ANNUAL REPORT | APRIL 2026

VINA SUBBASIN (5-021.57) GROUNDWATER SUSTAINABILITY PLAN ANNUAL REPORT – 2025

SUBMITTED BY

VINA AND ROCK CREEK RECLAMATION DISTRICT GROUNDWATER SUSTAINABILITY AGENCIES

PREPARED UNDER CONTRACT WITH

BUTTE COUNTY DEPARTMENT OF WATER AND RESOURCE CONSERVATION

PREPARED BY

Prepared by Luhdorff and Scalmanini Consulting Engineers and Davids Engineering under contract with Butte County Department of Water and Resource Conservation on behalf of the GSAs in the Vina Subbasin.

TABLE OF CONTENTS

LIST OF TABLES

TABLE OF CONTENTS

LIST OF FIGURES

APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
µS/cm	micro siemens per centimeter
AF	acre-feet
AFY	acre-feet per year
AMSL	above mean sea level
BBGM	Butte Basin Groundwater Model
CalWATRS	California Water Accounting, Tracking, and Reporting System
DID	Durham Irrigation District
DWR	Department of Water Resources
GEEEO	Groundwater Extraction Estimates Earth Observations
GPS	global positioning system
GSA	groundwater sustainability agency
GSP	groundwater sustainability plan
IM	Interim Milestone
InSAR	Interferometric Synthetic Aperture Radar
MA	management area
MO	measurable objective
MT	minimum threshold
PMA	projects and management action
RCRD	Rock Creek Reclamation District
RMS	representative monitoring site
SC	specific conductivity
SGMA	Sustainable Groundwater Management Act
SI	sustainability indicator
SMC	sustainable management criteria
Subbasin	Vina Subbasin
SWRCB	State Water Resources Control Board
WY	water year (October 1-September 30)

EXECUTIVE SUMMARY

The Vina Subbasin (Subbasin) (5-021.57) Annual Report was prepared on behalf of the Vina Groundwater Sustainability Agency (GSA) and the Rock Creek Reclamation District GSA to fulfill the statutory requirements set by the Sustainable Groundwater Management Act (SGMA) legislation (§10728) and the Groundwater Sustainability Plan (GSP) regulations (§354.40 and §356.2) developed by the California Department of Water Resources (DWR). The regulations mandate the submission of an annual report to DWR by April 1st after the reporting year, which spans the water year (WY) from October 1st to September 30th. This Annual Report includes information from the recent WY 2025 for the Vina Subbasin, located within Butte County, and shown in **Figure ES-1.**

Measured conditions in the Subbasin complied with all minimum thresholds (MTs) for all applicable sustainability indicators (SIs). An MT is the quantitative value that represents the groundwater conditions at a representative monitoring site that, when exceeded individually or in combination with the MTs at other monitoring sites, may cause an undesirable result(s) in the basin per DWR's definition. Whether the MT represents a minimum or a maximum value is dependent on the SI. As an example of a minimum, if groundwater levels are lower than the value of the measurable objective (MO) for that site, they are moving in the direction of the MT. As an example of a maximum, for the groundwater quality sustainable management criteria (SMC), as the value of the specific conductivity (SC) concentration increases beyond the MO established for that site, it moves towards the MT. The SIs and SMC, including MOs and MTs, are summarized in **Table ES-1.** Note that seawater intrusion is not an applicable SI in this Subbasin. Each SI is measured at Representative Monitoring Sites (RMS).

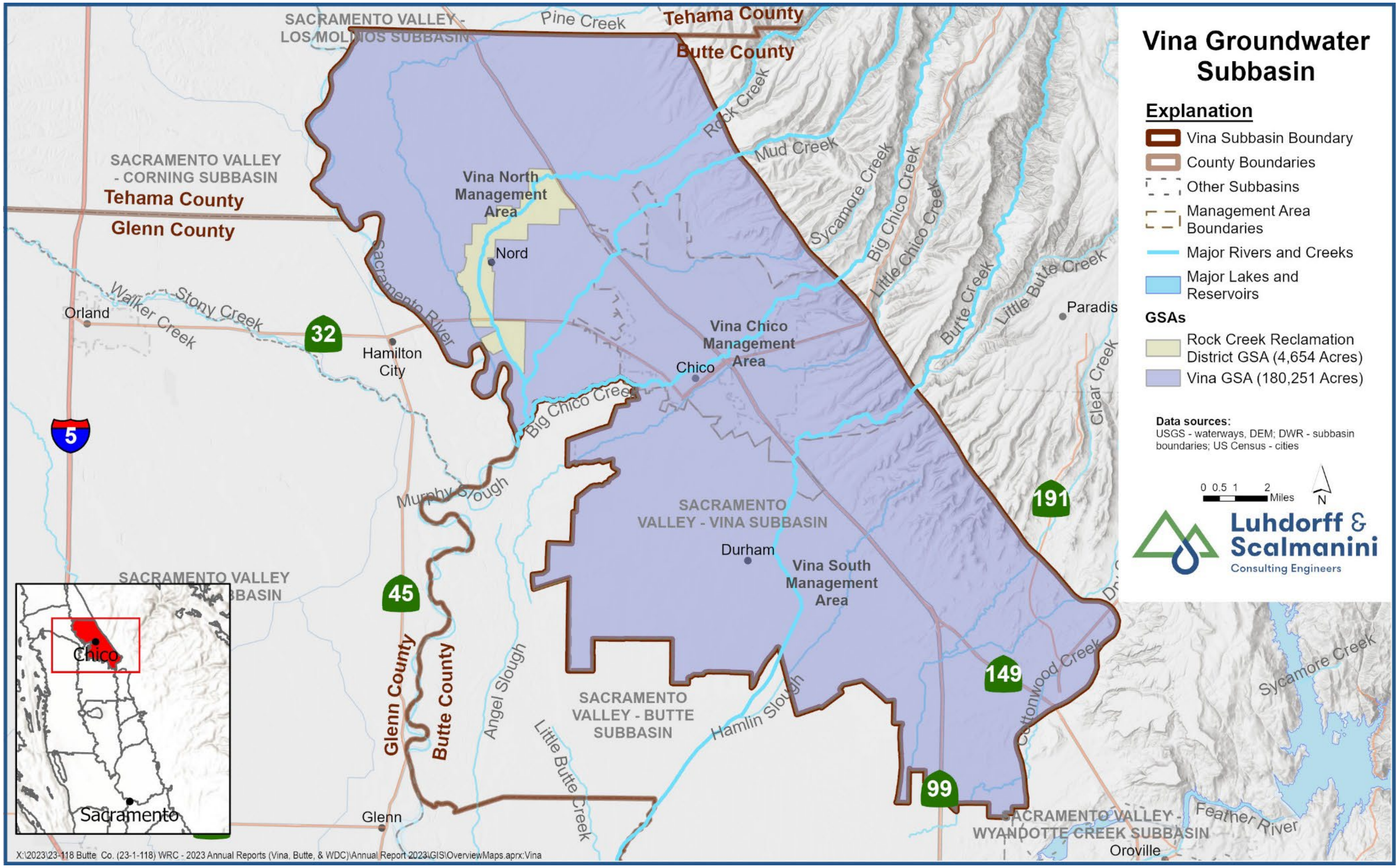


Figure ES-1. Vina Subbasin and Groundwater Sustainability Agency Boundaries

Table ES-1. Vina Subbasin Sustainability Indicator Summary			
2025 Status	**Undesirable Result Identification**	**Measurable Objective (MO) Definition**	**Minimum Threshold (MT) Definition**
Chronic Lowering of Groundwater Levels			
No indication of undesirable results There were no RMS wells with spring or fall 2025 groundwater level measurements below the MT.	When 2 RMS wells within a management area reach their MT for two consecutive non-dry year types.	The groundwater level is based on the groundwater trend line for the dry periods (over the period of record) of observed short-term climatic cycles extended to 2030 for each RMS well.	An elevation protective of sustainably constructed domestic wells (based on their well depths for wells drilled since 1980) within the polygon associated with the RMS well.
Reduction of Groundwater Storage			
No indication of undesirable results There were no RMS wells with spring or fall 2025 groundwater level measurements below the MT.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.
Degraded Water Quality			
No indication of undesirable results There were no RMS wells with SC levels exceeding their MTs in 2025.	When 2 RMS wells exceed their MT for two consecutive non-dry years.	Measured SC is less than or equal to the recommended Secondary Maximum Contaminant Level (900 µS/cm) based on State Secondary Drinking Water Standards at each well.	The upper limit of the Secondary Maximum Contaminant Level for SC (1,600 µS/cm) is based on the State Secondary Drinking Water Standards.
Land Subsidence			
No indication of undesirable results There were no RMS wells with spring or fall 2025 groundwater level measurements below the MT.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.

Table ES-1. Vina Subbasin Sustainability Indicator Summary			
2025 Status	**Undesirable Result Identification**	**Measurable Objective (MO) Definition**	**Minimum Threshold (MT) Definition**
Depletion of Interconnected Surface Water			
No indication of undesirable results There were no RMS wells with spring or fall 2025 groundwater level measurements below the MT.	Uses groundwater levels as a proxy. The GSP identifies data gaps and describes the "Interconnected Surface Water Sustainable Management Criteria Framework."	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.

Notes:

Salinity is the primary water-quality constituent of concern evaluated by measuring specific conductivity (SC).

MO = Measurable Objective, MT = Minimum Threshold, RMS = representative monitoring site, µS/cm = micro siemens per centimeter

Current Groundwater Level and Storage Conditions

The current groundwater conditions in the Subbasin are characterized by groundwater elevations that have remained consistently above the MO, have remained well above the corresponding MT, and remain within the Subbasin's established margin of operational flexibility for each RMS well. Importantly, none of the RMS wells experienced a decline below the MT for two consecutive non-dry years, per the current SMC hence avoiding undesirable results as defined in the GSP.

On average, groundwater elevations were 71 feet above the MT throughout the Subbasin and 20 feet above the MOs in WY 2025 over both spring and fall. Elevations are mostly near or slightly higher than those observed in recent years. This positive trend is largely attributable to the above-normal hydrologic conditions of WY 2025, which enhanced natural recharge and improved surface water availability. It should be noted, however, that surface water constitutes only a minority of total water supplies.

Fluctuations in groundwater levels and storage within the Subbasin are influenced by the balance between aquifer recharge and extraction. Groundwater levels are used as a proxy for estimating changes in groundwater storage, with observed patterns closely mirroring those in the broader Sacramento Valley. In years characterized by drought and low precipitation, increased agricultural irrigation demand and diminished surface water supplies lead to increased extractions and reduced recharge, resulting in a decline in groundwater storage.

WY 2025, classified as an Above-Normal WY (CDEC, 2025), marked an increase in groundwater storage of approximately 44,300 acre-feet (AF) in the Subbasin. For context, over the past 26 years, the largest one-year decrease in groundwater storage is estimated to be -151,700 AF, and the greatest one-year increase was estimated to be 144,100 AF. **Figure ES-2** shows groundwater pumping, as well as an annual and cumulative change in groundwater storage from WY 2000 to WY 2025.

Water Use

Groundwater extraction was approximately 261,600 AF in WY 2025, about 18,300 AF greater than the 243,300 AF extracted in WY 2024. The annual volume of surface water delivered to the Subbasin from surface water features such as Butte Creek was about 25,800 AF in WY 2025, less than the estimated 28,300 AF delivered in WY 2024.

Groundwater provided the majority (91%) of the water for agriculture in the Subbasin, and surface water was the source for the remainder. Groundwater also met the demand for municipal and rural residential users in WY 2025. The volume of groundwater and surface water used on an annual basis within the Subbasin is summarized directly from measured and reported groundwater pumping and surface water diversions when available; however, a water use estimation approach has been used to estimate the remaining unmeasured volume of groundwater extraction. Water use for the Subbasin is reported in **Appendix D**. The water use analysis methodology is discussed in **Appendix E. Table ES-2** provides a summary of water use by the water sector. Numbers are rounded to the nearest 100.

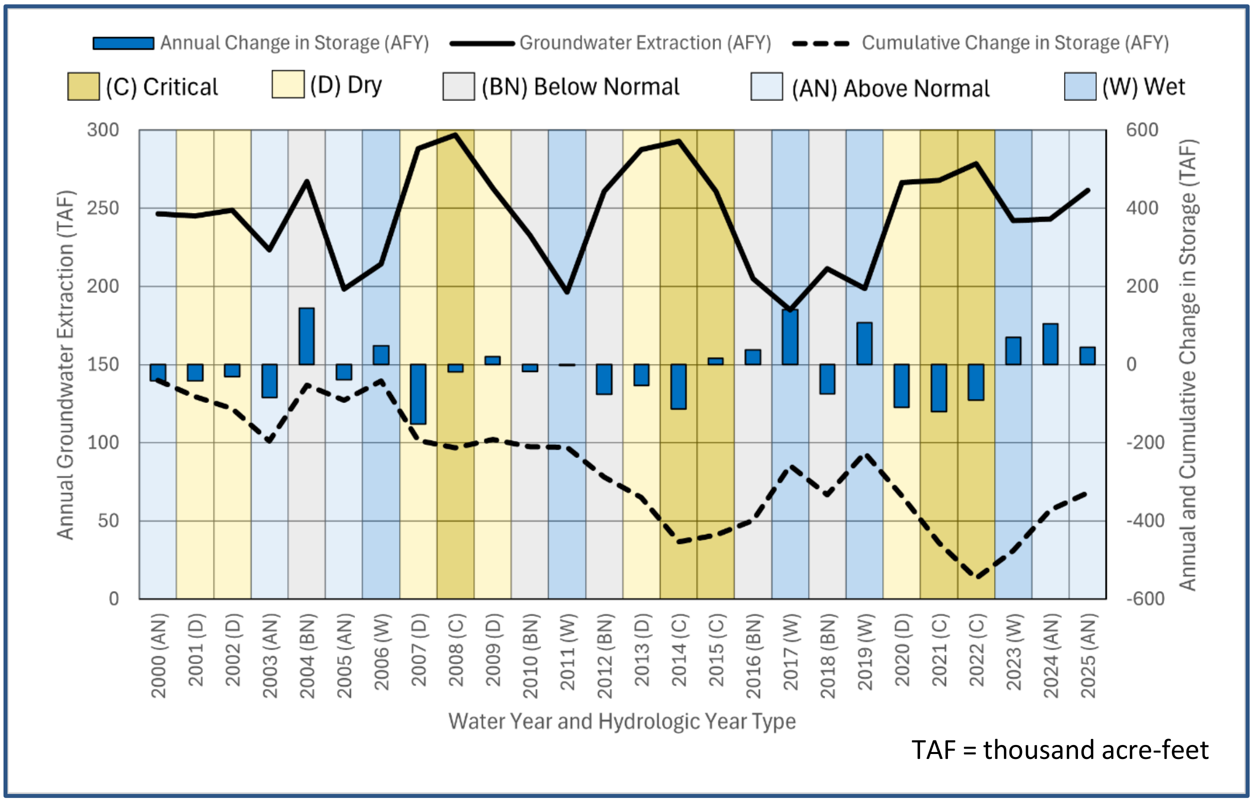


Figure ES-2. Vina Subbasin Groundwater Pumping, Annual and Cumulative Change in Storage from WY 2000 to WY 2025

Table ES-2. Vina Subbasin Total Water Use by Water Use Sector

Sector		WY 2025			
	Groundwater (AF)	Surface Water (AF)	Total (AF)	Percent of Total Water Use	Total Sector Area (ac)
Agricultural	240,200	25,800	**266,000**	**93%**	**75,500**
Municipal	18,400	--	**18,400**	**6%**	**19,100**
Rural Residential	3,000	--	**3,000**	**1%**	**n/a***
Total	**261,600**	**25,800**	**287,400**	**100%**	
Percent of Total Water Use	**91%**	**9%**	**100%**		

Notes:

[*]Rural Residential water use is calculated based on population from census data, not area.

