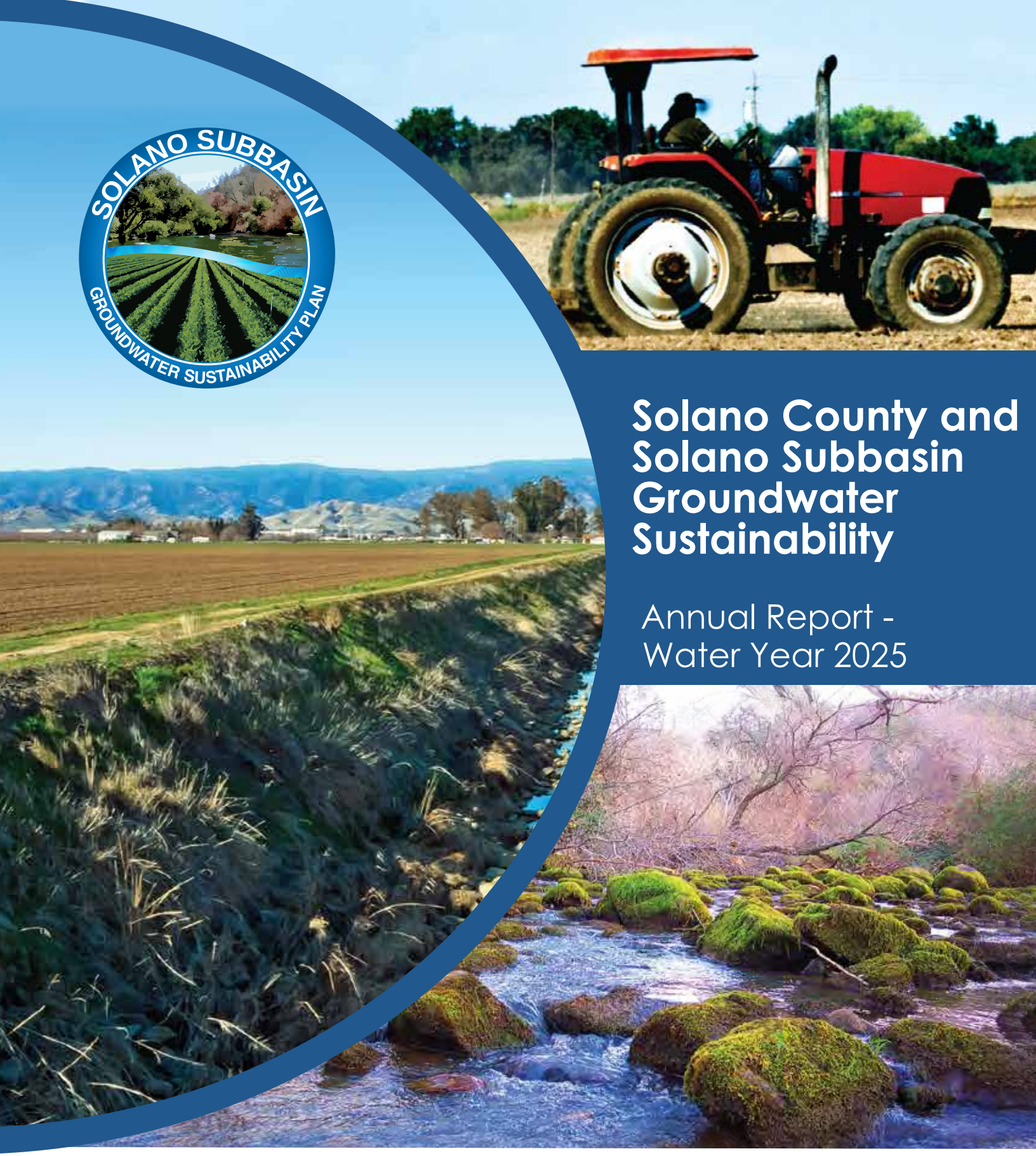

Solano County and Solano Subbasin Groundwater Sustainability

Annual Report - Water Year 2025

Prepared by

LSCE TEAM

March 2026

ANNUAL REPORT | APRIL 2026

SOLANO COUNTY AND SOLANO SUBBASIN GROUNDWATER SUSTAINABILITY ANNUAL REPORT – WATER YEAR 2025

PREPARED FOR

SOLANO COLLABORATIVE
AND THE
SOLANO COUNTY WATER AGENCY

PREPARED BY

Luhdorff & Scalmanini
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This report was prepared by the staff of Luhdorff & Scalmanini Consulting Engineers under the supervision of the Hydrogeologist whose seals and signatures appear hereon.

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TABLE OF CONTENTS

Executive Summary 1
ES-1. Overview of SGMA and the GSP 1
ES-2. Groundwater Related Monitoring 2
ES-3. Groundwater Conditions 2
ES-4. Water Budget 3
ES-5. Change in Groundwater Storage 3
ES-6. Assessment of Sustainability Criteria and Monitoring 5
ES-7. GSP Implementation 7
1. Introduction 1
1.1. Background 1
1.2. Study Area and Groundwater Basin Descriptions 2
1.2.1. Geography and Hydrogeology of the Solano Subbasin (Basin Number: 5-21.66) 2
1.2.2. Geography and Hydrogeology of the Suisun-Fairfield Valley Basin (Basin Number: 2-3) 4
1.2.3. Areas Outside of Solano Subbasin and Suisun-Fairfield Valley Basin 4
1.3. Solano Subbasin Groundwater Sustainability Planning 4
2. Groundwater-Related Monitoring 5
2.1.1. Groundwater Levels and Change in Storage 6
2.1.1. Groundwater Quality 8
2.1.2. Land Subsidence 10
2.1.3. Interconnected Surface Water 10
2.1.4. Data Gaps 10
3. Groundwater Conditions 12
3.1. Historical and Recent Hydrology and Climate 12
3.1.1. Precipitation 12
3.1.2. Temperature 13
3.2. Groundwater Levels 13
3.2.1. Groundwater Elevation Contour Maps 13
3.2.2. Groundwater Levels Trends 14
Alluvial Aquifer and Upper Tehama Zone 14
Basal Tehama Zone 16
Groundwater Level Trends by Depth 16
SCWA Nested Monitoring Wells 17

TABLE OF CONTENTS

Solano Subbasin GSA Nested Monitoring Wells 19
3.3. Groundwater Quality 21
3.3.1. Arsenic 21
3.3.2. Boron 21
3.3.3. Chloride 22
3.3.4. Chromium-6 22
3.3.5. Nitrate 23
3.3.6. TDS 23
3.3.7. Other Groundwater Quality Constituents 23
3.4. Land Subsidence 24
3.4.1. CGPS Stations 25
3.4.2. InSAR Data 28
3.4.3. Comparisons of Vertical Displacement and Groundwater Level Data 29
3.5. Interconnected Surface Water 31
4. Water Budget Approach for Quantifying Groundwater Extraction, Surface Water Supplies, and Total Water Use 33
4.1. Analysis Background and Approach 33
4.2. Groundwater Extraction - §356.2(b)(2) 34
4.2.1. Agricultural Groundwater Extraction 36
4.2.2. Urban Groundwater Extraction 36
4.2.1. Native Vegetation and Managed Wetlands Groundwater Extraction 39
4.3. Surface Water Supply - §356.2(b)(3) 40
4.3.1. Agricultural Surface Water Supply 41
4.3.2. Urban Surface Water Supply 41
4.3.3. Native Vegetation Surface Water Supply 42
4.3.4. Managed Wetlands Surface Water Supply 42
4.4. Total Water Use by Sector - §356.2(b)(4) 43
5. Change in Groundwater Storage (§356.2.b.5) 44
5.1. Change in Groundwater Storage Maps 44
5.2. Groundwater Use and Change in Groundwater Storage 46
6. Assessment of SMC and RMS Monitoring Network Status 47
6.1. Groundwater Levels 50
6.2. Groundwater Storage 53

6.3. Groundwater Quality 53
6.4. Interconnected Surface Water 55
6.5. Land Subsidence 56
6.6. Sea Water Intrusion 56
7. GSP Implementation Activities 57
7.1. Outreach and Education 63
7.2. Projects 64
7.3. Monitoring Enhancements and Addressing Data Gaps 67
7.4. Recommended GSP Corrective Actions in DWR Determination Letter 68
7.4.1. Recommended Corrective Action 1 68
7.4.2. Recommended Corrective Action 2 68
7.4.3. Recommended Corrective Action 3 69
8. References 71

LIST OF TABLES

Table ES-1. Summary of Sustainable Management Criteria Status and Responses ES-6
Table 2-1. Summary of Recent Water Level Monitoring (Since 2015) .... **Error! Bookmark not defined.**
Table 2-2. Summary of Recent Water Quality Monitoring (Since 2015) 9
Table 3-1. Summary of Land Subsidence Monitoring 26
Table 4-1. Groundwater Extraction in Each Water Year by Water Use Sector 35
Table 4-2. Groundwater Extraction by Method of Measurement (Water Year 2024) 35
Table 4-3. Urban Groundwater Extraction Data Sources (Water Year 2024) 39
Table 4-4. Surface Water Use in Each Water Year by Water Use Sector 40
Table 4-5. Surface Water Use in Each Water Year by Water Source Type 40
Table 4-6. Surface Water Diversions and Deliveries Data Sources in the Solano Subbasin (Water Year 2023) 42
Table 4-7. Total Water Use in the 2024 Water Year by Water Use Sector 43
Table 5-1. Change in Groundwater Storage in the Alluvial/Upper Tehama Zone in the Solano Subbasin 45
Table 5-2. Change in Groundwater Storage in the Basal Tehama Zone in the Solano Subbasin 46
Table 6-1. Summary of MTs, MOs, URs, and Selection Rationale 48
Table 6-2. Summary of Groundwater Level RMS Monitoring Status (Water Year 2024) 51

Table 6-3. Summary of Groundwater Quality RMS Monitoring Status (Water Year 2023) 54

Table 6-5. Summary of Interconnected Surface Water RMS Monitoring Status (Water Year 2024) ..... **Error! Bookmark not defined.**

Table 6-6. Summary of Measured Putah Creek Flows in Relation to Required Flows (Water Year 2023) 56

Table 6-4. Summary of Land Subsidence RMS Monitoring Status (Water Year 2024)..... 56

Table 7-1. Ongoing, Planned and Potential Projects and Management Actions in the Solano Subbasin 57

Table 7-2. Summary of Implementation Activities in the Solano Subbasin 60

LIST OF FIGURES

Figure ES-1. Annual Groundwater Storage Changes and Extractions

Figure 1-1. Location Map and Groundwater Basins and Subbasins

Figure 1-2. Major Water Purveyors

Figure 1-3. Groundwater Sustainability Agencies in Solano

Figure 1-4a. Surficial Geology

Figure 1-4b. Surficial Geology Legend

Figure 1-5. Sacramento Valley Schematic Cross Section X-X'

Figure 2-1. Wells with Water Level Information since 2015 -Alluvial Aquifer and Upper Zone

Figure 2-2. Wells with Water Level Information since 2015 - Confined Basal Tehama Zone

Figure 2-3. Wells with Water Level Information since 2015 - Unknown

Figure 2-4. Groundwater Level RMS Location Map-Alluvial Aquifer and Upper Zone

Figure 2-5. Groundwater Level RMS Location Map-Basal Tehama

Figure 2-6. Groundwater Quality Data since 2015 and RMS Location Map

Figure 2-7. Land Subsidence Monitoring Sites

Figure 2-8. Interconnected Surface Water Monitoring Sites

Figure 2-9. Solano Subbasin Data Gaps Update

Figure 3-1a. Cumulative Departure from Mean Annual Precipitation at Davis Station (1960-2024)

Figure 3-1b. Maximum Daily Temperature at Davis Station (1960-2024)

Figure 3-2. Groundwater Surface Elevation Map: Spring 2024 - Alluvial Aquifer and Upper Zone

Figure 3-3. Groundwater Surface Elevation Map: Fall 2024 - Alluvial Aquifer and Upper Zone

Figure 3-4. Groundwater Surface Elevation Map: Spring 2024 - Confined Basal Tehama Zone

Figure 3-5. Groundwater Surface Elevation Map: Fall 2024 - Confined Basal Tehama Zone

Figure 3-6a. Select Groundwater Level Hydrographs: Northern Alluvial Aquifer

Figure 3-6b. Select Groundwater Level Hydrographs: Central Alluvial Aquifer

Figure 3-6c. Select Groundwater Level Hydrographs: Southern Alluvial Aquifer

Figure 3-7a. Select Groundwater Level Hydrographs: Northern Upper and Middle Tehama

Figure 3-7b. Select Groundwater Level Hydrographs: Central Upper and Middle Tehama

Figure 3-8a. Select Groundwater Level Hydrographs: Northern Basal Tehama

Figure 3-8b. Select Groundwater Level Hydrographs: Central Basal Tehama

Figure 3-9a. Groundwater Level Hydrographs: SCWA Nested Wells

Figure 3-9b. Groundwater Level Hydrographs: SSGSA Nested Wells

Figure 3-10a. Maximum Arsenic Concentration Since 2015

Figure 3-10b. Average Arsenic Concentration Since 2015

Figure 3-11a. Maximum Boron Concentration Since 2015

Figure 3-11b. Average Boron Concentration Since 2015

Figure 3-12a. Maximum Chloride Concentration Since 2015

Figure 3-12b. Average Chloride Concentration Since 2015

Figure 3-13a. Maximum Chromium (VI) Concentration Since 2015

Figure 3-13b. Average Chromium (VI) Concentration Since 2015

Figure 3-14a. Maximum Nitrate as Nitrogen Concentration Since 2015

Figure 3-14b. Average Nitrate as Nitrogen Concentration Since 2015

Figure 3-15a. Maximum Total Dissolved Solids Since 2015

Figure 3-15b. Average Total Dissolved Solids Since 2015

Figure 3-16a. Continuous GPS (CGPS) Station Data - P248, P264, P265, P266, P267, DIXN, VCVL, UCD1

Figure 3-16b. Continuous GPS (CGPS) Station Data - P256, P261, P262, P268, P271, P273, P274

Figure 3-17. Land Surface Vertical Displacement: June 2015 to June 2024

Figure 3-18. Land Surface Vertical Displacement: October 2023 to 2024

Figure 3-19. Dixon Land Surface Elevation and Groundwater Level Changes

Figure 3-20. Vacaville Land Surface Elevation and Groundwater Level Changes

Figure 3-21. Discharge and Relative Stage Height Along Putah Creek

Figure 3-22. SCWA Stream Stage Monitoring

Figure 4-1. Groundwater Pumping, Water Year 2024

Figure 4-2. Groundwater Pumping, Water Year 2024- Alluvial Aquifer/Upper Tehama

Figure 4-3. Groundwater Pumping, Water Year 2024- Basal Tehama

Figure 5-1 Groundwater Elevation Change Map: Winter/Spring 2023 To 2024 - Alluvial Aquifer/Upper Tehama

Figure 5-2. Groundwater Level Change Map: Winter/Spring 2023 To 2024 - Confined Basal Tehama Zone

Figure 5-3. Groundwater Storage Change Map: Winter/Spring 2023 To 2024 - Alluvial Aquifer and Upper Tehama

Figure 5-4. Groundwater Storage Change Map: Winter/Spring 2023 To 2024 - Confined Basal Tehama Zone

Figure 5-5. Annual Groundwater Storage Changes and Extractions

Figure 6-1. Current Conditions for Groundwater Level RMS

Figure 6-2. Current Conditions for Groundwater Quality RMS

Figure 6-3 Arsenic Concentration for RMS

Figure 6-4 Chloride Concentration for RMS

Figure 6-5 Cr6 Concentration for RMS

Figure 6-6 NON3 Concentration for RMS

Figure 6-7 TDS Concentration for RMS

Figure 6-8. Current Conditions for Interconnected Surface Water RMS

Figure 7-1 Recharge Enhancement Project Locations

APPENDICES

Appendix A. Putah Creek Accord

Appendix B. Historical Groundwater Contour Maps

Appendix C. Groundwater Hydrographs

Appendix D. Additional Groundwater Quality Data

Appendix E. SWS Water Budget Components Summaries

Appendix F. Change in Storage Maps

TABLE OF CONTENTS

Appendix G. Historical Summary of Water Level RMS Monitoring Status

Appendix H1. Historical Summary of Water Quality RMS Monitoring Status

Appendix H2. Water Quality Plots

Appendix I. Historical Summary of Interconnected Surface Water RMS Monitoring Status

Appendix J1. Historical Summary of Land Subsidence RMS Monitoring Status

Appendix J2. Land Subsidence Plots

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
AF	Acre Feet
AFY	Acre Feet per Year
As	Arsenic
bgs	below ground surface
B	Boron
Cal Water	California Water Service Company
CASGEM	California Statewide Groundwater Elevation Monitoring Program
CAWC	California Water Code
CGPS	Continuous Global Positioning System
cm	centimeters
Cr6	Hexavalent Chromium
DDW	California State Water Resources Control Board - Division of Drinking Water
DIXN	Dixon
DMS	Data Management System
DWR	California Department of Water Resources
ET	Evapotranspiration
ft	Feet or foot
ft/year	Feet per year
GAMA	Groundwater Ambient Monitoring and Assessment Program
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
IHM	Integrated Hydrologic Model
in/year	Inches per year
InSAR	Interferometric Synthetic Aperture Radar
ISW	Interconnected Surface Water
JPA	Joint Powers Authority
LSCE	Luhdorff & Scalmanini, Consulting Engineers, Inc.
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
MPWD	Maine Prairie Water District
msl	mean sea level
MT	Minimum Threshold
MO	Measurable Objective
mybp	Million years before present
NASA JPL	National Aeronautics and Space Administration Jet Propulsion Laboratory
N03-N	Nitrate as Nitrogen
PBO	Plate Boundary Observatory

Acronym	Meaning
RCD	Solano Resource Conservation District
RD2068	Reclamation District 2068
RNVWD	Rural North Vacaville Water District
RMS	Representative Monitoring Site
SCADA	Supervisory Control and Data Acquisition System
SCWA	Solano County Water Agency
SGMA	Sustainable Groundwater Management Act
SID	Solano Irrigation District
SMC	Sustainable Management Criteria
SVSim	Sacramento Valley Groundwater-Surface Water Simulation Model
SWS	Surface Water System
SWRCB	California State Water Resources Control Board
TDS	Total Dissolved Solids
µg/L	Micrograms per liter
UR	Undesirable Results
USBR	U.S. Bureau of Reclamation
USGS	U.S. Geological Survey
VCVL	City of Vacaville
WY	Water Year

EXECUTIVE SUMMARY

ES-1. Overview of SGMA and the GSP

The Sustainable Groundwater Management Act (SGMA) encourages groundwater management at the local level. Local entities are responsible for forming Groundwater Sustainability Agencies (GSAs) to develop and implement Groundwater Sustainability Plans (GSPs) to guide the sustainable management of groundwater basins or subbasins identified as high or medium priority by the State. Five GSAs in the Solano Subbasin organized to form the Solano Collaborative to develop a single GSP for the Subbasin: Solano Subbasin GSA, Solano Irrigation District GSA, City of Vacaville GSA, Northern Delta GSA, and Sacramento County GSA. The Solano Collaborative, together with five other GSAs, has adopted the Solano Subbasin Groundwater Sustainability Plan and submitted the GSP to the Department of Water Resources (DWR) in January 2022. In January 2024 DWR notified the Subbasin that the GSP was approved.

In accordance with SGMA, the Solano Subbasin must also submit annual reports by April 1 of each year. Solano Subbasin has submitted annual reports since April 1, 2022. In July 20225 DWR informed the Subbasin that the annual report submitted for the Subbasin for water year 2025 meets the requirements of SGMA. This report provides information on the current groundwater conditions in the Solano Subbasin in accordance with SGMA requirements with additional information on conditions in the Suisun-Fairfield Valley Basin to assist in monitoring of groundwater in other parts of the County where groundwater represents an important source of supply, however no other areas of the County are within medium or high-priority basins or subbasins and therefore are not currently subject to the requirements of SGMA.

This Annual Report mimics the format and content of the last four Annual Reports previously reviewed by DWR and provides an update on groundwater conditions in Solano County and the Solano Subbasin, focused on water year 2025 (October 1, 2024-September 30, 2025) with a summary of estimated water use and groundwater extractions in the Solano Subbasin in accordance with the SGMA requirements for GSP annual reporting. Key topics addressed in the report are noted below.

- Current and historical groundwater-related monitoring
- Characterizing groundwater conditions
- Reporting on water use, groundwater extraction, and other key water budget components through the current water year (2025)
- Estimates of annual change in storage by principal aquifer
- Assessment of sustainable management criteria monitoring networks for tracking groundwater sustainability (avoiding undesirable results) related to the five sustainability indicators applicable to the Solano Subbasin (seawater intrusion is not applicable):
    - chronic lowering of groundwater levels
    - reduction in groundwater storage
    - water quality degradation
    - land subsidence
    - depletion of interconnected surface water
- Progress on GSP implementation

ES-2. Groundwater Related Monitoring

The Solano County and Solano Subbasin Data Management System (DMS) was updated in preparation for the Annual Report. The DMS was updated through water year 2025, with information related to the five sustainability indicators relevant to the sustainability of the Solano Subbasin. Monitoring data were assembled from public sources and local entities, including the GSAs in the Solano Subbasin.

ES-3. Groundwater Conditions

There are two primary aquifer zones defined in the Solano Subbasin GSP, the Alluvial Aquifer/Upper Tehama Zone and the Basal Tehama Zone. Most of the groundwater pumping in the Subbasin occurs in the shallower Alluvial Aquifer/Upper Tehama Zone. The Basal Tehama Zone is utilized locally, primarily by the City of Vacaville, and is generally found at great depths.

Hydrology and climate in the area during water year 2025 included slightly above-average precipitation in the Solano Subbasin area of about 19 inches (based on the Davis meteorologic station), approximately 103 percent of average, and DWR has preliminarily classified 2025 as an above-normal year for the Sacramento Valley based on Sacramento River watershed runoff characteristics. Water year 2025 was preceded by an above normal year in 2024, a wet year (2023) and three consecutive dry years from 2020 through 2022. Water year 2021, with only 6.5 inches of precipitation (less than 50 percent of average), was the driest year over the historical period from 1960 to 2025. Although precipitation in the Subbasin during water year 2025 was slightly above average, weather in the Subbasin included many warm days, with 116 days recorded with temperatures over 90 degrees Fahrenheit and 39 days with temperatures over 100 degrees (based on observations at the Davis meteorologic station). Water year 2025 had the most days over 90 degrees since 1960 with water year 2024 having the second most.

Groundwater levels reflecting the amount (storage) of water in the groundwater system exhibit stable long-term trends, although groundwater levels remain depressed in a localized area in the northwestern portion of the Solano Subbasin (Northwest Focus Area) identified in the GSP as having lowered groundwater levels. Consistent with historical conditions, prevailing groundwater flow directions in Solano County and Solano Subbasin within the Alluvial Aquifer and Upper Tehama Zone in 2025 tend to be towards the Sacramento River and Delta from the north and west, as indicated on contour maps. In the deeper confined Basal Tehama zone, groundwater gradients indicate flow is generally to the south and with a localized cone of depression in the vicinity of the City of Vacaville, mostly due to the pumping that occurs in the area.

Groundwater quality in Solano County and Subbasin is generally suitable for all beneficial uses, most notably for drinking water uses that typically have the most restrictive standards for water quality. Key groundwater quality constituents of interest identified in the Subbasin include total dissolved solids (TDS), nitrate (NO3-N), arsenic (As), boron (B), hexavalent chromium (Cr6), and chloride (Cl). Some localized areas with elevated concentrations of these key constituents exist in Solano County and Subbasin. Some of the elevated concentrations for select constituents are a result of naturally occurring conditions, although some areas exhibit degraded groundwater quality as a result of groundwater contamination (e.g., plumes) from historical activities on the land surface. Such impacted areas and actions to address these conditions are overseen by other regulatory programs and entities.

Land subsidence data continue to indicate only very minor amounts of subsidence in Solano County and Subbasin, with no documentation of inelastic (irreversible) land subsidence related to groundwater pumping. Historical land subsidence related to the oxidation of peat deposits has occurred in the Delta area of the Subbasin. No significant impacts to surface infrastructure in Solano County and Subbasin have been noted as a result of land subsidence, and the magnitude of seasonal (elastic) fluctuations in the ground surface elevation occurring in association with seasonal changes in groundwater conditions is greater than the rate of long-term subsidence.

Interconnected surface waters in Solano County and Subbasin are most common in the Delta area of the Solano Subbasin, where groundwater is very shallow. Fewer interconnected surface water features exist in the northern parts of the Subbasin, where water levels are somewhat deeper. Streamflows in Putah Creek are maintained by the Solano County Water Agency in a manner designed to support beneficial users along the Creek following the flow schedule outlined in the Putah Creek Accord. Dedicated nested monitoring wells at five sites in the Subbasin have been used to monitor interconnected surface water conditions since 2022, and several additional monitoring sites adjacent to surface water features were added to the GSP monitoring program in 2023, and several of these new sites were instrumented with automated monitoring equipment in 2024. One new stream stage monitoring gage was installed in 2024 to complement the addition of nearby wells to the monitoring network. The Subbasin also continues to track surface water and groundwater interaction with shallow seepage monitoring wells of varying depths installed along Putah Creek at four sites.

Seawater intrusion potential does not exist in the area because the Solano County and Subbasin do not have a coastline, although Delta areas of the Subbasin are tidally influenced. Monitoring any potential influence from higher salinity water intrusion from the Delta is addressed through monitoring of conditions related to the groundwater quality sustainability indicator.

ES-4. Water Budget

Historical and recent water use and water supplies in the Solano Subbasin were estimated through water year 2025 using the Solano Integrated Hydrologic Model (Solano IHM), a numerical groundwater flow model developed during the GSP preparation for application in the Solano Subbasin. Key inputs to the Solano IHM historical scenario used in GSP development were updated and expanded through water year 2025 for this Annual Report using available data and information about land use, water supplies, and water uses. The complete surface water system water budget for the Solano Subbasin was computed using the Solano IHM to estimate water use and groundwater extraction by water use sector. The estimated total water use during water year 2025 was 710,000 AF, and the estimated total groundwater extraction was 170,000 AF. Metered groundwater pumping accounted for about 10,000 AF of the total groundwater pumping in 2025.

ES-5. Change in Groundwater Storage

Annual changes in groundwater storage for the Solano Subbasin were calculated for 2022 to 2025 for each principal aquifer in the Subbasin by comparing spring (seasonal high) groundwater elevation contour maps for each of the years and multiplying the change in groundwater elevation by estimated aquifer properties. Changes in groundwater storage for water year 2025 were based on comparing Spring 2024

and Spring 2025 groundwater levels. Groundwater storage decreased by approximately 23,000 AF in the Alluvial Aquifer/Upper Tehama Zone from Spring 2024 to Spring 2025, while little or no change in storage was estimated for the Basal Tehama Zone. Historically, groundwater storage changes have been positive (increasing storage) in wet periods and negative (decreasing) in dry periods (**Figure ES-1**). Water years 2020 and 2021 were remarkably dry years in the Subbasin, and the negative changes in groundwater storage during these two years are consistent with these dry conditions. Water year 2022 was slightly wetter compared to previous years, and a corresponding increase in storage was noted. Water year 2023 was a wet year correlating with the increase in storage evident between Spring 2022 and Spring 2023. Water years 2024 and 2025 were above-normal water years, with slightly below and above average precipitation respectively and both years had decreases in storage. Water level data for some wells are not available every year due to access issues, influence from nearby pumping on water level measurements, or other quality control reasons, and the availability and timing of water level measurements in wells for a given year can affect the interpretation of groundwater level conditions across the Subbasin.

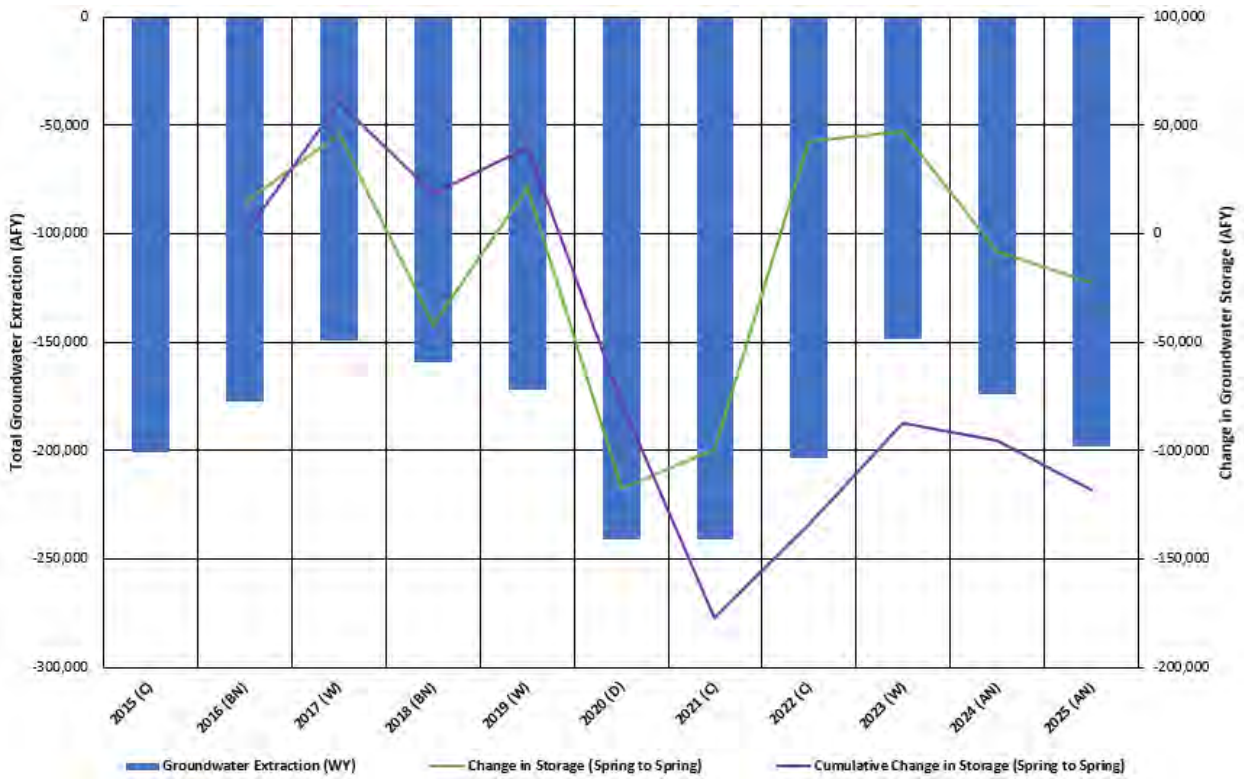

Figure ES-1. Annual Groundwater Storage Changes and Extractions

ES-6. Assessment of Sustainability Criteria and Monitoring

Each sustainability indicator was evaluated for the Subbasin and assigned minimum thresholds (MTs) and measurable objectives (MOs) to avoid undesirable results and ensure continued sustainable groundwater management. MOs and MTs are metrics assigned for sustainability indicators at selected representative monitoring sites (RMS) across the Solano Subbasin. MTs represent values at which undesirable results may be occurring in the Subbasin; MTs were set to avoid significant and unreasonable adverse impacts on beneficial users throughout the Subbasin, including drinking water users, agricultural users, and environmental users. MOs represent the long-term target for conditions in the Solano Subbasin. The RMS network in the Solano Subbasin consists of wells, streamflow gages, and land subsidence monitoring stations that are spatially distributed across the Solano Subbasin. Included in this Annual Report are updates on the five sustainability indicators relevant to the Subbasin, with current conditions presented in relation to MTs and any triggers identified in the GSP for implementing management actions. **Table ES-1** summarizes current Subbasin conditions with respect to MT exceedances (conditions that are above, or below in the case of groundwater elevation, the threshold value) and triggers. In 2025, five MT exceedances occurred in the water level sustainability indicator, although no undesirable result occurred. Two RMS water quality well exceeded the MT for chromium-6, and although chromium-6 is a naturally occurring constituent in groundwater and the exceedance does not constitute an undesirable result for degraded water quality, efforts are being initiated to evaluate factors that may relate to the water quality exceedance. One RMS for Interconnected Surface Water (ISW) exceeded the established MT based on groundwater levels and the factors relating to the measurement and exceedance and are being reviewed.

Table ES-1. Summary of Sustainable Management Criteria Status and Responses

Sustainability Indicator	Minimum Threshold Exceedances	Trigger Occurrences	Undesirable Result Occurrence	Response Summary
Chronic Groundwater Level Decline	Yes, 5 of 41 RMS wells recorded groundwater elevations below the MT.	Yes, a trigger is any MT exceedance.	No	Management actions underway include: • Outreach to all water users • Work to resume monitoring of wells previously monitored but dropped from other entity monitoring programs; identify replacement wells (as needed) and additional monitoring wells in data gap areas or areas of interest • Further evaluation of surface water available for recharge or management actions for enhancing recharge • Evaluation of factors related to MT exceedances
Reduction in Groundwater Storage				
Degraded of Water Quality	Yes, 2 of 27 RMS wells recorded groundwater quality concentrations above the MT	Yes, a trigger is a concentration of 75% of MT.	No	Management actions underway include: • Work to recruit and continue groundwater water quality sampling of wells that were previously monitored or have incomplete monitoring for GSP Constituents • Evaluation of factors related to increasing constituent concentrations
Land Subsidence	No	No	No	--
Depletions of Interconnected Surface Water	Yes, 1 of 6 RMS wells recorded groundwater elevations below the MT.	No	No	Management actions underway include: • Evaluate measurement resulting in MT exceedance and potential factors related to MT exceedance • Consideration of site-specific efforts to address MT exceedance
Seawater Intrusion	Not Applicable to the Solano Subbasin			

ES-7. GSP Implementation

DWR completed its review of the GSP and approved the GSP on January 18, 2024. DWR's GSP approval letter includes three recommended corrective actions to address in future GSP updates, primarily relating to clarifying and providing additional supporting rationale for SMC included in the GSP. Updates on the status of progress made in addressing these corrective actions will be included in future annual reports.

In December 2022, the GSAs applied for and were ultimately awarded funding through a DWR SGMA Implementation Grant to support select GSP implementation activities through March 2026. The grant agreement with DWR was finalized in February 2024 and includes approximately $4.4 million for GSP monitoring and data management enhancements, development of management actions to maintain groundwater sustainability, planning of water supply replenishment and reliability projects, and GSP compliance and outreach activities. In Fall 2025, the Subbasin submitted a request to amend the DWR grant and extend the deadline for completion of grant tasks; the amendment was approved, extending the grant period through March 2027.

GSP implementation activities continue to focus on conducting regular monitoring and reporting on conditions in the Subbasin and performing management actions outlined in the GSP. During and since the submittal of the GSP, the GSAs have initiated efforts to fill key monitoring data gaps by installing new dedicated shallow monitoring wells in areas of interest. In 2025 the Subbasin continued work coordinating with local water agencies for the collection of data for the GSP water quality monitoring program. The Subbasin, in partnership with local entities, conducted targeted outreach for the recruitment of wells for the GSP monitoring program. The GSAs were successful in adding several additional wells to the monitoring program in key areas of interest and are planned for future inclusion as RMS wells once sufficient data are available to assign appropriate sustainable management criteria (SMC).

Additional GSP implementation activities conducted by the GSAs in 2025 include the following.

- stakeholder engagement and outreach efforts through public meetings, workshops, newsletters, websites, and an interactive web map
- interbasin coordination efforts, especially coordination with Yolo Subbasin on groundwater and interconnected surface water conditions in the northern parts of the Solano Subbasin
- data management system enhancements and monitoring network expansion and site instrumentation and automation
- well and surface water diversion inventory and domestic well sampling
- refinement of ISW and groundwater dependent ecosystem (GDE) characterization
- model updates and refinements
- local water conservation and management support activities
- developing strategy for promoting projects and management actions to enhance recharge; identification of areas and landowners with interest and characteristics suitable for surficial recharge
- planning related to multi-benefit solutions to address excess stormwater drainage issues in areas of the Subbasin

- design, construction, and instrumentation of pilot recharge projects utilizing existing stormwater capture basins and natural storm drainage features
- Putah Creek floodplain pilot recharge project planning

Based on analyses conducted during GSP development, the Solano Subbasin anticipates sustainable groundwater conditions can be maintained without substantial intervention by the GSAs, although the GSP identifies projects and management actions that may be implemented to maintain sustainability throughout the Subbasin should they be needed or desired.

1. INTRODUCTION

Regular reporting on groundwater conditions is valuable for tracking changes in the groundwater system and is also a requirement for some areas of the state under the 2014 Sustainable Groundwater Management Act (SGMA). SGMA requires that all groundwater basins and subbasins ranked as medium or high priority by the California Department of Water Resources (DWR) in the state develop and submit a Groundwater Sustainability Plan (GSP) describing how the basin or subbasin will achieve or maintain sustainable conditions. SGMA also requires that all medium and high-priority subbasins submit annual reports describing groundwater monitoring activities and conditions and groundwater management efforts taken to maintain or achieve sustainability. The Solano Subbasin, primarily located within Solano County, is a medium-priority subbasin, and in January 2022, Groundwater Sustainability Agencies (GSAs) within the Solano Subbasin submitted a GSP (LSCE et al., 2022) covering the entire Subbasin, including parts of Sacramento and Yolo Counties. DWR completed its review of the GSP and approved the GSP on January 18, 2024. In accordance with SGMA, the Solano Subbasin must submit a GSP annual report by April 1 of each year. On May 24, 2024 DWR informed the Subbasin the annual report submitted for water year 2023 met reporting criteria. No other areas of Solano County are within medium or high priority basins or subbasins and therefore are not currently subject to the requirements of SGMA; however, this report provides information on the current groundwater conditions in the Solano Subbasin in accordance with SGMA requirements with additional information on conditions in the Suisun-Fairfield Valley Basin to assist in monitoring of groundwater in other parts of Solano County where groundwater represents an important source of supply.

This is the fourth annual report prepared for the Solano Subbasin in fulfillment of GSP Regulations. The report follows the format and content of previous Annual Reports reviewed by DWR and presents groundwater conditions through the end of water year 2025. It also includes selected groundwater budget information for the Solano Subbasin covering water years 2015 through 2025. This report serves to fulfill SGMA and GSP annual reporting requirements for the Solano Subbasin.

1.1. Background

Groundwater supplies meet the needs of many beneficial users in Solano County and the Solano Subbasin, including urban and domestic uses, agricultural uses, and environmental uses. Water managers in Solano County and the Solano Subbasin have recognized the value of this resource and have commissioned various studies prepared on behalf of the Solano County Water Agency (SCWA) and other water entities as part of their efforts to characterize and manage Solano County's groundwater resources and groundwater resources within the Solano Subbasin. Key recent reports on groundwater conditions in Solano County include:

- Westside Sacramento Integrated Regional Water Management Plan (Kennedy Jenks, 2013)
- Updated Hydrostratigraphic Interpretation of the Northern Solano County Deep Aquifer System (LSCE, 2014)
- 2018 Groundwater Conditions Report, Solano Subbasin and Suisun-Fairfield Valley Basin (LSCE, 2020)
- Solano Subbasin Groundwater Sustainability Plan (LSCE et al.,2022)

1.2. Study Area and Groundwater Basin Descriptions

This report includes a discussion of conditions in the Solano Subbasin and the Suisun-Fairfield Valley Groundwater Basin (**Figure 1-1**), with an additional focus on groundwater conditions and management activities as they relate to the implementation of the Solano Subbasin GSP. The majority of these two basins are within Solano County, although there are areas within the Solano Subbasin that are located within Sacramento and Yolo Counties and some areas of the Suisun-Fairfield Valley Groundwater Basin that are within Napa County.[1] Major purveyors in the basins are illustrated in **Figure 1-2** and include SCWA, Solano Irrigation District (SID), City of Vallejo, City of Fairfield, City of Vacaville, City of Dixon, City of Rio Vista, City of Benicia, Rural North Vacaville Water District (RNVWD), Maine Prairie Water District (MPWD), North Delta Water Agency and Reclamation District 2068 (RD 2068). Descriptions of the Solano Subbasin and the Suisun-Fairfield Valley Basin are provided below. These descriptions are partly based on the information contained in *California's Groundwater, Bulletin 118 Interim Update 2016* (DWR, 2016).

A portion of the Napa-Sonoma Lowlands Subbasin also occurs within Solano County, in the vicinity of Vallejo (**Figure 1-1**). Groundwater use in the Solano County portions of the Napa-Sonoma Lowlands Subbasin is very limited due to the availability of surface water supplied by the City of Vallejo. As such, the Napa-Sonoma Lowlands Subbasin is not a focus of this report.

1.2.1. Geography and Hydrogeology of the Solano Subbasin (Basin Number: 5-21.66)

The Solano Subbasin, located in the southernmost portion of the Sacramento Valley Groundwater Basin and extending into the northern portion of the Sacramento-San Joaquin Delta (Delta), is designated as a medium-priority subbasin by DWR. Subbasin boundaries are defined by Putah Creek on the north, the Yolo County line on the east, the North Mokelumne River on the southeast (from Walnut Grove to the San Joaquin River), and the San Joaquin River on the south (from the North Mokelumne River to the Sacramento River). The western Subbasin boundary is defined by consolidated rocks of the Coast Range and a groundwater divide present between the Sacramento Valley Groundwater Basin within the Sacramento River Hydrologic Region and the Suisun-Fairfield Valley Groundwater Basin within the San Francisco Bay Hydrologic Region. The largest municipalities located in the Subbasin include the cities of Vacaville, Dixon, and Rio Vista, with an overall population density across the Subbasin of approximately 191 people per square mile.

For purposes of understanding and managing groundwater conditions in the Subbasin, there are two primary aquifer zones defined: 1) the Alluvial Aquifer and Upper Tehama zone, and 2) the Basal Tehama zone. The Quaternary alluvium, Montezuma Formation, and Upper Tehama have similar hydrogeologic characteristics and behave as a hydraulically connected aquifer zone and represent a single primary aquifer referred to as the Alluvial Aquifer and Upper Tehama zone (Alluvial/Upper Tehama zone). The Basal Tehama zone, which coincides with the Basal Tehama Formation, is generally found at great depth and under confined (i.e., under pressure) conditions within the Subbasin, except for along parts of the

[1] 20% of the Solano Subbasin is located within Sacramento County. 1% of the Solano Subbasin is located within Yolo County. Less than 1% of the Suisun-Fairfield Valley Basin is located within Napa County.

western Subbasin boundary where it is steeply dipping and crops out at the surface. The Basal Tehama zone is not utilized for water supply throughout the entire subbasin but is primarily only used in the vicinity of Vacaville. The Middle Zone of the Tehama Formation, or Middle Tehama, is generally fine-grained with only relatively thin sandy intervals of limited lateral extent. As a result, the Middle Tehama does not serve as a major water-yielding unit in the Subbasin. Because of its fine-grained nature, the Middle Tehama functions as an aquitard in much of the Subbasin, confining the underlying Basal Tehama zone and limiting vertical movement of water between the shallower Alluvial Aquifer and Upper Tehama zone and the deeper Basal Tehama zone.

The hydrogeologic conceptualization of the Solano Subbasin is described in detail in the GSP (LSCE et al., 2022). This conceptualization includes fundamental descriptions of the groundwater system and hydrogeologic setting, including topography, surface water bodies, soils, regional and structural geologic setting and features, extent of the groundwater subbasin (laterally and vertically), identification and discussion of configuration and characterization of major aquifers and aquitards, presentation of groundwater recharge and discharge areas, and identification of surface water and imported water supply sources.

The eastern part of Solano County and Solano Subbasin overlies the southern Sacramento Valley portion of the larger Great Valley geologic province of California. The sedimentary deposits in the Sacramento Valley contain fresh groundwater extending to an elevation of approximately -3,000 ft mean sea level (msl) along the axis of the basin. The mountainous Coast Range geologic province provides the western boundary for the Sacramento Valley and is composed largely of Mesozoic rocks (before 66.5 million years before present (mybp)). The uppermost Mesozoic marine sedimentary rocks (the Great Valley Sequence) extend beneath the Sacramento Valley eastward to pinch out and overlap the older Mesozoic metamorphic and granitic rocks of the Sierra Nevada geologic province from the east. The Mesozoic marine rocks have been explored and tapped into for natural gas resources and do not contain freshwater and are well-consolidated.

Above the Mesozoic marine sedimentary rocks in the southern Sacramento Valley is a sequence of Cenozoic marine deposits of Tertiary age (66.5 to 5.3 mybp). Local surface exposure of these units occurs along the edge of the Sacramento Valley near the City of Vacaville, where they are deformed by faulting. Relatively younger Cenozoic non-marine sedimentary units include deposits sourced from basin margin alluvial fans from the Coast Range to the west and the Sierra Nevada to the east. These alluvial fan deposits transition basin-ward to broad, low-gradient alluvial plains crossed by distributary stream channels and an axial basin of a fluvial system of wide floodplain and flood basin areas with south-draining river channels. These nonmarine sedimentary deposits are poorly stratified and typically thin, discontinuous, laterally limited sand to gravel beds interstratified with thicker fine-grained clays and silt beds.

Most of the Cenozoic nonmarine sedimentary deposits in Solano County and the Solano Subbasin are attributed to the Tehama Formation. The Tehama Formation extends to the base of freshwater on the eastern side of the Coast Range. Overlying the Tehama Formation in Solano County and Solano Subbasin is a sequence of younger Quaternary alluvial deposits. **Figure 1-4** illustrates the surficial geology of northern Solano County and Solano Subbasin. A schematic hydrostratigraphic interpretation of the subsurface crossing Solano County from the Coast Ranges going eastward across the Central Valley to the Sierra Nevada foothills is provided in **Figure 1-5**. This cross-section illustrates the relative thicknesses of

the various geologic units described above that occur below Solano County and the order of their appearance and deposition. More details on the hydrogeology of Solano County and the Solano Subbasin are described in the GSP.

1.2.2. Geography and Hydrogeology of the Suisun-Fairfield Valley Basin (Basin Number: 2-3)

The Suisun-Fairfield Valley Groundwater Basin is located in an area of low alluvial plains to the west of the Solano Subbasin and directly north of Suisun Bay. Geologic formations of the Coast Range bound the Subbasin on the west. The southern extent of the Vaca Mountains forms the northern boundary of the Subbasin. The eastern margin of the Basin is delineated by the groundwater divide following low ridges of consolidated rock that outcrop near Vacaville and extend southeast to the Montezuma Hills (Thomasson et al, 1960). The Suisun-Fairfield Valley Basin is adjacent to the Suisun Bay in the south, and surface water features in the Basin, including Suisun Creek and Laurel Creek, drain into the Suisun Bay. The main groundwater-bearing geologic units in the Basin include the Tertiary Sonoma Volcanics, Pleistocene alluvium, and Recent (Quaternary) alluvium. Although there is relatively little reliance on groundwater as a source of water supply in the Basin, the Pleistocene alluvium is the main water-yielding unit in the Basin, although the Recent (Quaternary) alluvium provides some water to wells in the north, and many of the deeper wells in the western portion of the Basin are constructed in the Sonoma Volcanics. The Basin encompasses part of the City of Vacaville and also includes Fairfield and Suisun City, although these cities do not rely to a great degree on groundwater pumped from within the Basin.

1.2.3. Areas Outside of Solano Subbasin and Suisun-Fairfield Valley Basin

There is an area within Solano County west of the Solano Subbasin between the Subbasin boundary and the Lagoon Valley/Vaca Valley fault in which some groundwater development has occurred but which does not lie within a designated basin or subbasin area. This area is generally underlain by more consolidated rocks of the Great Valley Sequence, which have limited water-yielding characteristics.

1.3. Solano Subbasin Groundwater Sustainability Planning

Five GSAs in the Solano Subbasin organized to form the Solano Collaborative to sustainably manage groundwater in the Subbasin: Solano Subbasin GSA, City of Vacaville GSA, Northern Delta GSA, Sacramento County GSA, and Solano Irrigation District GSA. The Solano Collaborative, together with five other GSAs in the Subbasin, submitted a GSP for the Solano Subbasin in January 2022, and the GSP was approved by DWR in January 2024. The GSP describes historical and recent groundwater conditions based on available data at the time of the GSP development and outlines the approach to ensuring sustainable management of groundwater in the Subbasin. This annual report provides an update of information on groundwater conditions and the status of GSP implementation efforts in the Subbasin through the most recent water year.

2. GROUNDWATER-RELATED MONITORING

Groundwater-related monitoring data were assembled for this report from various entities and used to update the existing Data Management System (DMS). Groundwater-related monitoring data documented in this report include information related to the five sustainability indicators relevant to the sustainability of the Solano Subbasin, as described in the GSP. These indicators include groundwater levels (including groundwater storage), groundwater quality, land subsidence, and interconnected surface water. Seawater Intrusion is not directly applicable to the Solano Subbasin although potential impacts that could conceivably occur as a result of intrusion of higher-salinity surface water from Delta surface water features is addressed through groundwater quality monitoring.

Monitoring data were assembled from the following entities (**Tables 2-1 and 2-2**):

- Groundwater Levels/Groundwater Storage
    - DWR
    - SCWA
    - CAL Water-Dixon
    - City of Vacaville
    - City of RIO Vista
    - City of Dixon
    - Sacramento County
    - Solano Irrigation District (SID)
    - State Water Resources Control Board (SWRCB) GeoTracker
    - Rural North Vacaville Water District (RNVWD)
    - United States Bureau of Reclamation (USBR)
- Groundwater Quality (selected constituents)
    - CAL Water-Dixon
    - DWR
    - U.S. Geological Survey (USGS)
    - SID
    - SWRCB Division of Drinking Water (DDW)
    - SWRCB GeoTracker
- Land Subsidence
    - SCWA
    - EarthScope Consortium (previously known as UNAVCO [2] Plate Boundary Observatory [PBO]) stations
    - DWR
- Interconnected Surface Water
    - SCWA

[2] EarthScope Consortium formed from the merger between UNAVCO and Incorporated Research Institutions for Seismology in January 2023 and is "a non-profit university-governed consortium, facilitate(ing) geoscience research and education using geodesy". (https://www.unavco.org/)

2.1.1. Groundwater Levels and Change in Storage

Solano Subbasin has a long history of monitoring groundwater with groundwater level data going back to 1918. Early monitoring was limited mostly to the northern portion of the Subbasin, where more agricultural and urban areas exist. **Table 2-1** summarizes recent groundwater level monitoring since 2015. As highlighted in **Table 2-1**, most of the recent groundwater level monitoring in the area is within the Alluvial Aquifer and Upper Tehama aquifer zone, where most of the groundwater production occurs in Solano County and the Solano Subbasin. **Figures 2- 1 to 2-3** show the spatial distribution of recent groundwater level monitoring across the County and Subbasin. Monitored wells screened in the Alluvial/Upper Tehama Zone are located throughout the Subbasin but are predominately located in the northern parts of the Solano Subbasin. Wells monitoring groundwater level conditions in the Basal Tehama zone are more limited to areas where greater groundwater production occurs from this deeper zone, especially in the Vacaville area.

The Solano Subbasin GSP identified select wells for use as representative monitoring sites (RMS) and assigned sustainable management criteria (SMC) to these RMS to track groundwater sustainability in the Subbasin. During the development of the GSP, a total of 41 wells were selected as RMS wells, with an additional 161 wells identified as part of the supplemental monitoring network to track groundwater levels and changes in storage in the Subbasin. The selection of the RMS wells and supplemental monitoring network wells in the GSP was based on considerations related to spatial distribution (both laterally and vertically), availability of well construction details, historical data record, and proximity to key beneficial users (**Figures 2-4 to 2-5**). These well networks form the backbone of the GSP monitoring for groundwater levels and change in storage although all available groundwater level monitoring data are incorporated in ongoing evaluations of groundwater conditions in the Solano Subbasin. Several water level RMS wells were recently dropped from DWR and USBR monitoring programs, which provided monitoring of these wells. Efforts to re-recruit these wells for the GSP monitoring program have been occurring; however, three of these wells have been determined to be inaccessible, and the Subbasin is considering removing these wells from the network and replacing them with nearby wells. It was determined that 08N01W33A001M had an obstruction that prevented monitoring and is being replaced with a nearby well. Additionally, twelve wells have been added to the RMS network for improved tracking and representation of groundwater conditions; two of the new RMS are City of Rio Vista wells, and ten are the dedicated wells installed by DWR utilizing grant funds. MTs and MOs will be identified and set for all newly added RMS in the first Periodic Evaluation of the GSP to be completed by January 2027. Identification and vetting of potential replacement wells for the remaining inaccessible RMS continues. Through coordination with other agencies and landowners, two additional wells near Interstate 505 and Stevenson Bridge Road have been added to the supplemental network to address data gaps. Coordination with the Freshwater Trust has also provided new supplemental monitoring to areas of the Subbasin. As part of GSP implementation, GSAs in the Subbasin are actively working to ensure that monitoring at RMS wells is continued, with additional emphasis on maintaining monitoring at all supplemental sites.

Table 2-1. Summary of Recent Water Level Monitoring (Since 2015)

Monitoring Entity	RMS (Number of wells)		Supplemental Monitoring (Number of wells)					Other Monitoring Network (Number of wells)		
	Quaternary Alluvium/ Upper Tehama	Basal Tehama	Quaternary Alluvium/ Upper Tehama	Middle Tehama	Basal Tehama	Markley	Unknown	Quaternary Alluvium/ Upper Tehama	Basal Tehama	Unknown
Cal Water	0	0	7	0	0	0	0	2	0	0
City of Vacaville	0	0	4	0	13	1	0	12	4	0
DWR	39	8	48	0	1	0	8	13	0	9
Dixon	0	0	1	0	0	0	2	0	0	4
GeoTracker	0	0	0	0	0	0	0	1,293	0	37
Rio Vista	2	0	0	0	0	0	0	4	0	0
Sacramento County	2	0	6	0	0	0	0	0	0	0
SCWA	0	0	13	0	7	0	0	0	0	2
SID	2	0	18	0	0	0	4	5	0	14
United States Bureau of Reclamation	0	0	4	0	0	0	4	4	0	1
USGS	0	0	0	0	0	0	0	2	0	3
Total	**45**	**8**	**101**	**0**	**21**	**1**	**18**	**1,335**	**4**	**70**

Note: The RMS and Supplement networks include wells that were recently added, but they do not include wells where recruitment is still ongoing.

2.1.1. Groundwater Quality

Across Solano County and Subbasin, there are over 1,000 wells where recent groundwater quality conditions have been monitored since 2015 (**Table 2-2**). The majority of recent groundwater quality data were obtained from the SWRCB (Ag Lands, DDW and GeoTracker) for characterizing recent groundwater quality conditions. The data on GeoTracker include monitoring conducted for various regulatory programs; data from DDW include monitoring of public water system wells. Much of the available water quality information is located near areas of groundwater production for municipal and public supply and at sites where data are maintained on GeoTracker (**Figure 2-6**). Data provided by DDW for public supply wells generally do not include well construction information that is needed to classify the primary aquifer zone. An additional effort is required to locate any well construction information that may be available for wells with data available through DDW. As part of the GSP effort, 27 wells were selected to be part of the RMS network for groundwater quality and 225 wells were identified for inclusion in supplemental monitoring efforts related to water quality. The selection and identification of the RMS network and supplemental monitoring wells in the GSP were based on considerations related to spatial distribution (both laterally and vertically), availability of well construction details, historical data record, and proximity to key beneficial users. These well networks represent the foundation of the GSP monitoring for groundwater quality, although these networks will be evaluated as the GSP implementation progresses to ensure appropriate monitoring of groundwater quality is maintained and as specific locations of projects and management actions described in the GSP are identified. As part of GSP implementation, the Collaborative is actively working to ensure that monitoring at all RMS wells is continued with additional emphasis on maintaining monitoring at all supplemental sites

Table 2-2. Summary of Recent Water Quality Monitoring (Since 2015)										
Monitoring Entity	RMS (Number of wells)			Supplemental Monitoring (Number of wells)				Other Monitoring Network (Number of wells)		
	Quaternary Alluvium/ Upper Tehama	Basal Tehama	Unknown	Quaternary Alluvium/ Upper Tehama	Basal Tehama	Markley	Unknown	Quaternary Alluvium/ Upper Tehama	Basal Tehama	Unknown
Ag Lands	2	0	0	0	0	0	0	0	0	217
Cal Water	1	0	0	3	0	0	0	6	0	0
City of Vacaville	1	2	0	0	6	1	0	9	5	0
City of Rio Vista	2	0	0	5	0	0	0	3	0	0
DDW	0	0	13	2	0	0	58	0	0	79
Dixon	1	0	0	0	0	0	4	0	0	0
Geotracker	0	0	0	108	0	0	32	1096	0	316
SCWA	0	1	0	0	1	0	0	14	0	0
SID	1	0	1	0	0	0	1	8	0	0
UCD	0	0	0	0	0	0	0	0	0	1
USGS	0	0	0	0	0	0	0	0	0	15
Total	**8**	**3**	**14**	**118**	**7**	**1**	**95**	**1,136**	**5**	**628**

2.1.2. Land Subsidence

The locations of historical land subsidence monitoring stations are illustrated in **Figure 2-7**, including SCWA's two stations (Dixon (DIXN) and Vacaville (VCVL)), and other nearby Continuous Global Positioning System (CGPS) stations. The two SCWA subsidence stations, VCVL and DIXN, started recording data in 2012, whereas the other CGPS stations began in 2004 or 2005. Four subsidence monitoring stations located in the Solano Subbasin are part of the GSP RMS network for land subsidence. Additional data on vertical displacement of the land surface are available from DWR surveys conducted using remote sensing InSAR (Interferometric Synthetic Aperture Radar) technology. These data are available at different time intervals to supplement and compare with the high-resolution land subsidence monitoring stations.

2.1.3. Interconnected Surface Water

SCWA has a network of stream stages and gages located along the numerous small creeks found in Solano County, particularly in the northern and western areas of Solano County (**Figure 2-8**). Additionally, an extensive monitoring network exists along Putah Creek. Flows in Putah Creek within the Solano Subbasin are regulated through releases from Lake Berryessa and Lake Solano with specific flow requirements throughout the year that vary by month and water year type, including specific flow requirements for drought years as outlined in the Putah Creek Accord (**Appendix A**). The GSP RMS network for monitoring interconnected surface water includes six wells located near surface water features and key surface water gages along Putah Creek within the Subbasin (**Figure 2-8**). Thirty-six supplemental monitoring wells are also included in the monitoring network related to tracking groundwater and surface water relationships; these include new wells installed as part of activities described **Section 2.1.5**.

2.1.4. Data Gaps

A detailed description of data gaps is provided in **Sections 3 and 6 of the Solano GSP** (LSCE et al., 2022). As part of Technical Support Services (TSS) provided to the Solano Subbasin by DWR, a total of 10 new monitoring wells of varying depths at five different sites were installed in late 2021 and early 2022 to fill data gaps identified in the Solano Subbasin. The wells are supporting monitoring for groundwater level, groundwater water quality, and interconnected surface water conditions in key areas of the Subbasin. In 2025, the Subbasin continued outreach efforts to owners of wells in data gap areas. These outreach efforts involved coordination with GSAs and local entities and resulted in reinstating several wells in the GSP monitoring program and the addition of several new wells. **Figure 2-9** identifies the wells added to the monitoring network since the last annual report and data gaps identified in the Solano Subbasin. Many existing and additional monitoring facilities near to surface water features emphasize the collection of data necessary to evaluate relationships between groundwater and surface water resources consistent with SGMA including:

- Collecting groundwater and surface water data to detect changes in groundwater levels and groundwater quality and corresponding surface water stage, flow, and quality conditions.
- Collect groundwater and surface water data to establish baseline conditions that will facilitate assessments of the potential effects due to future climate change.

- Collect data to help identify mechanisms for and quantify exchanges of water between groundwater aquifers and surface waters, and responses of the hydrologic system to surface water and groundwater use.
- Provide surface water quality monitoring (including temperature and electrical conductivity) at existing monitoring sites along the Sacramento River and Delta Tributaries.
- Collect groundwater and surface water data that will enable water managers to avoid significant and unreasonable depletions of surface waters consistent with the requirements of SGMA.

3. GROUNDWATER CONDITIONS

3.1. Historical and Recent Hydrology and Climate

3.1.1. Precipitation

Figure 3-1a presents a graph of the historical annual precipitation and cumulative departure from the mean precipitation for the Davis meteorological station by water year (October 1-September 30). Unless otherwise noted, all years presented in this report refer to water years. The Davis station has a long and reliable historical record and exhibits trends similar to other meteorological stations in and around the Subbasin that have shorter periods of record. Rising segments of the cumulative departure curve indicate periods of wetter than average conditions, while falling segments indicate dryer than average periods. Flatter slopes on the curve indicate periods of more average precipitation conditions. The DWR water year hydrologic classifications (water year type) for the Sacramento Valley based on Sacramento River watershed runoff characteristics are indicated in **Figure 3-1a**. The water year types in order of wettest to driest include wet (W), above normal (AN), below normal (BN), dry (D), and critical (C). The Solano Subbasin and Solano County have historically experienced cycles of wet, dry, and average precipitation conditions. Notable dry periods since the 1960s include the late 1970s (1975-1977), late 1980s to early 1990s (1987-1992), and a longer-term drier-than-average trend from 1999 through 2023 with a few brief wet and average periods. Several wetter-than-average periods occurred in the late 1970s and early 1980s (1978-1983) and much of the 1990s (1993-1998), with three very wet single years in 2017, 2019, and 2023. Water year 2020 was a dry year with only about 12.5 inches of precipitation in the Solano Subbasin area (as measured at the Davis meteorologic station), and 2021 was classified as a critical year with only 6.5 inches of precipitation, less than half of the average precipitation measured at the Davis station (average at Davis is about 18.4 inches). Water year 2022 had an annual average precipitation recorded at the Davis Station of about 19.1 inches and was similar to the long-term average; however, approximately 75 percent of the precipitation in 2022 occurred during the months of October 2021-December 2021, and the water year was classified as a critical year. Water year 2023 was a wet year for the Sacramento Valley region, with annual precipitation at the Davis station exceeding the long-term average by approximately 10 inches (about 150 percent of average). Water year 2024 was an above normal water and water year 2025 has been preliminarily classified as an above-normal year for the Sacramento Valley region, although precipitation around the Solano Subbasin was slightly below average in water 2024 and about average in 2025. The majority of rain during water year 2025 fell in November and December (60%) with most additional precipitation (38%) occurring in February and March. Minimal precipitation was observed in the remaining winter and spring months and no precipitation occurred from June to September.

Groundwater conditions presented in this report focus on conditions during recent years, especially the last water year (2025). The influence of the prolonged period of drier-than-average conditions since about 2000 and the very dry hydrology that has occurred in the Subbasin during water years 2020 through 2022 is still evident in groundwater conditions in some areas of the Solano Subbasin and County. The occurrence of such dry years is not unusual in the area, as seen in historical precipitation data presented in **Figure 3-1a**. The response of conditions to the higher precipitation during water year 2023 continued during water year 2024 and remained steady in water year 2025 in many areas of the Subbasin; however, other weather factors occurring in 2025 also strongly influenced conditions in some parts of the Subbasin.

The historical hydrology and the variability in the hydrology are important considerations when evaluating groundwater conditions and trends. A representative base period from 1988 to 2018 was selected for the evaluation of conditions in the Solano Subbasin GSP because it is approximately representative of average long-term hydrologic (e.g., precipitation) conditions in the area.

3.1.2. Temperature

Temperature patterns also affect groundwater conditions because of the influence of temperature on the consumptive use of water through evaporation and transpiration and associated demands of environmental, agricultural, and urban uses. **Figure 3-1b** presents the number of days with high temperatures over 90 degrees and 100 degrees Fahrenheit (F) by water year since 1960 (based on observations at the Davis meteorological station). Weather in the Subbasin during water year 2025 included many warm days, with 124 days recorded with high temperatures over 90 degrees F and 39 days with high temperatures over 100 degrees F. Water Year 2025 recorded the highest number of days over 90°F on record and the second-highest number of days over 100°F since 1960. Water Year 2024 had the second-most days over 90°F and the most days over 100°F since 1960. The first 11 days of water year 2025 were over 90 degrees with 8 of those days over 100. Four of the five water years from 2020 through 2025 have been notably warm, with a high number of days over 90 and 100 degrees. These high temperatures typically translate to increased water use to satisfy evaporation and transpiration demands in the Subbasin.

3.2. Groundwater Levels

This section presents recent groundwater level conditions in Solano County and the Solano Subbasin. Groundwater level monitoring includes data from RMS wells in addition to supplemental monitoring being conducted and data collected from publicly available data sources. These data were used to prepare groundwater elevation contour maps and time-series graphs of groundwater levels.

3.2.1. Groundwater Elevation Contour Maps

Groundwater elevation contours for spring and fall water level conditions in 2025 for each of the primary aquifer zones in the Solano Subbasin (and select areas of Suisun-Fairfield Valley Basin) are presented in **Figures 3-2 to 3-5**. Groundwater elevation contours for all other years from 2015 through the present are included in **Appendix B**. For contouring seasonal high and low conditions, spring conditions are representative of seasonal high groundwater level conditions and include the maximum observed water level elevation during the period from February 1 to May 1. Seasonal low groundwater level conditions are represented by fall conditions based on the minimum static water level observed during the period from September 1 to December 1. Although the fall observation period spans two water years, fall conditions as defined by this time period are believed to be most representative of the seasonal low conditions related to the water year ending September 30 of each year. The groundwater elevation contour maps were developed using all available groundwater elevation data related to each time period and for each primary aquifer zone. Only wells with known construction information or sufficient information to assign them to a primary aquifer were included in the contouring.

Prevailing groundwater flow directions in the Solano Subbasin within the Alluvial Aquifer and Upper Tehama zone tend to be from west/northwest to east/southeast away from the English Hills and Montezuma Hills towards the Sacramento River and Delta as indicated on contour maps. In the deeper confined Basal Tehama zone, there are fewer groundwater level data, but groundwater gradients indicate flow is generally to the southwest towards the City of Vacaville, largely because this is the area where the most historical groundwater pumping in the Basal Tehama zone has occurred.

3.2.2. Groundwater Levels Trends

Overall, long-term trends in groundwater levels are stable in the Subbasin, with some declining levels evident in localized areas of the Subbasin, most notably in the northwestern part of the Subbasin. Groundwater levels exhibit declines during drought periods and recovery during and after wet periods, with seasonal fluctuations observed throughout the Subbasin as a result of the cyclic annual trends in groundwater pumping for urban and agricultural uses during the irrigation season. The Subbasin has experienced a prolonged drier-than-average period since about 2000; this is evident in many hydrographs, although many wells exhibit recovery from recent wetter years in 2017, 2019, and 2023.

Selected groundwater level hydrographs for different parts of the groundwater system are presented in **Figures 3-6a** to **Figure 3-8b** to illustrate temporal trends in groundwater levels across the Subbasin. Select groundwater level hydrographs are grouped and presented on separate figures for wells in the Alluvial deposits, Upper Tehama formation, and the Basal Tehama formation. Although hydrographs for wells in the Alluvial and Upper Tehama geologic units are presented on separate figures, as noted above, these two units have similar characteristics and behave as one hydraulically continuous primary aquifer zone referred to as the Alluvial Aquifer and Upper Tehama zone.

Additional groundwater level hydrographs, including for all RMS, are presented in **Appendix C**.

Alluvial Aquifer and Upper Tehama Zone

Select hydrographs for the alluvial deposits and other shallow deposits comprising part of the Alluvial/Upper Tehama Zone are displayed in **Figures 3-6a** to **3-6c,** organized by wells in the northern, central, and southern parts of the Subbasin. **Figures 3-7a** to **3-7b** present select hydrographs for wells screened in the Upper Tehama part of the Alluvial/Upper Tehama Zone. **Figures 3-6a** and **3-7a** present hydrographs for wells in the northern portion of the Solano Subbasin, where there are more wells, including many of the wells with the longest historical periods of record. **Figures 3-6b** and **Figure 3-7b** present select water level hydrographs for the alluvial deposits in the central portion of the Subbasin and **Figures 3-6c** presents wells in the southern portion of the Subbasin.

The influence of the completed Solano Project in the late 1950s on historical groundwater levels is evident in many of the hydrographs for the Alluvial Aquifer and Upper Tehama zone. A remarkable rise in groundwater levels in the early 1960s is apparent in many wells resulting from the increased availability of surface water and decreased reliance on groundwater in large parts of the Subbasin. This rising groundwater level trend during the 1960s coincided with a period of generally average to below average precipitation in the Subbasin. After the dramatic rise in groundwater levels in the 1960s, most hydrographs in the Alluvial Aquifer and Upper Tehama zone mimic the precipitation trends with periodic

rising and falling levels in response to wetter and drier periods. Groundwater levels appear stable in most of the Alluvial Aquifer and Upper Tehama zone with groundwater depths less than 100 feet bgs and considerably shallower in many areas. Periods of drought in the Solano Subbasin are evident in falling groundwater levels in the mid-to late-1970s, from 1987 to 1992, and more recently over the period 1999 to 2016, culminating with five below-average precipitation years from 2012 through 2016, three of which were dry or critical years, and then additional dry and critical years from 2020 through 2022. Water2023 was a remarkable wet year, and groundwater levels rebounded in many wells as a result of these wet conditions, with continuing effects from the increased recharge still observed in many areas of the Subbasin in water year 2024, which was a relative average water year. Water year 2025 was also an average year and water levels remained steady.

Groundwater levels in the Alluvial Aquifer and Upper Tehama zone in the northern portion of the Subbasin (**Figures 3-6a and 3-7a**) exhibit greater fluctuations over time relative to groundwater levels in the central and southern parts of the Subbasin. In the northern portion of the Subbasin, groundwater levels are heavily influenced by droughts, seasonal fluctuations, and pumping**.** The long-term groundwater level trends in the Alluvial Aquifer and Upper Tehama zone do not indicate any widespread chronic groundwater level declines, although groundwater levels in a number of wells have been declining recently as a result of the relatively dry conditions experienced since 2000. Declining water levels in some parts of this area are evident in hydrographs for wells, including 08N01E33Q002M, 07N01E11M001M, 07N02E15E001M, 07N01W05R001M, and 07N01E04P003M, which show declining levels starting around 2000. The recent recovery of groundwater levels is evident in many of these declining wells in response to wet years in 2017, 2019, and 2023, although additional dry years in 2020 and 2021 may counterbalance the longer-term influence of these wet years on groundwater levels. One notable outlier to the groundwater level trends exhibited by most other wells in the Alluvial Aquifer and Upper Tehama zone occurs in well 07N01W06E001M (**Figure 3-7a**), which shows relatively stable groundwater levels from the early 1930s through the late 1970s, but it has been progressively declining since. This well is located near the western edge of the Subbasin and is likely constructed in an area where the primary water-yielding geologic units are thinner and more consolidated. The nature and cause of localized declining groundwater levels in this area are being further monitored and evaluated.

Although there are fewer wells in the Alluvial Aquifer and Upper Tehama zone with longer periods of water level records in the central and southern parts of the Subbasin, the select hydrographs for those wells with available data suggest stable groundwater levels with minimal seasonal or longer-term groundwater level fluctuations or changes, and shallow groundwater is typically less than 20 feet bgs (**Figures 3-6b and 3-6c; and Figure 3-7b**). As presented in **Figure 3-6c**, one well (4N02E22P001M) in the southern part of the Subbasin is exhibiting longer-term declines in groundwater levels since the mid-1970s. This well is located in the Montezuma Hills, which is a topographically high area formed by the Montezuma Formation. The geology in this area is somewhat more consolidated and finer grained compared to the underlying Tehama Formation and Quaternary Alluvium. The declining groundwater levels evident in this well may be a result of the local hydrogeologic characteristics of the Montezuma Formation and its lower water-bearing capacity.

Basal Tehama Zone

Development of the Basal Tehama zone for groundwater supply occurred after the development of the Alluvial Aquifer and Upper Tehama zone. As a result, historical groundwater level monitoring in the Basal Tehama zone does not extend back as far in time. **Figures 3-8a and 3-8b** present select hydrographs for wells screened in the Basal Tehama zone. All of the hydrographs presented on these figures are for wells with depths greater than 1,000 feet and sometimes greater than 2,000 feet. As noted in previous sections, the Basal Tehama zone is under confined conditions throughout most of the Subbasin and in all the wells presented on **Figures 3-8a and 3-8b**. Therefore, the groundwater elevations presented on the hydrographs are potentiometric elevations reflecting the height to which water rises in the aquifer when penetrated by a well. Changes in the groundwater elevations shown on these hydrographs do not represent desaturation or re-saturation of the Basal Tehama, but they are a function of reduced pore pressure in the aquifer and the effects of the compression and expansion of the aquifer matrix and pore water. Large changes in groundwater elevation can result from relatively small changes in storage in a confined aquifer.

Groundwater elevations in most wells in the Basal Tehama zone exhibit considerable declines during the period from 2000 to 2010 (**Figure 3-8a and 3-8b**). This is largely because of the redistribution in the location of pumping from the Basal Tehama that occurred in the vicinity of the City of Vacaville during this period in an area where the Basal Tehama zone had previously been undeveloped. Most of the Basal Tehama wells presented in **Figures 3-8a and 3-8b** show stabilization and indication of reaching a new equilibrium in the groundwater levels over the last decade, at least since 2010. This stabilization in groundwater levels is believed to be a result of the natural stabilization and equilibration of recharge flow paths over time since the initial development of the aquifer occurred.

One deep monitoring well in the Basal Tehama zone located north of Vacaville and west of Interstate 505 (SCWA Allendale MW-1235) (**Figure 3-8a**) shows declining levels (about 40 feet) since 2010. This trend is similar to what is exhibited by shallower wells in this general part of the Subbasin and is consistent with the generally drier conditions over the period. Although the trend in this well continues to be monitored and evaluated, it is possible the Basal Tehama in this area of the Subbasin may be more closely hydraulically connected to the shallower part of the groundwater system, have more limited water-yielding characteristics and receive more limited recharge. As a result, groundwater levels in this well may reflect greater influences from climatic conditions and associated demands on groundwater. However, climatic influences on recharge to the Basal Tehama is likely to be strongly attenuated because of the longer travel times from the recharge source to reach the Basal Tehama zone in most areas of the Subbasin. As with the Alluvial Aquifer and Upper Tehama zone, long-term trends in groundwater levels in this area will continue to be monitored and evaluated.

