

Solano Subbasin Groundwater Conditions

Groundwater Workshop

January 23, 2024

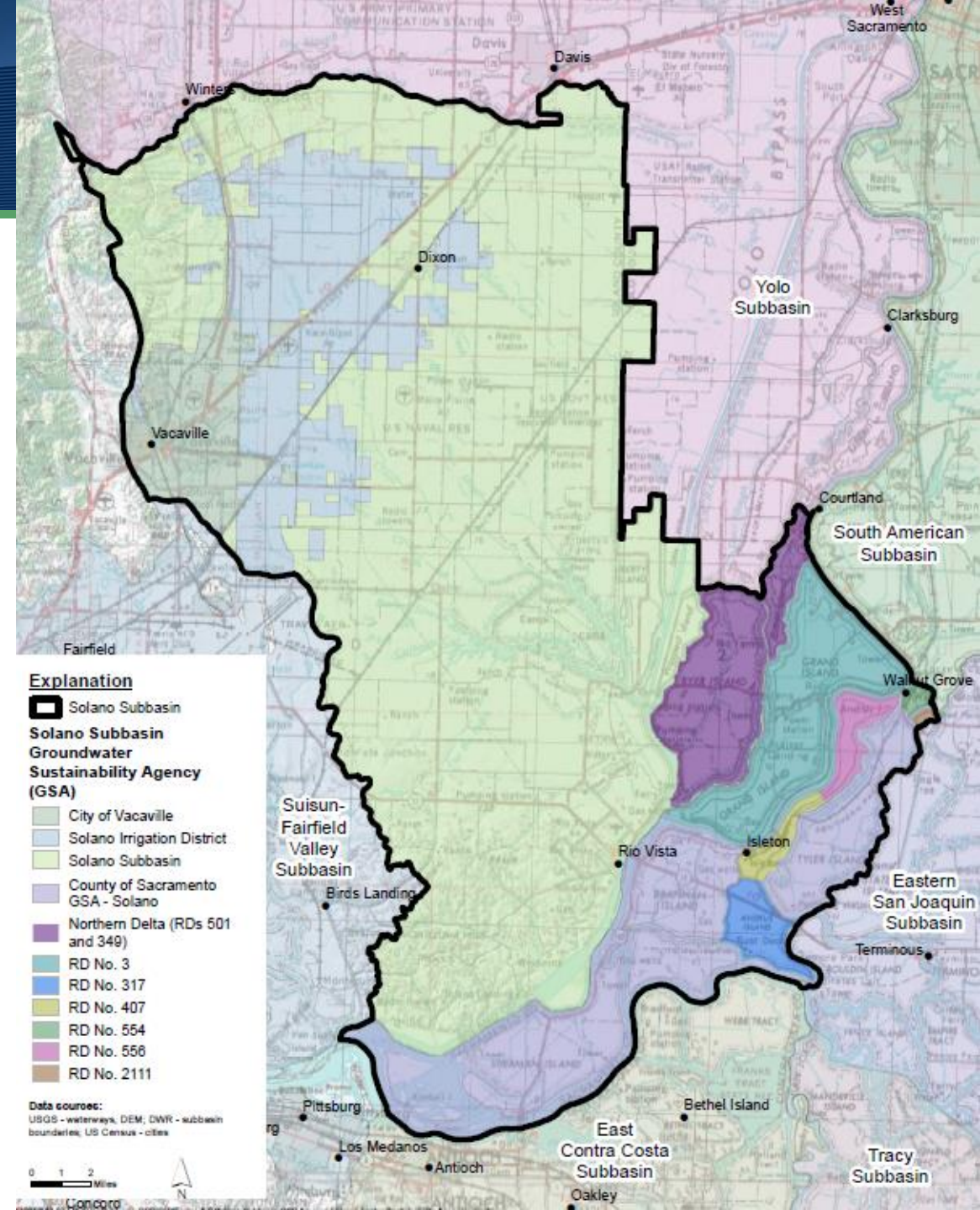
Nick Watterson



**Luhdorff &
Scalmanini**
Consulting Engineers

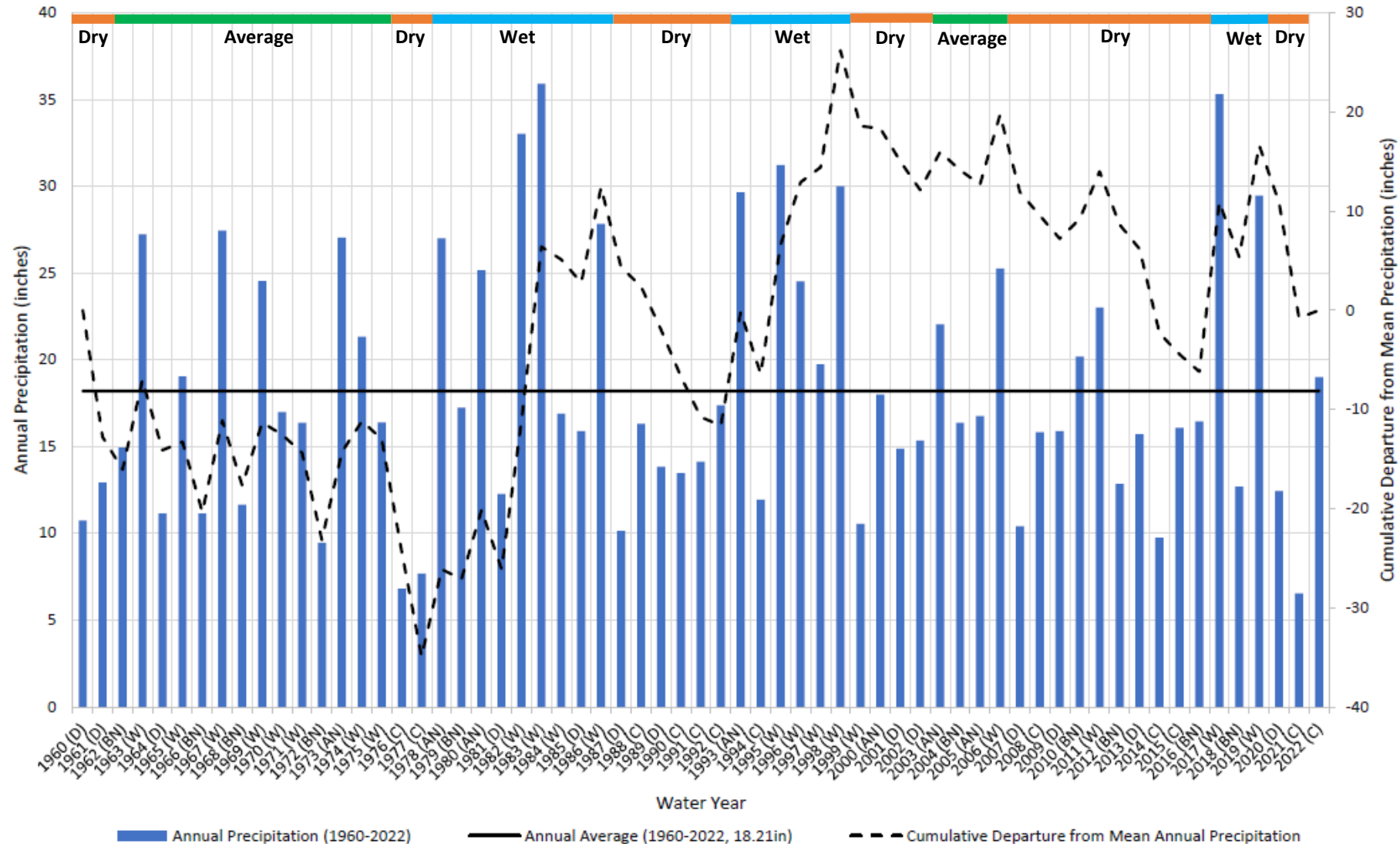
Outline

- Groundwater Levels in the Solano Subbasin
- Solano Subbasin Interactive Web Map
- Recent Groundwater Quality – Nitrate
- Sac Valley Water Quality Coalition High Vulnerability Area (HVA) Update
- Solano Subbasin Groundwater Recharge Interests and Considerations