GSP Implementation Progress

The main activities and updates from the previous Annual Report are as follows:

1. All sustainability indicators (SIs) are in compliance with their MTs (see summary **Table 5-1**).
2. The GSAs completed the WY 2025 Annual Report and other critical tasks related to monitoring and data collection.
3. The GSAs continued to participate in ongoing intra- and inter-basin coordination.
4. The GSAs adopted an initial uniform acreage-based property-related service fee to fund its operations and implementation costs required to comply with SGMA, with the intention of conducting a new fee study to explore funding options that reflect the diversity of groundwater users within its boundaries. The new fee study was initiated in the previous water year, and in the 2025 water year the GSAs adopted a two-part SGMA fee, which was implemented for the 2025-26 fiscal year.
5. Progress has been made on 12 PMAs since the last annual report (**Appendix G**).
6. The Vina GSA was recently awarded about $5.5 million to complete specific tasks ranging from filling data gaps, conducting feasibility analyses for two water supply projects, performing recharge feasibility and pilot projects, and designing and implementing pilot programs for demand reduction strategies. This portfolio approach funds various phases of projects listed in the GSP. Implementation of these projects continued in the 2025 WY.

The GSP was approved in July of 2023, and DWR proposed six recommended corrective actions that will enhance the GSP:

1. Providing additional information on historical and current groundwater quality conditions in the Subbasin and refining the definition of sustainable management criteria through a number of actions further described in the letter.
2. Review the model inputs/outputs and provide consistent information regarding stream loss and gains, clarifying whether values represent the overall interaction between the surface water and groundwater system or the quantity of depletion due to groundwater pumping.
3. Providing more information regarding the criteria used to identify significant and unreasonable conditions, undesirable results, and the potential impacts to various beneficial uses and users of groundwater related to the chronic lowering of groundwater level minimum thresholds through a number of actions further described in the letter.
4. Revising the definition of undesirable results to remove the non-dry year condition or discuss how degradation during dry periods will be managed as necessary to ensure that adverse water-quality conditions are offset during other periods.
5. Providing more information about the criteria used to identify undesirable results and sustainable management criteria for land subsidence through a number of actions further described in the letter.

6. Use future DWR guidance regarding estimations of the location, quantity, and timing of depletions of interconnected surface water and establish specific sustainable management criteria to sustainably manage depletions of interconnected surface water through a number of actions.

In 2025, the GSAs continued implementing projects to address recommended corrective actions, largely funded by the SGM Implementation Grant Program. The ongoing implementation of PMAs, described in **Appendix G**, aims to address these corrective actions effectively through the Periodic Evaluation of the GSP, which is due in January 2027.

1 GENERAL INFORMATION §356.2(A)

The Annual Report for the Vina Subbasin (Subbasin) (5-021.57) was prepared on behalf of the Vina Groundwater Sustainability Agency (GSA) and the Rock Creek Reclamation District (RCRD) GSA to fulfill the statutory requirements of the Sustainable Groundwater Management Act (SGMA) legislation (§10728) and regulatory requirements developed by the California Department of Water Resources (DWR) included in the Groundwater Sustainability Plan (GSP) regulations (§354.40 and §356.2). The regulations require GSAs to submit an Annual Report to DWR by April 1st of the year following the reporting year, which spans the water year (WY) from October 1st to September 30th. This Annual Report is the fifth annual report submitted on behalf of the Subbasin and includes data for the most recent WY 2025 (October 1, 2024, to September 30, 2025). Members of the public seeking information on Vina Subbasin and GSP Implementation, Vina GSA meeting schedules and recordings, and other resources should visit the **Vina Groundwater Sustainability Agency** website (www.vinagsa.org) and the **Rock Creek Reclamation District Groundwater Sustainability Agency** website (www.rockcreekreclamation.com).

1.1 Report Contents

This report is the fifth annual report prepared for the adopted Vina Subbasin GSP submitted in January 2022. The first annual report included data elements for the first reporting year, WY 2021, as well as a “bridge year,” WY 2020. The second, third, and fourth annual reports contain data only for the current reporting year, WY 2022, WY 2023, and WY 2024, respectively. Data elements presented in this report refer to WY 2025, the 12-month period spanning October 2024 through September 2025 unless otherwise noted. Pursuant to GSP regulations, the Annual Report includes:

- Groundwater Elevation Data
- Water Supply and Use
- Change in Groundwater Storage
- GSP Implementation Progress

1.2 Subbasin Setting

The Subbasin is a 289-square-mile (184,905 acres) area on the eastern side of the Sacramento Valley. The Subbasin is managed by the Vina and Rock Creek Reclamation District GSAs. The two GSAs have worked cooperatively to develop and submit a single GSP for the Subbasin and to submit Annual Reports every year.

The Subbasin is shown in **Figure 1-1** and **Figure 1-2**. The Subbasin lies in the eastern central portion of the Sacramento Groundwater Basin (**Figure 1-1)**. The Subbasin’s northern boundary is the Butte-Tehama County line, the western boundary is the Butte-Glenn County line, the southern boundary is a combination of property boundaries owned by the M&T Ranch, Reclamation District 2106 and Western Canal Water District, while the eastern boundary is the edge of the alluvium as defined by DWR Bulletin 118 (DWR, 2018), **Figure 1-2**. There are several surface water features located in the Subbasin, including Big Chico Creek, Butte Creek, Mud Creek, and Rock Creek. Generally, the streams traverse the Subbasin, moving northeast to southwest. Groundwater generally flows from northeast to southwest.

The GSP defines three management areas (MAs) in the Vina Subbasin: Vina North, Vina Chico, and Vina South. An MA refers to an area within a Subbasin for which a GSP may identify different minimum thresholds (MTs), measurable objectives (MOs), monitoring, and projects and management actions (PMAs) based on unique local conditions or other circumstances as described in the GSP regulations. Although all stakeholders have a shared interest in the sustainable management of groundwater in this predominantly groundwater-dependent Subbasin, the landscape of beneficial users varies between MAs. Vina North is dominated by irrigated agriculture dependent on wells with sparsely distributed rural residential and domestic well users, and the small community of Nord. The Vina-Chico MA is predominantly an urban area with California Water Service, Chico (Cal Water-Chico), providing groundwater supplies for residential and municipal/industrial use. To a very limited extent, private domestic wells provide households with their primary source of water or, in some cases, as a secondary supply for outdoor water use. The Vina South MA is dominated by irrigated agriculture dependent on groundwater and, to a lesser extent, surface water diversions (primarily from Butte Creek). In and around the Durham community, significant numbers of rural residents and ranchettes depend on groundwater, typically from relatively shallow domestic wells interspersed with agricultural land uses. In addition, Durham Irrigation District serves household water needs using groundwater from district wells in a portion of the Durham community.

The Vina Subbasin GSP estimates the sustainable yield of the Subbasin to be 233,500 acre-feet per year (AFY) based on historical groundwater pumping averages of 243,500 AFY, and an annual decrease in storage of 10,000 AFY (Geosyntec, 2021). Water use in the Subbasin is dominated by agricultural uses, including irrigation of nut and fruit trees, vineyards, row crops, grazing, and rice fields. Municipal and household water use accounts for the rest of the water used. Groundwater constitutes the majority of the Subbasin’s water supplies, while surface water constitutes the remaining portion.