Groundwater Level Trends by Depth

Figures 3-9a and **3-9b** present hydrographs for multiple-completion nested monitoring wells in the central and northern parts of the Subbasin. The data is recorded by automated pressure transducers at six-hour intervals, and the graphs display the resulting daily mean values. These hydrographs compare groundwater elevations between monitoring wells screened at different depths at the same location and illustrate some of the unique behavior of groundwater levels by depth zone. The numbers in the well

names in **Figure 3-9a** refer to the total depth of each well. **Figure 3-9b** present data for shallower nested monitoring wells located adjacent to surface water features.

SCWA Nested Monitoring Wells

SCWA has dedicated nested monitoring wells at sites across the Subbasin for tracking groundwater conditions at different depths and locations within the Subbasin. The following sections refer to the hydrographs shown in **Figure 3-9a**.

Allendale Monitoring Wells

The SCWA Allendale monitoring wells in the northwestern part of the Subbasin range in depth from 1,235 feet to 1,925 feet and all are screened in the Basal Tehama. The vertical gradient across these depth intervals is downward (elevations decrease with increasing depth), with potentiometric elevation differences between the shallowest and deepest wells ranging from about 60 feet in 2008 to about 30 in water year 2024. In water year 2025, the transducer for MW-1925 malfunctioned, and efforts are currently underway to restore the device. The shallowest well exhibits greater seasonal fluctuations in potentiometric elevation than the two deeper wells and also exhibits greater declines of about 50 feet since monitoring began. The middle well (Allendale MW-1345) has little seasonal fluctuations in water levels, but water levels have also been declining in this well since 2008. The rate of decline is slightly slower than in the shallower well, totaling roughly 10 feet over that period. Groundwater levels in the deepest well (Allendale MW-1925) also show seasonal fluctuations but have been largely stable over the period of record (since 2008).

RNVWD Monitoring Wells

The RNVWD monitoring wells are somewhat shallower than those at the SCWA Allendale site and include a mixture of wells screened in the Middle Tehama (MW-446 and MW-594) and deeper wells in the confined Basal Tehama zone (MW-862 and MW-1389) with depths ranging from 446 feet to 1,389 feet. The vertical gradient between the three shallowest wells is downward (groundwater surface elevation decreases with increasing depth); however, the deepest well (MW-1389) has a groundwater elevation that is similar to the two shallowest wells at the site (MW-446 and MW-594) and higher than the other Basal Tehama well (MW-862) indicating an upward vertical gradient at great depth within the Basal Tehama. All of the wells exhibit similar trends in groundwater levels over the period of record; these include similar magnitude of seasonal fluctuations and longer-term trends, including declining levels from 2002 through about 2008. The two shallowest wells have had generally stable levels since 2008; however, a slight declining trend in levels in MW-862 is evident starting in 2021 while increasing water levels have been observed at MW-1389 since 2023.

Dixon Monitoring Wells

The SCWA Dixon monitoring wells range from 1,200 feet deep to 2,370 feet deep, with the shallowest of the wells (MW-1200) screened in the upper part of the Basal Tehama zone and the other two wells completed within the lower parts of the Basal Tehama. MW-1200 exhibits seasonal fluctuations of 50 to 60 feet, which are quite distinct from the trends in the deeper wells in which groundwater levels show

little or no seasonal change. The greater seasonal fluctuations in MW-1200 likely reflect the influence of regional pumping. As a result of the seasonal fluctuations in groundwater levels in MW-1200, the vertical hydraulic gradient between these wells is downward during the winter and spring periods and shifts to an upward gradient between MW-2212 and MW-1200 during the summer and fall months. A consistent difference in head of about 20 feet is evident between the MW-2212 and MW-2370 wells, although the difference in the depths of these wells is only about 150 feet. The long-term trends in groundwater elevations exhibited in all wells at this site are relatively stable over the period of record (since 2009), although MW-1200 exhibits a stronger response in water levels to the wet year in 2023, which has resulted in a notable increase in water levels in the well since its historical low in 2022.

Maine Prairie Monitoring Wells

The SCWA Maine Prairie monitoring wells range from 840 feet deep to 2,170 feet deep, with the shallowest well (MW-840) screened in the undifferentiated Upper/Middle Tehama and the other two wells within the Basal Tehama zone. This site is approximately six miles south of the Dixon site and exhibits very similar trends in groundwater levels. MW-840 in the Upper/Middle Tehama formation has higher groundwater elevations than the deeper wells in the Basal Tehama and also shows considerable seasonal groundwater level fluctuations, typically between 60 to 70 feet. The greater seasonal fluctuations in MW-840 are likely a reflection of greater pumping occurring in the shallower part of the groundwater system in this part of the Subbasin. The two Basal Tehama wells at this site have nearly identical groundwater elevation trends. All of the wells at this site exhibit long-term stability in groundwater level trends over the period of record from 2008 to 2022. Water level data for most of 2023 and part of 2024 were not available because of difficulties with monitoring instrumentation in the wells at the site. The monitoring equipment was replaced in 2024, and recent water level data suggest a stable to slightly increasing trend in the water levels in the wells relative to 2022 conditions.

Meridian Monitoring Wells

The SCWA Meridian monitoring wells are located southeast of the City of Vacaville and include two wells in the shallower part of the Tehama Formation (Upper/Middle Tehama) and one well in the Basal Tehama zone with depths ranging from 400 to 1,680 feet. The two Upper/Middle Tehama wells (MW-400 and MW-825) exhibit very similar groundwater elevation trends that are relatively stable between about 50 and 60 feet msl with periodic influences from nearby pumping activity evident as relatively shorter-duration drawdown and recovery cycles. The deeper Basal Tehama well (MW-1680) has groundwater elevations and seasonal fluctuations that are very distinct from the shallower wells, with groundwater elevations approximately 100 feet below levels in the Upper/Middle Tehama wells. Seasonal groundwater level fluctuations in MW-1680 are typically about 20 feet and are greater than in the shallower wells, although some of the short-term pumping influences in the Upper/Middle Tehama wells exceed 20 feet. The Basal Tehama (MW-1680) also shows long-term stability in groundwater levels at this site from 2008 to 2022. A drop in water levels occurred in 2022 following the dry period from 2020 to 2022, and recent measurements indicate that water levels continue to recover.

Solano Subbasin GSA Nested Monitoring Wells

The Solano Subbasin GSA (SSGSA) installed and monitors dedicated nested monitoring wells at five sites to track groundwater conditions in select areas of the Subbasin near surface water features. In 2021 and 2022 SSGA had ten wells installed by DWR at five sites with DWR Technical Support Services assistance. These monitoring wells have been equipped with automated water level monitoring instrumentation for continuous monitoring of groundwater levels. Four of the SSGSA monitoring sites are along Putah Creek and one site is along Lindsey Slough near the Delta. Each of the sites have two wells at different depths, a shallower well with depths ranging from 25 to 75 feet deep and a deeper well with depths ranging from 71 to 109 feet deep, with well designs based on site-specific conditions. Hydrographs of groundwater levels in SSGSA monitoring wells are presented in **Figure 3-9b** and observations of groundwater level trends are discussed in the sections below. Most of these monitoring wells show notable increases in groundwater levels since 2022, especially in the deeper wells.

As additional data are acquired from monitoring at these sites, more thorough analyses of relationships between groundwater and surface water at each site will be conducted. The SSGSA wells have been added to RMS monitoring program, SMC will be assigned during the first Periodic Evaluation. SCWA installed shallow seepage monitoring wells in 2020 at the same four sites along Putah Creek. An in-depth characterization of groundwater conditions and the relationships between surface water and ground at these sites, including incorporation of data from the seepage monitoring wells, is planned as part of addressing data gaps in the Subbasin.

<u>SSGSA-01</u>

Monitoring site SSGSA-01 is located adjacent to Putah Creek, approximately one mile downstream of Lake Solano. The automated water level instrumentation in the shallow well at this site experienced technical issues during the initial months of monitoring and currently only has data since July 2023. From available groundwater level data in the wells at the site, levels in the shallower well (SSGSA-01a; 56 feet deep), suggest a strong hydraulic connection with the nearby stream, as evidenced by the sharp changes in water levels in response to storm events and streamflow conditions, with lesser seasonal variability in levels than in the deeper well. In contrast, the deeper well (SSGSA-01b; 90 feet deep) exhibits larger seasonal variability in water levels with a more muted response to streamflow conditions, suggesting a stronger influence from the regional changes in groundwater levels associated with seasonal conditions and groundwater pumping activities, although the temporal trends in water levels in the two wells are very similar. Recent water levels in SSGSA-01b have increased approximately 30 feet since the seasonal low in 2022.

<u>SSGSA-02</u>

Monitoring site SSGSA-02 is located adjacent to Putah Creek directly south of downtown Winters and approximately 3/4 mile downstream from SSGSA-01. Groundwater level data in the wells at the site suggest a greater influence from the regional changes in groundwater levels associated with seasonal conditions and groundwater pumping activities in both the shallow well (SSGSA-02a; 60 feet deep) and the deeper well (SSGSA-02b; 109 feet deep) than from the nearby stream, although water levels in the shallower well do indicate a stronger response to high streamflow events than the deeper well. A seasonal

change in groundwater levels of between 20 and 40 feet is apparent in the deeper well over the three years of monitoring. The seasonal low water levels in the shallow well appears to have been below the bottom of the well in 2022 and 2023. In 2024 the shallower well exhibited about 20 feet of seasonal fluctuation, similar to what was observed in the deeper well. The influence from nearby well pumping activities is apparent in the deeper well as oscillations in water levels superimposed on the longer-term trends in water levels. The seasonal low water level in SSGSA-02b was similar in 2024 and 2025, and both levels were more than 20 feet higher than the low recorded in 2022.

SSGSA-03

Monitoring site SSGSA-03 is located adjacent to Putah Creek in the vicinity of the Interstate 505 crossing near the town of Winters and approximately 3/4 mile downstream from SSGSA-03. Groundwater level data in the wells at the site suggest very similar conditions in the deeper well (SSGSA-03b; 95 feet deep) as observed upstream in SSGSA-02b). Water levels in the deeper well appear to reflect regional changes in groundwater levels associated with seasonal conditions and groundwater pumping activities. The influence from nearby well pumping activities is apparent in the deeper well as oscillations in water levels superimposed on the longer-term trends in water levels. The shallow well (SSGSA-03a; 36 feet deep) exhibits water levels dominated by influences from the nearby stream. This is evident in abrupt increases in water levels during early periods of storm events (and high streamflow) with a subsequent recession curve after each storm period. Summer and fall water levels in SSGSA-03a appear to be supported by streamflow in the nearby stream with relatively small amounts of long-term change in groundwater levels. The seasonal low water level in SSGSA-03a in 2025 is similar to previous years, the low level in SSGSA-03b continues to be about 30 feet higher than in 2022.

SSGSA-05

Monitoring site SSGSA-05 is located adjacent to Putah Creek, approximately five miles downstream from SSGSA-03. The shallower well (SSGSA-05a; 75 feet deep) and deeper well (SSGSA-05b; 100 feet deep) at this site show very similar groundwater level trends with influences apparent from the nearby stream and also from more regional and longer-term groundwater conditions affected by dynamics of groundwater demand and replenishment. Both wells exhibit a very similar and rapid response to storm events and streamflow conditions, with abrupt rises in water levels and slower declines during the dry season. Water levels in the two wells diverge more during the summer and fall, with the deeper well showing slightly more declines, likely because of a combination of greater reflection of seasonal demands from the primary groundwater production zones in the area coupled with lesser influence from recharge by the nearby stream. Groundwater levels in the winter of water year 2025 rose about five feet higher than previous winters and 12 feet higher than Fall 2022. In 2023 and 2024, only 2 to 3 feet of decline occurred during the irrigation season, whereas in 2025 an approximately eight-foot decline was observed.

SSGSA-06

Monitoring site, SSGSA-06 is located adjacent to Lindsey Slough in the more southern part of the Subbasin, nearer the Delta. The shallow well at the site (SSGSA-06a) is 25 feet deep, and the deeper well (SSGSA-06b) is 71 feet deep. In contrast to the four monitoring well sites along Putah Creek, groundwater levels in the deep well at SSGSA-06 tend to be several feet higher than in the shallower well suggesting some

level of confinement of groundwater and an upward gradient within some of the relatively shallow parts of the groundwater system. Only for short periods during the winter and in direct response to high levels in the nearby slough, water levels in the shallow well are higher than in the deeper well. Neither well exhibits great seasonal variability in water levels, although seasonal changes in levels are greater in the shallower well with a more rapid response to precipitation and nearby surface water conditions. Season-low water levels in both wells have been relatively consistent since monitoring began in 2022.

3.3. Groundwater Quality

Recent groundwater quality data for key constituents of interest in Solano County and Solano Subbasin are presented in maps in **Figures 3-10a** through **3-15b**. These map figures show the recent (since 2015) average and maximum observed levels for total dissolved solids (TDS), nitrate as nitrogen (NO3-N), arsenic (As), chromium-6 (Cr6), chloride (Cl), and boron (B) measured in wells in the area.

The water quality data presented in this report represent untreated groundwater samples and should not be interpreted as reflective of the quality of treated drinking water supplied by any public water system. Drinking water served by public water systems must meet regulatory drinking water standards, which may involve water treatment or blending processes. Drinking water standards such as maximum contaminant levels (MCLs) or other water quality goals (for unregulated constituents) are referenced in this report to provide a point of comparison for understanding groundwater quality conditions. Primary MCLs are health-based standards and secondary MCLs are aesthetic standards.

3.3.1. Arsenic

Because of the natural hydrogeologic conditions, some notable areas of high arsenic concentrations in groundwater exist in parts of the County and Subbasin (**Figures 3-10a and 3-10b**). Elevated arsenic concentrations are apparent in the more southern parts of the Subbasin, where the occurrences of historical maximum arsenic concentrations above the primary MCL of 10 µg/L are more common. Although some local areas of elevated arsenic concentrations exist in the more northern parts of the Subbasin, the arsenic levels in groundwater in the northern Subbasin are commonly less than 5 µg/L with some localized areas or depth horizons of the aquifer system exhibiting higher concentrations, most notably in and around parts of Vacaville and Dixon. A groundwater quality study conducted by the USGS as part of the GAMA for the Southern Sacramento Valley, including the Solano Subbasin, found arsenic concentrations above the MCL in eight percent of wells sampled (Bennett et al., 2011). These higher concentrations are believed to be from natural sources and tended to occur near major river channels and in the Delta where naturally low dissolved oxygen concentrations in groundwater produce reducing geochemical conditions that increase the solubility of arsenic (Bennett et al., 2011).

3.3.2. Boron

Boron commonly occurs in groundwater as a result of the natural leaching process from rocks and soils in which groundwater travels or occurs. Average and maximum boron concentrations in Solano County and the Solano Subbasin since 2015 are shown on **Figures 3-11a and 3-11b** and suggest that boron levels in groundwater are below the Notification Level for drinking water of 1000 µg/L (10 mg/L) throughout most of Solano County and Subbasin, with some areas of elevated levels. Boron does not have an established

drinking water MCL. Boron concentrations in the northwestern part of the Solano Subbasin tend to be the lowest with generally increasing concentrations to the south and east.

3.3.3. Chloride

Historical chloride concentrations in groundwater in the Subbasin are relatively low in most areas as displayed on **Figures 3-12a and 3-12b**. Chloride concentrations in the northern Subbasin are typically less than 50 mg/L, with nearly all well results suggesting concentrations below 100 mg/L. An area of relatively higher chloride concentrations is evident in the central and western part of the Subbasin, likely related to the geologic materials of marine origin that occur at shallower depths or at the surface along and to the west of the Subbasin in this area. Except for a few notable regulated facility sites, chloride concentrations within the Subbasin are generally below the secondary MCL of 250 mg/L. The generally low chloride concentrations across the Subbasin suggest little historical influence from any higher chloride concentrations that may have periodically occurred in the surface waterways of the Delta. Although elevated salinity and chloride concentrations have been observed in the Delta surface water during periods of major drought when freshwater outflows in the Delta were very low, no evidence of chronic intrusion of higher salinity surface water into the groundwater is apparent.

3.3.4. Chromium-6

Effective October 1, 2024, the State of California completed the rulemaking for setting the MCL for chromium-6, and an MCL of 10 µg/L for chromium-6 was established in addition to the existing MCL of 50 µg/L for total chromium. The compliance schedule for meeting the new chromium-6 MCL is based on the number of system service connections [3]. Small public water systems with less than 1,000 service connections have until October 1, 2028, to comply with the new chromium-6 MCL, whereas large water systems with greater than 10,000 connections must comply by October 1, 2026.

Average and maximum recent concentrations of chromium-6 in groundwater in the Subbasin are presented in **Figures 3-13a and 3-13b** and highlight several areas where concentrations are above 10 µg/L, including in Vacaville, Dixon, Winters, and south of Davis. Chromium occurs naturally in groundwater throughout California, including parts of Solano County and the Solano Subbasin. When dissolved in groundwater, chromium can occur in both trivalent (Cr-3) and hexavalent (Cr-6) forms. Naturally-occurring chromium-6 can occur in association with serpentinite-containing rock or chromium-containing geologic formations (SWRCB, 2017) that can be found in various metamorphic and igneous rocks common in the Coast Ranges throughout northern California. Chromium can also occur in groundwater as a result of localized contamination from industrial processes; however, chromium-linked industrial processes are not associated with any regulated soil and groundwater remediation sites (i.e., GeoTracker sites) in the County or Subbasin, including in the vicinity of municipal production wells where chromium-6 concentrations have been detected at elevated levels. Instead, it is likely that detections of chromium-6 in Solano County are the result of natural occurrence and geochemical processes.

[3] https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/SWRCBDDW-21-003_hexavalent_chromium.html

3.3.5. Nitrate

Data on nitrate concentrations in groundwater indicate many wells with high nitrate concentrations above the primary MCL of 10 mg/L exist along Interstate 80 between and around the Cities of Dixon and Davis, near Vacaville and Winters, and also dispersed more broadly across the northern Subbasin (**Figure 3-14a to 3-14b)**. Nitrate concentrations in groundwater are generally lower in the Suisun-Fairfield Subbasin and the southeastern portion of the Solano Subbasin. Nitrate can occur naturally in groundwater, although typically at relatively low concentrations below the MCL. Elevated concentrations of nitrate can be associated with impacts from chemical fertilizers or animal waste (i.e., septic or manure). Considerable additional data on nitrate concentrations are now available within the Solano Subbasin as a result of the recent requirement (starting in 2022 calendar year) for nitrate testing of all domestic wells on parcels enrolled in the Irrigated Lands Regulatory Program (ILRP) as part of the ILRP Drinking Water Well Monitoring program (DWWMP). These additional DWWMP data suggest a larger spatial extent of areas affected by elevated nitrate concentrations than had previously been documented. The areas with elevated nitrate levels tend to occur where depth to groundwater is very shallow, notably in areas south and east of Dixon. A historical nitrate contamination plume from a former meat processing facility is known to exist in the vicinity of Dixon, although the extent of any relationship of this point source to the broader elevated nitrate concentrations east and south of Dixon is not documented and may warrant future consideration. In reviewing nitrate concentration data within the Subbasin in 2023, a surprisingly high number of wells sampled as part of the ILRP DWWMP had very low nitrate concentrations in 2022, with large spikes in concentrations in 2023. Whether this spike in nitrate is real or a result of a systematic data reporting error is still part of an ongoing investigation, including through coordination with the SWRCB, which is responsible for receiving and hosting these data. If an actual spike in concentrations did occur in these wells in 2023, additional investigation of the potential causes will also be conducted.

3.3.6. TDS

TDS provides a measure of the overall salinity of groundwater. High concentrations of TDS in groundwater can be the result of naturally occurring salinity, especially within aquifers comprised of sediments sourced from marine deposits such as those formations occurring at great depth in the Solano Subbasin or in the Coast Range. TDS concentrations tend to be lower in the more northern parts of the Subbasin, with an increasing number of wells with higher TDS concentrations occurring in more southern parts of the Solano Subbasin near Montezuma Hills (**Figure 3-15a to Figure 3-15b**). Most of the wells in the Subbasin have recent historical TDS concentrations below the secondary upper MCL of 1,000 mg/L, and many of the wells in the northern and central Subbasin have TDS concentrations below the recommended MCL of 500 mg/L. Localized areas of higher TDS concentrations in groundwater correspond to environmental monitoring wells at regulated sites, likely reflecting point source impacts to TDS concentrations.

3.3.7. Other Groundwater Quality Constituents

Maps of a variety of other groundwater quality constituents are presented in **Appendix D.** Many of these maps highlight distinct areas of local groundwater contamination that should be considered when evaluating potential groundwater quality impacts from the implementation of projects and management actions to achieve sustainability. Wells with detections and exceedances for a variety of constituents, including anthropogenic contaminants like pesticides, solvents, and petroleum-related chemicals, are

displayed in maps in **Appendix D**. Most notably, maps of DBCP, EDB, 1,2,3-TCP, naphthalene, and BTEX concentrations all indicate areas or locations with wells exceeding the respective drinking water MCLs. Additional contaminants such as aldicarb sulfone, atrazine, diazinon, simazine, and perchlorate have also been detected in areas of the Subbasin, although at concentrations below drinking water MCLs. Naturally occurring constituents such as uranium and manganese are also elevated in some wells, with high uranium concentrations more apparent in the northern and central parts of the Subbasin and high manganese concentrations more common in the southeastern parts of the Subbasin. Uranium levels are generally below the MCL, except for one exceedance in the Delta area, whereas a greater number of manganese exceedances exist in the Subbasin.

Per- and polyfluoroalkyl substances (PFAS) are a category of rapidly emerging synthetic chemicals of concern in groundwater. PFAS have been used for a wide range of applications, including as surface and protective coatings in consumer, commercial, and industrial products, and have also been used as a surfactant in firefighting foam. They are resistant to heat, water, and oil and do not break down in the environment. MCLs have been established by the USEPA for some PFAS chemicals with monitoring requirements for public water systems starting in 2027 and a requirement for public water systems to implement solutions to address and reduce any PFAS levels in drinking water above the MCL by 2029 [4]. A map of concentrations of select PFAS chemicals in groundwater in relation to detection levels and any established MCLs is presented in **Appendix D**.

3.4. Land Subsidence

Land subsidence is the sinking or settling of the land surface. Historical land subsidence caused by decomposition of peat soils has been documented in the Delta islands, including in parts of the southern Solano Subbasin. There are two general types of land subsidence: elastic and inelastic. Elastic subsidence is a reversible condition that can occur as a result of short- or long-term groundwater level declines in alluvial aquifers and the associated compaction of the aquifer matrix material that occurs when water is removed from pore spaces in the aquifer. With elastic subsidence, as groundwater levels recover, the condition is reversed (i.e., there is a rebound of the land surface). Inelastic subsidence is permanent subsidence that is not reversible. Inelastic subsidence caused by groundwater level declines results from the compaction of fine-grained materials (e.g., clay layers) in the groundwater system as the water held in these materials is released. Once the water has been expelled from the fine-grained materials, the layers compact, and the water is permanently lost from these materials even when groundwater conditions change, and the groundwater levels rise. Inelastic subsidence caused by groundwater depletion typically occurs after a period of chronic groundwater level or pressure declines that last for a prolonged period. There has been no documented ***inelastic*** subsidence in the Solano Subbasin. Seasonal or shorter-term declines in groundwater levels do not typically cause inelastic subsidence.

Land subsidence activity in Solano County and Solano Subbasin is monitored with CGPS stations and using remote sensing techniques (Interferometric Synthetic Aperture Radar [InSAR]) comparing the elevation of the land surface over time and generating vertical displacement results. Negative vertical displacement measurements indicate land subsidence and positive vertical displacement measurements indicate uplift.

[4] https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas

3.4.1. CGPS Stations

The locations of long-term CGPS stations in and around Solano County and the Solano Subbasin are presented on **Figures 3-16a and 3-16b**. The CGPS stations are long-term and semi-permanent monitoring sites and collect highly accurate data on lateral and vertical positioning on a daily basis with records starting as early as 2005. CGPS surveying has an accuracy of less than 0.5 centimeters (cm) or about 0.2 inches (UNAVCO, 2010). The historical monitoring of the CGPS stations in the area has been conducted by SCWA and the University NAVSTAR Consortium (UNAVCO) Plate Boundary Observatory (PBO), including the installation and monitoring of two CGPS stations in June 2012 by SCWA to track land surface elevation conditions in the County and Subbasin. All ongoing acquisition and processing of monitoring data for CGPS stations is managed through EarthScope Consortium [5] (historically UNAVCO PBO). One additional nearby CGPS station (UCD1) located outside the Solano Subbasin on the UC Davis campus is monitored by Scripps Orbit and Permanent Array Center (SOPAC). Data and trends in vertical displacement monitoring from CGPS stations in and around the Solano Subbasin are summarized in **Table 3-1**. The four CGPS stations within the Solano Subbasin (DIXN, VCVL, P267, P266) are included as GSP RMS for monitoring subsidence in the Subbasin. For GSP reporting, vertical displacement data for CGPS stations are periodically acquired from UNAVCO PBO and other monitoring/reporting entities and updated to incorporate any changes to historical data made by EarthScope Consortium or others resulting from improvements in their data processing. As a result, some of the CGPS vertical displacement data presented in this report may differ slightly from what was presented in previous reports. The accuracy of the CGPS stations (about 0.2 inches) should also be considered when evaluating the very small amounts of vertical displacement recorded at CGPS stations within and around the Subbasin.

Data from the CGPS station located at the SCWA nested monitoring well site in Dixon (DIXN) exhibit an annual vertical displacement (change in elevation) behavior marked by a generally sinusoidal pattern with lower land surface elevations in summer and fall compared to winter and spring. This seasonal fluctuation pattern is typical of alluvial groundwater basins under natural and developed conditions as a result of the seasonal cycles of draining and replenishment of the groundwater system during different seasons. The land surface elevation at the DIXN site has historically been relatively stable, although an increased amount of negative vertical displacement (subsidence) is apparent at this site during water year 2021. The vertical displacement at the DIXN site has been very minimal since water year 2021. Over the period of record from 2012 through 2025, the vertical displacement has generally been slightly negative at an average rate of only -0.0122 feet per year (ft/yr) or -0.15 inch per year (in/yr)) with only minimal total subsidence (-0.1629 feet or -2.0 inches) over the period of record for water year 2013 to 2025 (**Table 3-1**). Data for DIXN suggest a slight amount of uplift at the site during WATER YEARs 2023 and 2024.

P267, located south of Dixon in the central part of the Subbasin, exhibits a similar historical trend in vertical displacement as the DIXN station, although the period of record extends back to 2005. The historical rate of vertical displacement at P267 is -0.013 ft/yr (-0.2701 feet or about 3 inches in total), with only very limited negative vertical displacement since 2022.

[5] In 2023 UNAVACO merged with IRIS to form EarthScope Consortium.

Data from the CGPS station at the City of Vacaville MW-16 site (VCVL) indicate stable conditions over its historical record since June 2012, with very small seasonal fluctuations in land surface elevations throughout the year. The VCVL station has exhibited only a very slight downward trend in vertical displacement (-0.0064 ft/yr or -0.08 in/yr) and minimal total subsidence (-0.085 feet or -1.02 inches) from 2012 through 2025 (**Table 3-1**). Over water years 2015 through 2025, the vertical displacement at the VCVL site has continued at a very small rate of subsidence (-0.0057 ft/yr or -0.068 in/yr).

Station P266 is in the western part of the Subbasin near the Montezuma Hills and has recorded only very little vertical displacement of -0.1149 feet (-0.0056 ft/yr) since 2005, with almost no long-term vertical displacement since 2019.

The CGPS stations show that the land surface elevation fluctuates seasonally by between 0.0688 and 0.0957 feet in areas of the Subbasin, with the higher fluctuations occurring in the central areas around Dixon. At the four CGPS stations within the Subbasin the average annual rate of displacement is considerably less than typical season fluctuations. There is currently insufficient information to indicate whether the vertical displacement observed at the stations is reflective of inelastic or elastic conditions. Additional data after recovery from the prolonged drier-than-average period since 1999 and more extreme drought periods ending in 2016 is necessary to determine the nature of any subsidence observed in the Subbasin. The seasonal fluctuations indicate the magnitude of elasticity that can occur as a function of seasonal variability in conditions.

Table 3-1. Summary of Land Subsidence Monitoring

Station ID	Years of Record	Date Range Evaluated	Total Vertical Displacement (ft)	Rate of Land Surface Elevation Change (ft/yr)	WY 2015-2025 Total Vertical Displacement (ft)	WY 2015-2025 Rate of Land Surface Elevation Change (ft/yr)	Average Annual Seasonal Elevation Fluctuation[1] (ft)
Stations Located Inside Solano Subbasin							
DIXN	13	6/9/2012 - 9/30/2025	-0.1629	-0.0122	-0.1379	-0.0125	0.0957
VCVL	13	6/8/2012 - 9/30/2025	-0.0851	-0.0064	-0.0624	-0.0057	0.0768
P266	19	6/8/2012 - 9/30/2025	-0.1149	-0.0056	-0.0585	-0.0053	0.0703
P267	20	6/8/2012 - 9/30/2025	-0.2701	-0.0132	-0.1836	-0.0167	0.0688
Stations Located Outside Solano Subbasin							
P248	18	9/21/2007 - 9/30/2025	-0.0213	-0.0012	-0.0255	-0.0023	0.0746

Table 3-1. Summary of Land Subsidence Monitoring							
Station ID	Years of Record	Date Range Evaluated	Total Vertical Displacement (ft)	Rate of Land Surface Elevation Change (ft/yr)	WY 2015-2025 Total Vertical Displacement (ft)	WY 2015-2025 Rate of Land Surface Elevation Change (ft/yr)	Average Annual Seasonal Elevation Fluctuation[1] (ft)
P256	21	10/28/2005 - 5/16/2024	-0.0644	-0.0031	-0.0457	-0.0042	0.0582
P261	21	6/4/2004 - 9/30/2025	-0.1256	-0.0059	-0.0857	-0.0078	0.0662
P262	21	3/30/2005 - 9/30/2025	-0.0346	-0.0017	-0.0187	-0.0017	0.0689
P264	20	5/13/2005 - 9/30/2025	-0.0547	-0.0027	-0.0633	-0.0058	0.0790
P265	20	8/27/2005 - 9/30/2025	-0.3108	-0.0155	-0.1822	-0.0166	0.0650
P268	20	4/11/2005 - 9/30/2025	-0.1973	-0.0096	-0.0994	-0.0090	0.0646
P271	21	6/8/2004 - 9/30/2025	-1.1348	-0.0532	-0.6448	-0.0586	0.1745
P273	15	10/27/2005 - 1/12/2021	-0.2040	-0.0134	-0.1319	-0.0210	0.0830
P274	19	10/28/2005 - 5/16/2024	-0.2956	-0.0159	-0.3019	-0.0314	0.0670
UCD1	29	5/19/1996 - 9/30/2025	-1.0945	-0.0373	-0.3752	-0.0341	0.1306

1 Annual fluctuation is calculated as the seasonal elevation variation occurring over a year spanning March to March.

Additional CGPS stations monitored as part of the UNAVCO PBO and SOPAC networks exist around the Subbasin and the historical vertical displacement data at some of these stations are presented in **Figures 3-16a** and **3-16b.** Station P265 is located outside the Subbasin near Winters, just across the northern Subbasin boundary, and the other nearby PBO stations are located in the adjacent hills to the west or south of the Delta. The stations located outside the Subbasin provide a useful comparison for relating to the vertical displacement occurring at points within the Subbasin.

Station P265, located just north of the Subbasin boundary, has exhibited an average subsidence (negative displacement) of approximately -0.3108 feet (about -3.73 inches) over the 20 years of record. This translates to an estimated rate of vertical displacement of -0.0155 ft/year (-0.186 in/yr). The trend in vertical displacement at the site has again stabilized since 2022 after a brief episode of increased negative displacement during the 2020 to 2021 period. Station UCD1 is also just north of the Subbasin on the UC

Davis campus and has a longer record of vertical displacement data extending back to 1996. The station has exhibited a slightly higher average rate of decrease in relative elevation compared to P265, averaging 0.0373 feet/year (0.448 in/yr), totaling 1.095 feet (13.14 inches) over its 29-year record. The rate of negative vertical displacement has stabilized since Summer 2022, similar to the trend at other CGPS stations in and around the Solano Subbasin.

Stations P264 and P248 are located outside of alluvial basins and provide an interesting comparison of vertical displacement trends that are occurring in these geologic environments in areas less impacted by groundwater development. Sites P264 and P248 exhibit vertical displacement trends that are opposite to what is occurring at the sites within the Subbasin. These sites record positive vertical displacement during the drier periods and negative displacement during wet periods. This is likely because these stations are in more consolidated materials that do not experience compaction in the same way that less consolidated alluvial basin sediments do. Instead, these sites may be exhibiting the influence of hydrologic loading during wet periods and unloading during dry periods that correspond with the negative displacement in winter and spring and positive vertical displacement in the summer and fall.

The sites outside the Subbasin are not an indication of subsidence occurring within the Solano Subbasin, but they do provide context for how conditions outside the Subbasin relate to those observed within the Subbasin.

3.4.2. InSAR Data

InSAR mapping of land subsidence is particularly useful for observing and tracking spatial patterns in vertical displacement over an area. The National Aeronautics and Space Administration Jet Propulsion Laboratory (NASA JPL) has historically provided spatial data of vertical displacement of the land surface across the Central Valley from InSAR surveys, which DWR has published. [6] Some of these datasets cover parts of the Sacramento Valley, including the Solano Subbasin. **Figure 3-17** shows the vertical displacement of the land surface between June 2015 and June 2025. Data spanning this period suggest that vertical displacement of the land surface across much of the Solano Subbasin and Solano County is slightly negative at amounts between -0.025 and -0.1 feet, with some areas of slightly greater negative values. Areas exhibiting the most negative vertical displacement (land subsidence) occur as red spots and are located south of the Solano Subbasin near Montezuma Hills, in the Delta regions, and south of Dixon and Davis in the Northern parts of the Solano Subbasin. The largest negative vertical displacements of 0.35 feet (4.2 inches) are observed in an isolated area southeast of Davis. The negative vertical displacement measured in the area of the Montezuma Hills using InSAR does not agree with the observations from CGPS station P266, which suggest very minimal subsidence (negative displacement of about -0.05 feet) in this area since 2015.

DWR has also published InSAR results in partnership with the European Space Agency's Sentinel-1A satellite, with the data processed by TRE ALTAMIRA [7]. **Figure 3-18** presents a map of InSAR data

[6] https://data.cnra.ca.gov/dataset/nasa-jpl-insar-subsidence; https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer
[7] https://gis.water.ca.gov/arcgisimg/rest/services/SAR

representing the vertical ground surface displacement during the period October 2024 to October 2025, spanning water year 2025. InSAR data indicate that vertical displacement in the Solano Subbasin was minimal during WATER YEAR 2025, ranging from extensive regions of positive displacement to areas of minor negative displacement. The areas of highest vertical displacement occurred northeast of Dixon and northeast of Rio Vista. Vertical displacement rates during water year 2025 are notably higher than in water year 2024 and similar to those in water year 2023, with a much greater extent of areas exhibiting rebound than in water year 2024. Data coverage is better than previous years with sparse data gaps in the eastern portion of the Subbasin that have not yet been successfully measured by InSAR. Nearby InSAR measurements suggest minimal subsidence in this data gap area. InSAR data for previous water years 2019 through 2023 also suggest only limited negative vertical land surface displacement within the Solano Subbasin, primarily in areas to the south of Davis and Dixon (**Appendix B**).

Although small amounts of land subsidence have been observed historically and recently in the Solano County and Solano Subbasin, it is not currently an issue of significant concern in the Solano Subbasin or the Suisun-Fairfield Valley Basin because of the very small amount of historical subsidence and limited potential for impacts from land subsidence on surface infrastructure.

3.4.3. Comparisons of Vertical Displacement and Groundwater Level Data

Regional groundwater levels generally exhibit annual variability in response to climatic influences, including precipitation or water year type, in addition to anthropogenic influences such as groundwater pumping. Groundwater levels measured in wells and changes in land surface elevation can sometimes be correlated, depending on the depth of the wells and the hydrogeologic setting, including the characteristics of the geologic materials and their response to changes in groundwater levels or potentiometric surfaces. **Figures 3-19** and **3-20** illustrate the historical and recent relationship between land surface vertical displacement at the DIXN and VCVL CGPS sites and groundwater levels measured in monitoring wells at these sites or wells nearby. The dedicated monitoring wells located at these CGPS sites are relatively deep and water levels in nearby shallower wells are also presented for comparison with conditions in the shallower parts of the groundwater system.

Figure 3-19 presents vertical displacement (change in elevation) at the DIXN site in relation to groundwater levels in wells ranging from depths of 150 feet to 2,370 feet. The SCWA Dixon MW-1200 monitoring well is 1,200 feet deep and monitors groundwater levels in the upper portion of the Basal Tehama zone, which is a confined aquifer in this area. As a result, groundwater levels in this well can respond to very small changes in groundwater storage. Seasonal lows in groundwater levels in Dixon MW-1200 recovered after 2014 and 2016 lows, and changes in land surface elevation also initially stabilized after 2016. Land surface elevations declined slightly in 2021 and groundwater levels for Dixon MW-1200 dropped to between the 2014 and 2016 lows but have shown recovery since 2022. The other two deep nested wells located at this site have groundwater levels that are stable with little or no obvious correlation evident between groundwater levels and land surface elevation change. Although there has been stability in the groundwater levels in all of the nested monitoring wells at the site and little correlation to the longer-term trend of slight downward land surface elevation change, MW-1200 does exhibit more notable seasonal fluctuations that are consistent with seasonal ground surface elevation

changes at the site. Changes in land surface elevation were slightly greater at the start of water year 2025 compared to the previous two years, but rebounded rapidly in late 2025.

The DIXN site does not have a shallow nested groundwater well, but there is a 150-foot deep well (07N01E11M001M) in the vicinity that has water level monitoring data. This shallow well is in the Alluvial Aquifer and Upper Tehama zone and exhibits a slightly declining groundwater level trend from 2012 through 2022, with some recovery in 2023 and stabilization thereafter. This water level trend is generally consistent with the trend in land surface elevation change over the same period. Well 07N01E11M001M exhibits much less seasonal variation in water level relative to MW-1200, although this is likely because the well reflects unconfined groundwater conditions. It is notable, however, that the seasonal fluctuations in water levels in well 07N01E11M001M are generally opposite of the ground surface elevation changes, with higher water levels in fall than in spring, which may reflect the influence of percolating irrigation water from nearby agricultural areas.

Figure 3-20 presents a comparison of ground surface elevation changes and groundwater levels for three nested wells at the Vacaville CGPS site. All of the monitoring wells at the site exhibit relatively stable groundwater level trends representative of depths ranging from 117 feet to 1430 feet. MW16-1430 and MW16-1166 are monitoring wells that are 1,430 and 1,166 feet deep, respectively, and both the land surface elevation data and the groundwater elevation data at the sites exhibit long-term stability. No strong correlation between groundwater levels in MW16-1430 and MW16-1166 and ground surface elevation changes are apparent at the site. Although slightly lowered but stable, groundwater levels in these wells since 2022 align with a drop in the ground surface elevation during 2022 and subsequently stable vertical displacement. Similarly, these wells exhibited a noticeable increase in water levels early in 2025 which aligns with a recent stabilization or slight increase in land surface elevations. The shallower MW16-117 is 117 feet deep, and water levels have been stable to slightly increasing since 2012, and no correlation between land surface elevation data and water elevation data is observed.

Although there is apparent consistency in some of the groundwater level and land surface elevation trends at the DIXN and VCVL sites and likely others in Solano County and Subbasin, evaluating whether the changing conditions at the different depth zones being monitored are the cause of land surface elevation changes can be challenging. Monitoring land subsidence paired with groundwater level measurements leads to an improved understanding of the aquifer system and hydrogeology; however, a sufficient period of monitoring and a combination of conditions (i.e., hydrology, pumping influences) are important to evaluate the relationship between groundwater levels and land surface elevation and characterization of elastic and inelastic changes. Further evaluation and additional data are also needed to differentiate elastic and inelastic subsidence in the Subbasin and identify which subsurface geologic materials (units) are responsible for compaction and expansion. Long-term monitoring of land surface elevation is key to detect delayed mechanisms causing inelastic subsidence such as dewatering of fine-grained materials like clays, that can take considerable time to occur. Additional efforts to evaluate the relationship between groundwater levels in different parts of the groundwater system, especially shallow and intermediate depths where most of the groundwater extraction occurs, and vertical displacement at the land surface will be considered as the GSP implementation progresses and additional groundwater level and subsidence monitoring information are available.

3.5. Interconnected Surface Water

Streamflows in lower Putah Creek within the Solano Subbasin are relatively consistent during the dry months as a result of regulated flow releases, as required by the Putah Creek Accord (**Figure 3-21**). Even during wet water years, runoff flows from precipitation events in the Putah Creek watershed are often muted in lower Putah Creek due to the large storage capacity of Lake Berryessa. Monitoring of Putah Creek at Interstate 505 indicates the stream water level (stage) typically fluctuates minimally (less than a foot) during dry-month periods over the monitoring record, and flows are commonly between 15 and 30 cubic feet per second (cfs). During high flow events, such as when flows exceed 100 cfs, the stage can rise considerably by more than five feet. Many of the highest flow events during the period from 2006-2022, shown in **Figure 3-21**, exceed the rating curve at the gage, and associated flow rates are not reported. Additional downstream monitoring during the lower-flow periods also occurs at the Stevenson Bridge Crossing and Pedrick Road Bridge. Both gages indicate stage varies by only a small amount during the months outside of the winter wet period. Typical stream stage at these locations vary by only a foot while discharges range between 10 and 100 cfs. Monitoring of Putah Creek at Interstate 80 indicates some variability in stage during drier months with typical fluctuations in stage of about one foot. During occasional wet periods, stage can rise by more than 7 or 8 feet. As with some of the other upstream gages, the rating curve at the Interstate 80 (I-80) gage does not extend to flood stages so discharges at very high flows are not reported. Some of the stream gages experienced operational difficulties caused by high flows and other circumstances resulting in missing data for sites.

Figure 3-22 illustrates the stream stage conditions for the other smaller creeks in the Solano Subbasin. Flows in three waterways (Sweeney Creek at South Putah South Canal and Midway Road and Ulatis Creek at Maine Prairie Road) exhibit a pattern of higher flows (higher stage) in the drier months and lower flows in the wetter months. Overall, stages in these three channels are highly influenced by irrigation water conveyance and drainage with elevated stages during the summer irrigation season. The other small surface water features in the Subbasin display a more typical pattern of elevated stages in the rainy winter months and lower stages in the dry summer months. Flows in the smaller Subbasin creeks and streams are generally less than 5 cfs. The Subbasin intends to establish elevation datums at select stream gage locations for relating surface water stage and groundwater levels.

Many creeks in the Subbasin are engineered for flood control and are also used by irrigation districts (i.e., MPWD and SID). During the typically dry months in the Subbasin, water is transported via the creeks to agricultural users, and flows in these creeks are largely or entirely sustained by irrigation water deliveries. Because so many of the surface water features in the Subbasin are used for water conveyance during the irrigation season, the potential for groundwater pumping to deplete natural stream flows is believed to be very limited in many parts of the Subbasin, especially in the more northern areas of the Subbasin that are more reliant on groundwater.

Flow conditions in the Delta are very complex and are very large, with flows in many Delta rivers being orders of magnitude larger than flows in Putah Creek and other streams in the northern parts of Solano County and Solano Subbasin. The Delta is the confluence of two major California rivers and as a result large amounts of water are being transported through the Delta and along the southern boundary of the Subbasin. Flows observed in the Delta portion of the Subbasin are managed outside the control and

authority of the GSAs in the Subbasin. Groundwater management activities within the Subbasin are unlikely to cause any adverse impacts on larger channels in the Delta surface water system because the flow and volume of surface water vastly exceeds the minimal flow and volume of any groundwater extraction in the Delta.

4. WATER BUDGET APPROACH FOR QUANTIFYING GROUNDWATER EXTRACTION, SURFACE WATER SUPPLIES, AND TOTAL WATER USE

In fulfillment of the Annual Report requirements for the Solano Subbasin GSP, a water budget approach has been used to quantify groundwater extraction, surface water supply availability, and total water use in the Subbasin. This section describes the structure and uncertainties of these water budgets. Most of the water budget results presented in this section are rounded to two significant digits, consistent with the typical uncertainty associated with the methods and sources used in the analysis. Water budget component results may not sum to the totals presented because of rounding.

4.1. Analysis Background and Approach

Water supply and use in the Solano Subbasin were quantified from the Subbasin surface water system (SWS) water budget, accounting for the total balance of inflows, outflows, and changes in storage in the subbasin's surface layer [8]. The primary inflows to the SWS water budget generally include surface water inflows (stream inflows, diversions, etc.), precipitation, groundwater extraction, and groundwater discharge. The primary outflows from each SWS water budget generally include evapotranspiration (ET), surface water outflows (stream outflows, spillage at the subbasin boundary, etc.), infiltration (deep percolation) of irrigation water and precipitation, and infiltration (seepage) of surface water. Additional information about the water budget structure, including all inflows, outflows, and calculations, are described in Chapter 5 and Appendix 5C of the GSP.

The complete SWS water budget for the Solano Subbasin was computed using the Solano Integrated Hydrologic Model (Solano IHM), a gridded numerical groundwater model that characterizes surface water and groundwater uses in elements representing land across the Solano Subbasin and surrounding areas in Solano, Sacramento, and Yolo Counties. The Solano IHM model was created to support GSP development through the adaptation of the Sacramento Valley Groundwater-Surface Water Simulation Model (SVSim). Inputs to the Solano IHM were summarized from the best available data and science, including information from Water Management Plans, Groundwater Management Plans, Agricultural Water Management Plans, Urban Water Management Plans, and other publicly available or agency-supplied data sources. Data and information about specific water agencies were used to quantify water supply and water use within the agency's service area to the extent permitted by the resolution of the Solano IHM element grid. Additional information about the Solano IHM development process is described in the GSP.

The historical Solano IHM application and inputs used in GSP development were updated and expanded for this Annual Report using available data and information about water supplies and uses since the GSP water budget period. Available data for the current reporting water year were updated, reviewed, or adapted from the GSP inputs. During the preparation of the annual report and associated updates to Solano IHM, additional historical surface water diversion records were incorporated that previously had

[8] The vertical boundaries of the subbasin surface water system are the land surface (upper boundary) and the bottom of plant root zone, within the lateral boundaries of the Subbasin. The plant root zone is defined as "the upper portion of the soil where water extraction by plant roots occurs." The depth to the bottom of the root zone varies by crop, but typically ranges from 2-7 feet (ASCE, 2016).

not been available. Incorporation of these data may result in some differences in historical water budgets from those presented in previous reports. A major change to the Solano IHM application since GSP development was the addition of managed wetlands as a simulated land use for the period 2019-2024 within select areas of the Delta region. These areas were identified from spatial land use data developed by Land IQ (2016, 2018, and 2020-2022) in which indications of managed wetlands were provided and generally correspond to areas that were previously categorized as native vegetation, riparian vegetation, and water in previous years. Model inputs and parameters used to calculate water demand and water use were adapted from wetlands simulated in DWR's SVSim model or comparable models elsewhere in the Sacramento Valley. Model refinements currently underway will include consideration of updated sources of information on the locations and water demands and sources relating to managed wetlands.

Other information about specific updates related to groundwater extraction and surface water supplies and uses are described in the sections below. Any data sources and methods not described in this section were generally the same as those described in Chapter 5, Appendix 5B, and Appendix 5C of the GSP.

Following model development and simulation of the entire Solano IHM domain, zonal summaries of model results were calculated for all elements representing the Solano Subbasin. These summaries are the source of the Subbasin SWS water budget results reported in this section. The SWS water budget is summarized from the historical Solano IHM model results through water year 2025 utilizing the data sources and procedures outlined in the subsections below. Summaries of all SWS water budget components by key water use sector for the period 1991 to 2025 are included in **Appendix E**. Due to limitations within the Solano IHM model structure, some managed wetlands demand was simulated as being met by groundwater pumping, although it is believed that this demand is actually met by surface water. As a result, some adjustments were made to the SWS water budget during the post-processing of model results to more accurately reflect true conditions.

4.2. Groundwater Extraction - §356.2(b)(2)

Groundwater extraction is reported for all water years extending from the end of the historical water budget period through the current reporting period (water years 2019-2025). **Table 4-1** summarizes groundwater extraction by water use sector in water years 2019-2025, and **Table 4-2** summarizes groundwater extraction by method of measurement and water use sector during the current reporting year (water year 2025). Historical estimates of groundwater extraction for 1991 through 2025 are presented in **Appendix E.**

Figure 4-1 presents the groundwater pumping in the Solano Subbasin in water year 2025. The majority of overall groundwater extraction of approximately 200,000 acre-feet (AF) in the Solano Subbasin in 2025 is used for agricultural purposes, totaling approximately 170,000 acre-feet (AF) of agricultural pumping. This represents a decrease from agricultural pumping observed in dry and critical years (180,000-210,000 AF) but a slight increase from above normal water year 2024 (150,00 AF). Groundwater extraction also occurs to supply urban water users in the Cities of Dixon, Rio Vista, and Vacaville, and rural domestic groundwater users in other areas of the Subbasin. As noted previously, because of the Solano IHM structure, the water demand in some areas identified as managed wetlands in the model were incorrectly simulated as receiving pumped groundwater. As a result, some adjustments were made to the SWS water budget

during post-processing of model results to more accurately reflect true conditions, which is reflected in **Tables 4-1 and 4-2 and Figure 4-1**.

Of the total groundwater extraction in 2025, 750 AF directly measured groundwater extraction for agricultural use in Solano Irrigation District (SID), and 9,300 AF directly measured groundwater extraction for urban use in the Cities of Dixon, Rio Vista, and Vacaville. The remaining volume of groundwater extraction in all water use sectors is estimated from the Solano IHM groundwater model results. While some groundwater may be used by native vegetation and managed wetlands in the Solano Subbasin, streamflows and precipitation are understood to be the primary originating sources of water available within these water use sectors. Due to confounding factors regarding the origins of water that is used, especially within the Delta region, all water supplies used in these sectors outside of precipitation are reported as surface water supplies.

The data sources and methods used to quantify groundwater extraction in each water use sector are described below.

Table 4-1. Groundwater Extraction in Each Water Year by Water Use Sector

Sector	2019 (AF)	2020 (AF)	2021 (AF)	2022 (AF)	2023 (AF)	2024 (AF)	2025 (AF)
Agricultural	140,000	210,000	210,000	180,000	120,000	150,000	170,000
Urban	28,000	28,000	26,000	26,000	27,000	27,000	27,000
Native Vegetation	0	0	0	0	0	0	0
Managed Wetlands	0	0	0	0	0	0	0
Total	**170,000**	**240,000**	**240,000**	**200,000**	**150,000**	**180,000**	**200,000**

Note: all values reported to two significant figures. Groundwater extractions do not include direct uptake of groundwater by plants.

Table 4-2. Groundwater Extraction by Method of Measurement (Water Year 2025)

Sector	Direct	Estimated	Description
Agricultural	750	150,000	Direct: Solano Irrigation District deep well usage records Estimated: Solano IHM groundwater model results
Urban	9,300	27,000	Direct: Well production data reported by the CalWater Dixon, Cities of Dixon, Rio Vista, and Vacaville Estimated: Solano IHM groundwater model results
Native Vegetation	0	0	Direct: N/A Estimated: Solano IHM groundwater model results
Managed Wetlands	0	0	Direct: N/A Estimated: N/A
Total	10,000	170,000	

Table 4-2. Groundwater Extraction by Method of Measurement (Water Year 2025)			
Sector	Direct	Estimated	Description

Note: Groundwater extractions do not include direct uptake of groundwater by plants. Estimated values reported to two significant figures.

4.2.1. Agricultural Groundwater Extraction

Groundwater extraction in the agricultural water use sector is summarized from two primary data sources: direct measurements of deep well usage by SID and estimates of groundwater extraction quantified in Solano IHM.

Deep well usage data was reported by SID on a monthly timestep. These volumes represent groundwater that is pumped from deep wells into the SID distribution system, where that water is delivered to district customers. The total groundwater extraction in 2025reported from SID deep well usage records is 970 AF (approximately 1 percent of the total agricultural groundwater extraction).

Estimates of groundwater extraction were quantified in Solano IHM by simulating the volume of groundwater pumping needed to fulfill agricultural water demand on a monthly timestep. The total agricultural water demand was quantified for various crop types simulated in the Solano IHM according to representative crop water use and root depth characteristics, soil characteristics, the reference ET demand for each month based on local weather and climate conditions, and other parameters established in the model. The estimated volume of groundwater pumping was then calculated within Solano IHM as the additional volume of water necessary to meet the total agricultural water demand for each crop type. This was done within each element after distributing any other specified surface water deliveries to agricultural land in that element. Additional information about the Solano IHM inputs and calculations is described in the GSP. The amount of additional groundwater extraction for agricultural use that was estimated using the Solano IHM is approximately 150,000 AF in water year 2025 (approximately 99 percent of the total agricultural groundwater extraction).

4.2.2. Urban Groundwater Extraction

Groundwater extraction in the urban water use sector is summarized from three primary data sources: direct measurements of well production reported by the Cities of Dixon, Rio Vista, and Vacaville; direct measurements of urban potable water production available from the State Water Resources Control Board (SWRCB) for urban suppliers and public water systems in the Solano Subbasin that are known to use groundwater exclusively; and estimates of groundwater extraction quantified in Solano IHM.

Urban well production data was reported by Cal Water Dixon, the Cities of Dixon, Rio Vista, and Vacaville on a monthly timestep. These volumes represent groundwater that is pumped from wells for delivery to customers within the urban suppliers' water service areas. The total groundwater extraction in water year 2025 reported by cities from their urban water production records is 9,300 AF (approximately 26 percent of the total urban groundwater extraction).

Urban potable water production data are also available from the SWRCB for urban suppliers and public water systems in the Solano Subbasin, including the Cities of Dixon, Rio Vista, and Vacaville. These data were compared to the urban well production data provided by the cities. For the Cities of Dixon and Rio Vista, volumes reported in both sources were found to be exactly or nearly identical; thus, only the city-supplied well production data are reported. The City of Vacaville delivers both surface water and groundwater supplies; thus, only the city-supplied well production data are reported there as well.

Within the Solano IHM, total urban groundwater extraction was also estimated on an element basis for urban demand areas [9] by simulating groundwater pumping based on urban population, urban per capita water use, and other urban water use criteria specified in the model. The cities' urban groundwater water production data and SWRCB urban potable water production data were used to develop the Solano IHM model inputs. However, these direct measurements are subtracted from the Solano IHM estimates of groundwater extraction reported in **Table 4-2**. The additional estimated groundwater extraction for urban use simulated in Solano IHM, after accounting for direct measurements, is approximately 27,000 AF in water year 2025 (approximately 74 percent of the total urban groundwater extraction). Details about the Solano IHM model inputs used to simulate urban groundwater extraction are summarized below.

The annual population in each urban demand area was quantified based on population data available from the California Department of Finance. In the Solano Subbasin, annual population estimates were aggregated for the Cities of Dixon, Rio Vista, and Vacaville and for Solano County from the calendar year 1984 (the beginning of the Solano IHM historical simulation period) through 2025. Solano IHM population inputs for the Cities of Dixon and Rio Vista were specified directly from Department of Finance data, while population inputs for the City of Vacaville were adjusted downward to account for the urban population within the Subbasin. Population inputs for areas within the Solano Subbasin, but outside those urban centers, were estimated based on Department of Finance data for unincorporated areas in Solano County, adjusted by the average ratio of those data and historical Solano IHM population inputs in 2014-2018. Population inputs for areas outside the Solano Subbasin were extrapolated from historical Solano IHM population inputs according to the average year-over-year population change for that area in 2009-2018. Data sources used for each urban demand area in 2025 are summarized in **Table 4-3**.

Per capita water use inputs for urban demand areas were generally estimated on a monthly basis based on available urban population data, urban well production or water use data, and comparison of those data with historical Solano IHM inputs. For the City of Vacaville, per capita water use was first calculated from the City's well production data and SWRCB population estimates (accounting for the city-wide service area). These values were then adjusted for the modeled area according to a regression calculated with the historical Solano IHM inputs from 2014-2018. For the Cities of Dixon and Rio Vista, per capita water use values were first calculated from SWRCB data and were then similarly adjusted for the modeled area according to a regression calculated with the historical Solano IHM inputs from 2015-2018. Per capita water use inputs for areas within the Solano Subbasin, but outside those urban centers, and for areas

[9] Urban demand areas are groups of element areas representing specific cities, communities, or unincorporated areas. Urban water use criteria were specified for each of these areas to account for available population data, water use data, or other representative information about that area.

outside the Solano Subbasin were estimated as equal to the water year 2018 inputs within the historical Solano IHM model used in GSP development.

Table 4-3. Urban Groundwater Extraction Data Sources (Water Year 2025)			
Urban Demand Area	**Groundwater Extraction Data Source**	**Population Data Source**	**Simulated Per Capita Water Use Data Source**
Dixon	Direct (California Water Service Company – City of Dixon groundwater pumping data)	California Department of Finance records	Calculated from SWRCB urban water use and population data, adjusted by relationship with historical Solano IHM inputs
Rio Vista	Direct (City of Rio Vista groundwater pumping data)	California Department of Finance records	Calculated from SWRCB urban water use and population data, adjusted by relationship with historical Solano IHM inputs
Vacaville	Direct (City of Vacaville urban well production data)	Population in Solano Subbasin estimated as fraction of California Department of Finance records (0.89, determined from 2014-2018 data analyses)	Calculated from City of Vacaville urban well production data and SWRCB population data, adjusted by relationship with historical Solano IHM inputs
Solano Subbasin Outside Urban Centers	Estimated (Solano IHM; inputs based on population and per-capita water use data sources)	Estimated from 2014-2018 relationship between historical California Department of Finance records for unincorporated county areas (0.89, determined from 2014-2018 data analyses)	Estimated as equal to water year 2018 inputs from historical Solano IHM
Outside Subbasin	Estimated (Solano IHM; inputs based on population and per-capita water use data sources)	Extrapolated from historical Solano IHM inputs by average year-over-year change in 2009-2018	Estimated as equal to water year 2018 inputs from historical Solano IHM

4.2.1. Native Vegetation and Managed Wetlands Groundwater Extraction

In the Solano Subbasin, streamflows and precipitation are believed to be the primary originating sources of water available to native vegetation and managed wetlands because of the prevalence of surface water features and proximity of these ecosystems to surface water bodies. Groundwater uptake through the root zone of native vegetation was evaluated in the Solano IHM, but it was ultimately not included in the final model due to complicating factors relating to simulation of agricultural irrigation management practices in areas of the Subbasin with shallow groundwater conditions, especially within the Delta region.

Model improvements to more accurately simulate the direct uptake of groundwater by native vegetation continue to be evaluated.

4.3. Surface Water Supply - §356.2(b)(3)

Surface water supplies used during the 2019 to 2025 water year are reported in **Table 4-4** by water use sector and in **Table 4-5** by water source type. Historical estimates of surface water supplies for 1991 through 2024 are presented in **Appendix E.** The majority of surface water supplies diverted for use in the Solano Subbasin are used for agricultural purposes, totaling approximately 400,000 AF in 2025. The City of Vacaville also receives surface water supplies from the Putah South Canal and the North Bay Aqueduct for treatment and delivery to urban water users. Surface water is also used by native vegetation and managed wetlands along waterways during periods when surface water is available.

Of the total surface water use in 2025, approximately 500,000 AF are local supplies (98 percent of the total surface water use), including Solano Project Supplies and diversions from local streamflows. The remaining surface water use includes 2,900 AF of State Water Project supplies delivered for urban uses in the City of Vacaville and an estimated 6,900 AF of reuse on agricultural lands. The data sources and methods used to quantify surface water supply use for each water use sector and water source type are described below.

Table 4-4: Surface Water Use in Each Water Year by Water Use Sector

Sector	2019 (AF)	2020 (AF)	2021 (AF)	2022 (AF)	2023 (AF)	2024 (AF)	2025 (AF)
Agricultural	400,000	450,000	460,000	440,000	410,000	390,000	400,000
Urban	10,000	12,000	13,000	11,000	9,800	11,000	12,000
Managed Wetlands	24,000	47,000	48,000	43,000	64,000	93,000	88,000
Native Vegetation	7,300	9,100	10,000	8,100	8,400	10,000	11,000
Total	440,000	520,000	530,000	500,000	490,000	500,000	510,000

Note: all values reported to two significant figures.

Table 4-5: Surface Water Use in Each Water Year by Water Source Type

Water Source Type	2019 (AF)	2020 (AF)	2021 (AF)	2022 (AF)	2023 (AF)	2024 (AF)	2025 (AF)
Local Supplies	410,000	480,000	490,000	460,000	440,000	490,000	500,000
State Water Project Supplies	4,600	3,600	4,000	4,500	5,800	2,400	2,900
Reuse	6,600	8,000	8,100	7,500	6,300	6,400	6,900
Total	420,000	490,000	500,000	470,000	450,000	500,000	510,000

Note: all values reported to two significant figures.

4.3.1. Agricultural Surface Water Supply

Surface water supplies used for agriculture in the Solano Subbasin include: deliveries of local surface water from the Solano Project to agricultural contractors and water users along the Putah South Canal, diversions of other local supplies by water rights users from the various waterways that traverse or adjoin the Subbasin, and reuse of upstream return flows for irrigation. Surface water supplies of these source types are summarized or estimated from the data sources listed in **Table 4-6**.

Application of surface water supplies for agricultural uses was quantified by specifying monthly diversions in Solano IHM. Monthly diversion volumes were summarized or estimated from the sources listed in **Table 4-6**. These diversions were then applied to groups of model elements that approximately correspond to the district service area or application area where that water is used. Deliveries were generally calculated by Solano IHM as the water supply used to meet simulated crop water demands, after accounting for any applicable seepage and evaporation of the diverted supply. Measured deliveries reported by SID from their TruePoint database and from their annual Solano Project reports were directly specified in the model and applied to elements representing the SID service area or the area where that water is delivered. Where applicable, diversions were simulated to occur from a location on the simulated stream or creek corresponding nearest to where that water is actually diverted. Available streamflows along those waterways were generally quantified in Solano IHM based on nearby or representative stream gage data available from the United States Geological Survey (USGS). Stream inflows were either directly summarized from those data sources (for stream gages near the inflow point), or they were estimated from those data through regression relationships computed from historical data and historical stream inflows simulated in Solano IHM.

Reuse was simulated in Solano IHM as the estimated fraction of return flow (i.e., runoff of delivered water) that is captured and re-used for irrigation. Reuse fractions for all crops are estimated to be approximately 0.015 of the total applied water, based on analyses of reuse in SID.

The surface water supplies reported in **Table 4-4** and **Table 4-5** represent the volume of water delivered for agricultural water use in the subbasin, as simulated in Solano IHM. Surface water supplies used for agricultural use totaled approximately 400,000 AF in water year 2025 (approximately 78 percent of the total surface water supplies used).

4.3.2. Urban Surface Water Supply

Surface water supplies used for urban water uses in the Solano Subbasin include: deliveries of surface water from the Solano Project to the City of Vacaville along the Putah South Canal and deliveries of State Water Project supplies to the City of Vacaville along the North Bay Aqueduct (**Table 4-6**). Application of surface water supplies for urban use was quantified by specifying monthly diversions in Solano IHM. These diversions were then applied to groups of model elements that approximately correspond to the City of Vacaville service area. The City of Vacaville delivers water for urban uses through a piped distribution system with minimal losses. Although some losses may occur, deliveries were estimated to equal the total diversion volumes. Surface water supplies used for urban use totaled approximately 12,000 AF in water year 2025 (approximately 2 percent of the total surface water supplies used).

4.3.3. Native Vegetation Surface Water Supply

Surface water supplies used in the native vegetation water use sector are estimated in Solano IHM on an element basis by simulating root water extraction of surface water flows along simulated waterways based on water demand and other crop water use characteristics specified in the model. The surface water supplies used by native vegetation were calculated within Solano IHM as the volume of surface water available to meet native vegetation water demand within each element in each month. All surface water supplies used by native vegetation are assumed to be local supplies. Surface water supplies used for native vegetation use was approximately 11,000 AF in water year 2025 (approximately 2 percent of the total surface water supplies used).

4.3.4. Managed Wetlands Surface Water Supply

Surface water supplies used in the managed wetlands water use sector are estimated in Solano IHM on an element basis by simulating root water extraction of shallow groundwater that is assumed to be supplied from nearby surface water sources based on water demand and other crop water use characteristics specified in the model. All water supplies used by managed wetlands are assumed to be local surface water supplies. Surface water supplies used for managed wetlands totaled approximately 88,000 AF in water year 2025 (approximately 18 percent of the total surface water supplies used).

Table 4-6. Surface Water Diversions and Deliveries Data Sources in the Solano Subbasin (Water Year 2025)

Water Source Type	Water Use Sector	Water Use Area	Surface Water Data Source
Solano Project Supply	Agricultural	SID	Solano Project Diversions Reports (diversions into SID distribution system and direct deliveries from Putah South Canal); TruePoint delivery records (deliveries from SID distribution system)
Solano Project Supply	Agricultural	Maine Prairie Water District	Solano Project Diversions Reports
Solano Project Supply	Agricultural	City of Vacaville	SID Solano Project Supply data sources (Deliveries from SID to turnouts within the City of Vacaville GSA)
Solano Project Supply	Urban	City of Vacaville	City of Vacaville Water Production Data
State Water Project Supply	Urban	City of Vacaville	City of Vacaville Water Production Data
Local Supply	Agricultural	Maine Prairie Water District	Compiled CalWATRS (Formerly eWRIMS) data when available; estimated from historical data when data not yet available
Local Supply	Agricultural	Reclamation District 2068	Compiled agency data and CalWATRS data when available; estimated from historical data when data not yet available
Local Supply	Agricultural	Delta region	Delta region diversions estimated from GSP analyses through comparison with available compiled CalWATRS
Local Supply	Agricultural	Various (miscellaneous water rights diversions)	Compiled CalWATRS data for water rights users where available; estimated from historical data when data not yet available

4.4. Total Water Use by Sector - §356.2(b)(4)

Total water use in the 2025 water year is reported in **Table 4-7** by water use sector. The volume of total water use is summarized from the results presented in **Section 4.2** and **4.3**. Historical estimates of total water use for 1991 through 2025 are presented in **Appendix E.**

Table 4-7. Total Water Use in the 2025 Water Year by Water Use Sector

Sector	Groundwater (AF)	Surface Water (AF)	Total (AF)
Agricultural	170,000	400,000	580,000
Urban	27,000	12,000	39,000
Managed Wetlands	0	88,000	88,000
Native Vegetation	0	11,000	11,000
Total	200,000	510,000	710,000

Note: all values reported to two significant figures.

5. CHANGE IN GROUNDWATER STORAGE (§356.2.B.5)

5.1. Change in Groundwater Storage Maps

Consistent with §354.18.b, based on a comparison of the annual spring groundwater elevation contour maps representing seasonal high groundwater conditions, changes in groundwater elevation were calculated for the Solano Subbasin for individual years starting in Spring 2015. To calculate annual change in groundwater storage from the groundwater level contour maps, the difference in groundwater elevation between annual spring contour maps was calculated for each of the principal aquifers (Alluvial/Upper Tehama zone and Basal Tehama zone). Changes in groundwater levels and the potentiometric surface for each year were than multiplied by a specific yield and storage coefficient, respectively. For the Alluvial/Upper Tehama zone, a spatially-varying dataset of specific yield values representing thickness-weighted average values for layers 1 through 3 in Solano IHM was used in the analysis and multiplied by spatially continuous data for the change in groundwater elevation to estimate change in storage. For the Basal Tehama zone, a single uniform storage coefficient used in the model to represent Basal Tehama aquifer properties and derived from available aquifer test data was used to multiple by change in groundwater elevations.

Figures 5-1 and 5-2 show the spatial distribution of calculated annual change in groundwater level for the most recent reporting year between Spring 2024 and Spring 2025 for the Alluvial/Upper Tehama zone and Basal Tehama zone. Maps of change in groundwater levels for each of the years between Spring 2016 and 2024, separated by principal aquifer, are presented in **Appendix F**. **Tables 5-1** and **5-2** summarize the calculated annual change in groundwater storage volumes for 2015 to 2025 for both the Alluvial/Upper Tehama zone and Basal Tehama aquifers based on comparison of spring groundwater elevation contours. Maps of the spatial distribution of change in storage in the Alluvial/Upper Tehama Zone and Basal Tehama for the most recent period from Spring 2024 to Spring 2025 are presented in **Figures 5-3 and 5-4**.

Data available for contouring spring levels are compiled from various sources, including publicly available data from monitoring programs unrelated to the GSP. As a result, the wells with available water level change every year because of changes in monitoring access or data reporting from the different sources. Changes in the spatial distribution of wells used to contour groundwater levels can affect the interpretation and calculation of changes in groundwater levels and therefore changes in groundwater storage. Prior to 2020 groundwater elevation contours were limited to areas where sufficient groundwater elevation data were available as there was incomplete spatial coverage of groundwater elevation data across parts of the Solano Subbasin during those years and groundwater elevation contours were limited to areas where sufficient groundwater elevation data were available. To estimate the change in groundwater storage within the Alluvial/Upper Tehama zone for the entire Subbasin, in areas with insufficient groundwater level data, the average change in groundwater elevation value calculated for the area with data was applied to areas without data to estimate change in storage amounts in these areas. Because very limited groundwater pumping occurs in the Delta region of the Solano Subbasin, areas with insufficient groundwater level data located in the Delta were assumed to have no change in storage. In the Basal Tehama zone where current groundwater pumping is believed to be primarily limited to utilization by the City of Vacaville, the analysis of change in storage was limited to areas with sufficient available data in the vicinity of the City of Vacaville.

Using representative specific yield (Alluvial/Upper Tehama zone) and storage coefficient (Basal Tehama zone) aquifer parameter values described above, the calculated changes in groundwater levels both the Alluvial/Upper Tehama zone and Basal Tehama aquifers annual change in groundwater storage are summarized in **Table 5-1** and **Table 5-2**. Negative change in storage values indicate depletion of groundwater storage, whereas positive change in storage values represent accretion of groundwater in storage. Groundwater in the Alluvial/Upper Tehama zone is considered to be unconfined and therefore changes in groundwater elevation translate to greater storage changes due to application of a specific yield value. Between Spring 2024 and Spring 2024 groundwater storage decreased in the Alluvial/Upper Tehama zone by an estimated 23,000 AF (**Table 5-2**). The change in storage in the Alluvial/Upper Tehama zone in previous years since 2015 is also included in **Table 5-1** and ranges from increases in storage up to 47,000 between Spring 2023 and Spring 2022 to a decrease in storage of about 117,000 AF between Spring 2019 and 2020. The decrease in groundwater storage in the Alluvial/Upper Tehama zone estimated between Spring 2023 and Spring 2024 may be partly a function of the high groundwater levels that occurred in Spring 2023 at the end of a very wet winter. In the Basal Tehama, where confined conditions exist, changes in groundwater levels translate to substantially smaller changes in groundwater storage due to the smaller overall area and application of a storage coefficient value in these areas. Annual estimates in change in groundwater storage in the Basal Tehama zone since 2015 generally fluctuate by less than 100 AF, with little or no change in storage estimated for 2025.

Table 5-1. Change in Groundwater Storage in the Alluvial/Upper Tehama Zone in the Solano Subbasin

Analysis Period (spring to spring)	Average Specific Yield	Average Groundwater Elevation Change (ft)	Average Groundwater Storage Change (AF/ac)	Analysis Area[1] (acres)	Delta Area Without Data[2] (acres)	Other Areas Without Data[3] (acres)	Annual Subbasin Groundwater Storage Change (AF)
2015-2016	0.0418	1.2008	0.0532	241,627	83,618	29,427	14,418
2016-2017	0.0418	3.3837	0.1695	214,269	83,618	56,786	45,936
2017-2018	0.0418	-2.8863	-0.1534	214,269	83,618	56,786	-41,586
2018-2019	0.0418	1.6367	0.0624	305,173	19,155	30,346	20,935
2019-2020	0.0418	-7.2153	-0.3496	305,173	19,155	30,346	-117,311
2020-2021	0.0418	-6.2233	-0.2802	354,673	--	--	-99,374
2021-2022	0.0418	-0.7498	0.0905	354,674	--	--	42,638
2022-2023	0.0418	2.7184	0.1335	354,673	--	--	47,358
2023-2024	0.0418	-0.5689	-0.0232	354,673	--	--	-8,215
2024-2025	0.0418	-1.7716	-0.0637	354,673	--	--	-22,593

1. Only areas within the Solano Subbasin with sufficient groundwater level data were contoured. Because Spring 2016, 2017 and Spring 2019 had limited data control, the analyses of change in elevation and change in storage did not cover the entire Subbasin and was limited to the "analysis area" where sufficient groundwater level data exist.
2. Very little groundwater pumping occurs in the Delta region of the Subbasin; therefore, for years and locations in the Delta region without groundwater elevation data, it is assumed that these areas have no change in groundwater storage.
3. Change in storage for areas outside of the Delta region with insufficient groundwater level data were estimated by applying the average change in storage per acre from areas with data (within the analysis area) to these areas without groundwater level data.

