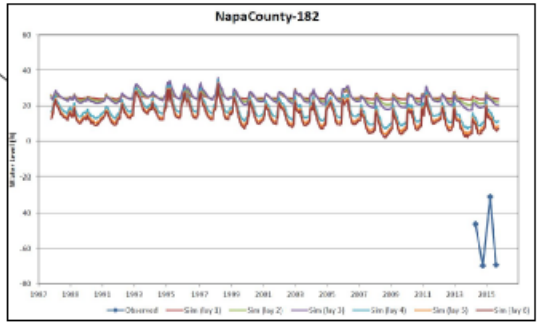
Water Level Targets for Calibration (examples)

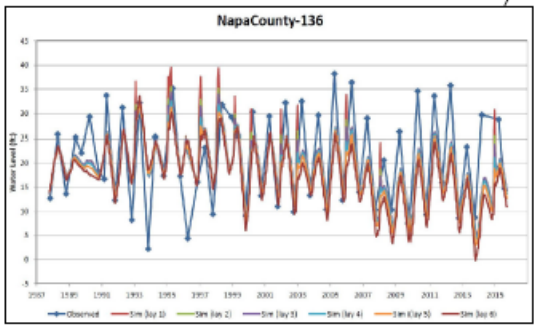


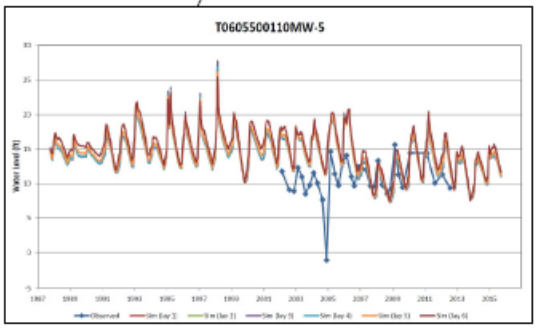