Historical Precipitation

- Drier than average in recent years
- Since 1999:
 - 17 below avg years
 - 9 above avg years
- 2023:
 - 28.49 inches
 - >10 inches above avg



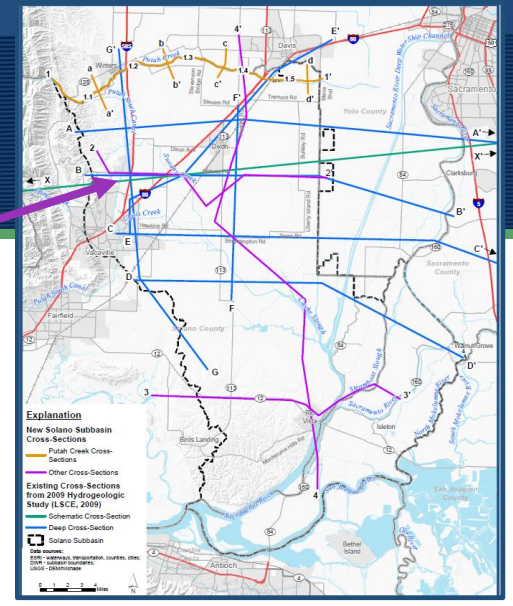
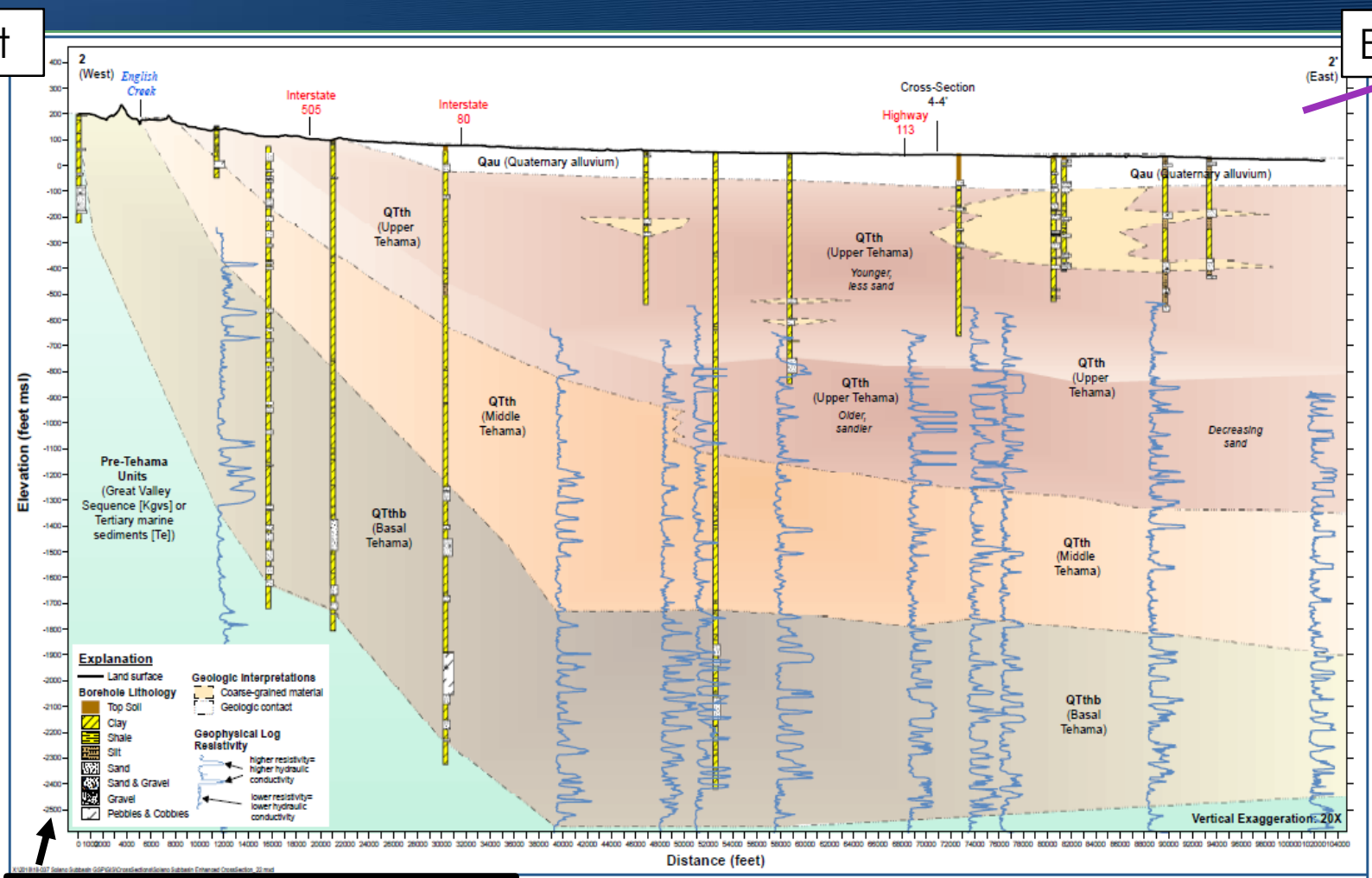
Precipitation measured at Davis Exp. Farm Station