Table 5-2 Change in Groundwater Storage in the Basal Tehama Zone in the Solano Subbasin					
Analysis Period (spring to spring)	Average Storativity	Average Groundwater Elevation Change (ft)	Average Groundwater Storage Change (AF/ac)	Analysis Area (acres)	Annual Groundwater Storage Change (AF)
2015-2016	2.2E-04	-4.5144	-9.71E-04	53,353	-52
2016-2017	2.2E-04	4.6855	1.01E-03	53,353	54
2017-2018	2.2E-04	-2.1996	-4.73E-04	53,353	-25
2018-2019	2.2E-04	1.3325	2.86E-04	53,353	15
2019-2020	2.2E-04	1.0013	2.15E-04	53,353	11
2020-2021	2.2E-04	-2.5957	-5.58E-04	53,353	-30
2021-2022	2.2E-04	-7.1300	-1.53E-03	53,353	-82
2022-2023	2.2E-04	4.6261	9.95E-04	53,353	53
2023-2024	2.2E-04	-0.0412	-8.85E-06	53,353	0
2024-2025	2.2E-04	7.2083	1.55E-03	53,353	37

5.2. Groundwater Use and Change in Groundwater Storage

Annual groundwater extractions and change in groundwater storage in the Solano Subbasin is shown in **Figure 5-5** for water years 2015 to 2025. Groundwater extractions are estimated or directly measured by water year following the procedures described in **Section 4**. Change in groundwater storage presented in **Figure 5-5** is estimated based on an annual comparison of spring groundwater elevations. Total annual groundwater extraction typically decreases in wet years and increases in dry years, while the annual change in groundwater storage has ranged between increases as high as about 47,000 AF to decreases of up to -117,000 AF (**Figure 5-5**). Historical groundwater extractions for the Subbasin for all water years since 1991, as estimated using the Solano IHM, are also included in **Appendix E**. Annual changes in groundwater storage in water years 1991 through 2018 are included in the GSP based on water balance results from the Solano IHM.

6. ASSESSMENT OF SMC AND RMS MONITORING NETWORK STATUS

Section 6 in the Solano Subbasin GSP provides a discussion of the Sustainable Management Criteria (SMC) developed for the Subbasin, including the sustainability goal, undesirable results, minimum thresholds, measurable objectives, interim milestones, and the monitoring networks for the five sustainability indicators relevant to groundwater management in the Subbasin. Undesirable results occur when significant and unreasonable effects for any sustainability indicator are caused by groundwater conditions occurring in the Subbasin. As described in the GSP, a network of RMS was identified for each of the sustainability indicators relevant to the Solano Subbasin to monitor sustainability and occurrence of any undesirable results. A summary of criteria used to define SMC in the Subbasin is provided in **Table 6-1**. This section provides an overview of the status of the RMS network in relation to the different SMCs in the GSP for tracking of conditions in the Subbasin. Consideration of any linkages between GSP implementation activities and groundwater conditions exceeding SMCs will be included in subsequent annual reports, as appropriate. The SMC developed in the GSP will be periodically reviewed to ensure they are appropriate for avoiding undesirable results from adverse impacts on beneficial users in the Subbasin, including no later than the first five-year GSP update.

Table 6-1. Summary of MTs, MOs, URs, and Selection Rationale

Sustainability Indicator	SMC Selection Considerations/Rationale	SMC Metric	Representative Monitoring Used	Minimum Threshold (MT)	Measurable Objective (MO)	Undesirable Result (URs)
Chronic Lowering of Groundwater Levels (GWL)	Locations based on groundwater use and historical groundwater conditions, density of domestic wells, disadvantaged communities reliant on GW, GDEs.	Fall (seasonal low) groundwater elevation	Separate RMS wells for Alluvial Aquifer/Upper Tehama and Basal Tehama zones	Alluvial Aquifer/Upper Tehama Zone: •Minimum static groundwater elevation in the base period (Water Year 1991 prior to January 2015), with consideration for operational flexibility. Basal Tehama Zone: •Fifty feet below the recent five year average static groundwater elevation (prior to January 2015)	Average static groundwater elevation in the base period (prior to January 2015)	30 percent of RMS wells below MTs for two consecutive years
Reduction of Groundwater Storage	Currently the Subbasin is pumping at or below the Sustainable Yield, GWL will be used as a proxy to determine overall changes	Fall (seasonal low) groundwater elevation	Groundwater elevation contours	Alluvial Aquifer/Upper Tehama Zone: •Minimum static groundwater elevation in the base period (prior to January 2015) Basal Tehama Zone: •Fifty feet below the recent five year average static groundwater elevation (prior to January 2015)	Average static groundwater elevation in the base period (prior to January 2015)	30 percent of wells below MTs for two consecutive years
Seawater Intrusion	Not Applicable – The Subbasin is not located along the Pacific Ocean, however potential for impacts from ancient conditions or future acute instances will be monitored via chloride concentrations, as part of the degraded water quality sustainability indicator	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Land Subsidence	The Subbasin does not have documented inelastic subsidence or impacts to surface infrastructure. SMCs consider historical rates of displacement, seasonal fluctuations in displacement.	Annual rate of vertical displacement	Existing subsidence monitoring stations	Annual subsidence rate exceeding the historical average range of the yearly fluctuation in vertical displacement	Rate of vertical displacement equal to average historical rate of vertical displacement	A RMS location exceeding MT for three consecutive years

Table 6-1. Summary of MTs, MOs, URs, and Selection Rationale						
Sustainability Indicator	**SMC Selection Considerations/Rationale**	**SMC Metric**	**Representative Monitoring Used**	**Minimum Threshold (MT)**	**Measurable Objective (MO)**	**Undesirable Result (URs)**
Degraded Water Quality	The MT accounts for applicable state and federal water quality standards. Constituents of Concerns were based on communication with water suppliers and historical elevated water quality results.	Concentrations for nitrate, TDS, arsenic, chloride, Cr6	RMS wells monitored by GSAs and for other programs	Drinking water MCLs or existing concentration plus 20%, whichever is greater.	Current concentrations of nitrate, arsenic, chloride, TDS, Cr6. For constituents with Primary MCL MT, Trigger Level set at 75% of MT. Trigger initiates evaluation of factors related to increasing constituent concentrations.	Greater than 25 percent of wells above the MT for the same constituent, based on average of most recent three-year period.
Depletion of Interconnected Surface Water	•Putah Creek has a long standing historical guidance for flows. •GDE distribution/viability and reduction in surface water availability were considered. Smaller streams are confounded by management and are not sufficient indicators of stream depletions WLs are used as a proxy •Flows in the Delta are so large, and GW is so shallow that depletions are not significant	Putah Creek streamflow; WLs as proxy elsewhere	Existing Putah Creek Accord compliance flow stations and select WL RMS wells	•Minimum Flows for Putah Creek outlined in the Putah Creek Accord. • Minimum static groundwater elevation in the base period (prior to 2015) for wells located in close proximity to groundwater connected waterways	•Compliance with the Putah Creek Accord for Putah Creek. •Average static groundwater elevation in the base period	•Non-compliance with the Putah Creek Accord flow requirements along Putah Creek. • 30 percent of wells below MTs for two consecutive years

6.1. Groundwater Levels

Figures 2-4 and **2-5** display the current groundwater level RMS wells for the Solano Subbasin. **Table 6-2** provides a summary of the current (2025) groundwater level measurements in all RMS wells, and **Appendix G** provides a summary of historical water level data for these wells. In 2025, five of the 41 RMS wells did not have water level measurements because they were recently removed from either the DWR or USBR water level monitoring program due to limitations on monitoring resources, access issues, or lack of well construction details. The Solano Subbasin continues efforts to re-recruit these wells and ensure they are monitored as part of the GSP monitoring program. In 2024 monitoring of one of the RMS wells dropped from DWR's monitoring program resumed by the GSAs with the assistance of coordinated efforts by the Dixon Resource Conservation District. One RMS well recently dropped by USBR due to access issues was determined to be the same as a well monitored by SID with a different well ID (07N01E16B001M). The combining of historical monitoring data for this well provides a longer-term record of water levels, but also necessitated adjustments to the MT and MO to be consistent with the methodology applied in the GSP. This change was made in the annual report for water year 2023. Three RMS wells are no longer accessible and replacement sites are in the process of being integrated into the monitoring network. In coordination with SID it was determined that 06N01E33L001M was not destroyed as noted by DWR in WDL but remains actively monitored by SID. In coordination with USBR, RMS well 08N01W33A001M was determined to have an obstruction that is not repairable. Well 08N01W33B002M located nearby well was determined to be a replacement RMS well. Two wells monitored by the City of Rio Vista were vetted and intend to be added to the RMS network. The 10 shallow dedicated monitoring wells installed as part of TSS program will also be evaluated for inclusion in the RMS network once a sufficiently long data record is available to establish SMCs. Additional RMS well candidates are being reviewed for replacing three other RMS wells that are no longer accessible.

In 2025, a total of five RMS wells in the Alluvial/Upper Tehama Zone had groundwater elevations below the MTs (MT exceedances) as presented in **Table 6-2** and **Figure 6-1**. These wells had elevations that have consistently been below the MT since 2015; however one of the wells with an MT exceedance had groundwater levels recover above the MT in 2023, with levels dropping below the MT again in 2024 and 2025. The Solano Subbasin GSP set triggers for groundwater levels as the occurrence of any MT exceedance. The occurrence of such conditions during the GSP implementation and sustainability period (after GSP adoption) triggers adaptive management actions, including evaluation of groundwater conditions contributing to any MT exceedances. The GSAs have been evaluating local conditions near MT exceedances, conducting outreach to water users, and considering potential projects and management actions in these areas. No wells in the Basal Tehama had groundwater elevations below the MT. Five (12 percent) of the RMS wells have had multiple years of MT exceedances; however, this does not constitute an undesirable result as outlined in **Table 6-1**, which occurs when more than 30 percent of wells exceed the MT for two consecutive years.

Table 6-2. Summary of Groundwater Level RMS Monitoring Status (Water Year 2025)							
RMS ID	Fall 2024 Water Elevation (ft msl)	Spring 2025 Water Elevation (ft msl)	Minimum Threshold (MT)		2025 Lowest Observed Water Level		Comment
			Depth (ft)	Elev (ft msl)	Depth (ft)	Elev (ft msl)	
06N01E12M001M	21.7	28.38	16.9	25.7	22.1	20.5	
07N01E04P003M	49.7	53.28	38.0	54.6	42.0	50.6	
07N01E11M001M	34.1	35.07	41.1	37.0	43.8	34.3	
07N02E15E001M	-25.9	-12.67	56.7	-12.2	70.9	-26.4	Successfully re-recruited, in Spring 2024
07N02E33D002M	-9.7	-0.728	43.3	-7.3	49.9	-13.9	
MW-15-188ft	76.4	79.48	32.1	63.3	18.5	76.9	
5340	-4.2	-3.6	16.4	-4.4	14.5	-2.5	
03N03E07N001M	0.4	0.5	38.6	-14.1	24.0	0.5	
04N01E02E001M	56.4	57.656	17.7	44.8	7.1	55.4	
04N02E09A001M	--	--	27.1	14.6			No Access, working to identify replacement well
05N02E25K001M	--	--	11.9	-8.4			No Access, working to identify replacement well
06N01E17M001M	54.9	60.74	18.2	48.1	10.8	55.5	
06N01E33L001M	--	37.94	17.2	30.3	12.4	35.1	
06N01W36C004M	--	--	21.7	61.2			Ongoing efforts to re-recruit
06N02E19J001M	18.8	22.42	15.2	10.8	8.7	17.3	
07N01E14J001M	14.1	21.07	70.0	-6.9	45.0	18.1	
07N01E16B001M	20.7	30.3	99.1	-21.5	55.9	21.7	Recent investigation has revealed that multiple agencies were monitoring; MT and MO have been updated to reflect changes
07N01E21H003M	-1.1	26.38	88.1	-14.5	71.7	1.9	
07N01E25M001M	2.3	16.3	66.7	-15.7	45.2	5.8	
07N01E29P001M	64.0	63.79	15.0	61.6	13.1	63.5	
07N01W04C002M	58.7	79.42	100.5	47.9	83.3	65.1	
07N01W05R001M	--	--	119.8	53.3	--	--	Working with RCD to recruit
07N01W13H001M	--	--	20.6	88.0	--	--	Working with RCD to recruit
07N01W33J002M	60.5	77.068	107.5	25.6	74.1	59.0	

Table 6-2. Summary of Groundwater Level RMS Monitoring Status (Water Year 2025)

RMS ID	Fall 2024 Water Elevation (ft msl)	Spring 2025 Water Elevation (ft msl)	Minimum Threshold (MT)		2025 Lowest Observed Water Level		Comment
			Depth (ft)	Elev (ft msl)	Depth (ft)	Elev (ft msl)	
07N02E35D002M	-14.7	-2.1	63.3	-25.6	56.0	-18.3	
08N01E24Q001M	-28.0	14.15	131.1	-60.1	91.4	-20.4	
08N01E32E001M	46.3	56.58	98.7	4.2	55.1	47.8	
08N01E33H001M	41.9	44.27	47.0	37.6	42.8	41.8	
08N01W26A002M	64.0	69.59	64.2	60.4	60.2	64.4	
08N01W33A001M	--	--	70.8	67.0	--	--	Removed from Monitoring Network, replaced with 08N01W33B002M
08N01W35R001M	45.7	61.7	85.9	26.1	59.4	52.6	
08N02E27C002M	-6.7	12.15	69.9	-15.4	60.8	-6.3	
08N03E31N001M	-25.6	-6.57	68.4	-34.9	62.3	-28.8	
MW-98A	4.6	34.35	138.6	-34.6	98.8	5.2	
MW-98C	-57.2	-50.6	179.0	-97.9	134.7	-53.6	
MW-15-1815ft	-77.7	-66.61	211.1	-116.2	163.4	-68.5	
MW-14	-86.0	-77.1	218.8	-125.8	175.2	-82.2	
06N01E10J004M	-52.8	-48.6	147.5	-93.9	108.4	-54.9	
06N01E30N003M	-67.9	-61.62	179.2	-101.3	145.2	-67.2	
07N01E11G002M	-8.9	-7.39	131.2	-51.7	88.8	-9.3	
07N01W15A001M	36.6	43.49	110.9	21.9	99.7	33.2	
New to RMS Network Since GSP Submittal							
08N01W33B002M	63.4	--	85.8	53.3	74.3	64.8	
City of Rio Vista-Well 10	--	-18.53	--	--	39.0	-25.5	
City of Rio Vista-Well 15	-55.2	-30.18	--	--	88.0	-52.2	
SSGSA-01a	80.0	115.73	--	--	25.0	90.7	
SSGSA-01b	73.7	107.16	--	--	29.3	86.6	
SSGSA-02a	58.4	82.59	--	--	42.6	65.0	
SSGSA-02b	43.4	67.6	--	--	62.6	44.8	
SSGSA-03a	72.5	82.9	--	--	22.6	73.1	
SSGSA-03b	39.9	64.53	--	--	57.7	38.0	
SSGSA-05a	56.1	63.93	--	--	44.2	56.6	
SSGSA-05b	55.8	63.4	--	--	44.7	56.0	
SSGSA-06a	1.4	5.14	--	--	9.3	1.1	
SSGSA-06b	3.4	5.73	--	--	7.1	3.3	

Blue indicates MT exceedance

6.2. Groundwater Storage

Groundwater levels are used as a proxy to detect any changes in groundwater storage that may be significant and unreasonable. Using groundwater levels as a proxy relies on field measurement of groundwater levels in the RMS monitoring well network (**Figures 2-4 and 2-5**). Groundwater levels have a direct relationship with groundwater storage based on aquifer properties. Aquifer properties in the Alluvial Aquifer/Upper Tehama Zone differ from the Basal Tehama zone. **Section 5.2** provides details on the methodology for change in storage calculations. In the Alluvial Aquifer/Upper Tehama Zone, which is unconfined, changes in groundwater levels are reflective of changes in saturated thickness of the aquifer and correspond with larger changes in groundwater storage than in the Basal Tehama zone based on the specific yield (or effective porosity) of the aquifer materials. In the Basal Tehama, where groundwater is confined and under pressure, changes in groundwater levels are not reflective of changes in saturated volumes. Rather they are indicative of the potentiometric surface (i.e., the elevation groundwater level will rise to under normal atmospheric pressure). As a result, changes in groundwater levels reflected in the Basal Tehama Zone are associated with very small changes in storage. In both unconfined and confined settings groundwater levels are a direct proxy to detect and evaluate changes in storage. In 2025 there are five (12 percent) MT exceedances in the water level RMS network over more than two years. An undesirable result for change in groundwater storage is 30 percent of wells below the MTs for two consecutive years. Accordingly, no undesirable result for change in storage occurred in 2025.

6.3. Groundwater Quality

Figure 6-2 displays the current water quality RMS wells for the Solano Subbasin GSP. **Table 6-3** provides a summary of the groundwater quality conditions for all RMS wells as represented by the average concentration over the most recent three years (2022-2025), in accordance with the SMC described in the GSP. Several RMS wells did not have data collected during the most recent three years. The Solano Subbasin continues to work on coordinating with monitoring entities on the timing of sampling and the necessary water quality analyses for GSP monitoring. **Appendix H1 and H2** provides a summary of historical water quality data and plots for these wells. In 2025 two wells in the RMS network had MT exceedances for chromium-6, but no undesirable results have yet to occur for any constituent. Recent review of SMC for water quality RMS included in the GSP highlighted several RMS wells with assigned MT values that were not consistent with the methodology intended in the GSP or which did not allow for sufficient variability in water quality concentrations associated with natural variability in water quality conditions and laboratory uncertainty. These MT were adjusted to reflect an increase of 20 percent from the MO which will allow for operation flexibility. The GSP outlined that RMS concentrations greater than 75 percent of the MT would trigger additional review of the circumstances relating to the triggering conditions, specifically review of GSP projects and management actions that may have exacerbated groundwater quality conditions. In 2025 several RMS wells had constituent concentrations above the trigger levels; a review will be conducted on trends that may be occurring at these locations. Consideration of any linkages between GSP implementation activities and groundwater quality conditions exceeding MTs will be included in future GSP Periodic Evaluations, once sufficient data are available representative of conditions since commencement of implementation of the GSP, as appropriate.

Table 6-3. Summary of Groundwater Quality RMS Monitoring Status (Water Year 2025)

Well Number	Aquifer Designation	MT Arsenic (µg/L)	2025 Arsenic (µg/L)	3-Yr Avg Arsenic (µg/L)	MT Nitrate (mg/L)	2025 Nitrate (mg/L)	3-Yr Avg Nitrate (mg/L)	MT Chloride (mg/L)	2025 Chloride (mg/L)	3-Yr Avg Chloride (mg/L)	MT TDS (mg/L)	2025 TDS (mg/L)	3-Yr Avg TDS (mg/L)	MT Cr6 (µg/L)	2025 Cr6 (mg/L)	3-Yr Avg Cr6 (µg/L)
61493	Alluvial/Upper Tehama	--	--	--	10	--	4.55	250	--	--	1176	--	--	--	--	--
61494	Alluvial/Upper Tehama	--	--	--	13.2	--	5.5	250	--	--	810	--	--	--	--	--
07N01E08N002M	Alluvial/Upper Tehama	--	--	--	10	--	--	250	--	--	500	--	--	--	--	--
07N01E14J001M	Alluvial/Upper Tehama	10	--	--	20	--	--	250	--	--	597.87	--	--	27.6	--	--
08N01E32N001M	Alluvial/Upper Tehama	10	--	--	10	--	--	250	--	--	500	--	--	--	--	--
08N01E35K001M	Alluvial/Upper Tehama	16.32	3.6	1.2	10	3.8	3.17	250	12	12	500	340	320	10	12	12
4810008-025	Alluvial/Upper Tehama	10	--	--	10	--	--	250	--	--	500	--	--	10	--	--
4810009-003	Alluvial/Upper Tehama	10	--	0	10	4.5	4.4	250	--	11	500	--	350	18.75	24	18
4810008-007	Basal Tehama	10	--	2	10	--	1.4	250	--	16	500	--	360	10	8.7	9
4810008-030	Basal Tehama	10	6.3	6.69	10	0.43	0.38	250	--	8.3	500	--	300	25.18	23	26
4810013-001	Basal Tehama	10	6.2	5.21	10	0.97	0.9	250	--	9	500	--	380	10	--	3.8
3400122-001	Unknown	10	--	4.05	10	--	0.89	250	--	7.9	500	--	180	10	--	--
3400192-001	Unknown	10	3.3	3.3	10	ND	ND	250	5	5	500	290	290	10	ND	ND
3400420-001	Unknown	94.57	78	69.23	10	ND	ND	--	--	--	--	--	--	--	--	--
3400444-001	Unknown	--	--	--	10	ND	ND	--	--	--	--	--	--	--	--	--
3400455-001	Unknown	--	--	--	10	ND	ND	--	--	--	--	--	--	--	--	--
3410047-001	Unknown	16	17	15.77	10	ND	ND	250	6.5	5.83	500	202	146	10	--	ND
3410302-002	Unknown	21	--	--	10	ND	ND	303	--	--	985	--	--	--	--	--
4800612-001	Unknown	10	9	9	10	ND	ND	--	--	--	--	--	--	--	--	--
4800709-001	Unknown	10	--	--	10	--	0.3	250	--	--	552	--	--	--	--	--
4800786-001	Unknown	10	--	--	10	0.99	0.96	250	--	--	500	--	--	--	--	--
4810004-003	Unknown	10	--	--	10	--	--	250	--	--	500	--	--	10	--	--
4810004-004	Unknown	18	16	15.36	10	0	0	250	--	40	500	440	435	10	ND	ND
4810011-001	Unknown	10	ND	ND	10	3.4	2.65	250	27	22.5	534.75	530	530	10	2	1.9
4810020-001	Unknown	10	ND	ND	10	8	7.11	250	--	--	500	--	--	14.4	11	10.07
4810023-001	Unknown	10	--	--	10	ND	ND	250	--	--	500	--	--	--	--	--
4810801-002	Unknown	10	--	5.6	10	--	0.28	250	--	--	852	--	--	10	0.43	0.43

6.4. Interconnected Surface Water

Figure 6-3 displays the current interconnected surface RMS network for the Solano Subbasin. Interconnected surface water conditions in the Subbasin are tracked using groundwater levels measured at select RMS wells and streamflow measured at gages specified in the Putah Creek Accord. **Table 6-5** provides a summary of the current (2025) groundwater levels at interconnected surface water RMS wells and **Appendix J1 and J2** provide a historical summary. One Interconnected Surface Water (ISW) RMS well (06N01E12M001M) had a water level below the MT in 2025. Additional evaluation of the data and conditions relating to the exceedance will be performed. In 2025, two RMS wells were not measured after being recently dropped from DWR's monitoring program. Efforts are being made to resume monitoring of these wells, as noted in Section 6.1. **Table 6-6** provides a summary of measured flows in Putah Creek during 2025relative to flow requirements within the Subbasin specified in the Putah Creek Accord. During 2025 all mean daily passing flows in Lower Putah Creek were above the required flow values with many months experiencing flow values in Lower Putah Creek that were two or three times those required by the Putah Creek Accord. An undesirable result for depletion of interconnected surface water is defined as greater than 30 percent of RMS wells exceeding the MT for two consecutive years or not meeting the flow requirements of the Putah Creek Accord. Therefore, no undesirable result for interconnected surface water occurred in the Subbasin in 2025.

Table 6-5. Summary of Interconnected Surface Water RMS Monitoring Status (Water Year 2025)

RMS ID	Fall 2024 Water Elevation (ft msl)	Spring 2025 Water Elevation (ft msl)	Minimum Threshold (MT)		Fall 2025 Water Elevation (ft msl)		Comment
			Depth (ft)	Elev (ft msl)	Depth (ft)	Elev (ft msl)	
06N01E12M001M	21.7	28.38	16.9	25.7	22.1	20.5	
MW-15-188ft	76.4	79.48	32.1	63.3	18.5	76.9	
05N02E25K001M	--	--	11.9	-8.4			Well no longer accessible; well planned for network removal and/or replacement
06N01E17M001M	54.9	60.738	18.2	48.1	10.8	55.5	
06N02E19J001M	18.8	22.416	15.2	10.8	8.7	17.3	
07N01W13H001M	--	--	20.6	88.0	--	--	Working with RCD to Recruit

Notes:

Blue shading indicates MT exceedance.

Table 6-6. Summary of Measured Putah Creek Flows in Relation to Required Flows (Water Year 2025)												
	October	November	December	January	February	March	April	May	June	July	August	September
Specified Flow Requirements – Non-Drought Year (cfs)												
Required Mean Daily Flow in Lower Putah Creek	5	10	10	15	15	25	30	20	15	15	10	5
2025 Measured Flows – Non-Drought Year (cfs)												
Actual Mean Daily Flow in Lower Putah Creek	42	40	30	28	61	--	72	50	41	38	29	24

March 2025 data unavailable

6.5. Land Subsidence

Figures 2-7 display the current land subsidence RMS network for the Solano Subbasin. **Table 6-4** provides a summary of the current (2025) seasonal fluctuation and **Appendix I** provides a historical summary. In 2025 no subsidence RMS had annual vertical displacement exceeding an MT.

Table 6-4. Summary of Land Subsidence RMS Monitoring Status (Water Year 2025)			
Station ID	MT Annual Vertical Displacement (ft/yr)	Annual Vertical Displacement (ft/yr) March to March	Annual Vertical Displacement (ft/yr) October to October
		2024-2025	2024-2025
DIXN	-0.0957	-0.0029	-0.0304
VCVL	-0.0786	0.0117	-0.0245
P266	-0.0677	-0.0212	-0.0313
P267	-0.0651	0.0087	-0.0235

6.6. Sea Water Intrusion

The Subbasin is not located adjacent to the Pacific Ocean and no monitoring network or SMC for sea water intrusion was developed in the GSP. However, chloride concentrations in groundwater are monitored as part of the groundwater quality monitoring network as a metric for tracking any potential migration of higher-salinity water from the Delta. No MT exceedances for chloride have occurred in the Subbasin to date.

7. GSP IMPLEMENTATION ACTIVITIES

The Solano Subbasin GSAs are committed to maintaining the sustainability of groundwater resources in the Subbasin. Many of the ongoing groundwater management activities in the Subbasin are summarized in the GSP. Additional projects and management actions (PMAs) have been developed to support the sustainability goal for the Subbasin, as described in the GSP. Based on historical, current, and projected water budgets, the Solano Subbasin is anticipated to remain sustainable with minimal to no additional intervention by the GSAs. The PMAs identified in the Solano GSP were determined not to be necessary to maintain sustainability throughout the Solano Subbasin, but they are being considered by the GSAs should conditions change and/or to develop greater drought resiliency. This section describes some of the GSP implementation activities occurring in the Subbasin. **Table 7-1** presents the potential PMAs in the Subbasin identified during GSP development and being pursued or considered during GSP implementation. The PMAs described in the GSP for ongoing completion or future planning include continued outreach and education efforts to implement practices that conserve water, enhance recharge, and reduce runoff and projects that will augment water supplies. Additional detail on the status and efforts related to some of the potential PMAs listed in the GSP is presented in sections below.

Table 7-1. Ongoing, Planned and Potential Projects and Management Actions in the Solano Subbasin

Name	Brief Description	Status
Ongoing PMAs		
Municipal & Industrial Water Use Efficiency Outreach & Implementation	Develop Outreach materials and incentives for municipal and industrial water users to increase water use efficiency.	Occurring, additional efforts planned with funding through SGMA Implementation grant
PMAs Developed for Implementation		
City of Vacaville Recycled Water	Develop City's Recycled Water Program as recommended in the 2020 Recycled Water Master Plan Feasibility Study, including construction and installation of recycled water treatment, storage and conveyance facilities; development of a recycled water use ordinance; updating permits; and identifying customers and executing supply contracts.	The City and their consultants have prepared a draft of a report intended to guide the City's next steps on recycled water planning
Westside Streams Stormwater Capture Project	Develop an implementation schedule for potential projects in the Northwest Focus Area to enhance groundwater recharge and support local groundwater sustainability.	With support through a GSP implementation grant the Subbasin has been evaluating opportunities to capture stormwater flows to enhance groundwater recharge, including coordinating and communicating with local property owners and water management

Table 7-1. Ongoing, Planned and Potential Projects and Management Actions in the Solano Subbasin		
Name	**Brief Description**	**Status**
		entities; these efforts are planned to continue.
Rainfall Managed Aquifer Recharge Demonstration Project	Evaluate the use of specific managed aquifer recharge activities on local farms to generate multiple benefits for groundwater sustainability and stormwater management.	With support through a GSP implementation grant the Subbasin has been conducting efforts to evaluate on-farm activities to enhance groundwater recharge, with strong focus on evaluation of benefits to groundwater from cover cropping of row crop fields; cover cropping pilot studies have been completed during 2023, 2024, and 2025 to assess effects of cover cropping on stormwater runoff, soil moisture, and groundwater recharge; similar efforts are planned to continue.
Potential PMAs		
Other Groundwater Recharge Opportunities	Several conceptual recharge projects have been identified along Ulatis Creek to support ongoing groundwater sustainability in the Solano Subbasin. The Nature Conservancy has provided GSAs with guidelines to implement on-farm, multi-benefit groundwater recharge efforts that would also be applicable in the Solano Subbasin.	Evaluating opportunities; with support through a GSP implementation grant the Subbasin has initiated discussion and evaluation of other recharge project concepts through outreach with landowners and with consideration of potential incentives to promote activities to enhance recharge.
Grower Education Related to On-Farm Practices for Sustainable Groundwater Management	Use of Solano Agricultural Scenario Planning System (SASPS), a web-based application that GSAs and other local agencies can use to design voluntary programs to engage agricultural producers in on-farm sustainable groundwater management projects.	Ongoing and for future consideration
Demand Management	Develop a program that would incentivize voluntary participants to reduce water consumption.	Ongoing consideration, additional efforts planned with funding through SGMA Implementation grant
Groundwater Trading Institution	Monitor Solano Subbasin conditions and consider a groundwater trading market to increase flexibility	For future consideration

Table 7-1. Ongoing, Planned and Potential Projects and Management Actions in the Solano Subbasin		
Name	**Brief Description**	**Status**
	(options) to respond to potential demand management programs.	
Education and Collaboration	The Solano Resource Conservation District (SRCD), The Freshwater Trust, Local Government Commission (LGC), and RD 2068 all provide groundwater and water conservation education to classrooms and growers within the Solano Subbasin.	Occurring; grower Groundwater Workshops held in January 2022, 2023, 2024, and 2025 focusing on groundwater conditions and management practices to enhance recharge, additional efforts planned with funding through SGMA Implementation grant
Well Owner Outreach and Education	Develop and implement education and outreach about private domestic well monitoring.	Occurring to some degree through new interactive web map and other information presented on the GSP website and coordinated ILRP efforts, additional efforts planned with funding through SGMA Implementation grant
Participation in Other Water Resources Management Programs	Implement other groundwater management strategies including further use of recycled water, expanded conjunctive water management, changes to well regulations, inventory of active wells, and other actions.	Occurring and in planning

Additional GSP implementation activities are being undertaken and are planned as part of work funded through a DWR Proposition 68 GSP Implementation Grant awarded to the Subbasin in 2023. The grant supports a variety of GSP implementation tasks being conducted by different GSAs and collaborating entities. A grant amendment has been approved by DWR extending the deadline for completion of grant tasks to March 2027. GSP implementation activities being supported by the grant include the following:

- Enhancements to monitoring program and data management system
- Well and surface water diversion inventories
- ISW and GDE evaluation
- Refinement of subbasin ET and water use estimates
- Water conservation evaluations, education, and outreach
- Developing future incentives and groundwater management policies
- Recharge study and project design and planning
- Recycled water planning
- GSP reporting
- Stakeholder engagement and community outreach

A list of key activities occurring related to the implementation of the Solano Subbasin GSP is presented in **Table 7-2**. Additional detail on some of these activities is described in sections below.

Table 7-2. Summary of Implementation Activities in the Solano Subbasin

Brief Description	Lead Agency and Partners
GSA administration and SGMA compliance	
Engagement and coordination with Reclamation Districts in Sacramento County about GSA status; coordinating GSA changes and assumption of additional responsibility areas by Sacramento County GSA , updates to public materials about this change	Sacramento County GSA, Ag Innovations
Monitoring and reporting, water level and quality monitoring, semi-annual data upload to Monitoring Network Module	Solano Collaborative
Outreach	
Virtual Town Hall May 2025, simulcast in English and Spanish with materials and recording posted in English and Spanish	Solano Collaborative, Dixon RCD, Solano RCD, GSA Board members, and Ag Innovations
Newsletter sand Website updates, including posting recordings of presentations from GSA Collaborative meetings, and Virtual Town Halls; as well as GSA Collaborative meeting notes meeting notes	Solano Collaborative, Solano RCD, Ag Innovations
Annual Collaborative GSA Get Together	Solano Collaborative
Grower Workshop	Dixon and Solano RCD, Solano Collaborative
Irrigation & Weed Management Workshop	Dixon and Solano RCD
Yolo Subbasin Interbasin coordination meetings	Solano Subbasin GSA
Updates on groundwater management activities included in monthly emails to 500+ landowner/grower members of the Sacramento Valley Water Quality Coalition in the Solano Subbasin	Dixon RCD
Quarterly GSA meetings	Solano Collaborative, Dixon RCD, Solano RCD, Solano County, Solano County Farm Bureau
Monthly Solano Water Advisory Commission meetings	Solano Subbasin GSA
Bimonthly multi-benefit project planning meetings	Dixon and Solano RCD, SCWA
Landowner recharge interest meetings	Dixon and Solano RCD
Reach out to potential Putah Creek agricultural water users and to host three “Putah Creek Pumper” meetings with growers and landowners	Solano Collaborative, Dixon RCD

Table 7-2. Summary of Implementation Activities in the Solano Subbasin	
Brief Description	**Lead Agency and Partners**
Workshop in Spanish for Spanish-speaking producers to outline all technical and financial assistance programs available, including groundwater recharge practices and potential pilot projects	Solano Collaborative, Dixon RCD, and Solano RCD
Distribute State of the Subbasin and groundwater materials in Spanish and English at the Winters Salmon Festival	Ag Innovations for Solano Collaborative
Programs 101 and Emerging Commodities workshop to highlight available grant funding and services in Solano County, including those that assist with irrigation efficiency and groundwater recharge. Presentations were in English and Spanish.	Solano and Dixon RCD, UCCE Small Farms, Solano County Farm Bureau, Sustainable Conservation, Yolo Solano Air Quality Management District, and USDA NRCS
Monitoring network enhancements outreach to well owners in key areas of Subbasin	Dixon RCD, Solano Collaborative
Coordination with Solano County drought resilience planning efforts	Solano County, Solano Subbasin GSA, Dixon and Solano RCD, SID, City of Vacaville
Coordination with Solano County One Water Project water master planning	Solano County, Solano Subbasin GSA, Dixon and Solano RCD, SID, City of Vacaville
Projects	
Exploration of recharge concept possibilities	Solano Collaborative, Dixon RCD, and Solano RCD
Kidwell pilot project: tailwater pond repurposed for stormwater detention and groundwater recharge.	SCWA, Growers, RD 2068, Dixon RCD, and Solano RCD
Pedrick pilot project: tailwater pond repurposed for stormwater detention and groundwater recharge.	SCWA, Growers, RD 2068, Dixon RCD, and Solano RCD
Wolfskill pilot project: riparian corridor/bioswale to improve stormwater infiltration.	SCWA, Growers, RD 2068, Dixon RCD, and Solano RCD
Pippo pilot project: bioswale/pond establishment and enhancement to increase groundwater recharge.	SCWA, Growers, RD 2068, Dixon RCD, and Solano RCD

Table 7-2. Summary of Implementation Activities in the Solano Subbasin	
Brief Description	**Lead Agency and Partners**
Photo documentation and grower estimates of winter vegetation on cropped acres	Dixon RCD
Putah Creek floodplain recharge project (Wimmerhaven project)	Solano Subbasin GSA
Working webmap for supporting recharge concept development	Solano Collaborative
Recycled water planning (engaging consultant to support evaluation)	City of Vacaville
Water supply planning to address new chromium-6 MCL – well and water system upgrades	City of Vacaville
Collect field level data on groundwater use in coordination with Irrigated Lands Regulatory Program annual reporting for GSA ground truthing	Dixon RCD
Management Actions	
Installation of two stormwater surface flow measurement stations in Upper Tremont 3 Watershed	SCWA and Dixon RCD
Photo documentation and grower estimates of winter vegetation on cropped acres	Dixon RCD
Exploration of policies and incentives to support sustainable groundwater management	Solano Collaborative, Dixon RCD, and Solano RCD
Water conservation actions support	Dixon and Solano RCD, Solano GSA
Data Gaps	
Enhancements to monitoring network – wells and stream gaging (include gage on Tremont 3 drain)	Solano Collaborative, Dixon RCD
DMS and webmap enhancements and updates	Solano Collaborative
Well and Surface Water diversion inventory	Solano Collaborative, Solano County, Sacramento County, Dixon RCD
Coordination with DWR on monitoring automation and addressing DWR network data gaps	Solano Collaborative
Solano IHM refinements – initial efforts related to implementation of improved crop ET estimates based on remote and ground-based sensing information	Solano Collaborative

7.1. Outreach and Education

The GSAs in the Subbasin have performed extensive outreach efforts focused on informing, educating, and engaging water users and other interested parties in the Subbasin. Particularly notable outreach efforts conducted recently include a public virtual town hall meeting, a grower workshop, the distribution of newsletters and other content with information on groundwater management activities and public engagement opportunities, and the development of an interactive web map application providing information on groundwater conditions in the Subbasin.

On May 19, 2025, the Solano Collaborative convened a virtual town hall event to provide interested participants an overview of GSP implementation activities, current and recent groundwater conditions in the Subbasin, and an opportunity to ask questions of GSA representatives and technical experts. Individuals representing a range of beneficial uses and users attended the virtual town hall. The Dixon and Solano RCDs, in coordination with the NRCS and the Solano GSA, held an annual Groundwater Workshop on January 30, 2025, focused on providing information to growers in the Subbasin and nearby areas on the status of GSP implementation, groundwater level, and quality conditions in the Subbasin, and recharge opportunities, and nitrogen and irrigation management. In 2023 The Solano Collaborative developed and launched an interactive web map presenting information on groundwater conditions in the Subbasin. The first phase of the web map development focuses on providing information on groundwater level and quality conditions at RMS locations; future web map enhancements are planned to incorporate information on other sustainability indicators and additional monitoring sites. The web map application can be accessed at the following link:
https://experience.arcgis.com/experience/bcf6baddd9014bf98b81917b5b2b2051/.

The Subbasin has and will continue in efforts to develop and distribute informational materials and conduct outreach to improve water use efficiency across all sectors. Many of these activities occur through efforts conducted by partnering entities in the Subbasin with missions involving improving water conservation and management.

The Solano County Water Agency (SCWA) has various ongoing programs targeting water conservation in the County, including in the Solano Subbasin. The SCWA website provides information to stakeholders on residential and commercial rebates, free assessments of residential water use through the Solano County Residential Survey Program, Solano County's School Water Education Program (SWEP) targeting K-12 schools in the County, and tips and resources for conserving water. The Solano Water Advisory Commission (SWAC) convened by SCWA and consisting of water managers in the County, developed a white paper in October 2022 (https://www.solanogsp.com/wp-content/uploads/2022/11/20221004_SWAC-White-Paper.pdf) summarizing findings from review of water conservation activities occurring in the County and evaluating compliance with statewide water conservation goals and regulations. The SWAC paper lists different actions implemented by urban water suppliers to improve water use efficiency. These include a variety of actions including:

- expanding outreach about rebate and incentive programs for increasing water conservation through turf removal and installation of water-efficient appliances and fixtures;

- expanding public education about water conservation;
- reinstating residential and commercial water use survey program;
- prohibiting, monitoring, and educating residents on preventing wasteful activities;
- making water use data more readily available to customers;
- restricting days and times for landscape irrigation; and
- leak detection and meter calibration/replacement programs to reduce water distribution system losses.

The Agricultural Water Conservation Committee comprised of representatives from SCWA, SID, MPWD, RD2068, Dixon RCD, Solano RCD, U.C. Cooperative Extension, and the Natural Resources Conservation Service provides soil and weather monitoring, educational materials, training, workshops, and well and irrigation system testing to support improvements to irrigation water management for growers in Solano County. The process for accessing these resources is included on the SCWA websites.

The Dixon and Solano RCDs provide many services within the Solano Subbasin that support water management, including conducting ongoing activities to educate and train stakeholders in water conservation and irrigation management practices. The Dixon RCD adopted a long-range plan in March 2022 that includes goals involving supporting improved water conservation, efficiency, and reuse by growers and landowners through continued support of the Solano County Agricultural Water Conservation Committee efforts to increase water efficiency and also partnering with various agencies (local, State, and Federal) to demonstrate and convey the benefits of water conservation. The Solano RCD goals also include educating children and adults about watershed science and stewardship. Partnering with the RCDs provides a valuable avenue for outreach on water management practices to a wide audience of stakeholders.

7.2. Projects

Projects identified for potential implementation as part of the GSP, if determined to be necessary or of interest in the Subbasin, include expanded use of recycled water from the City of Vacaville and enhancing groundwater recharge through stormwater capture and rainfall infiltration in parts of the Subbasin. Although these projects are not anticipated to be necessary to maintain sustainability in the Subbasin, the GSAs have continued exploration of potential opportunities for implementing projects aimed at enhancing groundwater recharge. In coordination with the GSAs, Solano and Dixon RCD has initiated outreach to landowners to solicit interest in implementing projects. The outreach conducted to date has included focused meetings and broader distribution of surveys to landowners in areas of the Solano Subbasin where there is greater need or benefit from projects aimed at enhancing recharge. Follow-up conversations with select survey respondents have also occurred and will continue in the future as further evaluation of potential recharge project opportunities occurs.

Building on work completed during the preparation of the GSP, the Subbasin GSAs have continued review of conditions and characteristics in the Subbasin for the purpose of evaluating the potential for implementing recharge projects in different areas of the Subbasin. The assessments have included a review of data on land uses and cropping, parcel characteristics (e.g., size, shape), groundwater levels, soil

characteristics, subsurface lithology, existing water infrastructure, historical flooding and drainage issues, and other considerations.

Because of the Subbasin's proximity to major surface water features in the Delta and westside tributary streams with periodic availability of stormflow water, including from surface water in Putah Creek and stored in Lake Berryessa, the Subbasin likely has access to considerable available surface water for use in enhancing recharge. Detailed assessment of surface water available for enhanced recharge projects in the Subbasin has not been conducted, although analyses of recharge projects conducted as part of the GSP development estimated available stormwater for the purpose of simulating the effects and benefits of implementing such activities. Additional analysis of surface water supplies and necessary infrastructure will occur as part of the study and design process for any recharge projects developed in the Subbasin.

Planning of multi-benefit projects to improve stormwater management and reduce local flooding while providing benefits to groundwater through enhanced recharge, especially in the Northwest Focus Area, is of strong interest in the Subbasin. Solano County has recently initiated a One Water Framework planning process intended to provide a coordinated approach to water management across the County, and the objectives of the One Water Framework planning activities are closely aligned with GSP implementation objectives. A One Water Framework Steering Committee comprised of representatives from water management entities across the entire County was formed, and six Steering Committee meetings were held in 2024 to provide input in the development of a One Water Master Plan and a draft document was released for public review and comment in March 2026.

GSAs and partnering entities (e.g., SCWA, Dixon RCD, Solano RCD) have been conducting monthly and bi-weekly meetings to continue planning discussions related to implementation of efforts to develop multi-benefit projects to enhance recharge and reduce stormwater runoff in the Subbasin. Key datasets relating to land use and ownership, water distribution and drainage infrastructure, historical flooding conditions, and hydrogeologic characteristics have been compiled in an internal interactive web map to support these discussions and efforts. In 2025, four properties within the Subbasin were selected as part of evaluation of the feasibility of concepts involving the use of existing natural and artificial landscape features enhance groundwater recharge. (**Figure 7-1**).

- Kidwell Site- A historical pond originally created to provide habitat for perch. The pond ultimately proved unsuitable for perch, and the adjacent ditch was later modified to allow stormwater to enter the pond through an overflow structure.
- Pedrick Rd- A historical tailwater pond that has become overgrown and underutilized in recent years due to irrigation efficiency improvements. The drainage ditch was modified to direct water into the pond.
- Wolfskill Rd- A riparian corridor identified as having potential for improved stormwater infiltration with targeted modifications. Native trees, shrubs, grasses, and forbs were planted along the waterline and in upland riparian areas beginning in winter 2025.

At all sites, initial infiltration tests were conducted, and prior to winter 2025, monitoring equipment was installed, including a staff gauge and a pressure transducer to measure pond infiltration. At the Kidwell and Pedrick Road sites, a rain gauge was also installed. The fourth site was identified as a demo for small recharge projects in the NW Focus Area. The swale and pond were scraped and shaped, followed by

seeding perennial native grasses, in winter 2025. The site was instrumented with a staff plate and game camera to monitor pond levels during the storm season.

As part of the ongoing multi-benefit projects to enhance groundwater recharge, an area around Dry Arroyo in the NWF region has been identified as a potential location where overflow from Lake Berryessa could be directed once precipitation events have passed. Current efforts are underway to identify landowners willing to allow monitoring of their wells to evaluate recharge responses.

Coordination and planning efforts have also been occurring between the Solano Subbasin GSA (and affiliates), UCD, and a private landowner to conduct a pilot recharge study within the floodplain of Putah Creek in the Northwest Focus Area. Through these efforts, a conceptual project design has been developed, with an outline for a proposed initial project monitoring plan utilizing a combination of new dedicated monitoring wells and existing wells in the area. Although plans were being developed to begin the pilot project in Summer 2025, the natural flooding of the site beginning in February 2025 postponed these plans as monitoring data for the period prior to, during, and after the flooding are evaluated.

SID has been continuing planning efforts related to a project to improve the reliability of water supply for drinking water and fire protection needs in the Quail Canyon Improvement District (QCID) community. SID recently secured $2.82 million in federal funding for design and construction of a new well and associated distribution system components for QCID. The existing QCID Public Water System Well is in the far northwestern part of the Solano Subbasin and is the sole source of supply for the community. Water levels in the well have been declining over recent years despite reductions in demand from water conservation efforts. The production capacity of the well has declined from 140 gallons per minute (gpm) to 40 gpm. The greatly reduced well production capacity cannot meet domestic or fire needs, as was demonstrated in the 2020 LNU Complex fire when production from the well was insufficient to fill tanker trucks needed for firefighting. There are also properties nearby that have requested service because of declining production and water levels in private wells. QCID is located several miles from the nearest domestic water system; therefore, interconnection is not feasible. The project will include constructing a new well at a nearby site with more favorable aquifer characteristics to provide drought and fire resiliency for QCID. Approximately 3,500 linear feet of conveyance pipeline will be installed to deliver water from the new well to serve current and future customers.

Through work managed by Solano RCD, the Solano County Farm Bureau and Fibershed received funding from the California Department of Food and Agriculture Healthy Soils Program to implement practices that improve infiltration. The grant supports staff time at the RCD to line up and design the projects, and funds the farmers to implement them. Between 2024 and 2025, approximately 1,500 acres of land was modified to improve infiltration through the planting of annuals/perennials, hedgerows, riparian forest, range planting, forage planting and the application of compost and mulch.

Through funding provided by the SGMA implementation grant, the GSAs intend to evaluate the need and opportunity for developing greater resilience of drinking water supplies in the far northwest part of the Subbasin. This evaluation will include consideration of domestic well vulnerability and opportunities to bolster drought and climate change resilience involving water system consolidation, localized enhanced recharge, and other more. Initial stages of characterizing the locations of wells and water quality

conditions in the vicinity of groundwater drinking water users is underway and involves a well inventory (described below).

7.3. Monitoring Enhancements and Addressing Data Gaps

The GSAs in the Solano Subbasin have been conducting various efforts to enhance GSP monitoring and address data gaps. Important efforts conducted in 2025 related to monitoring enhancement and addressing data gaps, some of which have been described above, consisted of the following:

- Re-recruiting of GSP monitoring network wells dropped from other monitoring programs (e.g., DWR, USBR)
- Recruiting of wells for the GSP monitoring program to address monitoring data gaps
- Planning and implementation of automated water level monitoring in select wells
- Establishing reference elevations for stream gage sites

In 2025 automated monitoring equipment installed at six wells. Additional automated monitoring equipment has been purchased and is set to be deployed in 2026. In winter 2025 a duel completion monitoring well was installed near Putah Creek and also outfitted with automated monitoring equipment.

As part of an effort to ensure an accurate representation of groundwater uses and users is available for groundwater management planning efforts in the Subbasin, in 2023, the GSAs started an inventory of wells throughout the Subbasin. The well inventory relies heavily on coordination with Solano County (most wells in the Subbasin are in Solano County) and will also support broader Solano County efforts to develop and maintain a more accurate accounting of wells across the entire County. Implementation of the well inventory builds on planning efforts initiated by the GSAs and Solano County in 2022 and involves compiling a complete GIS dataset of groundwater wells in Solano Subbasin, aggregating all available well completion report data from DWR and well permit data from the County, attempting to differentiate between active and inactive wells, and identifying and characterizing the uncertainty associated with individual records or mapped well locations. Data processing includes digital verification of all well locations where possible, evaluation of parcels likely to have wells and needing further reconnaissance, and development of a data structure to tie in with the County's current Accela database. Information gathered from this effort is currently in the process of being prepared for presentation in a technical memorandum and in digital data formats to inform the Subbasin on future water management strategies and strengthen understanding of the locations of current water users and estimates of water use.

Improving the representation of surface water diversions and deliveries in the Subbasin is important for estimating groundwater and surface water uses in the Subbasin. In coordination with the completion of the well inventory described above, the GSAs also started an inventory of surface water diversions in the Subbasin in 2023. This work also built on planning efforts initiated in 2022 with work in 2023 involving coordination with Solano County and existing data available from the County's Cache Slough Complex Habitat Conservation Plan, which is still in development, reviewing points of surface water diversions reflected in the SWRCB CalWATRS database system for the Subbasin, and compiling a processed GIS dataset that includes a refined inventory of surface water points of diversion, volumes of surface water diverted, and where possible the place of use for these diversions. Surface water diversion inventory efforts are ongoing. Information gathered from this effort is currently in the process of being prepared for

presentation in a technical memorandum and in digital data formats to inform the Subbasin on future water management strategies with improved estimates of locations and volumes of surface water use, which will also help support improvements to estimates of groundwater use.

7.4. Recommended GSP Corrective Actions in DWR Determination Letter

On January 18th, 2024 DWR issued an approval of the Solano Subbasin GSP. The GSP approval letter from DWR recommends three corrective actions to address in future GSP updates. The first required periodic evaluation of the GSP is due in January 2027 and depending on the outcome from the period evaluation, an amendment or update of the GSP may be warranted at that time, including to address the recommended corrective actions. The following section summarizes DWR's recommended GSP corrective actions and the status of GSA efforts undertaken to address each.

7.4.1. Recommended Corrective Action 1

> *Revise the definition of undesirable results for degraded groundwater quality so that exceedances of minimum thresholds caused by groundwater extraction, whether the GSAs have implemented pumping regulations or not, are considered in the assessment of undesirable results in the Subbasin. Under SGMA, GSAs are responsible for monitoring and managing potential water quality degradation caused by groundwater extractions in the Basin.*

The SMC for groundwater quality in the Subbasin are defined in **Section 6** of the GSP. The definition of an undesirable result for degraded groundwater quality will be reviewed and revised to address this recommendation at the time of the next update of the GSP.

7.4.2. Recommended Corrective Action 2

> *Revise the proposed sustainable management criteria for land subsidence as follows:*
>
> *a. Identify critical infrastructure susceptible to land subsidence and describe what constitutes significant and unreasonable effects. Define the rate (vertical displacement over time) and extent (lateral extent and total vertical displacement) of land subsidence considered to cause these significant and unreasonable impacts.*
>
> *b. Describe how minimum thresholds and the quantitative identification of undesirable results defined for the land subsidence monitoring network are protective of the rate and extent of land subsidence considered significant and unreasonable.*
>
> *c. Revise or expand the land subsidence monitoring network to be able to sufficiently detect land subsidence throughout the Subbasin. Department staff understand that portions of the Subbasin near the Delta may experience land subsidence due to the decomposition of peat, which is unrelated to groundwater extractions. The GSP may develop an evaluation process where groundwater level data is used in conjunction with land subsidence data to disregard this type of land subsidence, if detected.*

Historical subsidence data indicate there is only very small amounts of subsidence that may be related to groundwater extraction. The subsidence SMCs in the GSP were developed with consideration for historical rates of displacement and seasonal fluctuations in displacement and their potential to impact critical infrastructure. Subsidence SMC are assigned at selected CGPS sites identified as RMS. InSAR data for the Subbasin are now more readily available and are reviewed each year as part of the GSP annual reporting. Prior to and during completion of the periodic evaluation of the GSP, SMC for land subsidence will be reviewed with consideration of the items described in Recommended Corrective Action 2. The land subsidence best management practices (BMP) document prepared by DWR was released in 2025 with additional document released in January 2026 it will also be reviewed and considered in addressing this recommended corrective action.

Additional description and characterization of critical infrastructure in the Subbasin and defining the engineering tolerances of this infrastructure to accommodate land surface elevation changes without experiencing significant and unreasonable impacts will be a key part of addressing this item. The Subbasin has already commenced additional evaluation of design characteristics of critical infrastructure and is evaluating potential modifications to the subsidence RMS network utilizing available vertical displacement monitoring being conducted by DWR using InSAR and remote sensing technologies. The Subbasin is currently reviewing and considering the BMP for land subsidence

7.4.3. Recommended Corrective Action 3

Department staff understand that estimating the location, quantity, and timing of stream depletion due to ongoing, Subbasin-wide pumping is a complex task and that developing suitable tools may take additional time; however, it is critical for the Department's ongoing and future evaluations of whether GSP implementation is on track to achieve sustainable groundwater management. The Department plans to provide guidance on methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water and support for establishing specific sustainable management criteria in the near future. This guidance is intended to assist GSAs to sustainably manage depletions of interconnected surface water.

In addition, the GSA should work to address the following items by the first periodic update:

a. Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing.

b. Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion within the GSA's jurisdictional area.

c. Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions.

The Solano Subbasin has a robust network of streamflow monitoring sites along Putah Creek for the key purpose of administering and monitoring flows in relation to the Putah Creek Accord, which specifies minimum water releases and stream flows in the Lower Putah Creek to support downstream beneficial users. In Fall 2024, the Subbasin installed an additional stage monitoring gage along Putah Creek near Stevensons Bridge Road and outfitted the gage with an automated monitoring pressure transducer. Three wells were also added to the monitoring network in the vicinity of this gage to support the understanding of interconnectivity between groundwater and surface water in this area. Data developed through the monitoring conducted at this site, together with monitoring of shallow groundwater conditions at four other sites adjacent to Putah Creek and one site adjacent to Lindsay Slough, will enhance the characterization of ISW in the Subbasin as part of completion of the periodic evaluation and any necessary amendments to the GSP. Additionally, there is ongoing coordination with SCWA to evaluate the needs and benefits related to additional surface water monitoring gages in parts of the Subbasin and to complete elevation surveying of the existing surface water monitoring sites along Putah Creek to facilitate comparison of groundwater and surface water levels and flow gradients. Techniques to refine the characterization and quantification of exchanges between groundwater and surface water in the Subbasin, including through hydrologic modeling and synoptic streamflow measurements, will also be explored. Available guidance provided by DWR on the management of depletions of interconnected surface water, which to date has not yet been released, will be considered as part of completing the periodic evaluation and any amendment of the GSP.

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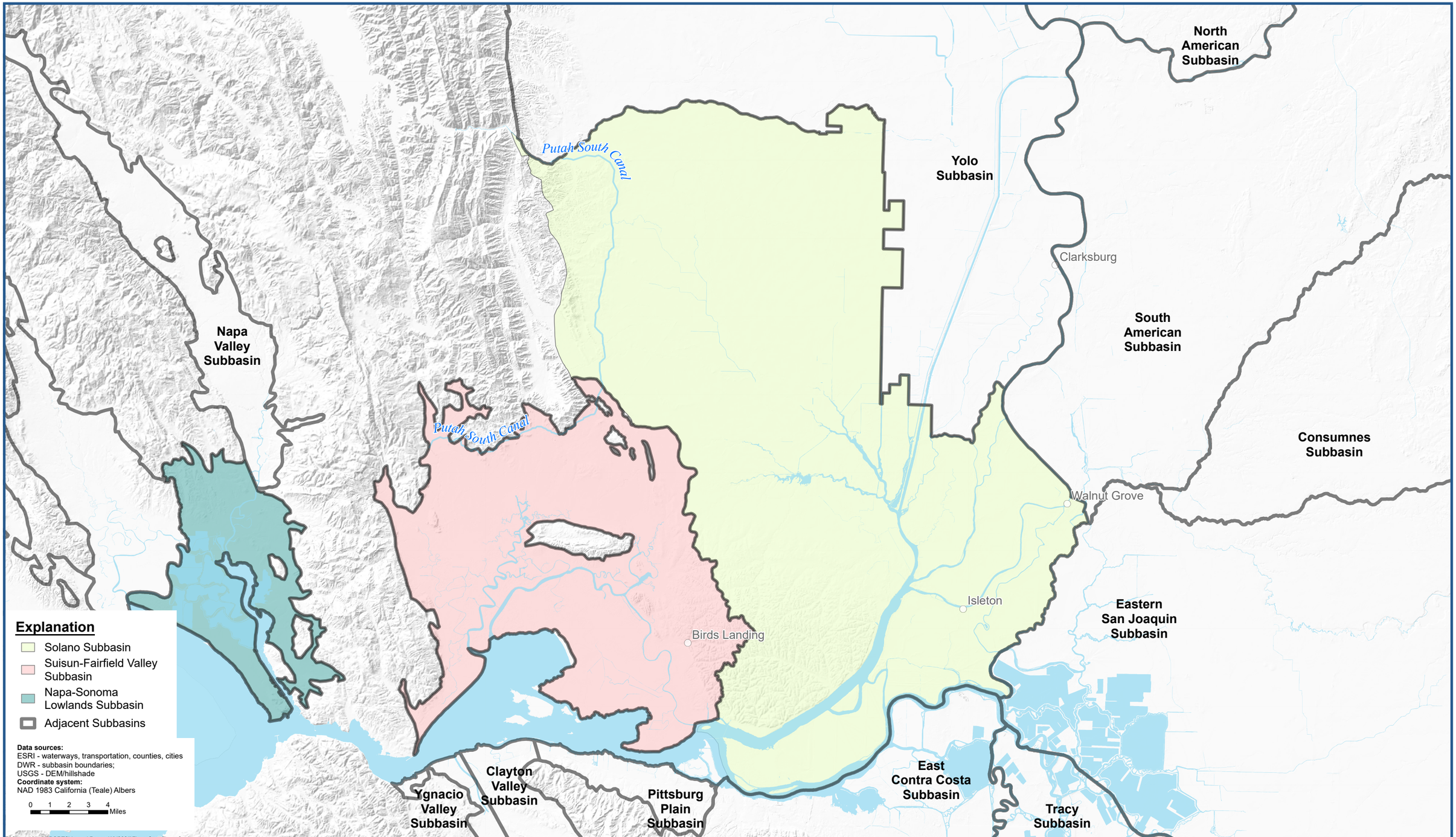
Figures

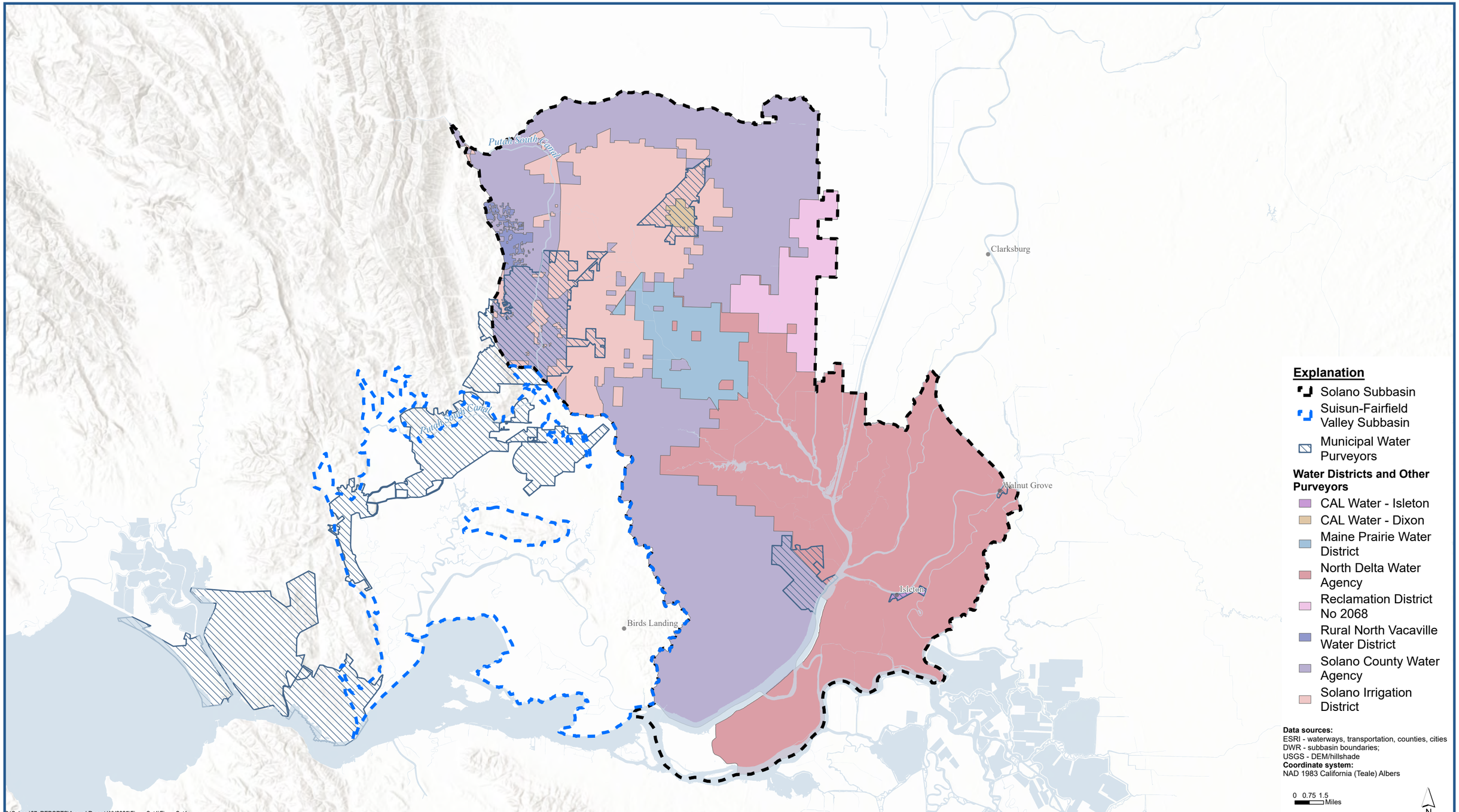


LSCE Team

Location Map and Groundwater Basins and Subbasins

Solano County and Subbasin
Annual Report - Water Year 2023

Figure 1-1



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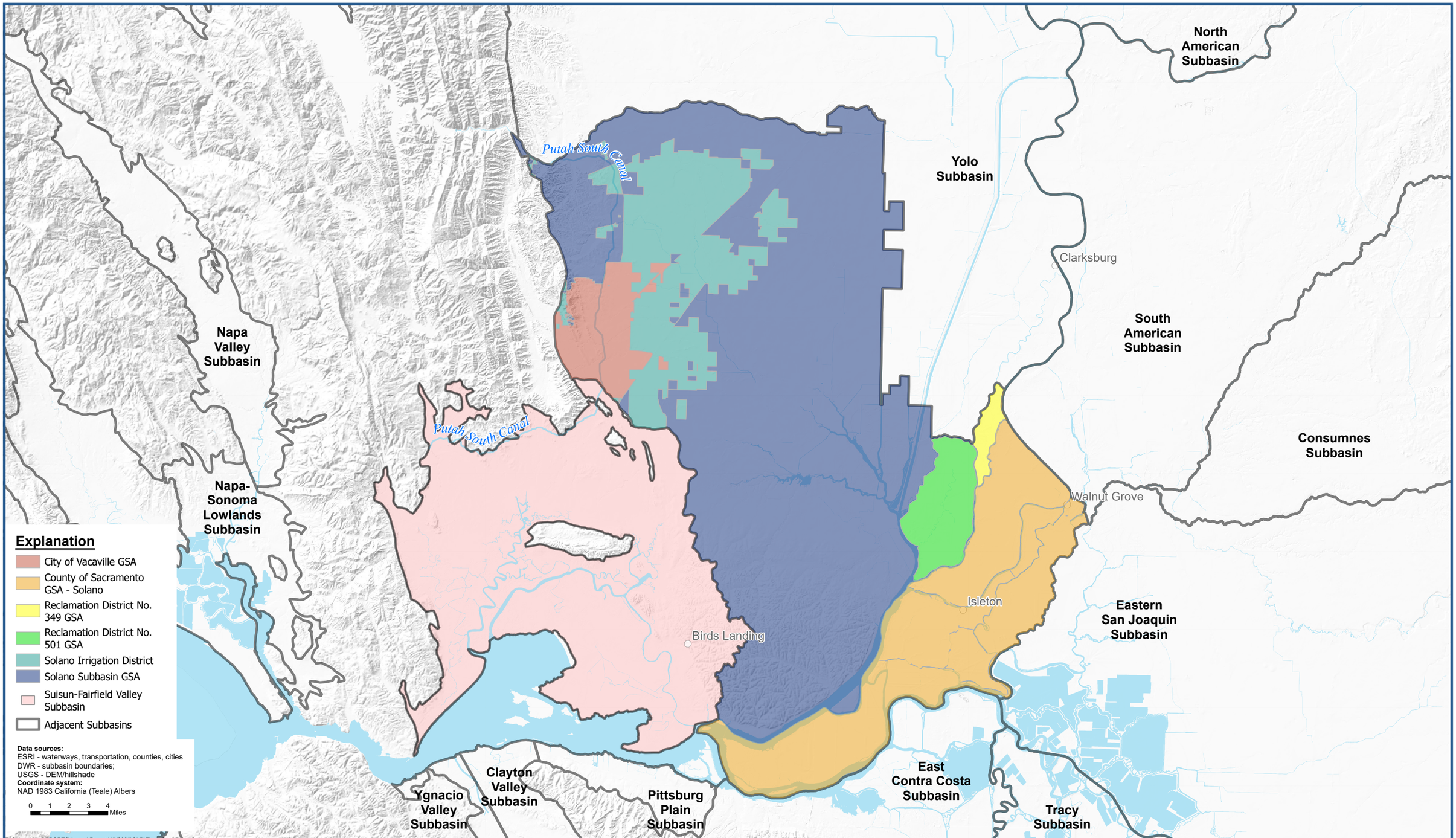
Major Water Purveyors in Solano Subbasin

Solano County and Subbasin
Annual Report - Water Year 2025

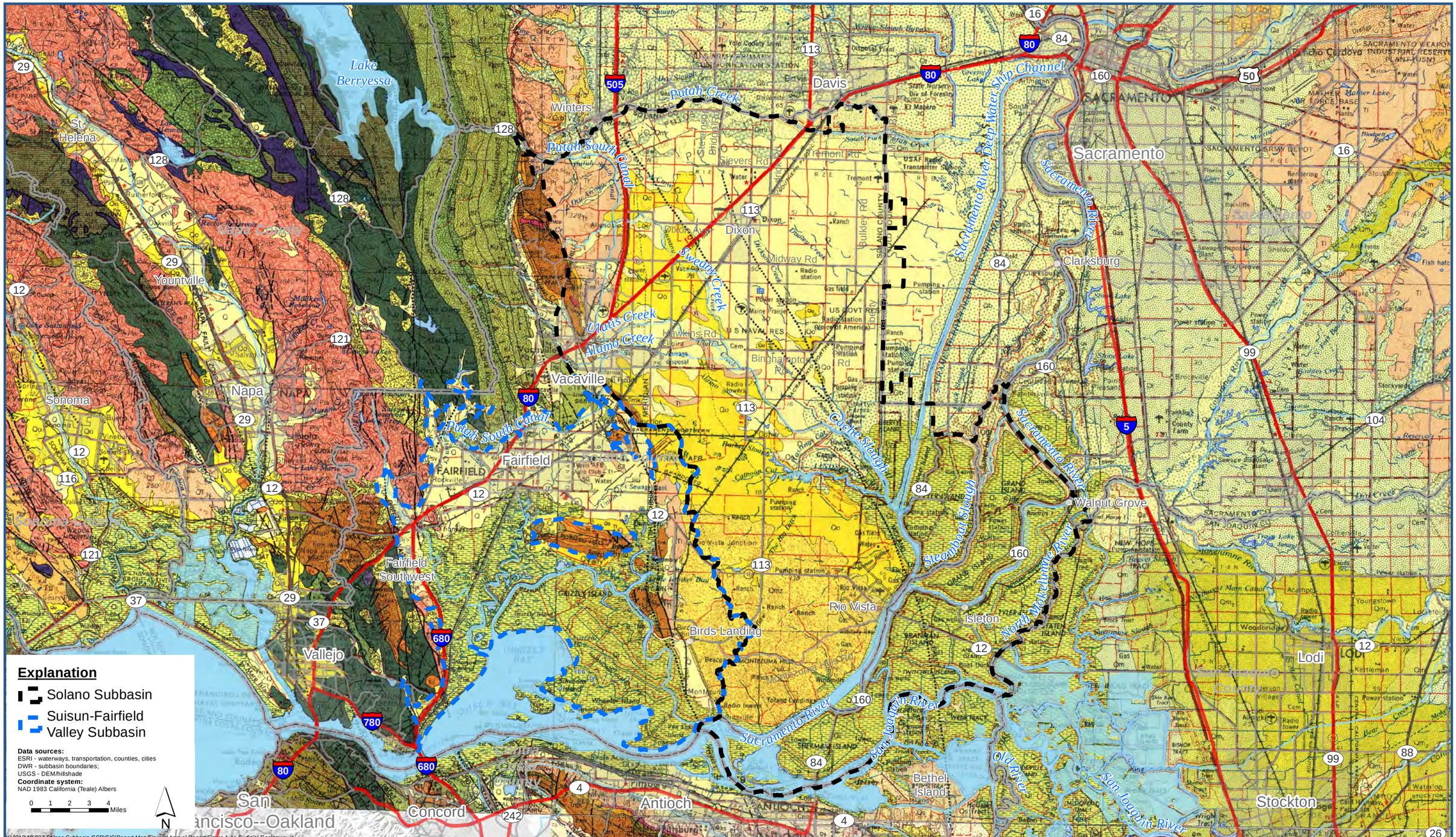
Figure 1-2



Groundwater Sustainability Agencies

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 1-3



SOLANO SUBBASIN GROUNDWATER SUSTAINABILITY PLAN

LSCE Team

Surficial Geology

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 1-4

- Q — Alluvium
- t — Mine and dredge tailings
- Qa — levee and channel deposits
- Qb — Basin deposits (Alluvium)
- Qi — Intertidal deposits (Peaty mud)
- Qs — Dune Sands
- Ql — Lake Deposits
- Qo — Older Alluvium
- Qg — Glacial Deposits
- Qm — Modesto Formation (Alluvium)
- Qr — Riverbank Formation (Alluvium)
- Qmr — Modesto-Riverbank Formations (Arkosic alluvium)
- Qmz — Montezuma Formation (Poorly consolidated, clayey sand)
- Qtl — Turlock Lake Formation (Sand, silt, and gravel)
- Qrb — Red Bluff Formation (Gravel in reddish, silty or sandy matrix)
- Qt hm — North Merced Gravel (This pediment veneer)

- Tt — Tehama Formation (Sand, silt, and volcaniclastic rocks)
- Tl — Laguna Formation (Consolidated alluvial deposits)
- Tsp — San Pablo Group (Marine sandstone and shale)
- Tm — Mehrten Formation (Andesitic conglomerate, sandstone, and breccia)
- Tvs — Valley Springs Formation (Rhyolitic tuff and sedimentary rocks)
- Tmk — Markley Sandstone (Marine)
- Tn — Nortonville Shale (Marine)
- Td — Domengine Sandstone (Marine)
- Tc — Capay Formation (Marine sandstone)
- Tg — "Auriferous" Gravels
- Ti — Ione Formation (Quartzose sandstone and kaolinitic clay)
- Tmz — Martinez Formation (Marine quartzose sandstone)
- Tlt — Lawlor Tuff
- Tvd — Dacite, rhyodacite domes
- Tet — Eureka Valley Tuff
- Ttm — Table Mountain Latite
- Tpp — Putnam Peak Basalt

X:\2018\18-037 Solano Subbasin GSP\GIS\Report Map Figures\HCM_GW Conditions TM\Figure 2.6b Surficial Geology Legend.mxd

LSCE Team

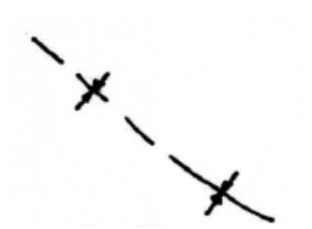
Surfical Geology Legend

Solano County and Subbasin
Annual Report - Water Year 2025

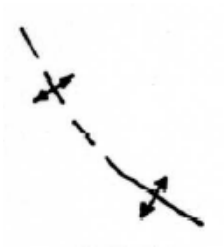
Figure 1-4b

Kg — Guinda Formation (Marine sandstone)

Kc — Chico Formation (Marine sandstone, shale, and conglomerate)

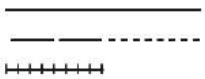


Synclinal fold
(Dashed where inferred" dotted where concealed by younger rocks or water.)



Anticlinal fold
(Dashed where inferred" dotted where concealed by younger rocks or water.)

Fault
(Solid where well located: dashed where approximately located; queried where continuation or existence is uncertain: except for the offshore area, faults are dotted where concealed by younger rocks or water. Arrows show relative or apparent direction of movement. U, upthrown side and D, downthrown side, relative or apparent.)