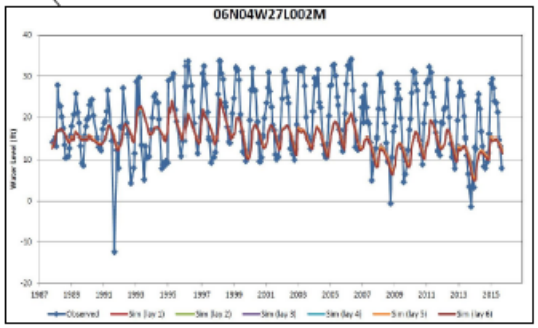




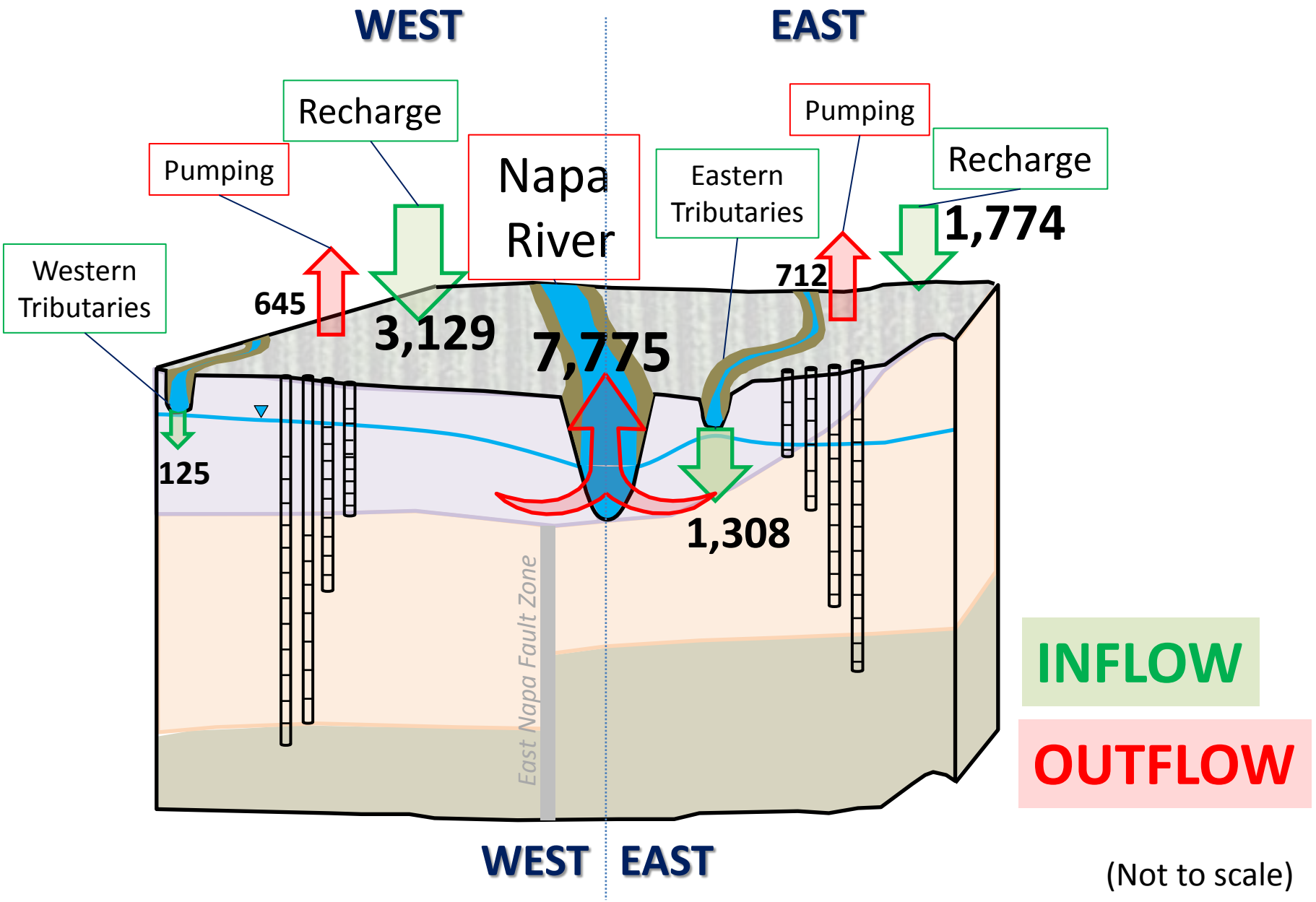




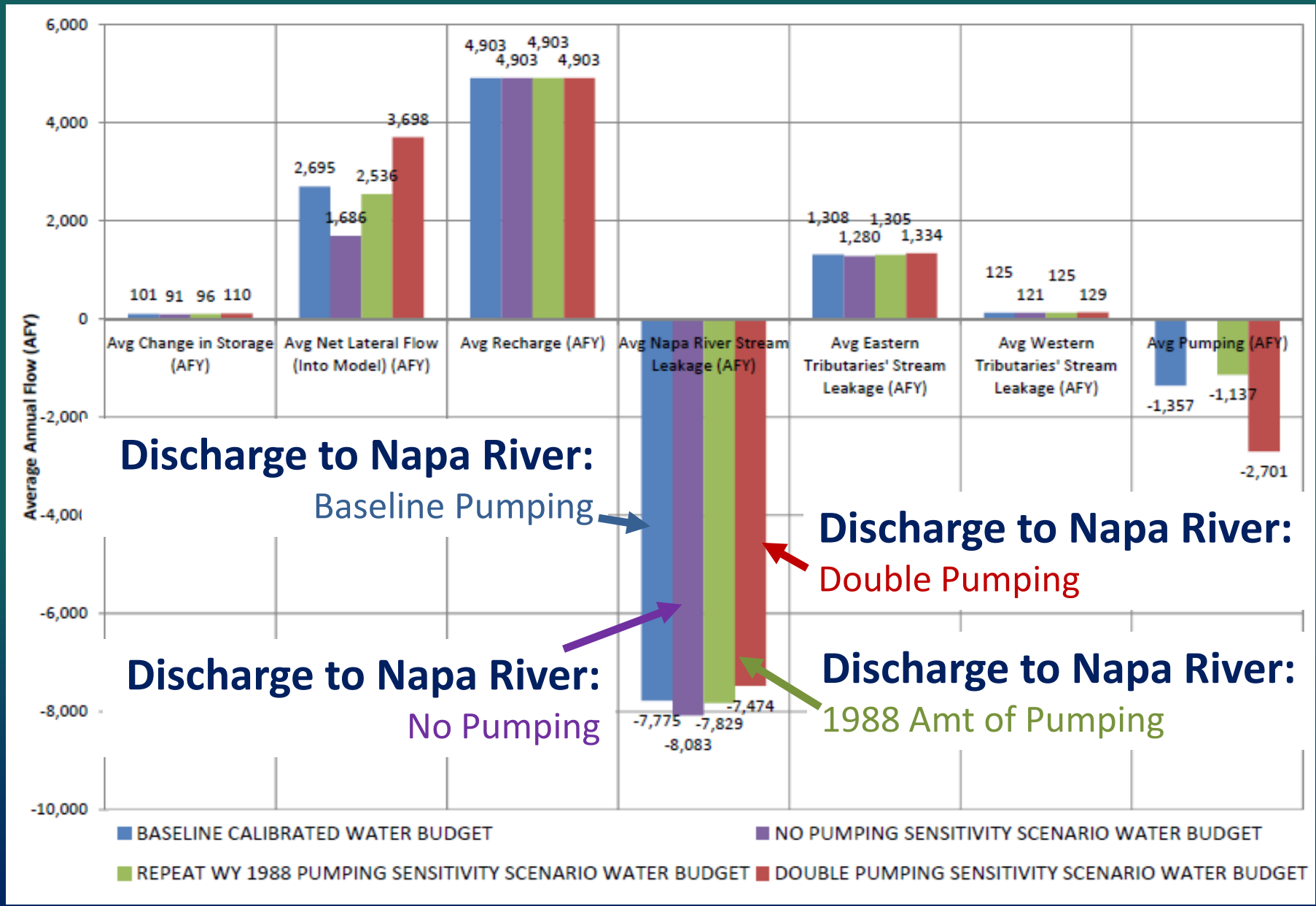




Select Average Baseline Water Budget Components (AFY)