Hydrogeology

West

East

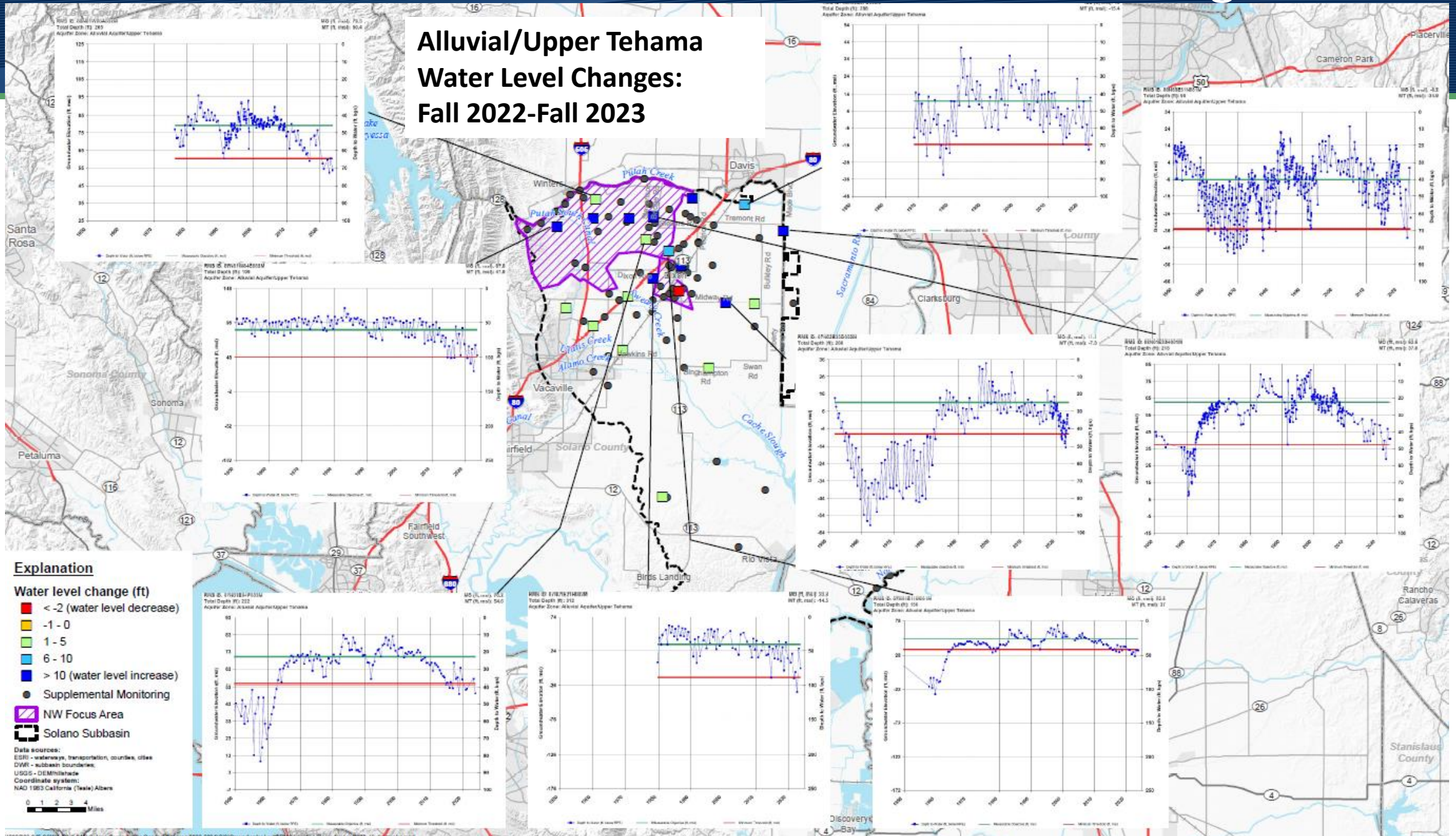


Alluvial/Upper Tehama Zone is primary aquifer for agricultural and small domestic wells

-2500 Ft Elev.; ~2,700 Ft. Deep

Solano Subbasin Groundwater Levels – 2023 changes

Alluvial/Upper Tehama Water Level Changes: Fall 2022-Fall 2023

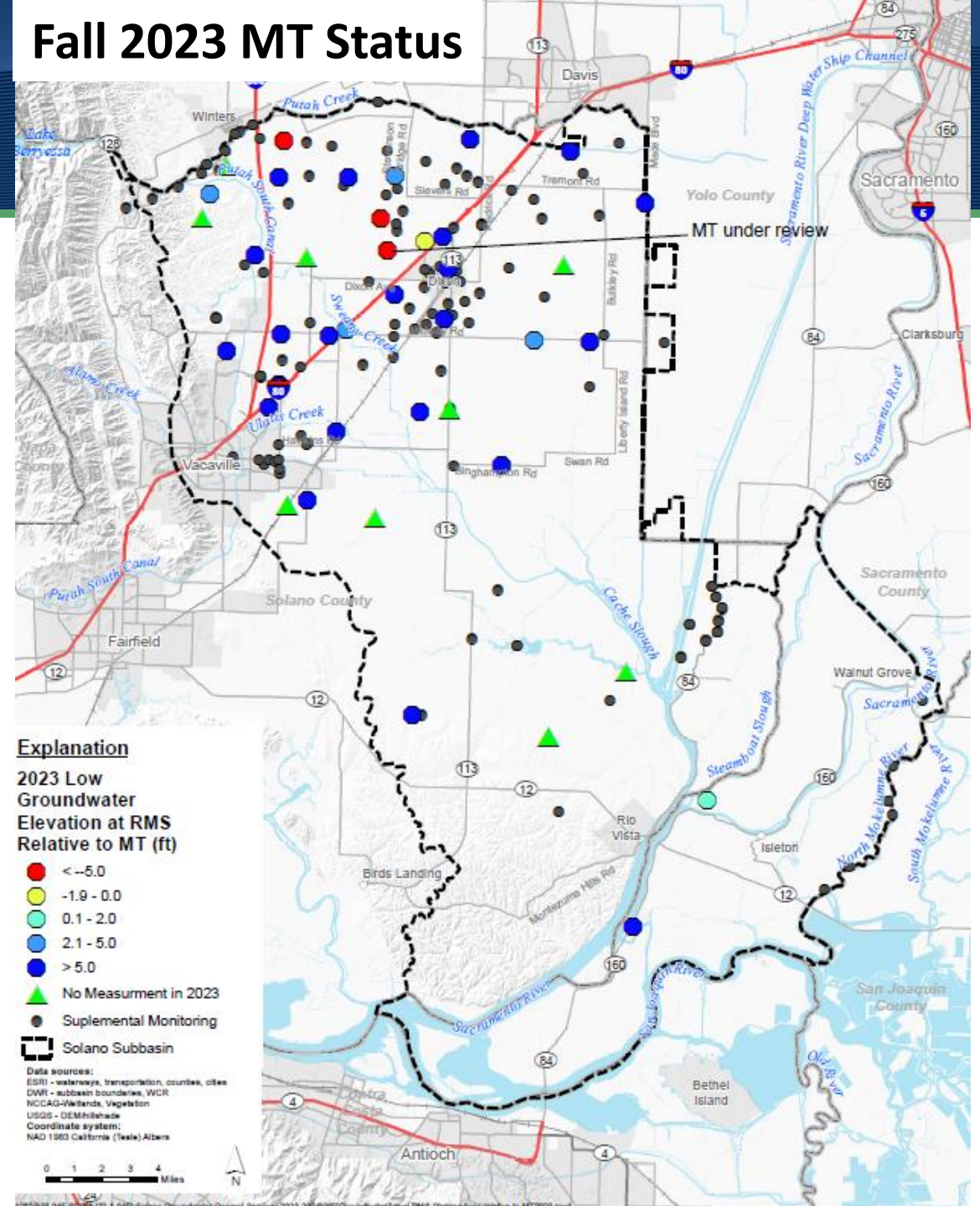


Fall 2023 Groundwater Level Update

- Four Minimum Threshold (MT) exceedances in Fall 2023
- 10 MT exceedances in 2022
- One exceedance under review



Fall 2023 MT Status



Water Level Summary

- Recent declining water levels in some areas of Solano Subbasin
- Some water level recovery evident in wells as a result of wet 2023
 - Increased groundwater recharge from precipitation
 - Decreased groundwater demand
 - WY 2023 annual report to be completed by April 1
 - Full benefit to deeper groundwater system from recharge may be delayed
- Northwest Focus Area remains area of special attention, including for opportunities to enhance recharge

Solano Subbasin Interactive Monitoring Web Map

- Tool for keeping water users/managers updated on Subbasin conditions
- Avenue for disseminating information more frequently than GSP Annual Reports
 - New measurements
 - Monitoring network changes
 - Relationship of conditions to GSP Sustainable Management Criteria
- Focus on GSP Representative Monitoring Sites (RMS) - groundwater levels and quality
- No private well information presented - precise well locations not shown
- Planned public release in February at SolanoGSP.com



Well Characteristics: 8 Selected

Monitoring Site Information: 1 of 41, 07N01E14J001M

Monitoring Indicator Selection:

- RMS Water Level:
- Supplemental Water Level:
- RMS Interconnected Surface Water:
- RMS Water Quality:
- Supplemental Water Quality:

Legend:

- Solano Monitoring Wells:
 - Alluvial/Upper Tehama
 - Basal Tehama
 - Other
- Solano Subbasin Boundary

Web map highlights

Monitoring Site Details & Time-Series Data

Monitoring Site Selection

- Groundwater Level (GWL)
- Interconnected Surface Water (ISW)
- Groundwater Dependent Ecosystem (GDE)
- Groundwater Quality (GWQ)
- Seawater Intrusion (SWI)
- Land Subsidence (LS)
- Surface Water Sites