Contact
(Observed or dashed where approximately located; queried where gradational or inferred.)

Geological Map Adapted from:
Graymer, R.W., Jones, D.L., and Brabb, E.E.:U.S.Geological Survey, Geologic map and map database of northeastern San Francisco Bay region, California, scale 1:100,00

Wagner, D.L., Jennings, C.W., Bedrossian, T.L., and Bortugno, E.J. : California Division of Mines and Geology Regional Geologic Map 1A, scale 1:250,000.

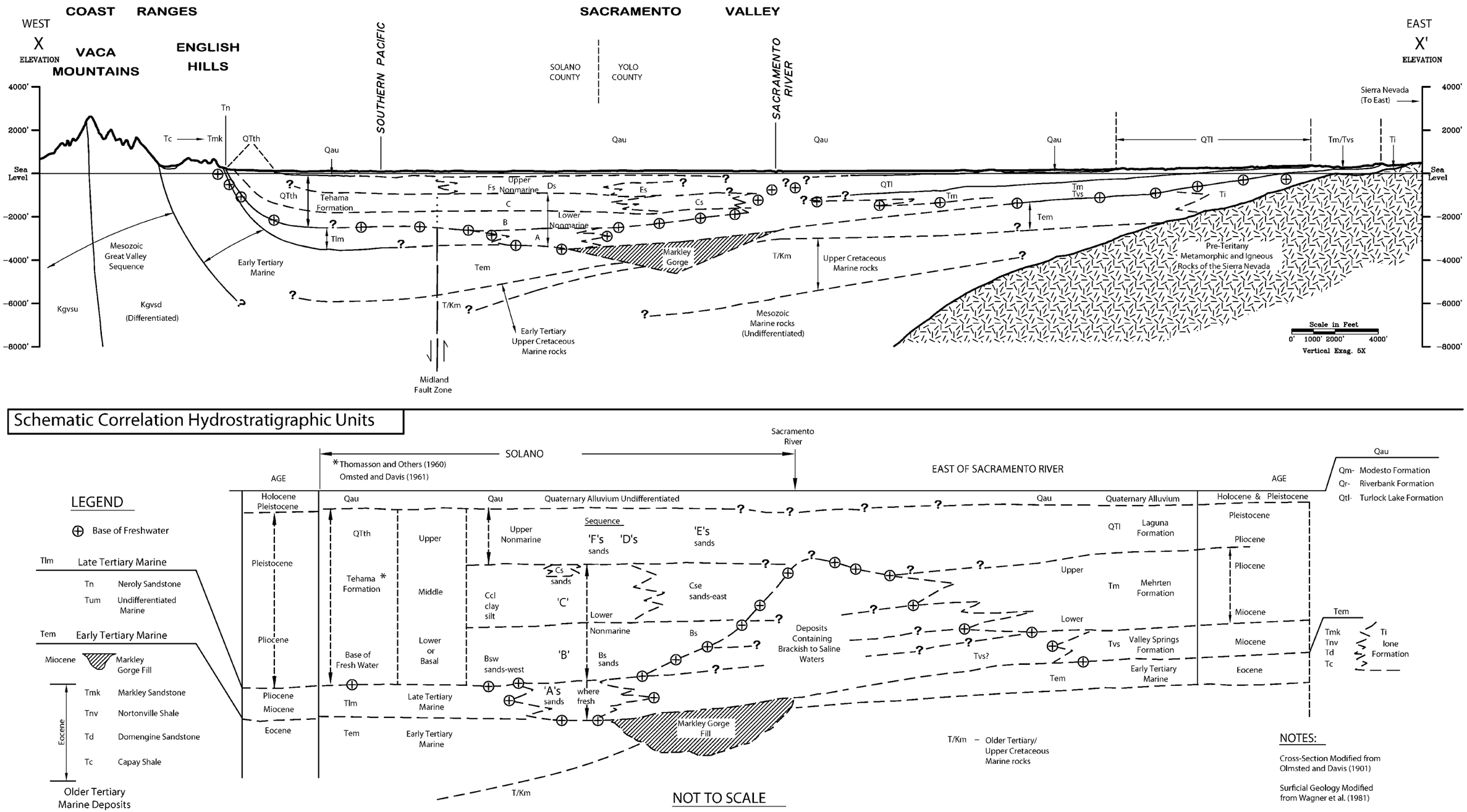
X:\2018\18-037 Solano Subbasin GSP\GIS\Report Map Figures\HCM_GW Conditions TM\Figure 2.6b Surficial Geology Legend.mxd

LSCE Team

Surfical Geology Legend

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 1-4c



Schematic Correlation Hydrostratigraphic Units

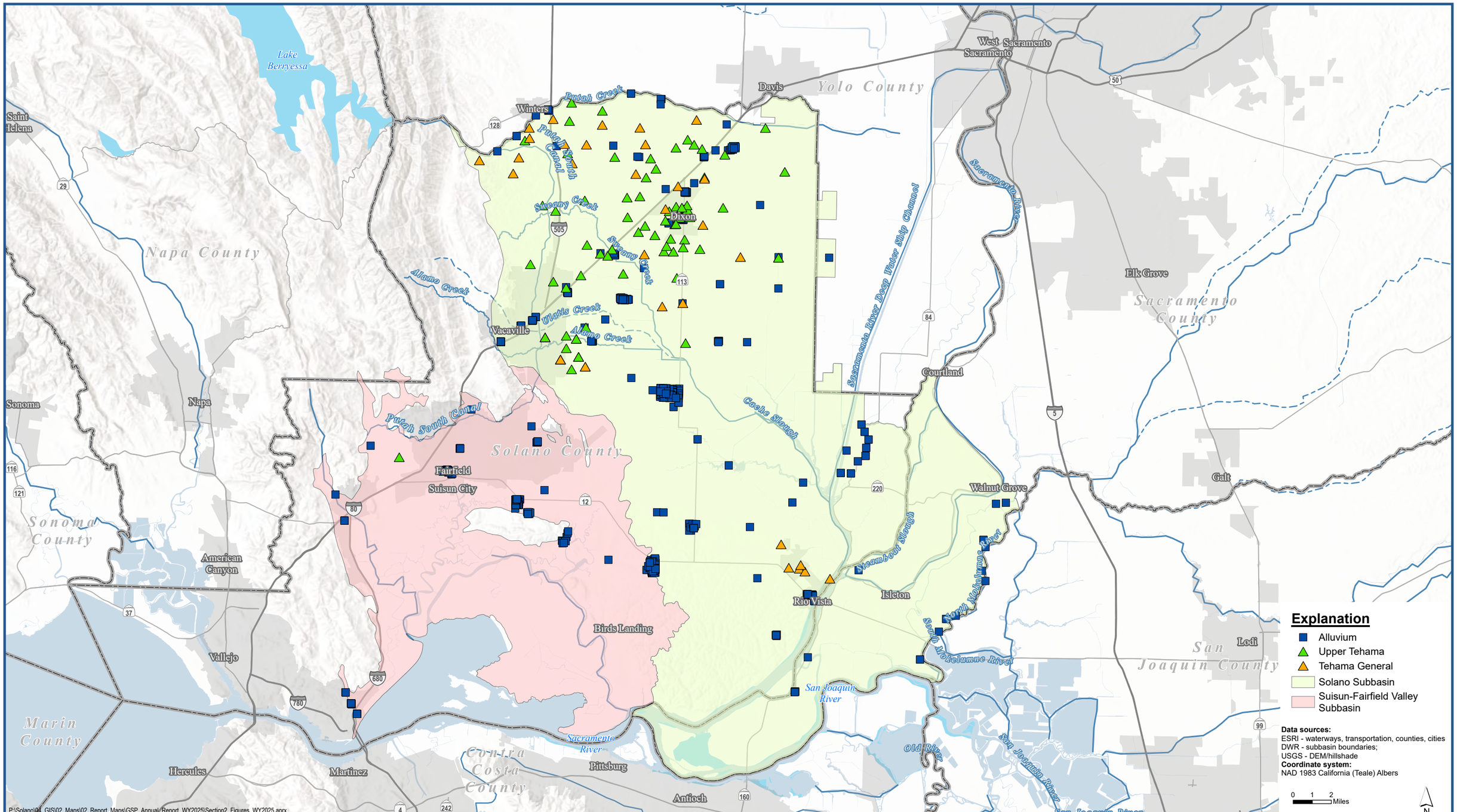
X:\2018\18-037 Solano Subbasin GSP\GIS\Report Map Figures\Annual Report\Figure 1-5 Sacramento Valley Schematic Cross Section X-X'.mxd

LSCE Team

Sacramento Valley Schematic Cross-Section X-X'

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 1-5

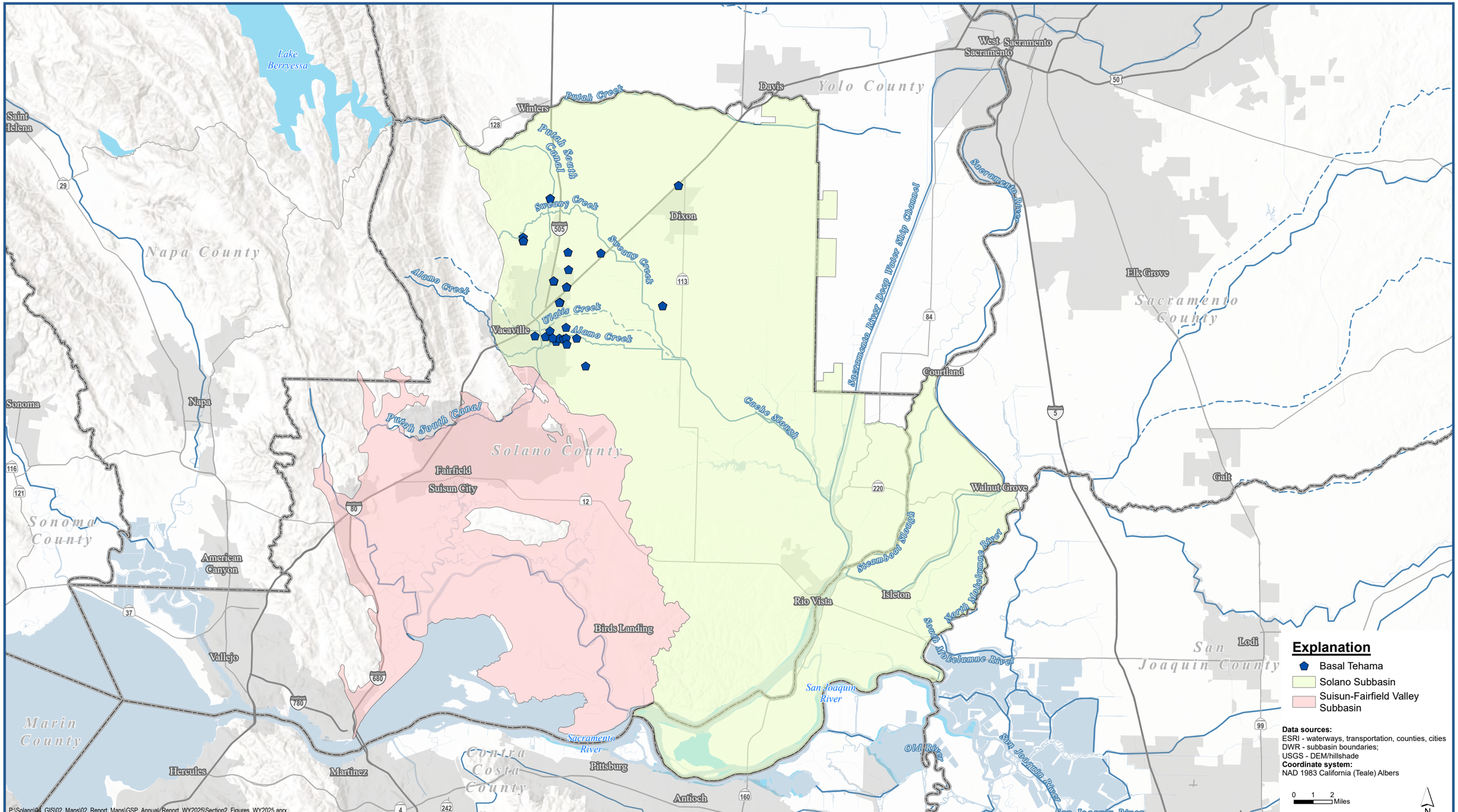


LSCE Team

Wells with Water Level Information since 2015-Alluvial Aquifer and Upper Zone

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 2-1

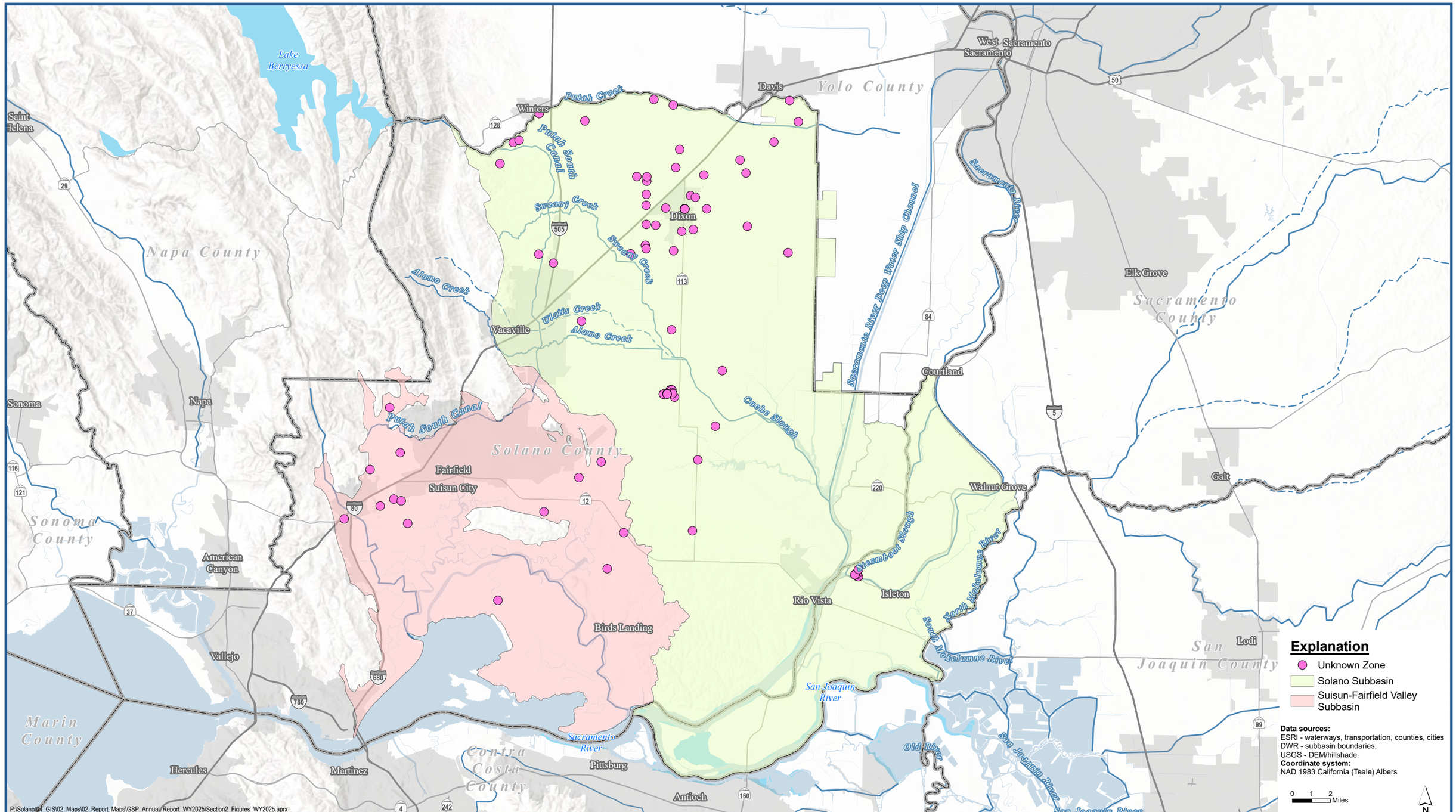


LSCE Team

Wells with Water Level Information since 2015- Confined Basal Tehama

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 2-2

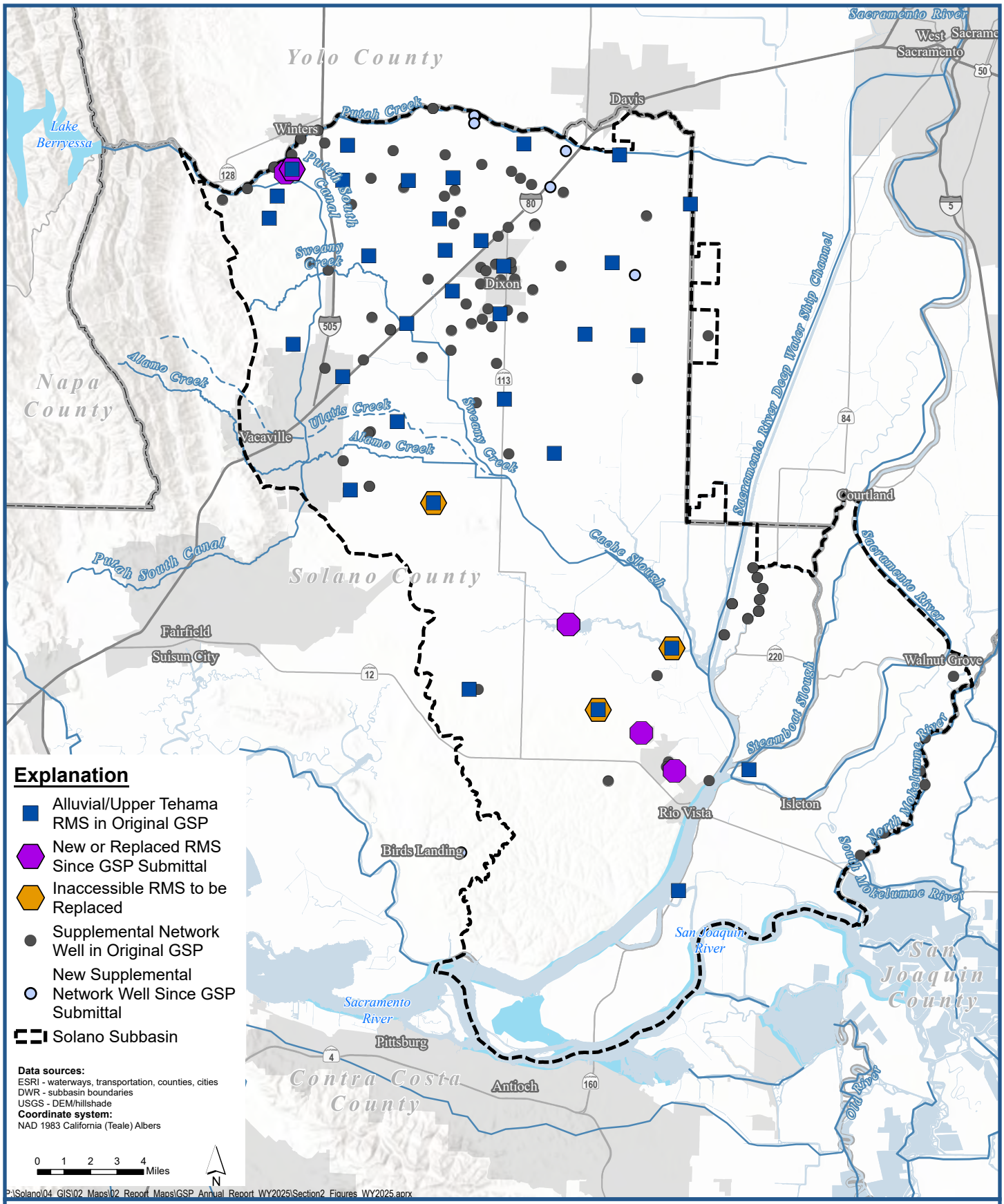


LSCE Team

Wells with Water Level Information since 2015- Unknown

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 2-3



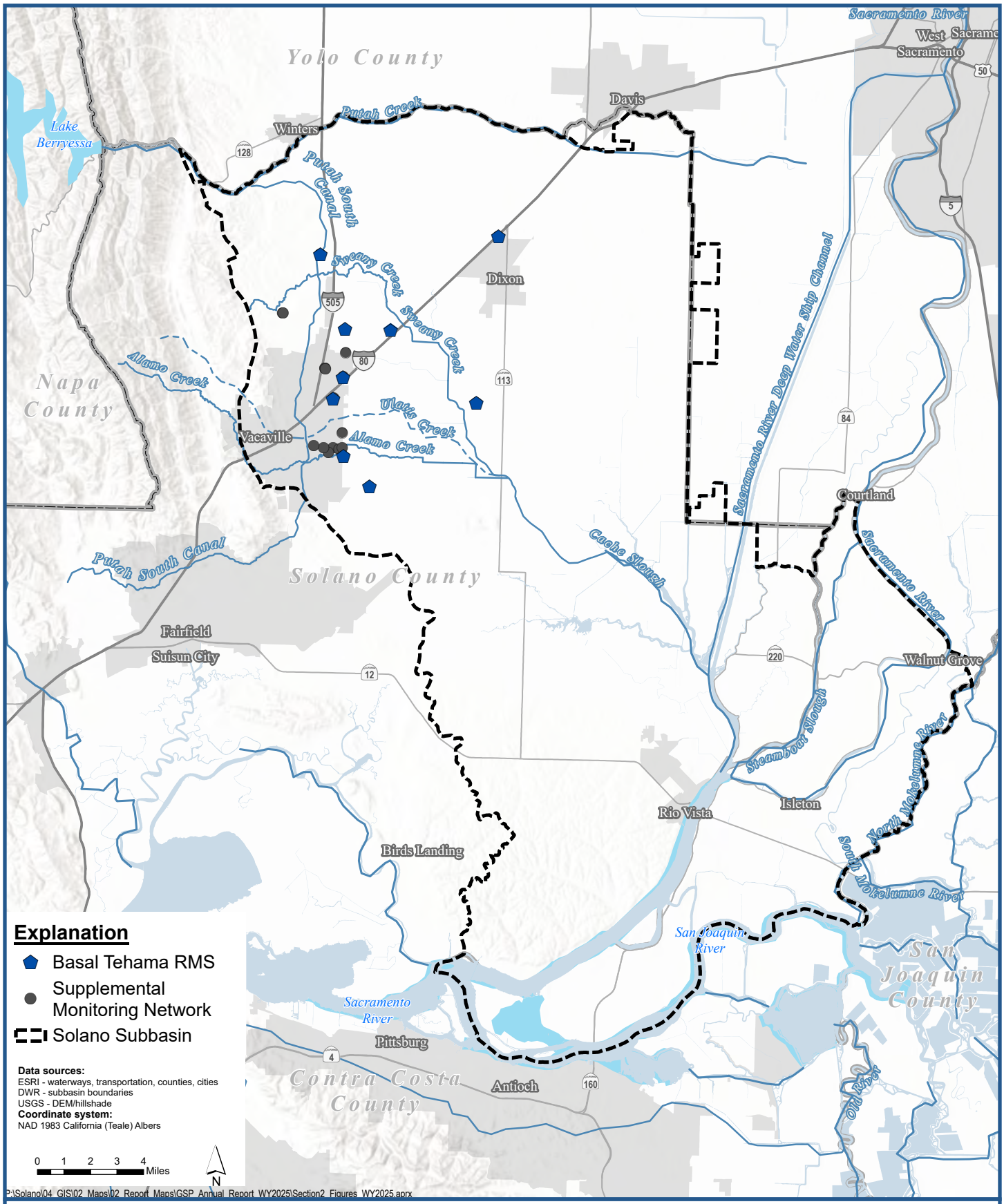
SOLANO SUBBASIN GROUNDWATER SUSTAINABILITY PLAN

LSCE Team

Groundwater Level RMS Location Map-
Alluvial Aquifer and Upper Zone

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 2-4



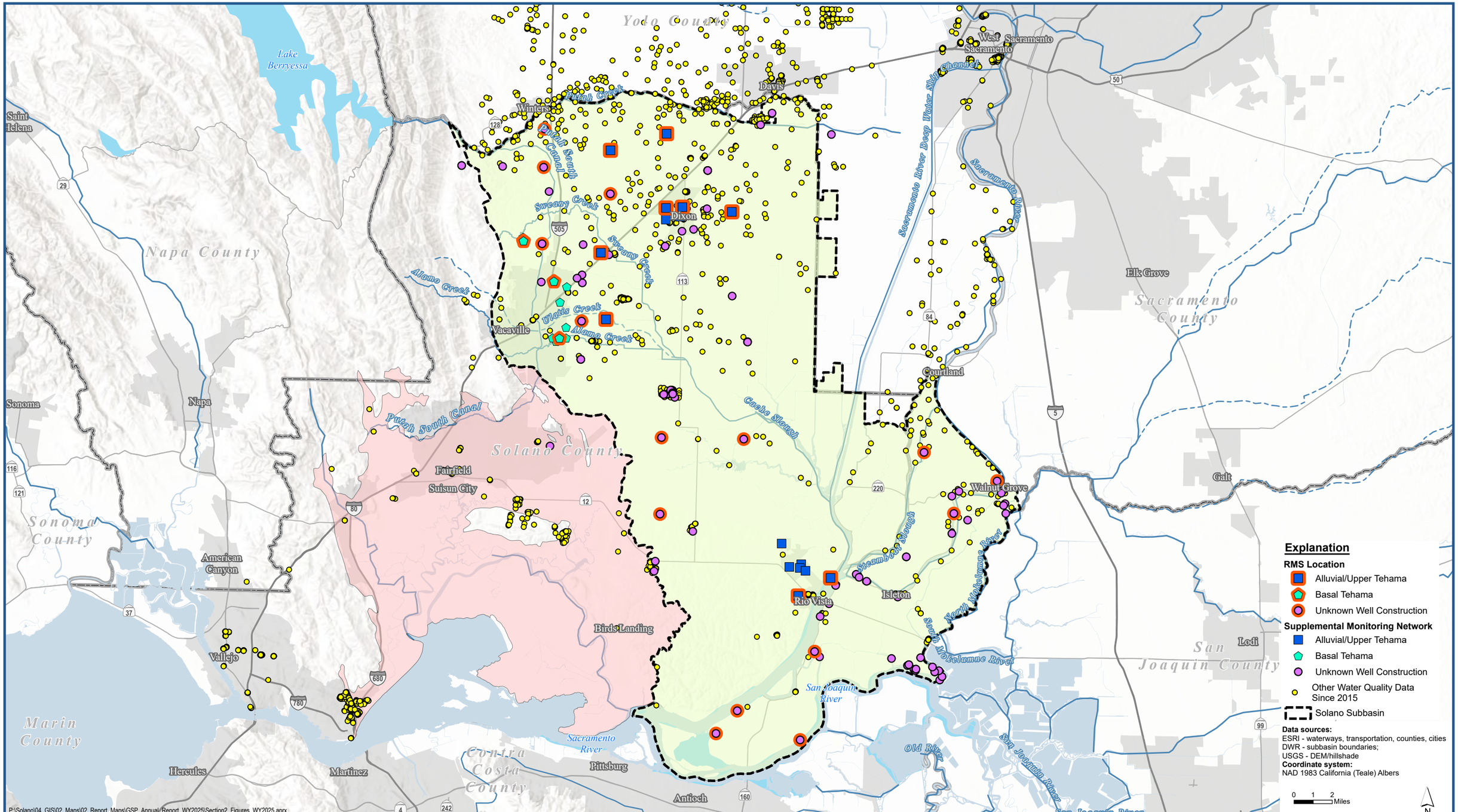
SOLANO SUBBASIN GROUNDWATER SUSTAINABILITY PLAN

LSCE Team

Groundwater Level RMS Location Map-
Basal Tehama

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 2-5

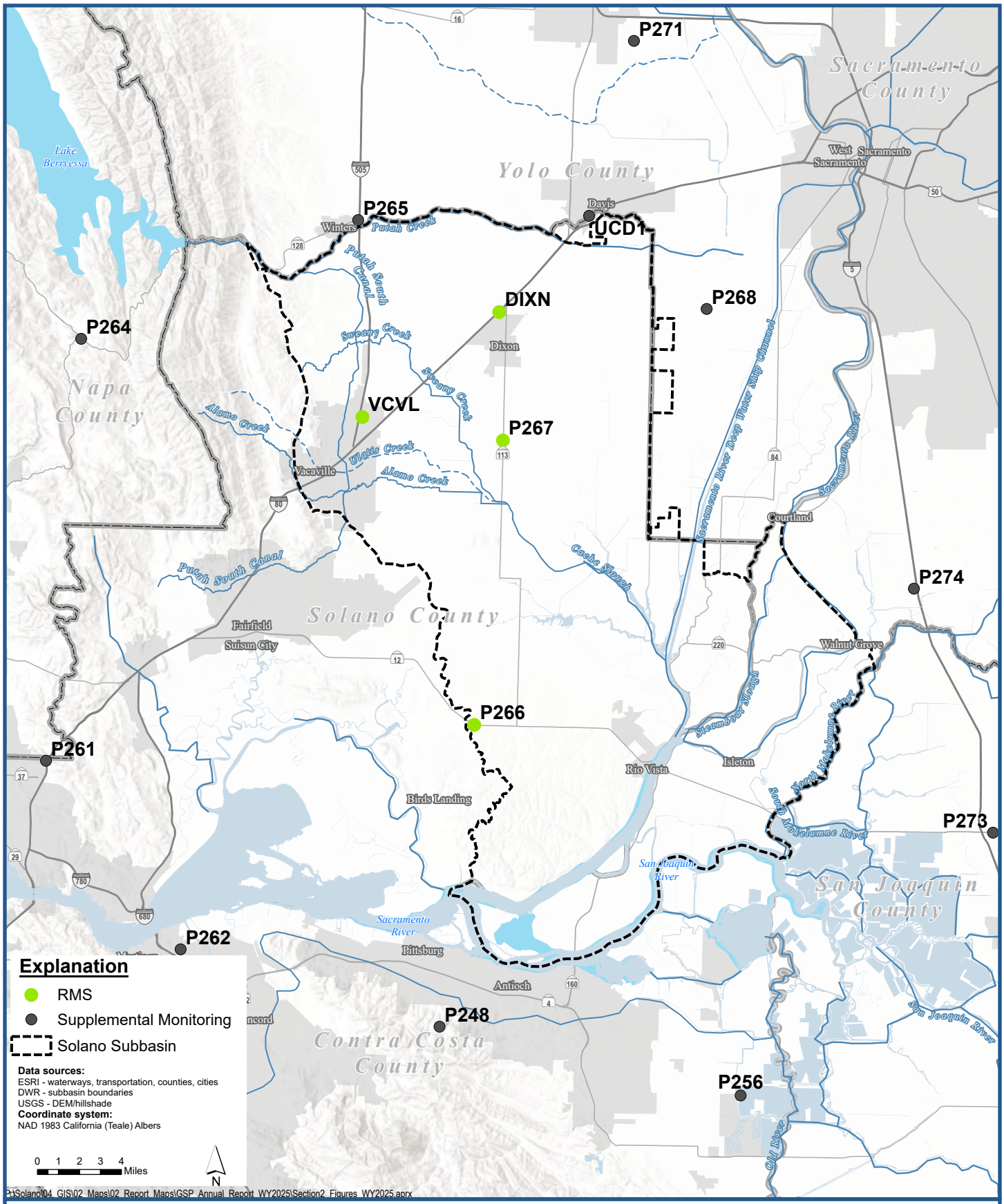


LSCE Team

Groundwater Quality Data since 2015 and RMS Location Map

Solano County and Subbasin
Annual Report - Water Year 2025

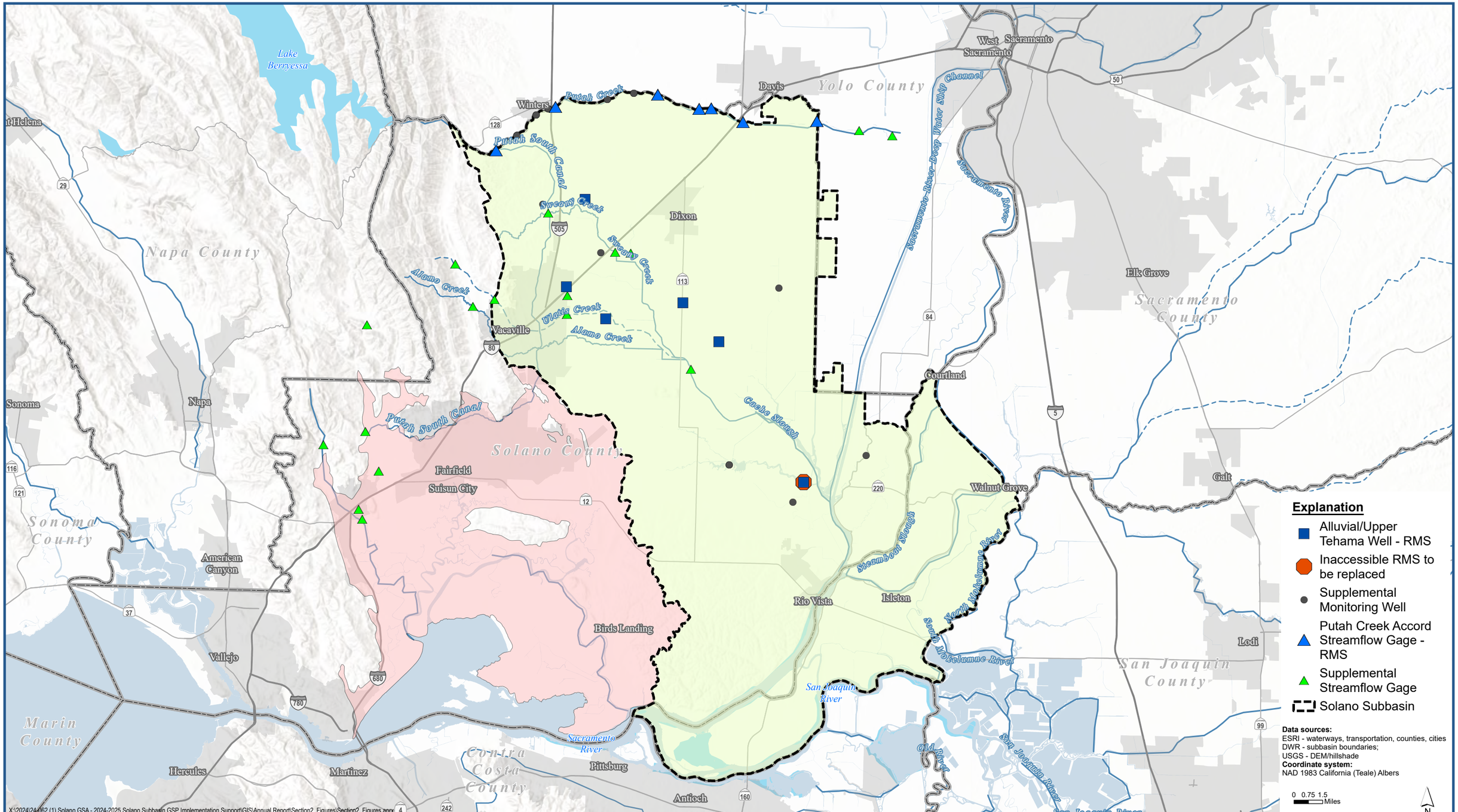
Figure 2-6



Land Subsidence Monitoring Sites

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 2-7



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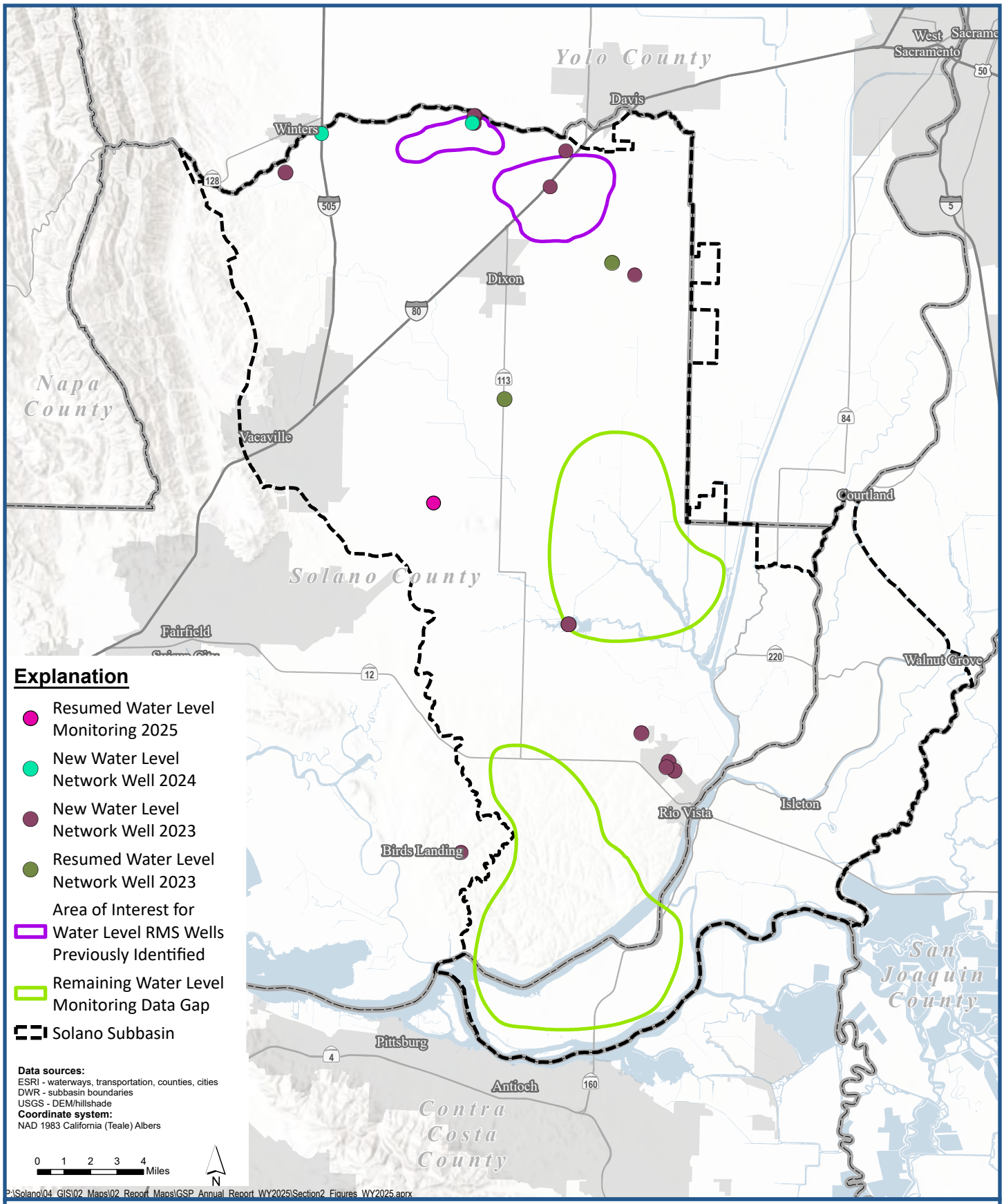
Interconnected Surface Water Monitoring Sites

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 2-8

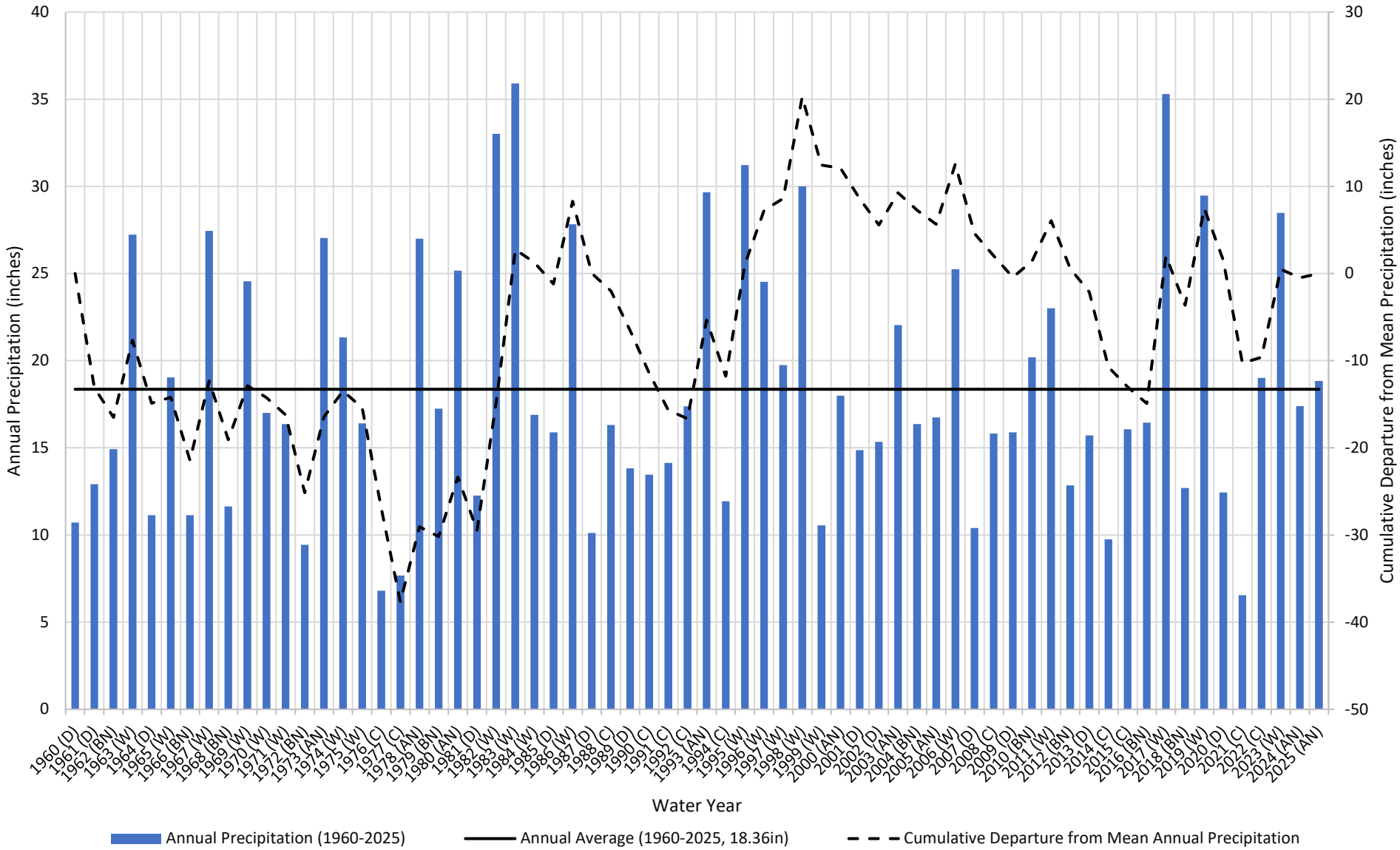


LSCE Team

Solano Subbasin Data Gap Update

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 2-9

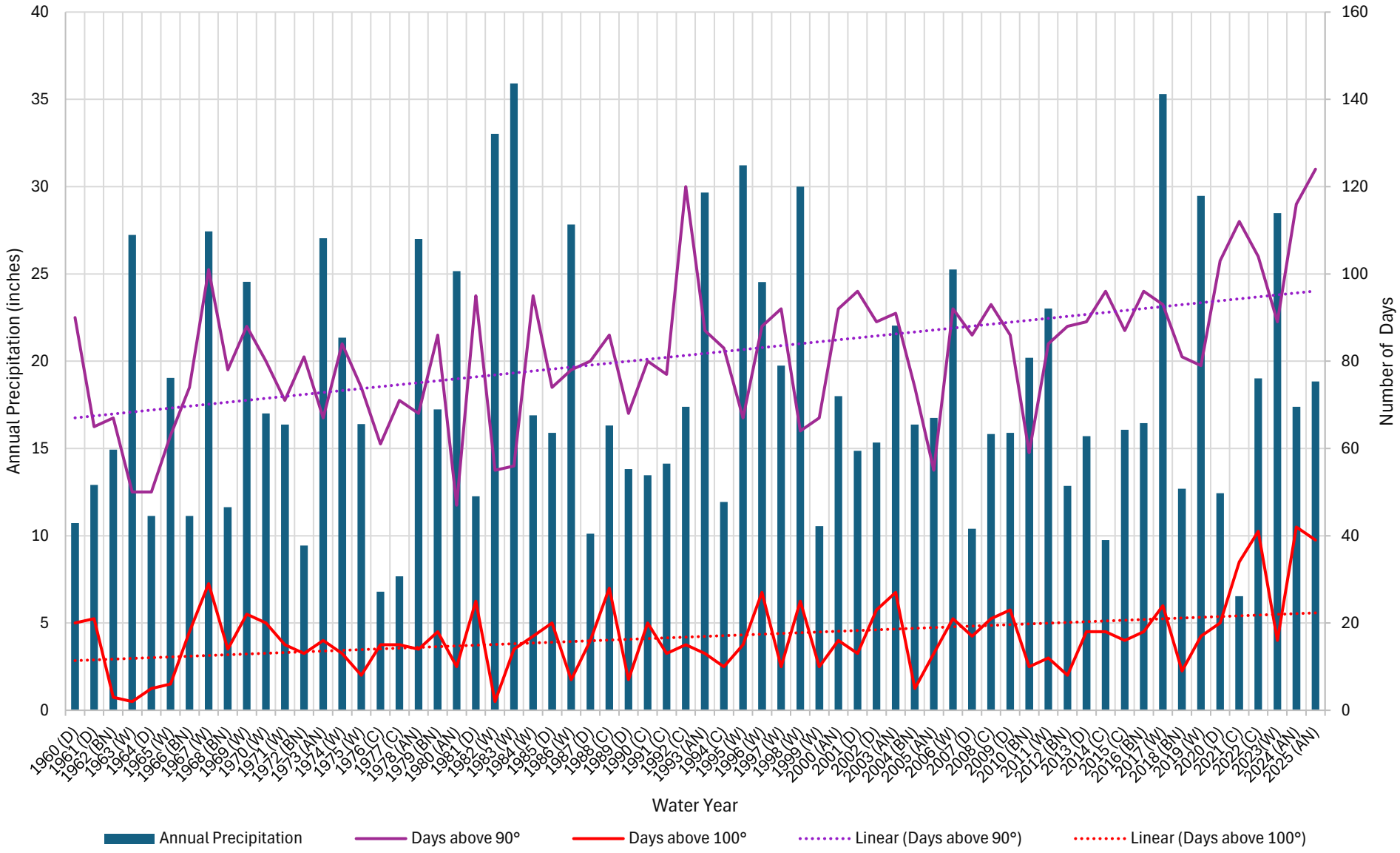


Source- NOAA, Davis 2 WSW Experimental Farm, CA US (USC00042294)

Cumulative Departure from Mean Annual Precipiation at Davis Station (1960-2025)

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-1a

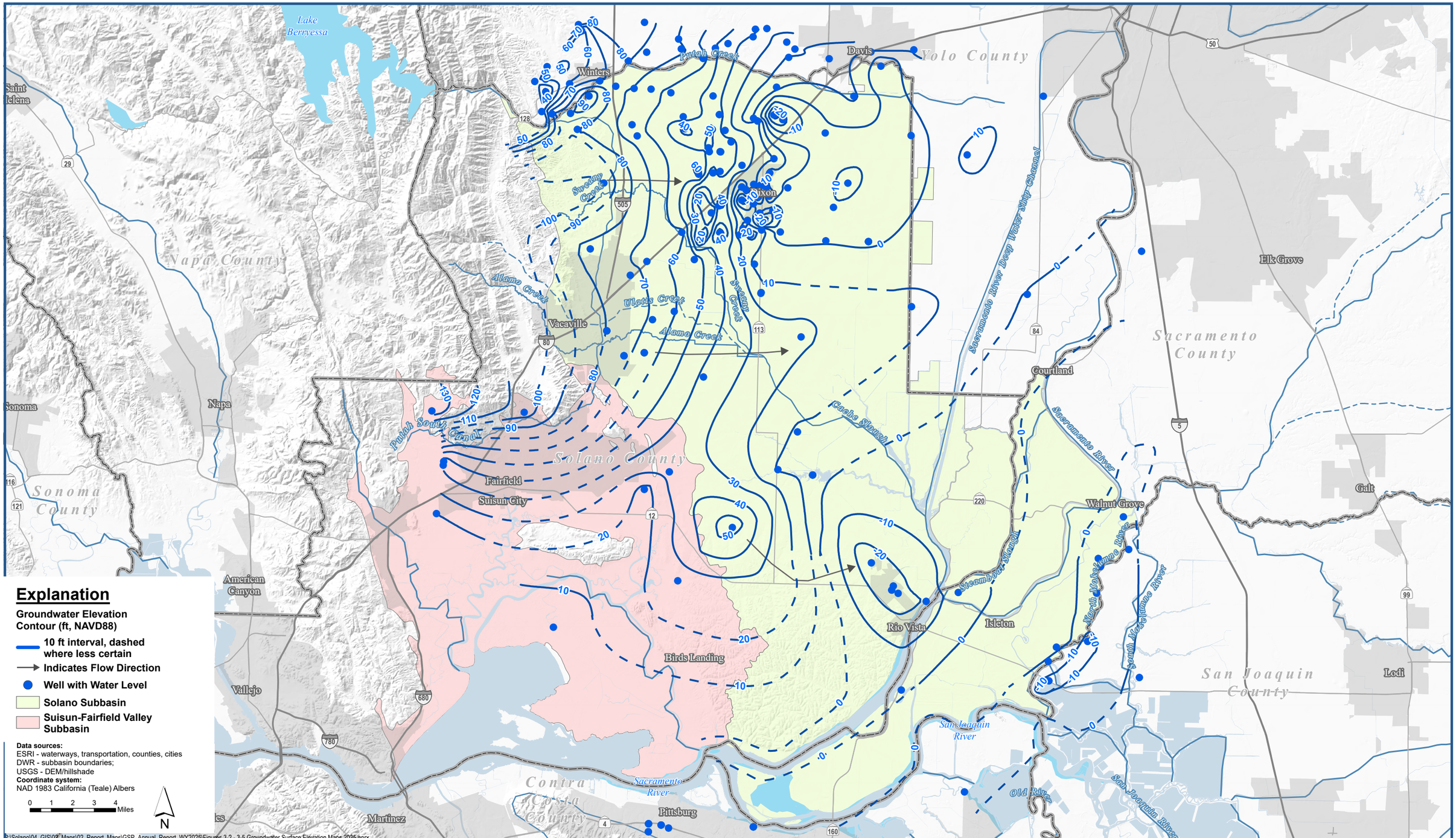


Source- NOAA, Davis 2 WSW Experimental Farm, CA US (USC00042294)

Temperature and Annual Precipiation at Davis Station (1960-2025)