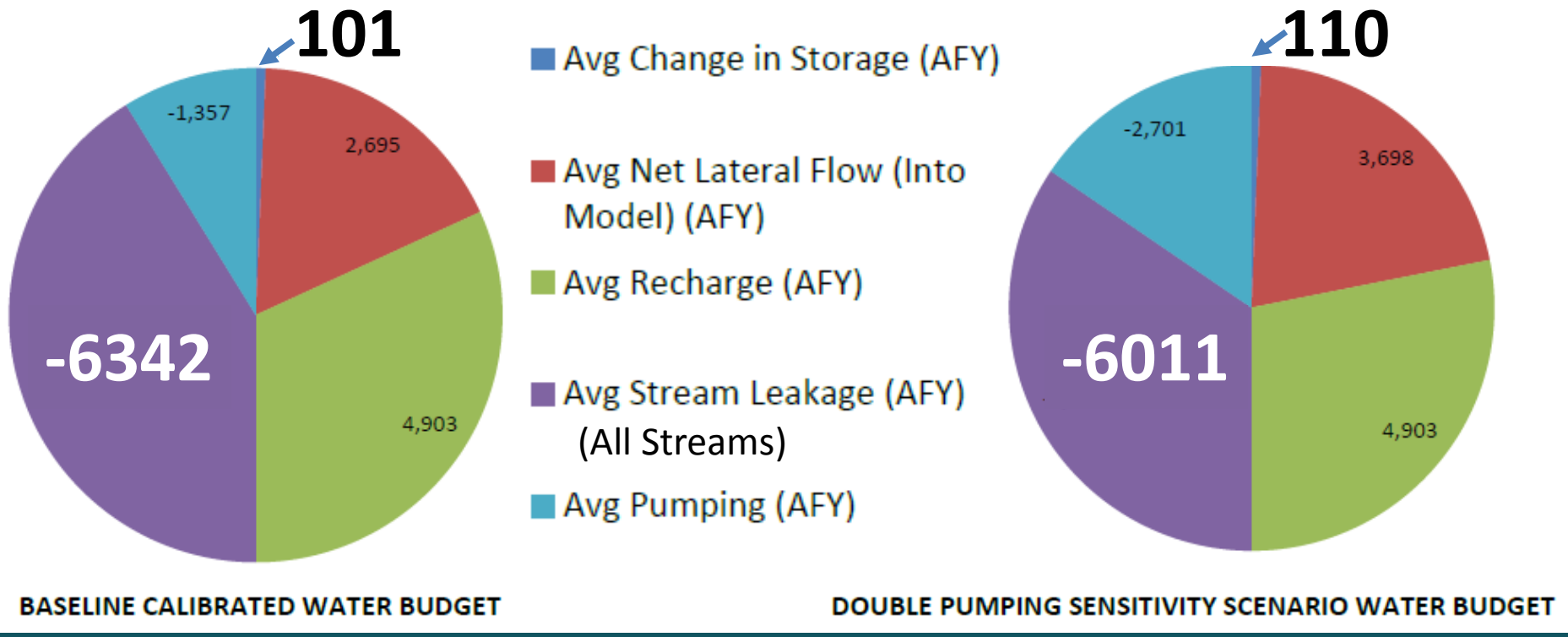
Average Annual Water Budgets: Baseline and 3 Scenarios