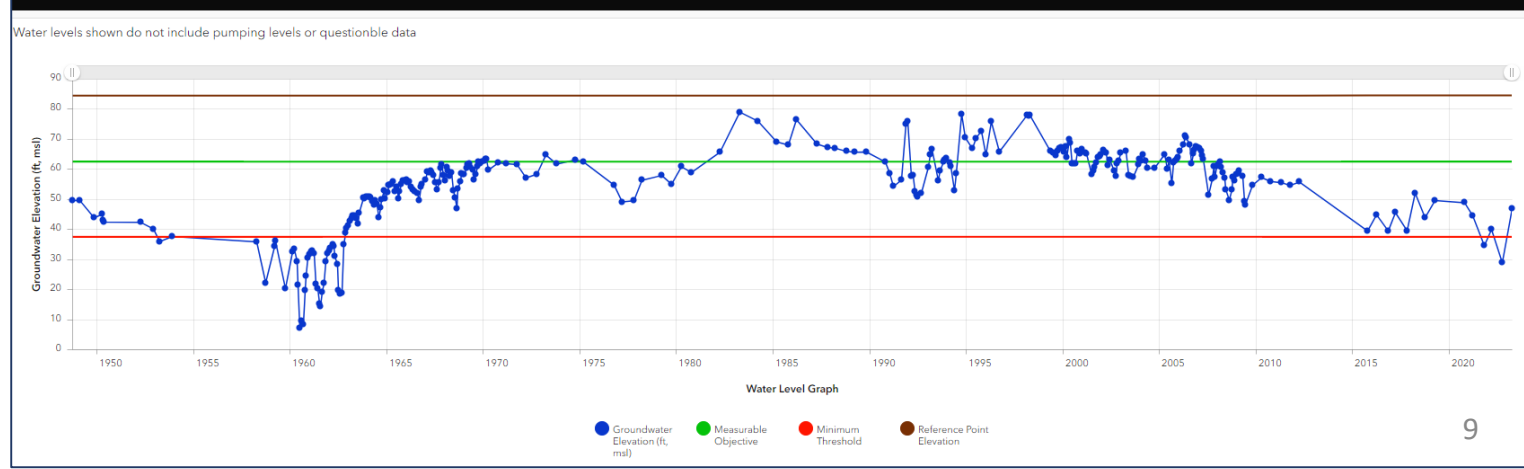
08N01E33H001M

SGMA Sustainability Indicators:

- Groundwater Levels
- Well Identification
- SWN: 08N01E33H001M
- Well Construction
- Well Type: Domestic
- Well Depth (ft bgs): 216
- Perforation Depths (ft bgs): Top = Not Available; Bottom = Not Available
- Ground Surface Elevation: 82