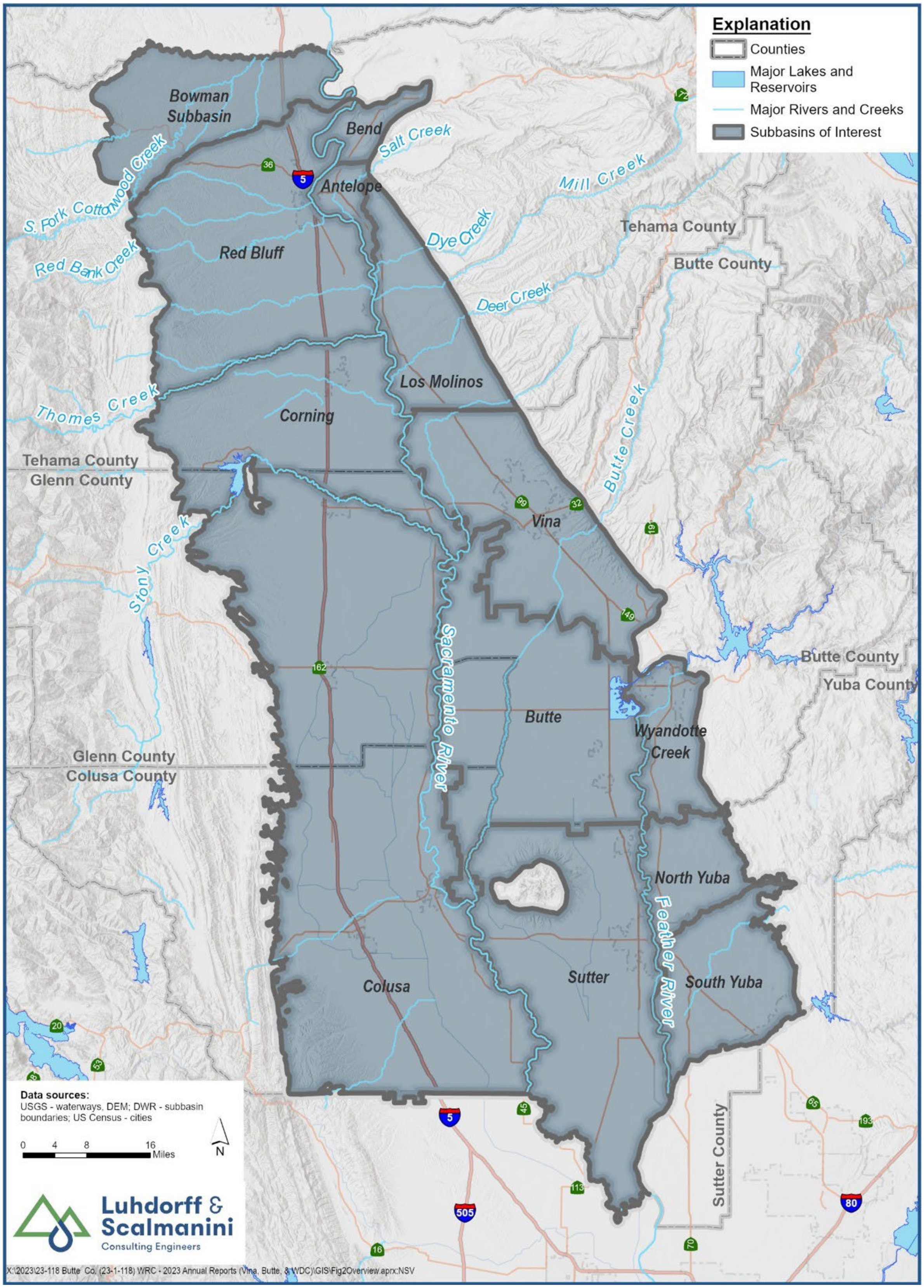


Figure 1-1. Subbasins in the Northern Sacramento Valley

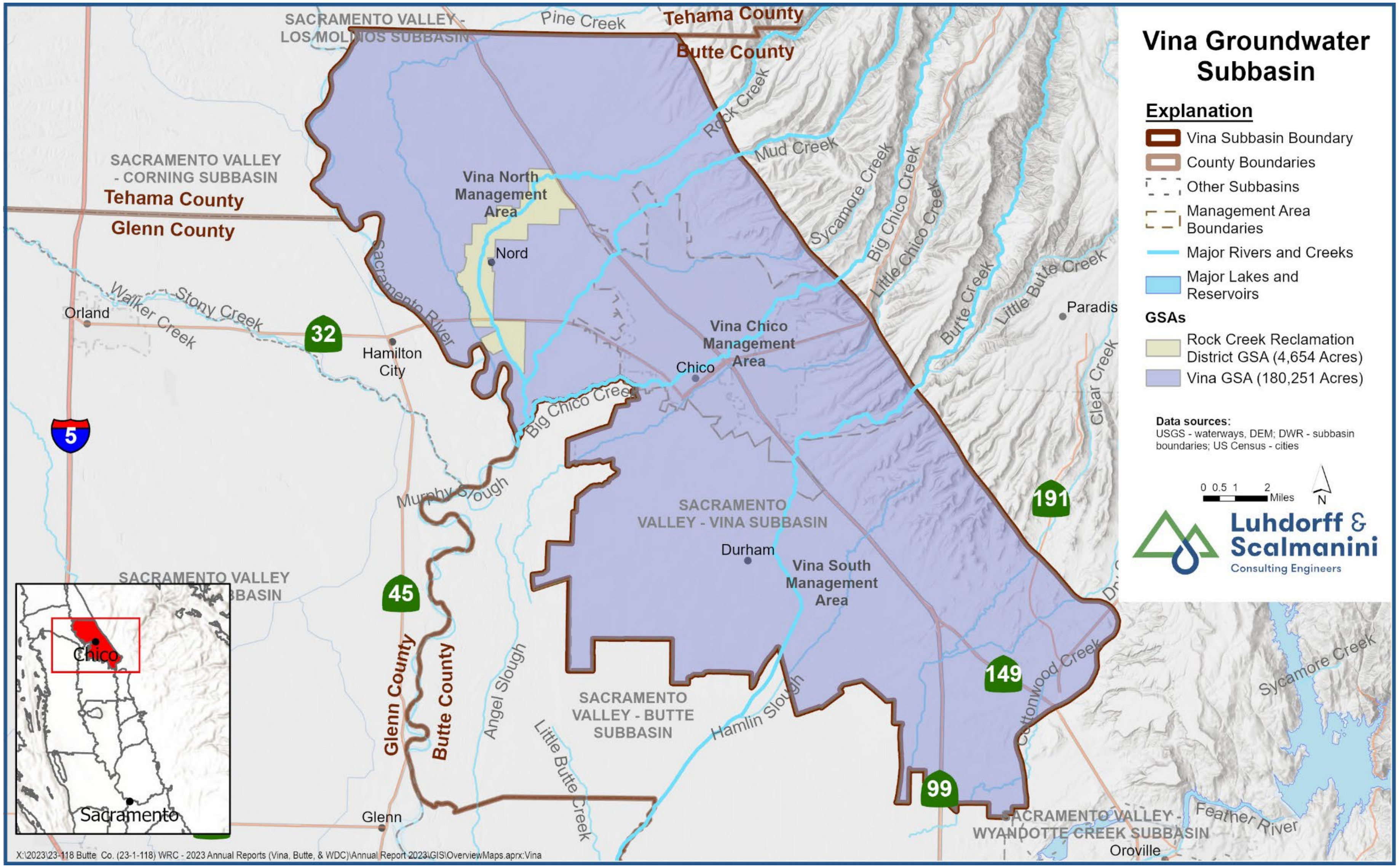


Figure 1-2. Vina Subbasin and Groundwater Sustainability Agency Boundaries

2 GROUNDWATER ELEVATIONS §356.2(b)(1)

Groundwater elevations in the Subbasin typically fluctuate seasonally between and within water years, particularly in groundwater-dependent areas or during drought years when groundwater is used to compensate for diminished surface water supplies. Seasonal fluctuations in groundwater levels occur in response to groundwater pumping and recovery, land and water use activities, recharge, and natural discharge. Sources of recharge into the groundwater system include precipitation, applied irrigation water, and seepage from local creeks and rivers.

Groundwater pumping for irrigation typically occurs from April to September, although depending on the timing of rainfall, it may shift earlier and/or later in the season. Consequently, groundwater levels are usually highest in the spring and lowest during the irrigation season in the summer months. Fall groundwater measurements (typically measured in October) indicate groundwater conditions after the primary irrigation season. Groundwater levels follow a variety of patterns in different areas of the Subbasin; in the WY of 2025, the depth to groundwater ranged from about 10 feet below ground surface to about 160 feet below ground surface in the RMS wells.

Groundwater levels in the Subbasin are monitored at representative monitoring site (RMS) wells that were selected in the GSP to represent localized groundwater conditions in specified areas of the Subbasin. RMS wells include a mixture of domestic wells, irrigation wells, and dedicated observation wells. In total, 17 RMS wells are used to monitor conditions in the Subbasin. **Appendix A** includes a map of the approximate locations of the RMS wells and hydrographs depicting groundwater elevations in the RMS wells. Sustainable management criteria (SMC) described in **Appendix B** are assigned to groundwater levels at the RMS wells.

Certain RMS wells, measured by DWR and Butte County, are equipped with data loggers and pressure transducers, which continuously monitor and record hourly changes in groundwater levels. These and the remaining wells in the network are measured by hand at least twice each year (in spring and fall) but up to four times each year in March, July, August, and October. Data from groundwater level monitoring wells are available from DWR's online SGMA Data Viewer tool (https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer).

Spring and fall 2025 groundwater elevation measurements from RMS wells in the Subbasin system are summarized in **Table 5-2**. Groundwater elevation data in the Subbasin is collected by DWR and Butte County and is publicly available from DWR's online SGMA Data Viewer tool (https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer). The groundwater level monitoring methods are consistent with the protocols described in the Vina Subbasin GSP. Depending on the well, groundwater elevations are measured using a steel tape, an electric sounder, or a pressure transducer. The accuracy of groundwater level measurements is typically either 0.01 feet or 0.1 feet, depending on the equipment used.

Groundwater elevations have remained on average 20 feet above their MOs over both seasons and well above their corresponding MTs and, therefore, remained within the Subbasin's margin of operational flexibility established for each RMS well. Therefore, none of the RMS wells fell below the MT for two consecutive non-dry years, hence avoiding undesirable results as defined in the GSP.

The following sections provide a summary of groundwater elevations and conditions during WY 2025 through the presentation and description of groundwater elevation contours (**Section 2.1**) and hydrographs of groundwater elevations (**Section 2.2; Appendix A**).

2.1 Groundwater Elevation Contour Maps – §356.2(b)(1)(A)

Groundwater elevation contour maps for spring and fall 2025 were prepared for the Subbasin, as shown in **Figures 2-1** and **2-2**. Spring contours are intended to generally represent seasonal high groundwater elevations (shallower depth to water), while fall contours are intended to generally represent seasonal low groundwater elevations (a deeper depth to water). Groundwater elevation contours were developed by creating a continuous groundwater elevation surface based on available monitoring well data (e.g., monitoring well measurements recorded in March of WY 2025 and the average of February and April measurements recorded for Cal Water Wells) using the kriging interpolation method. Questionable groundwater elevation measurements were excluded, and minor adjustments to the contours were made based on professional judgment.

The contour maps of the Subbasin (**Figures 2-1** and **2-2**) each show that groundwater elevations are generally higher in the northern and eastern areas of the Subbasin versus the southern and western areas, indicating a general gradient – and thus groundwater flow – from the northeast to the southwest. The contour maps illustrate several general features of the groundwater flow system in the Vina Subbasin, including:

- Overall, west-southwest groundwater flow is consistent with recharge from the north and along the eastern foothills.
- Convergence of groundwater flow toward pumping areas west of Butte Creek and near Durham in the Vina South MA.
- The higher concentration of contours in the southeast portion of the Subbasin indicates a steeper gradient and could suggest higher groundwater flow. However, given the characteristics of the aquifer materials in the eastern portion of the Subbasin, the steep gradient is likely evidence of aquifer materials with lower transmissivity. Nonetheless, the contours are consistent with the current understanding of recharge coming from the lower foothills.
- New sources of information and data may improve understanding of this area.

Average elevations in fall 2025 tend to be approximately 9 feet lower than elevations in spring 2025 throughout the Subbasin. Groundwater levels are typically lower in the fall at valley floor locations due to irrigation-season pumping.

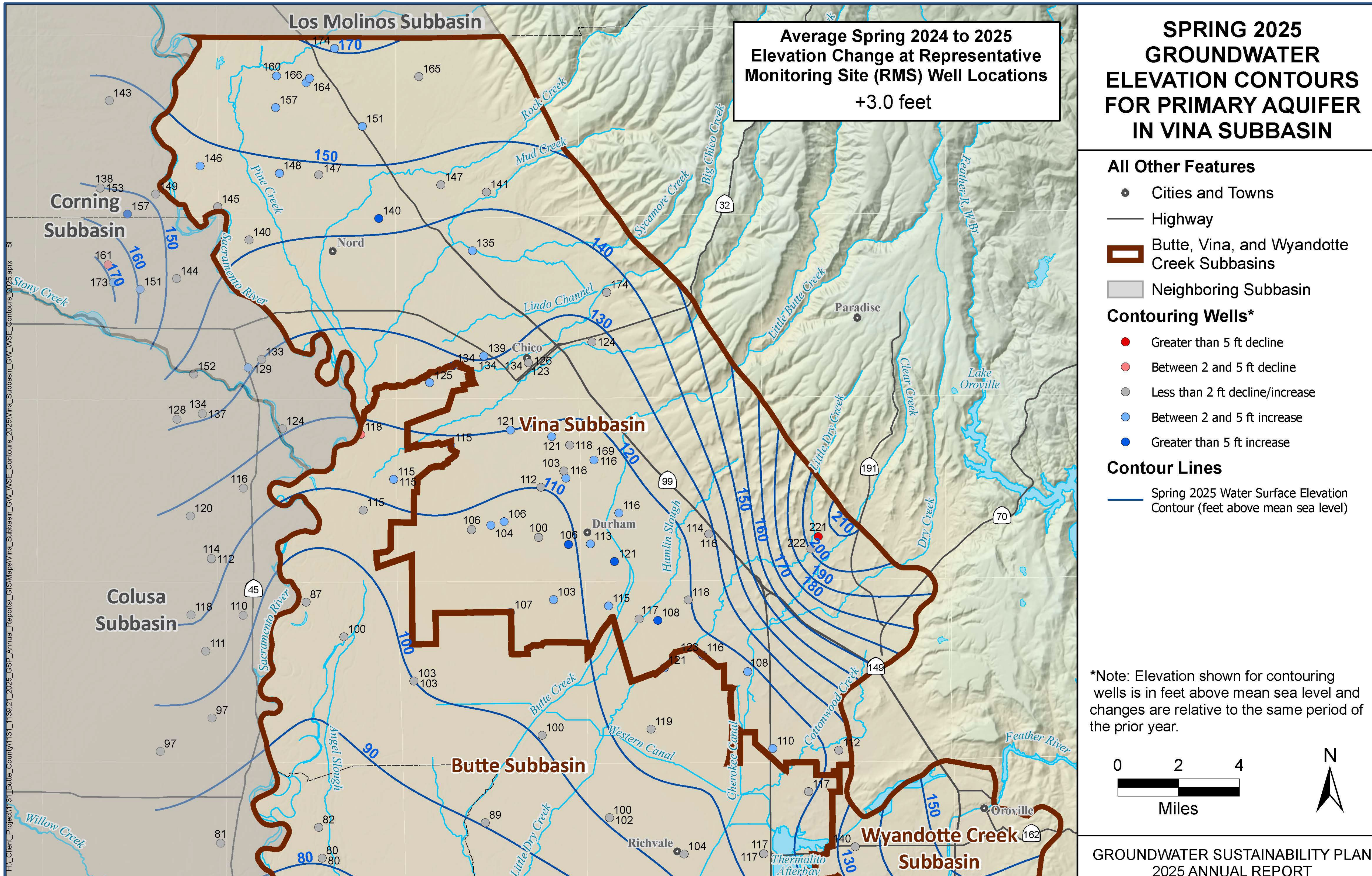


Figure 2-1. Vina Subbasin Contours of Equal Groundwater Elevation, Spring 2025 (Seasonal High)

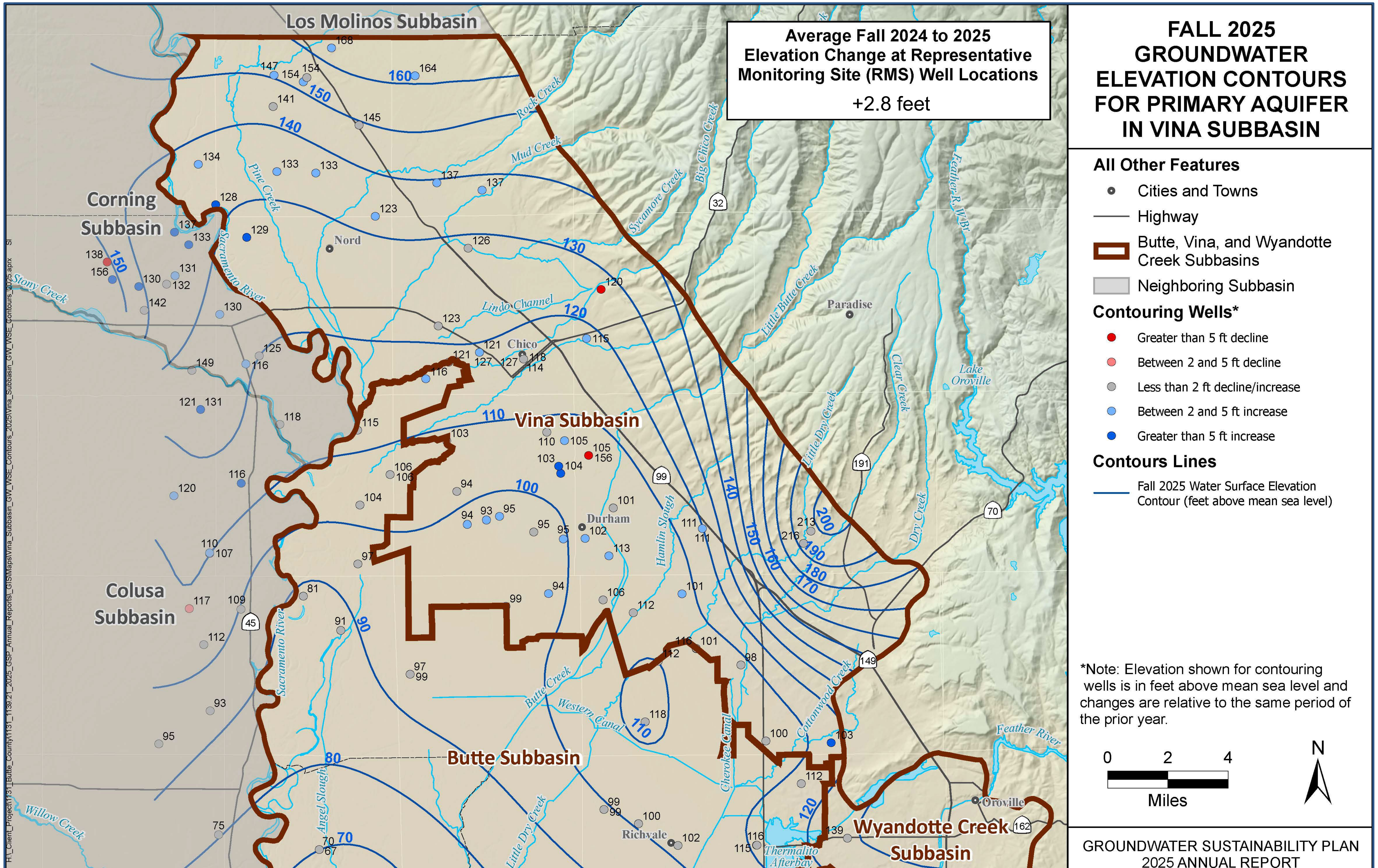


Figure 2-2. Vina Subbasin Contours of Equal Groundwater Elevation, Fall 2025 (Seasonal Low)

