Napa County Groundwater Sustainability Agency

Annual Report – Water Year 2022

March 28, 2023

Luhdorff & Scalmanini
Consulting Engineers

Outline

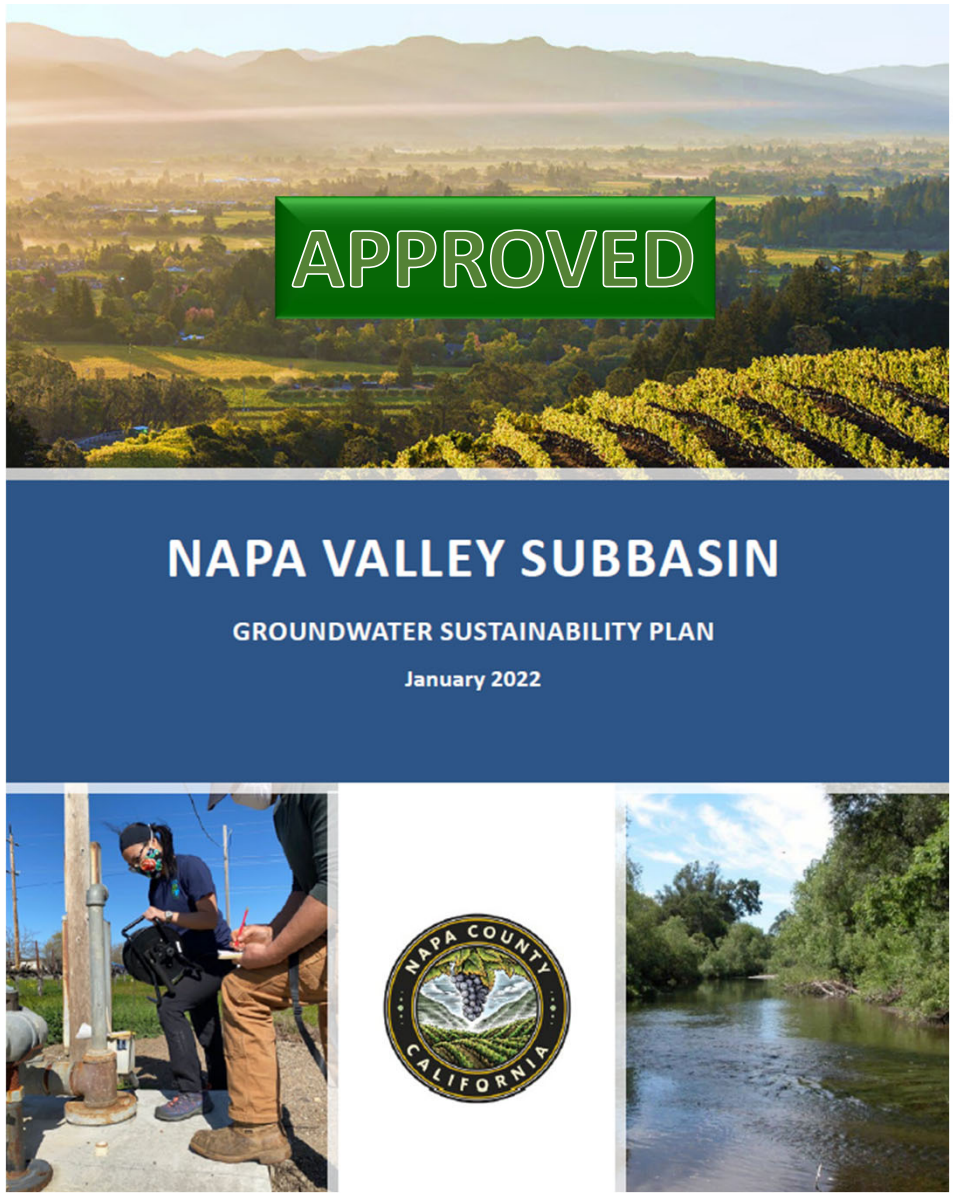
- Napa County and Climate Change
- Napa County & Subbasin Monitoring
- Napa Valley Subbasin Water Budget
- Sustainability Indicators & Metrics
- Response Actions & GSP Implementation

DWR Approves GSP

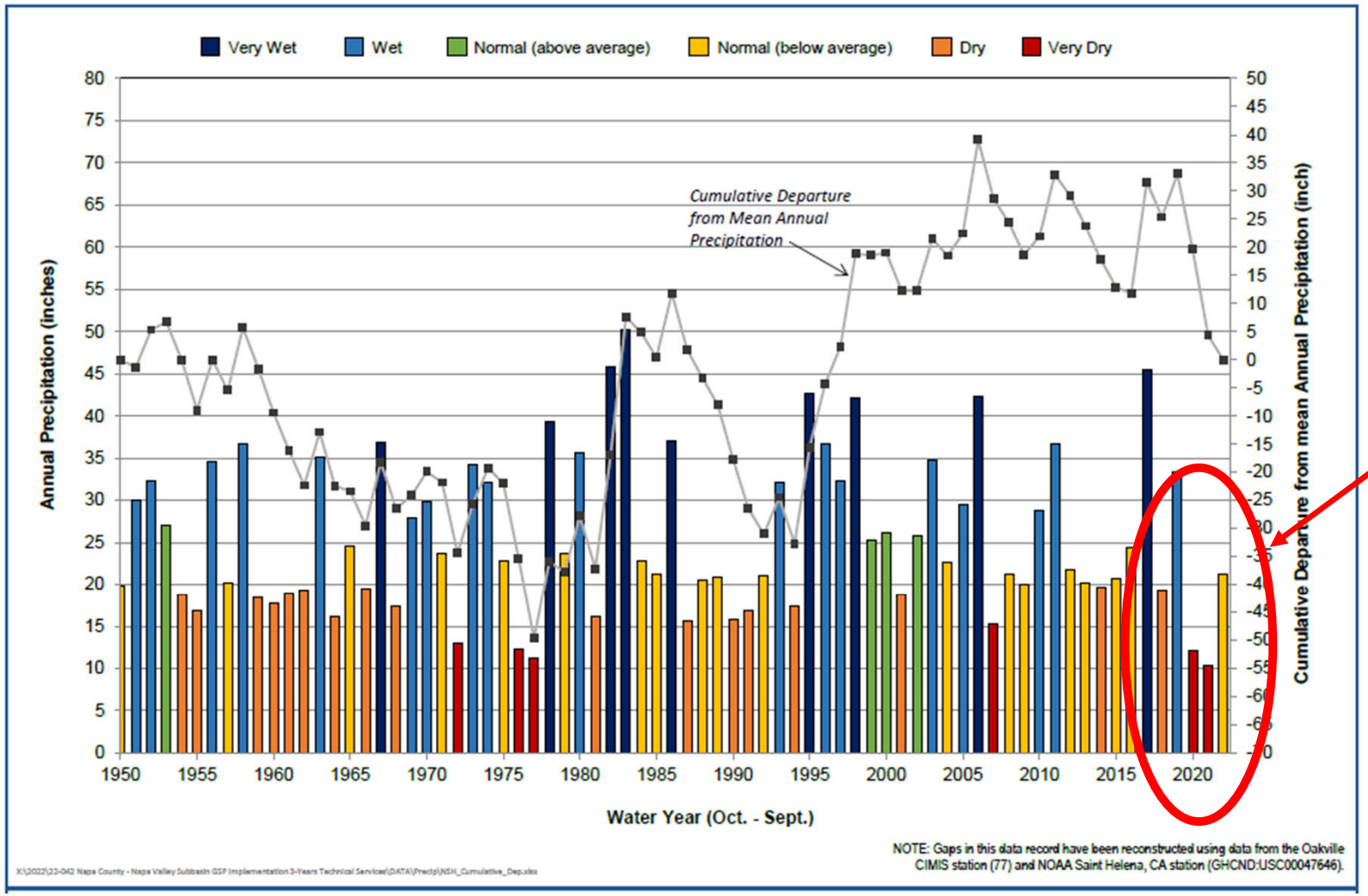
DWR Letter of Approval: Jan. 26, 2023

Recommended Corrective Actions for 5-Year Update (2027)

- Revise definition for chronic groundwater level decline sustainable management criterion to **remove drought year condition** or discuss management of extractions and recharge to offset decreases that occurred during drought
- Define a **new cumulative metric** for the subsidence MT of 0.5 ft within a 5-year period; this also avoids incremental effects of land subsidence
- Consider DWR guidance intended to assist GSAs to sustainably manage depletions of interconnected surface water ***when the guidance is developed***