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-1b

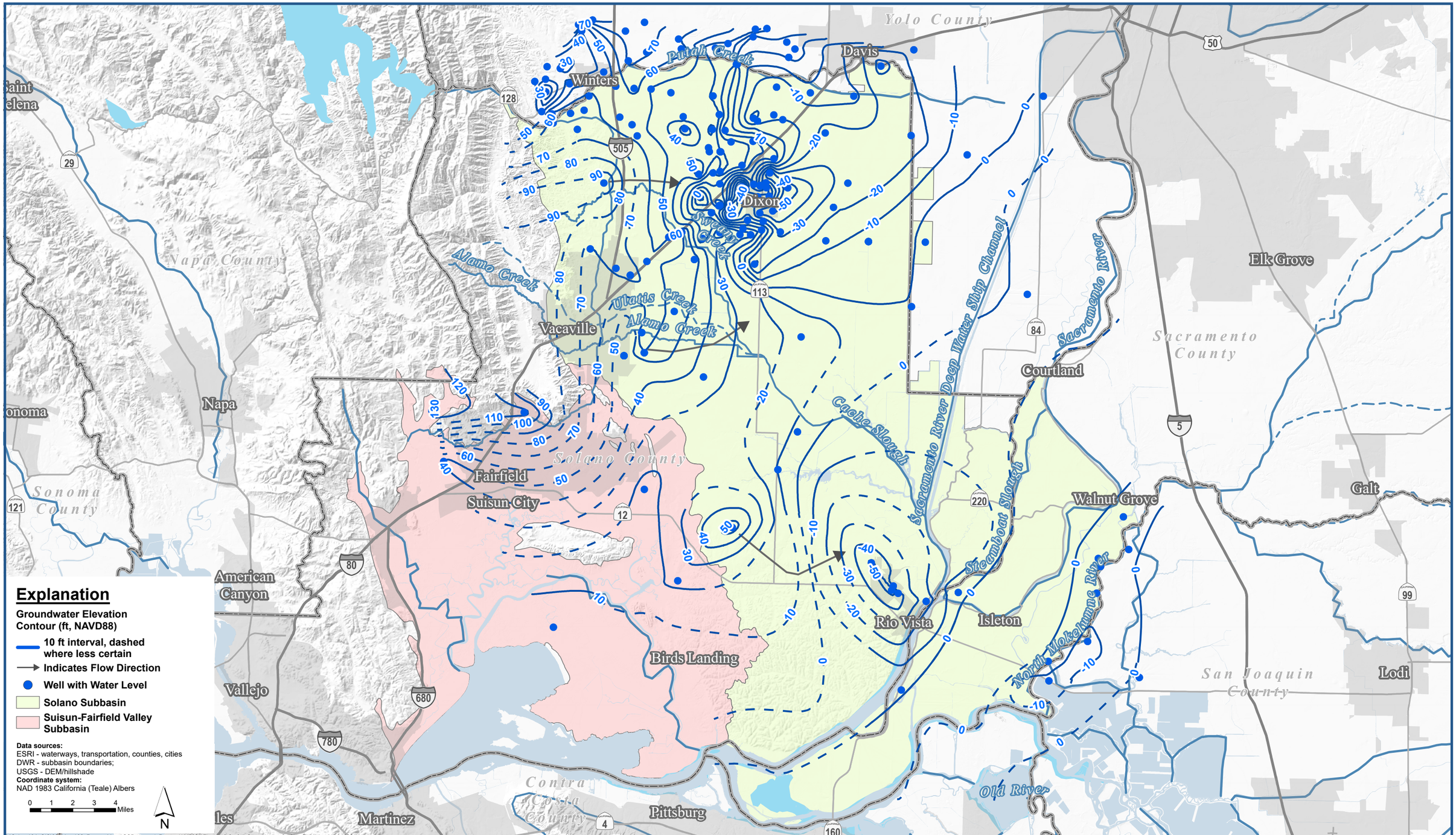


LSCE Team

Groundwater Surface Elevation Map: Spring 2025 - Alluvial Aquifer and Upper Zone

Solano County and Subbasin
Annual Report - Water Year 2025

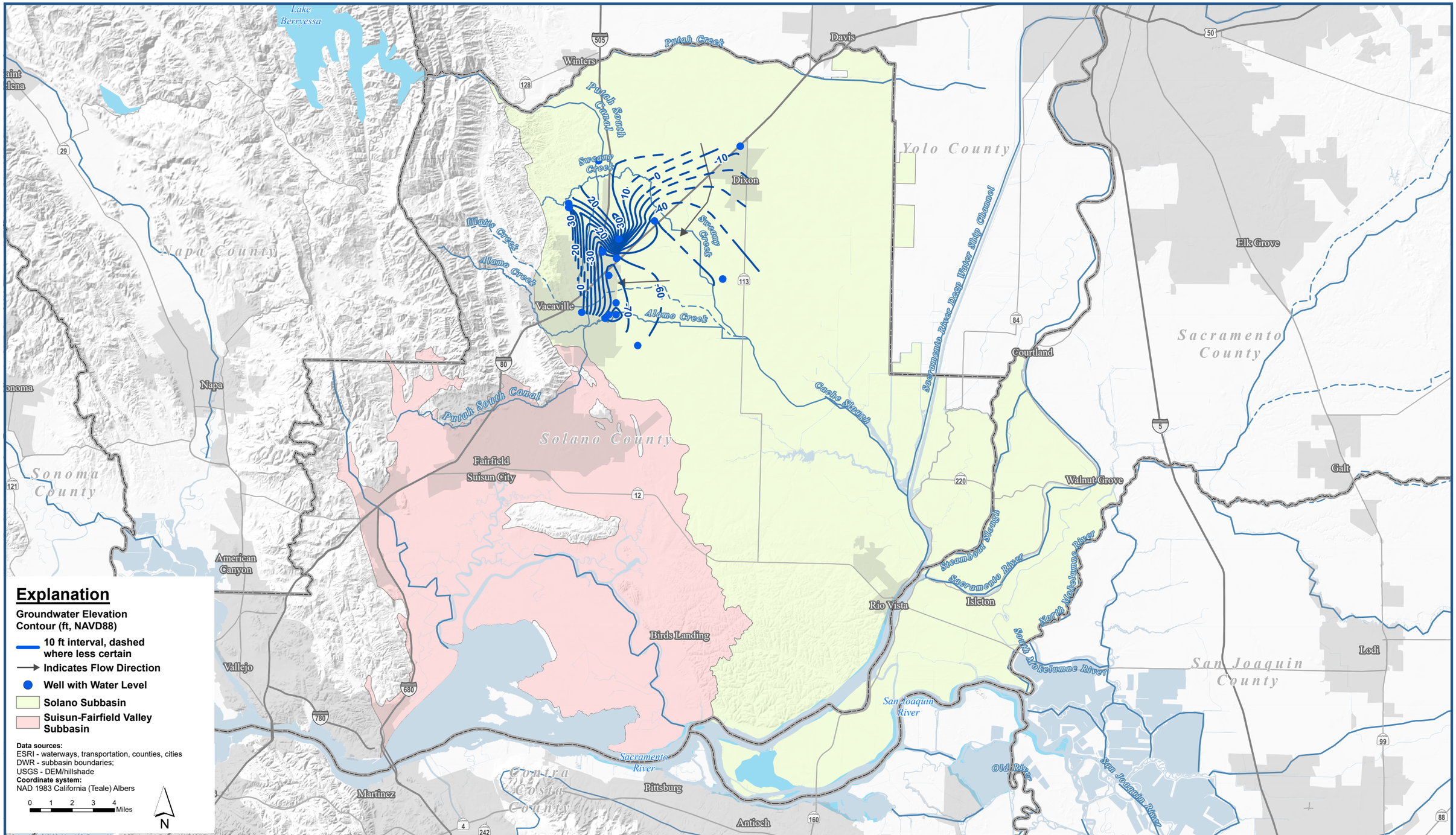
Figure 3-2



Groundwater Surface Elevation Map: Fall 2025 - Alluvial Aquifer and Upper Zone

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-3

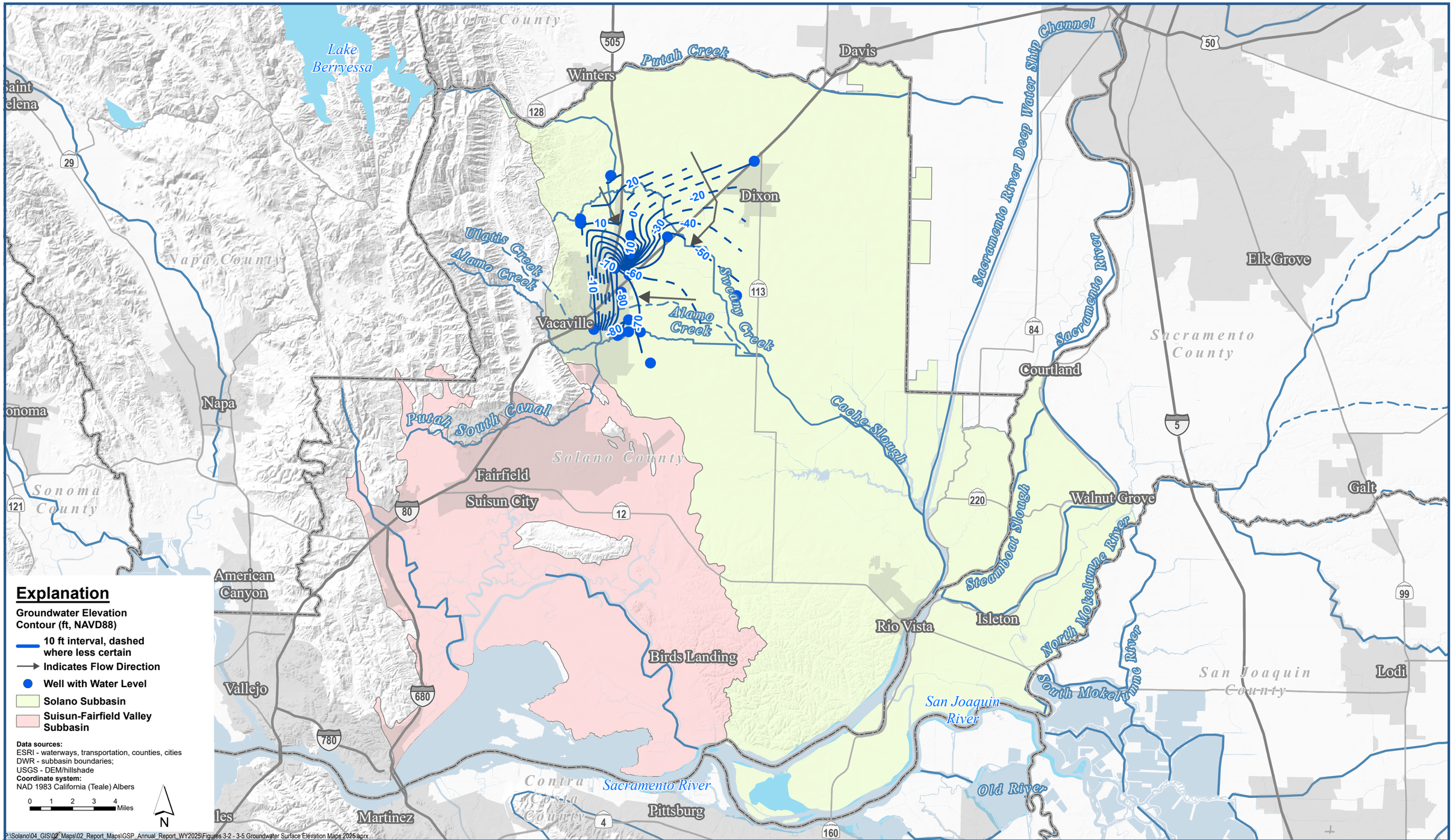


LSCE Team

Groundwater Surface Elevation Map: Spring 2025 - Confined Basal Tehama Zone

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-4

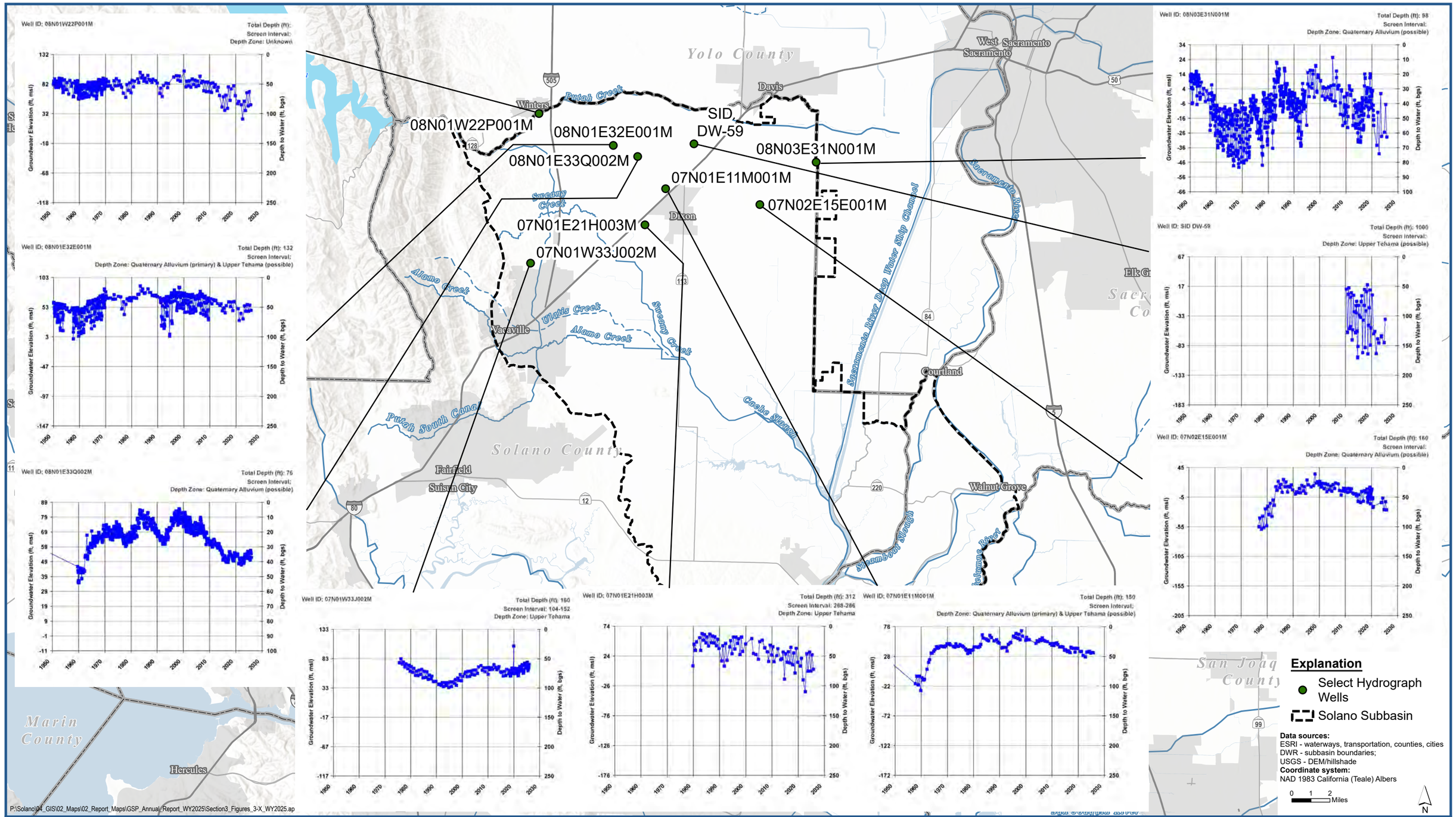


LSCE Team

Groundwater Surface Elevation Map: Fall 2025 - Confined Basal Tehama Zone

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-5

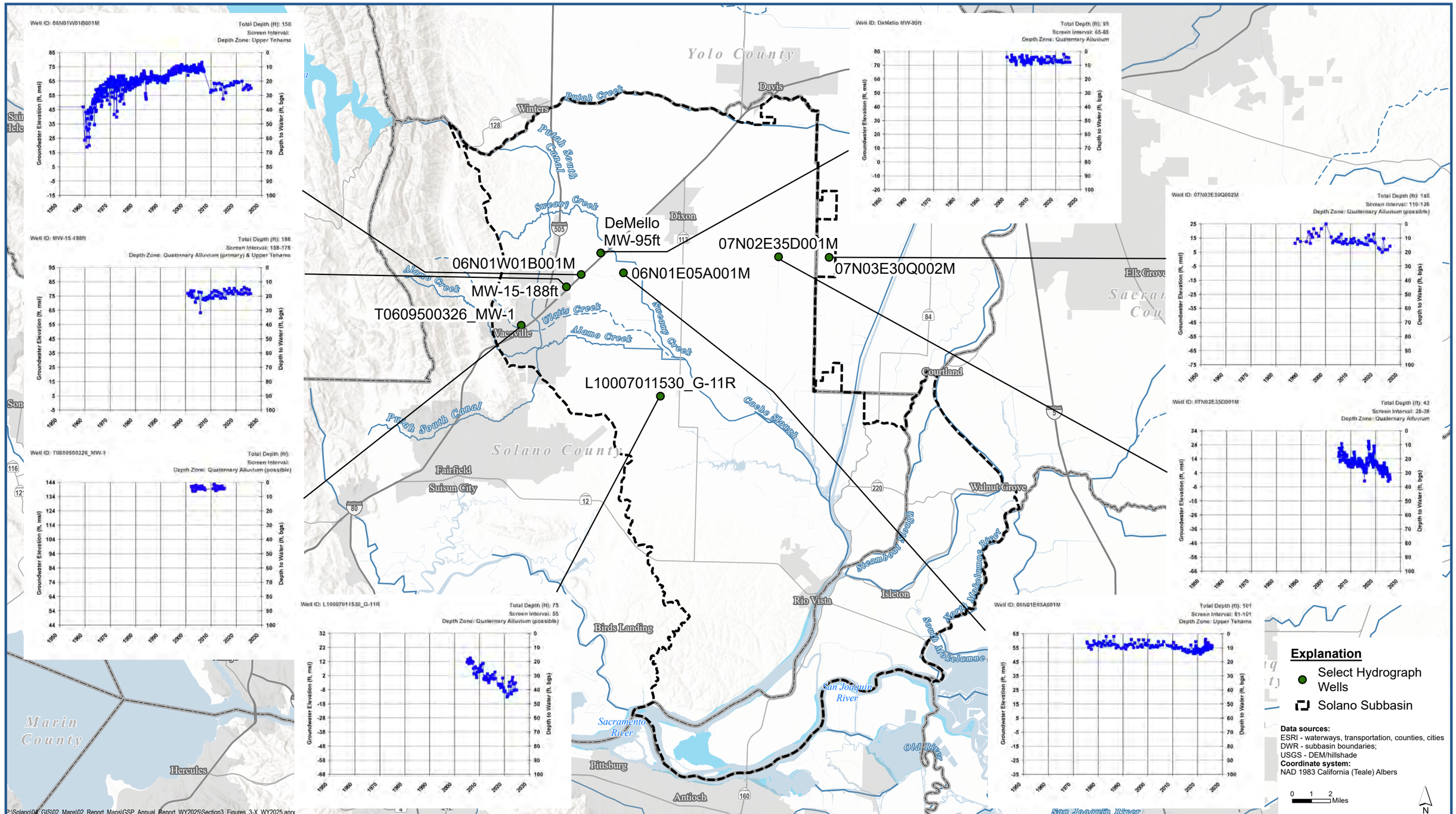


LSCE Team

Select Groundwater Level Hydrographs: Northern Alluvial Aquifer

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-6a

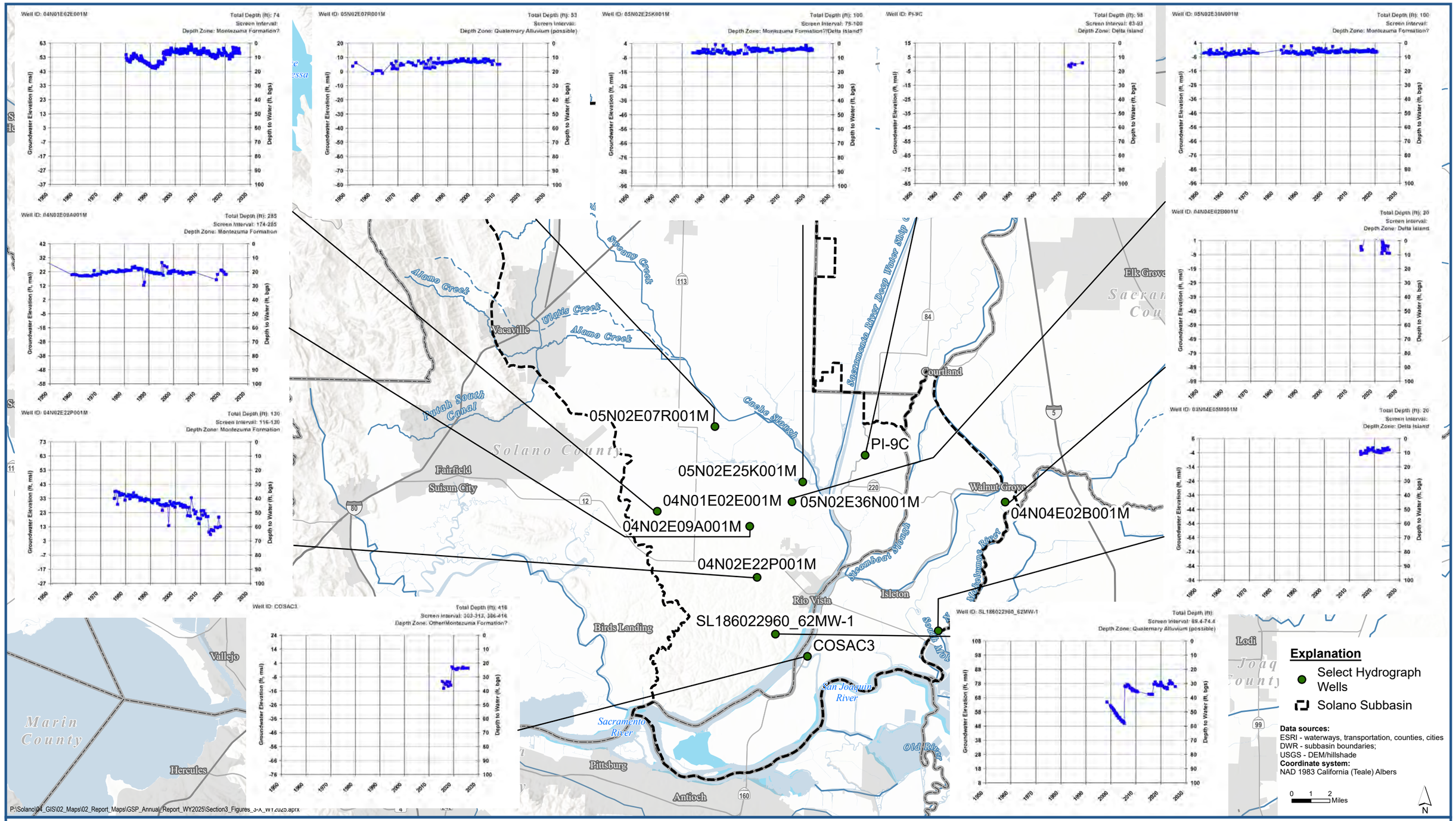


LSCE Team

Select Groundwater Level Hydrographs: Central Alluvial Aquifer

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-6b

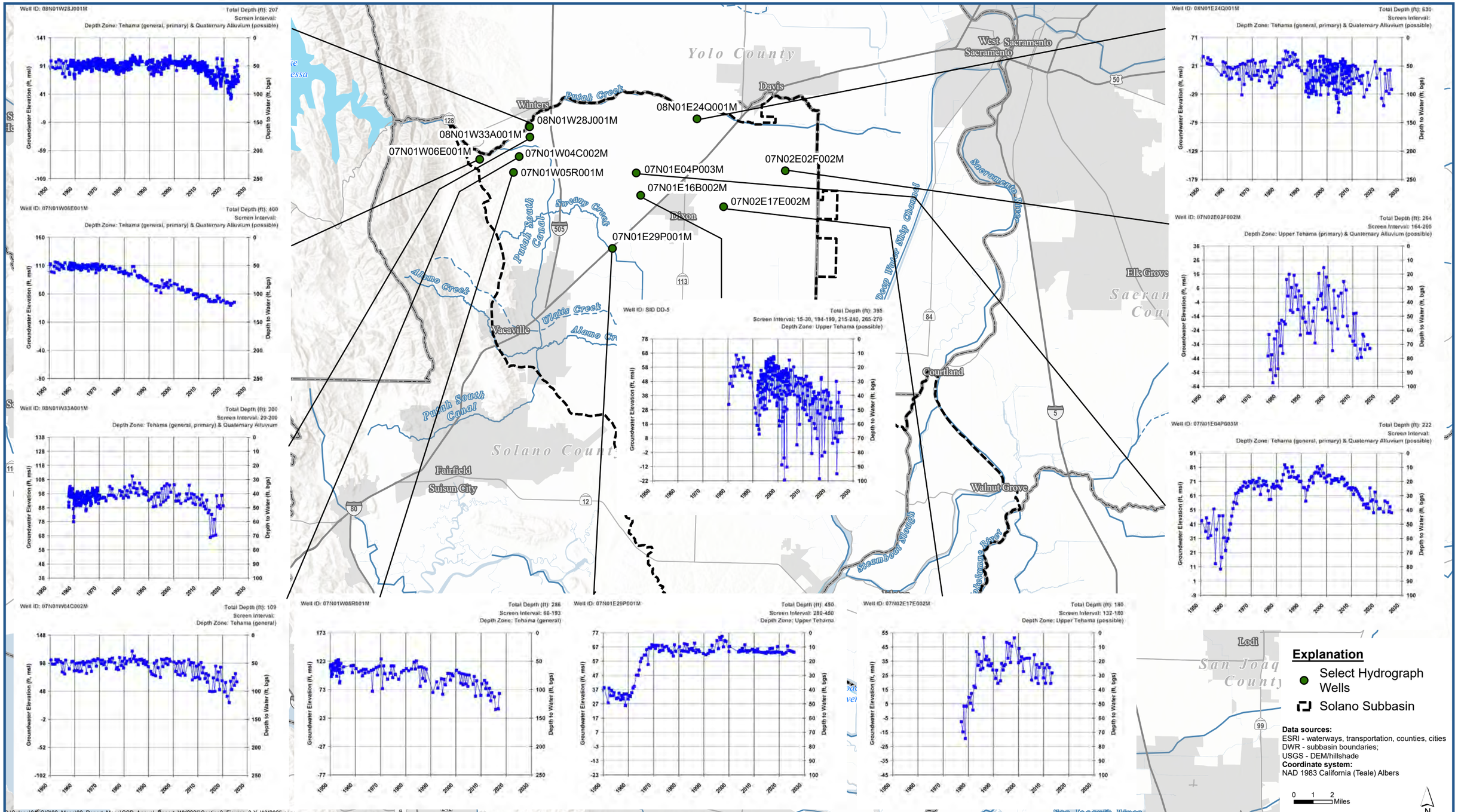


LSCE Team

Select Groundwater Level Hydrographs: Southern Alluvial Aquifer

Figure 3-6c

Solano County and Subbasin
Annual Report - Water Year 2025

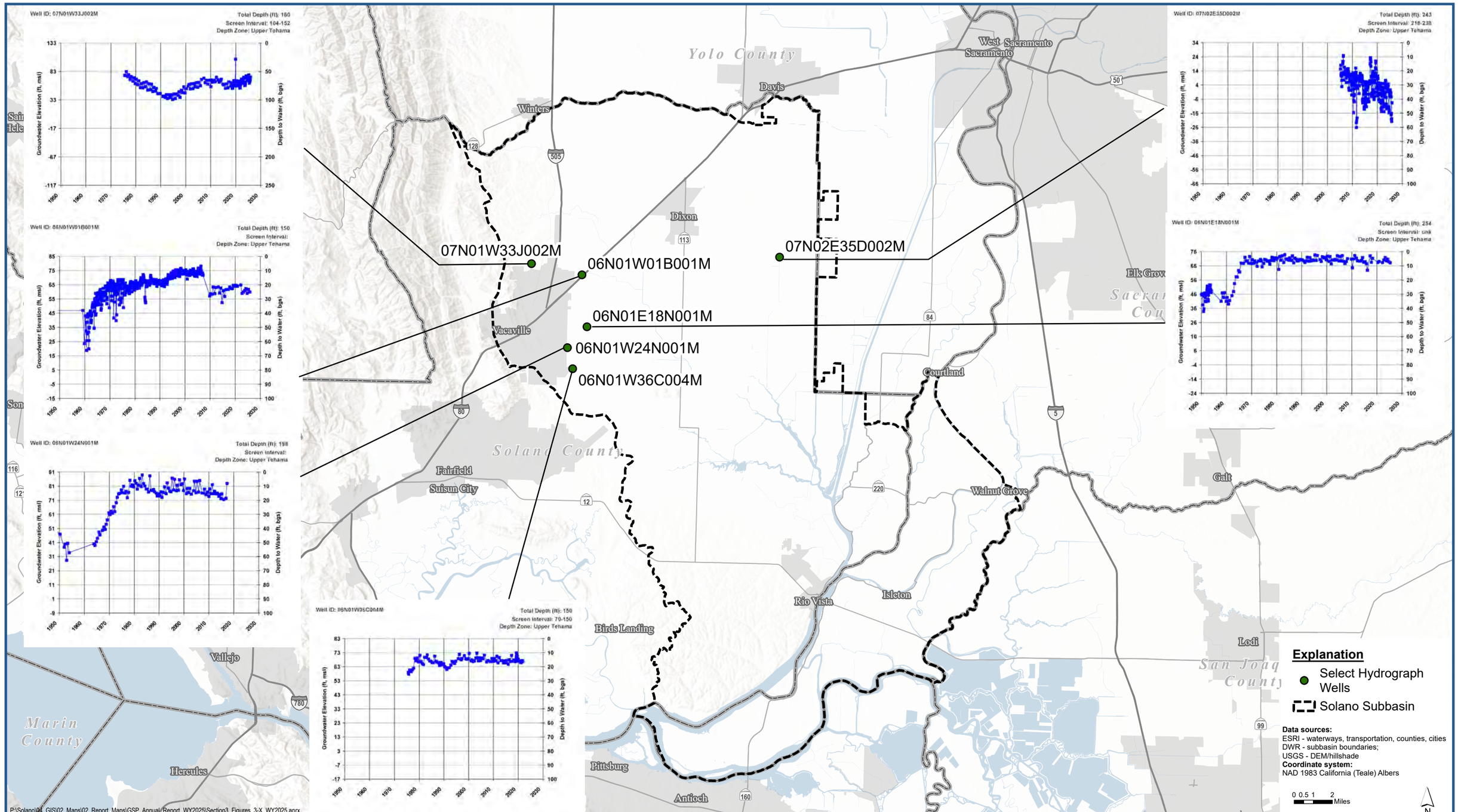


LSCE Team

Select Groundwater Level Hydrographs: Northern Upper and Middle Tehama Zone

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-7a

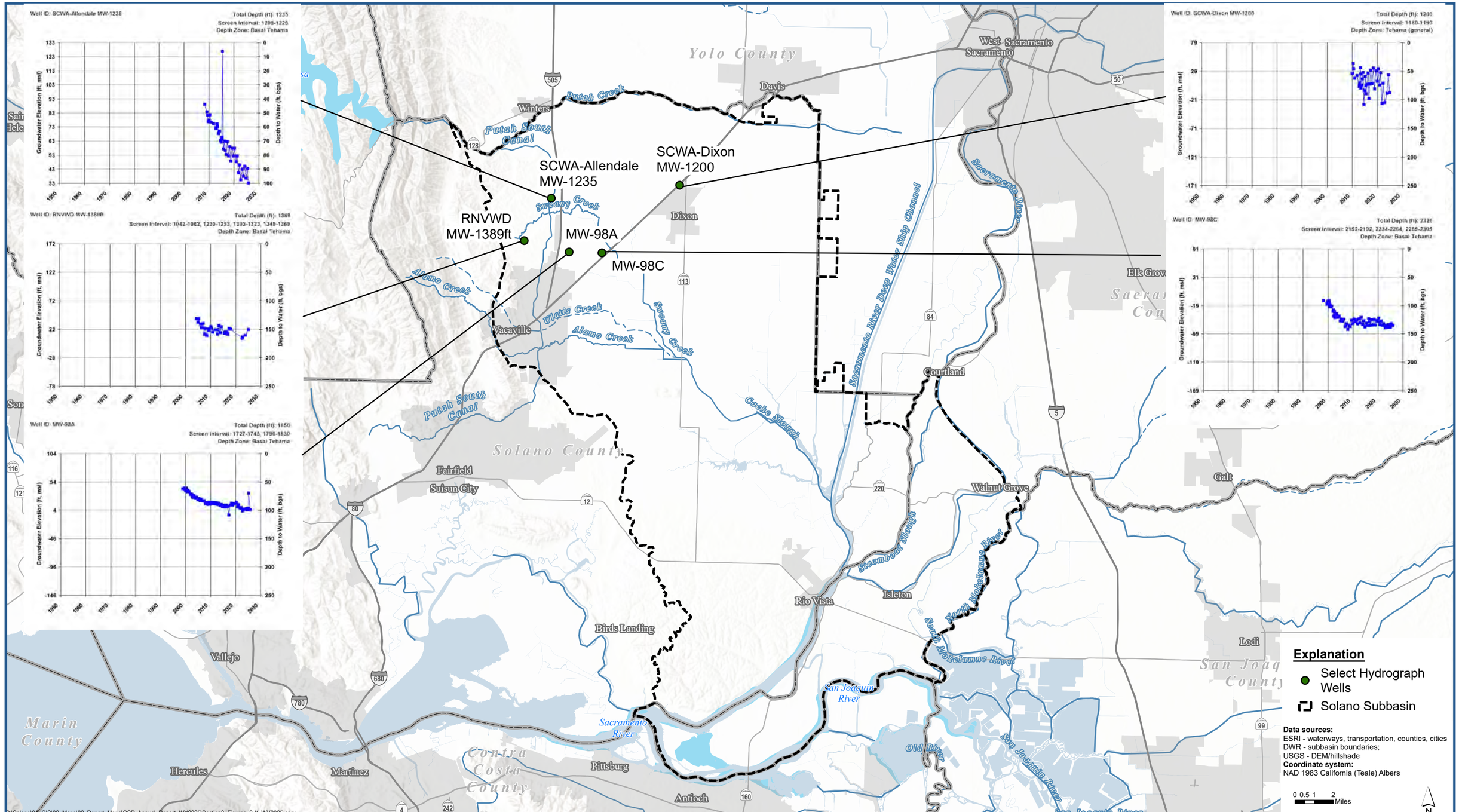


LSCE Team

Select Groundwater Level Hydrographs: Central Upper and Middle Tehama Zone

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-7b

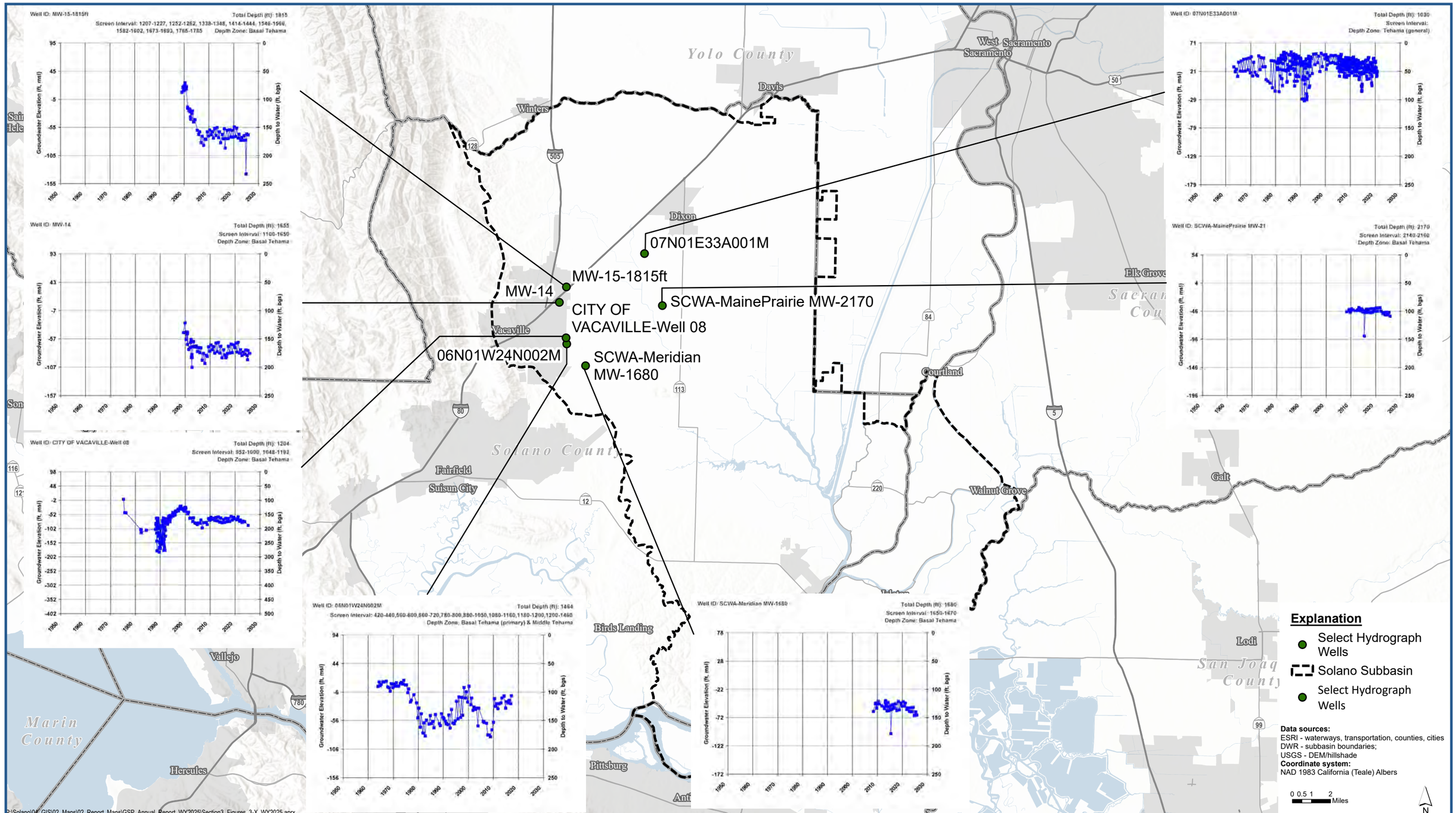


LSCE Team

Select Groundwater Level Hydrographs: Northern Basal Tehama

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-8a

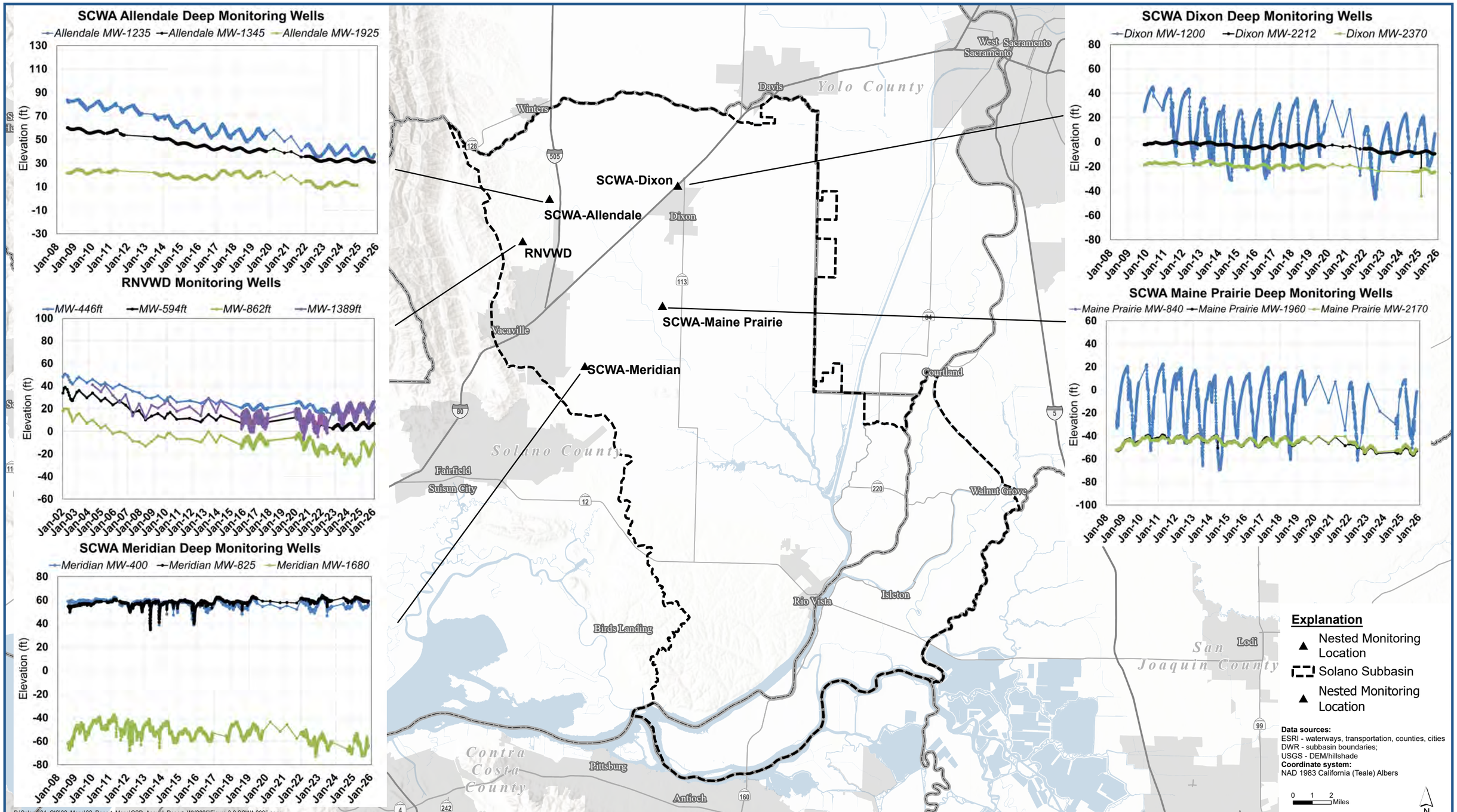


LSCE Team

Select Groundwater Level Hydrographs: Central Basal Tehama

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-8b

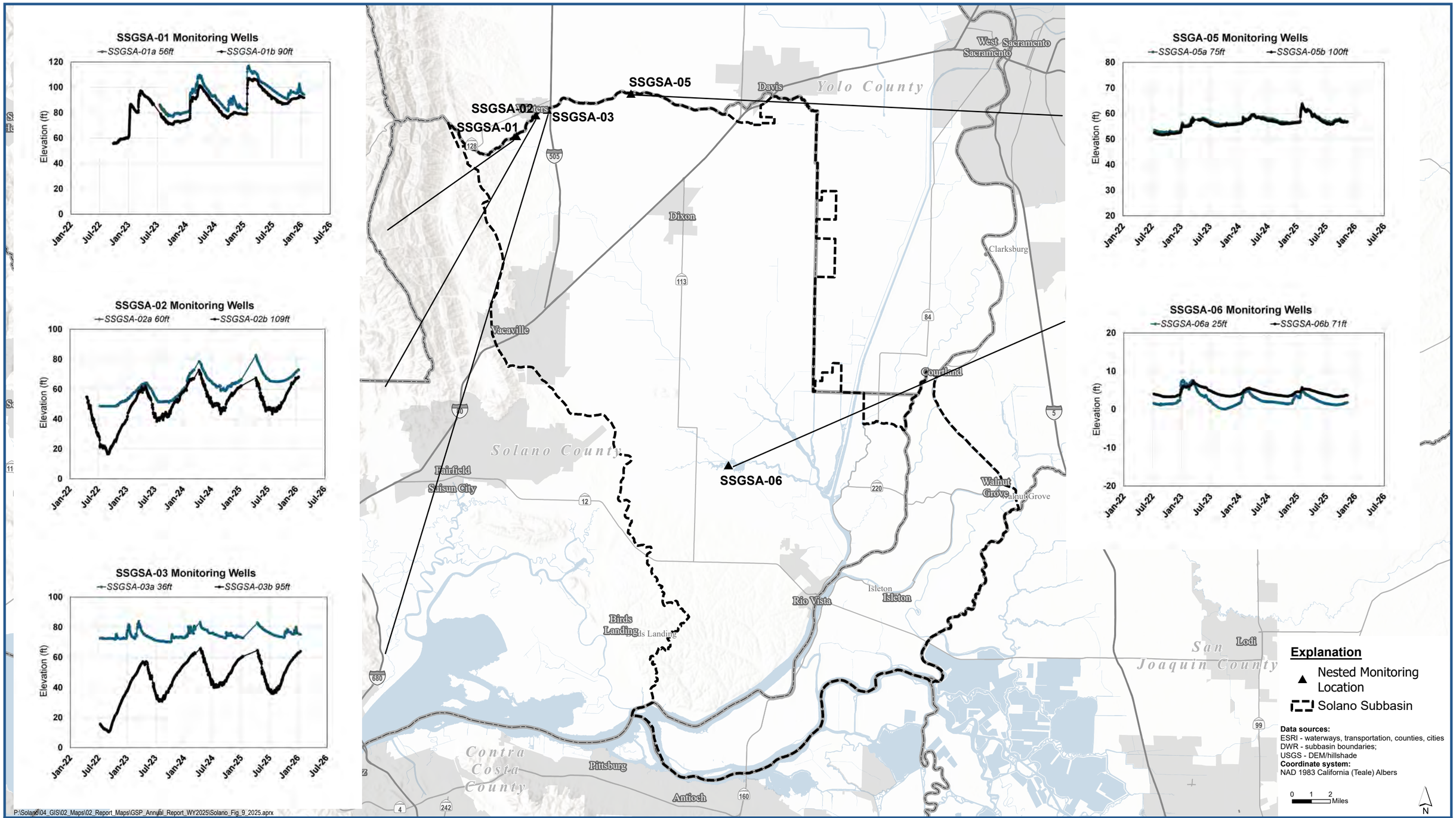


LSCE Team

Groundwater Level Hydrographs SCWA Nested Wells

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-9a

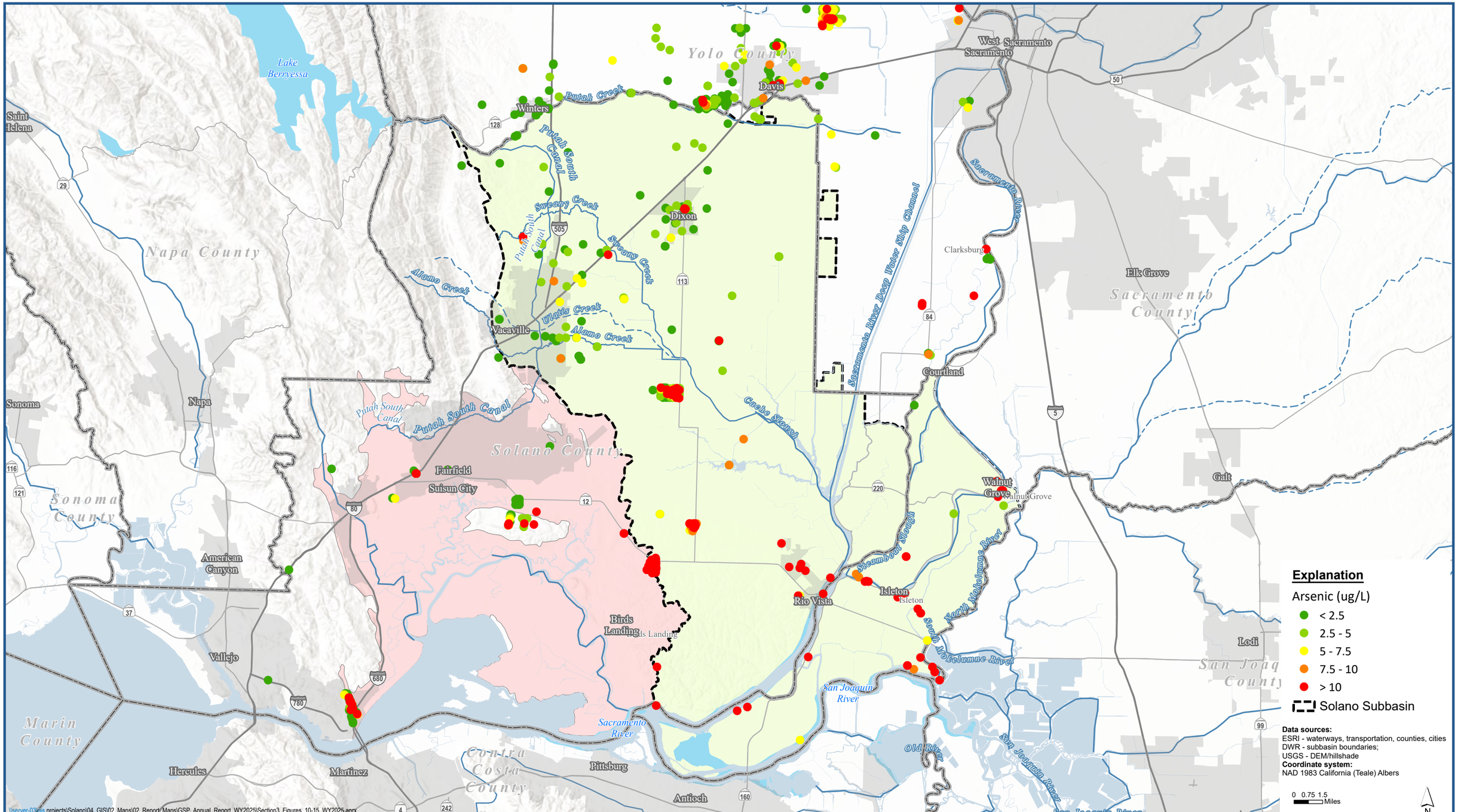


LSCE Team

Groundwater Level Hydrographs SSGSA Nested Wells

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-9b

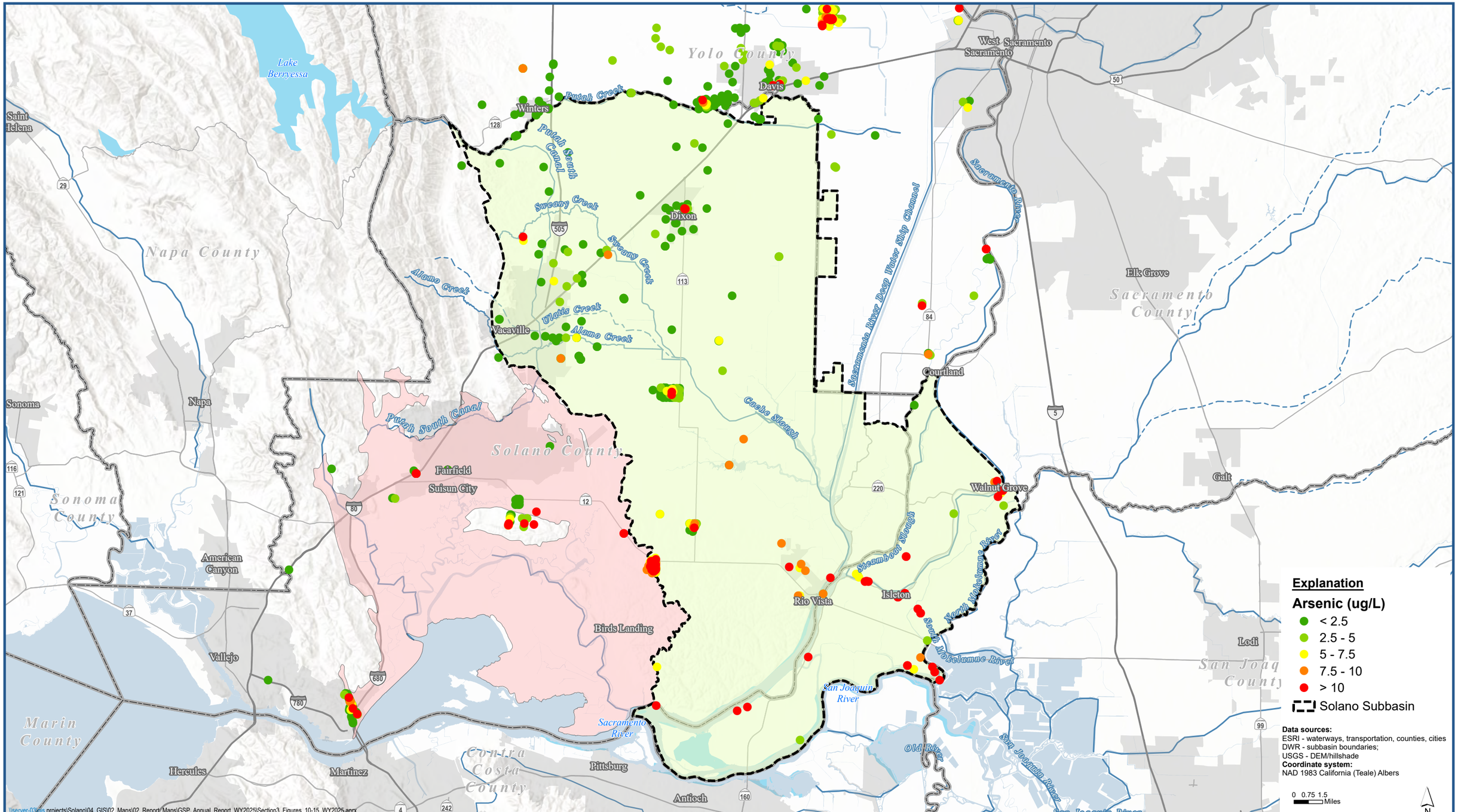


LSCE Team

Maximum Arsenic Concentration Since 2015

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-10a

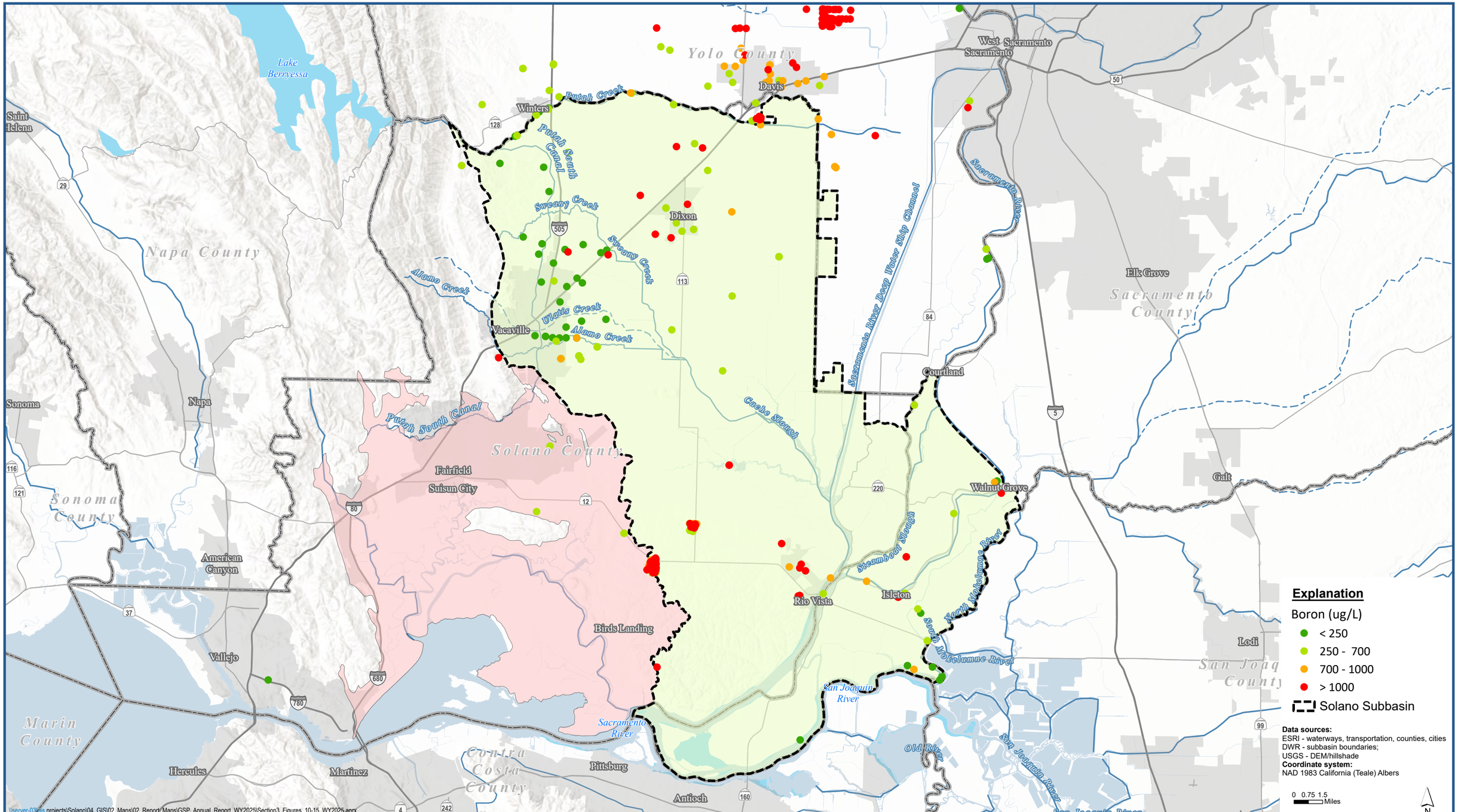


LSCE Team

Average Arsenic Concentration Since 2015

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-10b

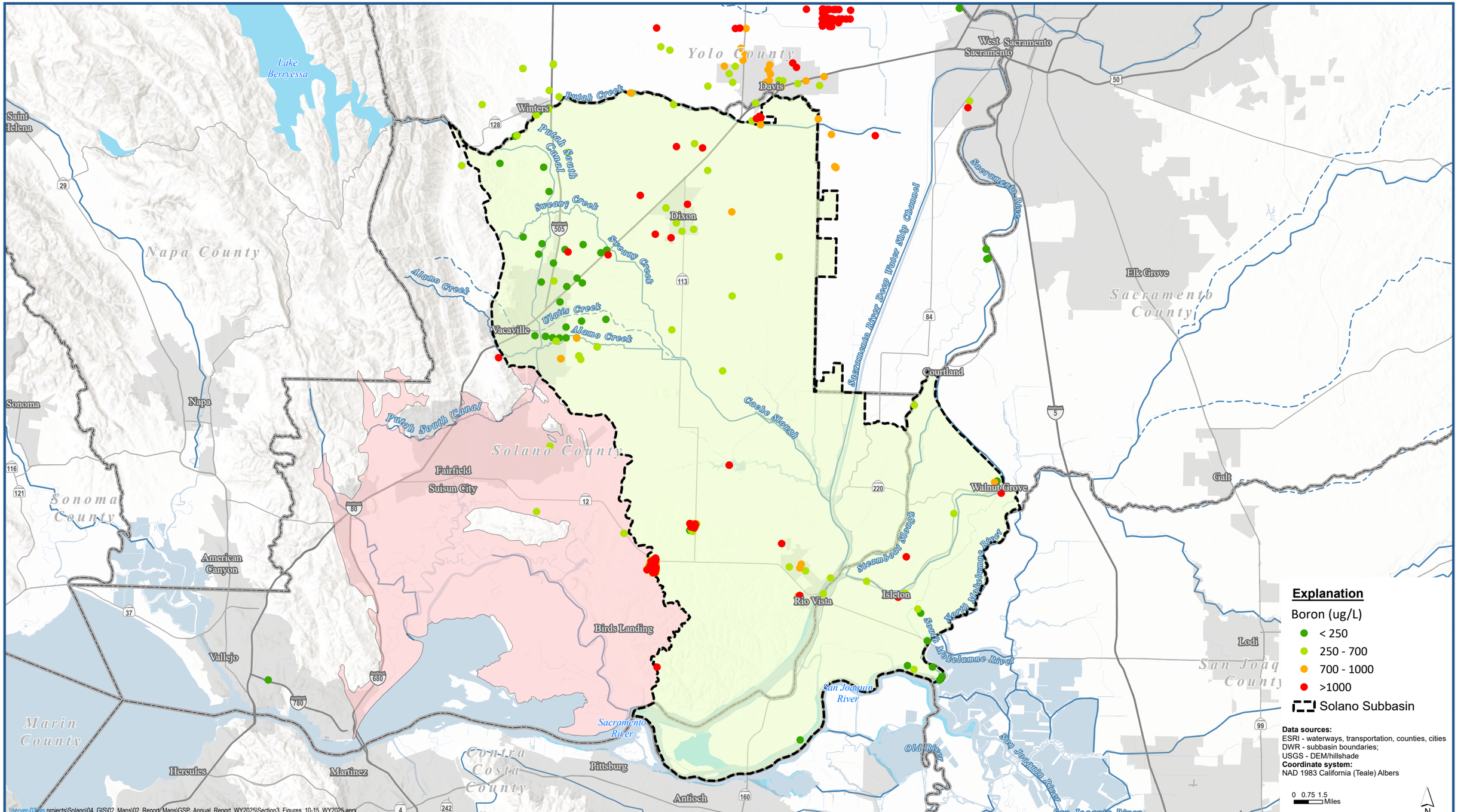


LSCE Team

Maximum Boron Concentration Since 2015

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-11a

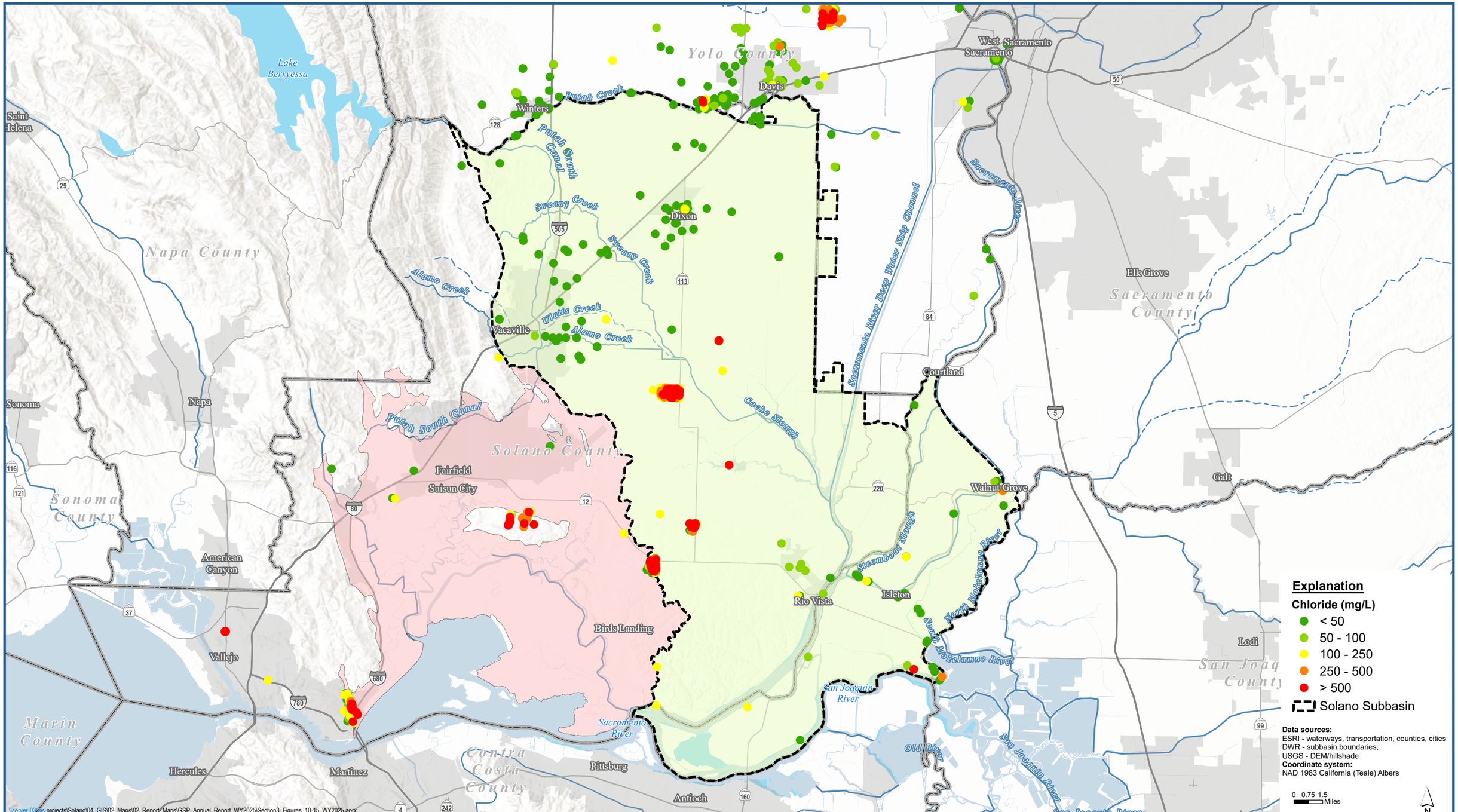


LSCE Team

Average Boron Concentration Since 2015

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-11b

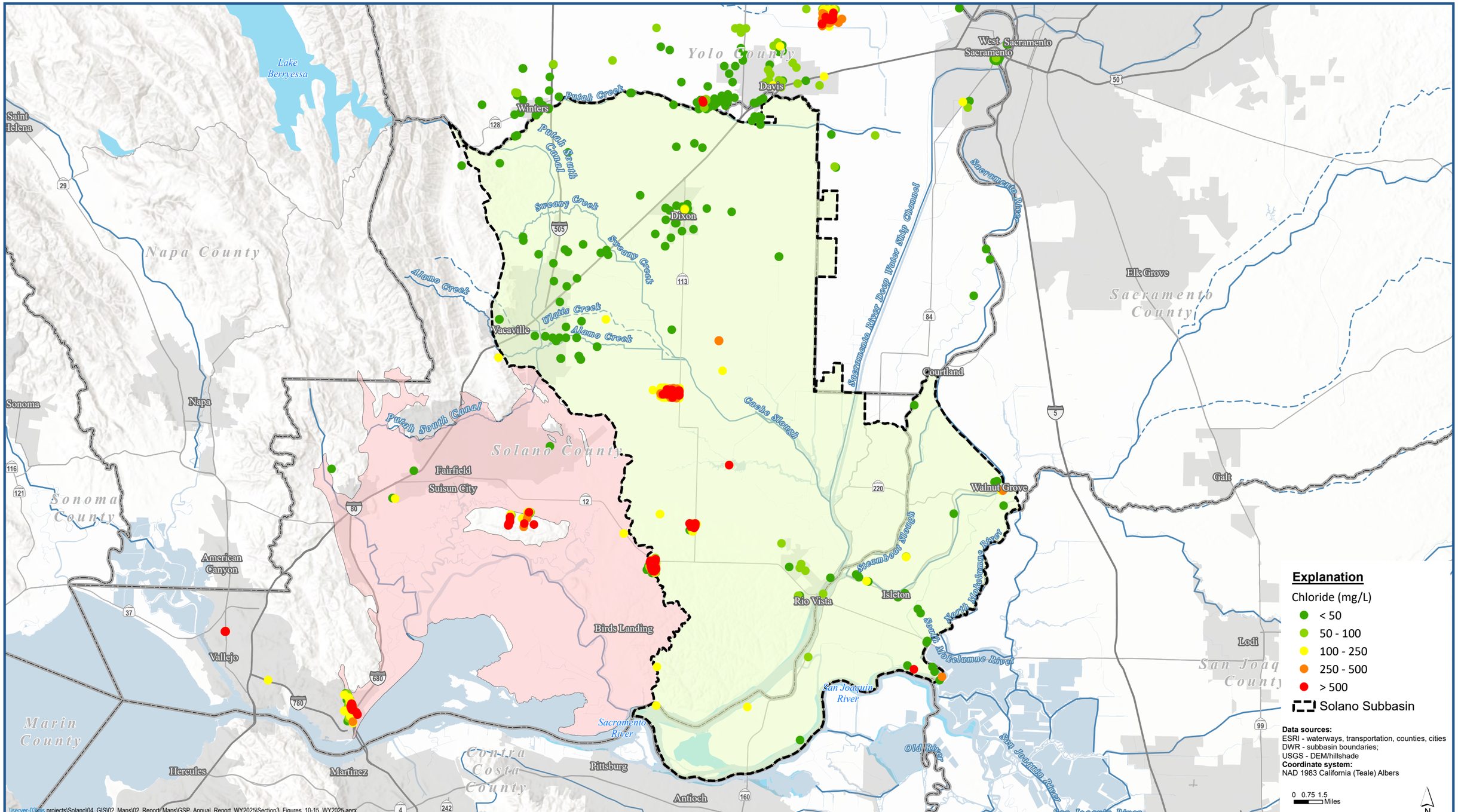


LSCE Team

Maximum Chloride Concentration Since 2015

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-12a



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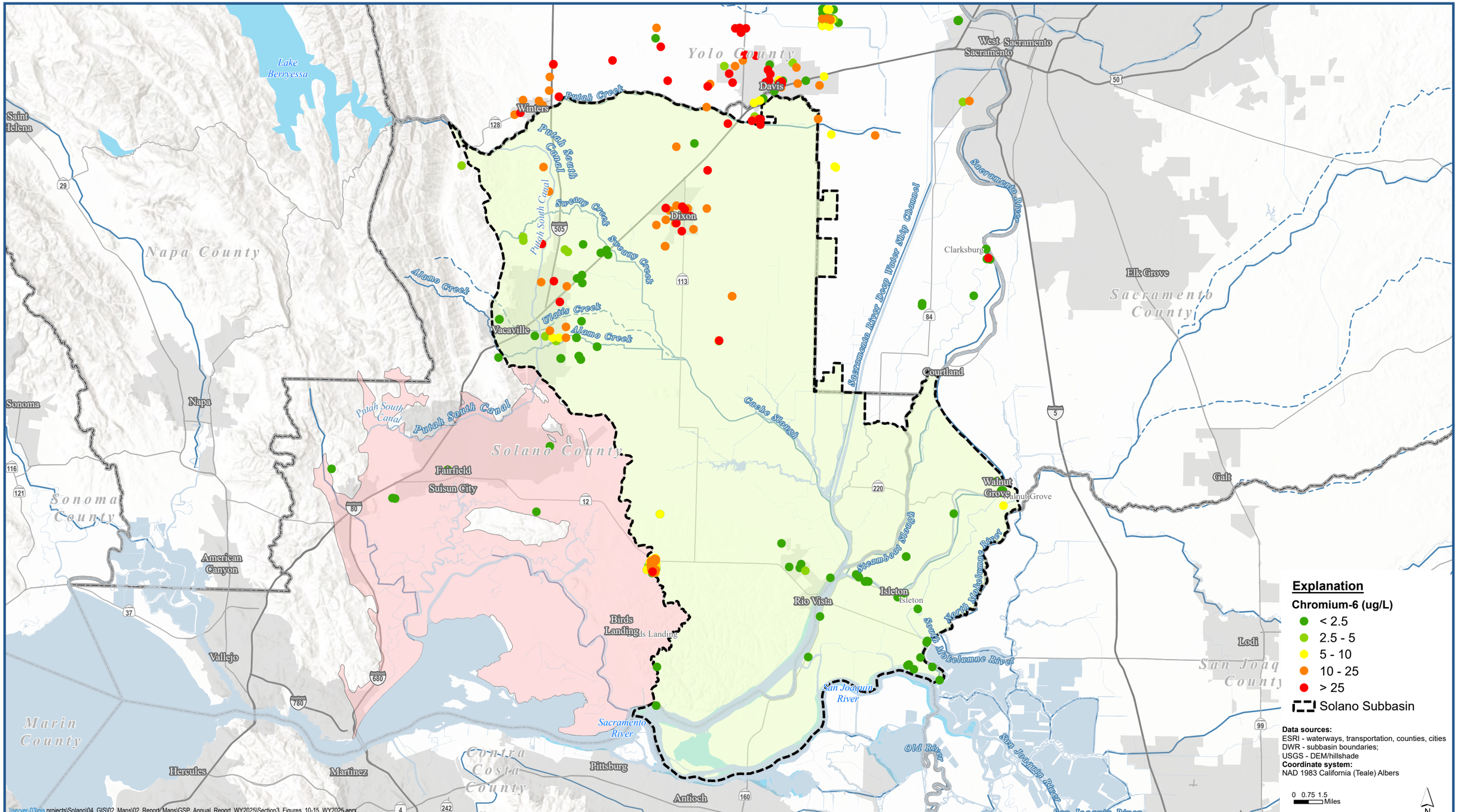
Average Chloride Concentration Since 2015

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-12b



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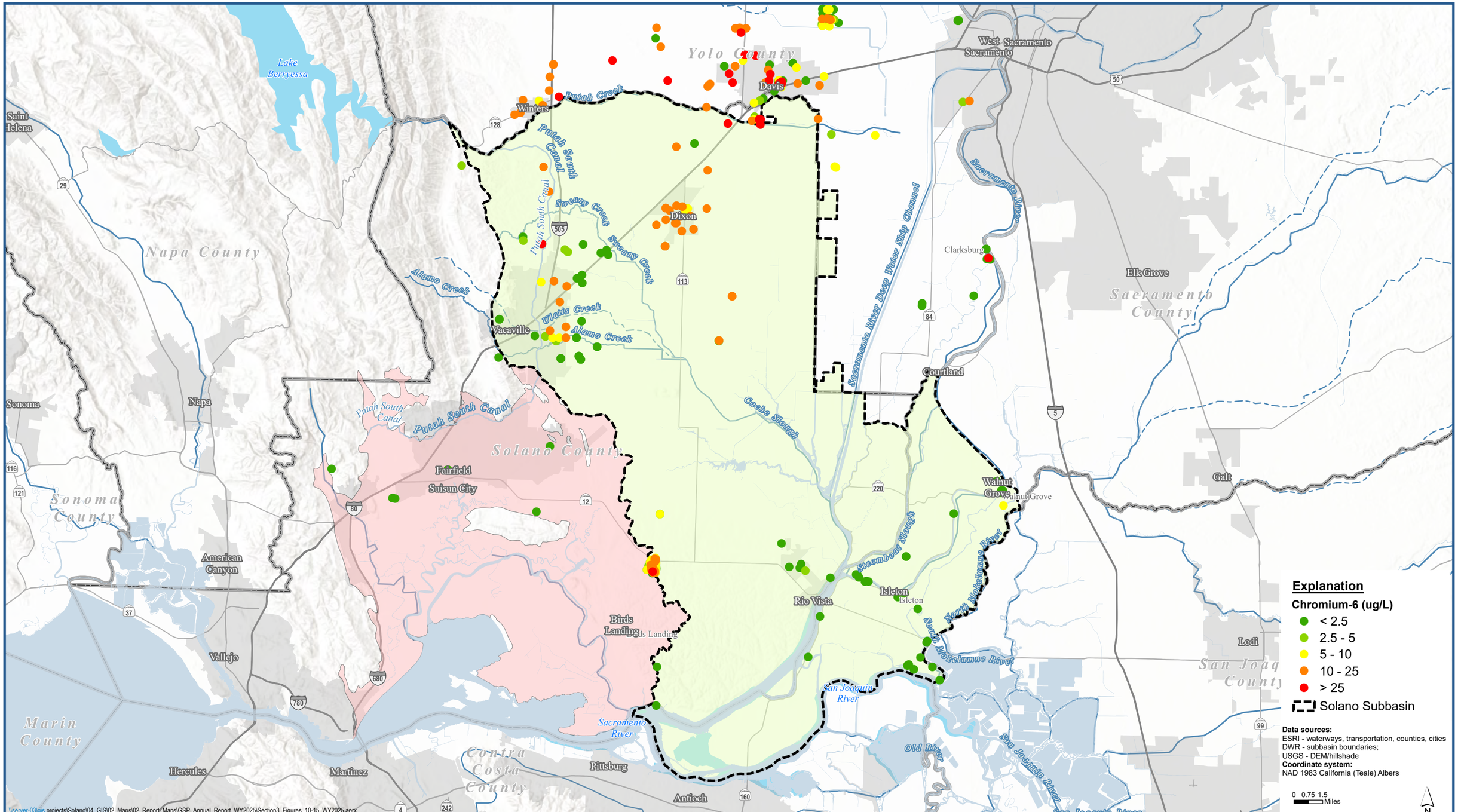
Maximum Chromium-6 Concentration Since 2015

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-13a

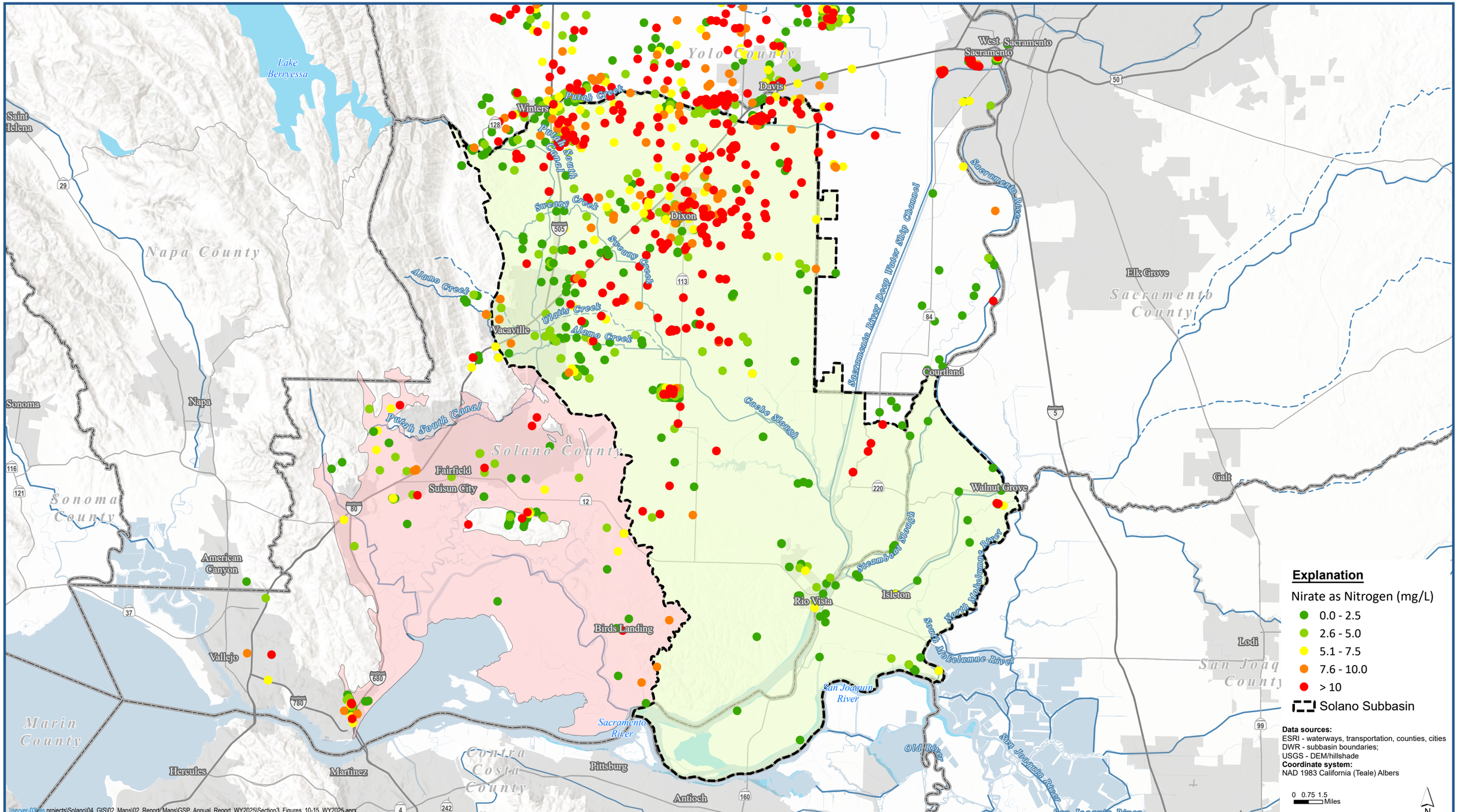


LSCE Team

Average Chromium-6 Concentration Since 2015

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-13b

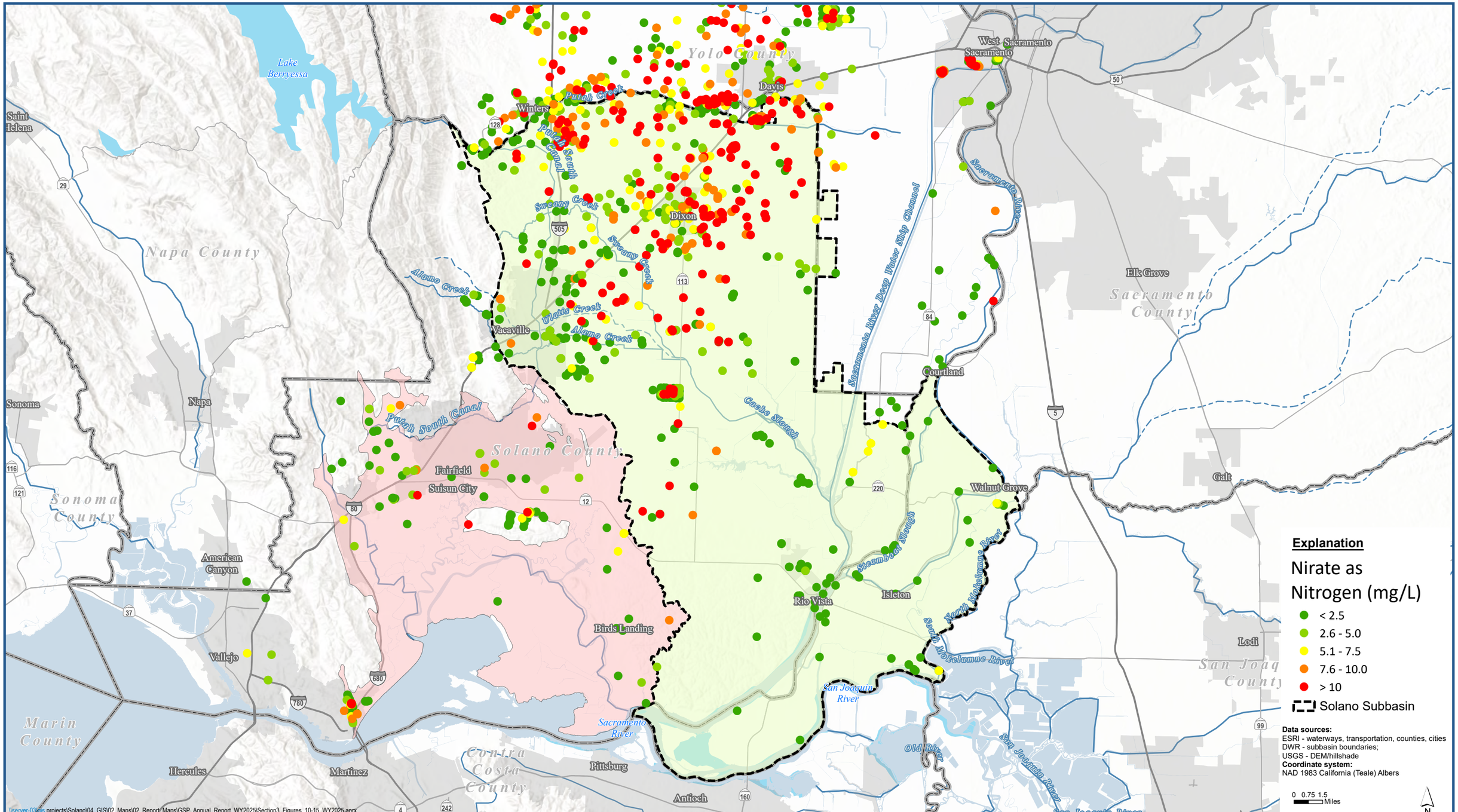


LSCE Team

Maximum Nitrate as Nitrogen Concentration Since 2015

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-14a

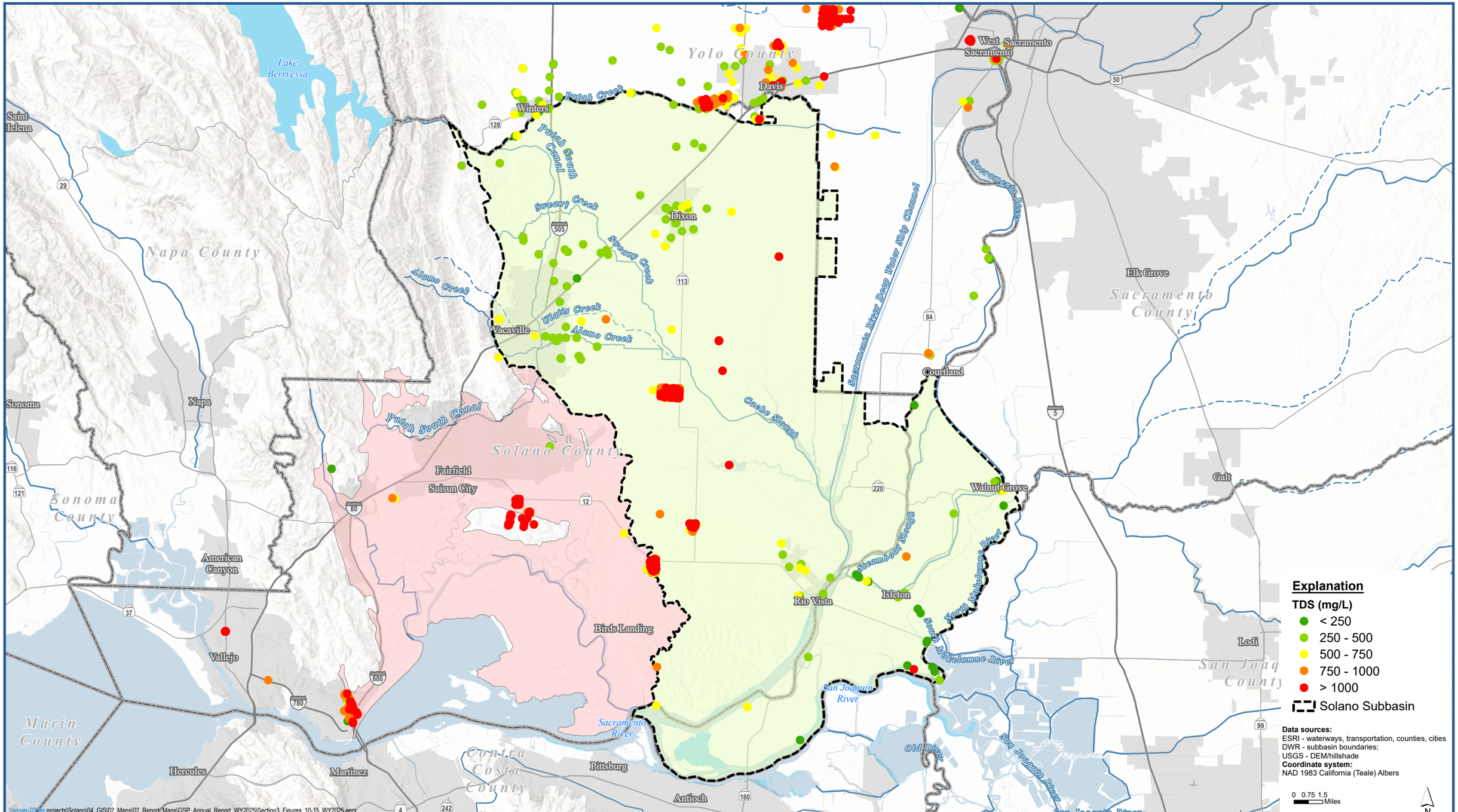


LSCE Team

Average Nitrate as Nitrogen Concentration Since 2015

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-14b

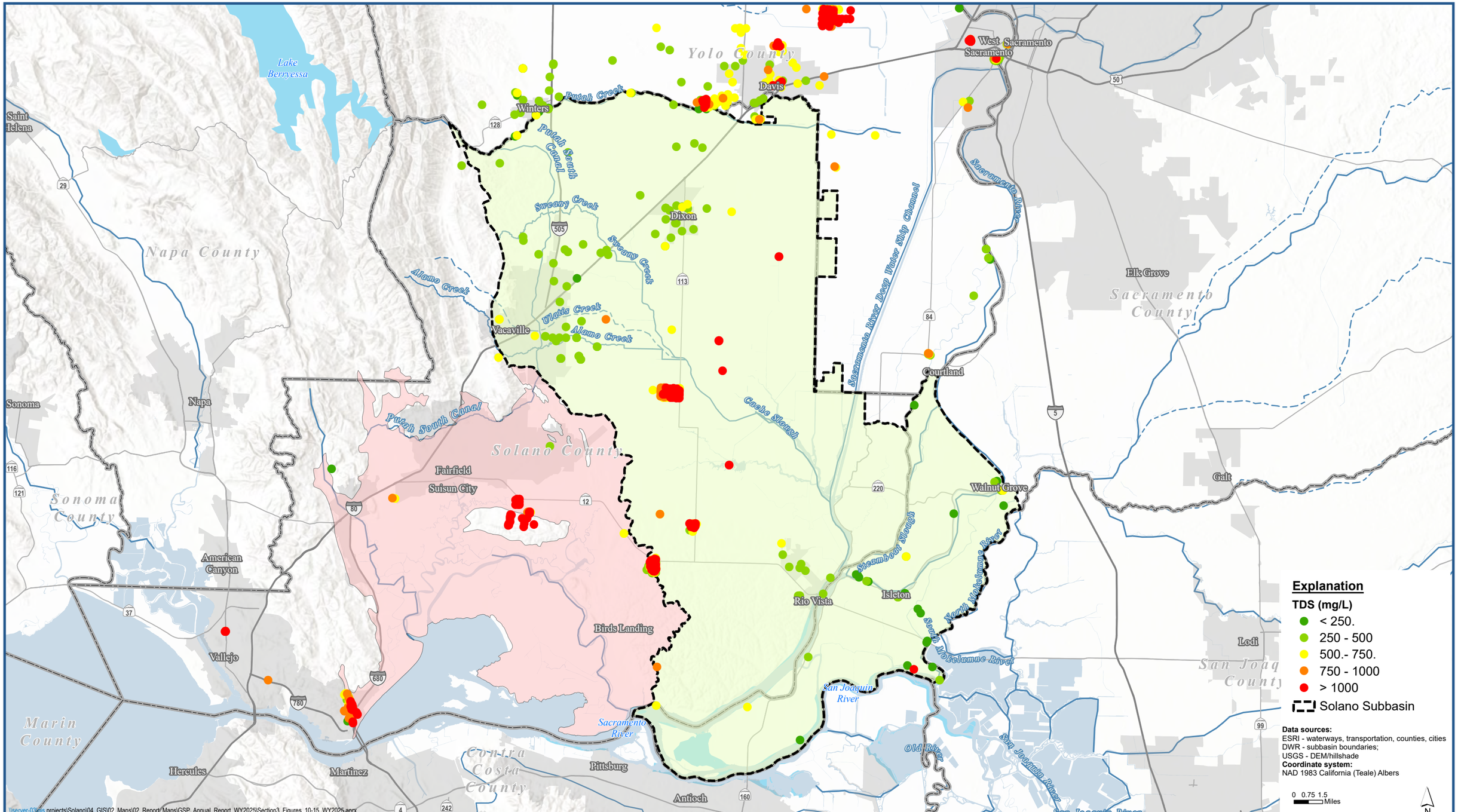


LSCE Team

Maximum Total Dissolved Solids (TDS) Concentration Since 2015

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-15a



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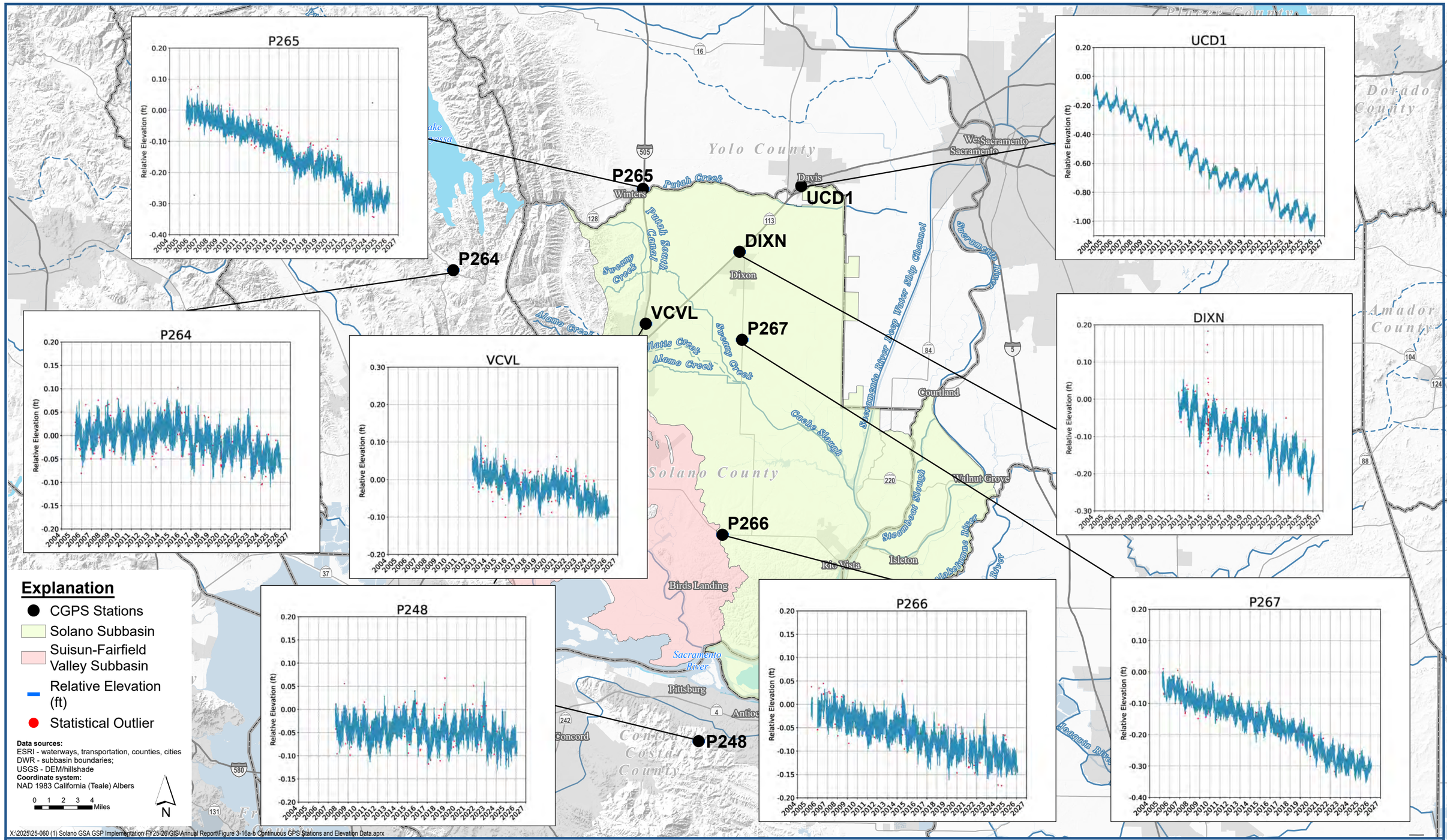
Average Total Dissolved Solids (TDS) Concentration Since 2015