2.2 Hydrographs of Groundwater Elevations – §356.2(b)(1)(B)

Groundwater elevation hydrographs for each RMS well are presented in **Appendix A**. The groundwater hydrographs also include a calculation of recent trends at each well. These are calculated based on spring measurements over the previous 10 years (or a shorter period depending on data availability). A linear regression is performed on spring elevations (excluding questionable measurements), and the slope of the regression line is used as the calculated rate of change over this period in feet per year. **Appendix B** provides an explanation of the SMC terminology defined in Section 3 of the GSP (e.g., MT, MO, interim milestone [IM]). **Table 5-1** summarizes the MOs, MTs, and identification of undesirable results for all applicable sustainability indicators (SIs) for WY 2025, and **Table 5-2** contains a summary of the spring 2025 (seasonal high) and fall 2025 (seasonal low) groundwater elevations measured at each RMS well. **Table 5-2** also summarizes the MA each well is located within, established MO and MT for groundwater elevations, the IM for 2027, the changes in groundwater elevations from WY 2024 to WY 2025, and the differences between the 2025 groundwater elevations and the MO for each RMS well in the spring and fall.

Historically, groundwater levels have typically remained at or above their respective MOs in the Subbasin's RMS wells. The GSP also established IMs to provide numerical metrics for GSAs to track the Subbasin's conditions relative to the overall sustainability goal every five years, ensuring that the groundwater management of the Subbasin remains sustainable.

Spring and fall 2025 groundwater elevations were generally near or slightly higher than seasonal groundwater elevations in previous years. In WY 2025, the average seasonal high was 134 feet above mean sea level (AMSL), and the average seasonal low was 125 feet AMSL. In WY 2024, the average seasonal high was 131 feet AMSL, and the average seasonal low was 120 feet AMSL. Rises in groundwater level elevations are expected due to increased recharge following consecutive Above-Normal water years (2024 and 2025).

All wells remained well above the MOs during spring and fall of 2025. All measured groundwater elevations also remained above the corresponding MT of that RMS well in both spring and fall, avoiding undesirable results related to groundwater levels as defined in the GSP. Groundwater levels in RMS wells were, on average, about 20 feet higher than MO elevations and 71 feet higher than MT elevations over both the spring and fall of 2025. All WY 2025 measured groundwater levels remained within the Subbasin's margin of operational flexibility and above the MOs and MTs.

3 WATER SUPPLY AND USE

As required by §356.2, this section summarizes water supply and use in the Subbasin, categorized by groundwater, surface water, and total supply. The total water available for use in the Subbasin was tabulated from groundwater extraction volumes reported in **Table 3-1** and the surface water supply reported in **Table 3-2**. The total water available is summarized in **Table 3-3** for WY 2025. Groundwater extraction volumes are either based on measured data or are estimates from a water use analysis based on 2024 land use data and 2025 climate conditions. Groundwater use data was supplied by water districts and or municipalities when available. Water use for the Subbasin is reported in **Appendix D**. The water use analysis methodology is discussed in **Appendix E**. Surface water use was estimated using electronic Water Rights Information Management System (EWRIMS) data or historic diversions when records were not available.

3.1 Groundwater Extraction – §356.2(b)(2)

Groundwater extraction volumes and percentages by sector in the Subbasin are summarized in **Table 3-1**. Groundwater extraction is reported from pumping records where available, (i.e. municipal suppliers) while the remaining groundwater extraction is estimated through the water use analysis approach described in the previous section and in **Appendix E**. In summary, the water use analysis approach uses a Groundwater Extraction Estimates from Earth Observations (GEEEO) model, which estimates unmeasured groundwater extraction for agricultural irrigation by integrating satellite-based evapotranspiration (i.e. OpenET data), land use, climate, and locally available water supply data. This method is used in lieu of annually updating the groundwater flow model. The methodology quantifies monthly spatially distributed results for applied water demand, effective precipitation, and known surface water supplies, and estimates groundwater extraction to meet the remaining applied water demand on irrigated lands.

The majority of the Subbasin uses groundwater supplies for agricultural irrigation, although portions of the Subbasin may rely on surface water for irrigation. There is generally less groundwater extraction in Above-Normal and Wet water years with wetter hydrological conditions, as some of the precipitation meets the irrigation demand to offset the need to pump groundwater. However, even between two years with similar water year types, there may be large differences in the volumes of groundwater extracted each year. One reason for this is the difference in timing, intensity and distribution of rainfall, which influences the volume of rainfall that is available to meet irrigation water demands, and as a result, offset groundwater extractions. This is known as "effective precipitation." Effective precipitation also affects the volume of infiltration contributing to groundwater storage via recharge versus the amount that runs off the ground surface and contributes to high stream flows during intense storm events. While there may be other reasons not listed here, the precipitation patterns in 2025 resulted in significantly less “effective precipitation” (i.e. the amount infiltrated into the soil versus running off the ground surface) in 2025 compared to 2024, which contributed to the increase in groundwater extraction from last year.

Municipal water users extracted approximately 18,400 AF of groundwater in the Subbasin in WY 2025. Municipal water supplies are measured and provided by Cal Water, Chico, and the Durham Irrigation District (DID). The record of municipal supplies does not distinguish between urban and industrial water uses.

Rural residential water users rely on private domestic wells to meet their household water needs and extracted approximately 3,000 AF in WY 2025. Rural residential groundwater extraction was quantified based on average per capita water use and estimated population. The average per capita water use reported in the California Water Service Chico-Hamilton City District 2020 Urban Water Management Plan 2020 (Cal Water-Chico, 2020) was 181 gallons per capita per day. This is considered representative of rural residential per capita water use in the region. Population estimates were based on average household sizes from the US census and aggregated to those living outside city water district boundaries. Population estimates were used to estimate residential groundwater pumping.

The total estimated groundwater extraction was approximately 261,600 AF in WY 2025, the majority of which was used to meet agricultural water demands (approximately 240,200 AF). The total groundwater extraction is about 261,600 AF. **Figure 3-1** shows the general areas where extraction occurs. The area of municipal extraction, which only uses groundwater, is shown alongside areas of agricultural extraction which are limited to coverage of irrigated lands and are divided into those with access to surface water and groundwater and those with access to only groundwater. **Figure 3-1** was generated using the following approach: water use by sector was first divided up by water source type as reported by water suppliers (e.g., surface water, groundwater, etc.) and then further divided into sectors based on use type (e.g., agriculture, municipal, mixed use, etc.). Most of the total groundwater extraction was used by the agricultural sector, while the remaining amount was used for municipal and rural residential water needs.

Table 3-1. Vina Subbasin Groundwater Use by Water Use Sector

Sector	WY 2025 (AF)	Percent of Total Groundwater Use
Agricultural	240,200	92%
Municipal	18,400	7%
Rural Residential	3,000	1%
Total	**261,600**	**100%**

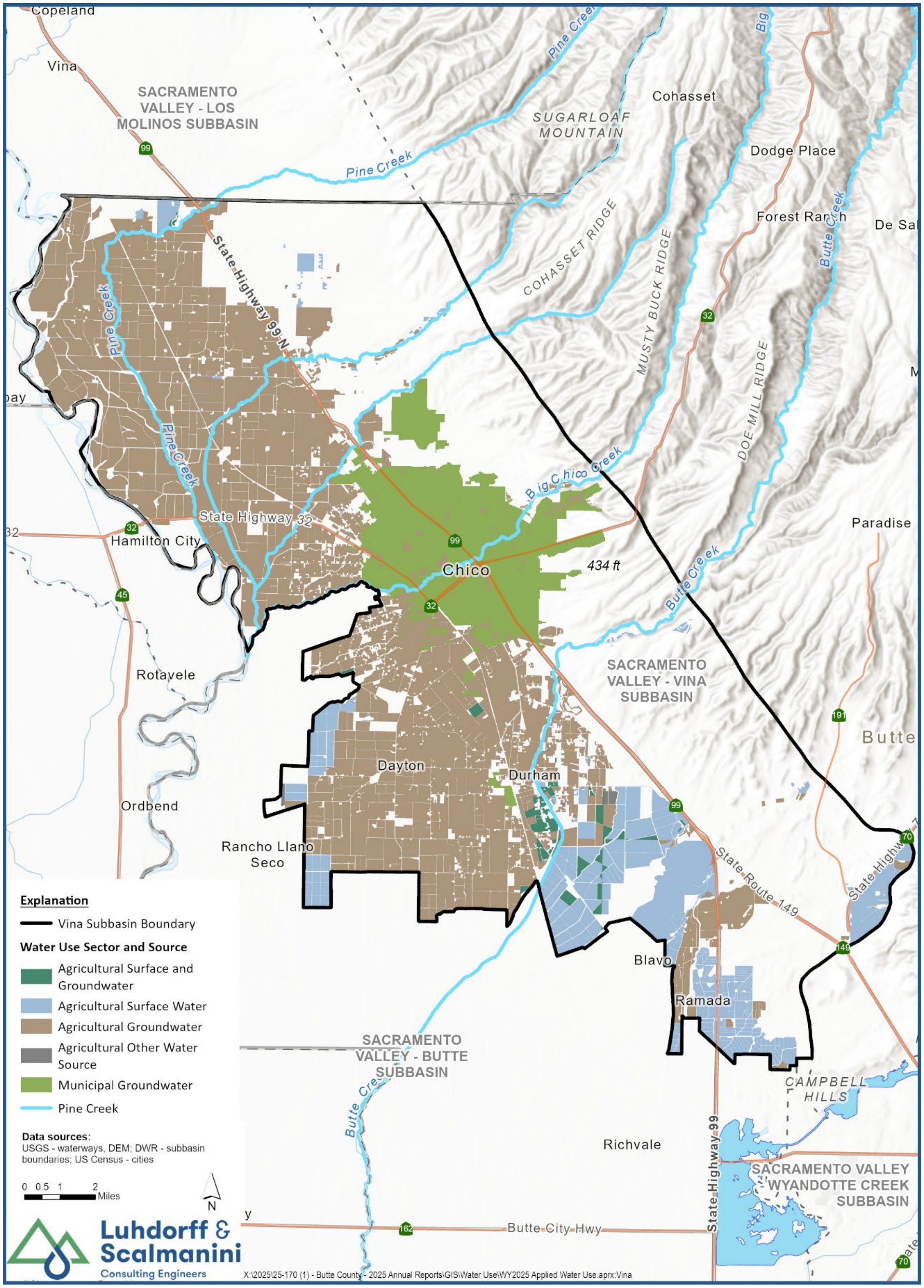


Figure 3-1. Vina Subbasin Areas of Groundwater Extraction - WY 2025

3.2 Surface Water Supply – §356.2(b)(3)

Surface water supplies used or available for use in the Subbasin by sector are summarized in **Table 3-2.** Surface water supplies are reported directly from water supplier records or collected from publicly available sources (water rights diversion records, etc.) where available. Missing surface water supply data was estimated based on available historical diversions data in similar water years.

Surface water provided a small portion of the agricultural water demand in the Subbasin for WY 2025. Diversions from Butte Creek were accessed from the State Water Resource Control Board's (SWRCB) CalWATR or direct requests from diverters. Data from CalWATR on surface water delivery indicated which water rights holders on Butte Creek had made diversions during WY 2025. There are currently no surface water supplies for municipal use in the Vina Subbasin. Total surface water diversions and deliveries for the Vina Subbasin are estimated to be about 28,800 AF and 25,800 AF, respectively. The difference between these two volumes represents estimated conveyance losses between points of diversion and application, such as seepage, evaporation, or spillage.

In contrast with reduced surface water supplies experienced in WY 2022 (20,500 AF), WY 2025 was an Above-Normal WY with more substantial surface water supplies (similar to WY 2024). These, combined with above-normal hydrological conditions, supported groundwater recharge and offset groundwater extraction volumes compared to WY 2022, a critically dry year.

Table 3-2. Vina Subbasin Surface Water Use by Water Use Sector for WY 2025

Sector	Diverted (AF)	Applied (AF)	Percent of Total Surface Water Use
Agricultural	28,800	25,800	100%
Municipal	--	--	0%
Total	**28,800**	**25,800**	**100%**

3.3 Total Water Use by Sector – §356.2(b)(4)

Total water demand in the Subbasin for WY 2025 was supplied mostly by groundwater and to a lesser extent, surface water. The total water available for use in the Subbasin was tabulated from groundwater extraction volumes reported in **Table 3-1** and the surface water supply reported in **Table 3-2**. The total water available is summarized in **Table 3-3** for WY 2025. The results are either based on measured data or estimates, as described in the previous two sections. **Table 3-3** also shows the total irrigated area in WY 2025 within the Subbasin.