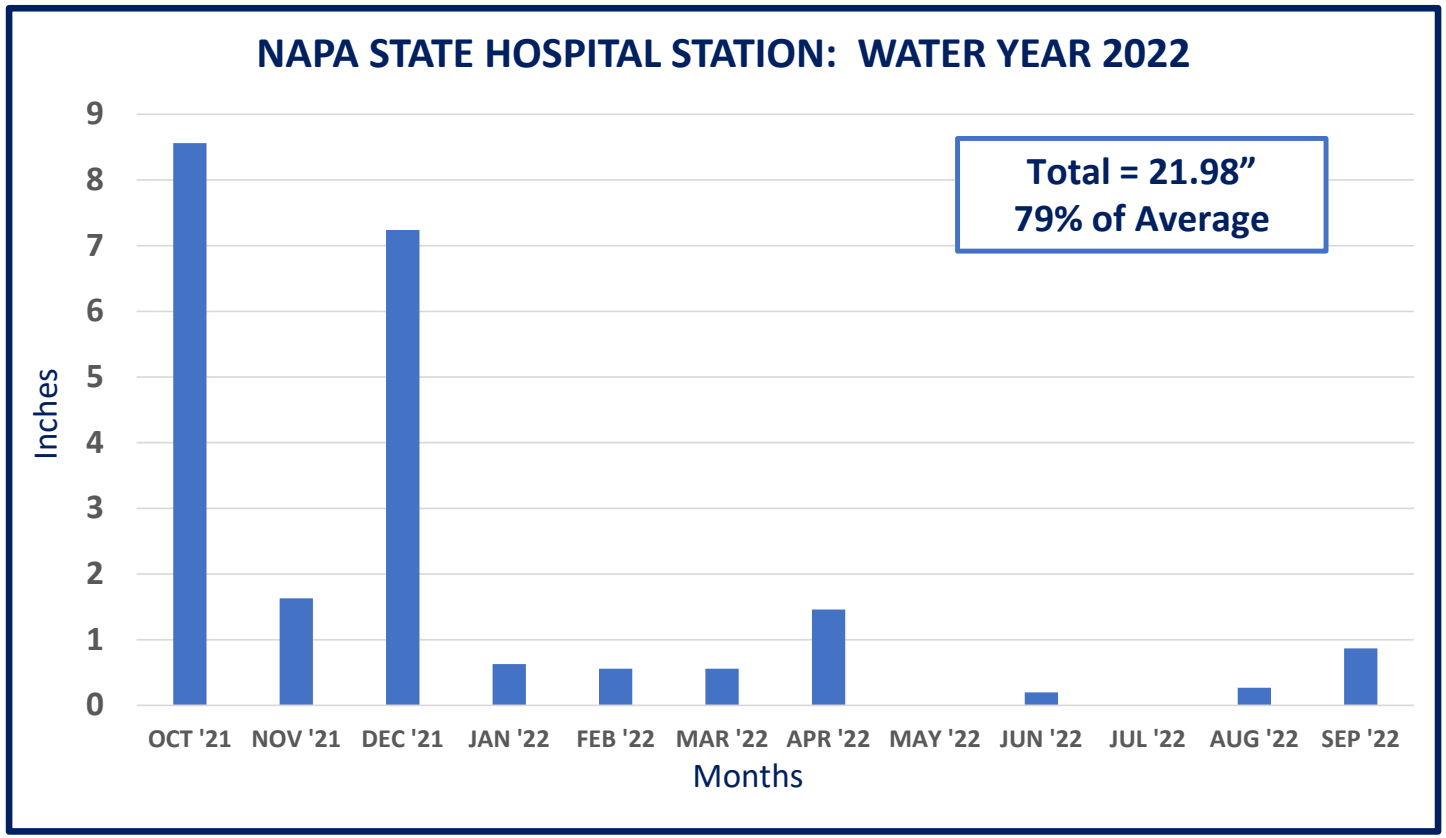


Historical Precipitation at Napa State Hospital



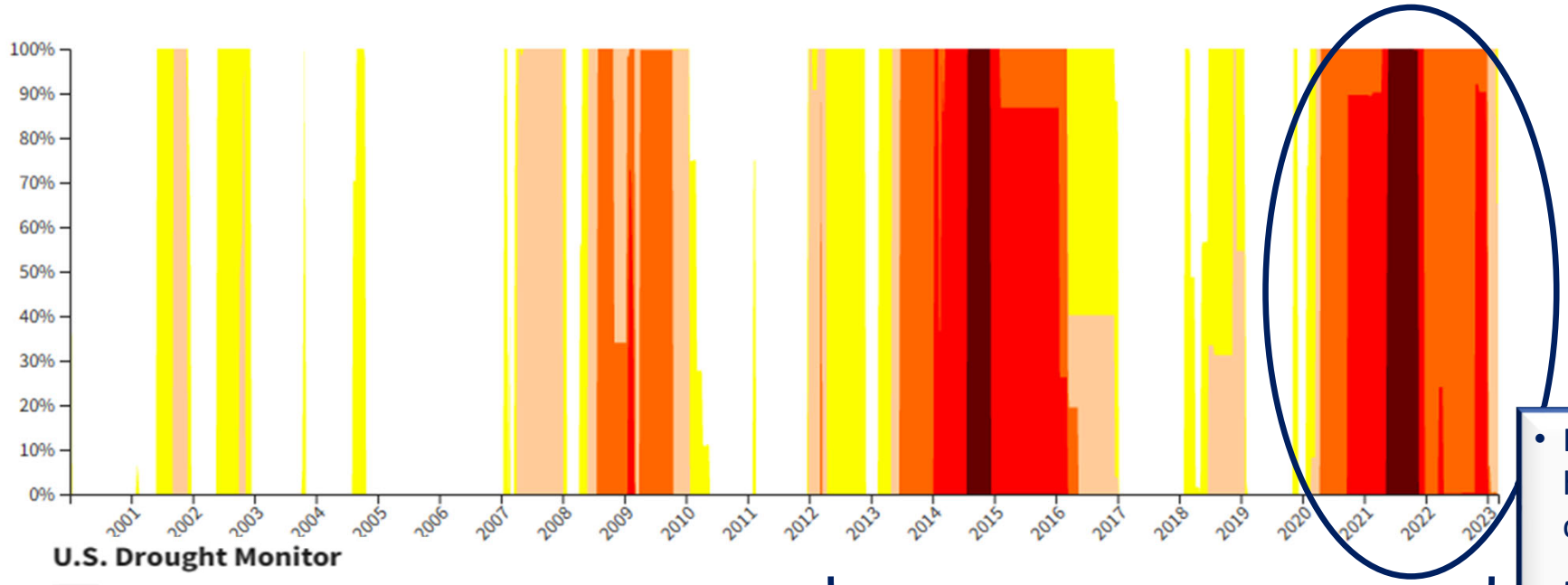
WYs 2020 & 2021 Very Dry; WY 2022 Normal (below average)

Precipitation: Water Year 2022



- Most precipitation for WY 2022 occurred in Fall 2021
- January through September 2022 were very dry

U.S. Drought Monitor: Napa County



U.S. Drought Monitor

- D0 - Abnormally Dry
- D1 - Moderate Drought
- D2 - Severe Drought
- D3 - Extreme Drought
- D4 - Exceptional Drought

Source(s): USDA NASS

Data as of: 3/7/2023

Many Dry Years & Only a Couple Wet Years

- Increasingly hotter/drier conditions
- Extreme variability
- WYs 2020, 2021, 2022: Severe to Exceptional Drought
- WY 2023: Moderate Drought(?)

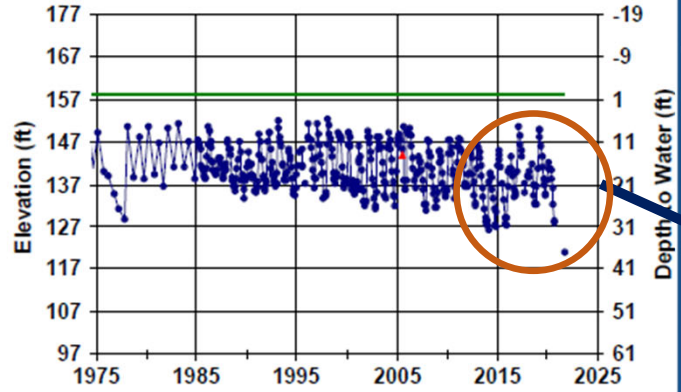
Monitoring Network	Measurement Type	Total			GSP-Specific	
		County	Napa Valley Subbasin	RMS	Supplemental	Planned
Groundwater Level	GW Levels	98	59	27	30	8
Groundwater Storage	GW Levels	--	27	0	27	0
	NVIHM Model	--	1	1	--	--
Land Subsidence	GW Levels	--	12	15	0	0
	Benchmark Monitoring	--	8	5	3	0
	InSAR		1			
Stream Stage and Stream Discharge	Stream Stage and Stream Discharge	--	5	0	5	Yes
	Stream Watch	39	33	--	--	Yes
	Flood Control	--	18	0	18	0
Interconnected Surface Water – Groundwater	GW Levels	--	26	7	11	8+
	NVIHM Model	--	2	2	--	--
GDE Monitoring	GW Level	--	22	0	15	8
	Stream Habitat	--	1	--	--	TBD
	Remote Sensing	--	10	0	10	0
Groundwater Quality	GW Quality	1,621[1]	34	21	18	0
Seawater Intrusion	Chloride testing	--	16	9	7	2
Surface Water Quality	SW Quality	--	6	7	0	0

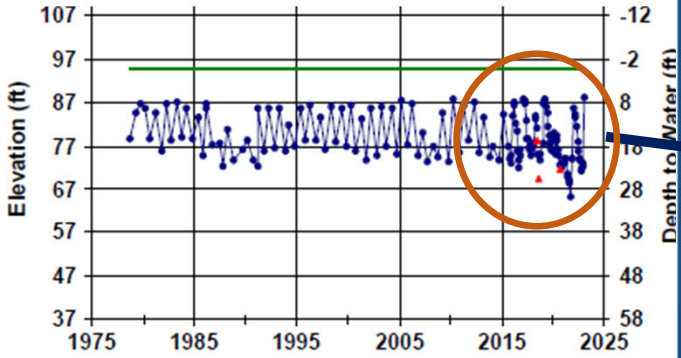
9 GSP Monitoring Networks

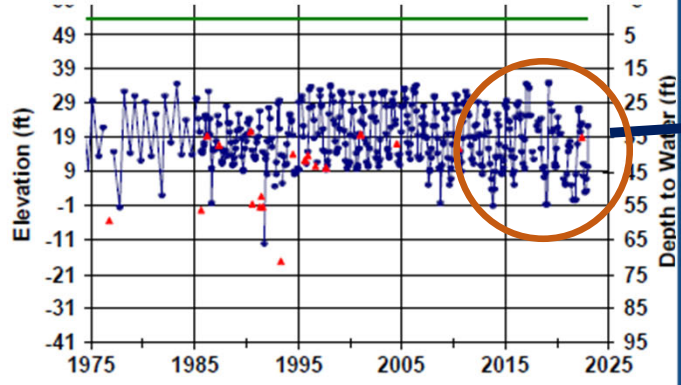
- **Already Much Monitoring**
- **GSP Compliant**
- **More MWs Being Installed (April-May 2023)**
- **More Monitoring to be Recommended**