Comparison of Water Budget

Baseline

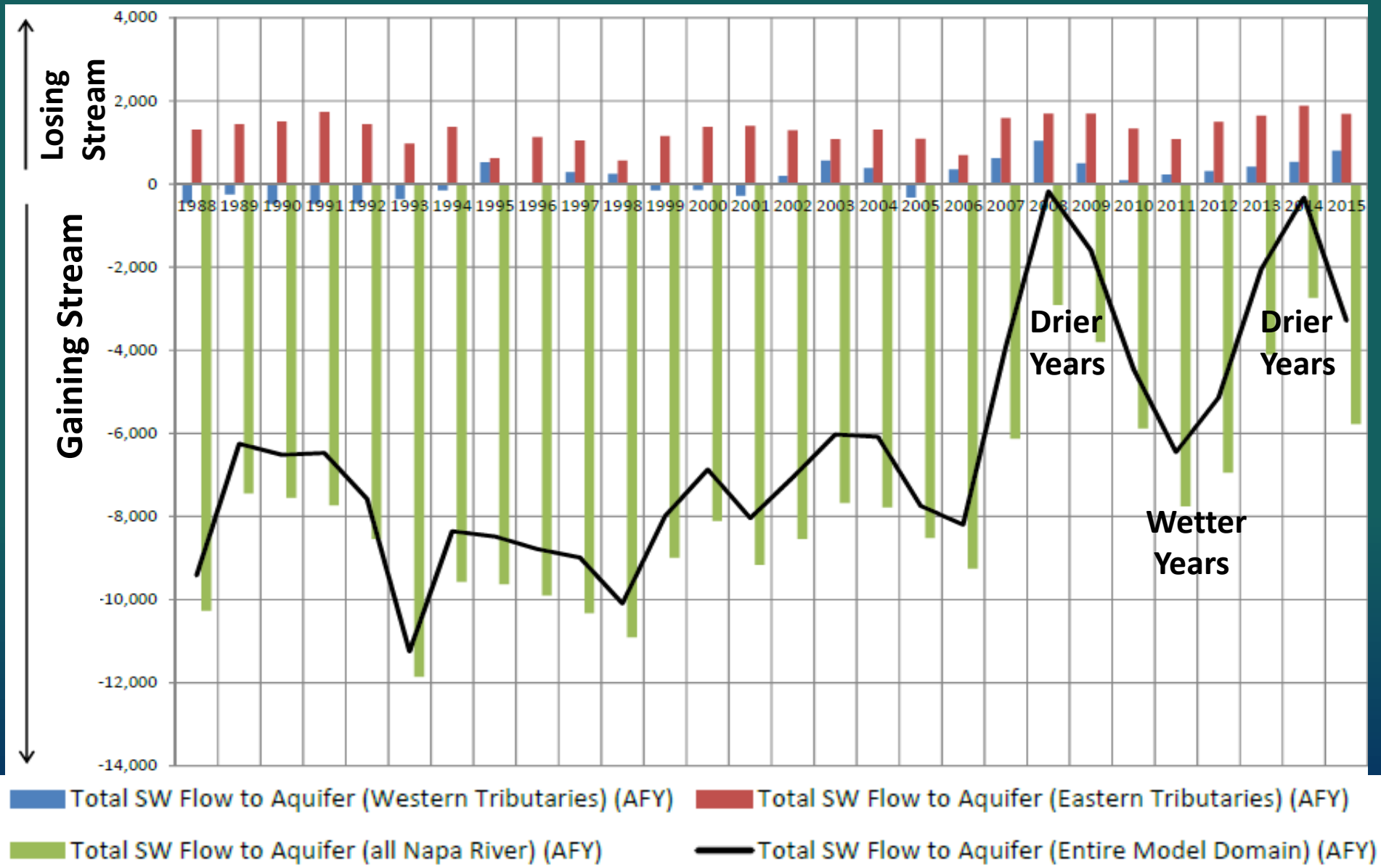
Double Pumping



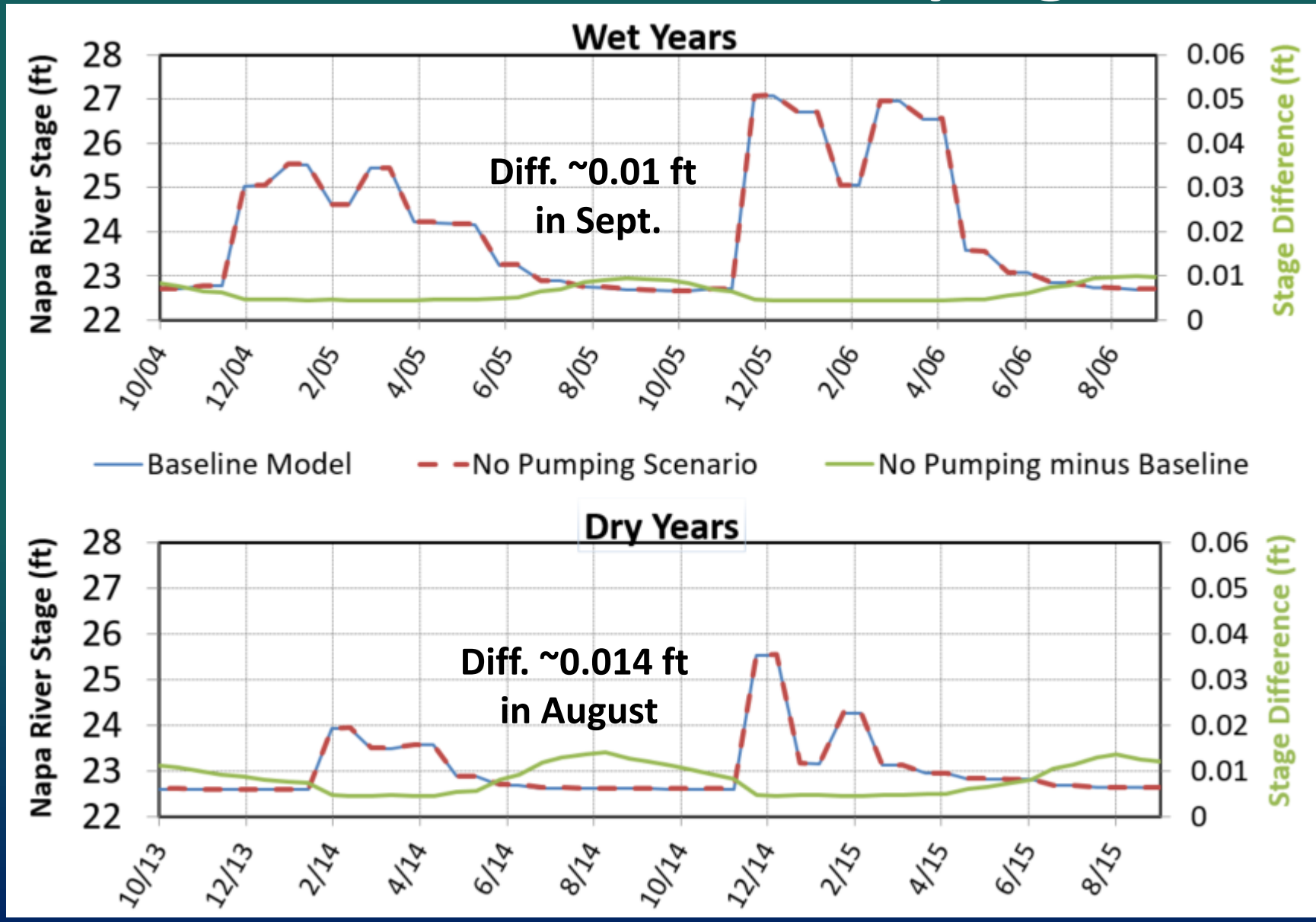
Average Stream Leakage (GW Discharge to Streams) Only About 5% Different for Double Pumping Compared to Baseline Pumping