Table 3-3. Vina Subbasin Total Water Use by Water Use Sector					
Sector		WY 2025			
	Groundwater (AF)	Surface Water (AF)	Total (AF)	Percent of Total Water Use	Total Sector Area (ac)
Agricultural	240,200	25,800	**266,000**	**93%**	**75,500**
Municipal	18,400	--	**18,400**	**6%**	**19,100**
Rural Residential	3,000	--	**3,000**	**1%**	**n/a***
Total	**261,600**	**25,800**	**287,400**	**100%**	
Percent of Total Water Use	**91%**	**9%**	**100%**		

Notes:
**Rural Residential water use is calculated based on population from census data, not area.*

3.4 Uncertainties in Water Use Estimates

Estimated uncertainties in the water budget components are presented in **Table 3-4**. The uncertainty of these water budget components is based on typical accuracies given in technical literature and the cumulative estimated accuracy of all inputs used to calculate the components.

Table 3-4. Vina Subbasin Estimated Uncertainty in Water Use Estimates			
Water Budget Component	Data Source	Estimated Uncertainty (%)	Source
Groundwater			
Agricultural	Measurement	20%	Typical uncertainty from water balance calculation.
Municipal/Industrial	Measurement/ Estimate	5%	Typical accuracy of municipal water system reporting.
Rural Residential	Calculation	15%	Estimated from per capita water use and Census information.
Surface Water			
Agricultural	Calculation	10%[1]	Estimated from the Senate Bill 88 measurement accuracy standards.

[1] *Higher uncertainty of 10%-20% is typical for estimated surface water inflows, including ungauged inflows from small watersheds into creeks that enter the Subbasin.*

4 GROUNDWATER STORAGE

Long-term fluctuations in groundwater levels and groundwater in storage occur when there is an imbalance between the volume of water recharged into the aquifer and the volume of water removed from the aquifer, either by extraction or natural discharge to surface water bodies. If, over a period of years, the amount of water recharged to the aquifer exceeds the amount of water removed from the aquifer, then groundwater levels will increase and groundwater storage increases (i.e., positive change in storage). Conversely, if, over time, the amount of water removed from the aquifer exceeds the amount of water recharged, then groundwater levels decline, and groundwater storage decreases. These long-term changes can be linked to various factors, including increased or decreased groundwater extraction, boundary inflows/outflows, or variations in recharge associated with wet or dry hydrologic cycles.

A review of the RMS well hydrographs (**Appendix A**) indicates that groundwater elevations are either relatively stable or show a declining trend over time. Declines may be influenced by the significant percentage of water years since 2006 that have been dry (i.e., characterized as Below-Normal, Dry, or Critical). Since groundwater storage is closely related to groundwater levels, measured changes in groundwater levels can serve as a proxy for and be utilized to estimate changes in groundwater storage. Changes in groundwater storage in the Subbasin follow a pattern typically seen in the majority of the Sacramento Valley. During normal to wet years, groundwater is withdrawn during the summer for irrigation and is replenished during the winter through recharge of precipitation and surface water inflows, allowing groundwater storage to potentially rebound by the following spring. This is evidenced by stable or increased groundwater levels when comparing spring levels over time. During dry years and drought conditions, this pattern is disrupted when more groundwater may be pumped to meet irrigation demand, and less recharge may occur due to reduced precipitation, diminished or curtailed surface water supplies, and reduced stream flow. The net effect of these changes in inflows and outflows can result in lower groundwater levels and therefore decreased groundwater in storage.

In WY 2025 (an Above-Normal WY type), groundwater storage increased by approximately 44,300 AF in the Subbasin. This is significantly less than the groundwater storage change estimated in WY 2024 (104,500 AF), which was also an Above-Normal WY type. Although 2025 received overall more precipitation than 2024, the timing and distribution of rainfall affected the volume of infiltration contributing to groundwater storage via recharge verses the amount that runs off the ground surface and contributes to high stream flows during intense storm events. The precipitation patterns in 2025 resulted in significantly less “effective precipitation” (i.e. the amount infiltrated into the soil verses running off the ground surface) in 2025 compared to 2024. Another factor is the increased groundwater extraction in 2025 compared to 2024; however it is possible there are other factors contributing to this not listed here. Even given these changes relative to WY 2024, WY 2025 was the third consecutive year with an increase in storage (corresponding to the third consecutive year with Wet or Above-Normal water year classifications).

The following sections present a summary of groundwater use and change in storage over time, along with a description of the uncertainty in storage change estimates.

4.1 Change in Groundwater Storage – §356.2(b)(5)(B)

Annual groundwater pumping, groundwater storage changes, and the cumulative change in storage over time are presented for WY 2000 through WY 2025 in **Table 4-1** and **Figure 4-1**. Substantial decline in groundwater storage occurred in the dry to critical WY 2020 through WY 2022 timeframe. Significant recovery began in the wet WY 2023 and continued in the above normal WY 2024 and WY 2025. Groundwater storage in the Subbasin increased by 44,300 AF in WY 2025. For context, in the past 26 years, the largest one-year decrease in groundwater storage is estimated to be -151,700 AF, and the highest one-year increase was estimated to be 144,100 AF.

The historical record since 2000 includes multiple data sources. Groundwater extractions for WY 2000 through WY 2018 were obtained from the Butte Basin Groundwater Model (BBGM) (BCDWRC, 2021), and the water budgets were prepared as part of the Vina Subbasin GSP (Geosyntec, 2021). The WY 2019 and WY 2020 groundwater extraction values were calculated as the average based on the hydrologic year type from WY 2000 to WY 2018. The WY 2021 groundwater extraction estimates were based on a drought impact analysis conducted around the time of annual report development that year (LSCE, 2022). The WY 2022, WY 2023, and WY 2024 groundwater extraction values were obtained from prior annual reports and were developed using the same methods as WY 2025, as described in **Section 3** and **Appendix E**. Groundwater extractions for the entire period include pumping for agricultural, municipal, and rural residential purposes.

Observed groundwater levels are the basis of the annual and cumulative changes in groundwater storage calculated for the period from WY 2000 through WY 2025 based on the methodology described below in **Section 4.2**. This methodology differs from the change in groundwater storage estimates available through the BBGM (which are not shown). An evaluation of a total of 20 pairs of concurrent annual storage changes over the period from WY 1999 through WY 2018 was assembled from the BBGM, and the methodology described in **Section 4.2** was completed to evaluate the consistency of the new methodology with the BBGM results. Although groundwater storage changes differ in some cases, the general trends are similar, and there is agreement between the methodologies.

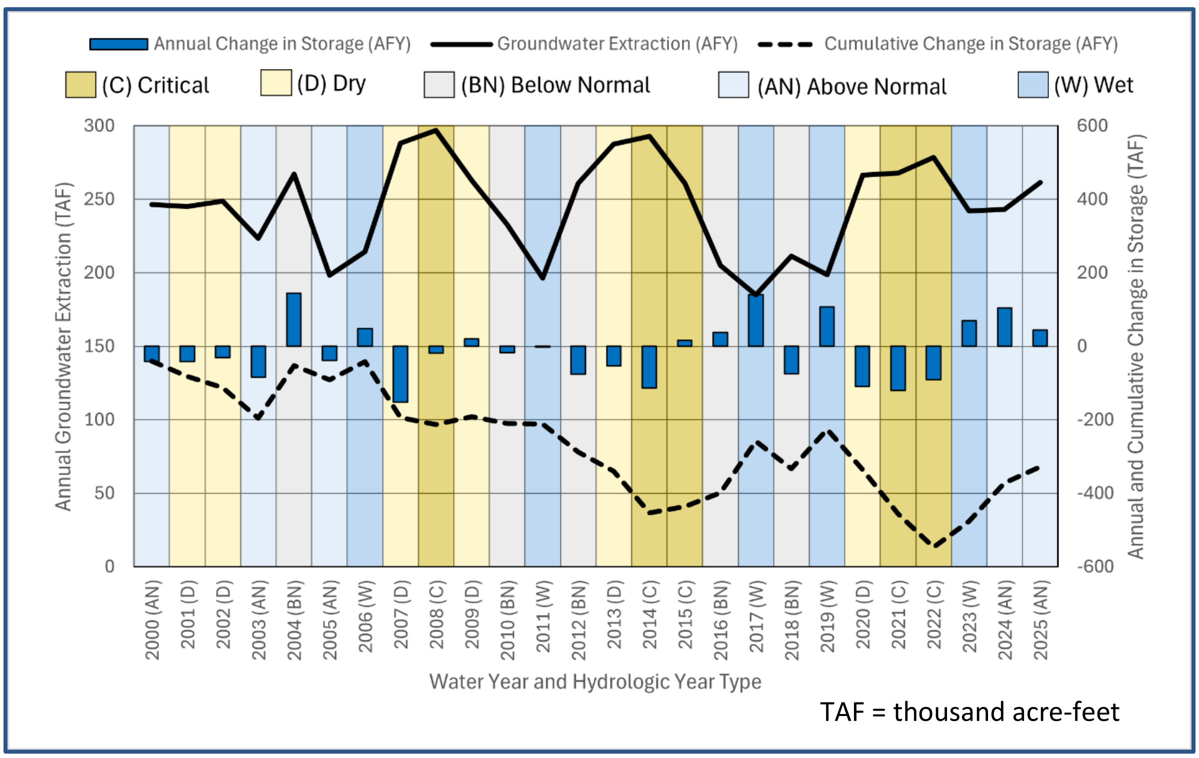


Figure 4-1. Vina Subbasin Groundwater Pumping and Annual and Cumulative Change in Storage from WY 2000 to WY 2025

Table 4-1. Vina Subbasin Groundwater Extraction, Annual Groundwater Storage Change, and Cumulative Change in Storage			
Water Year & Type	Groundwater Extraction[1] (AFY)	Annual Change in Storage (AFY)	Cumulative Change in Storage (AFY)
2000 (AN)	246,600	-41,000	-41,000
2001 (D)	245,200	-40,800	-81,800
2002 (D)	248,900	-30,300	-112,100
2003 (AN)	223,500	-83,900	-196,000
2004 (BN)	267,200	144,100	-51,900
2005 (AN)	198,400	-38,800	-90,700
2006 (W)	214,400	48,700	-42,000
2007 (D)	288,400	-151,700	-193,700
2008 (C)	297,100	-18,900	-212,600
2009 (D)	263,000	20,700	-191,900
2010 (BN)	232,700	-17,600	-209,500
2011 (W)	196,500	-2,100	-211,600
2012 (BN)	261,000	-75,700	-287,300
2013 (D)	287,600	-53,000	-340,300
2014 (C)	293,000	-112,600	-452,900
2015 (C)	260,900	16,800	-436,100
2016 (BN)	205,100	37,200	-398,900
2017 (W)	185,000	140,300	-258,600
2018 (BN)	211,400	-73,900	-332,500
2019 (W)	198,600	106,700	-225,800
2020 (D)	266,600	-109,400	-335,200
2021 (C)	267,980	-120,400	-455,600
2022 (C)	278,700	-90,700	-546,300
2023 (W)	242,000	70,200	-476,100
2024 (AN)	243,300	104,500	-371,600
2025 (AN)	261,600	44,300	-327,300
Average[2]			
2000-2024 (25 years)	244,900	-14,900	
W (5 years)	207,300	72,800	
AN (4 years)	228,000	-14,800	
BN (5 years)	235,500	2,800	
D (6 years)	266,600	-60,800	
C (5 years)	279,500	-65,200	

Notes: *Table notes are included on the following page.*

Positive values indicate inflows to the groundwater system, and negative values indicate outflows from the groundwater system.

AF = acre-feet

Water Year Types Classified According to the Sacramento Valley Water Year Index:

W = Wet, AN = Above-Normal, BN = Below-Normal, D = Dry, C = Critical

[1] *Groundwater extraction values from 2000 to 2018 were estimated using BBGM (Geosyntec, 2021). Values for 2019-2020 are averages from that period. Estimates for 2021 were based on a drought impact analysis (LSCE, 2022), while estimates for 2022-2025 are based on a GEEEO process (described in* ***Appendix E****).*

[2] *The historical average calculation covers the period from 2000 to 2024, excluding the current water year.*

4.2 Groundwater Storage Maps – §356.2(b)(5)(A)

The spatial distribution of estimated changes in groundwater storage for the period from spring 2024 to spring 2025 are shown in **Figure 4-2** for the Subbasin. Since groundwater storage is closely related to groundwater levels, measured changes in groundwater levels can serve as a proxy for and be utilized to estimate changes in groundwater storage. The change in groundwater storage was estimated based on the change in measured spring-to-spring groundwater levels at each RMS well, multiplied by the area of a Thiessen polygon surrounding that RMS well (defining a representative area for each RMS well) and a representative storage coefficient of 0.1 for the Subbasin.

Spring measurements used to calculate the change in groundwater storage were computed as the average of all available groundwater level measurements from March of the respective year, with the exception of CalWater wells, for which the spring measurement was calculated as the average of available February and April measurements. Spring measurements used to calculate the change in groundwater storage are depicted in **Table 5-2**. The representative storage coefficient was established by roughly calibrating the estimated change in storage based on changes in observed groundwater levels (i.e., calculated using groundwater level data, representative area, and a storage coefficient parameter) with estimated change in storage outputs from the BBGM, as reported in the GSP, to aggregate characteristics across all zones of the Subbasin system. A total of 20 pairs of concurrent annual storage changes assembled from both methods over the period from WY 1999 through WY 2018 were used for calibration. Determination of a representative storage coefficient allows for estimating the change in volume of groundwater storage based on the measured change in groundwater levels and known representative area (i.e., Thiessen polygon) associated with each groundwater level measurement.

Negative changes in storage values indicate lowering groundwater levels and depletion of groundwater storage, whereas a positive change in storage values represents rising groundwater levels and accretion of groundwater in storage. As shown in **Figure 4-2**, the change in storage for each representative area (i.e., Thiessen polygon) in the Subbasin over the previous year ranged from roughly -1,500 AF to 4,000 AF. One representative area near the central portion of the Subbasin had a negative change in storage, while the northern, southern, and surrounding central areas had neutral or positive changes in storage. Total groundwater storage change in the Subbasin was estimated to be approximately 44,300 AF between spring 2024 and spring 2025.