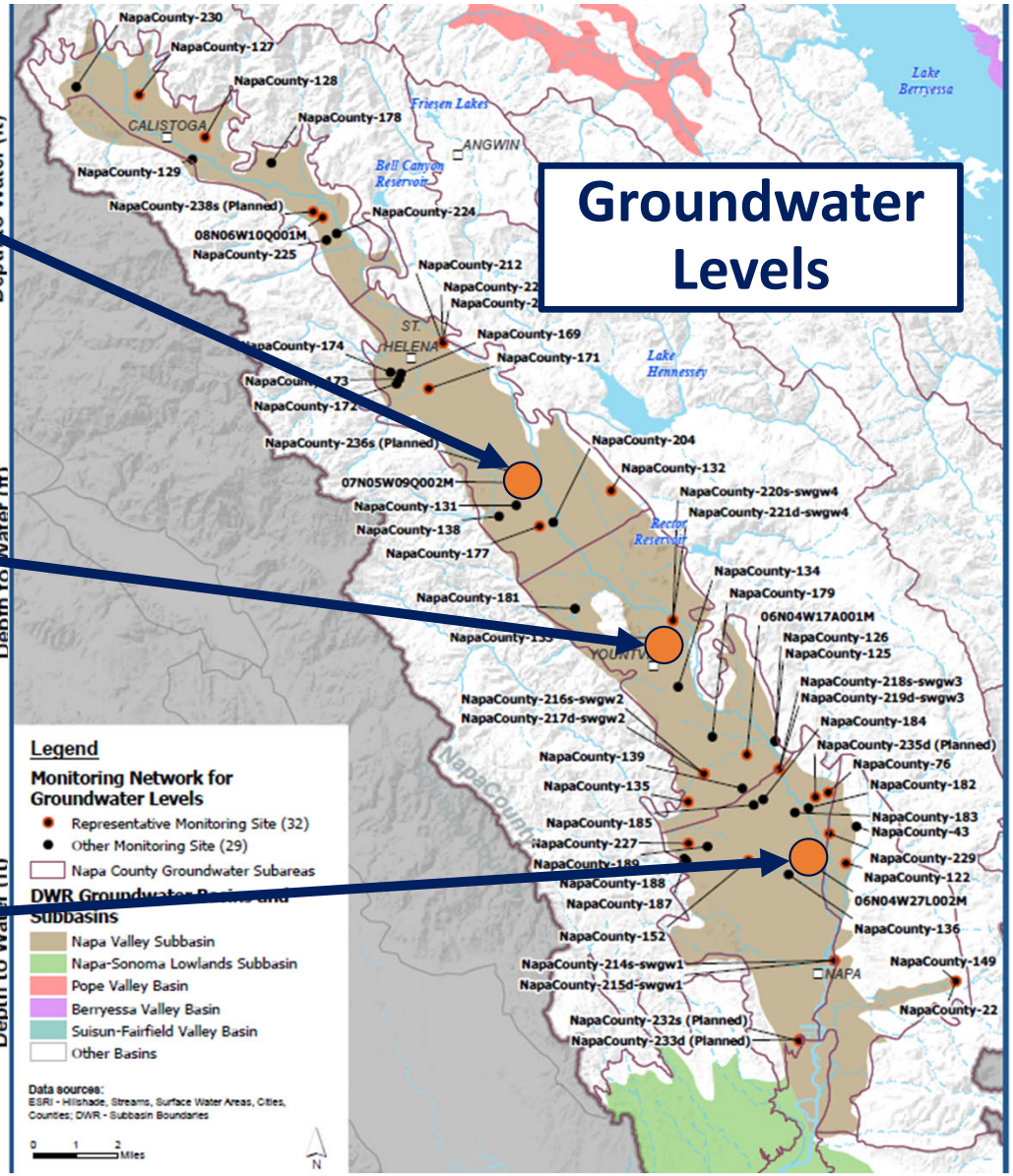
Napa Valley Subbasin Hydrographs

Recent Drought Effects



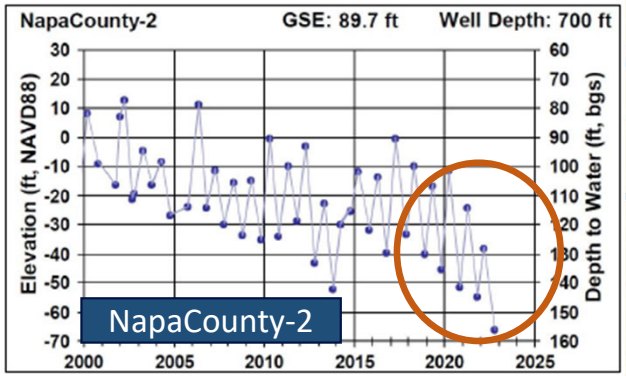


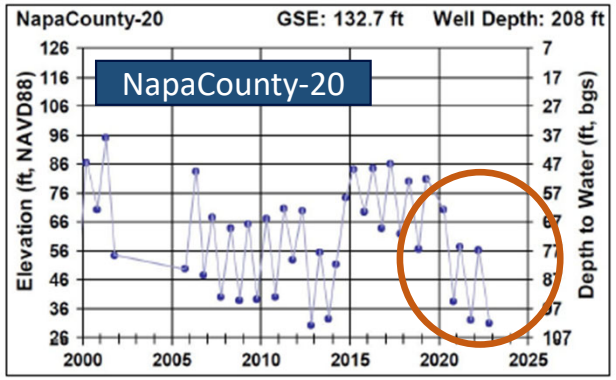


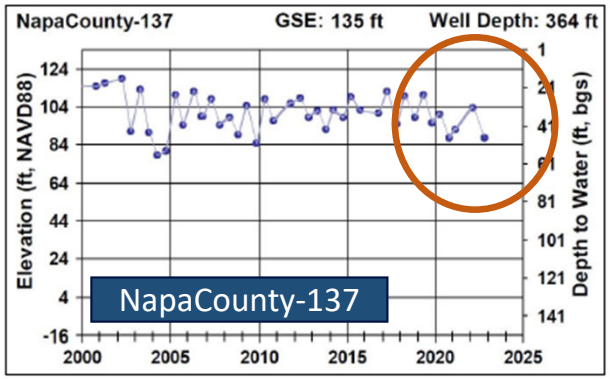


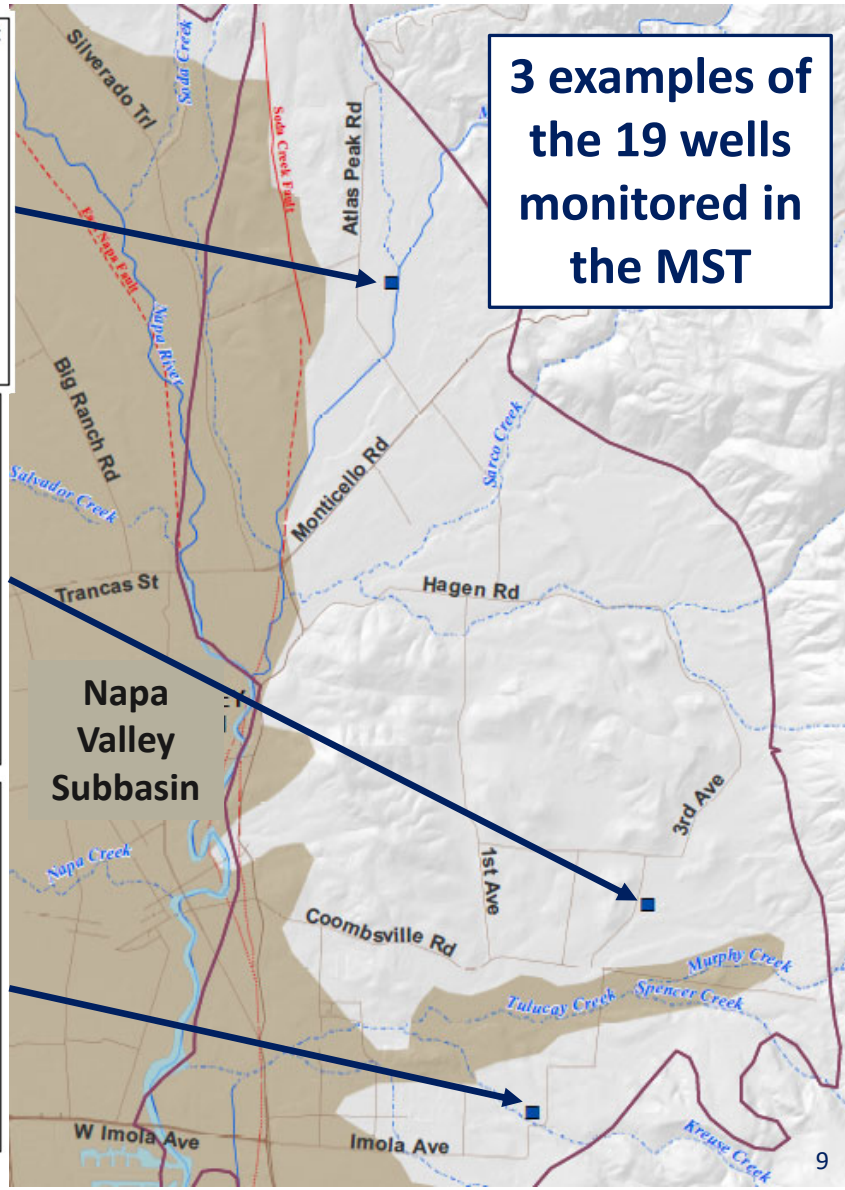
MST Hydrographs

- MST largely outside Subbasin
- Monitoring data available for more than four decades
- Recognized historical declines
- Stable groundwater levels ~ 2009-2020
- Many monitoring wells show recent declines