Average Change in Groundwater Storage About in Balance

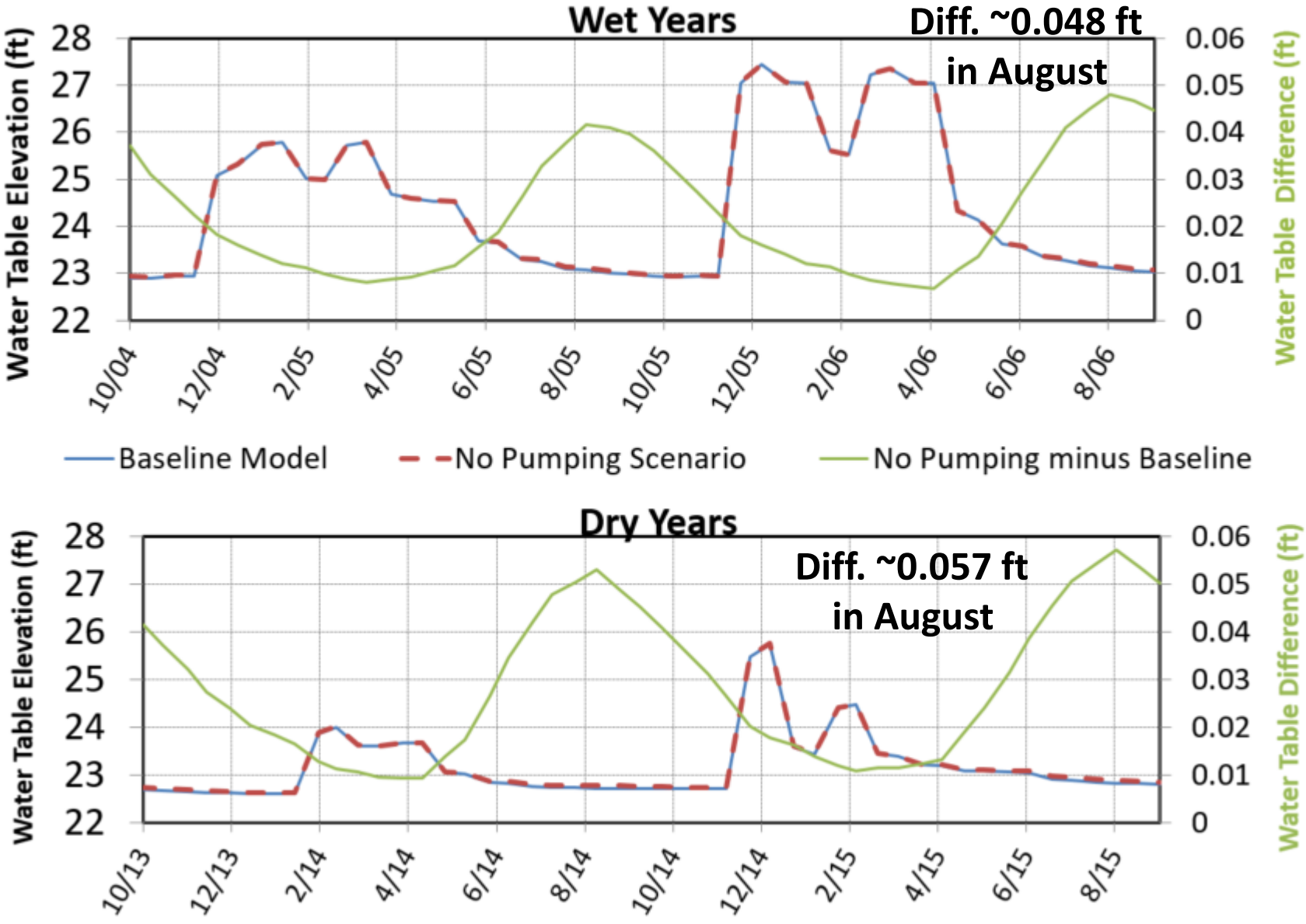
Simulated SW Flow: Baseline Model Gaining & Losing