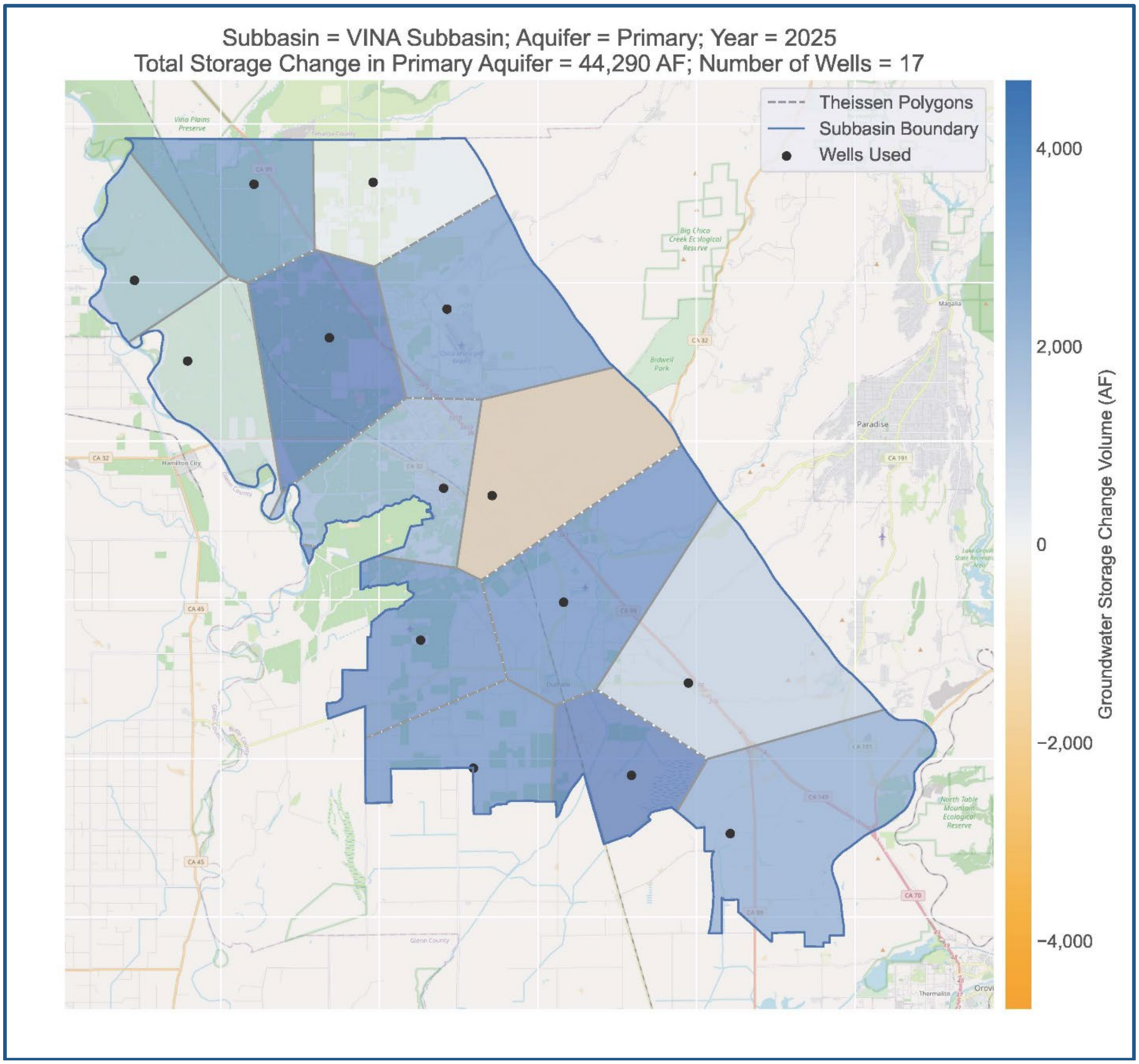


Figure 4-2. Vina Subbasin Change in Groundwater Storage from Spring 2024 to Spring 2025

4.3 Uncertainty in Groundwater Storage Estimates

The uncertainty associated with the change in groundwater storage estimates depends in part on the underlying uncertainty of the groundwater level data, the representative area (i.e., Thiessen polygon), and the calibrated storage coefficient parameter used to calculate the change in groundwater storage. As described in **Section 4.2**, a calibration process was conducted to roughly align the estimated change in groundwater storage based on observed groundwater levels to the estimated change in groundwater storage outputs from the BBGM. Thus, the uncertainty of the estimated change in groundwater storage reported in **Table 4-1** and **Figure 4-2** is estimated to be approximately equal to the uncertainty of the estimated change in groundwater storage outputs from the BBGM (typically 20-30% for integrated hydrologic models).

5 GSP IMPLEMENTATION PROGRESS – §356.2(B)(5)(C)

5.1 Main Activities of Water Year 2025

The main activities and updates from the previous Annual Report are as follows:

1. All sustainability indicators (SIs) are in compliance with their MTs (see summary **Table 5-1**).
2. The GSAs completed the WY 2025 Annual Report and other critical tasks related to monitoring and data collection.
3. The GSAs continued to participate in ongoing intra- and inter-basin coordination.
4. The GSAs adopted an initial uniform acreage-based property-related service fee to fund its operations and implementation costs required to comply with SGMA, with the intention of conducting a new fee study to explore funding options that reflect the diversity of groundwater users within its boundaries. The new fee study was initiated in the previous water year, and in the 2025 water year the GSAs adopted a two-part SGMA fee, which was implemented for the 2025-26 fiscal year.
5. Progress has been made on 12 PMAs since the last annual report (**Appendix G**).
6. The Vina GSA was awarded about $5.5 million in 2024 to complete specific tasks ranging from filling data gaps, conducting feasibility analyses for two water supply projects, performing recharge feasibility and pilot projects, and designing and implementing pilot programs for demand reduction strategies. This portfolio approach funds various phases of projects listed in the GSP. Implementation of these projects continued in the 2025 WY.

The GSP was approved in July of 2023, and DWR proposed six recommended corrective actions that will enhance the GSP:

1. Providing additional information on historical and current groundwater quality conditions in the Subbasin and refining the definition of sustainable management criteria through a number of actions further described in the letter.
2. Review the model inputs/outputs and provide consistent information regarding stream loss and gains, clarifying whether values represent the overall interaction between the surface water and groundwater system or the quantity of depletion due to groundwater pumping.
3. Providing more information regarding the criteria used to identify significant and unreasonable conditions, undesirable results, and the potential impacts to various beneficial uses and users of groundwater related to the chronic lowering of groundwater level minimum thresholds through a number of actions further described in the letter.
4. Revising the definition of undesirable results to remove the non-dry year condition or discuss how degradation during dry periods will be managed as necessary to ensure that adverse water-quality conditions are offset during other periods.

5. Providing more information about the criteria used to identify undesirable results and sustainable management criteria for land subsidence through a number of actions further described in the letter.
6. Use future DWR guidance regarding estimations of the location, quantity, and timing of depletions of interconnected surface water and establish specific sustainable management criteria to sustainably manage depletions of interconnected surface water through a number of actions.

In 2025, the GSAs continued implementing projects to address recommended corrective actions, largely funded by the SGM Implementation Grant Program. The ongoing implementation of PMAs, described in **Appendix G**, aims to address these corrective actions effectively through the Periodic Evaluation of the GSP, which is due in January 2027.

5.2 Progress Toward Achieving Interim Milestones

Observed conditions for all SIs are in compliance with their MTs (see summary **Table 5-1**). An MT is a quantitative value that represents the groundwater conditions at an RMS that, when exceeded individually or in combination with MTs at other monitoring sites, may cause an undesirable result in the basin per DWR's definition. Whether the MT represents a minimum or maximum value is dependent on the SI. As an example of a minimum, if groundwater levels are lower than the value of the MO for that site, they are moving in the direction of the MT. As an example of a maximum, for the groundwater quality SMC, as the value of the specific conductance concentration increases from the MO established for that site, it moves in the direction of the MT. The SIs and SMC, including MTs, are summarized in **Table 5-2**. Seawater Intrusion is not an applicable SI in the Vina Subbasin.

Table 5-1. Vina Subbasin Sustainability Indicator Summary			
2025 Status	**Undesirable Result Identification**	**Measurable Objective (MO) Definition**	**Minimum Threshold (MT) Definition**
Chronic Lowering of Groundwater Levels			
No indication of undesirable results There were no RMS wells with spring or fall 2025 groundwater level measurements below the MT.	When 2 RMS wells within a management area reach their MT for two consecutive non-dry year types.	The groundwater level is based on the groundwater trend line for the dry periods (over the period of record) of observed short-term climatic cycles extended to 2030 for each RMS well.	An elevation protective of sustainably constructed domestic wells (based on their well depths for wells drilled since 1980) within the polygon associated with the RMS well
Reduction of Groundwater Storage			
No indication of undesirable results There were no RMS wells with spring or fall 2025 groundwater level measurements below the MT.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.
Degraded Water Quality			
No indication of undesirable results There were no RMS wells with SC levels exceeding their MTs in 2025.	When 2 RMS wells exceed their MT for two consecutive non-dry years.	Measured SC is less than or equal to the recommended Secondary Maximum Contaminant Level (900 µS/cm) based on State Secondary Drinking Water Standards at each well.	The upper limit of the Secondary Maximum Contaminant Level for SC (1,600 µS/cm) is based on the State Secondary Drinking Water Standards.
Land Subsidence			
No indication of undesirable results There were no RMS wells with spring or fall 2025 groundwater level measurements below the MT.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.

Table 5-1. Vina Subbasin Sustainability Indicator Summary			
2025 Status	**Undesirable Result Identification**	**Measurable Objective (MO) Definition**	**Minimum Threshold (MT) Definition**
Depletion of Interconnected Surface Water			
No indication of undesirable results There were no RMS wells with spring or fall 2025 groundwater level measurements below the MT.	Uses groundwater levels as a proxy. The GSP identifies data gaps and describes the "Interconnected Surface Water Sustainable Management Criteria Framework."	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.

Notes:

Salinity is the primary water-quality constituent of concern, evaluated by measuring specific conductivity (SC).

MO = measurable objective, MT = minimum threshold, RMS = representative monitoring site, µS/cm = micro siemens per centimeter

5.2.1 Chronic Lowering of Groundwater Levels and Reduction in Groundwater Storage SMC

The reduction in groundwater storage SMC utilizes the chronic lowering of groundwater levels SMC as a proxy (**Table 5-1**). Thus, groundwater conditions related to storage and chronic lowering of groundwater levels are discussed together. Groundwater conditions in the Subbasin are on track to meet the first 5-year 2027 IMs and avoid undesirable results for groundwater levels at each of the RMS wells. In spring 2025, all groundwater elevations at the RMS wells were above the established MOs and MTs (as indicated in **Table 5-2**), which shows measurements from WY 2025 for spring seasonal highs and fall seasonal lows, along with MOs and MTs. Spring water level data for non-Cal-Water wells was recorded from measurements taken during the month of March, while water level data for Cal Water wells was recorded as the average of both the February and April measurement for each well. **Table 5-2** also compares the WY 2025 measurements to those from WY 2024 and to the measurable objectives. Spring and fall 2025 groundwater elevations were all at or above the established MOs (DWR, 2025). Groundwater elevations are all above the MTs throughout the Subbasin, with elevations mostly near or slightly higher than those observed in recent years (**Appendix A**). Higher water levels observed in spring 2025 compared to spring 2024 have bolstered groundwater storage in the Subbasin due to above-normal hydrological conditions, and increased recharge despite an increase in groundwater extraction from the previous year.

Table 5-2. Vina Subbasin Measurable Objectives, Minimum Thresholds, and Seasonal Groundwater Elevations of Representative Monitoring Site Wells

State Well Number	Groundwater Elevation (feet above mean sea level)									
	2025 Measurements									
	Date Measured	Spring (seasonal high)	Date Measured	Fall (seasonal low)	MO	MT	Spring 2025 vs. MO (ft)	Fall 2025 vs. MO (ft)	Spring 2025 vs. Spring 2024 (ft) (seasonal high)	Fall 2025 vs. Fall 2024 (ft) (seasonal low)
Vina North Management Area										
23N02W**25C001M**	3/11/2025	146	10/10/2025	133.9	130	50	16	3.9	2.2	2.3
23N01W**10E001M**	3/11/2025	163.88	10/8/2025	153.68	136	80	27.88	17.68	3.2	--
23N01E**07H001M**	3/18/2025	165.2	10/7/2025	163.9	136	72	29.2	27.9	0.3	1.6
22N01W**05M001M**	3/11/2025	140.48	10/8/2025	129.08	115	31	25.48	14.08	0.8	8
23N01W**36P001M**	3/11/2025	140.45	10/8/2025	123.35	108	45	32.45	15.35	7.5	3.6
23N01E**33A001M**	3/18/2025	140.69	10/7/2025	136.64	125	72	15.69	11.64	1.93	2.75
Vina Chico Management Area										
CWSCH01b	2/1/2025,4/1/2025**	125.5	10/25/2025	118	106	85	19.5	12	4.5	11
CWSCH02	2/1/2025,4/1/2025**	133	10/25/2025	127	105	85	28	22	5	7
CWSCH03	2/1/2025,4/1/2025**	122	10/25/2025	114	108	85	14	6	1	1
CWSCH07	2/1/2025,4/1/2025**	110	10/25/2025	104	95	85	15	9	0	0
22N01E**28J003M**	3/18/2025	138.79	10/10/2025	126.78	111	85	27.79	15.78	4.56	3.46
Vina South Management Area										
21N01E**21C001M**	3/19/2025*	--	10/8/2025*	--	64	10	--	--	--	--
21N02E**18C003M**	3/18/2025	169.4	10/7/2025	155.59	130	65	39.4	25.59	2.35	-7.96

20N01E**10C002M**	3/19/2025	106.85	10/8/2025	99.15	92	20	14.85	7.15	--	--
20N02E**24C001M**	3/21/2025	108.21	10/9/2025	98.29	77	18	31.21	21.29	4.12	0.4
20N02E**09L001M**	3/21/2025	119.63	10/10/2025	108.33	91	30	28.63	17.33	5.6	2.6
21N02E**26E005M**	3/19/2025	114.06	10/8/2025	111.45	95	36	19.06	16.45	2.6	3

[1] *The portion of the State Well Number shown in bold, underlined text is the RMS ID.*

**questionable measurement; **averaged WLE over two measurements*

MO = measurable objective, MT = minimum threshold, -- = Indicates missing or questionable data

5.2.2 Degraded Water Quality SMC

The degraded water quality MT and MO are summarized in **Table 5-1**. Salinity is the main constituent of concern in the Subbasin and is evaluated by SC. Salinity (i.e., SC) is measured at RMS wells throughout the Subbasin, and the County collected the data in WY 2025. There were no wells above the established MOs and MTs in 2025. A summary of groundwater quality monitoring data is available in **Appendix F**. Groundwater conditions are on track to avoid undesirable water quality results.