Solano County and Subbasin
Annual Report - Water Year 2025

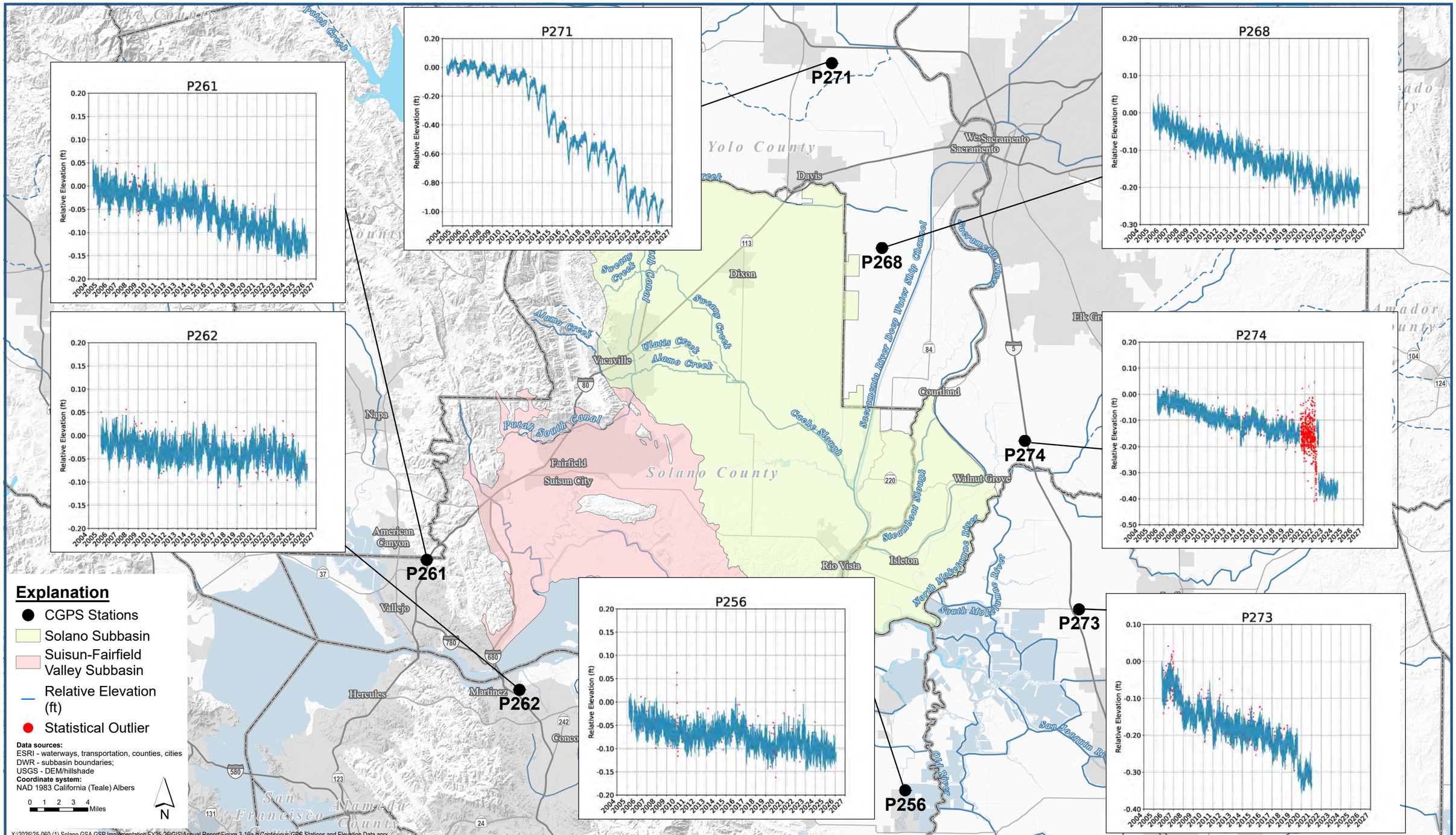
Figure 3-15b



Continuous GPS (CGPS) Stations and Elevation Data (1996-2025)
Stations P248, P264, P265, P266, P267, DIXN, VCVL, UCD1

Figure 3-16a

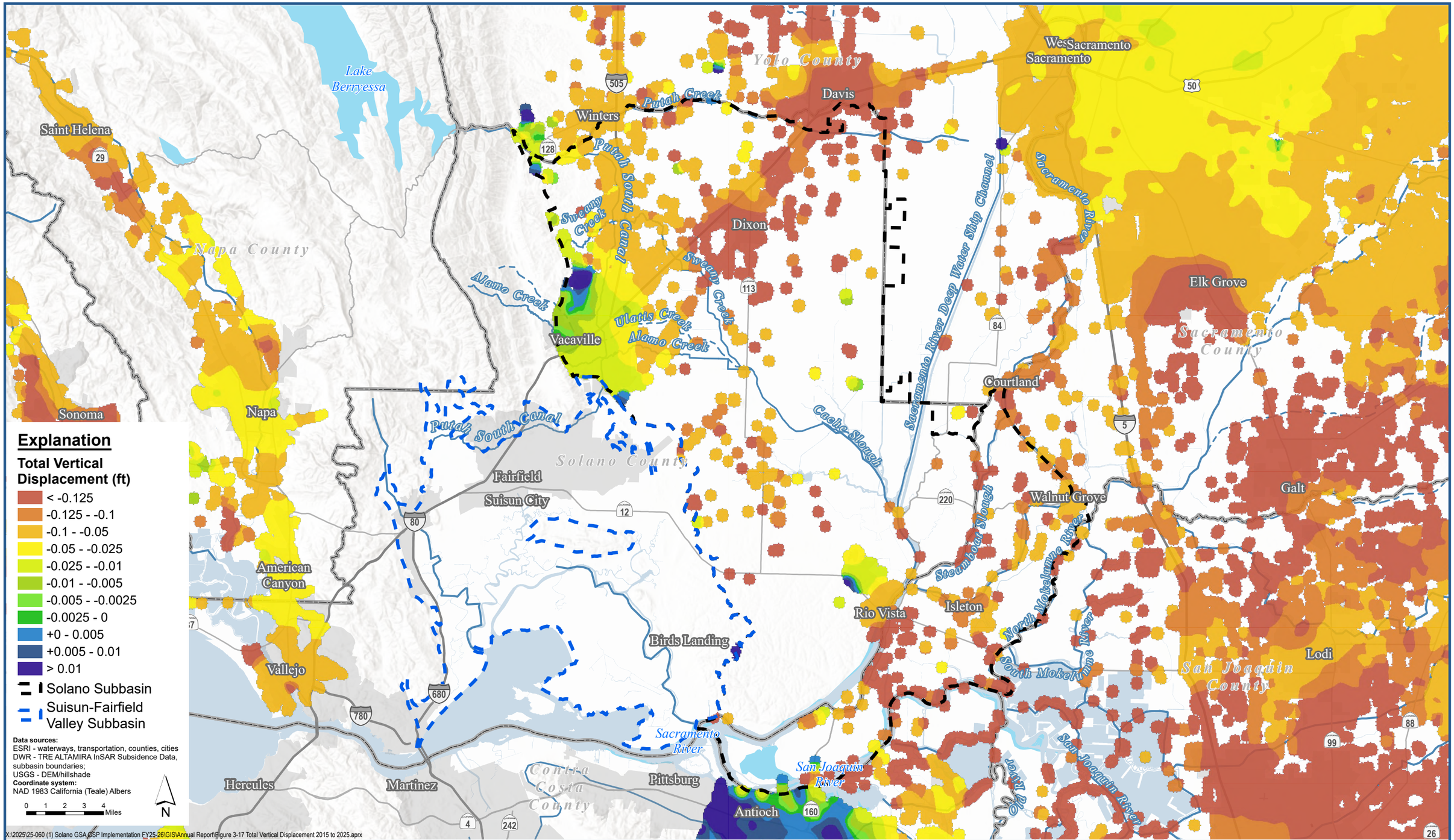
Solano County and Subbasin
Annual Report - Water Year 2025



Continuous GPS (CGPS) Stations and Elevation Data (2004-2025)
Stations P256, P261, P262, P268, P271, P273, P274

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-16b



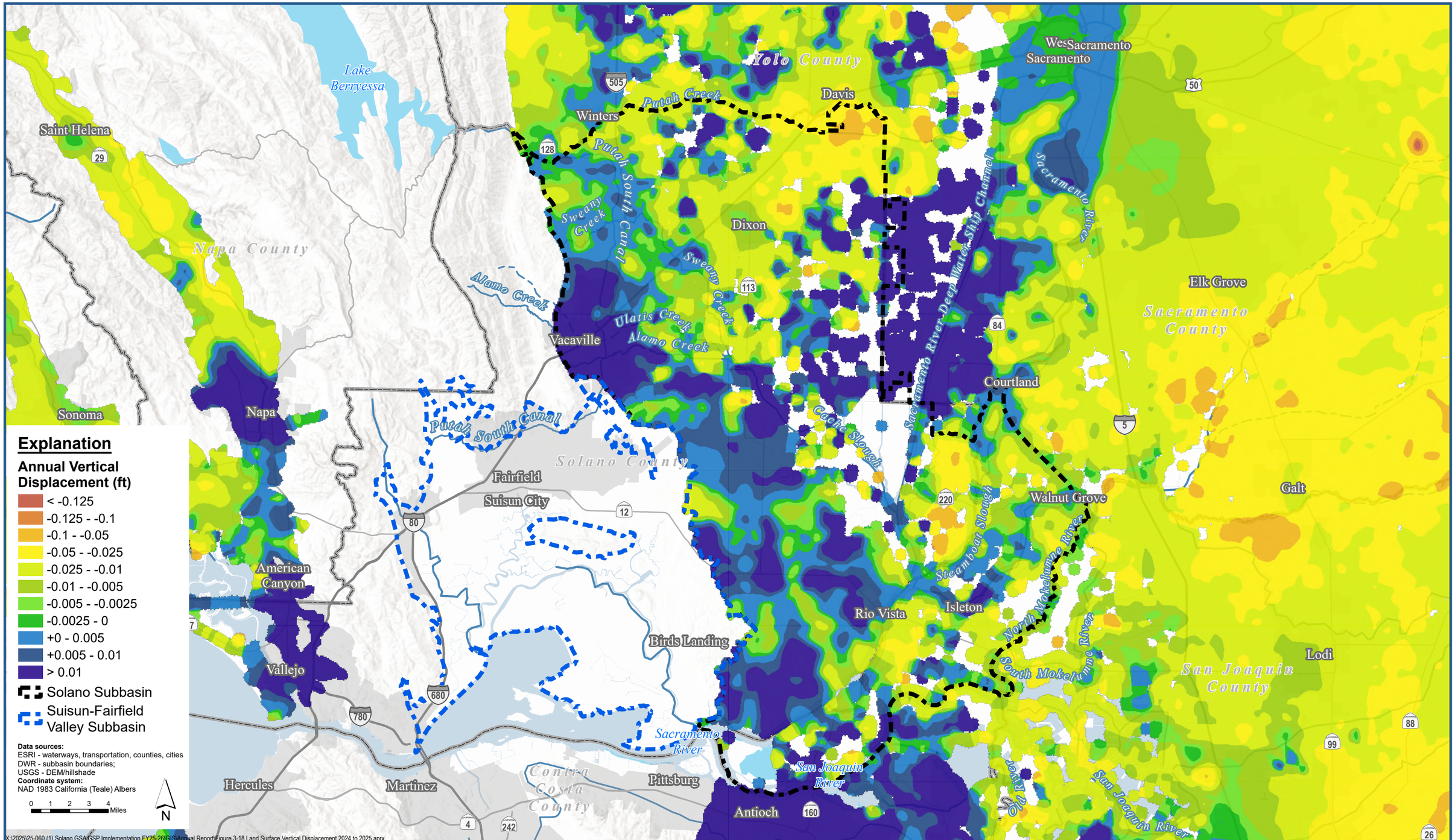
SOLANO SUBBASIN GROUNDWATER SUSTAINABILITY PLAN

LSCE Team

Land Surface Vertical Displacement: June 2015 to June 2025

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-17

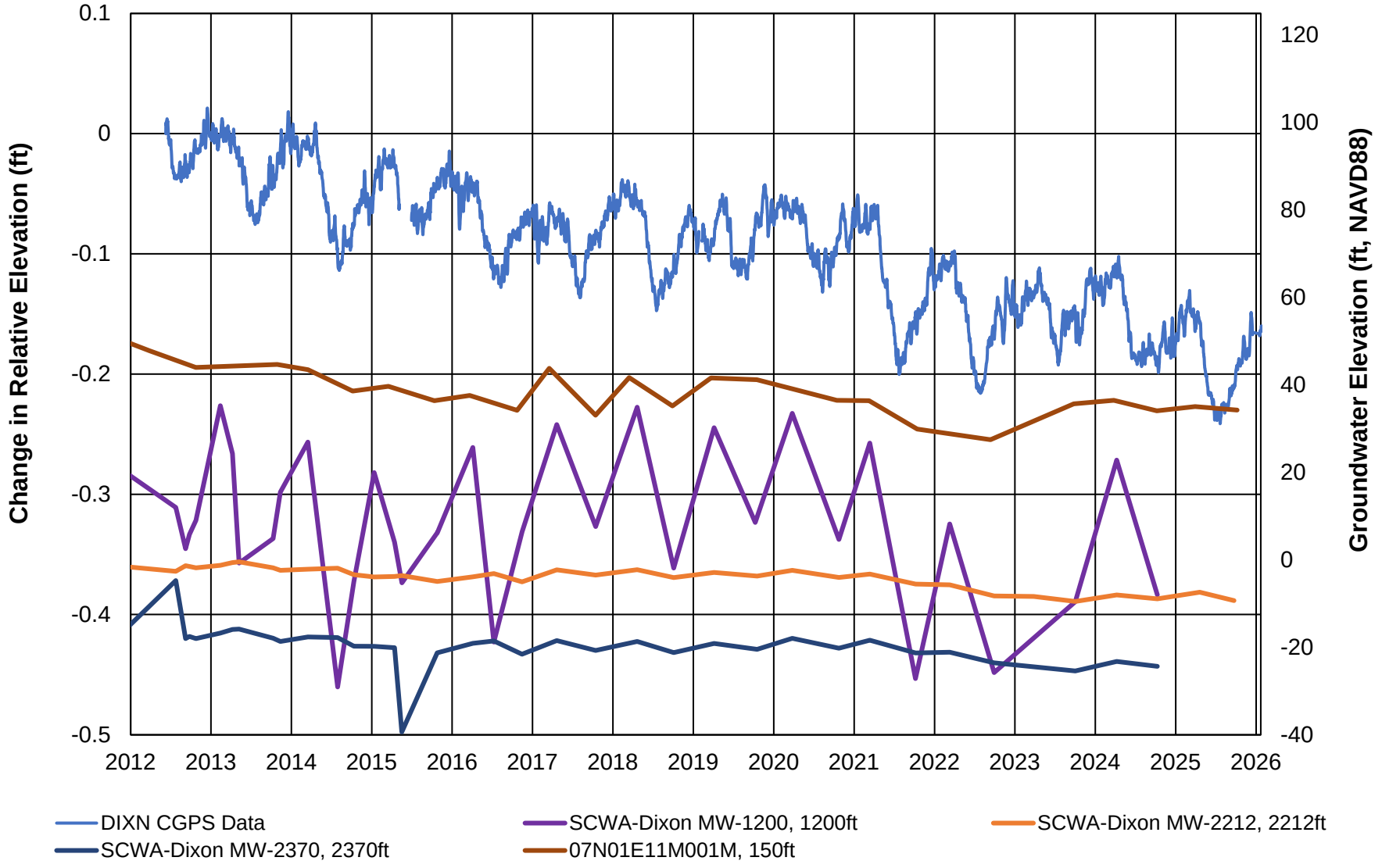


LSCE Team

Land Surface Vertical Displacement: October 2024 to October 2025

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-18

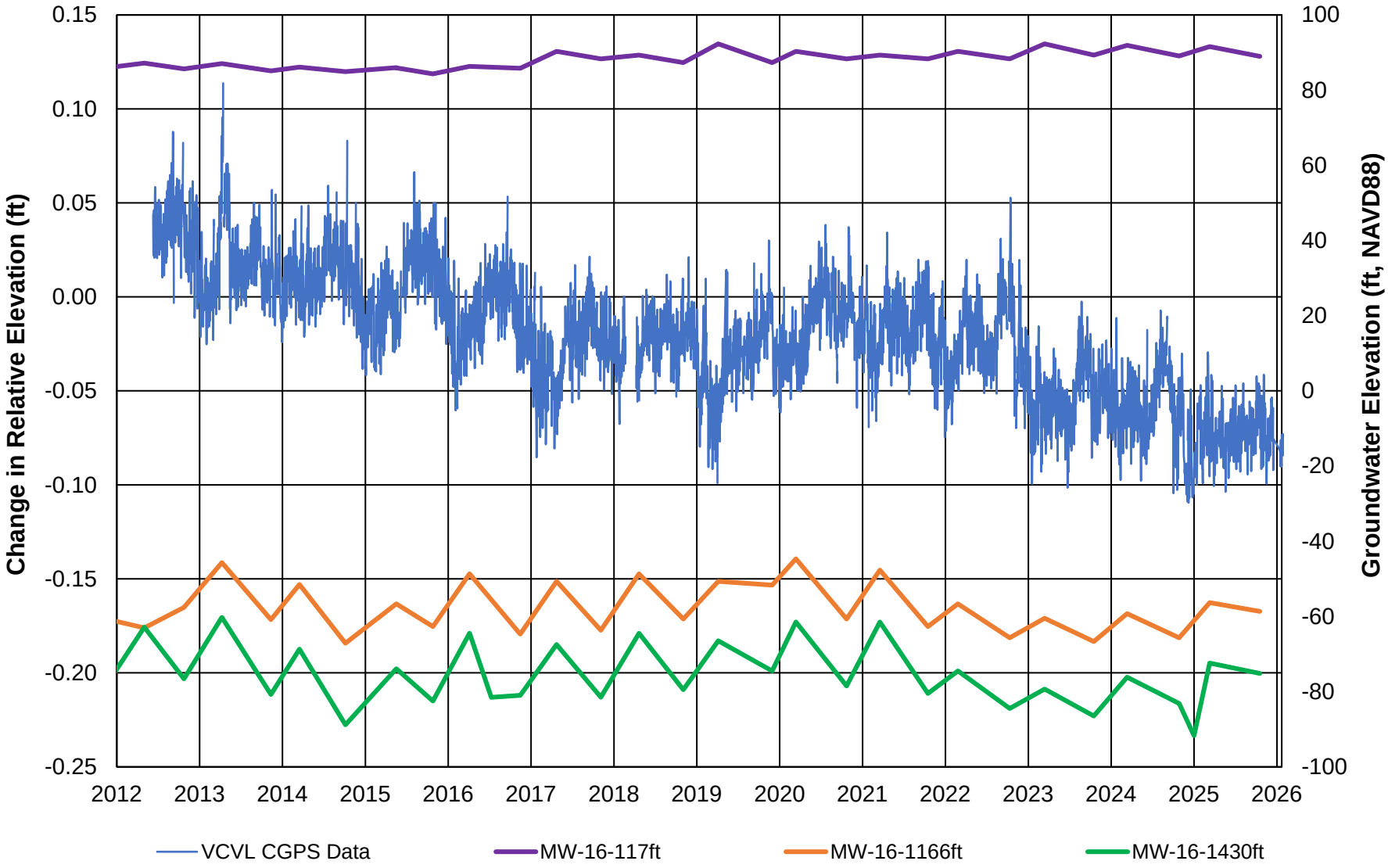


Luhdorff & Scalmanini Consulting Engineers

Dixon Station CGPS and Groundwater Levels

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-19

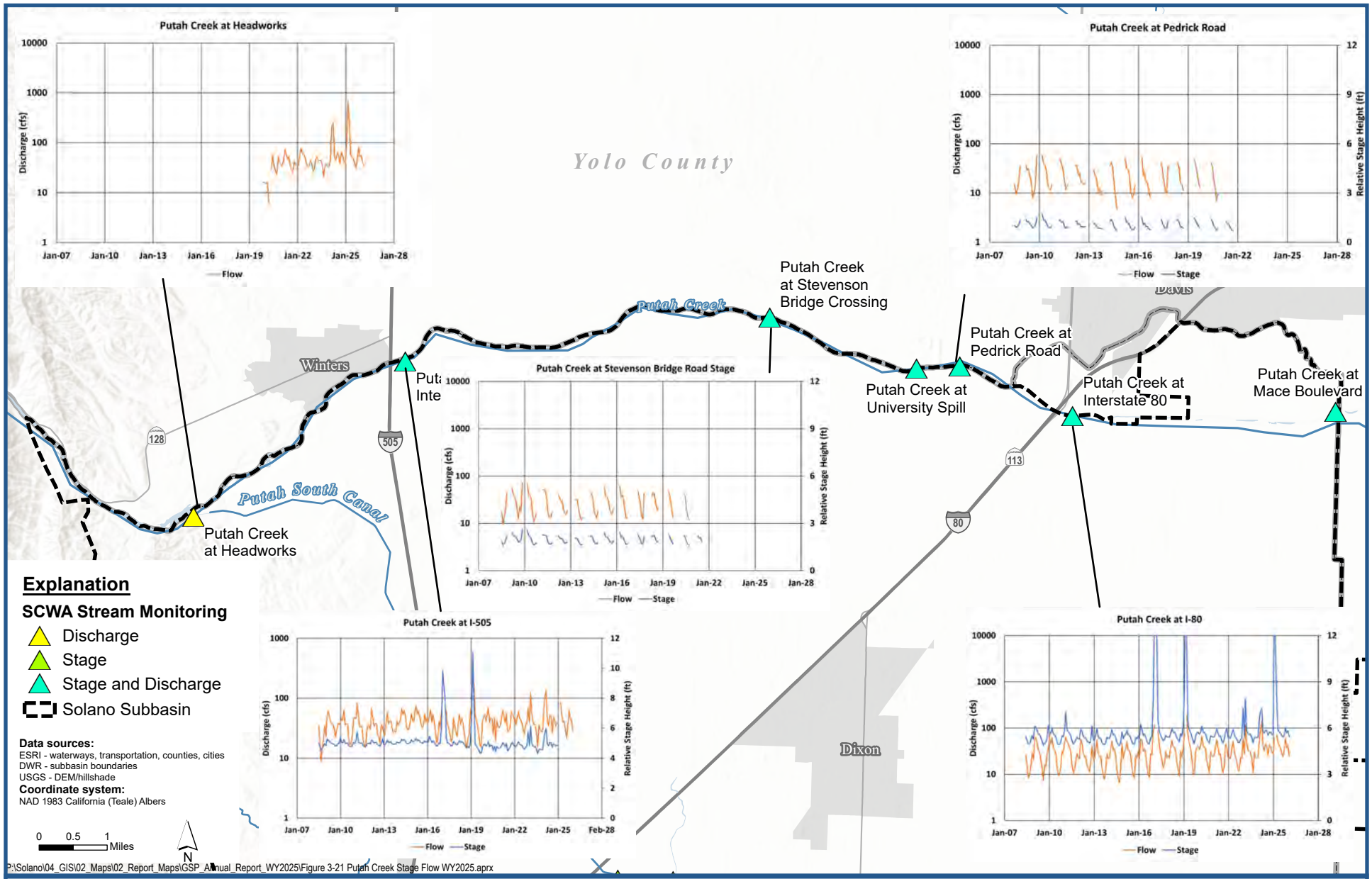


Luhdorff & Scalmanini Consulting Engineers

Vacaville Station CGPS and Groundwater Levels

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-20

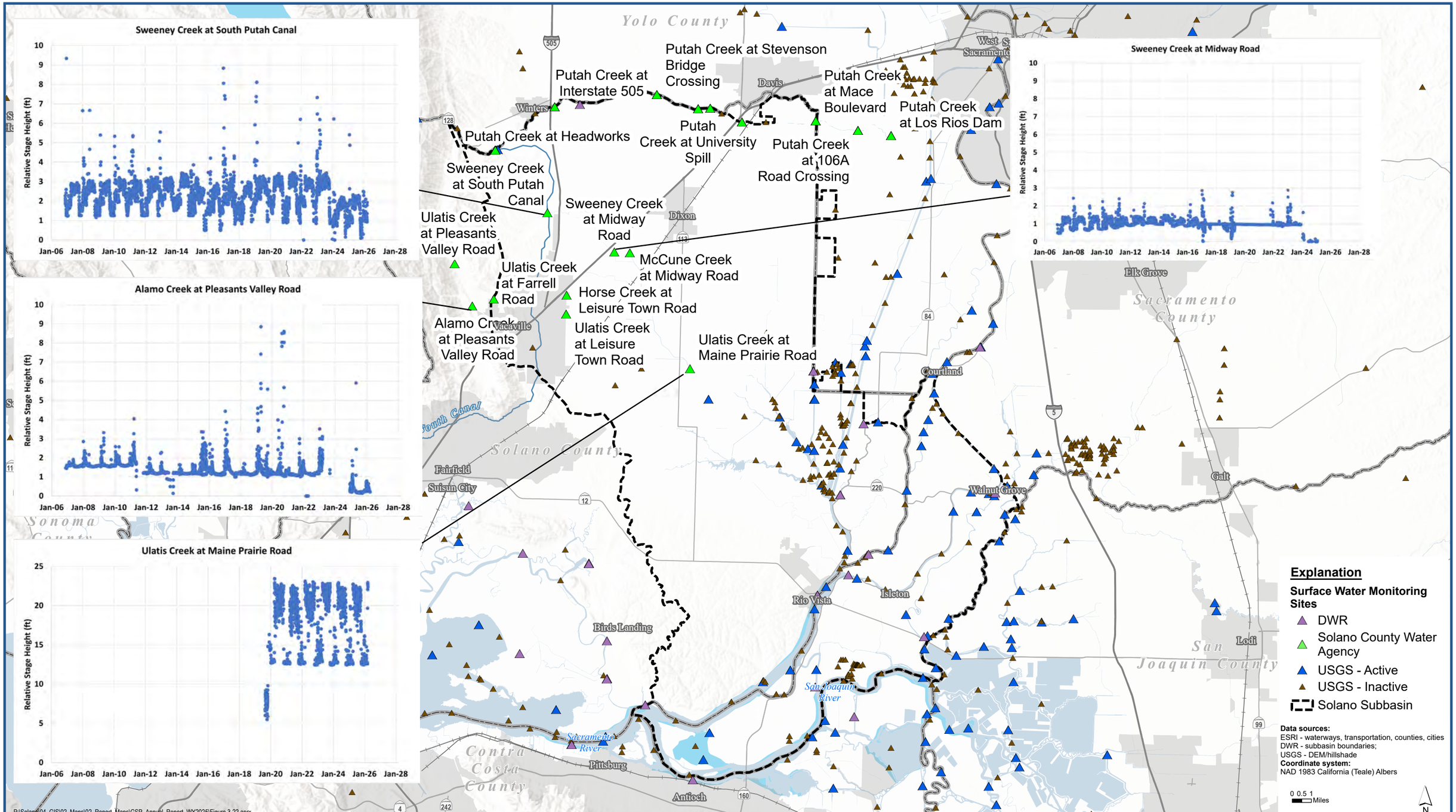


LSCE Team

Discharge and Relative Stage Height Along Putah Creek

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 3-21

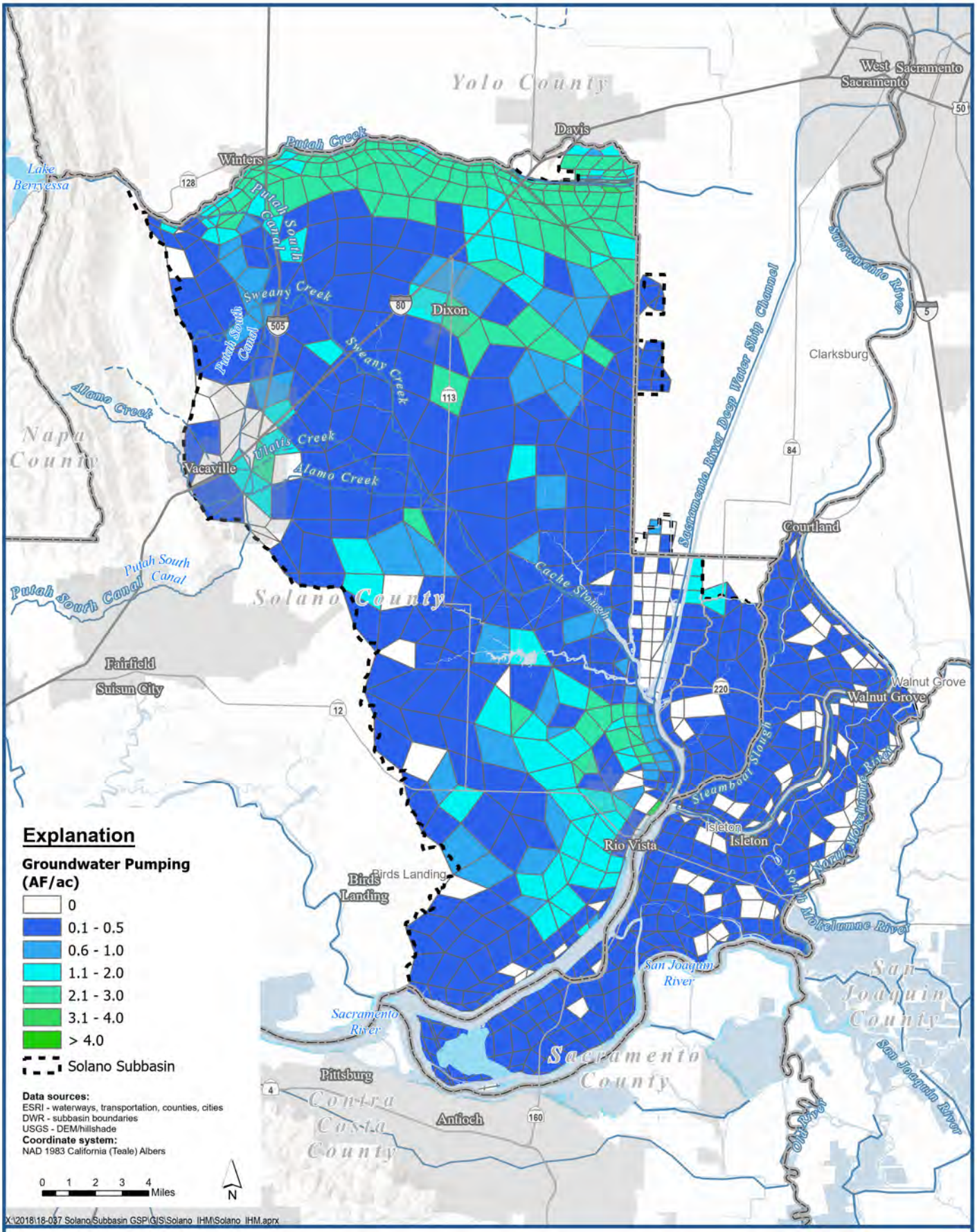


LSCE Team

SCWA Stream Stage Monitoring

Solano County and Subbasin
Annual Report - Water Year 2025

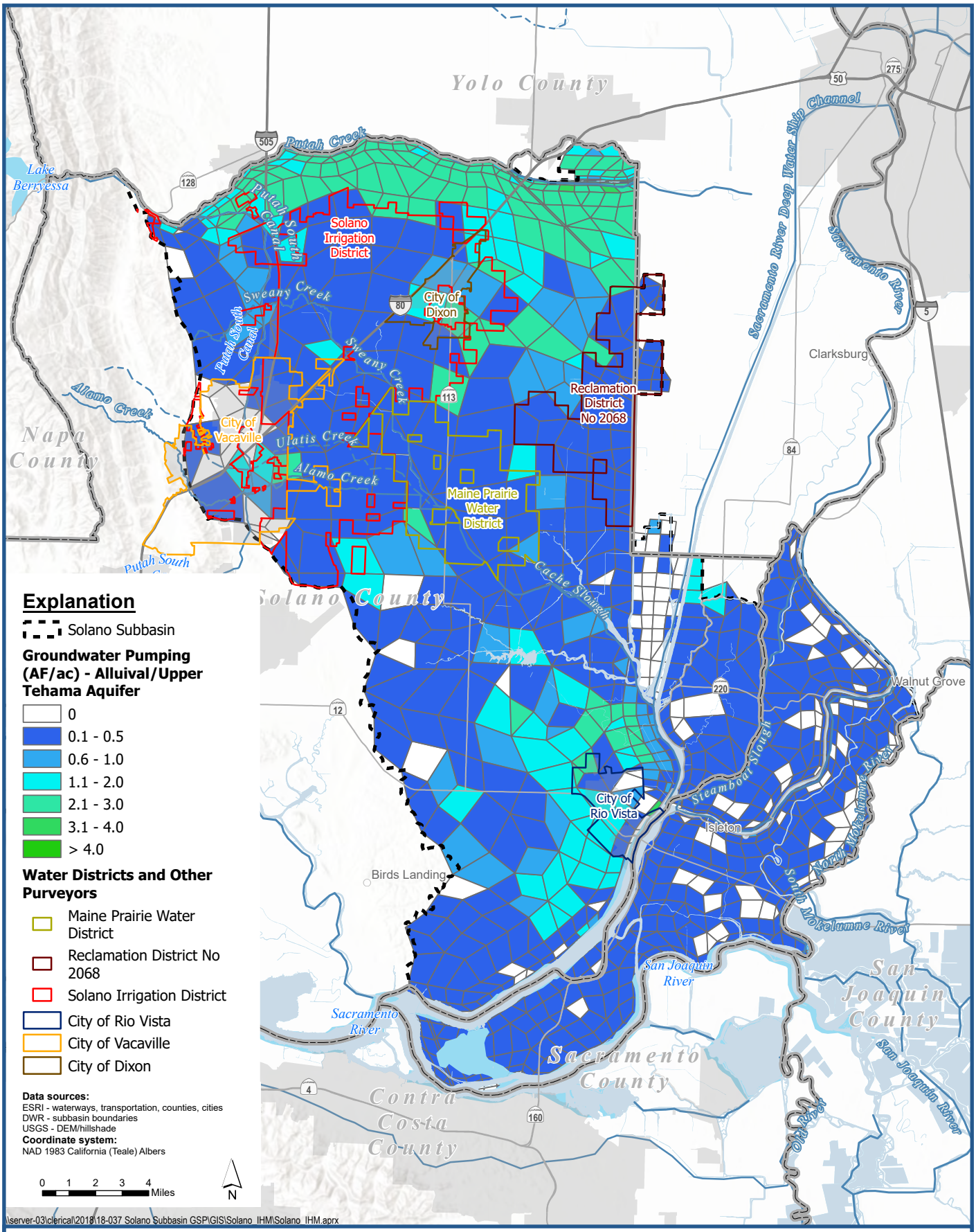
Figure 3-22



Groundwater Pumping, Water Year 2025

Solano County and Subbasin
Annual Report - Water Year 2025

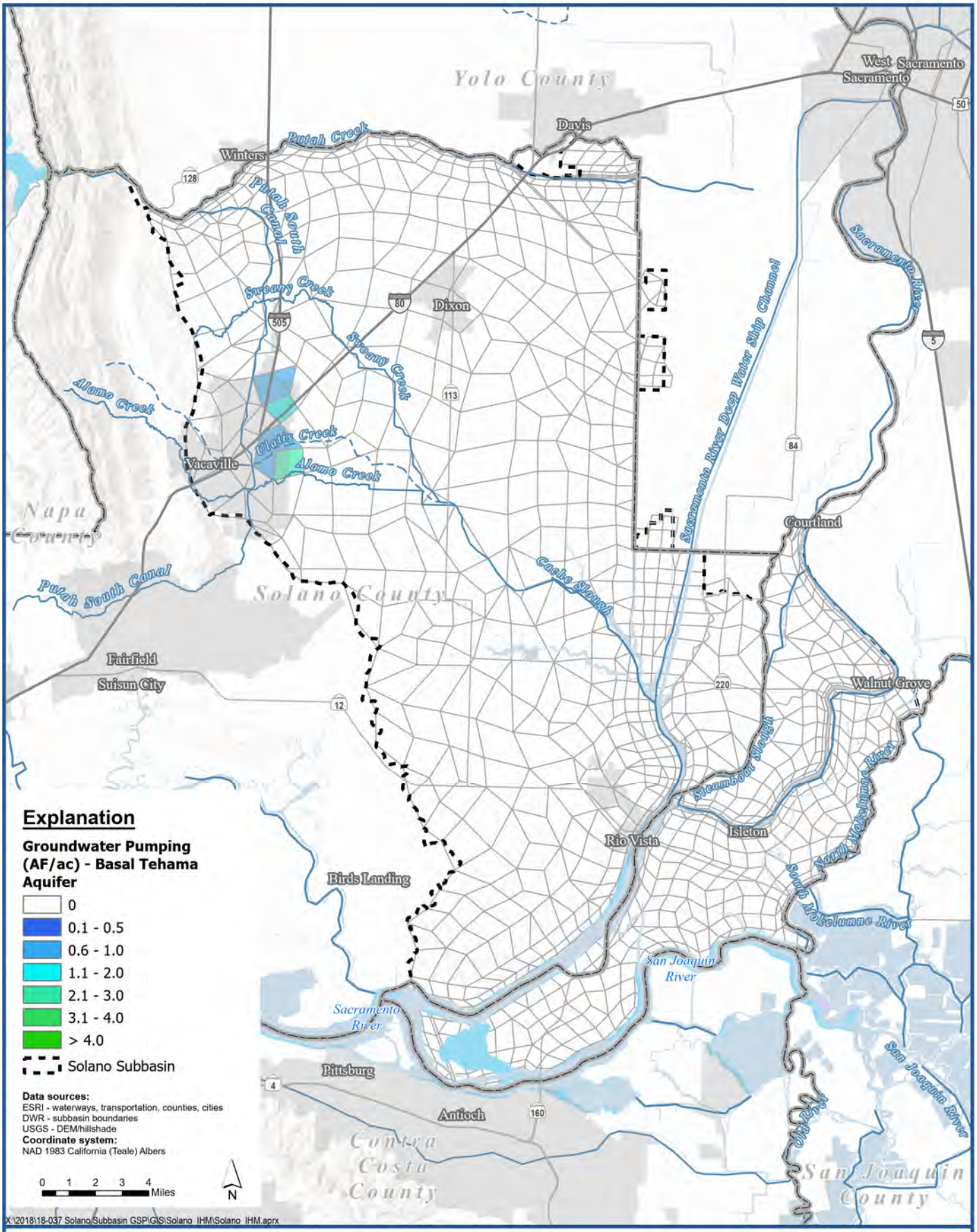
Figure 4-1



Groundwater Pumping, Water Year 2025 - Alluvial/Upper Tehama

Solano County and Subbasin
Annual Report - Water Year 2025

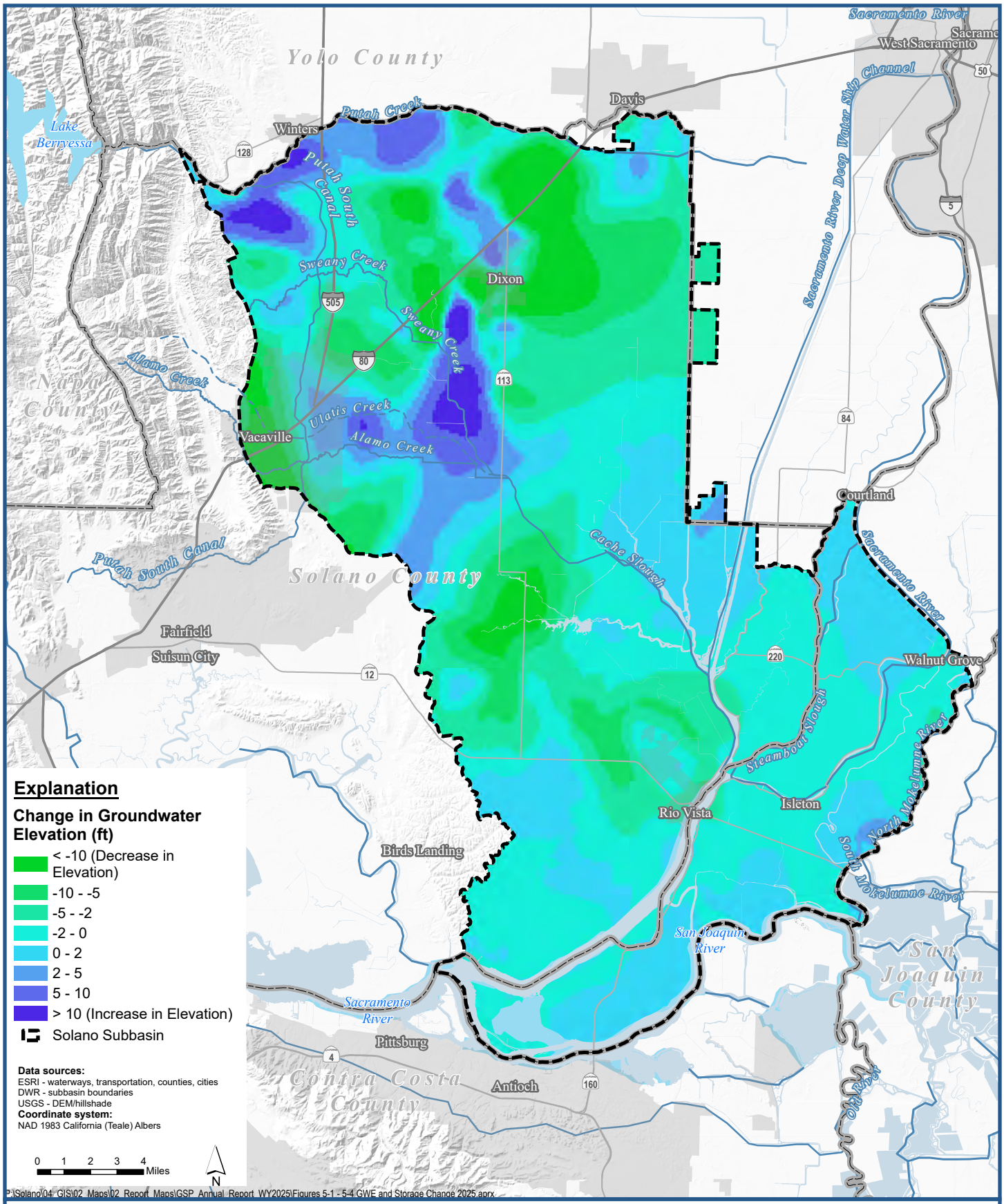
Figure 4-2



Groundwater Pumping, Water Year 2025 - Basal Tehama

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 4-3

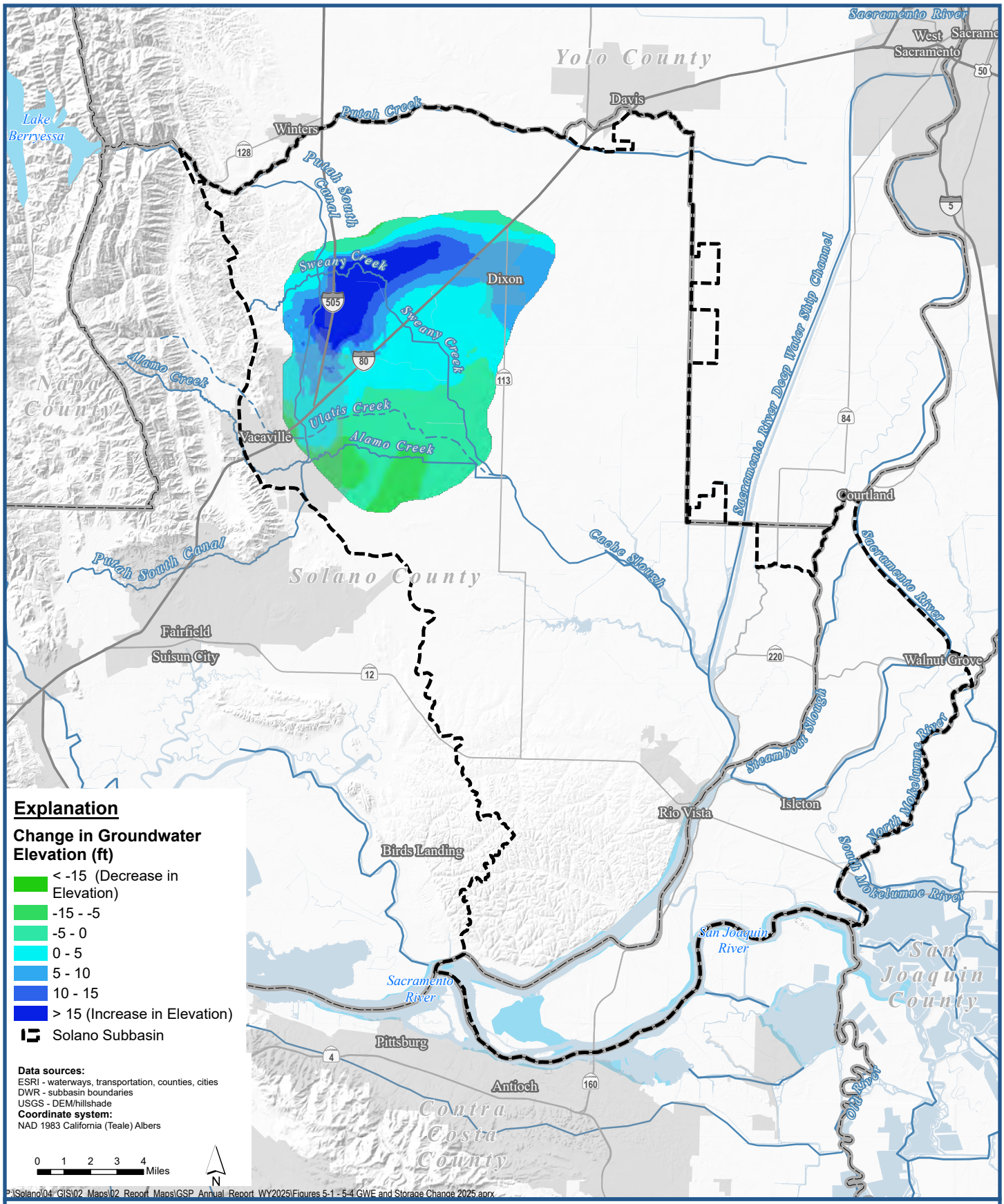


LSCE Team

Groundwater Level Change Map: Winter/Spring 2024 to 2025 - Alluvial/Upper Tehama Zone

Solano County and Subbasin
Annual Report - Water Year 2025

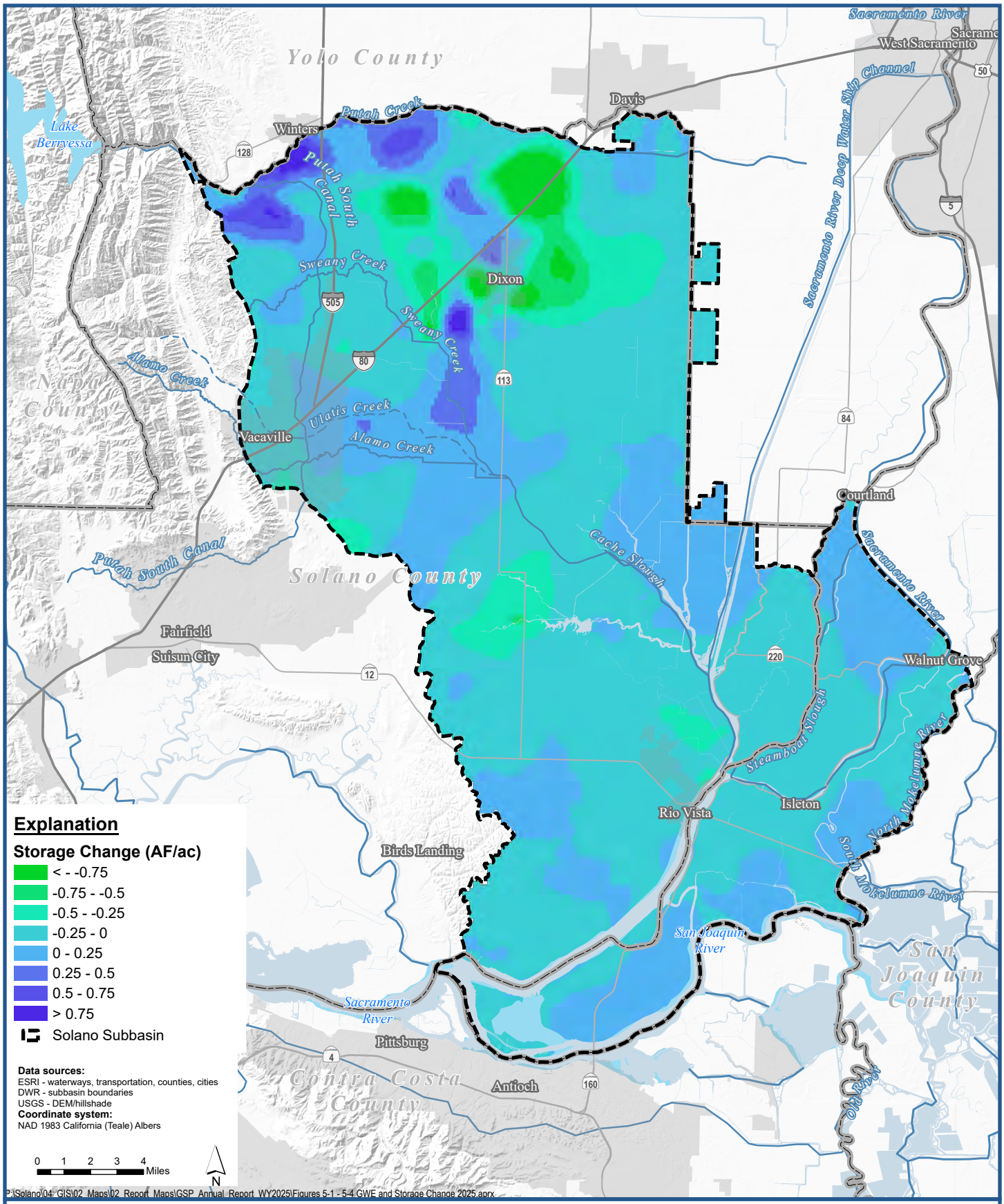
Figure 5-1



Groundwater Level Change Map: Winter/Spring 2024 to 2025 - Confined Basal Tehama Zone

Solano County and Subbasin
Annual Report - Water Year 2025

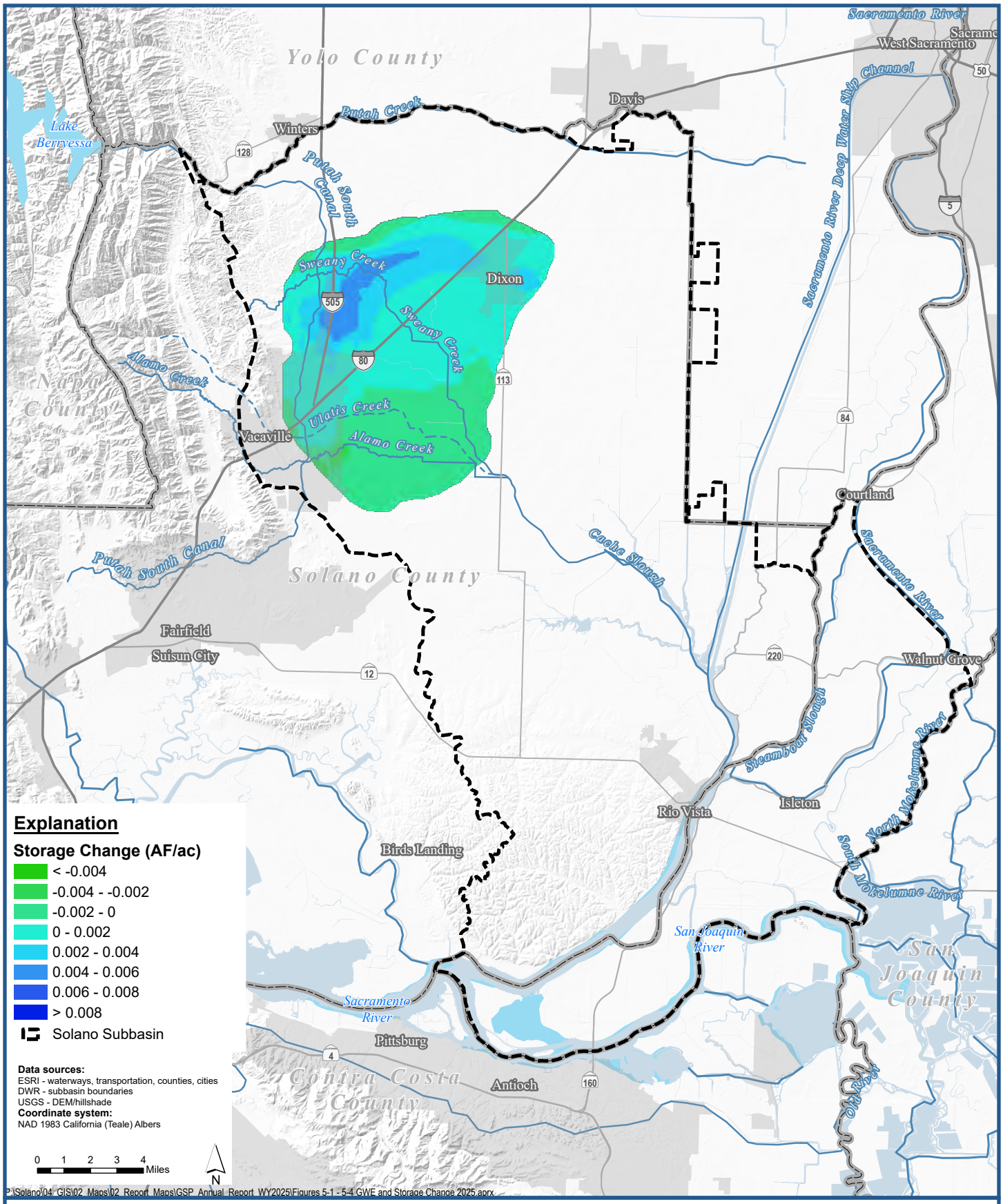
Figure 5-2



Groundwater Storage Change Map: Winter/Spring 2024 to 2025- Alluvial Aquifer and Upper Tehama

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 5-3

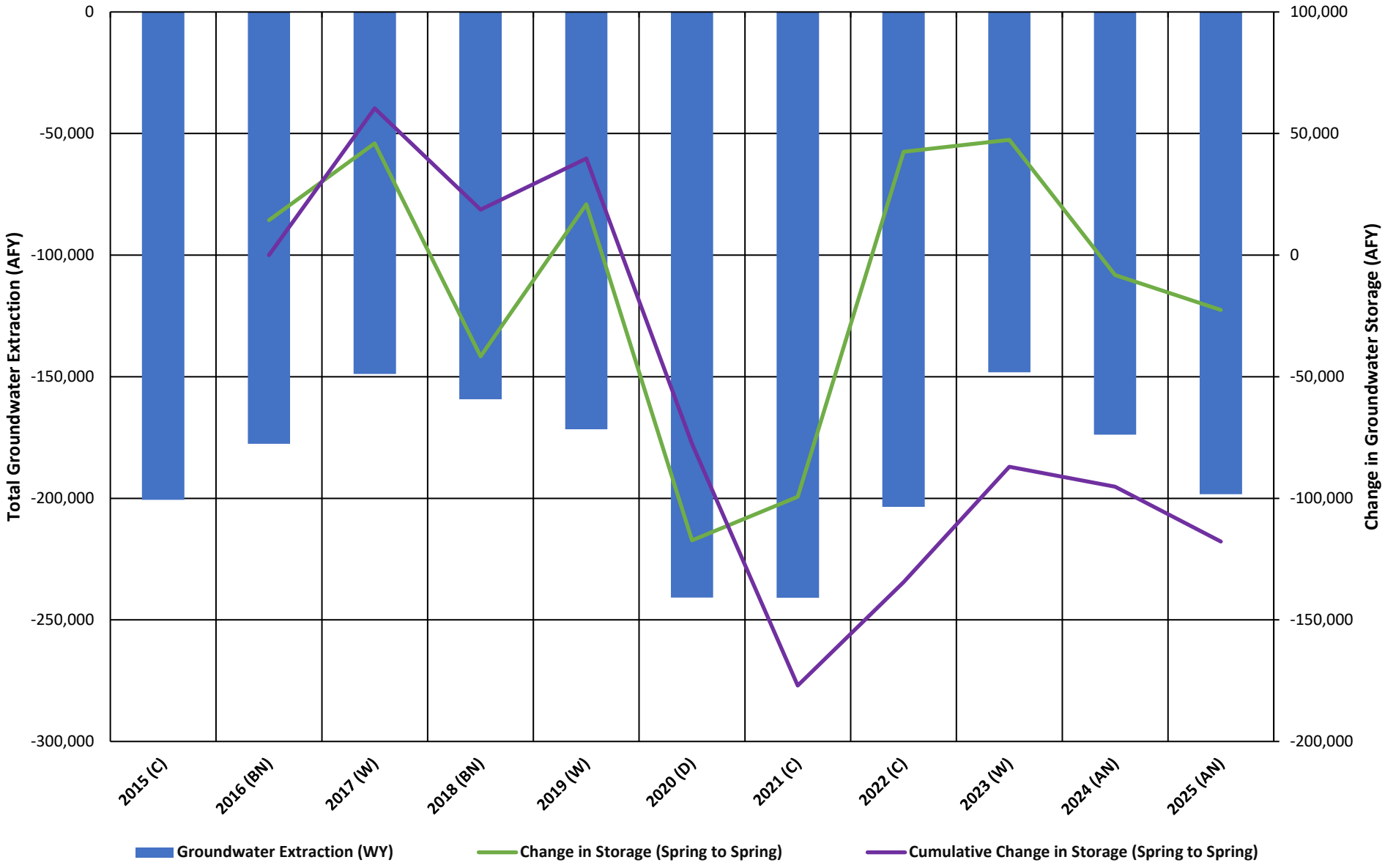


LSCE Team

Groundwater Storage Change Map: Winter/Spring 2024 to 2025 - Confined Basal Tehama Zone