Water Levels

Water Quality

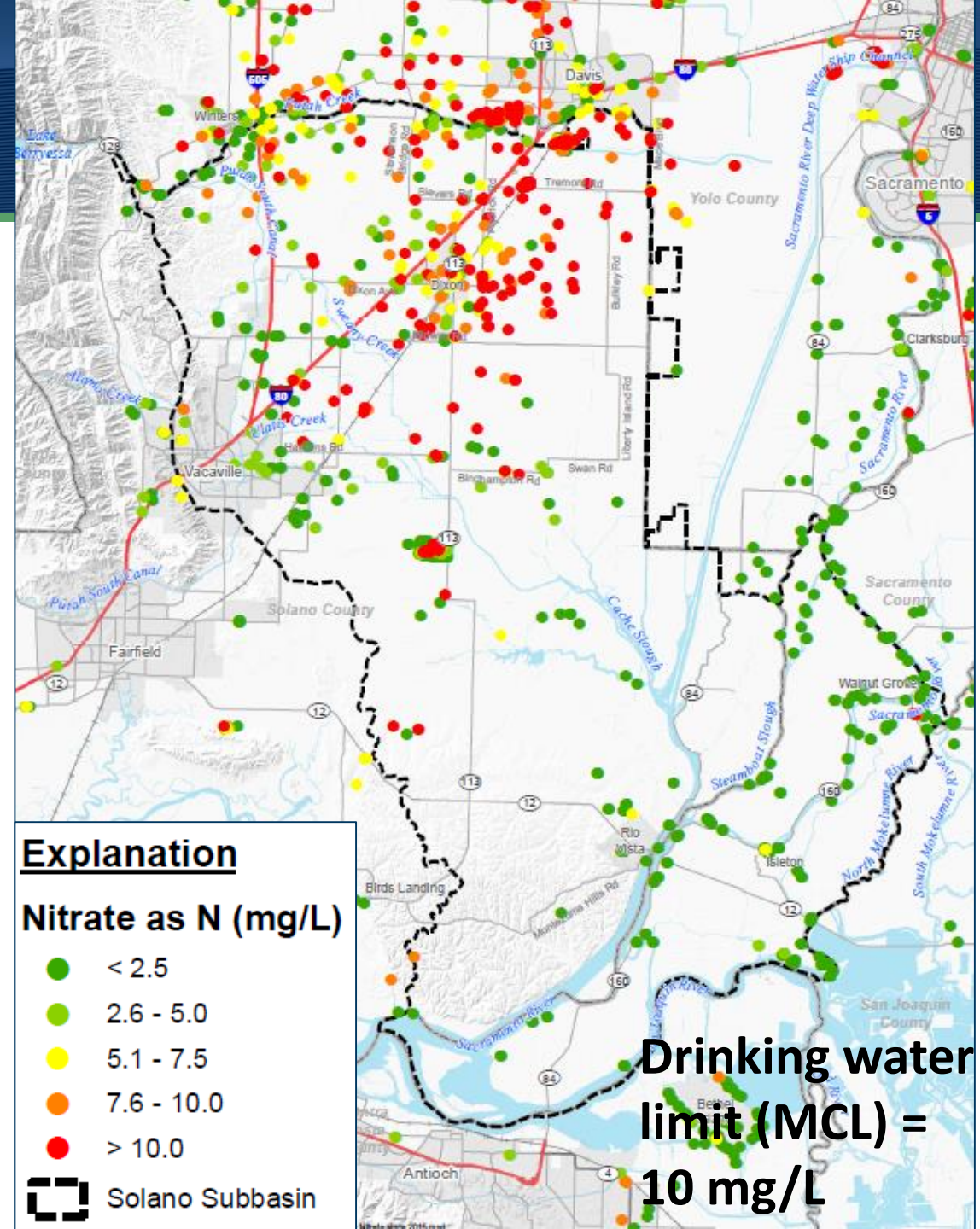


Filter by Monitoring Entity and Sustainability Indicator



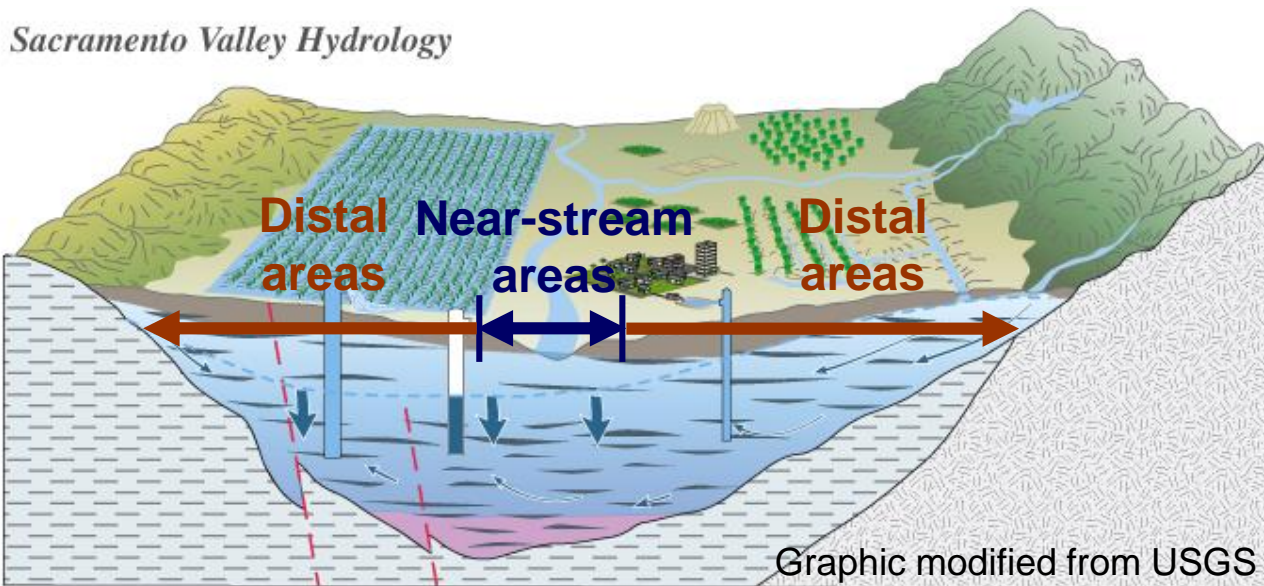
Groundwater Quality

- Recent monitoring suggests broader occurrence of elevated nitrate in GW
- Upper Zone nitrate conditions:
 - 119 wells with historical exceedance, many on ag land
 - Statistically significant trends in concentrations
 - 28 wells increasing
 - 16 decreasing
 - 23 neutral
- Management challenges:
 - Shallow GW conditions
 - Historical loading/residual nitrogen

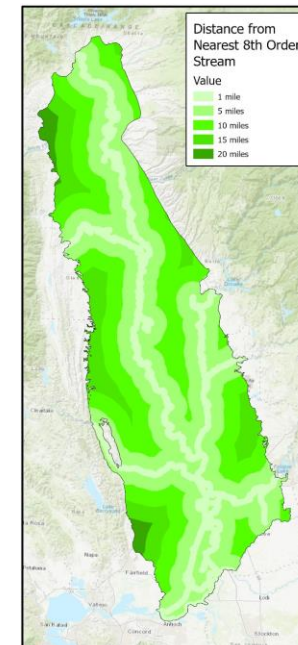


High Vulnerability Area (HVA) Update

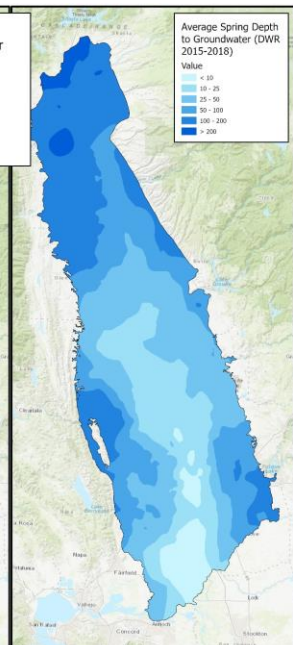
- HVA updated as part of Five-Year GAR Update requirement
- Delineated Hydrogeologically Sensitive Area (HSA) based on important hydrogeologic factors
- Irrigated areas overlapping HSA are HVA