5.2.3 Land Subsidence SMC

The land subsidence MT and MO are summarized in **Table 5-1**. Only inelastic subsidence, solely due to lowered groundwater elevations, will be considered relevant to the SMC. Data from monuments in the Sacramento Valley Global Positioning System (GPS) Subsidence Monitoring Network were utilized to track cumulative subsidence in the area in 2008 and 2017 (DWR, 2024a) and were used for identifying undesirable results in the GSP; however, these sites have not been measured since then. Observations from the Sacramento Valley GPS Subsidence Monitoring Network are supplemented by Interferometric Synthetic Aperture Radar (InSAR) data provided by DWR annually (DWR, 2024b) to assess this SMC. The InSAR data has a resolution of 0.5 ft and represents average vertical displacement over 100m × 100m areas. Rasters were interpolated from these point measurements. InSAR data was analyzed from October 2024 to October 2025 to track annual changes (**Figure 5-1**), from October 2020 to October 2025 to track net 5-year changes (**Figure 5-2**).

Conditions indicate that there has not been any inelastic land subsidence historically or during the reporting period. Subsidence and uplift measured by InSAR from October 2024 to October 2025 were negligible and ranged from 0.1 to 0.17 feet of vertical change within the Subbasin. Subsidence and uplift measured by InSAR over the 5-year period from WY 2020 to WY 2025 resulted in uplift only ranging from 0.1 feet to 0.125 feet of uplift. Groundwater conditions in the Subbasin are on track to meet the first 5-year 2027 IMs and avoid undesirable results for land subsidence.

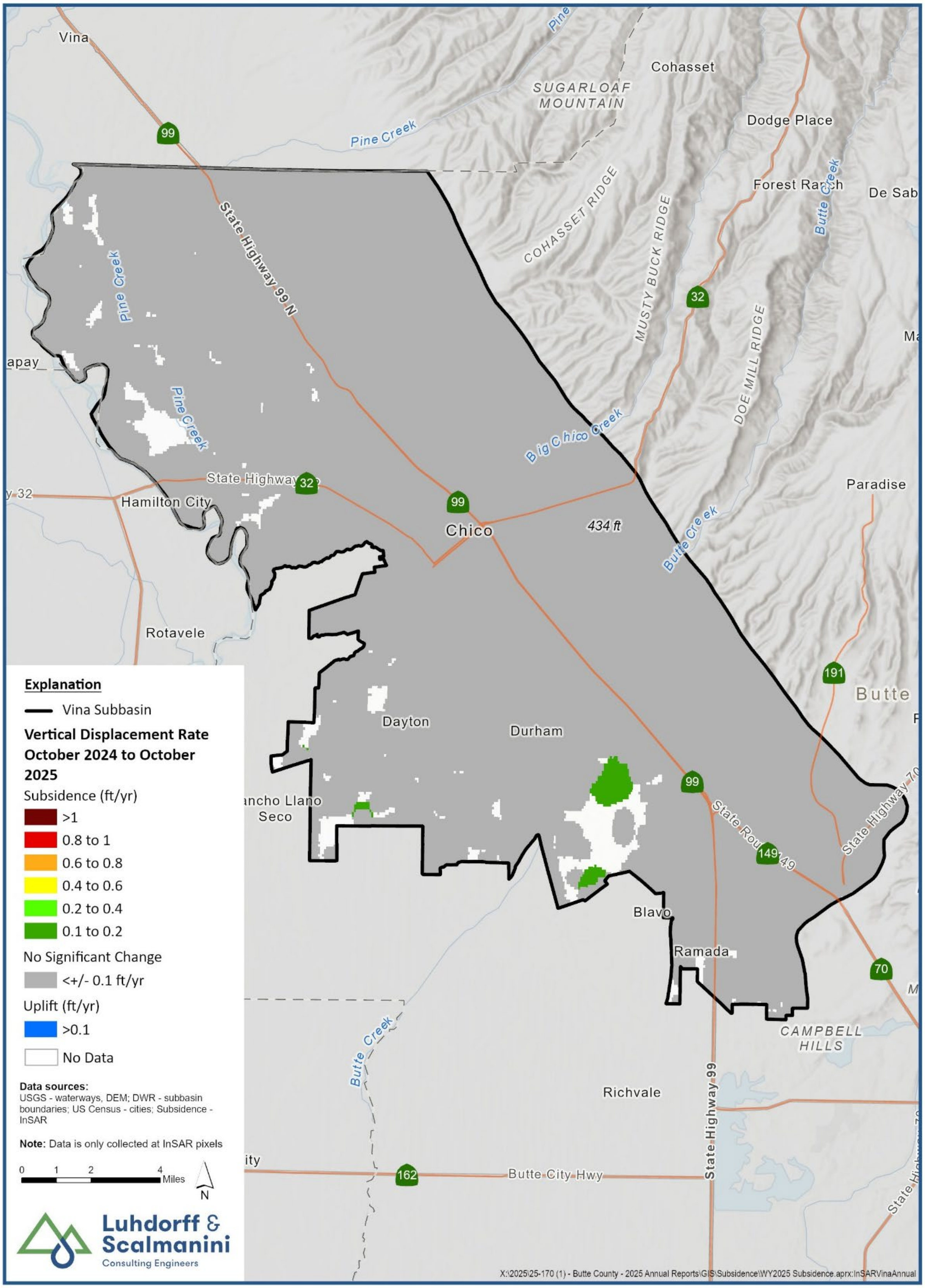


Figure 5-1. Vina Subbasin Vertical Displacement in Ground Surface from 10/2024 to 10/2025

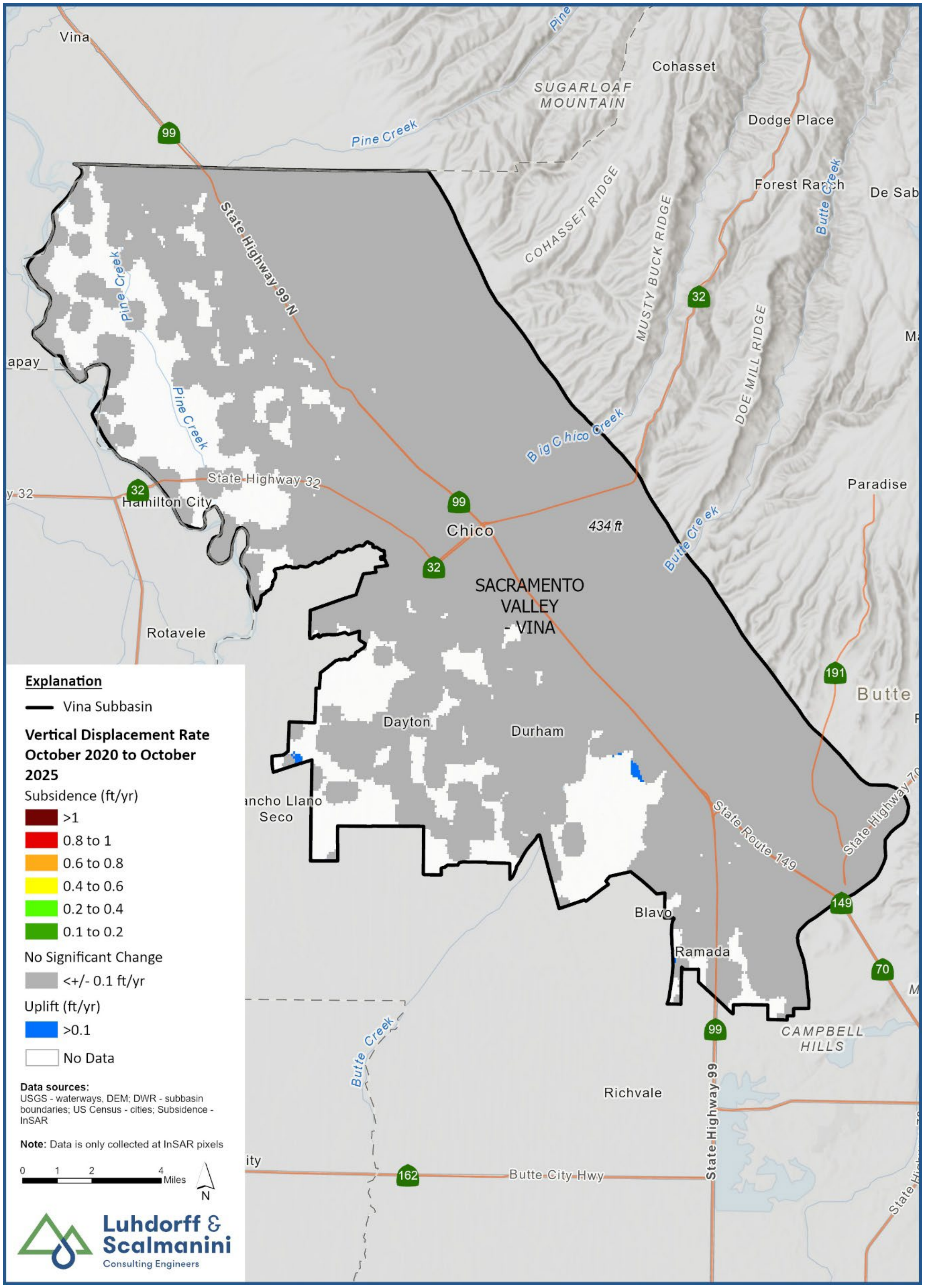


Figure 5-2. Vina Subbasin Vertical Displacement in Ground Surface from 10/2020 to 10/2025

5.2.4 Depletion of Interconnected Surface Water SMC

The depletion of interconnected surface water utilizes the chronic lowering of groundwater levels SMC as a proxy (**Table 5-1**). Groundwater conditions in the Subbasin are on track to meet the first 5-year 2027 IMs and to avoid undesirable results for groundwater levels at each of the RMS wells.

5.3 Progress Toward PMA Implementation

The Vina GSP includes a description of the projects and management actions the GSAs have determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin. A description of progress towards implementing projects and management actions in the GSP is included in the PMA Module in **Appendix G.**

6 Conclusions

The Vina Subbasin GSAs adopted and submitted the GSP to DWR in January 2022 and continue to actively work on sustainable groundwater management in the Subbasin directly and with partners. As presented in **Section 5** of this report, recent progress made on activities applicable to the GSAs demonstrates the commitment of the GSAs to implement the GSP by allocating the necessary time and resources to achieve long-term sustainable management of the groundwater resources in the Vina Subbasin.

7 References

Butte County Department of Water and Resource Conservation (BCDWRC). 2021. Model Documentation v 1.0. Butte Basin Groundwater Model (BBGM). November 30. Available at: ://www.buttecounty.net/DocumentCenter/View/5429/Butte-Basin-Groundwater-Model-Documentation-Version-10-PDF.

Butte County. 2022. Vina Subbasin Annual Report WY 2021. Available at: https://sgma.water.ca.gov/portal/gspar/preview/91. Prepared by Luhdorff & Scalmanini Consulting Engineers and Davids Engineering.

Butte County. 2023. Vina Subbasin Annual Report WY 2022. Available at: https://sgma.water.ca.gov/portal/gspar/preview/245. Prepared by Luhdorff & Scalmanini Consulting Engineers and Davids Engineering.

Butte County. 2024. Vina Subbasin Annual Report WY 2023. Available at: https://sgma.water.ca.gov/portal/gspar/preview/289. Prepared by Luhdorff & Scalmanini Consulting Engineers and Davids Engineering.

Butte County. 2025. Vina Subbasin Annual Report WY 2024. Available at: https://sgma.water.ca.gov/portal/gspar/preview/434. Prepared by Luhdorff & Scalmanini Consulting Engineers and Davids Engineering.

California Data Exchange Center (CDEC). 2024. Water Year Type. Retrieved at: https://data.ca.gov/dataset/cdec-water-year-type-dataset

California Department of Water Resources (DWR). 2018. 5-021.70 Sacramento Valley-Butte Basin Boundaries Description. Available at: https://data.cnra.ca.gov/dataset/ca-gw-basin-boundary-descriptions/resource/2385b4bd-4858-4902-b98d-19936ee3f21e.

California Department of Water Resources (DWR). 2024. Periodic Groundwater Level Measurements - Datasets - California Natural Resources Agency Open Data. Downloaded November 2024. Available at: https://data.cnra.ca.gov/dataset/periodic-groundwater-level-measurements.

California State Water Resources Control Board (SWRCB). 2024. California Water Accounting, Tracking, and Reporting System (CalWATRS). Available at: https://www.waterboards.ca.gov/upward/calwatrs/.

California Water Service Company (Cal Water-Chico). 2020. 2020 Urban Water Management Plan (UWMP) 2020 Chico-Hamilton City District. Available at: https://www.calwater.com/docs/uwmp2020/CH_2020_UWMP_FINAL.pdf.