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 5-4

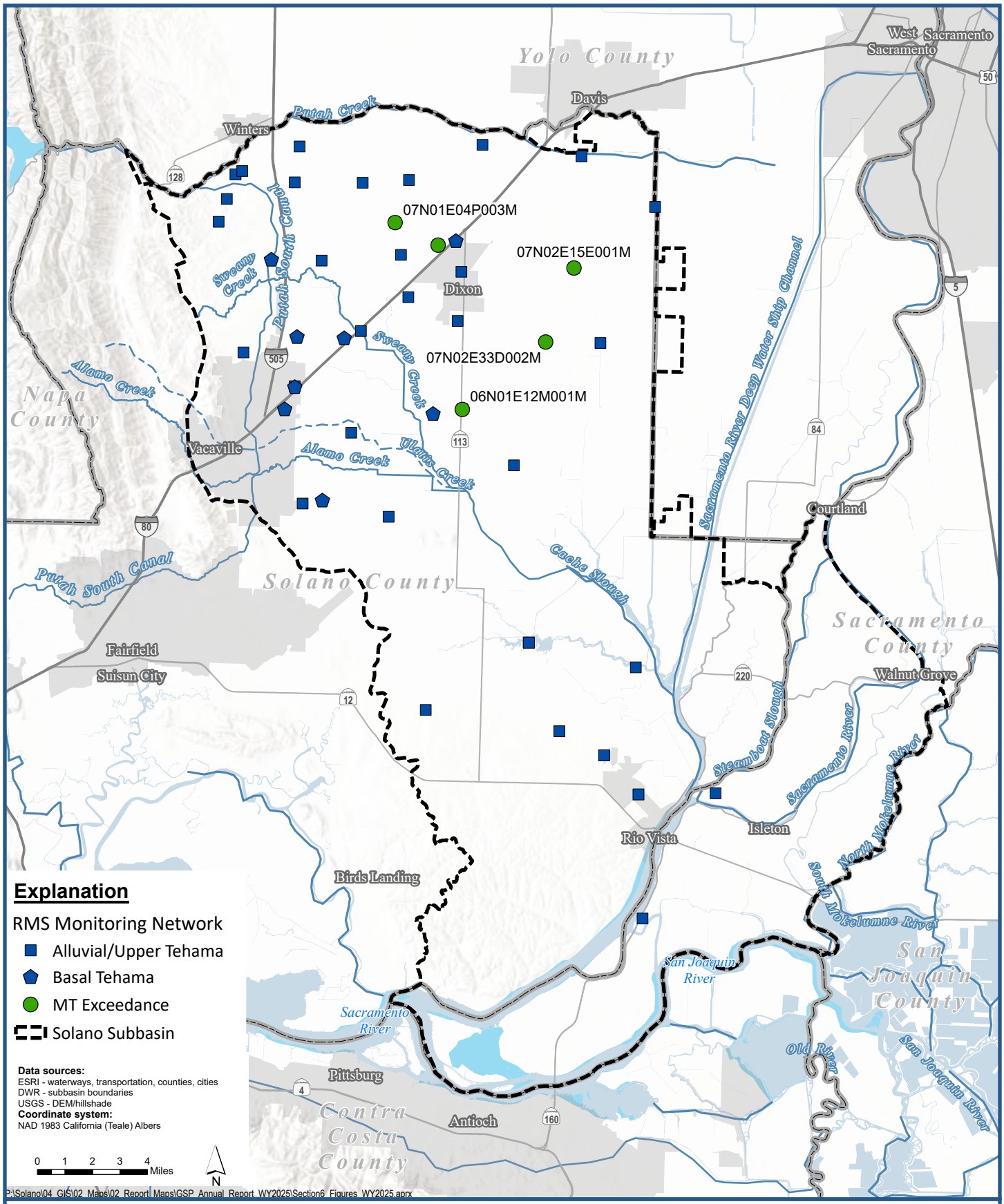


Luhdorff & Scalmanini Consulting Engineers

Annual Groundwater Storage Changes and Extractions

Solano Subbasin and Solano County
Annual Report - Water Year 2025

Figure 5-5

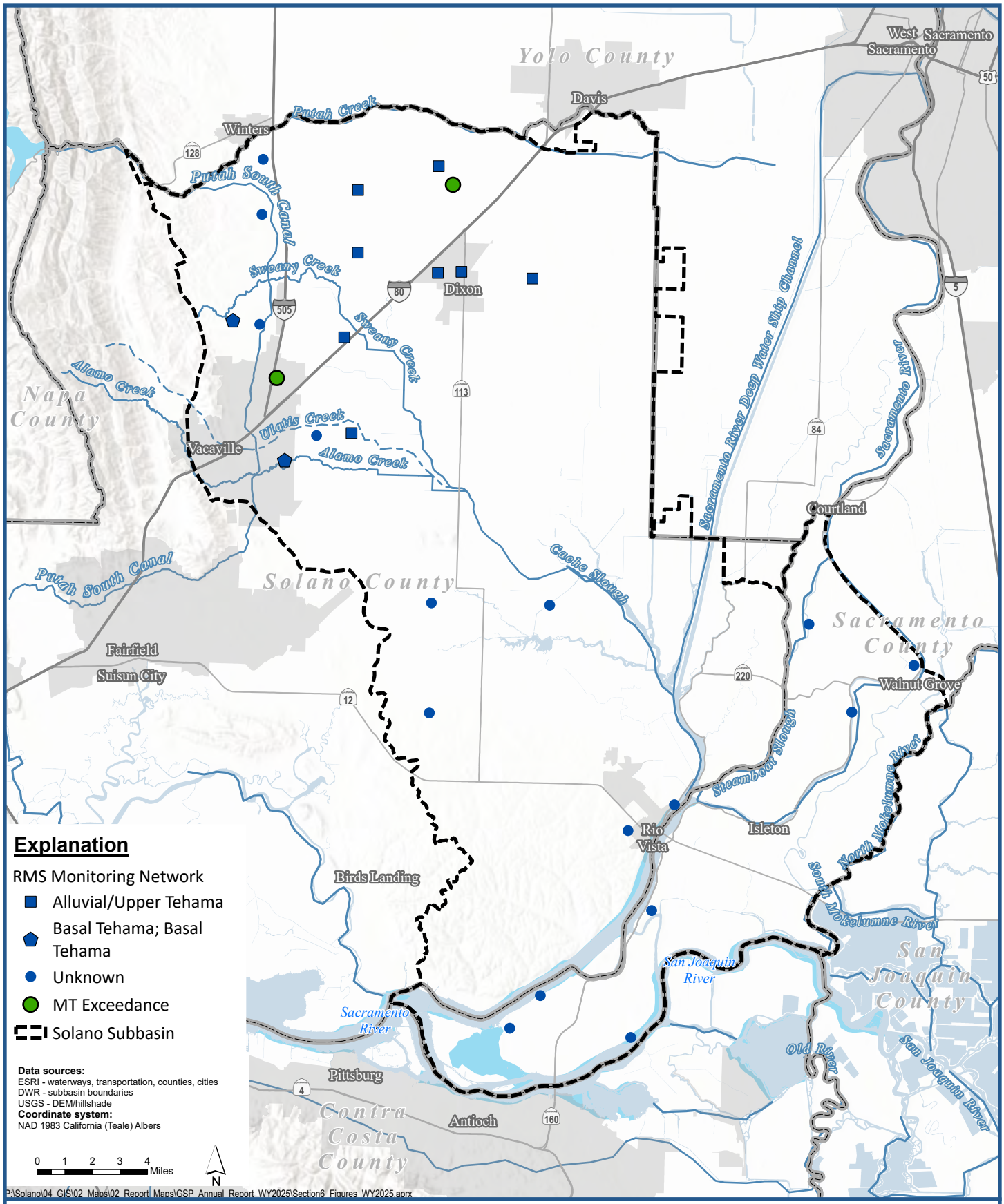


LSCE Team

Current Conditions for Groundwater Level RMS

Solano County and Subbasin
Annual Report - Water Year 2024

Figure 6-1

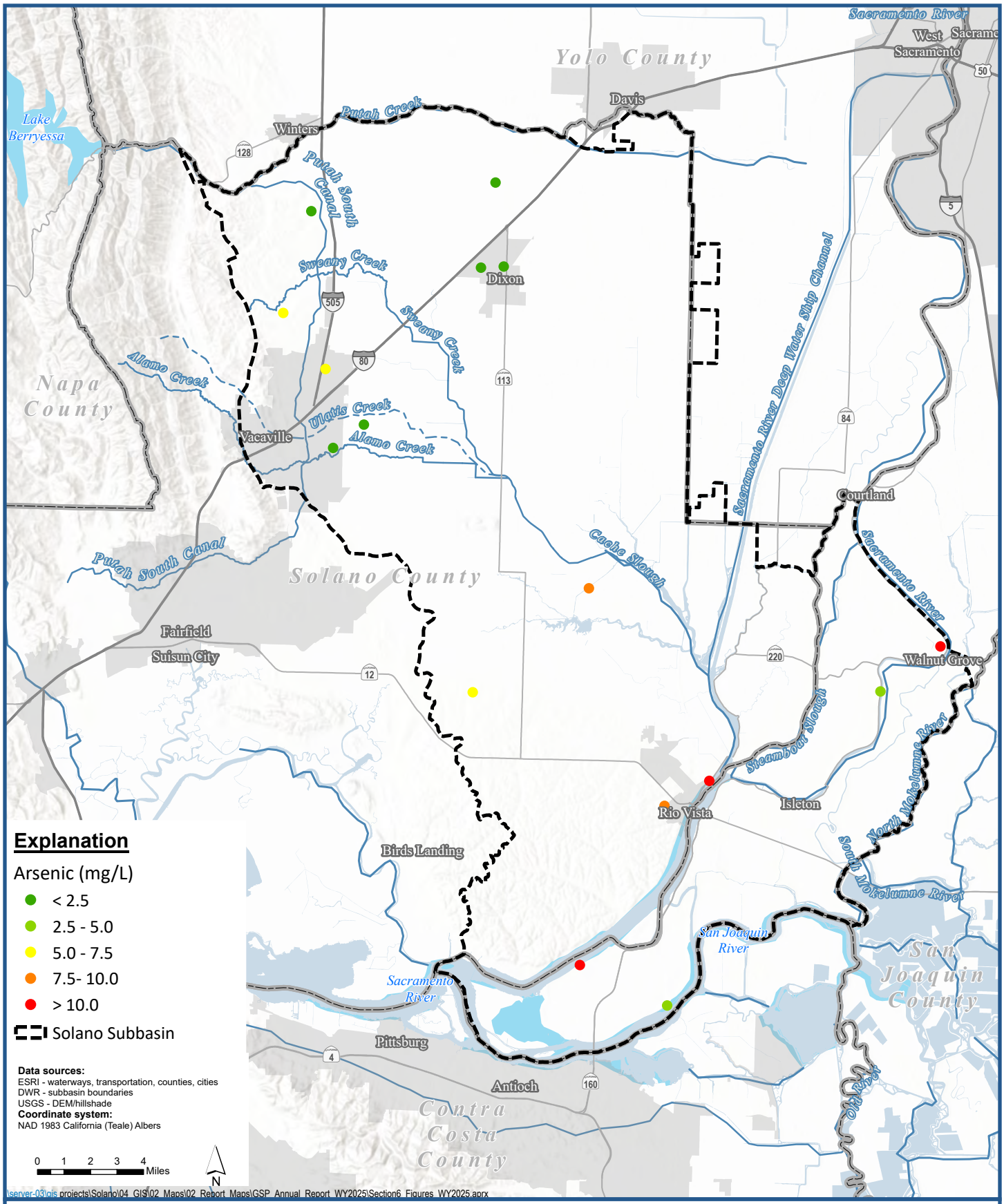


LSCE Team

Current Conditions for Groundwater Quality RMS

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 6-2

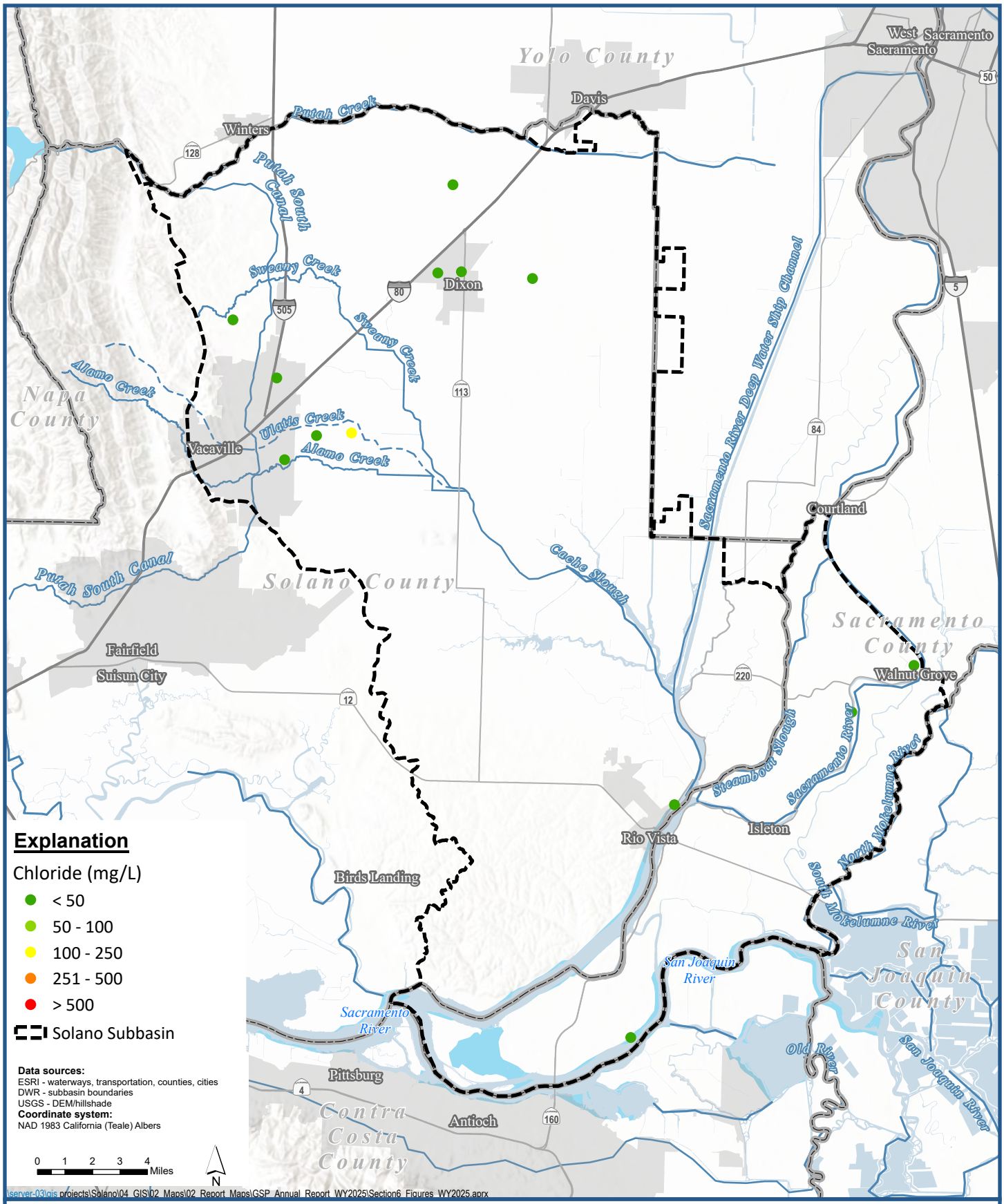


LSCE Team

Arsenic Concentration Evaluation for RMS

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 6-3

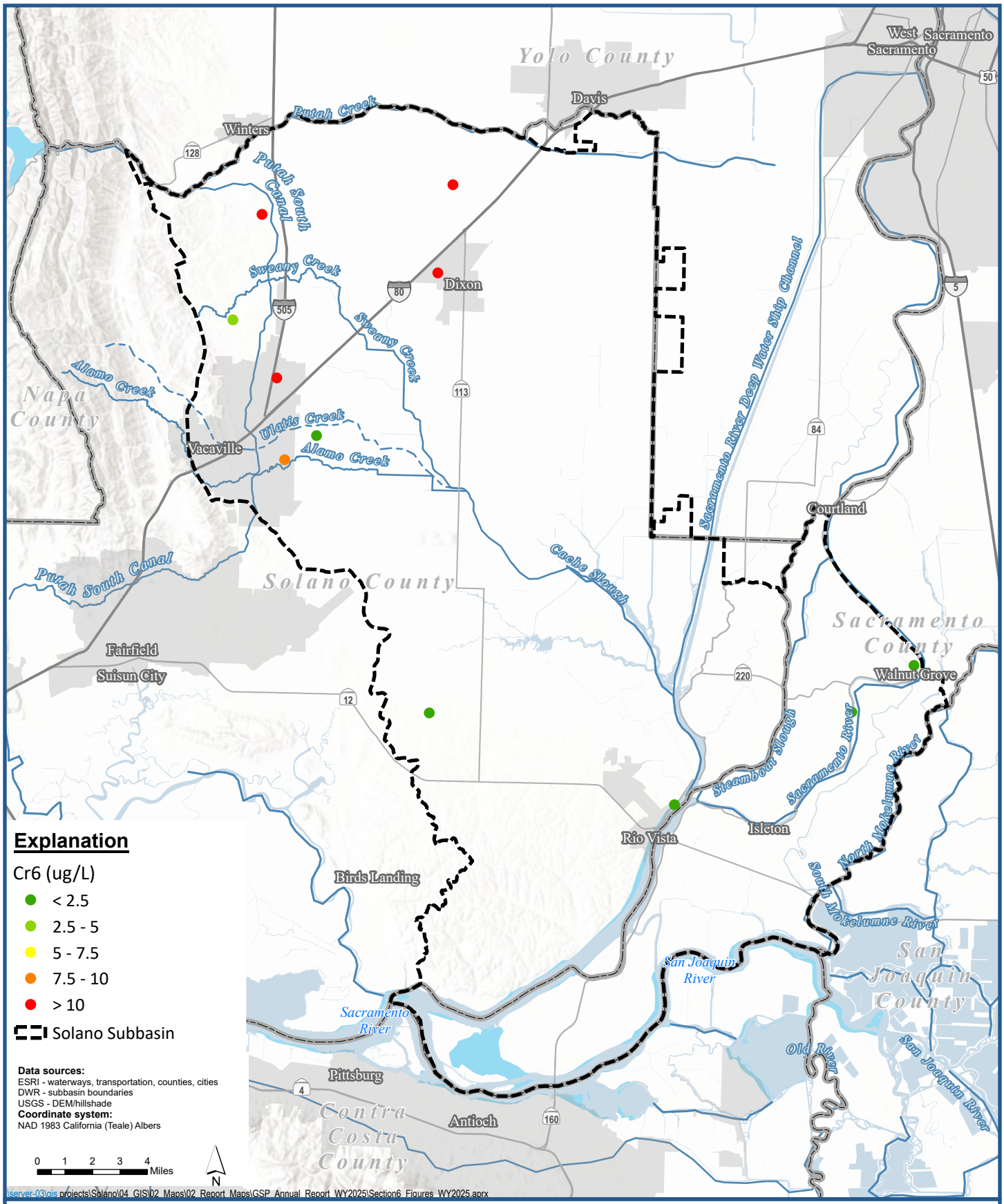


LSCE Team

Chloride Concentration Evaluation for RMS

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 6-4

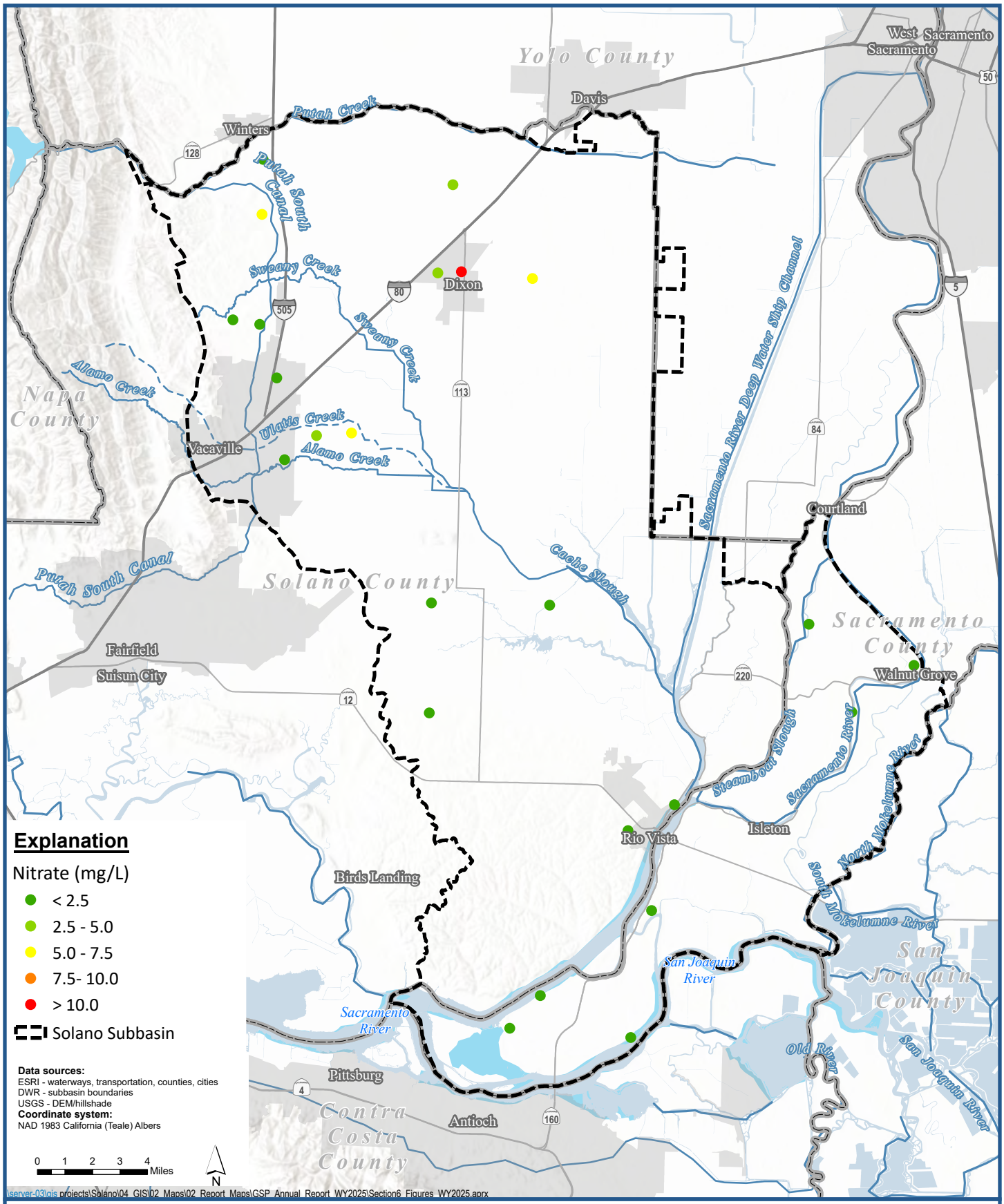


LSCE Team

Chromium (VI) Concentration Evaluation for RMS

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 6-5

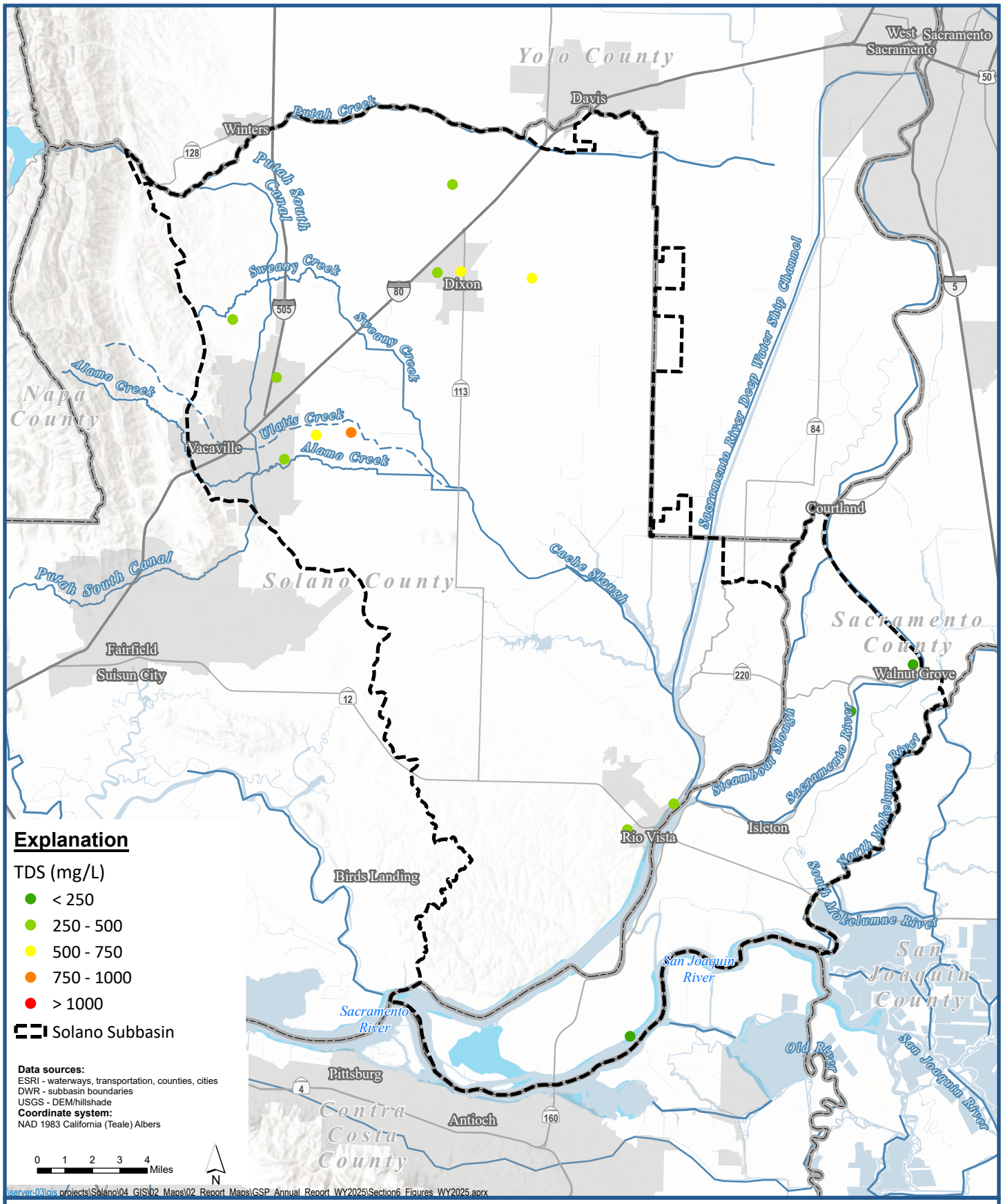


LSCE Team

Nitrate Concentration Evaluation for RMS

Solano County and Subbasin
Annual Report - Water Year 2025

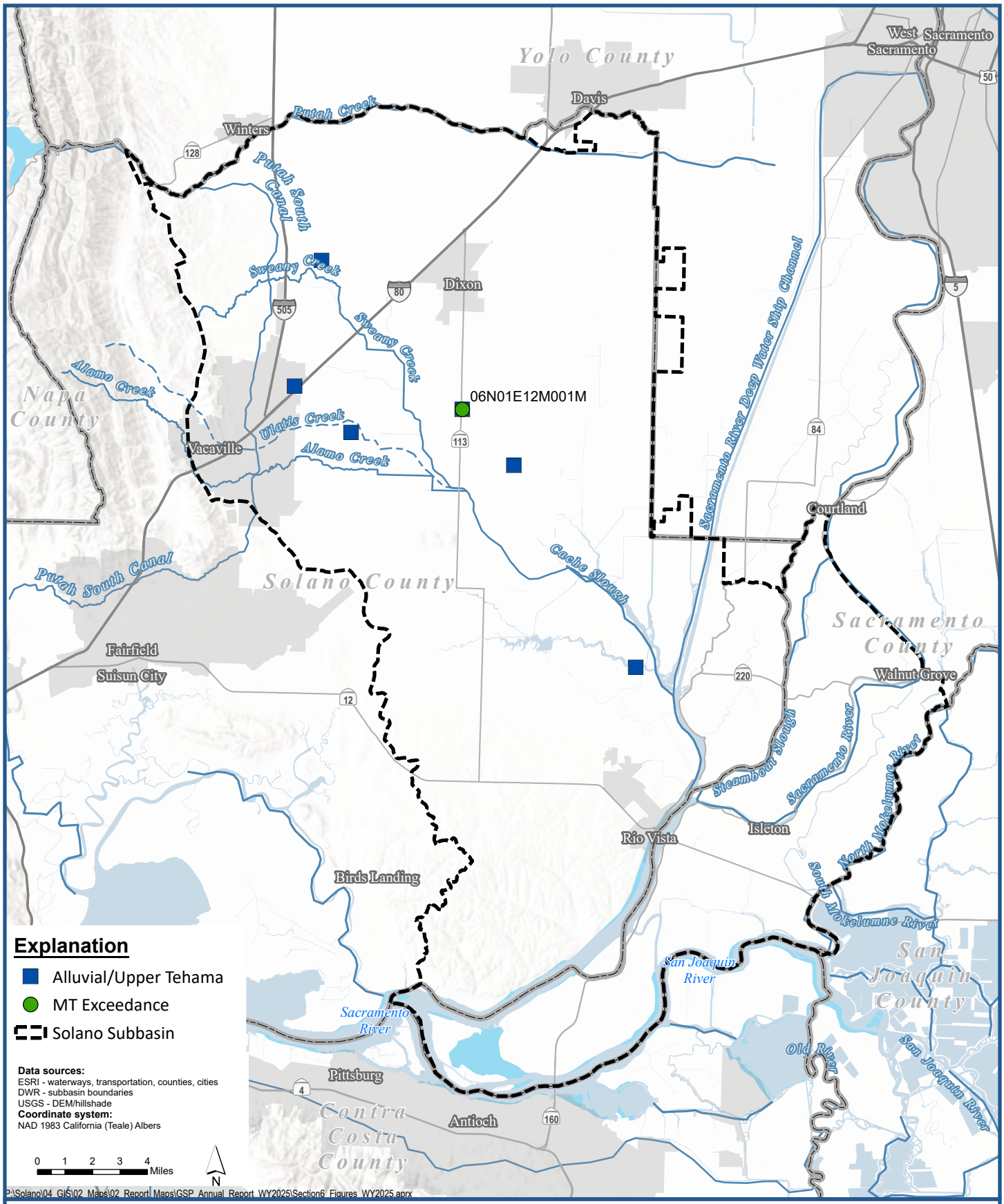
Figure 6-6



Total Dissolved Solids Concentration Evaluation for RMS

Solano County and Subbasin
Annual Report - Water Year 2025

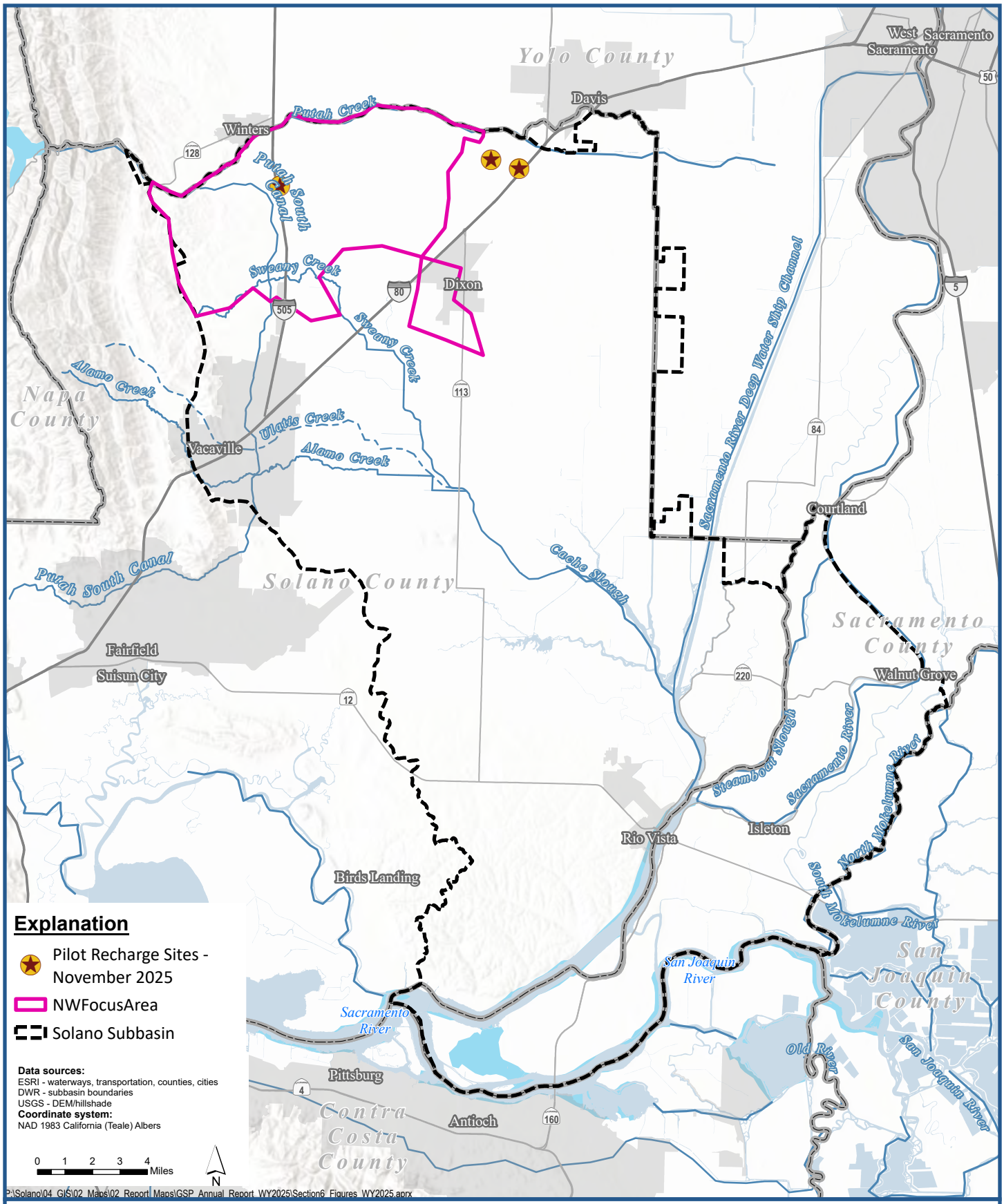
Figure 6-7



Current Conditions for Interconnected Surface Water RMS

Solano County and Subbasin
Annual Report - Water Year 2025

Figure 6-8



LSCE Team

Pilot Recharge Sites

Solano County and Subbasin
Annual Report - Water Year 2024

Figure 7-1

Appendices

Appendix A Putah Creek Accord

Putah Creek 1990
Settlement - FINAL

DE CUIR & SOMACH
A Professional Corporation
400 Capitol Mall, Suite 1900
Sacramento, CA 95814
Telephone: (916) 446-7979
Facsimile: (916) 446-8199

MEMORANDUM

VIA FEDERAL EXPRESS

To: Alan B. Lilly
Daniel J. O'Hanlon

From: Stuart L. Somach

Subject: Settlement – Putah Creek Cases

Date: April 26, 2000

Enclosed is a final settlement package. Please note that the Settlement Agreement provides for its execution in counterparts, although it may be appropriate for the document to be executed in a "ceremony." If we choose to execute by counterparts, I will date the agreement as of the date of the last signature. Also, the exact dollar numbers in the PCC Amended Judgment (Exhibit "B") are not filled in, but shall not exceed the total amount agreed upon.

Please do not hesitate to contact me if you have any questions or need additional information.

SLS:sb
Encl.
cc: Martha H. Lennihan (w/o Encl.)

SETTLEMENT AGREEMENT AND STIPULATION AMONG SOLANO COUNTY WATER AGENCY SOLANO IRRIGATION DISTRICT MAINE PRAIRIE WATER DISTRICT CITIES OF VACAVILLE, FAIRFIELD, VALLEJO AND SUISUN CITY AND PUTAH CREEK COUNCIL, CITY OF DAVIS AND THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

This Settlement Agreement ("Agreement") is entered into this __ day of _____, 2000 among the PUTAH CREEK COUNCIL, the CITY OF DAVIS, and THE REGENTS OF THE UNIVERSITY OF CALIFORNIA (collectively "Yolo Parties"), and SOLANO COUNTY WATER AGENCY, SOLANO IRRIGATION DISTRICT, MAINE PRAIRIE WATER DISTRICT and THE CITIES OF VACAVILLE, FAIRFIELD, VALLEJO, and SUISUN CITY (collectively "Solano Parties").

RECITALS

A. The PUTAH CREEK COUNCIL ("PCC") is a non-profit corporation organized under the laws of the State of California, dedicated to the appreciation, preservation and improvement of Putah Creek.

B. The CITY OF DAVIS ("Davis") is a municipal corporation of the State of California, located in Yolo County.

C. The REGENTS OF THE UNIVERSITY OF CALIFORNIA ("Regents") is a public corporation created by Article 9, Section 9 of the California Constitution.

D. The SOLANO COUNTY WATER AGENCY ("SCWA") is a political subdivision of the State of California, duly organized, existing, and acting pursuant to the laws thereof, with its principal place of business in the City of Vacaville. SCWA holds a contract with the United States Bureau of Reclamation for water service from

the Solano Project and a separate contract for the operation of the Solano Project. The Solano Project includes Monticello Dam, the Putah South Canal and the Putah Diversion Dam, which control the flow of Putah Creek downstream of Monticello Dam.

E. The SOLANO IRRIGATION DISTRICT ("SID") is an irrigation district formed pursuant to Division 11 of the California Water Code. SID is a participating agency within the boundaries of SCWA that contracts with SCWA for water service from the Solano Project.

F. The MAINE PRAIRIE WATER DISTRICT is a California water district formed pursuant to Division 13 of the California Water Code. The district is a participating agency within the boundaries of SCWA that contracts with SCWA for water service from the Solano Project.

G. The CITIES OF VACAVILLE, VALLEJO, FAIRFIELD and SUISUN CITY are municipal corporations of the State of California. The cities are each participating agencies within the boundaries of SCWA that contract with SCWA for water service from the Solano Project.

H. On April 16, 1990, SID and SCWA filed an action in Superior Court to determine the water rights of Putah Creek, Solano County Superior Court No. 108552 (the "Adjudication Action").

I. On August 15, 1990, PCC filed a complaint for injunctive relief under Fish and Game Code Section 5937, Sacramento County Superior Court No. 515766 (the "Putah Creek Council Action").

J. In May of 1991, the Putah Creek Council Action and the Adjudication Action were coordinated by the Judicial Council as Coordination Proceeding Special Title (Rule 1550(b)) PUTAH CREEK WATER CASES Judicial Council Coordination Proceeding No. 2565 (the "Putah Creek Water Cases").

K. In 1993, Davis and Regents, defendants in the Adjudication Action, filed cross-complaints in the Adjudication Action.

L. The parties have been in litigation to determine the minimum instream flow of water required pursuant to the causes of action asserted by the Yolo Parties in lower Putah Creek for the past ten years. On August 23, 1996, three judgments, substantially the same except for the identity of the Yolo Party in whose favor each was entered, the number of defendants, and whether they included declaratory relief, were entered ("Judgments"). Appeals of the Judgments by the Solano Parties are currently pending before the Court of Appeal of the State of California, Third Appellate District ("Appellate Court"), No. 3 Civil C025527. Appeals of subsequent orders awarding attorney fees and costs also are pending in the Appellate Court, No. 3 Civil C025791.

M. On February 28, 1999, SCWA renewed its water service Contract No. 14-06-200-4090R ("USBR Contract") with the United States Bureau of Reclamation ("USBR").

N. On May 6, 1999, SCWA filed a Complaint for Determination of Validity of Contract pursuant to Code of Civil Procedure Section 861 in Solano County Superior Court No. 012612 to validate the USBR Contract ("Validation Action"). The court approved an extension of the time within which the Putah Creek Council and the City of Davis may file oppositions to the validation actions to allow for settlement discussions.

O. PCC and Davis are prepared to file protests to the Validation Action.

P. At the request of SCWA, the USBR asked the State Water Resources Control Board ("SWRCB") to initiate licensing of the water rights for the Solano Project, Permit Nos. 10657, 10658, and 10659 ("Water Rights"), and it is anticipated that SWRCB will process that request.

Q. The parties wish to reach a settlement that will allow the following to occur:

(i) Establishment of the minimum Solano Project releases and minimum instream flows for Putah Creek downstream of the Putah Diversion Dam ("lower Putah Creek") that are set forth in the attached Exhibit "A" (jointly, the "Instream Flows"), and implementation of management measures for the benefit of fish and riparian habitat in and adjacent to the creek;

(ii) Amendment of the Judgments in the Putah Creek Water Cases to reflect the Instream Flows, thereby allowing and requiring dismissal of the pending appeals;

(iii) The licensing of the Water Rights, with inclusion of the agreed upon Instream Flows; and

(iv) Validation of the USBR-SCWA Contract to proceed.

NOW, THEREFORE, the parties agree as follows:

1. Settlement of Numerous Matters. The parties intend this as a settlement of the following matters:

a. The Putah Creek Water Cases, Sacramento Superior Court Case No. JC 2565.

b. The appeals of the Putah Creek Water Cases pending before the Court of Appeal of the State of California, Third Appellate District, Case Nos. 3 CIVIL C025527 and 3 CIVIL 025791.

c. The Complaint for Determination of Validity of Contract pursuant to Code of Civil Procedure Section 861, Solano County Superior Court No. 012612.

2. Amended Judgments.

a. The Parties have agreed upon proposed amended Judgments for each of the actions noted above. These proposed amended Judgments are attached hereto as Exhibits "B", "C" and "D", and are hereby fully incorporated herein by reference. Attached to each of these proposed amended Judgments is an identical Exhibit "A" which sets forth, among other things, the terms of the permanent injunction governing Instream Flows in lower Putah Creek and monitoring requirements. This same Exhibit "A" is attached hereto as Exhibit "A" to this Agreement and is hereby fully incorporated herein by reference.

b. Within ten (10) days after execution of this Agreement by all parties, the Yolo and Solano Parties shall jointly request the Appellate Court to remand Case Nos. 3 CIVIL C025527 and 3 CIVIL C025791 to the Sacramento County Superior Court, the Honorable Richard K. Park, for the specific purpose of considering and acting upon the parties' joint request that the Judgments be amended as set forth in Exhibits "B", "C" and "D" hereto.

c. Within ten (10) days after receipt of the Appellate Court's response to the above referenced request, if such response allows for Superior Court jurisdiction to amend the Judgments, the parties shall jointly petition the Sacramento County Superior Court to amend the Judgments in accordance with the Amended Judgments set forth in Exhibits "B", "C" and "D" hereto.

d. If the Superior Court amends the Judgments in the manner set forth in Exhibits "B", "C" and "D" hereto, or if the Superior Court amends the Judgments in any other manner that is accepted in writing by all of the parties to this Agreement, then within ten (10) days after the Superior Court's entry of the amended judgments, the Solano Parties shall dismiss with prejudice the appeals in the Putah Creek Water Cases in Case Nos. 3 CIVIL No. C025527 and 3 CIVIL C025791.

3. Conformance of Solano Project Water Rights. Within ten (10) days after amendment of the Judgments in accordance with subsection 2.d. above, SCWA shall send this Agreement to the USBR along with a formal request on behalf of all Solano Parties that the USBR promptly file a petition with the SWRCB to amend the Water Rights, specifying that the content of that petition shall be the same as the petition attached hereto as Exhibit "E" (the "Petition"). The Yolo Parties shall provide written notification to the USBR that they support the Petition. After the USBR files the Petition with the SWRCB, all parties shall promptly inform the SWRCB in writing that they support amendment of the Water Rights to conform to the provisions of the Petition.

4. Licensing Process. If the USBR petitions the SWRCB to amend the Water Rights in the manner described in Exhibit "E" hereto, then no party to this Agreement will: (a) oppose the licensing of the Water Rights by the SWRCB, including the vesting of the Water Rights in the name of SCWA and the Solano Project Participating Agencies, so long as the licensing is consistent with the terms and conditions of this Settlement Agreement; (b) oppose amendment of the authorized places of use in the Water Rights to include the areas designated in Exhibit "F" hereto; or (c) oppose adding frost protection, municipal, industrial, agriculture, irrigation or recreation to the authorized purposes of use in the Water Rights; Provided, however, any party to this Agreement may file a protest with the SWRCB, or otherwise participate in the SWRCB proceedings in order to insure that the SWRCB, in fact, amends the Water Rights in manners that are consistent with this Settlement Agreement, including Exhibits "E"

and "F", or to ask the SWRCB to include terms or conditions in the licenses that provide for equal treatment of all Solano Project Participating Agencies.

5. Compliance with Provisions of Agreement. Immediately upon execution of this Agreement, SCWA and SID shall operate the Solano Project to maintain the Instream Flows that are set forth in the attached Exhibit "A", and all the parties shall, as provided for herein, take the necessary actions to implement all of the provisions of this Agreement.

6. Notice to Riparian Landowners. Within 60 days after the filing of the Amended Judgments associated with the Appellate Court's consolidated appeal in Case No. 3 CIVIL No. C025527, SCWA shall notify all riparian landowners within lower Putah Creek that it intends to bring legal action against any illegal diverter whose action adversely affects the Solano Project's ability to meet its obligations under the Amended Judgments. The notification letter shall explain the means by which SCWA will make a determination of illegal diversions. The term "illegal diversion" shall mean a diversion determined to be illegal upon the application of the formulas contained within the attached Exhibit "A-2".

7. Validation Action. Upon execution of this Agreement, no party will oppose entry of a default judgment in the Complaint for Determination of Validity of Contract pursuant to Code of Civil Procedure Section 861 in Solano County Superior Court No. 012612.

8. Habitat Conservation Plan.

a. SCWA is currently working with various Cities and districts within Solano County and the United States Fish and Wildlife Service ("USFWS") to develop habitat conservation plans pursuant to Section 10 of the federal Endangered Species Act, 16 U.S.C. § 1539. The habitat conservation plans may also involve the National Marine Fisheries Service ("NMFS") and the California Department of Fish and Game ("DF&G") if species under their jurisdictions are involved. To the extent that SCWA or

participating Cities and districts within Solano County include fishery and riparian actions on Lower Putah Creek in these habitat conservation plans, the Yolo Parties shall inform the USFWS (and NMFS and DF&G, if appropriate) that the Exhibit "A" flows, and any management measures that may be approved by the LPCCC, subject to the terms set forth in Section 9 hereof, are acceptable elements of those habitat conservation plans.

b. As part of this habitat conservation planning process, SCWA may seek a Safe Harbor Agreement from the USFWS, pursuant to the provisions of 50 C.F.R. §§ 17.22, 17.32; see also Final Safe Harbor Policy – Fish and Wildlife Service, National Marine Fisheries Service, 64 FR 32713, June 17, 1999 (hereinafter "Final Safe Harbor Policy"), and from the National Marine Fisheries Service pursuant to its Final Safe Harbor Policy. Both the habitat conservation planning as well as the development of the Safe Harbor Agreement may rely upon the Exhibit "A" flows as well as other terms and conditions of this Settlement Agreement. The Yolo Parties shall not oppose the instream flow provisions of any habitat conservation plan developed by the Solano Parties as long as that plan includes the provisions of this Settlement Agreement, and the Yolo Parties shall not oppose the instream flow provisions of any Safe Harbor Agreement that complies with and includes the terms and conditions of this Settlement Agreement. In this regard, the Yolo Parties shall not object to the utilization of the Exhibit "A" flows without Exhibit "A" "Supplemental Flows," set forth in Section C of Exhibit "A" hereto, as part of the "baseline conditions" for both the habitat conservation plan and the Safe Harbor Agreement, and the Yolo Parties acknowledge that SCWA may seek a Safe Harbor Agreement that encompasses these Exhibit "A" Supplemental Flows.

9. Term.

a. The term of this Agreement as it addresses the provisions of Supplemental Flows, set forth in Section C of Exhibit "A" hereto, shall be for a period of twenty (20) years. A reasonable time before the expiration of the twenty-year period, but in no case later than one year before the termination

of the twenty-year period, the parties shall meet and confer regarding potential amendments to the Supplemental Flows set forth in Section C of the attached Exhibit "A". If the parties are unable to agree to amendments, then the Supplemental Flows set forth in Section C of Exhibit "A" hereto shall continue to be maintained after the expiration of the 20-year period, but also shall be subject to amendment by the SWRCB or a court of competent jurisdiction in accordance with applicable laws, and the provisions of Section 10 of this Agreement shall cease to apply and be of no further force or effect with respect to the "supplemental flows" set forth in Section C of the attached Exhibit "A".

b. Except as specified above, the term of this Agreement shall be in perpetuity.

c. Notwithstanding any other provision of this Agreement, if the Appellate Court denies the parties' request to remand Case Nos. 3 CIVIL C025527 and 3 CIVIL C025791 to the Superior Court or if the Superior Court denies, in full or in part, the parties' petitions to replace the Judgments with the Amended Judgments set forth in Exhibits "B", "C" and "D" hereto, then the parties shall meet and confer with respect to how best to proceed, and shall consider modification of this Agreement or other measures to obtain approval of the remand or petitions, and if the parties can reach agreement thereon, shall seek the appropriate Court's approval. If the parties' request to the Appellate Court for a remand to the Superior Court or the parties' petition to the Superior Court is denied, and the parties do not agree to modification of this Agreement or other measures which result in approval of the remand or petitions, then the parties shall no longer be bound to the terms of this Agreement. Under the circumstances described in the preceding sentence, nothing in this Agreement or any Exhibit hereto shall be construed as a waiver of any right or claim that any party otherwise may have or assert with respect to the pending appeals, nor shall any of these

documents or other settlement documents or discussions among the parties to this Agreement and with the USBR be utilized, in any way, in these pending appeals or in any other related proceeding.

10. Restrictions Upon Seeking Changes to Flow Regime.

a. The parties to this Agreement, for the purposes of settlement have agreed upon the instream flow regime set forth in Exhibit "A" as an appropriate minimum flow regime for lower Putah Creek. During the applicable term of this Agreement as set forth in Section 9 above, no party to this Agreement will directly assert a claim or request of any kind, whether by petition, complaint or otherwise, directed to any local, state or federal agency or court, which seeks to reduce or increase the minimum instream flows in Lower Putah Creek required to be maintained by the Solano Project as set forth in Exhibit "A". Accordingly, no party shall support actions, claims or requests directly or indirectly through testimony, funding or otherwise, which seek to reduce or increase the instream flows required by Exhibit "A", including by way of illustration, but not limited to:

i. a complaint or petition to the State Water Resources Control Board;

ii. a complaint or petition to the California Department of Fish and Game;

iii. a complaint, petition, or request to the United States Fish and Wildlife Service or the National Marine Fisheries Service to list as threatened or endangered any species then known to exist in Lower Putah Creek, or to include Lower Putah Creek as critical habitat for any listed species;

iv. a complaint or motion before any state or federal court;

v. a proposal, request or complaint to the USBR in the context of contract negotiations or otherwise.

b. The restrictions in Section 10.a. do not apply to actions, claims or requests that do not seek, directly or indirectly, to reduce or increase the instream flow and other requirements set forth in Exhibit "A". For example, nothing herein shall preclude the parties to this Agreement from participating in proceedings dealing with the topics of water quality, riparian water rights, habitat improvement or restoration other than changes in Instream Flows, or issues of general state-wide or regional concern or application, or in proceedings involving any creek or stream besides lower Putah Creek, even if positions taken by parties in those proceedings are inconsistent with the end results obtained in this Agreement and even if those other proceedings may have the effect of establishing policies or precedents that are inconsistent with the end results obtained in this Agreement.

11. Maximum Solano Project Diversions. The parties agree that the maximum amount of water that may be put to beneficial use from the Solano Project for municipal, industrial and agricultural purposes, by direct diversion from Putah Creek or by withdrawal from storage, pursuant to any water rights licenses to be issued by the SWRCB on Permit Nos. 10657, 10658, and 10659, shall be approximately 248,000 acre feet per year, and that this amount shall be the maximum amount, in any year, that Solano Project water users will be able to take (through direct diversion and storage withdrawals) from the Solano Project. Any use of carryover water shall be included under this limit.

12. Additions to Place of Use and Point of Re-Diversion.

a. Subject to the qualifications expressly stated in this paragraph, the Solano Parties shall support any action taken by the Regents to add, to the authorized places of use for Solano Project water in the Water Rights and in the USBR contract, any additional lands that have been, or in the future may be, added to the University of California, Davis campus (including the Russell Tract), and to add the pumps that

pump water from lower Putah Creek to the Russell Tract to the authorized points of re-diversion in the Water Rights and to the point of delivery in the USBR contract. Such support shall include agreement by SCWA to any necessary amendments to the USBR contract to make these additions and any necessary requests by SCWA to the USBR to file a petition with the SWRCB to make the necessary changes to the Water Rights. The Solano Parties' support that is described in this paragraph is expressly conditioned upon the development of reasonable conditions so that the Regents will be responsible for: (a) appropriate mitigation measures to address any impacts on the fishery resources of lower Putah Creek from the diversion of Solano Project water from lower Putah Creek at the Russell Tract; and (b) separately accounting for the Regents' diversions pursuant to riparian rights and the Regents' diversions of Solano Project water. In addition, deductions from the Regents' Solano Project water account shall be made for any channel losses that are caused by the conveyance of Solano Project water from the Putah Diversion Dam to the Russell Tract for diversion by the Regents at the Russell Tract.

b. The parties to this Agreement agree that whenever the Regents' diversions of Solano Project water from lower Putah Creek at the Russell Tract are less than or equal to 20 cubic feet per second ("cfs"), the channel losses described above shall be deemed to be 10 percent of the amount of Solano Project water that the Regents divert from lower Putah Creek at the Russell Tract. The parties to this Agreement also agree that, if the Regents' diversions of Solano Project water from lower Putah Creek at the Russell Tract ever are greater than 20 cfs, then SCWA and the Regents shall measure the streamflow losses in lower Putah Creek between the Putah Diversion Dam and the Regents' diversion at the Russell Tract, and the channel losses described above shall be deemed to be 10 percent of the first 20 cfs of Solano Project water that the Regents divert from lower Putah Creek at the Russell Tract, plus any incremental streamflow losses that are caused by releases of additional Solano Project water from the Putah Diversion Dam to provide for additional diversions by the Regents at the Russell Tract above a 20 cfs diversion rate.

13. Binding Upon Successors, Parties Hereto. This Agreement shall be binding upon and shall inure to the benefit of, and be enforceable by the successors, assigns, administrators, trustees or receivers of the parties hereto, subject to the terms hereof. Only the entities that are parties to this agreement are bound by the provisions hereof. The parties acknowledge that nothing in this agreement limits or conditions actions by individuals not acting in a representative capacity of any party hereto, including *inter alia* faculty members of the University of California, employees, directors, board or council members, and other individuals exercising any right or seeking any remedy that is available to them under state or federal law; provided, however, that nothing herein is intended to be construed as a waiver of any defenses that otherwise might be available against such individuals including, but not limited to, assertions of collateral estoppel.

14. Dispute Resolution. If any party to this Settlement Agreement seeks to enforce any aspect of this Settlement Agreement or any aspect of Exhibits "B", "C" or "D", or has any concern or complaint with respect to any issue that is related to this Settlement Agreement or Exhibits "B", "C" or "D", then it may first raise its claims or concerns with the LPCCC. The LPCCC shall promptly consider the claims or concerns raised by the complaining party and attempt to resolve those claims or concerns in an expeditious fashion.

15. Counterparts. This Agreement may be executed simultaneously in one or more counterparts, each of which shall be an original, but all of which together shall constitute one and the same document.

16. Complete Agreement. This Agreement contains the entire understanding of the Parties related to their interests, obligations and rights in connection with the subject matter set forth herein. All prior communications, negotiations, stipulations and understandings, whether oral or written are of no force or effect and are superseded, except as referenced herein.

17. Disability of Putah Creek Council. If the PCC is dissolved, is suspended by the Secretary of State, is no longer a corporation in good standing, or for any other reason is unable to conduct its affairs for a period of at least six months, then the remaining parties to this Agreement are excused from any obligation to seek the consent of the PCC to modify this Agreement, or to take any other action for which the PCC's consent, vote or participation would otherwise be required under this Agreement.

18. No Admission. Each party acknowledges that neither this Agreement, nor actions taken pursuant to this Agreement, shall be taken or construed to be an admission or concession of any kind with respect to alleged liability or alleged wrongdoing by the other, except as may be necessary in any action seeking to enforce the terms of this Agreement, or the terms of any of the exhibits hereto.

19. Settlement of Disputes Concerning SCWA/UCD Solano Project Contract. This Agreement shall not become effective unless and until the Regents and SCWA execute a separate agreement settling *Regents of the University of California v. Solano County Water Agency*, Sacramento County Superior Court No. 99AS02824, and resolving *Solano County Water Agency v. All Persons Interested in the Matter of the Contract Between the Solano County Water Agency and the University of California for the Delivery of Water from the Solano Project*, Solano County Superior Court No. C12608.

SOLANO COUNTY WATER AGENCY

By _____
Chairman

Attest: _____
Secretary

SOLANO IRRIGATION DISTRICT

By _____
President

Attest: _____
Secretary

MAINE PRAIRIE WATER DISTRICT

By _____
President

Attest: _____
Secretary

CITY OF FAIRFIELD

By _____
Mayor

Attest: _____
Clerk

CITY OF VACAVILLE

By _____
Mayor

A test: _____
Clerk

CITY OF VALLEJO
A Municipal Corporation

By _____
David R. Martinez

APPROVED AS TO FORM: City Manager

_____ Attest: _____

JOHN M. POWERS, City Attorney; ALLISON VILLARANTE, City Clerk

APPROVED AS TO CONTENT:

_____

CITY OF SUISUN CITY

By _____
Mayor

Attest: _____
Clerk

PUTAH CREEK COUNCIL

By _____

CITY OF DAVIS

By _____
Mayor

Attest: _____
Clerk

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

By _____

Exhibit "A-1"

Effects of Illegal Diversions of Water from Lower Putah Creek on Solano Project's Obligations to Maintain Exhibit A Instream Flow Requirements

1. The Solano Project shall satisfy all of the release and instream flow requirements that are specified in Exhibit A at all times, whether or not any illegal diversions of water from lower Putah Creek are occurring, except to the extent that exceptions to the instream flow requirements are authorized by this Exhibit "A-1". These exceptions shall only be authorized during the irrigation season. "Irrigation season" shall mean the period from March 1 through October 31 of each year.

2. To determine the Solano Project's obligations to satisfy the instream flow requirements specified in Exhibit A during times when illegal diversions from lower Putah Creek are occurring, an Illegal Diversion Account shall be established. Starting at the beginning of the sixth irrigation season during which this Illegal Diversion Account is drawn upon, the balance in this account shall be set to 1,000 acre feet at the beginning of each irrigation season, regardless of the account's balance at the end of the prior irrigation season. Prior to the sixth irrigation season in which the Illegal Diversion Account is drawn upon, the balance in the Illegal Diversion Account at the beginning of each irrigation season shall be set to 2,000 acre feet. Any credits made pursuant to Paragraph 9 of this Exhibit "A-1" for any irrigation season shall be in addition to the initial balance. SCWA shall maintain an accurate accounting of all credits to and deductions from this account, and shall provide all members of the LPCCC with an updated accounting of the credits to and deductions from this account on at least a weekly basis whenever such credits or deductions are made.

3. At the beginning of each irrigation season, SCWA shall provide written notice to all riparian landowners of SCWA's projections of the time period during which such landowners legally may divert from each reach of lower Putah Creek during the irrigation season. This notice shall encourage each riparian landowner to provide SCWA with the dates and amounts of the landowner's planned diversions of water from lower Putah Creek during the irrigation season. SCWA may, in its discretion, provide additional notices, making updated SCWA projections of the amounts of water that such landowners legally may divert from lower Putah Creek, to these landowners as the irrigation season progresses. The calculations in these notices shall be based on the formulas and procedures described in Exhibit "A-2". SCWA shall provide a copy of one of each type of all such notices to all of the members of the LPCCC at the same time that SCWA provides such notices to any riparian landowners.

4. The term "illegal diversion" in this Exhibit "A-1" means a diversion that is illegal based on the formulas and procedures described in Exhibit "A-2". The sole purposes of this definition are for implementing the provisions of this Exhibit "A-1" regarding deductions from the Illegal Diversion Account pursuant to this paragraph 4 and modifying the Solano Project's release requirements pursuant to paragraph 6 of this Exhibit "A-1". If SCWA has filed, and is diligently pursuing, a court action against a landowner with an illegal diversion, and if SCWA has complied with all of the provisions of paragraph 3 of this Exhibit "A-1", and is complying with all of the provisions of paragraph 5 of this Exhibit "A-1", then deductions shall be made from the Illegal Diversion Account for any amounts of water that the Solano Project releases from the Putah Diversion Dam into lower Putah Creek during the irrigation season solely for the purpose of compensating for that illegal diversion

while maintaining the instream flows specified in Exhibit "A". "Diligently pursuing" means seeking, at the earliest possible opportunities, a temporary restraining order, a preliminary injunction and a permanent injunction stopping the illegal diversion, and a declaratory judgment regarding the illegality of the diversion. If there is more than one illegal diversion, then all of the provisions of this paragraph shall apply to each illegal diversion.

5. During any period during which deductions are being made from the Illegal Diversion Account, SCWA shall make streamflow measurements on a continuous basis at sufficient locations along lower Putah Creek to make the calculations and determinations described in Exhibit "A-2". During such periods, SCWA shall provide copies of all of the streamflow measurement data, the calculations and determinations described in Exhibit "A-2" and the accurate accounting of all credits to and deductions from the Illegal Diversions Account to all members of the LPCCC at least once each week, and shall post all such data, calculations and determinations on its Internet website, or make such information available to members of the LPCCC and the public by similar electronic means, and shall update such posted information at least once each day.

6. If the balance in the Illegal Diversion Account ever reaches zero, then, during the remainder of the irrigation season during which the Account balance reached zero and while SCWA continues to diligently pursue the court action described in the paragraph 4 above and continues to make available the data, calculations, determinations and reports described in paragraph 5 above, and while the court action is pending, the Solano Project shall not be required to fully comply with any instream flow requirement that is specified in Exhibit "A" for a point that is located downstream of any illegal diversion that is subject to the court action and that occurs after the Illegal Diversion Account balance reaches zero.

Instead, under these conditions, the Solano Project shall release from the Putah Diversion Dam into lower Putah Creek at least the amounts of water that would be sufficient to satisfy all of the instream flow requirements in Exhibit "A", if the illegal diversion that is subject to the court action were not occurring. Under these circumstances, the Solano Project's release obligations shall be adjusted as frequently as necessary to reflect changes in hydrological conditions or changes in the rate of the illegal diversion. Immediately upon the cessation of such illegal diversion, the conclusion, dismissal or cessation of diligent pursuit of the court action, or the end of the irrigation season, whichever occurs first, the Solano Project shall satisfy all of the instream flow requirements in Exhibit "A". If court actions regarding more than one illegal diversion are pending, then the provisions of this paragraph shall apply to all such illegal diversions.

7. Deductions from the Illegal Diversion Account for an illegal diversion may be made only for a maximum of two years after the court action described in paragraph 4 above is filed against the landowner with the illegal diversion. Even if a final judgment is not issued in such court action within two years after the action is filed, and even if such court action is dismissed for any reason, the Solano Project nevertheless thereafter shall be required to maintain all of the instream flows described in Exhibit "A", and no further deductions shall ever be made from the Illegal Diversion Account for any illegal diversion that is or was the subject of the court action. However, if a new illegal diversion with neither a point of diversion nor a place of use that is within the scope of the court action described in paragraph 4 above occurs, then the provisions of paragraphs 4, 5 and 6 above, and this paragraph, shall apply to the new illegal diversion. If there is more than one such new illegal

Exhibit "A-2"

Solano County Water Agency's Methodology for Monitoring and Quantifying the Availability and Use of Riparian Water in Lower Putah Creek

This document provides the Solano County Water Agency's ("SCWA") explanation and basis for its methodology for monitoring and quantifying the availability and use of riparian water in Putah Creek, downstream of the Putah Diversion Dam. SCWA's methodology, hereafter referred to as the Lower Putah Creek Riparian Water Program ("PRWP"), will be used by SCWA to (1) differentiate between and quantify the availability of riparian versus non-riparian waters in Putah Creek, downstream of the Putah Diversion Dam, and (2) identify and quantify illegal water diversions, downstream of the Putah Diversion Dam. SCWA anticipates that implementation of the PRWP will increase the efficiency with which the instream flow requirements of the Solano Project, as specified by the Putah Creek Settlement Agreement, are satisfied, and facilitate the lawful diversion of riparian water downstream of the Putah Diversion Dam.

1.0 OVERVIEW

1.1 Key Elements of Lower Putah Creek Riparian Water Program

The PRWP consists of two components: Pre-irrigation season water availability forecasts, and real-time stream flow monitoring during the irrigation season, where "irrigation season" is defined as March 1 through October 31. Annual water availability

forecasts will be provided to riparian water users prior to the irrigation season, so they and other interested parties can plan and, if necessary, make other arrangements for obtaining irrigation water, before significant time and financial resources are committed to the cultivation of a given crop. Real-time monitoring will be conducted to: (1) determine, on a daily basis, the quantities of riparian water that are available to water users in Lower Putah Creek, and (2) differentiate and quantify, on a daily basis, legal versus illegal riparian diversions.

1.2 Definition of Riparian Water

For the purposes of the PRWP, riparian stream flows are defined as any surface water derived from precipitation or rising groundwater that, given prevailing hydrologic conditions, would occur in Lower Putah Creek in the absence of the Solano Project. Non-riparian water, such as treated wastewater and agricultural return flows originating from a non-riparian source (e.g., pumped groundwater that would not otherwise be tributary to the creek) cannot, by definition, be diverted by riparian water right claimants and, therefore, is not included as a source of riparian water from Lower Putah Creek.

2.0 WATER AVAILABILITY FORECASTS

SCWA's riparian water availability forecasts for Lower Putah Creek will be based on stream flow conditions observed in the Putah Creek drainage, upstream of the Putah Diversion Dam, in the prior (i.e., antecedent conditions) and current water year. Forecasts

will be made on January 1, March 1 and May 1. The January 1 and March 1 forecasts, which will be made before the current rainy season is over, will be based in part on projected stream flow conditions for the balance of the rainy season, while the May 1 forecast, the final forecast for the water year, will be based on actual runoff measured to date. Both the January 1 and March 1 forecasts will include three scenarios, based on the assumption that the balance of the rainy season will either be "wet" (25% exceedance), "normal" (50% exceedance) or "dry" (75% exceedance).

In order to address the differing sources and durations of riparian stream flows (surface stream flows from Putah Creek and/or tributaries to Putah Creek, or rising groundwater), Lower Putah Creek has been divided into five reaches. Water availability forecasts will be made for each reach. Stream reach designations and the analytic framework for making water availability forecasts are presented in "Attachment 1".

3.0 REAL-TIME MONITORING

3.1 Quantifying Available Riparian Water Supply

Stream flows and the associated stream flow gains and losses will be monitored by reach, on a continuous basis, and the availability of riparian water and extent of illegal diversions will be determined daily, using a series of water mass balance equations to track the quantities of both riparian and non-riparian water entering and leaving each stream reach.

A summary of the equations used to define riparian water availability, by stream reach, is presented in Attachment 1.

Although the determination of net riparian flow is based on real-time stream flow measurements, there are situations where real-time stream flow measurements are not practical and therefore simplifying assumptions must be used, much as they are in the Condition 12 Settlement Agreement for the Upper Putah Creek drainage. For example, under existing conditions it is difficult to measure accurately real-time stream flow losses in the stream reach now inundated by Lake Solano. Consequently, a "fixed" loss figure previously adopted by the United States Bureau of Reclamation may be used in the water mass balance calculation for this reach. In all cases, the simplifying assumptions used to quantify the availability of riparian water are purposely conservative in the sense that they tend to overstate the availability of riparian stream flows. Overstating riparian water availability is preferred, since it presumably increases the enforceability of the PRWP and its acceptability to riparian water users.

3.1.1 Data Collection

3.1.1.1 Measurement of Riparian Diversions

Riparian diversions will either be measured directly, using an appropriate meter and assuming landowner/operator permission is obtained, or indirectly, via measurement of creek stream flows in the vicinity of the diversion. Riparian diversions typically constitute a

readily measurable fraction of the total stream flow in any given reach (500-2,000 gallons per minute, or about 1-5 cubic feet per second), and are therefore easily detected by continuously measuring stream flows entering and leaving a given stream segment.

3.1.1.2 Measurement of Agricultural Return Flows and Wastewater Discharges

The agricultural return flows entering Lower Putah Creek are for the most part non riparian water sources, as are the treated wastewater discharges from the University of California - Davis (U.C. Davis) water treatment facility, which enter Lower Putah Creek near Old Davis Road. Nevertheless, these water sources must be quantified for water mass balance accounting purposes. The University's treated wastewater discharges are measured and recorded by the treatment plant operators. Most of the agricultural return flows are too small and/or sporadic to warrant direct measurement, and will therefore be estimated, or if insignificant relative to the total creek stream flow, ignored. However, one notable exception is the Willow Canal, which discharges into Lower Putah Creek just upstream of Pedrick Road. Discharges from the Willow Canal, which is operated by the Yolo County Flood Control and Water Conservation District (YCFC&WCD), will be measured as necessary.

3.1.1.3 Measurement of Groundwater Seepage and Evapotranspiration

The amounts of groundwater seepage (into or out of the creek) and water lost to open-water evaporation and transpiration by riparian vegetation vary gradually over time, in comparison to the fluctuating gains and losses associated with water diversions and

agricultural return flows. For the purposes of the PRWP, the net flow gain or loss from these factors (groundwater seepage, evaporation and transpiration) are combined into a single term that represents the natural or "background" net stream flow gain or loss rate within a given reach. Background gains and losses are most easily quantified as the difference in stream flow over a given reach ("top of reach" stream flow versus "bottom of reach" stream flow), in the absence of any diversions or "intra reach inflows."

Groundwater seepage along the reach from I-505 to Stevenson Bridge typically transitions from net loss (seepage out of the creek) to net gain (seepage into the creek). The location of the transition point and the total amount of influent seepage along the gaining stretch depend on the regional groundwater levels in the underlying groundwater basin. This reach will be subdivided into two sub-reaches when necessary to calculate riparian water availability. The upstream end of the gaining segment will be detected by periodic stream flow measurements and/or temperature changes in the creek.

3.1.1.4 Special Situations

Pumping from Riparian Wells

There is no clear boundary between wells that induce additional seepage from the creek and wells that pump regional groundwater; the percentage of pumped water that consists of induced seepage decreases gradually with depth and horizontal distance from the creek. A pragmatic approach adequate for the purpose of the PRWP is to include in the accounting the effects of a well if its effect on stream flow can be detected by the stream flow

ATTACHMENT 1 TO EXHIBIT "A-2"

1.0 Pre Irrigation Season Predictions

A) Objective:

To estimate future availability of riparian stream flows, based on projected and/or prior hydrologic conditions in the Putah Creek drainage. For pre irrigation season prediction purposes, assume riparian stream flows consist of surface runoff from precipitation and rising groundwater

B) Analytic Approach:

i) Divide Lower Putah Creek into the following reaches:
   a) Putah Diversion Dam to Highway 505 Bridge (a "losing reach")
   b) Highway 505 Bridge to Stevenson Bridge (a "gaining reach")
   c) Stevenson Bridge to I-80 Bridge (a "losing reach")
   d) I-80 Bridge to Mace Boulevard (a "losing reach"
   e) Mace Boulevard to Yolo Bypass (a "losing reach")

(Reach designations based on hydrogeologic features, proximity of suitable stream flow gaging sites and existing riparian diversions. When necessary, reach "b" will be subdivided into two sub-reaches.)

ii) Predict average monthly flow and date of zero flow for each of the above riparian water sources, in each of the five reaches:
   a) Surface runoff: calculate using statistical relationships derived from historical data.
      - Stream flow recession curves derived from stream flow gaging data for "At Winters", "Near Winters" and "Near Davis" stream flow gaging stations
      - Stream reach percolation/evapotranspiration loss estimating algorithms developed for the Solano County Water Agency's Lower Putah Creek stream flow model

   b) Rising groundwater: calculate using statistical relationships derived from historical data.
      - Stream reach groundwater gain/loss estimating algorithms developed for the Solano County Water Agency's Lower Putah Creek streamflow model

C) Timing of Pre Irrigation Season Predictions:

i) January 1 – Predictions based on hydrology of water year to date and three scenarios for the remainder of the year's rainy season: "wet year" (25% Lake

Berryessa inflow exceedance), "normal year" (50% Lake Berryessa inflow exceedance) and "dry year" (75% Lake Berryessa inflow exceedance)

ii) March 1 – Predictions based on hydrology of water year to date and projected 25%, 50% and 75% exceedance runoff rates for the remainder of the year's rainy season

iii) May 1 – Final prediction based on hydrology of the water year through April

2.0 Methodology for Quantifying Riparian Streamflows During Irrigation Season

Note: Riparian stream flows are defined here as any surface water derived from precipitation or rising groundwater that, given prevailing hydrologic conditions, would occur in Lower Putah Creek in the absence of the Solano Project. Non riparian water, such as treated wastewater and agricultural return flows originating from a non riparian source (e.g., pumped groundwater) cannot, by definition, be diverted by riparian water right claimants and therefore, are not included as a source of riparian water from Lower Putah Creek.

A) Overview:

i) Calculate, on a daily basis, pre Solano Project stream flows (i.e., stream flow that would occur if there were no dams – no Solano Project) at the Putah Diversion Dam site

ii) Compare computed daily pre Solano Project stream flow (i.e., stream flow that would occur if there were no dams – no Solano Project) with current Putah Diversion Dam release – determine what fraction of the current release is stored water or any other non riparian water source, versus riparian stream flows

iii) Using real-time stream flow monitoring data to quantify prevailing percolation/evapotranspiration losses and any non riparian water sources, calculate riparian flows by stream reach. The total quantity of riparian water in any given reach is defined here as the sum of all riparian water sources less percolation/evapotranspiration losses.

B) Analytical Approach:

i) Riparian stream flows at Putah Diversion Dam site

$$USRSF = LBI + IDTI - IDCL$$

Where: USRSF = Riparian stream flow at Putah Diversion Dam

LBI = Computed/measured Lake Berryessa inflow (less any associated non riparian flow)

IDTI = Inter Dam Reach tributary inflow (less any associated non riparian flow)

IDCL = channel percolation/evapotranspiration losses that would occur in the Inter Dam Reach in the absence of Lake Solano

(A stream gage will be placed on Pleasants Creek to facilitate real-time estimation of inflow from inter-dam tributaries. For accounting purposes, seepage and evaporation losses from Lake Solano are assumed to be constant and will therefore be characterized by a fixed continuous loss rate term).

ii) Riparian stream flows in first reach downstream of Putah Diversion Dam (Putah Diversion Dam to 505 Bridge)

1RRSF = USRSF + TRSF + 1RAG – 1RCL

Where: 1RRSF = Computed riparian stream flow in Reach 1
USFSF = Computed riparian stream flow at Putah Diversion Dam
TRSF = Measured stream flow from tributaries (Dry Creek, McCune aka Pleasant Creek), less any associated non riparian flow
1RAG = Ag return flow water originating from a riparian source in = reach 1
1RCL = Measured channel percolation/evapotranspiration losses in reach 1

Notes:
(1) Agricultural return flow water that originates from a riparian water source (riparian water diverted from Putah Creek or associated tributaries) is classified as riparian water and therefore can be lawfully diverted by other riparian water right claimants.

iii) Riparian stream flows in second reach downstream of Putah Diversion Dam (505 Bridge to Stevenson Bridge)

2RRSF = 1RRSF – 1RD (+/-) 2RCL + 2RAG

Where: 2RRSF = Computed riparian stream flow in Reach 2
1RRSF = Computed riparian stream flow in Reach 1
2RCL = Combined sum of groundwater "gains", channel percolation/evapotranspiration losses in reach 2
2RAG = Ag return flow water in reach 2 originating from a riparian source
1RD = Riparian diversion in Reach 1

Notes:

(1) There are no significant tributaries entering Putah Creek in this Reach

(2) Due to the spatial and temporal variability of rising groundwater, portions of the so called "gaining reach" (generally the upstrcammost third of the reach) frequently lose rather than gain water. Accordingly, there are instances when some of the riparian diverters within Reach 2 have access

to rising groundwater, while others do not. When necessary, Reach 2 will be broken into two sub reaches for the purpose of quantifying riparian stream flows.

iv) Riparian stream flows in third reach downstream of Putah Diversion Dam (Stevenson Bridge to I-80)

3RRSF = 2RRSF – 2RD – 3RCL + 3RAG

Where: 3RRSF = Computed riparian stream flow in Reach 3
2RRSF = Computed riparian stream flow in Reach 2
2RD = Riparian diversions in Reach 2
3RCL = Measured channel percolation/evapotranspiration losses in reach 3
3RAG = Ag return flow water in reach 3 originating from a riparian source

v) Riparian stream flows in fourth reach downstream of Putah Diversion Dam (I-80 to Mace Boulevard)

4RRSF = 3RRSF– 3RD – 4RCL + 4RAG

Where: 4RRSF = Computed riparian stream flow in Reach 4
3RRSF = Computed riparian stream flow in Reach 3
3RD = Riparian diversion in Reach 3
4RCL = Measured channel percolation/evapotranspiration losses in reach 4
4RAG = Ag return flow water in reach 4 originating from a riparian source

vi) Riparian stream flows in fifth reach downstream of Putah Diversion Dam (Mace Boulevard to RM 0.0 aka Yolo Bypass)

5RRSF = 4RRSF– 4RD –5RCL + 5RAG

Where: 5RRSF = Computed riparian stream flows in Reach 5
4RRSF = Computed riparian stream flows in Reach 4
4RD = Riparian diversions in Reach 4
5RCL = Measured channel percolation/evapotranspiration losses in reach 5
5RAG = Ag return flow water in reach 5 originating from a riparian source

Note: The above formulas will be adjusted as necessary to reflect changing conditions such as new or terminated diversions or discharges.

1.0 Methodology for Quantifying Illegal Riparian Diversion During Irrigation Season

Note: Diversions in excess of the available riparian stream flow (i.e.. diversion of water released from storage or other non riparian flow) are considered illegal

A) Overview:

For each reach, calculate difference between daily riparian diversions and computed riparian streamflow. If riparian diversions exceed computed riparian streamflow, the difference is considered to be the result of illegal diversions.

B) Analytical Approach:

i) Illegal riparian diversions in first through fifth reaches downstream of Putah Diversion Dam

If: (ith)RD>(ith)RRSF
Then: (ithIRD) = (ithRD) – (ithRRSF)

Where: (ith)RD = Riparian diversions in Reach 1, 2, 3, 4 or 5
(ithRRSF) = Computed riparian streamflow in Reach 1, 2, 3, 4 or 5
(ithIRD) = Computed illegal diversions in Reach 1, 2, 3, 4 or 5

The Solano County Water Agency is under no obligation to enforce against any illegal riparian diverters whose actions do not adversely affect the Agency's ability to comply with any contractual or legal obligation.

Exhibit "B"

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF SACRAMENTO

Coordination Proceeding Special Title (Rule 1550(b)) PUTAH CREEK WATER CASES	Judicial Council Coordination No. 2565
PUTAH CREEK COUNCIL, Plaintiff, v. SOLANO IRRIGATION DISTRICT and SOLANO COUNTY WATER AGENCY, Defendants.	Sacramento County Superior Court No. 515766 **AMENDED JUDGMENT**

The case of *Putah Creek Council* v. *Solano Irrigation District and Solano County Water Agency*, Sacramento County Superior Court No. 515766, was regularly tried before the Court sitting without a jury. This trial occurred in coordination with the trials of all the causes of action of the cross-complaint filed by the City of Davis, and the second cause of action of the cross-complaint filed by the Regents of the University of California, in *Solano Irrigation District, et al.* v. *The Names Of All Appropriative Water Rights Holders In Upper Basin, et al.*, Solano County Superior Court No. 108552. This Amended Judgment, however, is entered only in *Putah Creek Council* v. *Solano Irrigation District and Solano County Water Agency*, Sacramento County Superior Court No. 515766.

The trial was held on March 4, 1996 through April 5, 1996. Appearing as attorneys for plaintiff Putah Creek Council were Beveridge & Diamond, by Daniel J. O'Hanlon, Lawrence S. Bazel, and Brett P. Moffatt. Appearing as attorneys for defendants Solano Irrigation District and Solano County Water Agency were Minasian, Minasian, Minasian, Spruance, Baber, Meith & Soares, by Timothy O'Laughlin and William C. Paris, III.

Following the trial, the Court, having heard the testimony and considered the evidence, rendered its Judgment in this action. Judgment was entered on August 23, 1996. The defendants appealed from the Judgment.

On December 4, 1996, the Court entered an Order Awarding Attorneys Fees, awarding fees and costs to the Putah Creek Council, its attorneys, and its experts. The defendants appealed from that Order.

While the Judgment was on appeal, and before any decision on the appeal, the parties reached a stipulated settlement of the issues raised in this action. Pursuant to the terms of the settlement, the Court of Appeal remanded the action to this Court for the limited purpose of considering the proposed settlement.

By motion filed on _____, the parties jointly requested that the Court amend its Judgment in this action and its Order Awarding Attorneys Fees to conform to the terms of a settlement stipulated to among the parties. The Court has considered the proposed amendments to the Judgment and the Order, the briefs and evidence offered by the parties in support of the proposed amendments, and the oral presentations of counsel for the parties. The Court finds that the proposed amendments to the Judgment and the Order are consistent with the requirements of Article X, Section 2 of California Constitution, the public trust doctrine, and section 5937 of the California Fish and Game Code. Accordingly, the Court finds that the Judgment and Order should be amended as requested, and that the Amended Judgment requested and stipulated to by the parties should be entered.

WHEREFOR, the Judgment entered in this action on August 23, 1996, and the Order entered herein on December 4, 1996, are hereby AMENDED and superseded by this Amended Judgment, and the Court now ORDERS AND ADJUDGES AS FOLLOWS:

I. PERMANENT INJUNCTION

The Solano Irrigation District ("SID") and Solano County Water Agency ("SCWA") forthwith shall modify their operations of, and other conduct regarding, the Solano Project as specified in Exhibit "A" attached hereto and incorporated herein fully by reference.

II. ENFORCEMENT ACTIONS

The Putah Creek Council shall not pursue an action or proceeding for contempt of this Amended Judgment based on a violation or violations of one or more of the minimum mean daily flows requirements established in Exhibit "A" sections A.(2), B.(2), C.(1), C.(2), C.(3), C.(4) and D.(3), or one or more of the minimum instantaneous flow requirements established in Exhibit "A" sections A.(2), B.(2), C.(1), C.(2), C.(3) and C.(4), so long as: (a) the four day running mean flow at the relevant compliance point equaled or exceeded the applicable minimum mean daily flow; and (b) the instantaneous flow at the relevant compliance point was not more than 5 cfs less than the applicable minimum mean daily flow if the violation occurred during the period from January through July, and was not more than 3 cfs less than the applicable minimum mean daily flow if the violation occurred during the period from August through December.

III. LOWER PUTAH CREEK COORDINATING COMMITTEE

A. The parties shall, within six months after the filing of this Amended Judgment, form a Lower Putah Creek Coordinating Committee ("LPCCC") to carry out the responsibilities assigned to the LPCCC under this Amended Judgment. The LPCCC shall be organized and governed in a manner that, at a minimum, incorporates the following:

(1) Membership: The LPCCC shall consist of ten members with five members representing the Putah Creek Council, the City of Davis, and the Regents of the University of California (the "Yolo parties") and five members representing the Solano County Water Agency, the Solano Irrigation District, the Maine Prairie Water District, and the Cities of Vacaville, Fairfield, Vallejo and Suisun City (the "Solano parties"). The selection of the Yolo parties' representatives shall be undertaken in a manner to be determined by the Yolo parties; the selection of the Solano parties' representatives shall be undertaken in a manner to be determined by the Solano parties.

(2) Voting:

(a) Full LPCCC Membership: Matters before the LPCCC shall be deemed approved only if a majority of the Yolo members and a majority of the Solano members approve the action. A quorum shall be deemed present if a minimum of three members are present

from each side. Alternates may be selected and shall have the voting rights of the regular members not in attendance.

(b) Rotation of Chairmanship: A chairman and vice-chairman shall be elected (or selected by agreement of all LPCCC members) to serve on an annual basis. If the first chairman elected (or selected) is a Solano party representative, then the first vice-chairman shall be a Yolo party representative, and conversely if the first chairman selected is a Yolo party representative, then the first vice-chairman shall be a Solano party representative. Thereafter, the chairman and vice-chairman shall alternate between a Yolo party representative and a Solano party representative. The chairman and vice-chairman together shall constitute an executive committee. In situations where emergency actions must be taken before the LPCCC or the Core Group can be convened, either in person or by conference telephone call, the executive committee shall be authorized to act without the full LPCCC or the Core Group. In that event, the executive committee immediately shall report its actions to the full LPCCC by fax or e-mail, and shall obtain ratification or further directions from the full LPCCC.

(c) Core Group: A "Core Group" shall be formed. It shall be comprised of six members, of which three shall be representatives of the three Yolo parties, and three shall be selected by the Solano parties' representatives. At the discretion and written request of any member of the Core Group, a matter otherwise subject to vote by the full LPCCC shall be dealt with solely by the Core Group. Any action dealt with by the Core Group shall only be approved if at least two of the Core Group members representing the Yolo parties and two of the Core Group members representing the Solano parties shall have voted to approve the action.

(3) Scope of Authority: The LPCCC shall have the responsibility to undertake the following:

(a) To monitor implementation of the Putah Creek Settlement Agreement and to make an annual report to the Court and to the parties to the settlement agreement.

(b) Through the Streamkeeper and any other means that may be approved by the LPCCC, to monitor the condition of Putah Creek from Putah Diversion Dam to the Yolo Bypass ("lower Putah Creek") and to make recommendations to appropriate agencies

about the condition of the waterway and actions appropriate to preserve and protect this stretch of Putah Creek.

(c) To undertake maintenance, restoration and enhancement measures with respect to lower Putah Creek resources and to support and coordinate the efforts of public agencies, private property owners and non-profit associations in furtherance of such maintenance, restoration and enhancement.

(d) To serve as a forum for discussion and possible resolution of lower Putah Creek related concerns and issues. Provided, however, this provision shall not be construed to give the LPCCC any authority to amend this Amended Judgment.

(e) To coordinate with the Reclamation Board and the Department of Water Resources on flood control issues regarding Putah Creek.

(f) To develop a system to share data regarding lower Putah Creek.

(g) To develop an active public education/information program on Lower Putah Creek.

(h) To seek grants and funds where appropriate for projects in pursuit of the above goals.

(i) To oversee the Streamkeeper. The Streamkeeper shall be employed by SCWA except as otherwise determined by the LPCCC after entry of this Amended Judgment.

(j) To establish standing and ad hoc committees, including a Technical Committee, as may be necessary or appropriate to further the LPCCC's responsibilities.

(4) The LPCCC and any standing committees shall comply with the Ralph M. Brown Act, Government Code sections 54950–54962.

(5) SCWA shall provide administrative support for the LPCCC, any standing or ad hoc committees and the Streamkeeper.

(6) As part of the Parties' ongoing efforts to protect and enhance the instream values associated with lower Putah Creek, SCWA shall contribute, in coordination with the contributions and activities specified in Section III.H. hereof, the following amounts of money, which shall be utilized for the specified activities. Each specific expenditure of money shall be authorized in advance by the LPCCC, and the LPCCC shall supervise the specified activities.

(a) $10,000 per year for native vegetation preservation and enhancement, including the identification of areas along the lower Putah Creek dominated by non-native species, and their removal and replacement with native trees and grasses. This work will be coordinated with efforts by other individuals and entities involved in similar removal and replacement efforts.

(b) $55,000 per year for the monitoring of wildlife, including birds, mammals, reptiles and amphibians which live in and around lower Putah Creek.

(c) Amounts, if any, to be determined by SCWA for acquisition of easements from voluntary, willing sellers, for the maintenance and enhancement of the biological resources of lower Putah Creek. These acquisitions shall be coordinated with the development of a long-term plan. The development of this plan shall be coordinated with other interested entities and individuals.

(d) $55,000 per year for the monitoring of native fish in lower Putah Creek.

(e) $40,000 per year for a Streamkeeper for lower Putah Creek, whose duties shall include, without limitation, preparing reports to the LPCCC regarding all aspects of lower Putah Creek, attending all LPCCC meetings, weekly monitoring and recording of flows at specified locations, weekly monitoring and recording of all diversions from lower Putah Creek, coordinating field trips and public projects to improve lower Putah Creek natural values, and identification and reporting to the LPCCC of any activities that are harmful to the health of lower Putah Creek.

(f) General grants totaling $250,000 in the aggregate for the preservation and enhancement of the natural values of lower Putah Creek, which shall be allocated by the LPCCC.

(g) The amounts provided for in subsections (a), (b), (d) and (e) to the extent not allocated by the LPCCC in any given year shall not carry over to subsequent years. Amounts not expended on the matters enumerated above, however, as authorized by the LPCCC, may be expended for the following additional purposes:

(i) For preservation and enhancement of birds, mammals, reptiles and amphibians that live in and around lower Putah Creek.; and

(ii) For preservation and enhancement of native fish in lower Putah Creek.

(h) The contributions specified in subparagraphs (6)(a), (b), (d) and (e) shall be annually adjusted, up or down, in proportion to any changes in the first quarterly IPD published, in the relevant year, in the Survey of Current Business, by the United States Department of Commerce. If the IPD no longer is available, then the most comparable available index shall be used instead.

B. If the parties to this Amended Judgment have not reached agreement on the exact form and functions of the LPCCC within six months after the filing of this Amended Judgment, then the Court, exercising its reserved jurisdiction, shall mediate the development of a final agreement with respect to the form and functions of the LPCCC and, if the parties fail to agree during the mediation, shall have the authority to mandate the form and functions of the LPCCC after considering any arguments of the parties. If the LPCCC ever is unable to decide how to spend any of the moneys that are described in subsection III.A.(6) hereof, then the Court, exercising its reserved jurisdiction, shall mediate the development of an appropriate plan to spend such moneys, and, if the LPCCC fails to approve such a plan, then the Court shall have the authority to mandate an appropriate plan for the expenditure of such moneys.

C. The LPCCC shall specify the general duties and responsibilities of the Streamkeeper and shall review and evaluate the Streamkeeper's performance at least once each year. The Streamkeeper shall report directly to the Executive Committee of the LPCCC, and the Executive Committee of the LPCCC shall supervise the Streamkeeper's day-to-day duties and responsibilities.

D. The LPCCC shall determine the scopes of the work to be performed under subparagraphs A.(3)(a), (b), (c) and (d) of this Amended Judgment. No expenditures under subparagraphs A.(6)(a), (b), (c), (d), (e) and (f) of this Amended Judgment shall be made without the advance approval of the LPCCC.