Distance from large stream



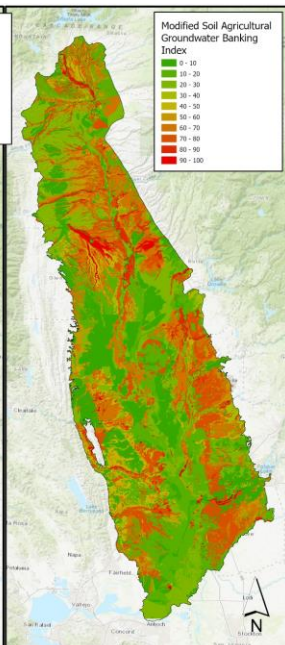
Depth to Groundwater



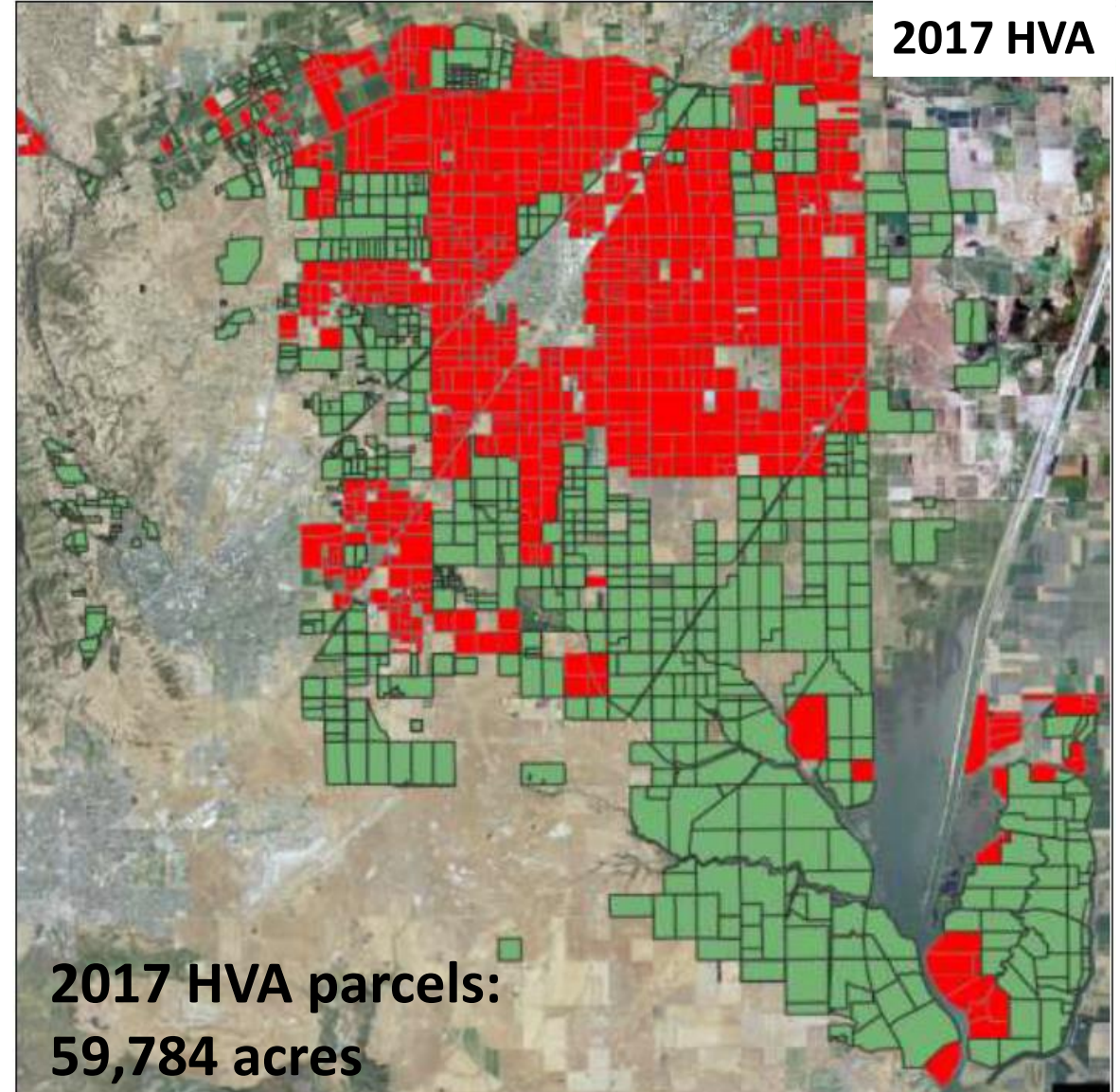
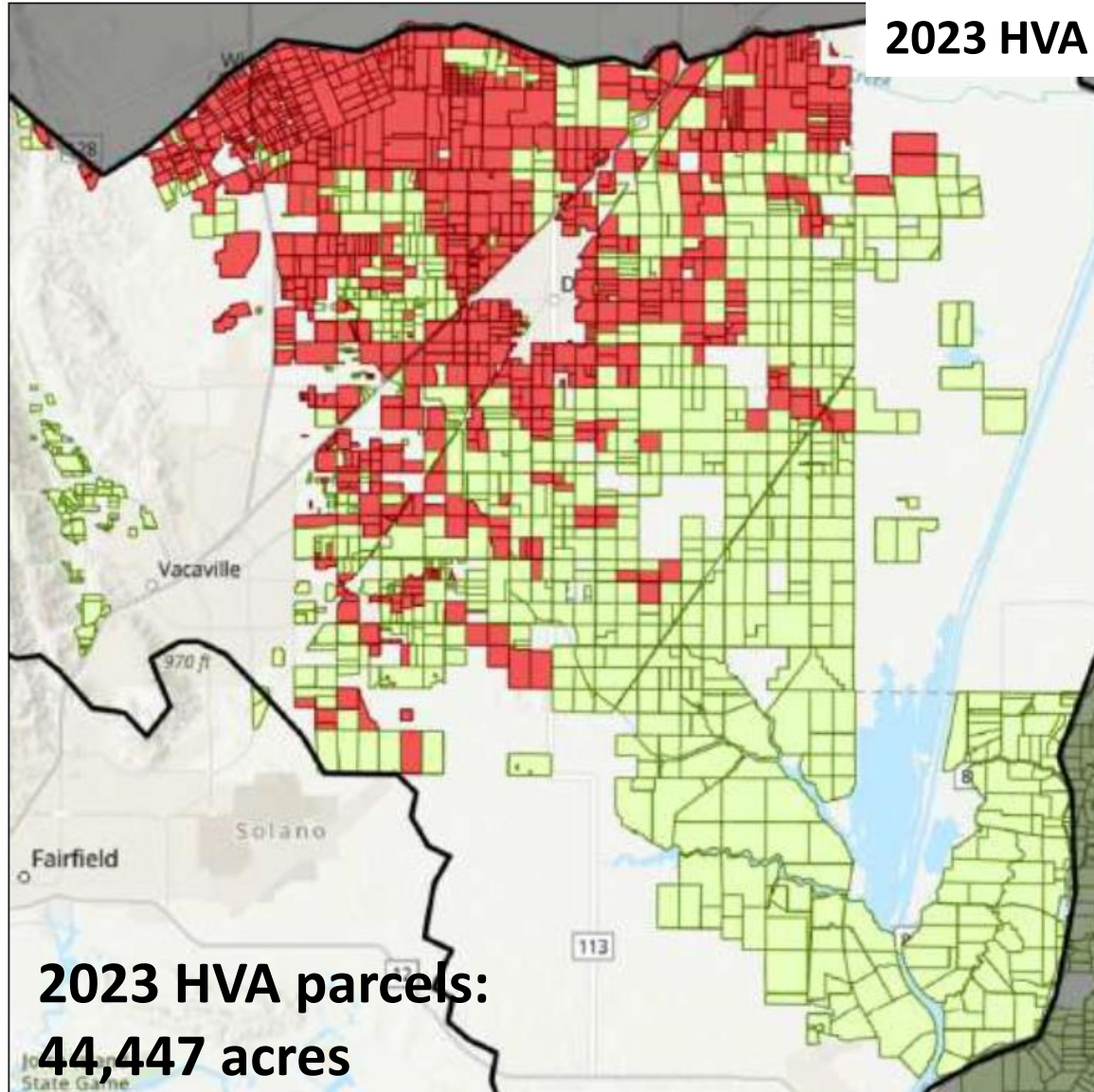
Density of Streams