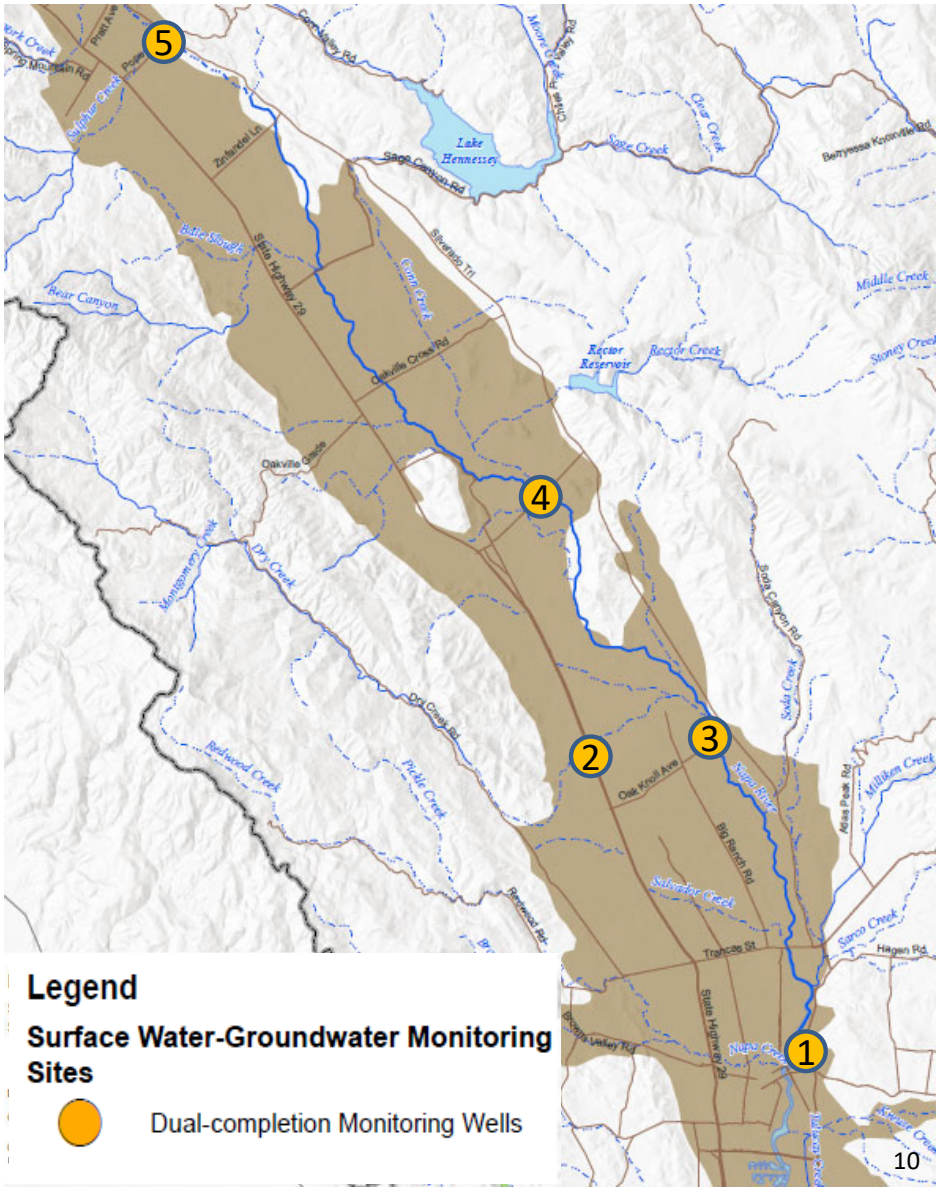




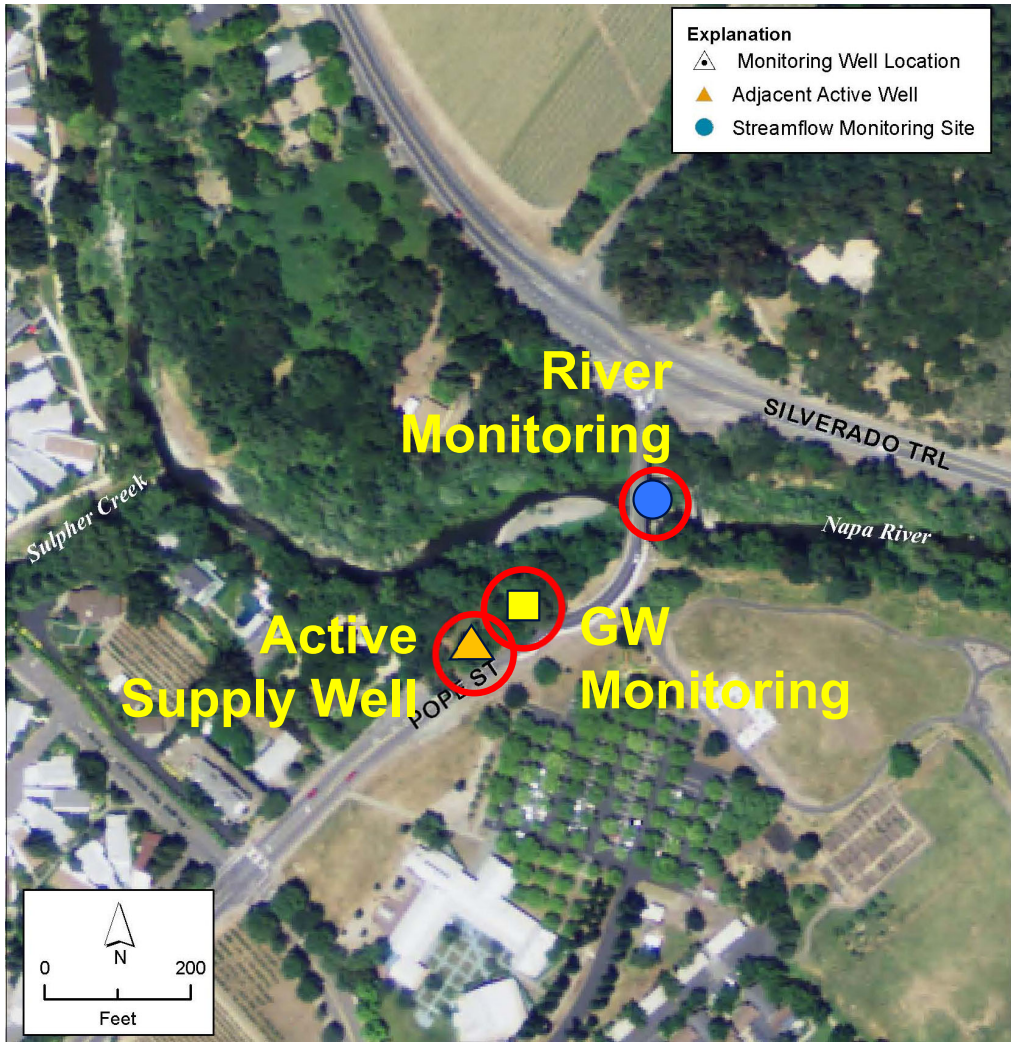
Surface Water/Groundwater Interaction

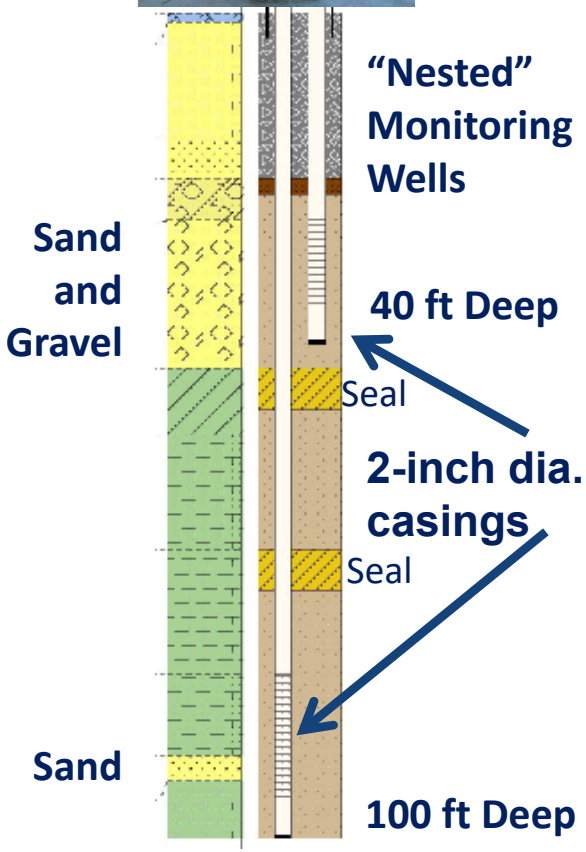
Dedicated Monitoring Facilities at 5 Sites

- DWR grant support: 2014 Pre-SGMA
- Paired Shallow Monitoring Wells (MWs) each site
  - Levels & quality
- Stream Gauge each site
  - Streamflow & quality
- > 8 years of data



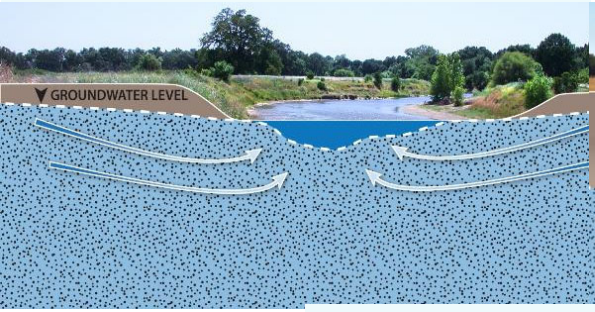
SW/GW Interaction: Site 5 St. Helena



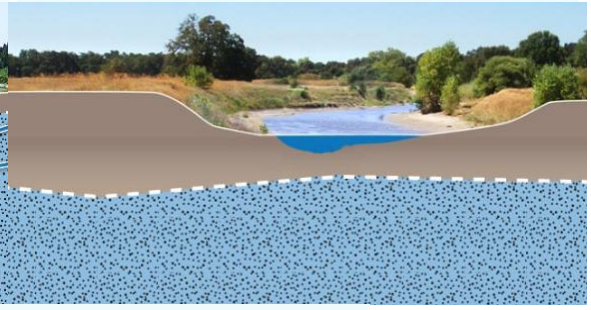


Surface Water/Groundwater Interactions

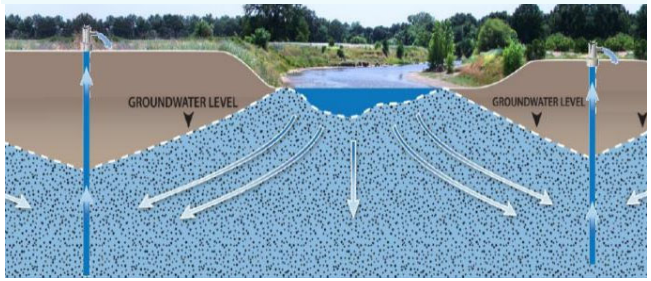
Direct Connection
Maintains/Discharges to Stream (Groundwater Baseflow) **A**