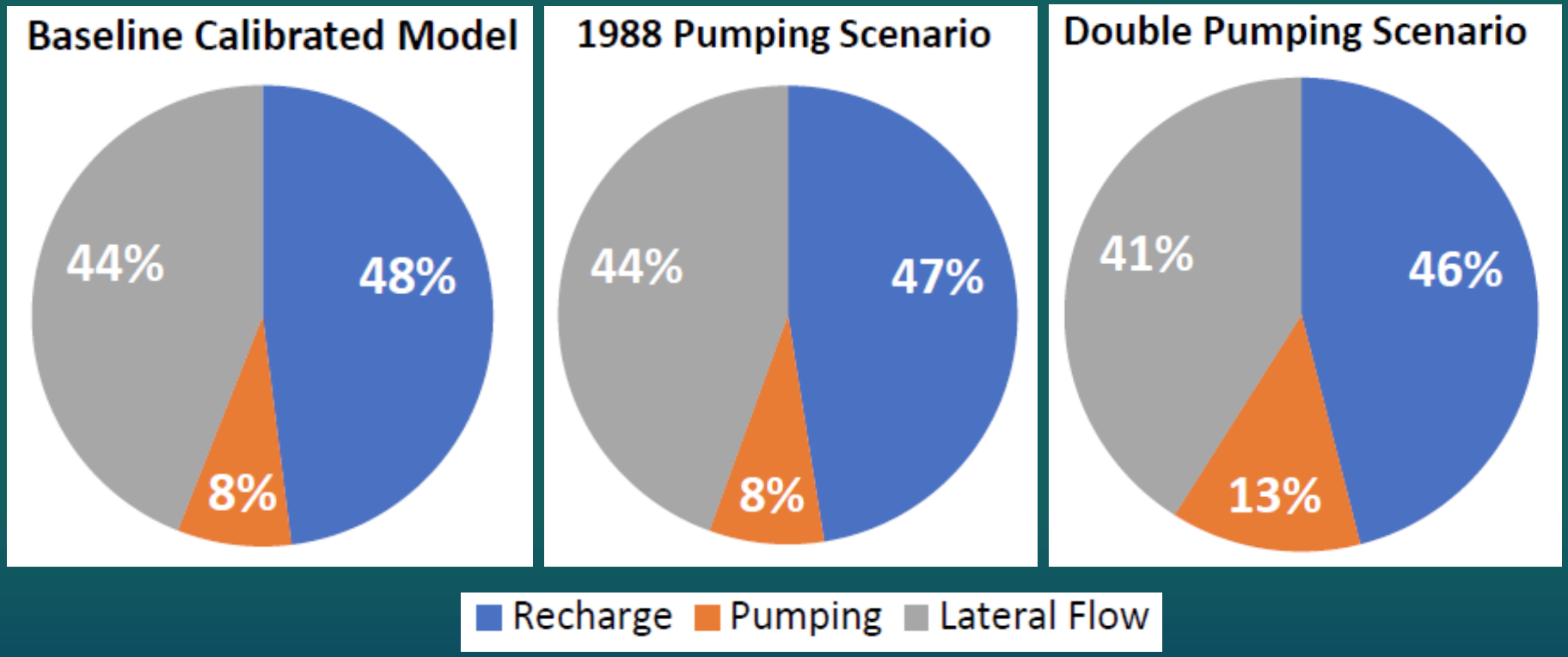
Napa River Stage at Row 111, Col. 62
Baseline vs. No Pumping