SAGBI Soil Recharge Potential

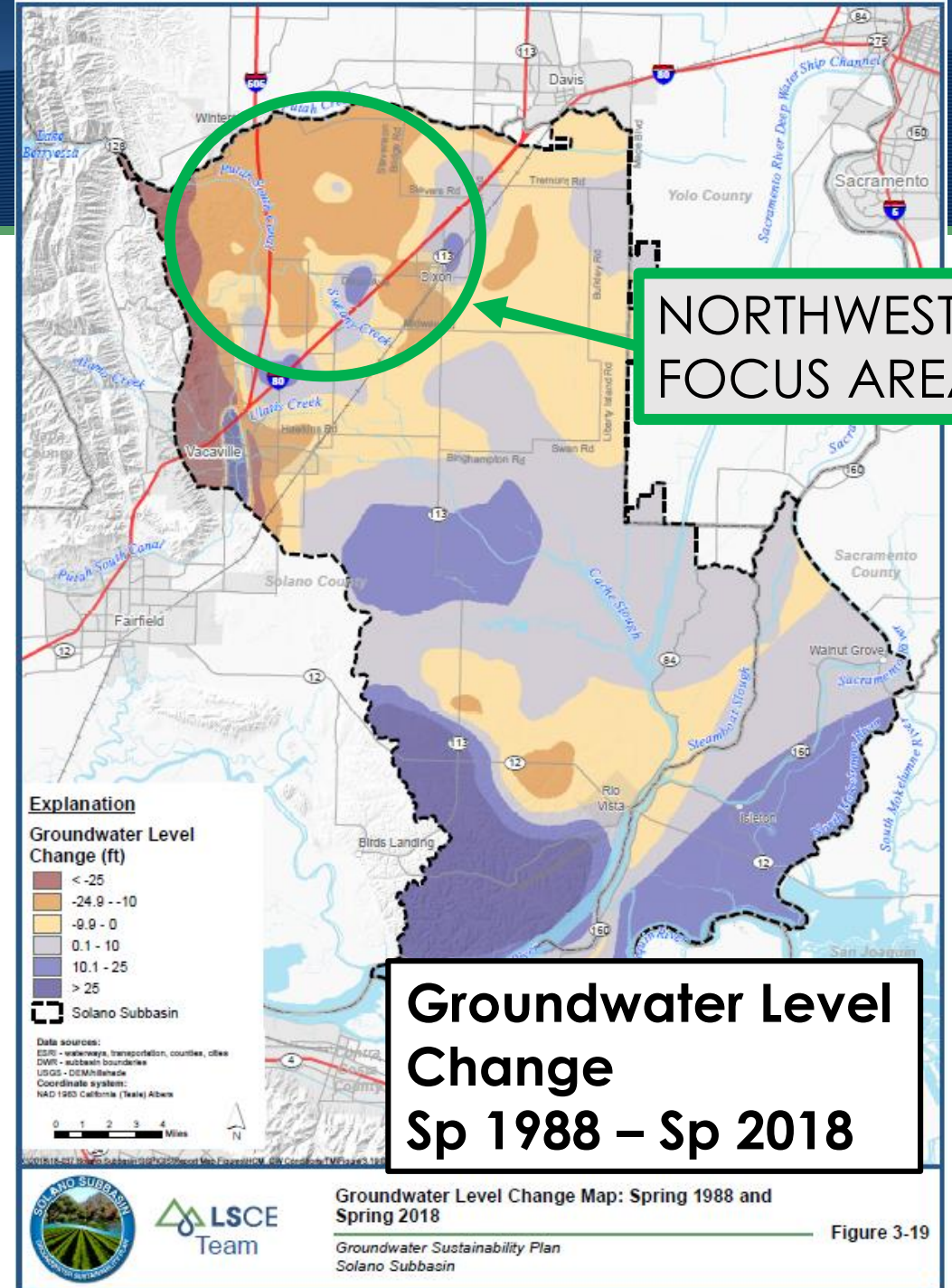


High Vulnerability Area (HVA) Update

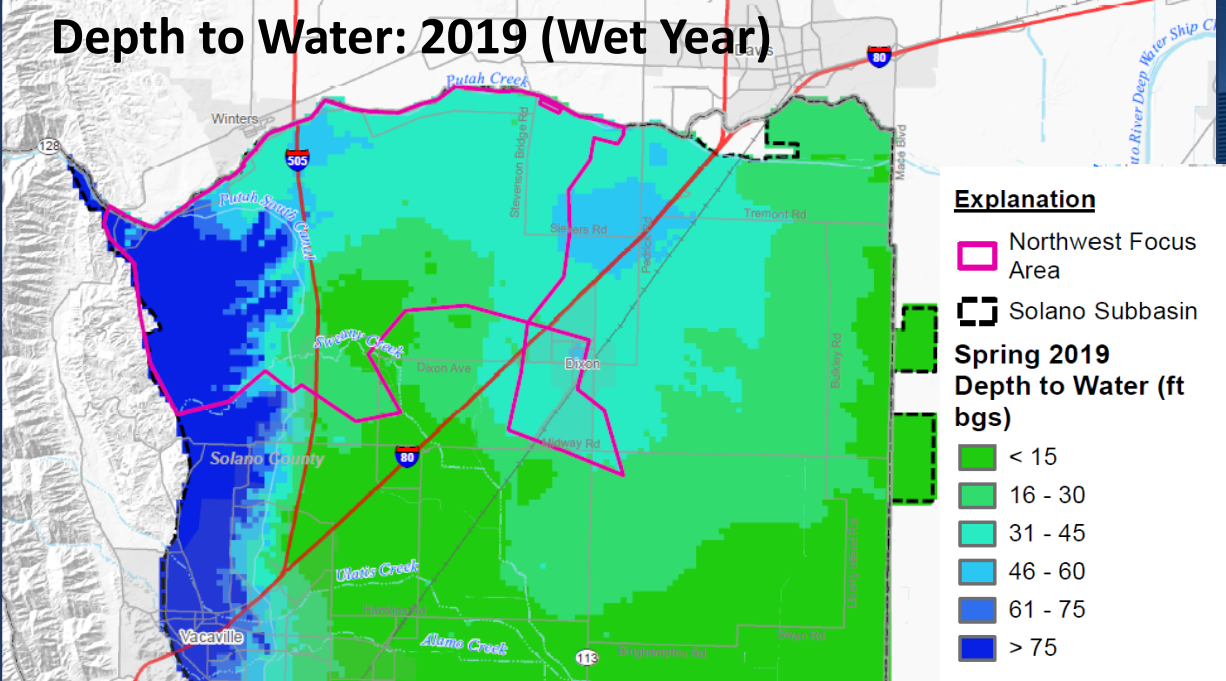


Groundwater Recharge

- NW Focus Area has recent groundwater level declines
- GSP implementation includes exploring ways to enhance groundwater recharge
 - Retain stormwater on agricultural lands
 - Use flood flows from creeks in this area (wet year average inflow ~ 24,000 AF, excluding Putah Creek)
- Achieve multiple benefits: increase groundwater recharge in NW Focus Area and improve stormwater management



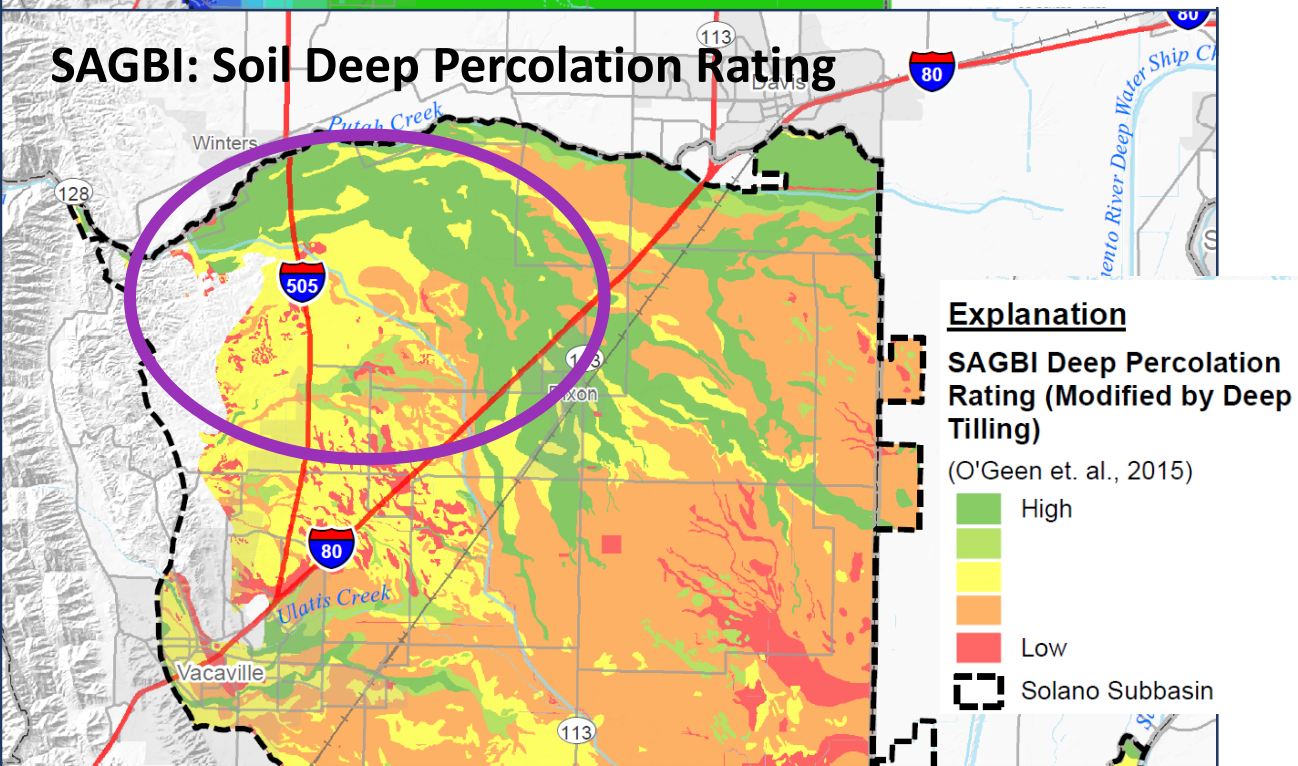
Depth to Water: 2019 (Wet Year)



Groundwater Recharge Considerations

- Different methods of recharge involve unique considerations
- Hydrogeology
 - Soils (surface infiltration)
 - Deeper sediments within unsaturated zone (potential to transmit and store water)
 - Depth to water (storage potential during wet and dry years)
 - Fate of recharge water
- Infrastructure/water conveyance