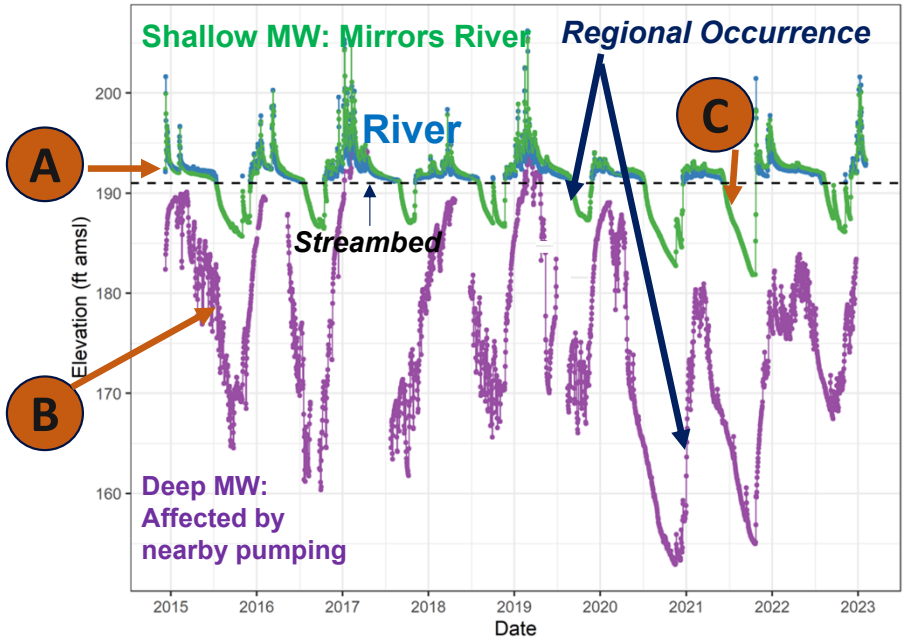
Indirect Connection
Stream Seepage Independent of GW Levels **C**



Groundwater Pumping
Stream Loses Water/Recharge to GW **B**



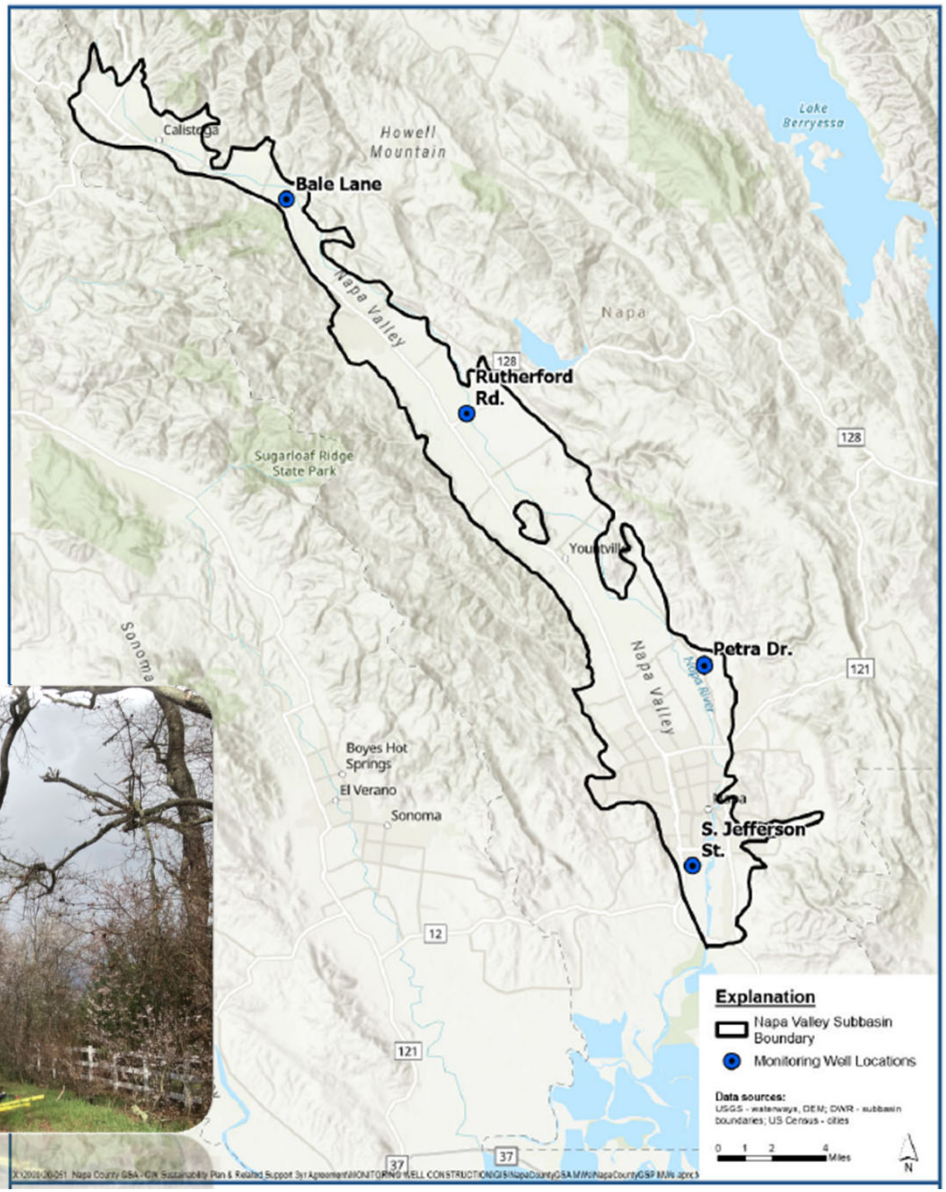
St. Helena SW/GW Site 5

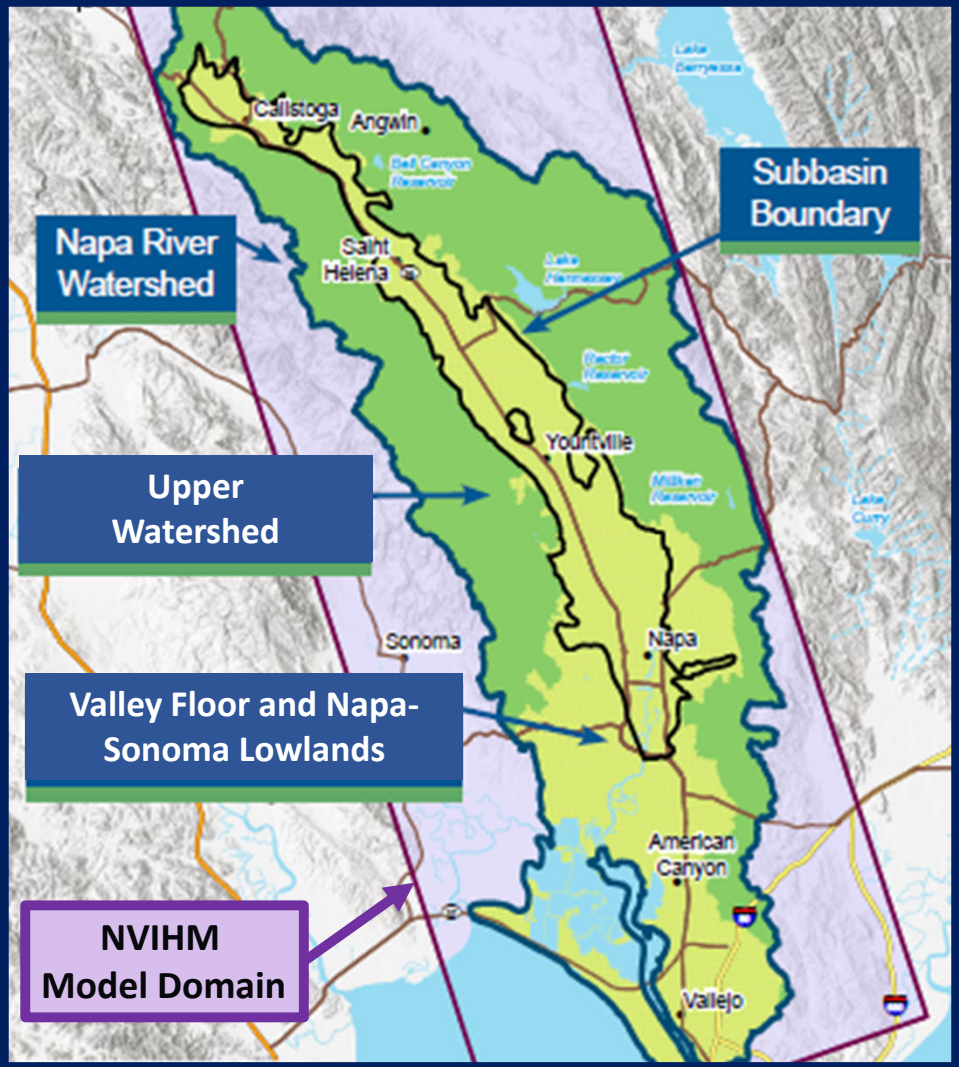


River and Shallow MW not exhibiting short-term pumping effects

Four New MW Sites: Focus on SW/GW Interaction

- Four new monitoring sites (8 MWs)
  - Two sites (4 MWs installed; January/February 2023)
  - When sites accessible, two other sites (4 MWs) to be installed (April-May 2023)