Water Table at Row 111, Col. 62
Baseline vs. No Pumping



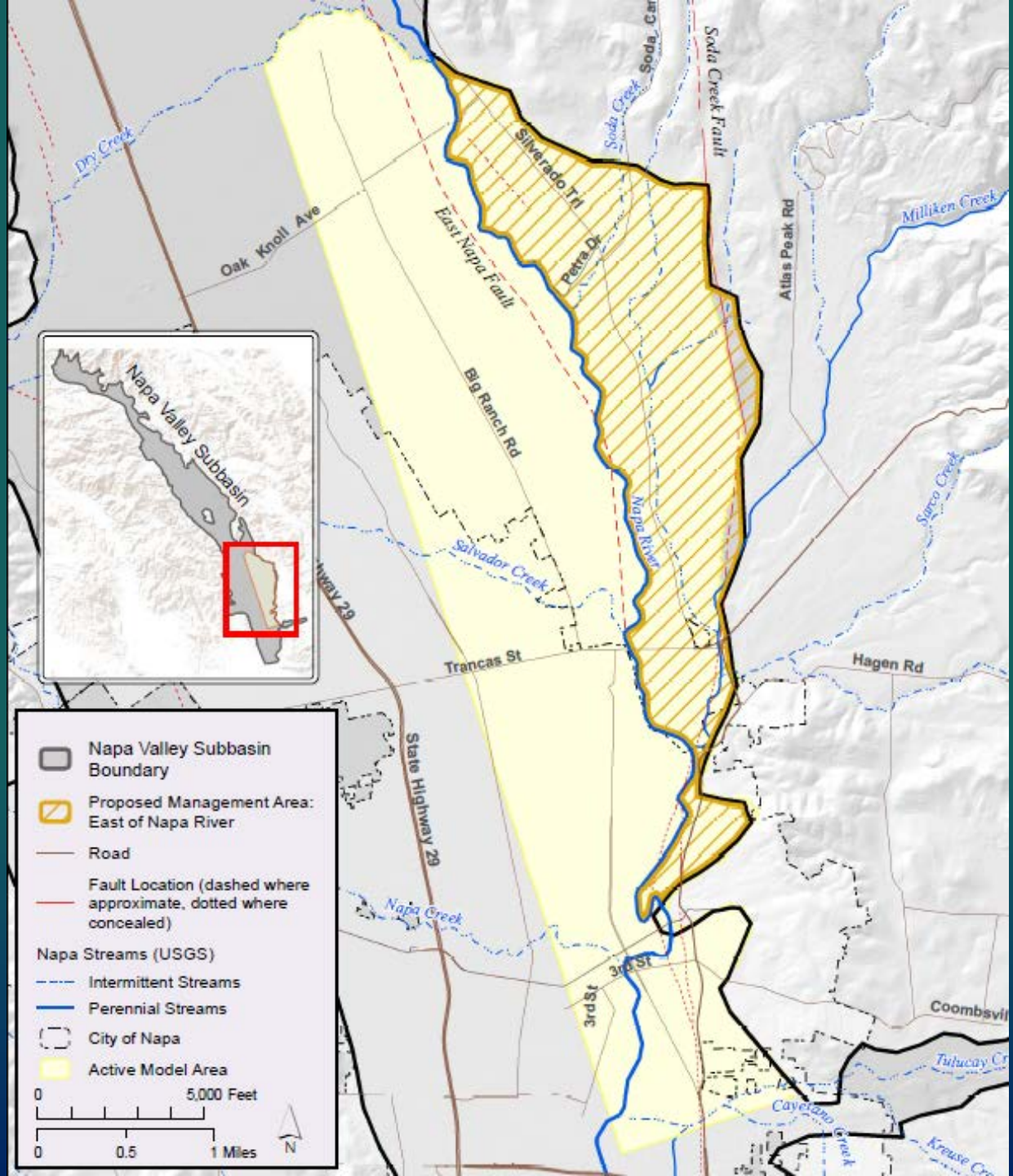
NE Napa Area: Influence of Water Budget Components on GW-SW Interactions



The small variations between these scenarios indicates the primary role of climate-driven effects.

Proposed Management Area

- Conditions different than overall Napa Valley Subbasin
- Management Area = NE Napa Area/ East of Napa River



Report: Findings NE Napa Study Area

- **GW storage change is ~ net-zero annually.**
- Pumping is relatively small part of water budget.
- Recharge is 2nd largest water budget component.
- **Within the model, GW discharge into the Napa River dominates the GW budget.**
- **Tributaries in the area most often recharge the GW on a seasonal basis.** Tributaries east of Napa River consistently show net losing stream conditions. Soda Creek is more affected by climate, than pumping in determining the rate of stream leakage to GW.

Report: Findings (cont.)

- Starting in the late 1990s, a decrease in GW discharge to streams occurs. This recent trend can be **attributed to less precipitation (climatic effects), including reduced recharge and subsurface lateral flows, rather than to pumping.**
- **Geologic faulting** in the model area is **important to the overall behavior of water levels east of Napa River**. Additional concealed faults may be present, which may affect water levels in deeper wells in the Petra Drive area.

Report: Findings (cont.)

- The modeling scenarios indicate the **primary role of climate–driven effects.**
- Statistical analyses of model recharge, lateral flows and pumping relative to baseflow in Napa River show **climate effects contribute to 87 to 92% of the effect on baseflow in Napa River, while pumping contributes to 8 to 13% of the effect on baseflow.**
- Some drawdown in the Petra Dr. area is associated with mutual well interference (compounded by high well density). The lowered GW levels near Petra Dr. are not as significant as the regional influence of GW movement away from Petra Dr. towards the MST Subarea.

Report: Recommendations

A. Surface Water/Groundwater Monitoring Facilities

- Construct shallow nested MWs (like LGA SW/GW) east of Napa River near Petra Drive

B. SGMA Management Area Designation

- Management Area = Northeast Napa Area/East of Napa River
- Meets criteria for designation due to geologic features and aquifer parameters distinct from the Napa Valley Subbasin

C. Discretionary Project WAA Review in Management Area

- For discretionary projects, recommend additional project-specific analyses (WAA Tier 2) be conducted to ensure that proposed project location or planned GW use does not cause an undesirable result (i.e., may include water use criteria)

Report: Recommendations (cont.)

D. New Well Tracking in the Management Area

- Track new non-discretionary groundwater wells constructed in the Management Area, including planned usage and location.