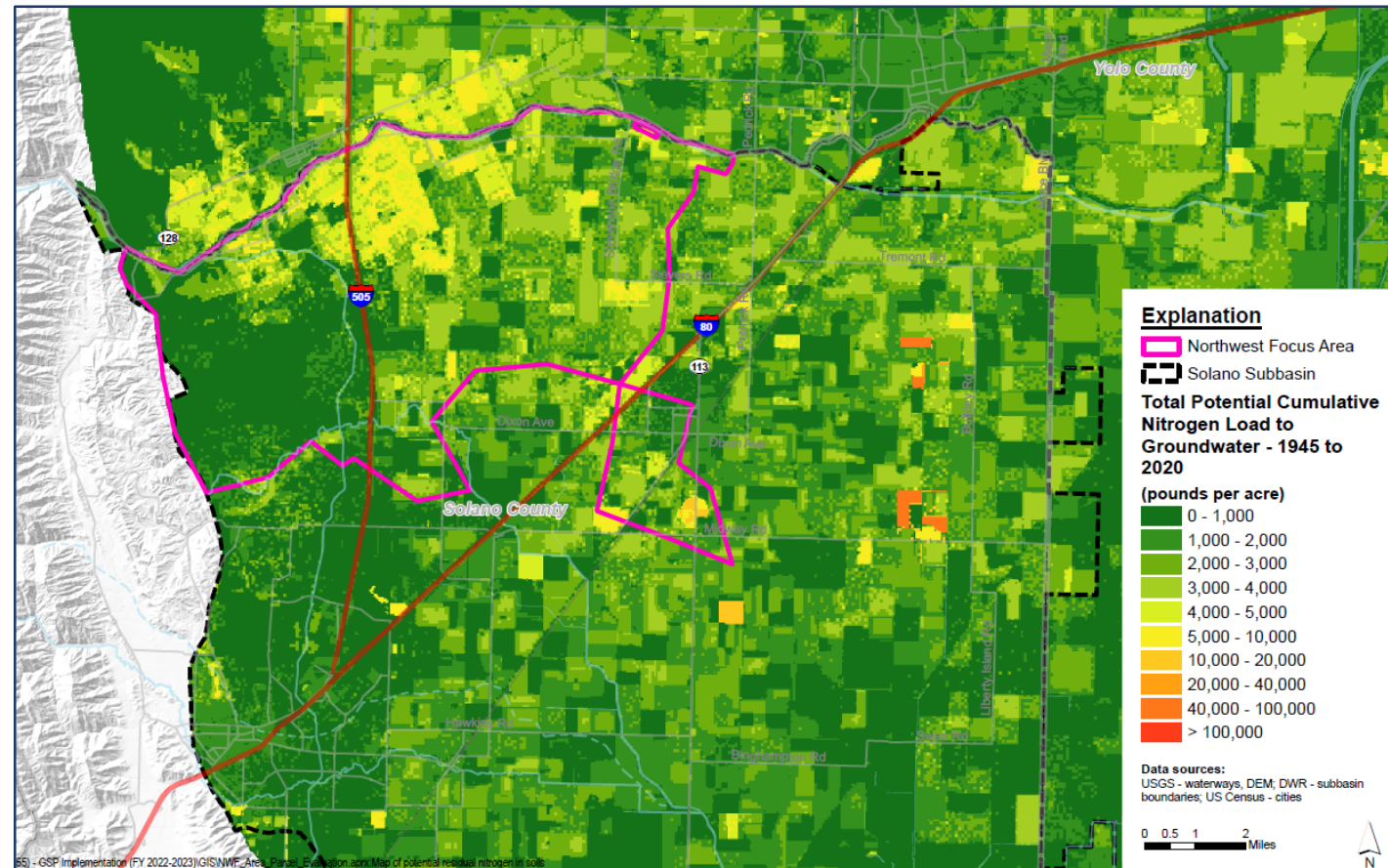
SAGBI: Soil Deep Percolation Rating



Groundwater Recharge Considerations

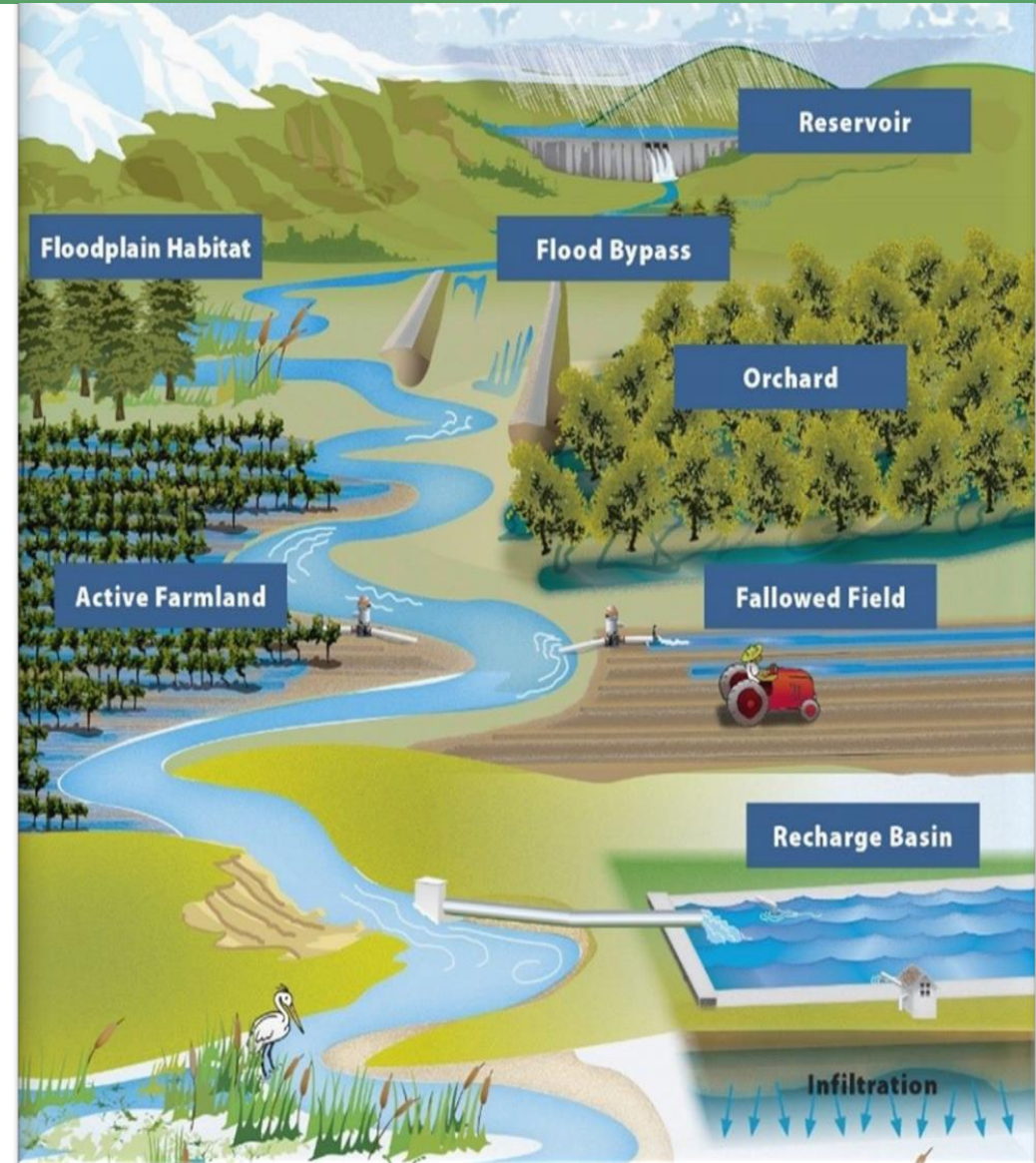
- Other site characteristics
 - Field/crop management
 - Potential for leaching or mobilizing chemicals/nutrients
 - Nearby drinking water sources
 - Monitoring needs
- Benefits and adverse impacts from enhanced recharge on groundwater quality
- Solano Subbasin characteristics align with multi-benefit opportunities

Estimates of historical nitrogen loading: since 1945 (from Harter et al., 2017)



Interest in Conducting Groundwater Recharge

- Have received interest from land owners/managers during GSP preparation and early implementation
- DWR GSP Implementation Grant will support some initial efforts
 - Education and outreach on management practices to enhance recharge
 - Pilot studies
- Planning future discussions with interested land owners/managers





THANK YOU