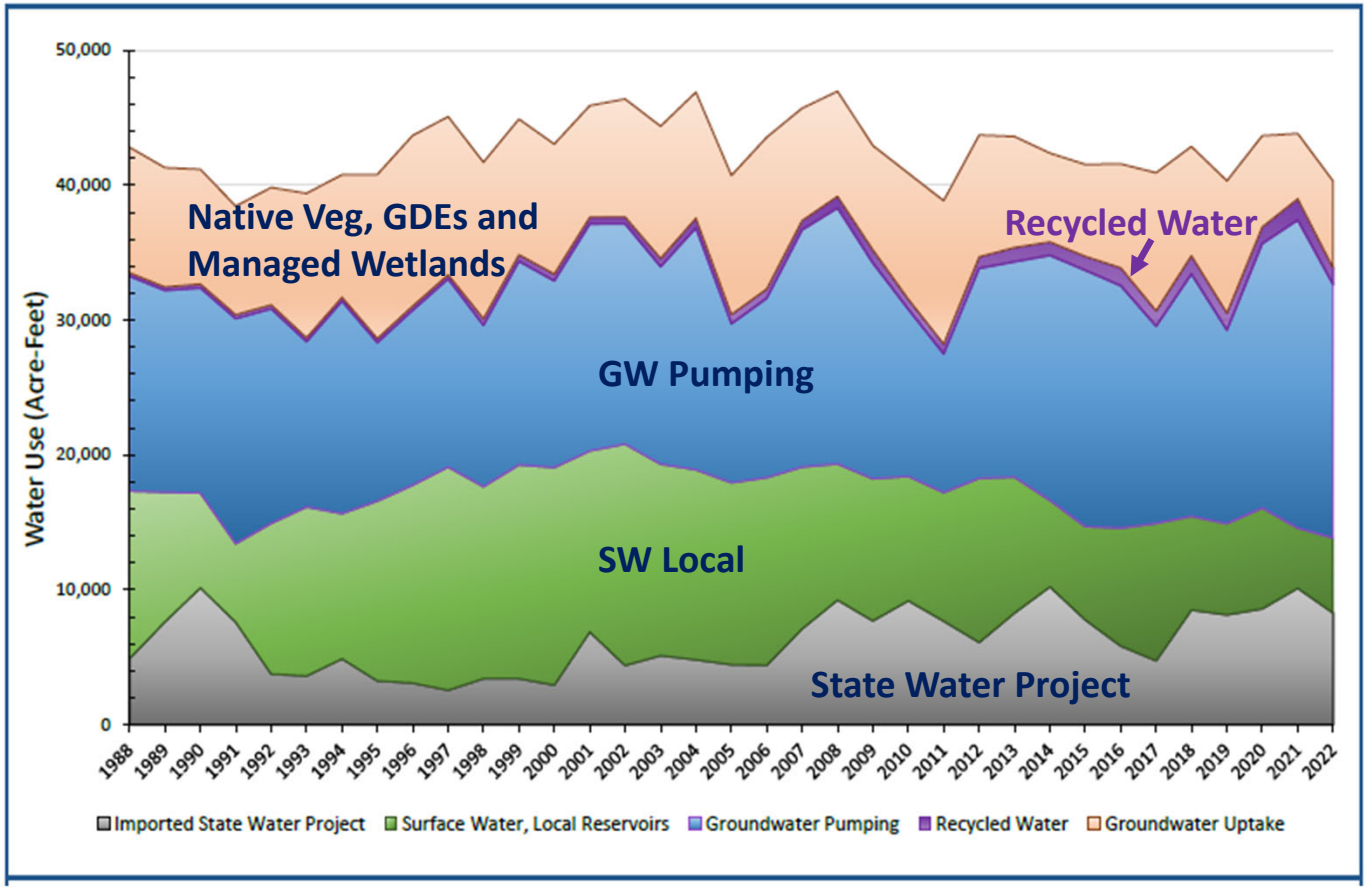
Napa Valley Integrated Hydrologic Flow Model (NVIHM)

Model Updates for WY 2022 Annual Report

- **UPPER WATERSHED** (USGS Basin Characterization Model)
  - Climate through WY 2022
  - Watershed processes and results feed into Valley Floor/Lowlands Model
- **NAPA VALLEY FLOOR, MST & LOWLANDS** (USGS One-Water Hydrologic Flow Model)
  - Land use (2019) and water budget components through WY 2022

Water Use: WY 2022

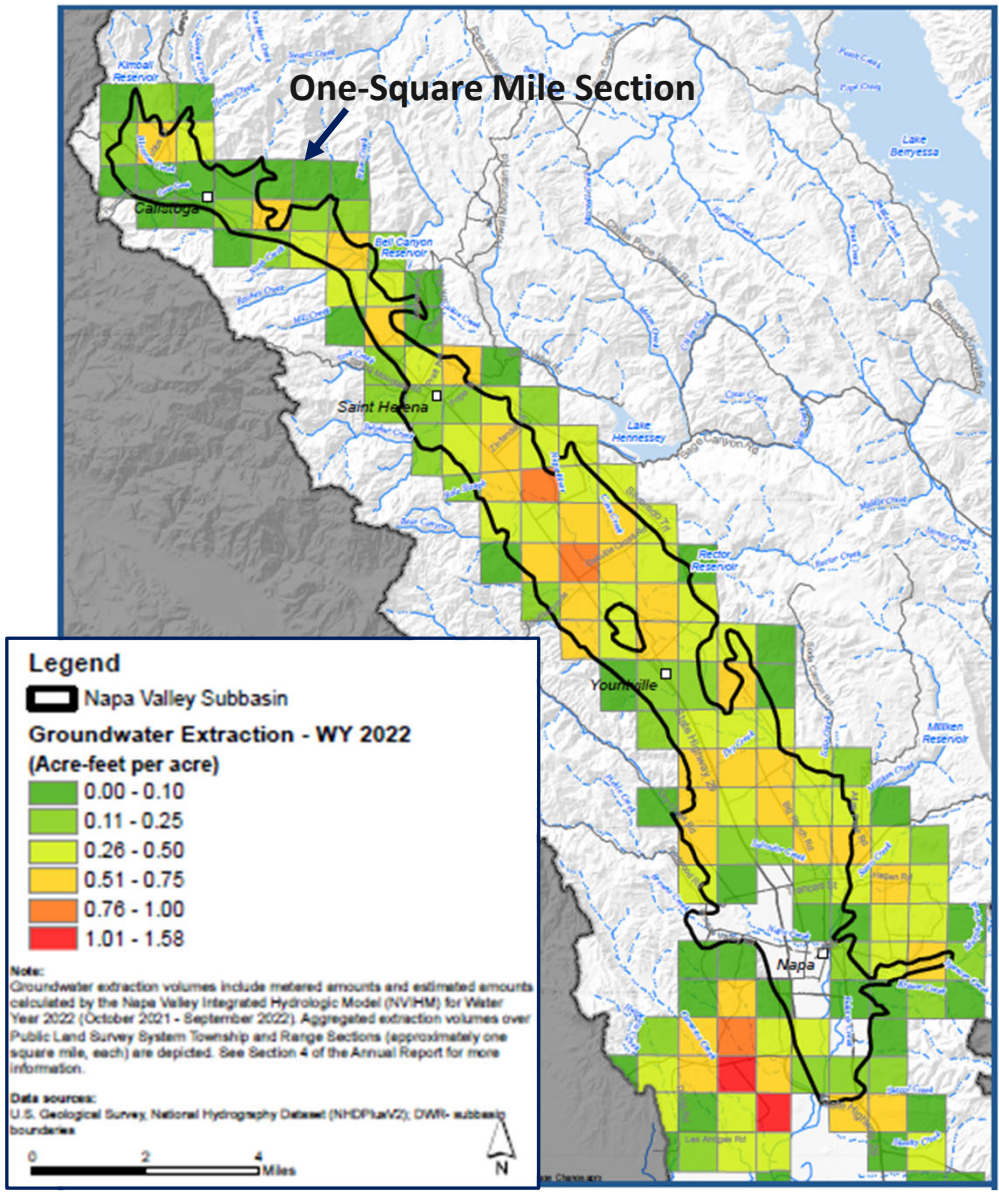
Water Use	Acre-Feet
2022 Groundwater Pumping	18,790
2022 Native Veg, GDEs & Managed Wetlands	6,440
2022 Recycled Water Use	1,220
2022 Local Surface Water Use (including reservoirs, diversions, etc.)	5,562
2022 State Water Project Use	8,290
TOTAL	**40,302**



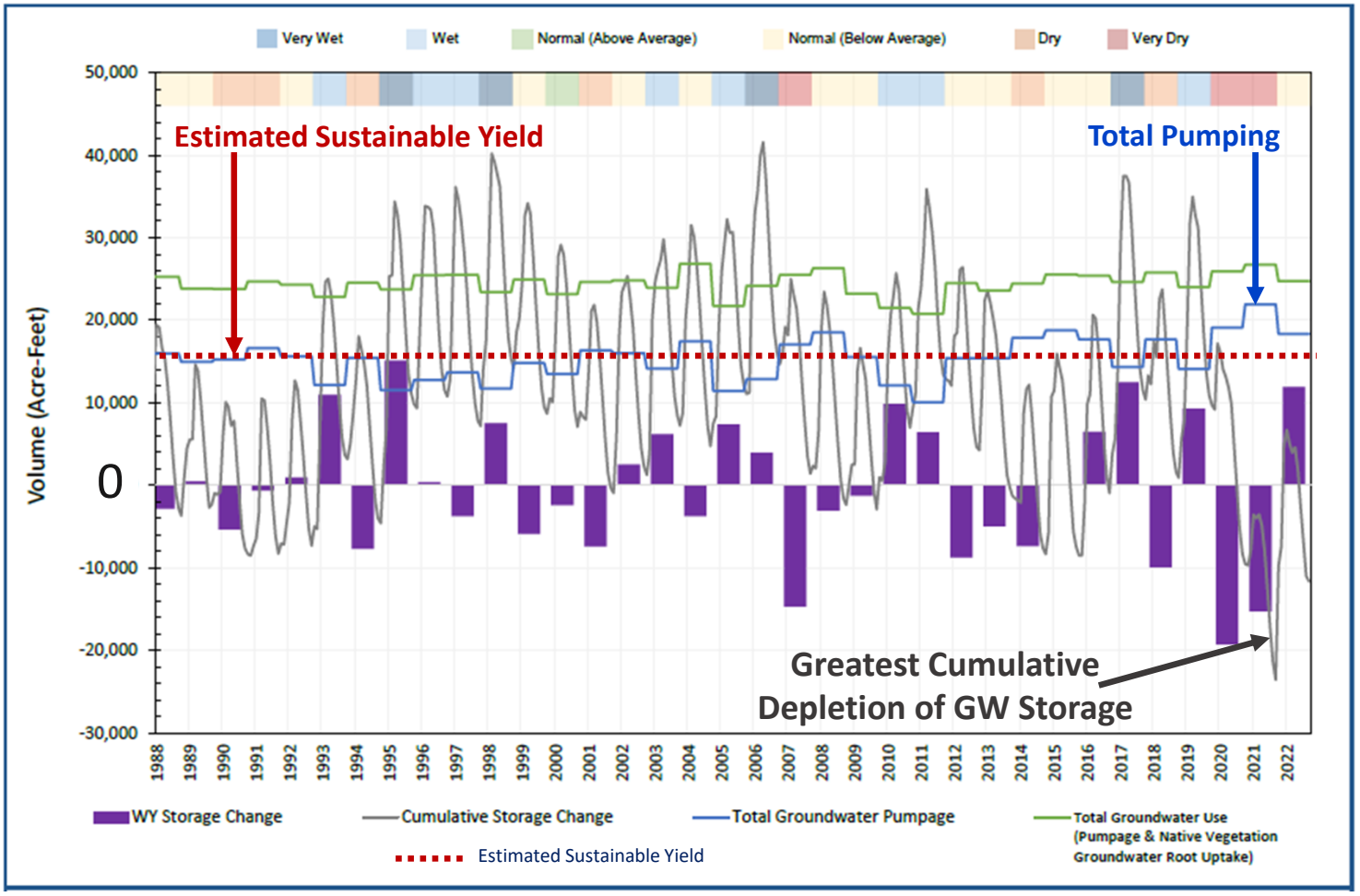
Groundwater Pumping, 2022 (Acre-feet)