E. The LPCCC shall pursue and support the following types of measures for anadromous fish, through the fish surveys and the Streamkeeper's work described in subparagraphs A.(6)(d) and (e) and other actions that may be taken by the LPCCC, including seeking additional funding where already identified sources are insufficient and coordinating with other applicable planning efforts:

(1) A survey and analysis of existing spawning gravels for anadromous fish in the reach of lower Putah Creek from the Putah Diversion Dam to Pedrick Road, and the potential for enhancement of these spawning gravels;

(2) A survey and analysis of any obstacles to anadromous fish passage in lower Putah Creek, includes for the purposes of this survey and analysis, the Putah Diversion Dam and any structures downstream therefrom;

(3) The development of a sedimentation management plan for lower Putah Creek that would prevent or mitigate for any damage to fish habitat that may be caused by releases of sediment at the Putah Diversion Dam;

(4) Monitoring of lower Putah Creek to determine the extent and timing of chinook salmon, steelhead trout and Pacific lamprey in lower Putah Creek;

(5) Provided, however, that if an HCP process has been initiated within one year of entry of this Amended Judgment and includes a proposed Safe Harbor provision with activities delineated within subparagraphs III.E.(1)–(4), then the LPCCC shall not undertake the activities delineated in both the proposed Safe Harbor provision and subparagraphs III.E.(1)–(4) until either the HCP is finalized or five years have passed since entry of this Amended Judgment.

F. The Core Group may approve changes to any provision of this Section III, provided that such changes do not alter, and are not inconsistent with, any other provision of this Amended Judgment. The Core Group shall file any such changes and an explanation of the reasons for the change with the court, for filing with this Amended Judgment, within 30 days after the Core Group approves the changes.

G. All data collected during any of the activities referenced in this Paragraph III and all reports and other documents provided to the LPCCC shall be immediately made available for inspection and copying by any party to this Amended Judgment or any interested member of the public during normal business hours. To the extent feasible and reasonable, SCWA shall post on its Internet website, or make available to the public by similar electronic means, all data and reports that must be made available for inspection and copying under the preceding sentence of this paragraph within 15 days after SCWA receives each set of such data and each such report.

H. The parties are encouraged to augment, to the degree permitted by applicable law, the sums of money herein committed by SCWA, in order to further the work outlined herein. The parties will provide notice to and coordinate with the LPCCC regarding actions that may affect the scope of the LPCCC's authority and responsibilities with respect to lower Putah Creek as is provided for in this Amended Judgment.

IV. LIMIT ON AVERAGE ANNUAL ALLOCATIONS

Solano Project Contract Allocations are defined as the amount of all Solano Project Water delivered to Participating Agencies pursuant to the agreements between SCWA and the Participating Agencies. Solano Project Contract Allocations also include Solano Project Water not delivered during the allocation year and instead stored in Lake Berryessa pursuant to Article 4(c) of the Contract Between the United States and Solano County Water Agency Providing For Water Service (Contract No. 14-06-200-4090R). Putah South Canal Conveyance losses (Canal inflows minus deliveries from Canal) are not included in Solano Project Contract Allocations. During each year, Solano Project Contract Allocations shall be limited such that there are never ten (10) successive years during which, over those ten years, the average Solano Project Contract Allocations exceed 192,350 af per year. The Parties acknowledge that the 10-year average amount of Solano Project Water delivered to Participating Agencies may exceed 192,350 af in certain years due to the delivery of the aforementioned stored water.

V. AWARD OF FEES AND EXPENSES

Within thirty (30) days after entry of this Amended Judgment, SCWA and SID shall pay to the Putah Creek Council's attorneys, the Putah Creek Council itself, and to the Putah Creek Council's expert witnesses, respectively, the amount listed below for each:

1. Beveridge & Diamond, LLP $ _____
2. Morrison & Foerster $ _____
3. Latham & Watkins $ _____
4. Putah Creek Council $ _____
5. Peter B. Moyle $ _____
6. Eugene Yates $ _____
7. Steven Chainey $ _____

If for any reason the sums above or any portion thereof have not been paid as of the thirtieth (30th) day following entry of this Amended Judgment, then any amounts remaining unpaid as of that day shall thereafter accrue interest at the legal rate until paid.

VI. RESERVED JURISDICTION

This Court reserves continuing jurisdiction over the parties to provide for the administration and enforcement of this Amended Judgment, including jurisdiction to modify this Amended Judgment in accordance with applicable law.

DATED: _____, 2000.

_____
The Honorable Richard K. Park
Sacramento County Superior Court

Exhibit "C"

SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF SACRAMENTO

Coordination Proceeding Special Title (Rule 1550(b))	Judicial Council Coordination No. 2565
PUTAH CREEK WATER CASES	Solano County Superior Court No. 108552
CITY OF DAVIS, Cross Complainant, v. SOLANO IRRIGATION DISTRICT, SOLANO COUNTY WATER AGENCY, CITY OF FAIRFIELD, CITY OF VACAVILLE, CITY OF VALLEJO, CITY OF SUISUN and MAINE PRAIRIE WATER DISTRICT. Cross Defendants.	[Proposed] AMENDED JUDGMENT

All causes of action of the cross-complaint of the City of Davis in Solano Irrigation District et. al. v. the Names of all Appropriative Water Rights Holders, et. al., Solano County Superior Court No. 108552, were regularly tried before the Court sitting without a jury. This trial occurred in coordination with the trials of the second cause of action of the cross-complaint filed by the Regents of the University of California in this action and Putah Creek Council v. Solano Irrigation District and Solano County Water Agency, Sacramento County Superior Court No. 515766. This Amended Judgment, however, is entered only in Solano Irrigation District et. al. v. the Names of all Appropriative Water Rights Holders, et. al., Solano County Superior Court No. 108552.

The trial was held on March 4, 1996 through April 5, 1996. Appearing as attorneys for cross complainant City of Davis was Law Offices of Martha H. Lennihan, by Martha H. Lennihan. Appearing as attorneys for cross defendants Solano Irrigation District and Solano County Water Agency were Minasian, Minasian, Minasian, Spruance, Baber, Meith & Soares,

by Timothy O'Laughlin and William C. Paris, III.

Following the trial, the Court, having heard the testimony and considered the evidence, rendered its Judgment in this action. Judgment was entered on August 23, 1996. The cross defendants appealed from the Judgment.

On December 19, 1996, the Court entered an Order Awarding Attorneys Fees, awarding fees and costs to the City of Davis and its experts. The cross defendants appealed from that Order.

While the Judgment and Order were on appeal, and before any decision on the appeals, the parties reached a stipulated settlement of the issues raised in this action. Pursuant to the terms of the settlement, the Court of Appeal remanded the action to this Court for the limited purpose of considering the proposed settlement.

By motion filed on _____, the parties jointly requested that the Court amend its Judgment in this action and its Order Awarding Attorneys Fees to conform to the terms of a settlement stipulated to among the parties. The Court has considered the proposed amendments to the Judgment and the Order, the briefs and evidence offered by the parties in support of the proposed amendments, and the oral presentations of counsel for the parties. The Court finds that the proposed amendments to the Judgment and the Order are consistent with the requirements of Article X, Section 2 of California Constitution, the public trust doctrine, and section 5937 of the California Fish and Game Code. Accordingly, the Court finds that the Judgment and Order should be amended as requested, and that the Amended Judgment requested and stipulated to by the parties should be entered.

WHEREFOR, the Judgment entered in this action on August 23, 1996, and the Order entered herein on December 19, 1996, are hereby AMENDED and superseded by this Amended Judgment, and the Court now ORDERS AND ADJUDGES AS FOLLOWS:

I. PERMANENT INJUNCTION

The Solano Irrigation District ("SID") and Solano County Water Agency ("SCWA") forthwith shall modify their operations of, and other conduct regarding, the Solano Project as

specified in Exhibit "A" attached hereto and incorporated herein fully by reference.

II. ENFORCEMENT ACTIONS

The City of Davis shall not pursue an action or proceeding for contempt of this Amended Judgment based on a violation or violations of one or more of the minimum mean daily flows requirements established in Exhibit "A" sections A.(2), B.(2), C.(1), C.(2), C.(3), C.(4) and D.(3), or one or more of the minimum instantaneous flow requirements established in Exhibit "A" sections A.(2), B.(2), C.(1), C.(2), C.(3) and C.(4), so long as:

A. the four day running mean flow at the relevant compliance point equaled or exceeded the applicable minimum mean daily flow; and

B. the instantaneous flow at the relevant compliance point was not more than 5 cfs less than the applicable minimum mean daily flow if the violation occurred during the period from January through July, and was not more than 3 cfs less than the applicable minimum mean daily flow if the violation occurred during the period from August through December.

III. LOWER PUTAH CREEK COORDINATING COMMITTEE

A. The parties shall, within six months after the filing of this Amended Judgment, form a Lower Putah Creek Coordinating Committee ("LPCCC") to carry out the responsibilities assigned to the LPCCC under this Amended Judgment.

The LPCCC shall be organized and governed in a manner that, at a minimum, incorporates the following:

(1) Membership: The LPCCC shall consist of ten members with five members representing the Putah Creek Council, the City of Davis, and the Regents of the University of California (the "Yolo parties") and five members representing the Solano County Water Agency, the Solano Irrigation District, the Maine Prairie Water District, and the Cities of Vacaville, Fairfield, Vallejo and Suisun City (the "Solano parties"). The selection of the Yolo parties' representatives shall be undertaken in a manner to be determined by the Yolo parties; the selection of the Solano parties' representatives shall be undertaken in a manner to be determined by the Solano parties.

(2) Voting:

(a) Full LPCCC Membership: Matters before the LPCCC shall be deemed approved only if a majority of the Yolo members and a majority of the Solano members approve the action. A quorum shall be deemed present if a minimum of three members are present from each side. Alternates may be selected and shall have the voting rights of the regular members not in attendance.

(b) Rotation of Chairmanship: A chairman and vice-chairman shall be elected (or selected by agreement of all LPCCC members) to serve on an annual basis. If the first chairman elected (or selected) is a Solano party representative, then the first vice-chairman shall be a Yolo party representative, and conversely if the first chairman selected is a Yolo party representative, then the first vice-chairman shall be a Solano party representative. Thereafter, the chairman and vice-chairman shall alternate between a Yolo party representative and a Solano party representative. The chairman and vice-chairman together shall constitute an executive committee. In situations where emergency actions must be taken before the LPCCC or the Core Group can be convened, either in person or by conference telephone call, the executive committee shall be authorized to act without the full LPCCC or the Core Group. In that event, the executive committee immediately shall report its actions to the full LPCCC by fax or e-mail, and shall obtain ratification or further directions from the full LPCCC.

(c) Core Group: A "Core Group" shall be formed. It shall be comprised of six members, of which th ee shall be representatives of the three Yolo parties, and three shall be selected by the Solano parties' representatives.

At the discretion and written request of any member of the Core Group, a matter othe wise subject to vote by the full LPCCC shall be dealt with solely by the Core Group. Any action dealt with by the Core Group shall only be approved if at least two of the Core Group members representing the Yolo parties and two of the Core Group members representing the Solano parties shall have voted to approve the action.

(3) Scope of Authority: The LPCCC shall have the responsibility to undertake

the following:

(a) To monitor implementation of the Putah Creek Settlement Agreement and to make an annual report to the Court and to the parties to the settlement agreement.

(b) Through the Streamkeeper and any other means that may be approved by the LPCCC, to monitor the condition of Putah Creek from Putah Diversion Dam to the Yolo Bypass ("lower Putah Creek") and to make recommendations to appropriate agencies about the condition of the waterway and actions appropriate to preserve and protect this stretch of Putah Creek.

(c) To undertake maintenance, restoration and enhancement measures with respect to lower Putah Creek resources and to support and coordinate the efforts of public agencies, private property owners and non-profit associations in furtherance of such maintenance, restoration and enhancement.

(d) To serve as a forum for discussion and possible resolution of lower Putah Creek related concerns and issues. Provided, however, this provision shall not be construed to give the LPCCC any authority to amend this Amended Judgment.

(e) To coordinate with the Reclamation Board and the Department of Water Resources on flood control issues regarding Putah Creek.

(f) To develop a system to share data regarding lower Putah Creek.

(g) To develop an active public education/information program on Lower Putah Creek.

(h) To seek grants and funds where appropriate for projects in pursuit of the above goals.

(i) To oversee the Streamkeeper. The Streamkeeper shall be employed by SCWA except as otherwise determined by the LPCCC after entry of this Amended Judgment.

(j) To establish standing and ad hoc committees, including a Technical Committee, as may be necessary or appropriate to further the LPCCC's responsibilities.

(4) The LPCCC and any standing committees shall comply with the Ralph M. Brown Act, Government Code sections 54950-54962.

(5) SCWA shall provide administrative support for the LPCCC, any standing or ad hoc committees and the Streamkeeper.

(6) As part of the Parties' ongoing efforts to protect and enhance the instream values associated with lower Putah Creek, SCWA shall contribute, in coordination with the contributions and activities specified in Section III.H. hereof, the following amounts of money, which shall be utilized for the specified activities. Each specific expenditure of money shall be authorized in advance by the LPCCC, and the LPCCC shall supervise the specified activities.

(a) $10,000 per year for native vegetation preservation and enhancement, including the identification of areas along the lower Putah Creek dominated by non-native species, and their removal and replacement with native trees and grasses. This work will be coordinated with efforts by other individuals and entities involved in similar removal and replacement efforts.

(b) $55,000 per year for the monitoring of wildlife, including birds, mammals, reptiles and amphibians which live in and around lower Putah Creek.

(c) Amounts, if any, to be determined by SCWA for acquisition of easements from voluntary, willing sellers, for the maintenance and enhancement of the biological resources of lower Putah Creek. These acquisitions shall be coordinated with the development of a long-term plan. The development of this plan shall be coordinated with other interested entities and individuals.

(d) $55,000 per year for the monitoring of native fish in lower Putah Creek.

(e) $40,000 per year for a Streamkeeper for lower Putah Creek, whose duties shall include, without limitation, preparing reports to the LPCCC regarding all aspects of lower Putah Creek, attending all LPCCC meetings, weekly monitoring and recording of flows at specified locations, weekly monitoring and recording of all diversions from lower

Putah Creek, coordinating field trips and public projects to improve lower Putah Creek natural values, and identification and reporting to the LPCCC of any activities that are harmful to the health of lower Putah Creek.

(f) General grants totaling $250,000 in the aggregate for the preservation and enhancement of the natural values of lower Putah Creek, which shall be allocated by the LPCCC.

(g) The amounts provided for in subsections (a), (b), (d) and (e) to the extent not allocated by the LPCCC in any given year shall not carry over to subsequent years. Amounts not expended on the matters enumerated above, however, as authorized by the LPCCC, may be expended for the following additional purposes:

(i) For preservation and enhancement of birds, mammals, reptiles and amphibians that live in and around lower Putah Creek; and

(ii) For preservation and enhancement of native fish in lower Putah Creek.

(h) The contributions specified in subparagraphs (6)(a), (b), (d) and (e) shall be annually adjusted, up or down, in proportion to any changes in the first quarterly IPD published, in the relevant year, in the Survey of Current Business, by the United States Department of Commerce. If the IPD no longer is available, then the most comparable available index shall be used instead.

B. If the parties to this Amended Judgment have not reached agreement on the exact form and functions of the LPCCC within six months after the filing of this Amended Judgment, then the Court, exercising its reserved jurisdiction, shall mediate the development of a final agreement with respect to the form and functions of the LPCCC and, if the parties fail to agree during the mediation, shall have the authority to mandate the form and functions of the LPCCC after considering any arguments of the parties. If the LPCCC ever is unable to decide how to spend any of the moneys that are described in subsection III.A.(6) hereof, then the Court, exercising its reserved jurisdiction, shall mediate the development of an

appropriate plan to spend such moneys, and, if the LPCCC fails to approve such a plan, then the Court shall have the authority to mandate an appropriate plan for the expenditure of such moneys.

C. The LPCCC shall specify the general duties and responsibilities of the Streamkeeper and shall review and evaluate the Streamkeeper's performance at least once each year. The Streamkeeper shall report directly to the Executive Committee of the LPCCC, and the Executive Committee of the LPCCC shall supervise the Streamkeeper's day-to-day duties and responsibilities.

D. The LPCCC shall determine the scopes of the work to be performed under subparagraphs A.(3)(a), (b), (c) and (d) of this Amended Judgment. No expenditures under subparagraphs A.(6)(a), (b), (c), (d), (e) and (f) of this Amended Judgment shall be made without the advance approval of the LPCCC.

E. The LPCCC shall pursue and support the following types of measures for anadromous fish, through the fish surveys and the Streamkeeper's work described in subparagraphs A.(6)(d) and (e) and other actions that may be taken by the LPCCC, including seeking additional funding where already identified sources are insufficient and coordinating with other applicable planning efforts:

(1) A survey and analysis of existing spawning gravels for anadromous fish in the reach of lower Putah Creek from the Putah Diversion Dam to Pedrick Road, and the potential for enhancement of these spawning gravels;

(2) A survey and analysis of any obstacles to anadromous fish passage in lower Putah Creek, includes for the purposes of this survey and analysis, the Putah Diversion Dam and any structures downstream therefrom;

(3) The development of a sedimentation management plan for lower Putah Creek that would prevent or mitigate for any damage to fish habitat that may be caused by releases of sediment at the Putah Diversion Dam;

(4) Monitoring of lower Putah Creek to determine the extent and timing of

chinook salmon, steelhead trout and Pacific lamprey in lower Putah Creek;

(5) Provided, however, that if an HCP process has been initiated within one year of entry of this Amended Judgment and includes a proposed Safe Harbor provision with activities delineated in both the proposed Safe Harbor provision and subparagraphs III.E.(1)-(4), then the LPCCC shall not undertake the activities until either the HCP is finalized or five years have passed since entry of this Amended Judgment.

F. The Core Group may approve changes to any provision of this Paragraph III, provided that such changes do not alter, and are not inconsistent with, any other provision of this Amended Judgment. The Core Group shall file any such changes and an explanation of the reasons for the change with the court, for filing with this Amended Judgment, within 30 days after the Core Group approves the changes.

G. All data collected during any of the activities referenced in this Paragraph III and all reports and other documents provided to the LPCCC shall be immediately made available for inspection and copying by any party to this Amended Judgment or any interested member of the public during normal business hours. To the extent feasible and reasonable, SCWA shall post on its Internet website, or make available to the public by similar electronic means, all data and reports that must be made available for inspection and copying under the preceding sentence of this paragraph within 15 days after SCWA receives each set of such data and each such report.

H. The parties are encouraged to augment, to the degree permitted by applicable law, the sums of money herein committed by SCWA, in order to further the work outlined herein. The parties will provide notice to and coordinate with the LPCCC regarding actions that may affect the scope of the LPCCC's authority and responsibilities with respect to lower Putah Creek as is provided for in this Amended Judgment.

IV. LIMIT ON AVERAGE ANNUAL ALLOCATIONS

Solano Project Contract Allocations are defined as the amount of all Solano Project Water delivered to Participating Agencies pursuant to the agreements between SCWA and the

Participating Agencies. Solano Project Contract Allocations also include Solano Project Water not delivered during the allocation year and instead stored in Lake Berryessa pursuant to Article 4(c) of the Contract Between the United States and Solano County Water Agency Providing For Water Service (Contract No. 14-06-200-4090R). Putah South Canal Conveyance losses (Canal inflows minus deliveries from Canal) are not included in Solano Project Contract Allocations. During each year, Solano Project Contract Allocations shall be limited such that there are never ten (10) successive years during which, over those ten years, the average Solano Project Contract Allocations exceed 192,350 af per year. The Parties acknowledge that the 10-year average amount of Solano Project Water delivered to Participating Agencies may exceed 192,350 af in certain years due to the delivery of the aforementioned stored water.

V. AWARD OF FEES AND EXPENSES

Within thirty (30) days after entry of this Amended Judgment, SCWA and SID shall pay to the City of Davis the amount of Five Hundred Fifty-Six Thousand Two Hundred Eighty-Seven Dollars ($556,287). If for any reason this sum or any portion thereof has not been paid as of the thirtieth (30th) day following entry of this Amended Judgment, then any amounts remaining unpaid as of that day shall thereafter accrue interest at the legal rate until paid.

VI. RESERVED JURISDICTION

This Court reserves continuing jurisdiction over the parties to provide for the administration and enforcement of this Amended Judgment, including jurisdiction to modify this Amended Judgment in accordance with applicable law.

DATED: _____, 2000

_____
Honorable Richard A. Park
Sacramento Superior Court

Exhibit "D"

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF SACRAMENTO

Coordination Proceeding Special Title (Rule 1550(b)) **PUTAH CREEK WATER CASES**	**Judicial Council Coordination No. 2565** **Solano County Superior Court No. 108552**
REGENTS OF THE UNIVERSITY OF CALIFORNIA, **Cross-Complainant,** **v.** **SOLANO COUNTY WATER AGENCY, SOLANO IRRIGATION DISTRICT, CITY OF FAIRFIELD, CITY OF VACAVILLE, CITY OF VALLEJO, CITY OF SUISUN CITY, and MAINE PRAIRIE WATER DISTRICT,** **Cross-Defendants.**	**AMENDED JUDGMENT**

The second cause of action of the cross-complaint of the Regents of the University of California in Solano Irrigation District, et al. v. The Names of All Appropriative Water Rights Holders, et al., Solano County Superior Court No. 108552, was regularly tried before the Court sitting without a jury. This trial occurred in coordination with the trials of all causes of action of the cross-complaint filed by the City of Davis in this action and Putah Creek Council v. Solano Irrigation District and Solano County Water Agency, Sacramento County Superior Court No. 515766. The Judgment however, is entered only on the Regents of the University of California's

cross-complaint in Solano Irrigation District, et al. v. The Names of All Appropriative Water Rights Holders, et al., Solano County Superior Court No. 108552.

The trial was held on March 4, 1996 through April 5, 1996. Appearing as attorneys for cross-complaint Regents of the University of California were Bartkiewicz, Kronick & Shanahan, P. C., by Alan B. Lilly. Appearing as attorneys for cross-defendants Solano County Water Agency, Solano Irrigation District, City of Fairfield, City of Vacaville, City of Vallejo, City of Suisun City and Maine Prairie Water District were Minasian, Minasian, Minasian, Spruance, Baber, Meith & Soares, by Tim O'Laughlin and William C. Paris, III.

Following the trial, the Court, having heard the testimony and considered the evidence, rendered its Judgment in this action. Judgment was entered on August 23, 1996. The cross-defendants appealed the Judgment.

On November 27, 1996, the Court entered an Order Granting Cross-Complainant's Motion For Reimbursement of Attorneys Fees and Expenses, awarding fees and costs to the Regents of the University of California. The cross defendants appealed that Order.

While the Judgment and Order were on appeal, and before any decision on the appeals, the parties reached a stipulated settlement of the issues raised in this action. Pursuant to the terms of the settlement, the Court of Appeal remanded the action to this Court for the limited purpose of considering the proposed settlement.

By motion filed on _____, the parties jointly requested that the Court amend its Judgment in this action, and its Order Granting Cross-Complainant's Motion For Reimbursement of Attorneys Fees and Expenses, to conform to the terms of a settlement stipulated to among the parties. The Court has considered the proposed amendments to the Judgment and the Order, the briefs and evidence offered by the parties in support of the proposed amendments, and the oral presentations of counsel for the parties. The Court finds that the proposed amendments to the Judgment and the Order are consistent with the requirements of Article X, Section 2 of California Constitution, the public trust doctrine, and section 5937 of the California Fish and Game Code. Accordingly, the Court finds that the Judgment and Order should be amended as requested, and that the Amended

Judgment requested and stipulated to by the parties should be entered.

WHEREFOR, the Judgment entered in this action on August 23, 1996, and the Order entered herein on November 27, 1996, are hereby AMENDED and superseded by this Amended Judgment, and the Court now ORDERS AND ADJUDGES AS FOLLOWS:

I. PERMANENT INJUNCTION

The Solano Irrigation District ("SID") and Solano County Water Agency ("SCWA") forthwith shall modify their operations of, and other conduct regarding, the Solano Project as specified in Exhibit "A" attached hereto and incorporated herein fully by reference.

II. ENFORCEMENT ACTIONS

The Regents of the University of California shall not pursue an action or proceeding for contempt of this Amended Judgment based on a violation or violations of one or more of the minimum mean daily flows requirements established in Exhibit "A" sections A.(2), B.(2), C.(1), C.(2), C.(3), C.(4) and D.(3), or one or more of the minimum instantaneous flow requirements established in Exhibit "A" sections A.(2), B.(2), C.(1), C.(2), C.(3) and C.(4), so long as:

A. the four day running mean flow at the relevant compliance point equaled or exceeded the applicable minimum mean daily flow; and

B. the instantaneous flow at the relevant compliance point was not more than 5 cfs less than the applicable minimum mean daily flow if the violation occurred during the period from January through July, and was not more than 3 cfs less than the applicable minimum mean daily flow if the violation occurred during the period from August through December.

III. LOWER PUTAH CREEK COORDINATING COMMITTEE

A. The parties shall, within six months after the filing of this Amended Judgment, form a Lower Putah Creek Coordinating Committee ("LPCCC") to carry out the responsibilities assigned to the LPCCC under this Amended Judgment.

The LPCCC shall be organized and governed in a manner that, at a minimum, incorporates the following:

(1) Membership: The LPCCC shall consist of ten members with five members

representing the Putah Creek Council, the City of Davis, and the Regents of the University of California(the "Yolo parties") and five members representing the Solano County Water Agency, the Solano Irrigation District, the Maine Prairie Water District, and the Cities of Vacaville, Fairfield, Vallejo and Suisun City (the "Solano parties"). The selection of the Yolo parties' representatives shall be undertaken in a manner to be determined by the Yolo parties;-the selection of the Solano parties' representatives shall be undertaken in a manner to be determined by the Solano parties.

(2) Voting:

(a) Full LPCCC Membership: Matters before the LPCCC shall be deemed approved only if a majority of the Yolo members and a majority of the Solano members approve the action. A quorum shall be deemed present if a minimum of three members are present from each side. Alternates may be selected and shall have the voting rights of the regular members not in attendance.

(b)Rotation of Chairmanship: A chairman and vice-chairman shall be elected (or selected by agreement of all LPCCC members) to serve on an annual basis. If the first chairman elected (or selected) is a Solano party representative, then the first vice-chairman shall be a Yolo party representative, and conversely if the first chairman selected is a Yolo party representative, then the first vice-chairman shall be a Solano party representative. Thereafter, the chairman and vice-chairman shall alternate between a Yolo party representative and a Solano party representative. The chairman and vice-chairman together shall constitute an executive committee. In situations where emergency actions must be taken before the LPCCC or the Core Group can be convened, either in person or by conference telephone call, the executive committee shall be authorized to act without the full LPCCC or the Core Group. In that event, the executive committee immediately shall report its actions to the full LPCCC by fax or e-mail, and shall obtain ratification or further directions from the full LPCCC.

(c) Core Group: A "Core Group" shall be formed. It shall be comprised of six members, of which three shall be representatives of the three Yolo parties, and three shall be selected by the Solano parties' representatives.

At the discretion and written request of any member of the Core Group, a matter otherwise subject to vote by the full LPCCC shall be dealt with solely by the Core Group. Any action dealt with by the Core Group shall only be approved if at least two of the Core Group members representing the Yolo parties and two of the Core Group members representing the Solano parties shall have voted to approve the action.

(3) Scope of Authority: The LPCCC shall have the responsibility to undertake the following:

(a) To monitor implementation of the Putah Creek Settlement Agreement and to make an annual report to the Court and to the parties to the settlement agreement.

(b) Through the Streamkeeper and any other means that may be approved by the LPCCC, to monitor the condition of Putah Creek from Putah Diversion Dam to the Yolo Bypass ("lower Putah Creek") and to make recommendations to appropriate agencies about the condition of the waterway and actions appropriate to preserve and protect this stretch of Putah Creek.

(c) To undertake maintenance, restoration and enhancement measures with respect to lower Putah Creek resources and to support and coordinate the efforts of public agencies, private property owners and non-profit associations in furtherance of such maintenance, restoration and enhancement.

(d) To serve as a forum for discussion and possible resolution of lower Putah Creek related concerns and issues. Provided, however, this provision shall not be construed to give the LPCCC any authority to amend this Amended Judgment.

(e) To coordinate with the Reclamation Board and the Department of Water Resources on flood control issues regarding Putah Creek.

(f) To develop a system to share data regarding lower Putah Creek.

(g) To develop an active public education/information program on Lower Putah Creek.

(h) To seek grants and funds where appropriate for projects in pursuit of the above goals.

(i) To oversee the Streamkeeper. The Streamkeeper shall be employed by SCWA except as otherwise determined by the LPCCC after entry of this Amended Judgment.

(j) To establish standing and ad hoc committees, including a Technical Committee, as may be necessary or appropriate to further the LPCCC's responsibilities.

(4) The LPCCC and any standing committees shall comply with the Ralph M. Brown Act, Government Code sections 54950-54962.

(5) SCWA shall provide administrative support for the LPCCC, any standing or ad hoc committees and the Streamkeeper.

(6) As part of the Parties' ongoing efforts to protect and enhance the instream values associated with lower Putah Creek, SCWA shall contribute, in coordination with the contributions and activities specified in Section III.H. hereof, the following amounts of money, which shall be utilized for the specified activities. Each specific expenditure of money shall be authorized in advance by the LPCCC, and the LPCCC shall supervise the specified activities.

(a) $10,000 per year for native vegetation preservation and enhancement, including the identification of areas along the lower Putah Creek dominated by non-native species, and their removal and replacement with native trees and grasses. This work will be coordinated with efforts by other individuals and entities involved in similar removal and replacement efforts.

(b) $55,000 per year for the monitoring of wildlife, including birds, mammals, reptiles and amphibians which live in and around lower Putah Creek.

(c) Amounts, if any, to be determined by SCWA for acquisition of easements from voluntary, willing sellers, for the maintenance and enhancement of the biological resources of lower Putah Creek. These acquisitions shall be coordinated with the development of a long-term plan. The development of this plan shall be coordinated with other interested entities and individuals.

(d) $55,000 per year for the monitoring of native fish in lower Putah Creek.

(e) $40,000 per year for a Streamkeeper for lower Putah Creek, whose duties shall include, without limitation, preparing reports to the LPCCC regarding all aspects of lower

Putah Creek, attending all LPCCC meetings, weekly monitoring and recording of flows at specified locations, weekly monitoring and recording of all diversions from lower Putah Creek, coordinating field trips and public projects to improve lower Putah Creek natural values, and identification and reporting to the LPCCC of any activities that are harmful to the health of lower Putah Creek.

(f) General grants totaling $250,000 in the aggregate for the preservation and enhancement of the natural values of lower Putah Creek, which shall be allocated by the LPCCC.

(g) The amounts provided for in subsections (a), (b), (d) and (e) to the extent not allocated by the LPCCC in any given year shall not carry over to subsequent years. Amounts not expended on the matters enumerated above, however, as authorized by the LPCCC, may be expended for the following additional purposes:

(i) For preservation and enhancement of birds, mammals, reptiles and amphibians that live in and around lower Putah Creek; and

(ii) For preservation and enhancement of native fish in lower Putah Creek.

(h) The contributions specified in subparagraphs (6)(a), (b), (d) and (e) shall be annually adjusted, up or down, in proportion to any changes in the first quarterly IPD published, in the relevant year, in the Survey of Current Business, by the United States Department of Commerce. If the IPD no longer is available, then the most comparable available index shall be used instead.

B. If the parties to this Amended Judgment have not reached agreement on the exact form and functions of the LPCCC within six months after the filing of this Amended Judgment, then the Court, exercising its reserved jurisdiction, shall mediate the development of a final agreement with respect to the form and functions of the LPCCC and, if the parties fail to agree during the mediation, shall have the authority to mandate the form and functions of the LPCCC after considering any arguments of the parties. If the LPCCC ever is unable to decide how to spend any of the moneys that are described in subsection III.A.(6) hereof, then the Court, exercising its reserved jurisdiction, shall mediate the development of an appropriate plan to spend such moneys, and, if the LPCCC fails

to approve such a plan, then the Court shall have the authority to mandate an appropriate plan for the expenditure of such moneys.

C. The LPCCC shall specify the general duties and responsibilities of the Streamkeeper and shall review and evaluate the Streamkeeper's performance at least once each year. The Streamkeeper shall report directly to the Executive Committee of the LPCCC, and the Executive Committee of the LPCCC shall supervise the Streamkeeper's day-to-day duties and responsibilities.

D. The LPCCC shall determine the scopes of the work to be performed under subparagraphs A.(3)(a), (b), (c) and (d) of this Amended Judgment. No expenditures under subparagraphs A.(6)(a), (b), (c), (d), (e) and (f) of this Amended Judgment shall be made without the advance approval of the LPCCC.

E. The LPCCC shall pursue and support the following types of measures for anadromous fish, through the fish surveys and the Streamkeeper's work described in subparagraphs A.(6)(d) and (e) and other actions that may be taken by the LPCCC, including seeking additional funding where already identified sources are insufficient and coordinating with other applicable planning efforts:

(1) A survey and analysis of existing spawning gravels for anadromous fish in the reach of lower Putah Creek from the Putah Diversion Dam to Pedrick Road, and the potential for enhancement of these spawning gravels;

(2) A survey and analysis of any obstacles to anadromous fish passage in lower Putah Creek, includes for the purposes of this survey and analysis, the Putah Diversion Dam and any structures downstream therefrom;

(3) The development of a sedimentation management plan for lower Putah Creek that would prevent or mitigate for any damage to fish habitat that may be caused by releases of sediment at the Putah Diversion Dam;

(4) Monitoring of lower Putah Creek to determine the extent and timing of chinook salmon, steelhead trout and Pacific lamprey in lower Putah Creek;

(5) Provided, however, that if an HCP process has been initiated within one year of entry of this Amended Judgment and includes a proposed Safe Harbor provision with activities

delineated in both the proposed Safe Harbor provision and subparagraphs III.E.(1)-(4), then the LPCCC shall not undertake the activities until either the HCP is finalized or five years have passed since entry of this Amended Judgment.

F. The Core Group may approve changes to any provision of this Paragraph III, provided that such changes do not alter, and are not inconsistent with, any other provision of this Amended Judgment. The Core Group shall file any such changes and an explanation of the reasons for the change with the court, for filing with this Amended Judgment, within 30 days after the Core Group approves the changes.

G. All data collected during any of the activities referenced in this Paragraph III and all reports and other documents provided to the LPCCC shall be immediately made available for inspection and copying by any party to this Amended Judgment or any interested member of the public during normal business hours. To the extent feasible and reasonable, SCWA shall post on its Internet website, or make available to the public by similar electronic means, all data and reports that must be made available for inspection and copying under the preceding sentence of this paragraph within 15 days after SCWA receives each set of such data and each such report.

H. The parties are encouraged to augment, to the degree permitted by applicable law, the sums of money herein committed by SCWA, in order to further the work outlined herein. The parties will provide notice to and coordinate with the LPCCC regarding actions that may affect the seopeof the LPCCC's authority and responsibilities with respect to lower Putah Creek as is provided for in this Amended Judgment.

IV. LIMIT ON AVERAGE ANNUAL ALLOCATIONS

Solano Project Contract Allocations are defined as the amount of all Solano Project Water delivered to Participating Agencies pursuant to the agreements between SCWA and the Participating Agencies. Solano Project Contract Allocations also include Solano Project Water not delivered during the allocation year and instead stored in Lake Berryessa pursuant to Article 4(c) of the Contract Between the United States and Solano County Water Agency Providing For Water Service (Contract No. 14-06-200-4090R). Putah South Canal Conveyance losses (Canal inflows minus

deliveries from Canal) are not included in Solano Project Contract Allocations. During each year, Solano Project Contract Allocations shall be limited such that there are never ten (10) successive years during which, over those ten years, the average Solano Project Contract Allocations exceed 192,350 af per year. The Parties acknowledge that the 10-year average amount of Solano Project Water delivered to Participating Agencies may exceed 192,350 af in certain years due to the delivery of the aforementioned stored water.

V. AWARD OF FEES AND EXPENSES

The cross-defendants shall not be required to pay the Regents of the University of California any amount of money on account of the attorney fees and expenses incurred by the Regents in this action before or on the date of this Amended Judgment.

VI. RESERVED JURISDICTION

This Court reserves continuing jurisdiction over the parties to provide for the administration and enforcement of this Amended Judgment, including jurisdiction to modify this Amended Judgment in accordance with applicable law.

DATED: _____, 2000

_____
Richard K. Park, Judge
Sacramento County Superior Court

Exhibit "E"

BEFORE THE STATE WATER RESOURCES CONTROL BOARD

OF THE STATE OF CALIFORNIA

DIVISION OF WATER RIGHTS

In the Matter of Solano Project Water Rights: Application 11199, Permit 10657; Application 12578, Permit 10658; Application 12716, Permit 10659.	)))))	**PETITION FOR CHANGE** (Water Code § 1707)

The United States of America, Department of the Interior, Bureau of Reclamation (the "Bureau of Reclamation"), permittee for water-right Permits 10657, 10658 and 10659, hereby petitions the State Water Resources Control Board (the "SWRCB"), pursuant to section 1707 of the California Water Code, for the following changes in these water-right permits:

1. To add preservation and enhancement of wetlands habitat and fish and wildlife resources to the authorized purposes of use;

2. To add the channel of Putah Creek from the Putah Diversion Dam to the Toe Drain on the eastern side of the Yolo Bypass to the authorized place of use; and

3. To replace condition 11 of SWRCB Decision 869 (as last amended by SWRCB Order WR 84-7) with the release and instream-flow requirements specified in the attached Exhibit "E-1" (which includes the attached Exhibits "E-2" and "E-3"). On issuance of water-right licenses for these water rights, the term "permittee" in these exhibits shall be replaced with the term "licensees".

The Bureau of Reclamation requests that any SWRCB order on this petition explicitly confirm that permittee and any subsequent licensees are not abandoning any waterthat is released from the Putah Diversion Dam to satisfy the instream-flow requirements specified in the attached Exhibits "E-1", "E-2"

and "E-3", and that permittee and subsequent licensees shall retain dominion and control over the released water until all of the applicable instream-flow requirements in these attached exhibits are satisfied.

UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

DATED: _____, 2000.

By:_____
Regional Director

Exhibit "E-1"

Solano Project Releases and Instream Flows for Lower Putah Creek

A. Rearing Flows ((1), (2) & (3) all shall be maintained)

(1) Permittee shall, for each month as set forth below, maintain mean daily releases from the Putah Diversion Dam to Creek downstream of the Putah Diversion Dam (hereinafter "lower Putah Creek") that are equal to or in excess of the following rates, expressed in cubic feet per second ("cfs"):

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean Daily Release (cfs)	20	25	25	25	16	26	46	43	43	43	34	20

These mean daily releases shall be measured at the Putah Diversion Dam and made from the Putah Diversion Dam into lower Putah Creek immediately downstream of the Putah Diversion Dam. The instantaneous releases at the Putah Diversion Dam shall at all times equal or exceed ninety percent (90%) of the applicable mean daily release requirement.

(2) Permittee shall, for each month as set forth below, release sufficient water from the Putah Diversion Dam into lower Putah Creek immediately downstream of the Putah Diversion Dam to maintain mean daily flows in lower Putah Creek that are equal to or in excess of the following rates, expressed in cubic feet per second ("cfs"):

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean Daily Flows (cfs)	5	10	10	15	15	25	30	20	15	15	10	5

These mean daily flows shall be maintained and measured at or in the near vicinity of the Interstate 80 Bridge. The instantaneous flow at the Interstate 80 Bridge shall at all times equal or exceed ninety percent (90%) of the applicable mean daily flow requirement.

(3) Permittee shall at all times of the year release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a continuous flow of surface water in Putah Creek from the Old Davis Road Bridge to the western boundary of the Yolo Bypass, identified as River Mile 0.0 on trial exhibit number 41 in the *Putah Creek Water Cases*, Judicial Council Coordination Proceeding No. 2565.

B. Spawning Flows ((1), (2) & (3) all shall be maintained)

(1) At a time between February 15 and March 31 of every calendar year, Permittee shall release a three-consecutive-day pulse of water from the Putah Diversion Dam into lower Putah Creek equal to or in excess of the following rates:

(a) 150 cfs for the first 24 hours;

(b) 100 cfs for the second 24 hours; and

(c) 80 cfs for the third 24 hours.

Permittee may, in its discretion, time this pulse so as to utilize any uncontrolled flows that may provide some or all of the water needed to comply with this requirement.

(2) In every year, for the 30 days that follow the three-day pulse release described in paragraph B.(1), Permittee shall release sufficient water from the Putah Diversion Dam into lower Putah Creek to maintain a mean daily flow equal to or in excess of 50 cfs at the Interstate 80 Bridge. During this period, the instantaneous flows at the Interstate 80 Bridge shall at all times equal or exceed 45 cfs.

(3) In every year, at the conclusion of the 30th day of the 50 cfs spawning flows described in subsection B.(2), Permittee then shall ramp down the controlled releases from the Putah Diversion Dam gradually over a seven-day period until the flows are in compliance with the applicable requirements set forth in subsections A.(2), A.(3), C.(3) and C.(4) of this Exhibit "E-1".

C. Supplemental Flows ((1), (2), (3) & (4) all shall be maintained

The requirements set forth thus far herein are intended to protect the aquatic and related resources found in lower Putah Creek. In addition to maintaining these resources,

Permittee shall provide supplemental flows in an attempt to enhance the aquatic and related resources of lower Putah Creek above that baseline. Accordingly:

(1) Permittee shall, during the period from November 1 through December 15 of each calendar year, release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a mean daily flow of at least 5 cfs, and an instantaneous flow of at least 2 cfs, at the point where Putah Creek discharges into the Toe Drain on the eastern side of the Yolo Bypass (the "East Toe Drain").

(2) Beginning sometime between November 15 and December 15 of each calendar year, Permittee shall release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a mean daily flow of at least 50 cfs, and an instantaneous flow of at least 45 cfs, for five consecutive days at the point where Putah Creek discharges into the East Toe Drain. If a flash board dam is present on Putah Creek near the East Toe Drain during that period, and if the flash boards are removed during that period, then to the extent feasible the first day of the 50 cfs pulse flow at the East Toe Drain shall follow the removal of the flash boards. The precise timing of the initiation of the 50 cfs pulse flow shall be set each year by the Lower Putah Creek Coordinating Committee (the "LPCCC") established in accordance with section III of the Amended Judgments in the *Putah Creek Water Cases*, Judicial Council Coordination Proceeding No. 2565.. The objective of the LPCCC shall be to time the release so as to maximize the potential for such flows to attract anadromous fish into Putah Creek. If the exact date of releases has not been established or agreed upon by the LPCCC, then the releases dealt with in this subparagraph shall commence on December 1 of the affected calendar year.

(3) Beginning on the sixth day after initiation of the above described 50 cfs pulse flow, and continuing each day thereafter through March 31, Permittee shall release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a mean daily flow of at least 19 cfs, and an instantaneous flow of at least 14 cfs, at I-80.

(4) Beginning on April 1 of each calendar year, and continuing each day thereafter through May 31, Permittee shall release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a mean daily flow of at least 5 cfs, and an instantaneous flow of at least 2 cfs, at the point where Putah Creek discharges into the East Toe Drain.

D. Drought Year Flows

(1) During years when total storage in Lake Berryessa is less than 750,000 acre feet ("af") as of April 1 (a "Drought Year"), the release and instream flow requirements set forth in sections D.(2), D.(3) and D.(4) below ("Drought Year Requirements") shall apply instead of the release and instream flow requirements set forth in sections A., B. and C. above ("Non-Drought Year Requirements"). Provided, however, that if after April 1 the total storage in Lake Berryessa rises to 750,000 af or more, then the Non-Drought Year Requirements shall immediately take effect.

(2) During a Drought Year, releases of water from the Putah Diversion Dam into lower Putah Creek shall equal or exceed the following amounts (mean daily values, in cfs, with instantaneous releases always equal to or exceeding 90 % of the listed values):

Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma	Jun	Jul	Aug	Sep
15	25	25	25	16	26	46	33	33	33	26	15

(3) During a Drought Year, Permittee shall release sufficient water from the Putah Diversion Dam to maintain a continuous flow of surface water in Putah Creek from Putah Diversion Dam to the Interstate 80 Bridge, and further shall release sufficient water from the Putah Diversion Dam to maintain a minimum mean daily instream flow of 2 cfs at the Interstate 80 Bridge, with instantaneous flows always equal to or exceeding 1 cfs. Under

these conditions, Permittee shall not be required to maintain a continuous flow of surface water in the reach of Putah Creek below the Interstate 80 Bridge.

(4) Whenever the release and instream flow requirements set forth in sections D.(2) and D.(3) are in effect for two consecutive years, then during the next year thereafter the Non-Drought Year Requirements shall apply and shall remain in effect for an entire period from April 1 through March 31, unless total storage in Lake Berryessa on April 1 is less than 400,000 af. If the Drought Year Requirements are ever in effect for three or more consecutive years, then the Non-Drought Year Requirements shall apply and remain in effect for an entire period from April 1 through March 31 in the first subsequent year during which total storage in Lake Berryessa on April 1 exceeds 400,000 af.

(5) For the purposes of this section D, "total storage in Lake Berryessa" shall be the actual amount of water that physically is stored in Lake Berryessa (including all carryover storage) plus a Storage Adjustment. As of the date of entry of this Amended Judgment, the Storage Adjustment shall be zero. Thereafter, the amount of any controlled release of water from Lake Berryessa that is not for the purpose of (i) Solano Project Diversions, or (ii) maintaining the flows in lower Putah Creek that are required by this Amended Judgment shall be added to the Storage Adjustment. When Lake Berryessa spills, and all carryover storage has been spilled or otherwise eliminated, the Storage Adjustment shall be re-set to zero. The Storage Adjustment shall never be less than zero. "Solano Project Diversions," for the purpose of this paragraph, means water delivered to Solano Project Participating Agencies and Putah South Canal Conveyance losses (Canal inflows minus deliveries from canals).

(6) If Solano Project Water that is not within the scope of Solano Project Contract Allocations, as is defined in Section IV of the Amended Judgments in the *Putah Creek Water Cases*, Judicial Council Coordination Proceeding No. 2565, ever is stored in an offstream reservoir or reservoirs or underground storage, and, as a result, Lake Berryessa storage levels are reduced below the levels that would occur in the absence of such storage, then the

750,000 af amount in paragraph D.(1) and the 400,000 af amount in paragraph D.(4) shall be adjusted so that Drought Year Requirements will continue to occur at the same frequencies as they would have occurred in the absence of such storage.

E. Illegal Diversion Account

If there is any risk that illegal diversions may take place from lower Putah Creek to a degree that water released by the Solano Project for the purposes of maintaining the minimum flows set forth herein will be significantly depleted, then the procedures set forth in the attached Exhibit "E-2" shall be implemented.

F. Monitoring Requirements ((1), (2), (3) & (4) all shall be satisfied)

(1) Permittee shall continuously measure and record releases from the Putah Diversion Dam to lower Putah Creek, and shall determine and record each day's mean daily release.

(2) Permittee shall forthwith install and maintain flow measurement gauges capable of measuring instream flows on a continuous basis at the Interstate 80 Bridge and near the East Toe Drain. Permittee shall collect and maintain the data recorded by each of these gauges as is necessary to demonstrate their compliance with the flow requirements imposed by this Amended Judgment. In addition, Permittee shall make regular measurements of instream flows at Stevenson Road Bridge, Pedrick Road Bridge and Old Davis Road Bridge. If the instream flow measured at Stevenson Road Bridge, Pedrick Road Bridge, or at Old Davis Road Bridge, is less than the minimum instream flow requirements in section A.(2) above on more than an infrequent basis, then the paragraph A.(2) flow requirements shall start to apply at such measurement point or points, in addition to still applying at the Interstate 80 Bridge. Permittee shall install, maintain, repair, calibrate and operate gauging equipment at such compliance points as may be necessary to ensure and demonstrate their compliance with the provisions of this Exhibit "A". Gaging equipment shall be installed to provide a range of measurement from 0 cfs to at least 200 cfs.

(3) Permittee shall monitor flows in the entire reach of lower Putah Creek from Old Davis Road Bridge to River Mile 0.0 with su ficient frequency and by suf icient means to ensure compliance with the requirement in part A.(3) of this Amended Judgment that continuous flow of surface water be maintained in this reach at all times of the year. All measurements and observations of this reach made for purposes of compliance with this requirement shall be recorded.

(4) Permittee shall maintain records, in both paper and electronic format, of all release and flow measurements, all calculated mean daily releases and flows, and all observations required by this Judgment. Promptly upon request, these records shall be made available for review and copying by any person during normal business hours at the offices of Permittee or its designee.

Exhibit "E-2"

Effects of Illegal Diversions of Water from Lower Putah Creek on Solano Project's Obligations to Maintain Exhibit A Instream Flow Requirements

1. The Solano Project shall satisfy all of the release and instream flow requirements that are specified in Exhibit "E-1" at all times, whether or not any illegal diversions of water from lower Putah Creek are occurring, except to the extent that exceptions to the instream flow requirements are authorized by this Exhibit "E-2". These exceptions shall only be authorized during the irrigation season. "Irrigation season" shall mean the period from March 1 through October 31 of each year.

2. To determine the Solano Project's obligations to satisfy the instream flow requirements specified in Exhibit "E-1" during times when illegal diversions from lower Putah Creek are occurring, an Illegal Diversion Account shall be established. Starting at the beginning of the sixth irrigation season during which this Illegal Diversion Account is drawn upon, the balance in this account shall be set to 1,000 acr feet at the beginning of each irrigation season, regardless of the account's balance at the end of the prior irrigation season. Prior to the sixth irrigation season in which the Illegal Diversion Account is drawn upon, the balance in the Illegal Diversion Account at the beginning of each irrigation season shall be set to 2,000 acre feet. Any credits made pursuant to Paragraph 9 of this Exhibit "E-2" for any irrigation season shall be in addition to the initial balance. Permittee or, at Pe mittee's election, the Solano County Water Agency ("SCWA") shall maintain an accurate accounting of all credits to and deductions from this account.

3. At the beginning of each irrigation season, Permittee or SCWA shall provide written notice to all riparian landowners of Permittee's or SCWA's projections of the time

period during which such landowners legally may divert from each reach of lower Putah Creek during the irrigation season. This notice shall encourage each riparian landowner to provide Permittee or SCWA with the dates and amounts of the landowner's planned diversions of water from lower Putah Creek during the irrigation season. Permittee or SCWA may, in its discretion, provide additional notices, making updated projections of the amounts of water that such landowners legally may divert from lower Putah Creek, to these landowners as the irrigation season progresses. The calculations in these notices shall be based on the formulas and procedures described in Exhibit "E-3".

4. The term "illegal diversion" in this Exhibit "E-2" means a diversion that is illegal based on the formulas and procedures described in Exhibit "E-3". The sole purposes of this definition are for implementing the provisions of this Exhibit "E-2" regarding deductions from the Illegal Diversion Account pursuant to this paragraph 4 and modifying the Solano Project's release requirements pursuant to paragraph 6 of this Exhibit "E-2". If Permittee or SCWA has filed, and is diligently pursuing, a court action against a landowner with an illegal diversion, and if Permittee or SCWA has complied with all of the provisions of paragraph 3 of this Exhibit "E-2", and is complying with all of the provisions of paragraph 5 of this Exhibit "E-2", then deductions shall be made from the Illegal Diversion Account for any amounts of water that the Solano Project releases from the Putah Diversion Dam into lower Putah Creek during the irrigation season solely for the purpose of compensating for that illegal diversion while maintaining the instream flows specified in Exhibit "E-1". "Diligently pursuing" means seeking, at the earliest possible opportunities, a temporary restraining order, a preliminary injunction and a permanent injunction stopping the illegal diversion, and a declaratory judgment regarding the illegality of the diversion. If there

is more than one illegal diversion, then all of the provisions of this paragraph shall apply to each illegal diversion.

5. During any period during which deductions are being made from the Illegal Diversion Account, Permittee or SCWA shall make streamflow measurements on a continuous basis at sufficient locations along lower Putah Creek to make the calculations and determinations described in Exhibit "E-3". During such periods, Permittee or SCWA shall post all such data, calculations and determinations on its Internet website, or make such information available to members of the public by similar electronic means, and shall update such posted information at least once each day.

6. If the balance in the Illegal Diversion Account ever reaches zero, then, during the remainder of the irrigation season during which the Account balance reached zero and while Permittee or SCWA continues to diligently pursue the court action described in the paragraph 4 above and continues to make available the data, calculations, determinations and reports described in paragraph 5 above, and while the court action is pending, the Solano Project shall not be required to fully comply with any instream flow requirement that is specified in Exhibit "E-1" for a point that is located downstream of any illegal diversion that is subject to the court action and that occurs after the Illegal Diversion Account balance reaches zero. Instead, under these conditions, the Solano Project shall release from the Putah Diversion Dam into lower Putah Creek at least the amounts of water that would be sufficient to satisfy all of the instream flow requirements in Exhibit "E-1", if the illegal diversion that is subject to the court action were not occurring. Under these circumstances, the Solano Project's release obligations shall be adjusted as frequently as necessary to reflect changes in hydrological conditions or changes in the rate of the illegal diversion. Immediately upon the

cessation of such illegal diversion, the conclusion, dismissal or cessation of diligent pursuit of the court action, or the end of the irrigation season, whichever occurs first, the Solano Project shall satisfy all of the instream flow requirements in Exhibit "E-1". If court actions regarding more than one illegal diversion are pending, then the provisions of this paragraph shall apply to all such illegal diversions.

7. Deductions from the Illegal Diversion Account for an illegal diversion may be made only for a maximum of two years after the court action described in paragraph 4 above is filed against the landowner with the illegal diversion. Even if a final judgment is not issued in such court action within two years after the action is filed, and even if such court action is dismissed for any reason, the Solano Project nevertheless thereafter shall be required to maintain all of the instream flows described in Exhibit "E-1", and no further deductions shall ever be made from the Illegal Diversion Account for any illegal diversion that is or was the subject of the court action. However, if a new illegal diversion with neither a point of diversion nor a place of use that is within the scope of the court action described in paragraph 4 above occurs, then the provisions of paragraphs 4, 5 and 6 above, and this paragraph, shall apply to the new illegal diversion. If there is more than one such new illegal diversion, then the provisions of paragraphs 4, 5 and 6 above, and this paragraph, shall apply to each such new illegal diversion.

8. If a court of competent jurisdiction issues a final judgment specifying the legality or illegality of any particular diversion from lower Putah Creek, then Permittee or SCWA shall adjust the formulas and calculations in Exhibit "E-3" to be consistent with the court's judgment, and the adjusted formulas and calculations shall be applied thereafter. If

any interested party disagrees with Permittee's or SCWA's adjustment, then that party may ask the SWRCB, by noticed motion, to determine what the appropriate adjustment should be.

9. If any adjustments to the formulas or calculations in Exhibit "E-3" are made pursuant to paragraph 8 of this Exhibit "E-2", then appropriate adjustments shall be made to the Illegal Diversion Account, for example, credits shall be made for the total amount of all debits that previously were made from the Account for diversion that were treated by Permittee or SCWA as illegal, but which would have been legal under the adjusted formulas and calculations. If Permittee or SCWA ceases to diligently pursue any court action described in paragraph 4 of this Exhibit "E-2" before a final judgment is entered, then credits shall be made to the Illegal Diversion Account for the total amount of all debits that previously were made from the Account for the diversion that was the subject of the court action. The credits described in this paragraph shall be spread equally over the same number of irrigation seasons as the number of irrigation seasons during which debits from the Account were made. If the court issues its final judgment during an irrigation season, then the first year of such credits shall be made immediately to the Account. If the court issues its final judgment not during an irrigation season, then the first year of such credits shall be made during the next irrigation season. Subsequent credits shall be made during the immediately following irrigation seasons.

Exhibit "E-3"

Permittee's Methodology for Monitoring and Quantifying the Availability and Use of Riparian Water in Lower Putah Creek

This document provides Permittee's explanation and basis for its methodology for monitoring and quantifying the availability and use of riparian water in Putah Creek, downstream of the Putah Diversion Dam. Permittee's methodology, hereafter referred to as the Lower Putah Creek Riparian Water Program ("PRWP"), will be used by Permittee or, at Permittee's election, by the Solano County Water Agency ("SCWA"), to (1) differentiate between and quantify the availability of riparian versus non-riparian waters in Putah Creek, downstream of the Putah Diversion Dam, and (2) identify and quantify illegal water diversions, downstream of the Putah Diversion Dam. Permittee anticipates that implementation of the PRWP will increase the efficiency with which the instream flow requirements of the Solano Project, as specified by this petition, are satisfied, and facilitate the lawful diversion of riparian water downstream of the Putah Diversion Dam.

1.0 OVERVIEW

1.1 Key Elements of Lower Putah Creek Riparian Water Program

The PRWP consists of two components: Pre-irrigation season water availability forecasts, and real-time stream flow monitoring during the irrigation season, where "irrigation season" is defined as March 1 through October 31. Annual water availability

forecasts will be provided to riparian water users prior to the irrigation season, so they and other interested parties can plan and, if necessary, make other arrangements for obtaining irrigation water, before significant time and financial resources are committed to the cultivation of a given crop. Real-time monitoring will be conducted to: (1) determine, on a daily basis, the quantities of riparian water that are available to water users in Lower Putah Creek, and (2) differentiate and quantify, on a daily basis, legal versus illegal riparian diversions.

1.2 Definition of Riparian Water

For the purposes of the PRWP, riparian stream flows are defined as any surface water derived from precipitation or rising groundwater that, given prevailing hydrologic conditions, would occur in Lower Putah Creek in the absence of the Solano Project. Non-riparian water, such as treated wastewater and agricultural return flows originating from a non-riparian source (e.g., pumped groundwater that would not otherwise be tributary to the creek) cannot, by definition, be diverted by riparian water right claimants and, therefore, is not included as a source of riparian water from Lower Putah Creek.

2.0 WATER AVAILABILITY FORECASTS

Permittee's riparian water availability forecasts for Lower Putah Creek will be based on stream flow conditions observed in the Putah Creek drainage, upstream of the Putah Diversion Dam, in the prior (i.e., antecedent conditions) and current water year. Forecasts

will be made on January 1, March 1 and May 1. The January 1 and March 1 forecasts, which will be made before the current rainy season is over, will be based in part on projected stream flow conditions for the balance of the rainy season, while the May 1 forecast, the final forecast for the water year, will be based on actual runoff measured to date. Both the January 1 and March 1 forecasts will include three scenarios, based on the assumption that the balance of the rainy season will either be "wet" (25% exceedance), "normal" (50% exceedance) or "dry" (75% exceedance).

In order to address the differing sources and durations of riparian stream flows (surface stream flows from Putah Creek and/or tributaries to Putah Creek, or rising groundwater), Lower Putah Creek has been divided into five reaches. Water availability forecasts will be made for each reach. Stream reach designations and the analytic framework for making water availability forecasts are presented in "Attachment 1".

3.0 REAL-TIME MONITORING

3.1 Quantifying Available Riparian Water Supply

Stream flows and the associated stream flow gains and losses will be monitored by reach, on a continuous basis, and the availability of riparian water and extent of illegal diversions will be determined daily, using a series of water mass balance equations to track the quantities of both riparian and non-riparian water entering and leaving each stream reach.

A summary of the equations used to define riparian water availability, by stream reach, is presented in Attachment 1.

Although the determination of net riparian flow is based on real-time stream flow measurements, there are situations where real-time stream flow measurements are not practical and therefore simplifying assumptions must be used, much as they are in the Condition 12 Settlement Agreement for the Upper Putah Creek drainage. For example, under existing conditions it is difficult to measure accurately real-time stream flow losses in the stream reach now inundated by Lake Solano. Consequently, a "fixed" loss figure previously adopted by the United States Bureau of Reclamation may be used in the water mass balance calculation for this reach. In all cases, the simplifying assumptions used to quantify the availability of riparian water are purposely conservative in the sense that they tend to overstate the availability of riparian stream flows. Overstating riparian water availability is preferred, since it presumably increases the enforceability of the PRWP and its acceptability to riparian water users.

3.1.1 Data Collection

3.1.1.1 Measurement of Riparian Diversions

Riparian diversions will either be measured directly, using an appropriate meter and assuming landowner/operator permission is obtained, or indirectly, via measurement of creek stream flows in the vicinity of the diversion. Riparian diversions typically constitute a

readily measurable fraction of the total stream flow in any given reach (500-2,000 gallons per minute, or about 1-5 cubic feet per second), and are therefore easily detected by continuously measuring stream flows entering and leaving a given stream segment.

3.1.1.2 Measurement of Agricultural Return Flows and Wastewater Discharges

The agricultural return flows entering Lower Putah Creek are for the most part non riparian water sources, as are the treated wastewater discharges from the University of California - Davis (U.C. Davis) water treatment facility, which enter Lower Putah Creek near Old Davis Road. Nevertheless, these water sources must be quantified for water mass balance accounting purposes. The University's treated wastewater discharges are measured and recorded by the treatment plant operators. Most of the agricultural return flows are too small and/or sporadic to warrant direct measurement, and will therefore be estimated, or if insignificant relative to the total creek stream flow, ignored. However, one notable exception is the Willow Canal, which discharges into Lower Putah Creek just upstream of Pedrick Road. Discharges from the Willow Canal, which is operated by the Yolo County Flood Control and Water Conservation District (YCFC&WCD), will be measured as necessary.

3.1.1.3 Measurement of Groundwater Seepage and Evapotranspiration

The amounts of groundwater seepage (into or out of the creek) and water lost to open-water evaporation and transpiration by riparian vegetation vary gradually over time, in comparison to the fluctuating gains and losses associated with water diversions and

agricultural return flows. For the purposes of the PRWP, the net flow gain or loss from these factors (groundwater seepage, evaporation and transpiration) are combined into a single term that represents the natural or "background" net stream flow gain or loss rate within a given reach. Background gains and losses are most easily quantified as the difference in stream flow over a given reach ("top of reach" stream flow versus "bottom of reach" stream flow), in the absence of any diversions or "intra reach inflows."

Groundwater seepage along the reach from I-505 to Stevenson Bridge typically transitions from net loss (seepage out of the creek) to net gain (seepage into the creek). The location of the transition point and the total amount of influent seepage along the gaining stretch depend on the regional groundwater levels in the underlying groundwater basin. This reach will be subdivided into two sub-reaches when necessary to calculate riparian water availability. The upstream end of the gaining segment will be detected by periodic stream flow measurements and/or temperature changes in the creek.

3.1.1.4 Special Situations

Pumping from Riparian Wells

There is no clear boundary between wells that induce additional seepage from the creek and wells that pump regional groundwater; the percentage of pumped water that consists of induced seepage decreases gradually with depth and horizontal distance from the creek. A pragmatic approach adequate for the purpose of the PRWP is to include in the accounting the effects of a well if its effect on stream flow can be detected by the stream flow

monitoring program. The philosophy behind this approach is that well pumping does not matter if its effects on stream flow are not measurable; and if the effects are measurable, then the evidence and justification for including the well as a riparian diverter are already at hand. In practice, it is unlikely that wells more than about 500 feet from the creek or more than 100 feet deep will measurably affect stream flow.

Impoundments Below Mace Boulevard

Riparian water accounting is slightly more complicated at the downstream end of Putah Creek, between Mace Boulevard and the Toe Drain in the Yolo Bypass. Two impoundments are created in the creek channel each year to provide pumping pools for irrigation operations. The lower impoundment is a flashboard dam operated jointly by Los Rios Farms and the California Department of Fish and Game. Frequently, some of the water impounded behind this dam is water that is diverted from the Toe Drain of the Yolo Bypass at a pumping station about 1 mile north of the dam and conveyed to the impoundment by a canal. It may be necessary to gage the inflows from this canal into Putah Creek to determine the availability of Putah Creek riparian water in the impoundment. The issue may be moot, however, because the downstream compliance point for resident native fish flows is at river mile 0, which is upstream of the impoundment.

The upper impoundment is a temporary dirt berm across the channel that provides a crossing for farm vehicles in addition to creating a pumping pool. The berm is at about river mile 1.0 (aligned with country road 106B), and the impounded water derives entirely from Putah Creek. Irrigation return flows from adjacent fields may include water that originated

from Toe Drain diversions, and these return flows will be measured or estimated in the same manner as for return flows in other reaches of the creek.

Riparian Diversions from Pools in the Creekbed

Prior to construction of the Solano Project, landowners in a few locations were able to pump water from natural or constructed pools in the creekbed after live flow in the creek had ceased in summer. These pools were separate from the well-documented gaining reach above Stevenson Bridge, where groundwater seepage into the creekbed can create surface water stream flows in the absence of surface water inflows from upstream eaches. The accounting methodology described here does not encompass the water in isolated pools that would have been present in the absence of the Solano Project. The historical number of pools is thought to be small, and the pumping rates they could sustain also were probably small.

The possible availability of riparian water from isolated pools will be dealt with on a case-by-case basis. If a landowner can provide evidence that persistent pools existed on his or her property during periods of discontinuous streamflow prior to the Solano Project construction, then the sustained pumping yield of those pools will be estimated to quantify the amount of riparian water presently available to the landowner from that source. The yield will be estimated from the pool volume and the permeability of the surrounding streambed materials, which may release shallow groundwater when the pool level is lowered by pumping.

New Diversions and Return Flows

As parcels change ownership or existing landowners modify their farming operations, some diversions and return flows may be added and others discontinued. Word of mouth and the annual riparian water forecast mailing should be sufficient to inform any newcomers that riparian diversions from Lower Putah Creek are monitored and regulated. The new users will be encouraged to join the cooperative effort to manage and utilize riparian water supplies. Any changes in discharges by U.C. Davis, YCFC&WCD, and other agencies or industries hopefully will also be communicated to the Solano County Water Agency to facilitate a smooth transition. Any unreported changes will eventually be detected by the stream flow monitoring program, periodic field surveys, neighboring landowners, or the streamkeeper.

Uncooperative Riparian Diverters

It is hoped that all riparian diverters will cooperate with each other and with the Solano County Water Agency to make efficient use of the available riparian water supply without any illegal diversions. However, it is possible that some landowners will attempt to conceal their diversions or refuse to provide information about when and how much water they are diverting, or when and where return flows occur. Fortunately, all of this information can be obtained anyway. It would be impossible to conceal a significant diversion for very long because the pumping equipment and power supplies are large, visible, and make sound and because the effects of the diversion will be detected by the stream flow monitoring program. The pumping rate at any diversion can be measured fairly accurately by gaging the stream flow immediately upstream and downstream of the diversion. Return flows can

similarly be estimated by surveys of the field drainage patterns and the direct observation of the return flows.

3.2 Quantifying Illegal Diversions

Any diversion in excess of the calculated net riparian flow is considered illegal. Illegal diversions, like net riparian flow, will be monitored and quantified by reach, and to the extent possible, by individual diverters. A summary of the equations used to quantify illegal diversions is presented in Attachment 1.

If total riparian diversions in any given reach exceed the available riparian supply and the diverters are unwilling to voluntarily reduce their total diversions to match the available supply, and these actions adversely affect the Solano County Water Agency, then the Agency may sue some or all of the active diverters and seek court orders addressing the illegal diversions. It is hoped that this type of enforcement action will not be necessary. The PRWP will provide all of the data needed on a real-time basis to enable the active riparian diverters to manage their activities and restrict the locations and rates of their diversions so that they remain within the legally available supply.

3.3 Public Access to Riparian Water Accounting Data and Calculations

The Solano County Water Agency will conduct the data collection activities and complete the calculations necessary to generate the pre-irrigation season water availability

forecasts and the real-time riparian water availability determinations. All data collected for these purposes and all formulas and computer programs used in the calculations will be available on request to any interested agency, group or individual. The Solano County Water Agency will publish the data and results on its website and update the information approximately daily during the irrigation season.

The Solano County Water Agency will deliver the first (January) pre-season water availability forecast by mail to all riparian landowners along Lower Putah Creek. Landowners may at that time request that the subsequent forecasts (March and May) also be sent by mail if the landowner is unable to access the information by Internet. It would not be practical to disseminate the real-time monitoring data by mail because it will be updated daily during the irrigation season. Active diverters who need the daily information will be able to view it on the Solano County Water Agency's website or call the Agency to obtain the information by telephone.

ATTACHMENT 1 TO EXHIBIT "E-3"

1.0 Pre Irrigation Season Predictions

A) Objective:

To estimate future availability of riparian stream flows, based on projected and/or prior hydrologic conditions in the Putah Creek drainage. For pre irrigation season prediction purposes, assume riparian stream flows consist of surface runoff from precipitation and rising groundwater

B) Analytic Approach:

i) Divide Lower Putah Creek into the following reaches:
   a) Putah Diversion Dam to Highway 505 Bridge (a "losing reach")
   b) Highway 505 Bridge to Stevenson Bridge (a "gaining reach")
   c) Stevenson Bridge to I-80 Bridge (a "losing reach")
   d) I-80 Bridge to Mace Boulevard (a "losing reach"
   e) Mace Boulevard to Yolo Bypass (a "losing reach")

(Reach designations based on hydrogeologic features, proximity of suitable stream flow gaging sites and existing riparian diversions. When necessary, reach "b" will be subdivided into two sub-reaches.)

ii) Predict average monthly flow and date of zero flow for each of the above riparian water sources, in each of the five reaches:
   a) Surface runoff: calculate using statistical relationships derived from historical data.
      - Stream flow recession curves derived from stream flow gaging data for "At Winters", "Near Winters" and "Near Davis" stream flow gaging stations
      - Stream reach percolation/evapotranspiration loss estimating algorithms developed for the Solano County Water Agency's Lower Putah Creek stream flow model

   b) Rising groundwater: calculate using statistical relationships derived from historical data.
      - Stream reach groundwater gain/loss estimating algorithms developed for the Solano County Water Agency's Lower Putah Creek streamflow model

C) Timing of Pre Irrigation Season Predictions:

i) January 1 – Predictions based on hydrology of water year to date and three scenarios for the remainder of the year's rainy season: "wet year" (25% Lake

Berryessa inflow exceedance), "nonnal year" (50% Lake Berryessa inflow exceedance) and "dry year" (75% Lake Berryessa inflow exceedance)

ii) March 1 – Predictions based on hydrology of water year to date and projected 25%, 50% and 75% exceedance runoff rates for the remainder of the year's rainy season

iii) May 1 – Final prediction based on hydrology of the water year through April

2.0 Methodology for Quantifying Riparian Streamflows During Irrigation Season

Note: Riparian stream flows are defined here as any surface water derived from precipitation or rising groundwater that, given prevailing hydrologic conditions, would occur in Lower Putah Creek in the absence of the Solano Project. Non riparian water, such as treated wastewater and agricultural return flows originating from a non riparian source (e.g., pumped groundwater) cannot, by definition, be diverted by riparian water right claimants and therefore, are not included as a source of riparian water from Lower Putah Creek.

A) Overview:

i) Calculate, on a daily basis, pre Solano Project stream flows (i.e., stream flow that would occur if there were no dams – no Solano Project) at the Putah Diversion Dam site

ii) Compare computed daily pre Solano Project stream flow (i.e., stream flow that would occur if there were no dams – no Solano Project) with current Putah Diversion Dam release – determine what fraction of the current release is stored water or any other non riparian water source, versus riparian stream flows

iii) Using real-time stream flow monitoring data to quantify prevailing percolation/evapotranspiration losses and any non riparian water sources, calculate riparian flows by stream reach. The total quantity of riparian water in any given reach is defined here as the sum of all riparian water sources less percolation/evapotranspiration losses.

B) Analytical Approach:

i) Riparian stream flows at Putah Diversion Dam site

$$USRSF = LBI + IDTI - IDCL$$

Where: USRSF = Riparian stream flow at Putah Diversion Dam

LBI = Computed/measured Lake Berryessa inflow (less any associated non riparian flow)

IDTI = Inter Dam Reach tributary inflow (less any associated non riparian flow)

IDCL = channel percolation/evapotranspiration losses that would occur in the Inter Dam Reach in the absence of Lake Solano

(A stream gage will be placed on Pleasants Creek to facilitate real-time estimation of inflow from inter-dam tributaries. For accounting purposes, seepage and evaporation losses from Lake Solano are assumed to be constant and will therefore be characterized by a fixed continuous loss rate term).

ii) Riparian stream flows in first reach downstream of Putah Diversion Dam (Putah Diversion Dam to 505 Bridge)

1RRSF = USRSF + TRSF + 1RAG – 1RCL

Where: 1RRSF = Computed riparian stream flow in Reach 1
USFSF = Computed riparian stream flow at Putah Diversion Dam
TRSF = Measured stream flow from tributaries (Dry Creek, McCune aka Pleasant Creek), less any associated non riparian flow
1RAG = Ag return flow water originating from a riparian source in = reach 1
1RCL = Measured channel percolation/evapotranspiration losses in reach 1

Notes:
(1) Agricultural return flow water that originates from a riparian water source (riparian water diverted from Putah Creek or associated tributaries) is classified as riparian water and therefore can be lawfully diverted by other riparian water right claimants.

iii) Riparian stream flows in second reach downstream of Putah Diversion Dam (505 Bridge to Stevenson Bridge)

2RRSF = 1RRSF – 1RD (+/-) 2RCL + 2RAG

Where: 2RRSF = Computed riparian stream flow in Reach 2
1RRSF = Computed riparian stream flow in Reach 1
2RCL = Combined sum of groundwater "gains", channel percolation/evapotranspiration losses in reach 2
2RAG = Ag return flow water in reach 2 originating from a riparian source
1RD = Riparian diversion in Reach 1

Notes:

(1) There are no significant tributaries entering Putah Creek in this Reach

(2) Due to the spatial and temporal variability of rising groundwater, portions of the so called "gaining reach" (generally the upstreammost third of the reach) frequently lose rather than gain water. Accordingly, there are instances when some of the riparian diverters within Reach 2 have access