E. New Well Pump Testing

- Management Area, and also deeper geologic units in Napa Valley Subbasin

F. Groundwater Flow Model Development

- Develop model for entire Napa Valley Subbasin

G. Increased Water Conservation and Recharge

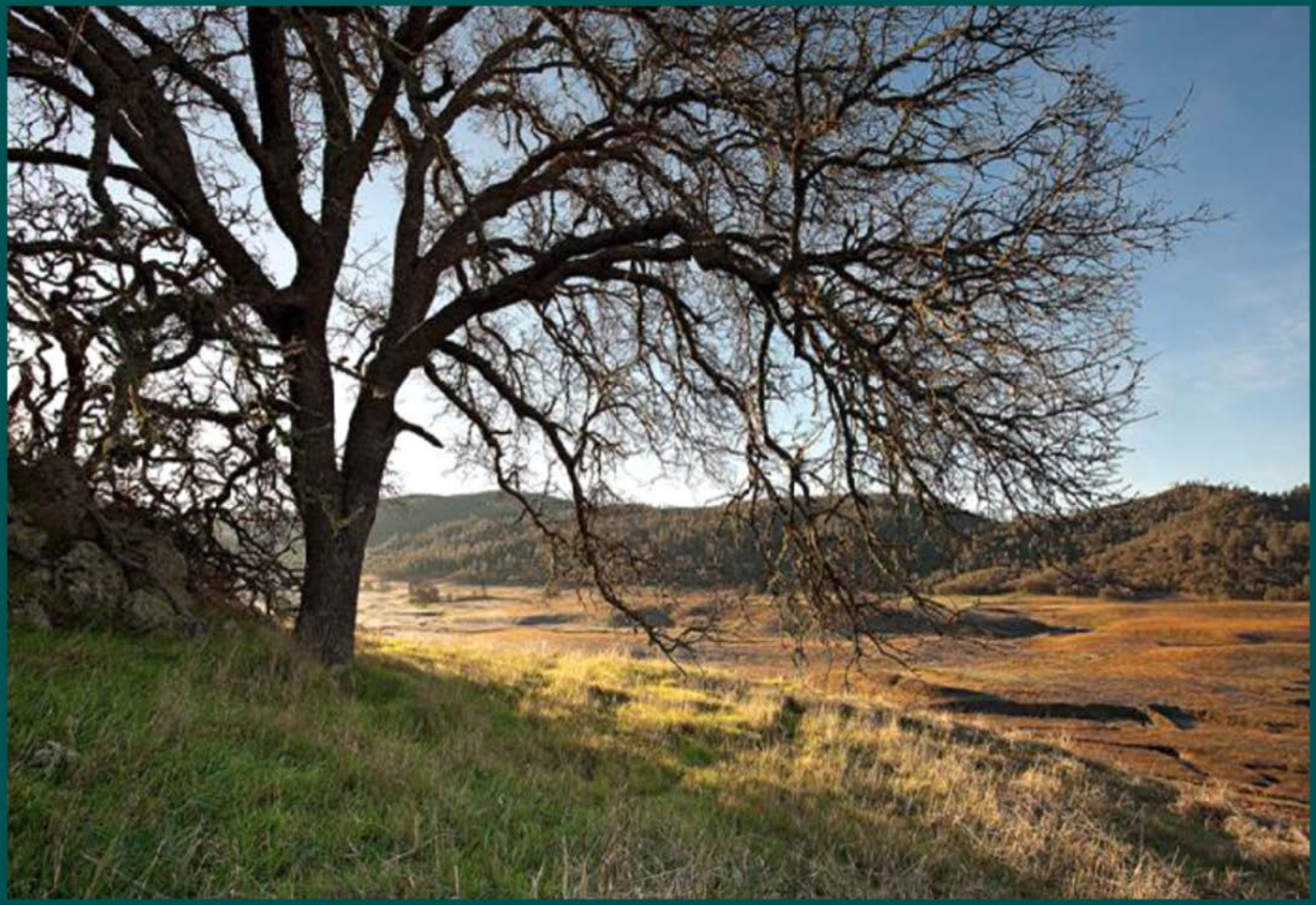
- Promote sustainable water use, including maintain/improve ecosystem health.
- Evaluate approaches stormwater management and increase water conservation, create additional climate resiliency through targeted recharge strategies.

Summary of Recommendations

	RECOMMENDATIONS	Management Area (NE Napa/ East of River	All Napa Valley Subbasin
A	Add SW/GW Monitoring Wells	X	X
B	Management Area Designation	X	
C	Discretionary Projects – Additional WAA Review (Tier 2)	X	
D	New Well Tracking in Management Area	X	
E	New Well Pump Testing	X (All)	X (Deeper formations)
F	GW Flow Model Development		X
G	Increase Conservation & Recharge	X	X

Summary: Other Updates

- Presentation to Board of Supervisors October 24, 2017
  - BOS supported Management Area designation and other recommendations
- Preparation of supplemental report (in progress)
  - Sustainable Groundwater Management Act/ Groundwater Sustainability Plan Regulations for Management Areas (Section 354.20)
  - NE Napa Management Area: water budget is in balance for inflows and outflows over the 28-year study period
  - Establish minimum thresholds, measurable objectives, and monitoring sites, and management actions to maintain balance



Thank You