Groundwater Pumping	Acre-feet	Percent Use
Ag (vines and other)	14,210	76%
Municipal	450	2%
Self-Supplied Users Domestic (2,815 AF for outdoor use)	3,060	16%
Small Public Water Systems	1,070	6%

TOTAL = 18,790 Acre-feet



GW Pumping, Total Use, and GW Storage Change and Cumulative Change (1988-2022)



Many Factors Contributing to Most Cumulative Depletion of GW Storage since 1988:

- Very dry years (2020-2021)
- WY 2022: Most precipitation in Fall 2021 followed by very little precipitation rest of WY
- Prolonged drought
- Reduced recharge
- General increase in GW pumping since ~2014

SGMA/GSP Sustainability Indicators

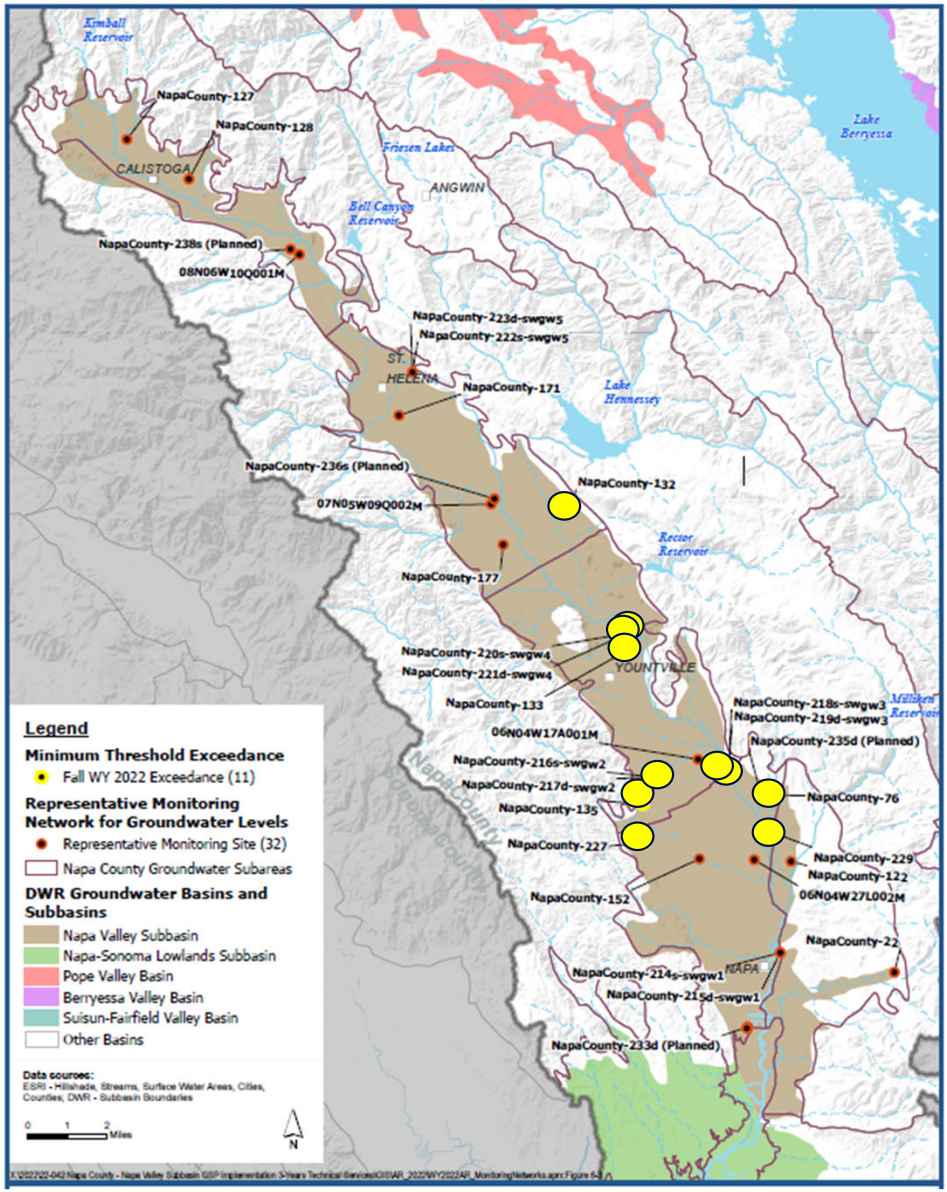
Not Causing Undesirable Results:
Means Avoiding Significant and Unreasonable …

- 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

RMS Groundwater Levels: Fall 2022

- 11 out of 24 RMS wells had MT exceedances
- 6 RMS of these wells have 3 consecutive Fall MT exceedances
  - **No UR for GW levels**

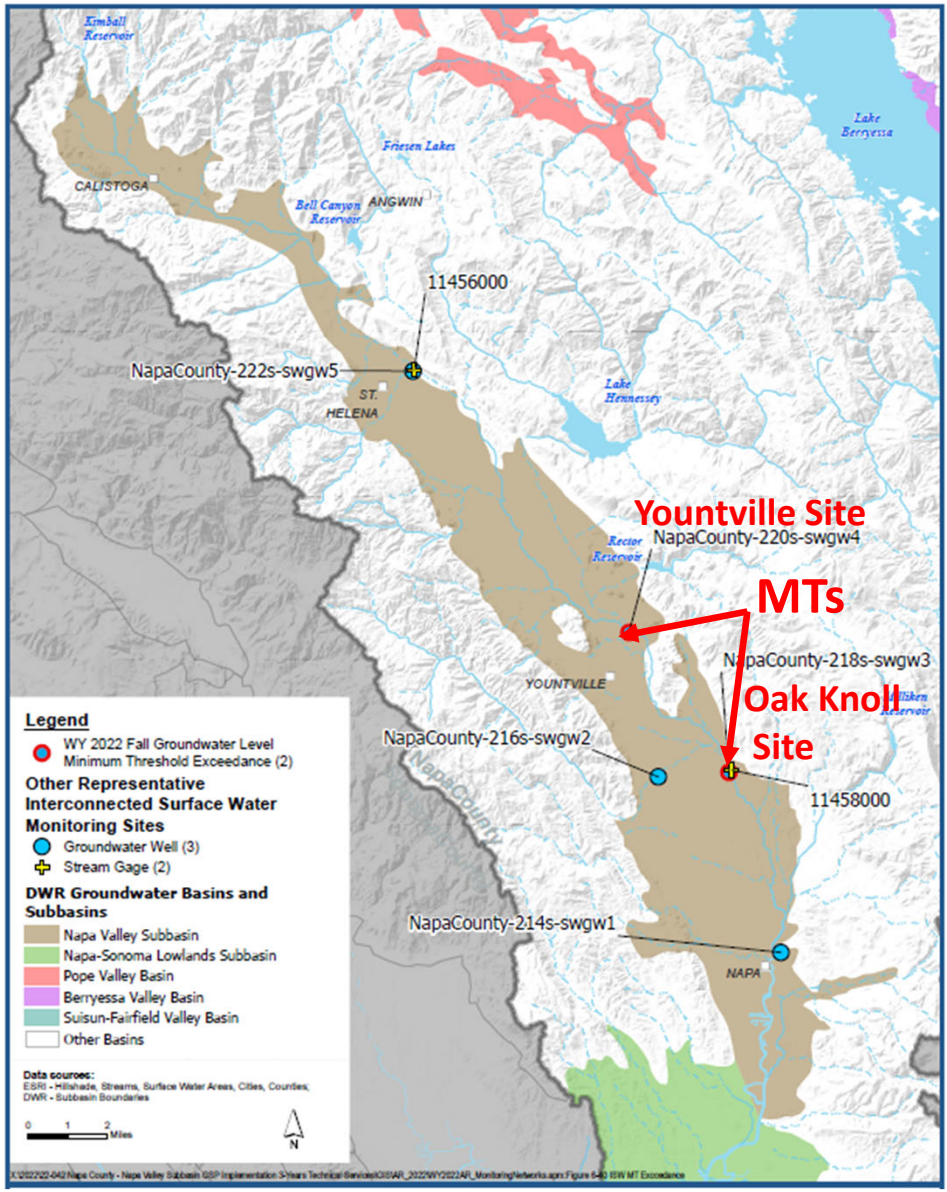


Undesirable Result Definition for Chronic Lowering of GW Levels:

➢20% of designated RMS well levels fall below the MT in fall (October) for 3 consecutive years of fall measurements in **non-drought years**

Interconnected Surface Water (ISW): GW Levels and MTs

- 2 RMS/ISW wells with MT exceedances *(Yountville and Oak Knoll Sites)*
- 1 RMS/ISW well (out of 5 sites) had 3 consecutive Fall exceedances *(Yountville Site)*
  - **An UR has occurred**



Undesirable Result Definition for ISW:

➢20% of designated RMS well levels fall below the MT in Fall (October) for 3 consecutive years of fall measurements

Reduction of Groundwater Storage

Minimum Threshold

Net GW extraction by pumping exceeding the sustainable yield for the Subbasin, where net GW extraction is the volume extracted less any volume of augmented recharge achieved by projects implemented in the Subbasin.

Undesirable Result

Seven (7) year average annual net GW extraction in the Subbasin exceeds the sustainable yield.

- UR occurred since 7-year average exceeds the sustainable yield for the Subbasin.

Sustainable Yield (Est.) = ~15,000 AFY

Year	Total Groundwater Extraction (AF)
2016	17,980
2017	14,640
2018	17,960
2019	14,340
2020	19,610
2021	22,840
2022	18,790
7 Year Avg.	**18,023**

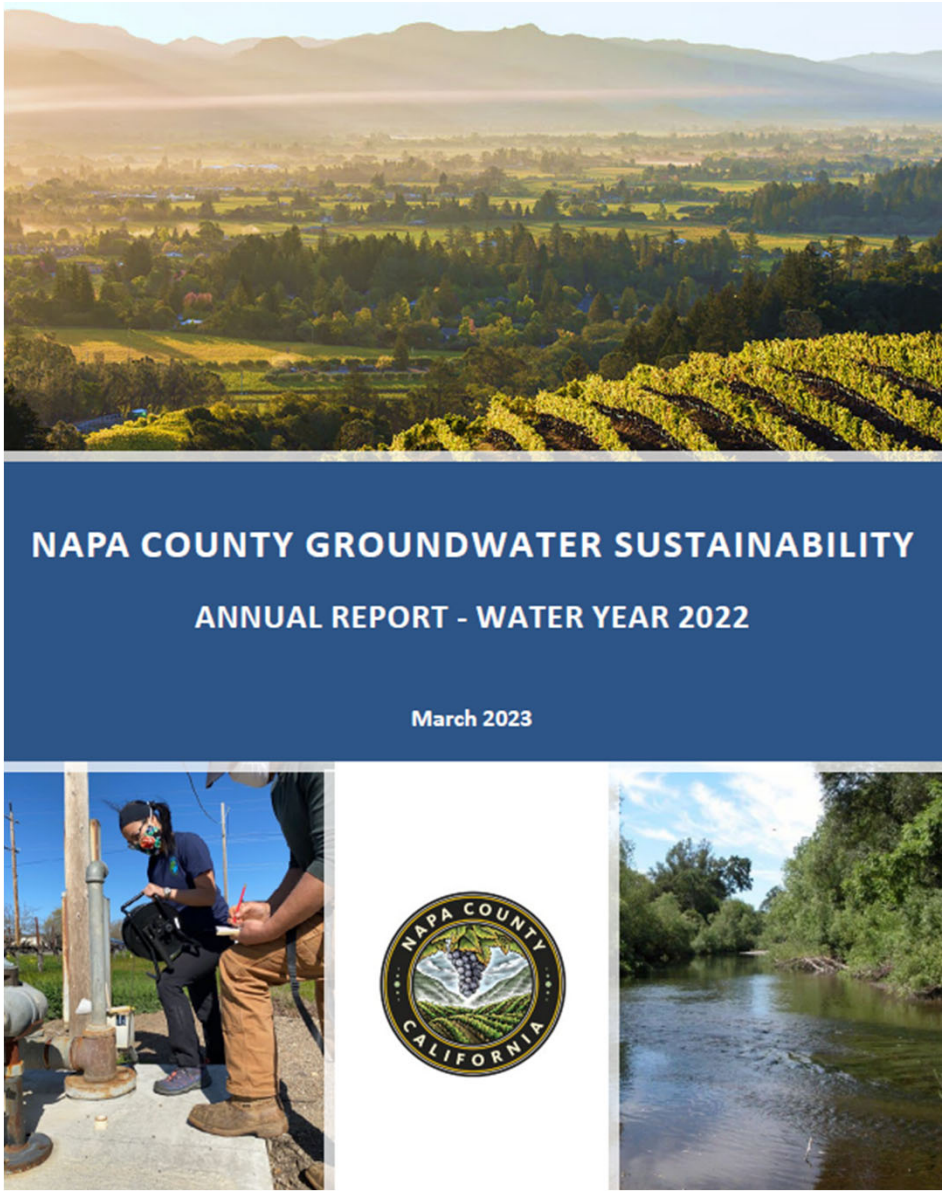
RMS Groundwater Levels: Response Action Required

- 1 RMS/ISW well (Yountville site) has 3 consecutive Fall MT exceedances
  - **UR has occurred for depletion of ISW; applies to any water year type**
- Avg. GW pumping over 7-year period exceeds Sustainable Yield
  - **UR occurred for Reduction in Groundwater Storage (WYs 2021 and 2022)**
- Subbasin must be sustainable at least by 2042
  - **Strive for resiliency long before**

Sustainability Indicator	WY 2021	WY 2022
	UR: Yes or No	UR: Yes or No
Chronic GWL Lowering (CGWL)	No	No
Depletion of Interconnected Surface Water (ISW)	No	Yes
GW Quality Degradation	No	No
Reduction of GW Storage	Yes	Yes
Land Subsidence	No	No
Seawater Intrusion	No	Future evaluation

WY 2022 Annual Report: Summary

- **Subbasin:** GW level declines in response to drought and lack of recharge
  - Some GW replenishment due to precipitation in Oct-Dec 2021
  - Still had GW level MT exceedances in WY 2022
  - UR: Interconnected Surface Water
  - UR: Reduction of GW Storage
- **MST:** Historical GW level declines moderated before recent drought years; now drought effects observed



Response Actions: Near-Term and Subsequent

Very Near-Term

- Voluntary Drought Measures
- GSA: Subbasin
- County: Watershed/County
- Local: Cities/Communities
- Agricultural/Wineries

Short Term

- Stormwater Resource
- Water Conservation
- Groundwater Pumping Reduction
- Interconnected Surface Water & GDEs

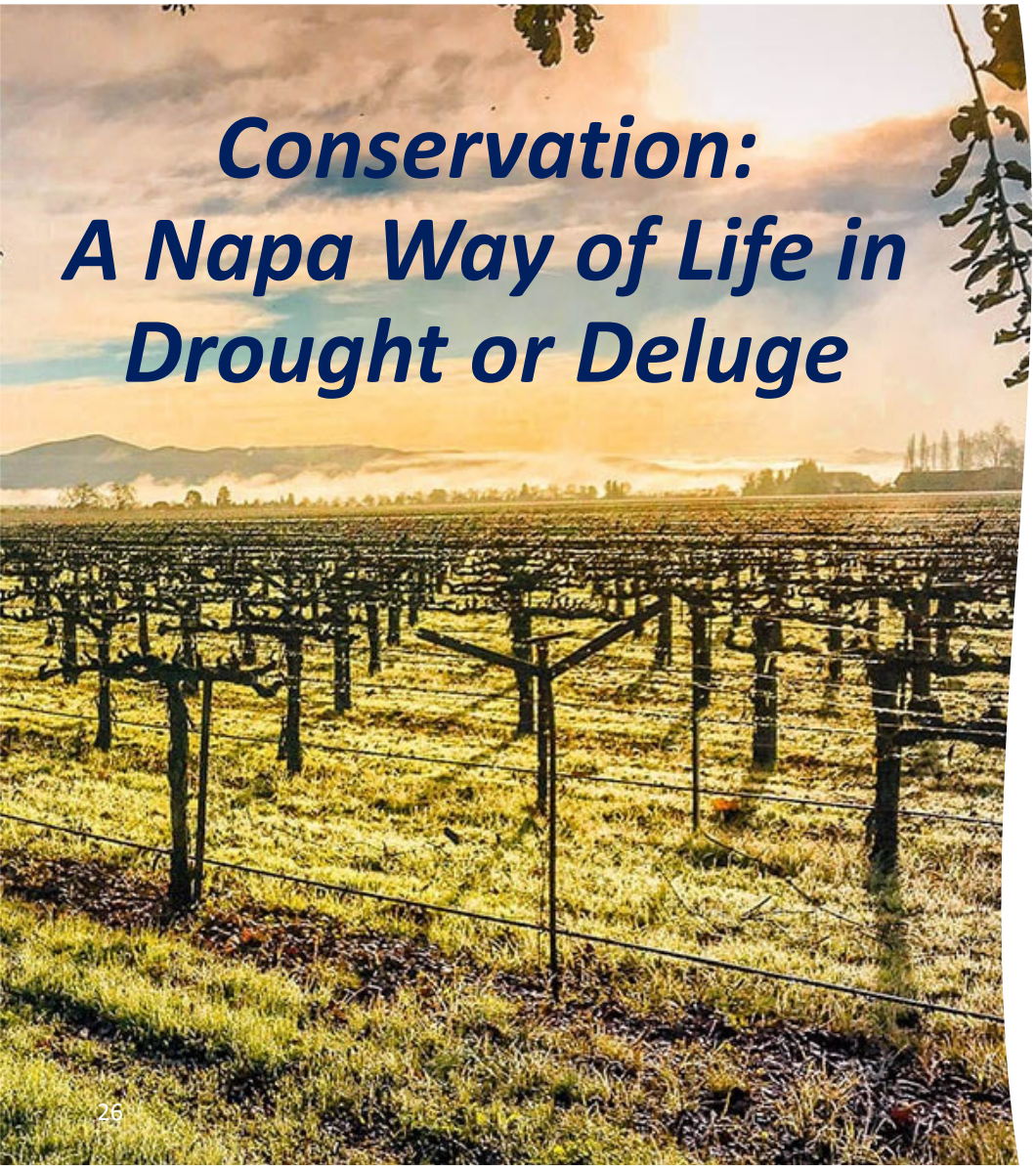
Mid-Term

- ID Recharge Areas of Interest
- Explore Recharge Opportunities
- Implement Workplans
- GW Pumping Reduction Options

GSP Implementation

- NCGSA Technical Advisory Group (Kick-Off August 2022)
- Annual Reports WY 2021 (April 2022) and WY 2022 (March 2023)
- Interconnected Surface Water and GDEs Workplan (Fall 2023)
- Napa County Vineyard and Winery Water Conservation Workplan (Summer 2023)
- Groundwater Pumping Reduction Workplan (Summer 2023)
- Stormwater Resource Plan (March 2023)
- Refining Water Use Data (ET: OpenET and Local Sensors; in Progress)
- MW Installation (4 Sites/8 MWs: January – April 2023)
- Other MW Sites (being Evaluated Spring 2023)
- RCD and Stream Watch Monitoring (in Progress)
- Evaluate Potential Recharge Areas and Feasibility (in Progress)
- Stakeholder Coordination and Outreach (Ongoing)
- Coordination with Napa County Drought and Water Shortage Efforts

DWR Approved Napa Valley Subbasin GSP January 26, 2023



- Climate change and weather extremes more prevalent
- Napa Valley Subbasin responds to extremes:
  - Drought and lack of recharge affect the river system **(MORE OF THESE WATER YEARS)**
  - Wetter years provide groundwater replenishment **(MANY FEWER OF THESE)**
- Future water management requires building resiliency:
  - Expand water conservation by **ALL** sectors
  - Facilitate recharge & use of alternative water sources to help mitigate drought effects
  - Develop innovative tools & technologies to refine water management strategies & reduce groundwater pumping

Thank You

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