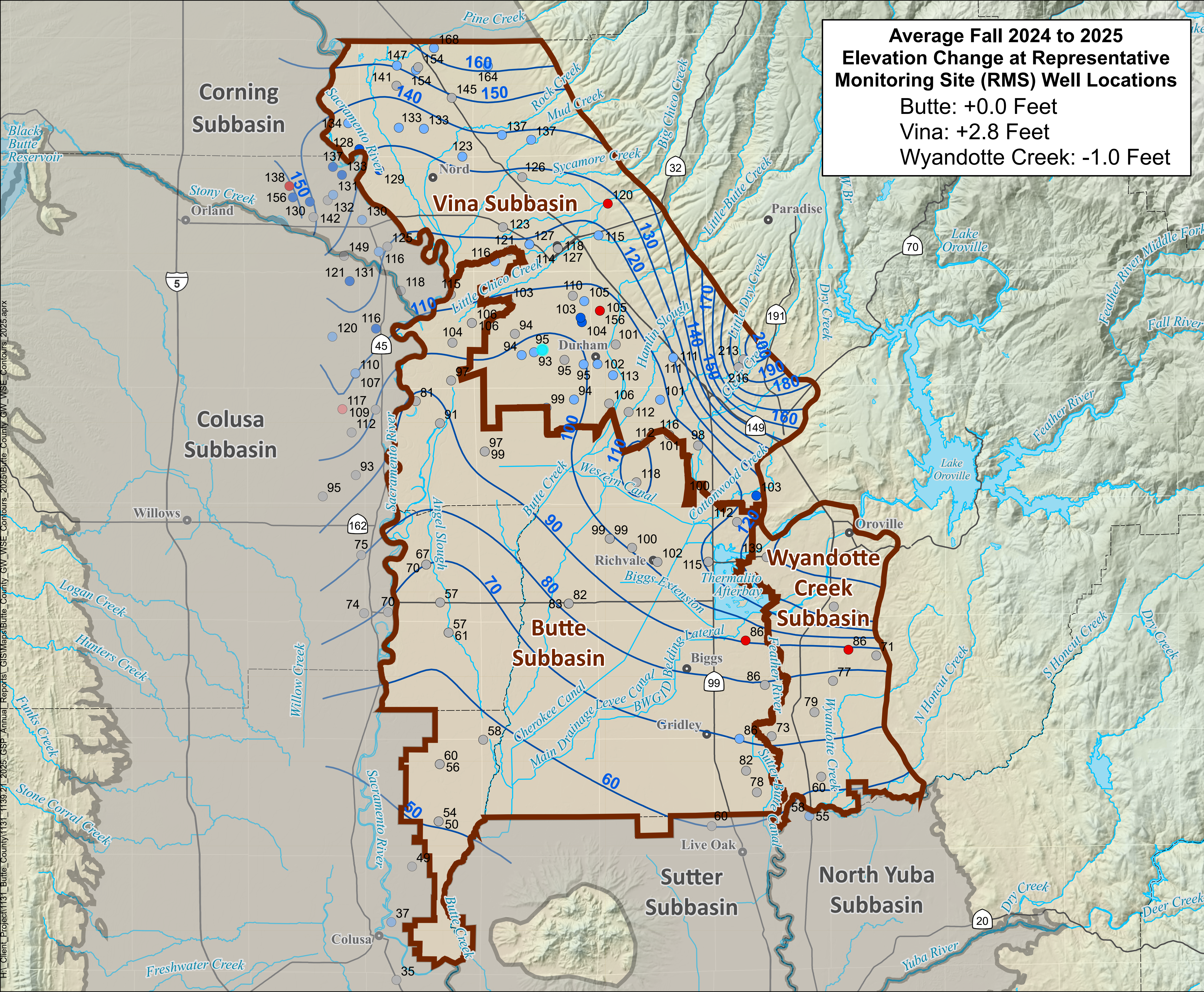
Geosyntec Consultants, Inc. 2021. Vina Groundwater Sustainability Plan. Available at: https://sgma.water.ca.gov/portal/gsp/preview/86.

Luhdorff and Scalmanini Consulting Engineers (LSCE). 2022. Drought Impact Analysis Study. Prepared for the County of Butte Water and Resource Conservation Department. Available at https://www.buttecounty.net/1240/Drought-Impact-Analysis-Study

Water Year 2025 Annual Report

Appendix A

Regional Contours, Characteristics, and Hydrographs of Representative Monitoring Site (RMS) Wells



FALL 2025 GROUNDWATER ELEVATION CONTOURS FOR PRIMARY AQUIFER IN BUTTE COUNTY SUBBASINS

All Other Features

- Cities and Towns
- Highway
- Butte, Vina, and Wyandotte Creek Subbasins
- Neighboring Subbasin

Contouring Wells*

- Greater than 5 ft decline
- Between 2 and 5 ft decline
- Less than 2 ft decline/increase
- Between 2 and 5 ft increase
- Greater than 5 ft increase

Contour Lines

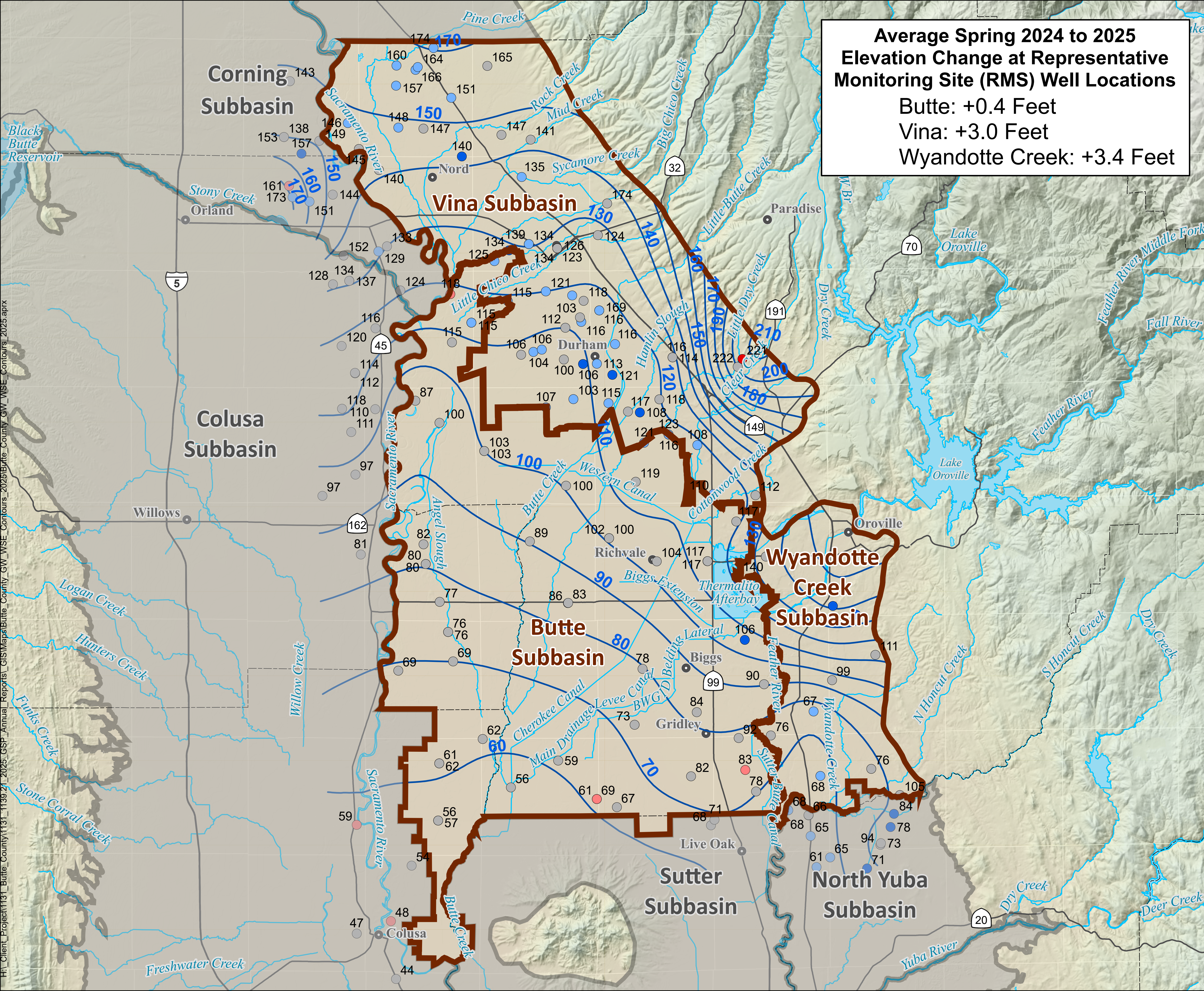
- Fall 2025 Water Surface Elevation Contour (feet above mean sea level)

*Note: Elevation shown for contouring wells is in feet above mean sea level and changes are relative to the same period of the prior year.

0 4 8
Miles

N

SPRING 2025 GROUNDWATER ELEVATION CONTOURS FOR PRIMARY AQUIFER IN BUTTE COUNTY SUBBASINS



All Other Features

- Cities and Towns
- Highway
- Butte, Vina, and Wyandotte Creek Subbasins
- Neighboring Subbasin

Contouring Wells*

- Greater than 5 ft decline
- Between 2 and 5 ft decline
- Less than 2 ft decline/increase
- Between 2 and 5 ft increase
- Greater than 5 ft increase

Contouring Lines

- Spring 2025 Water Surface Elevation Contour (feet above mean sea level)

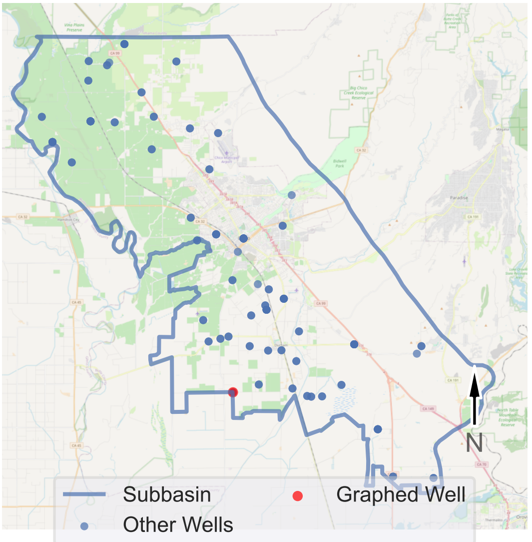
*Note: Elevation shown for contouring wells is in feet above mean sea level and changes are relative to the same period of the prior year.

0 4 8
Miles

N

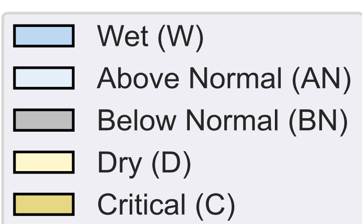
VINA Subbasin - State Well Number (SWN): 20N01E10C002M

Well Location Map

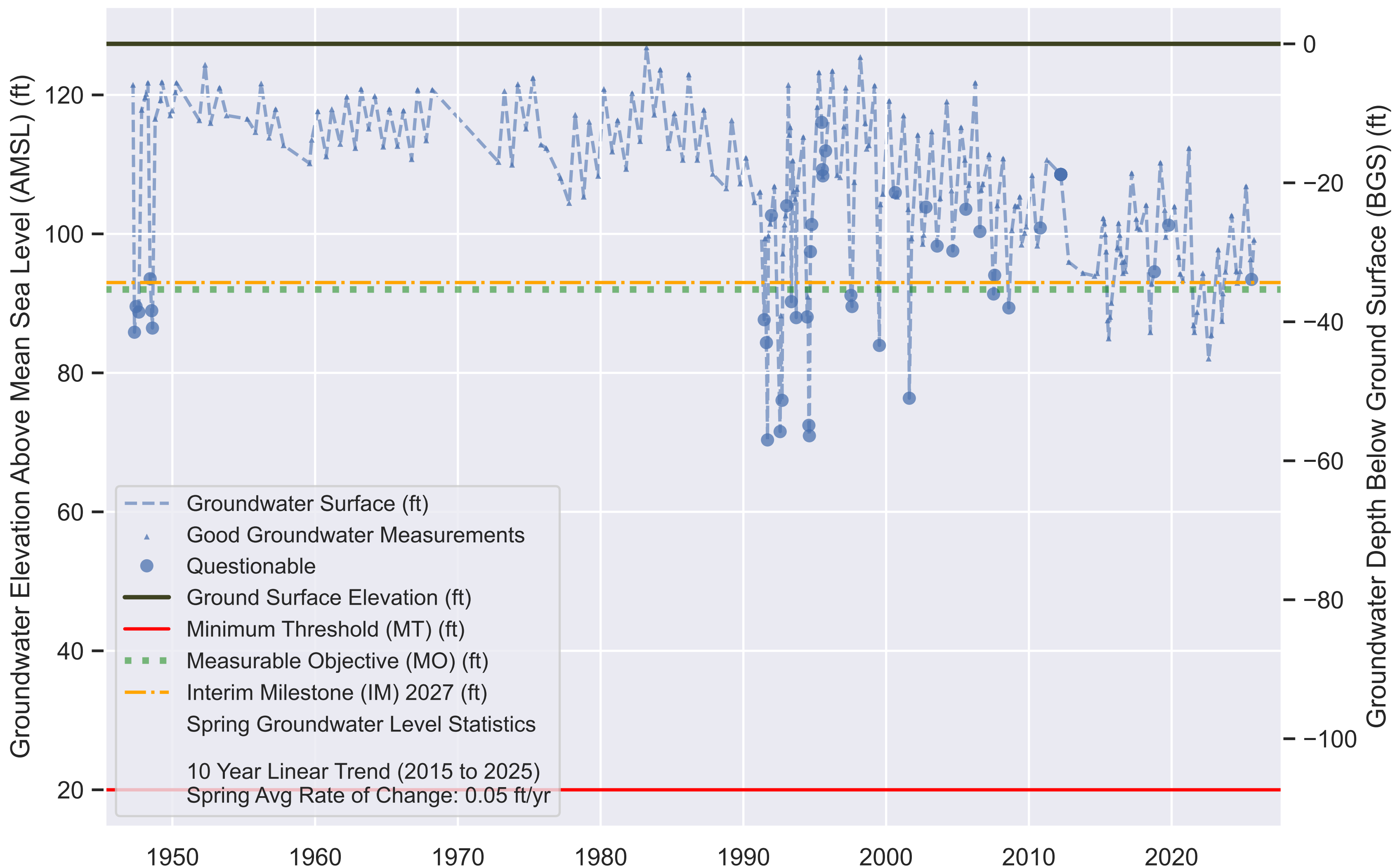


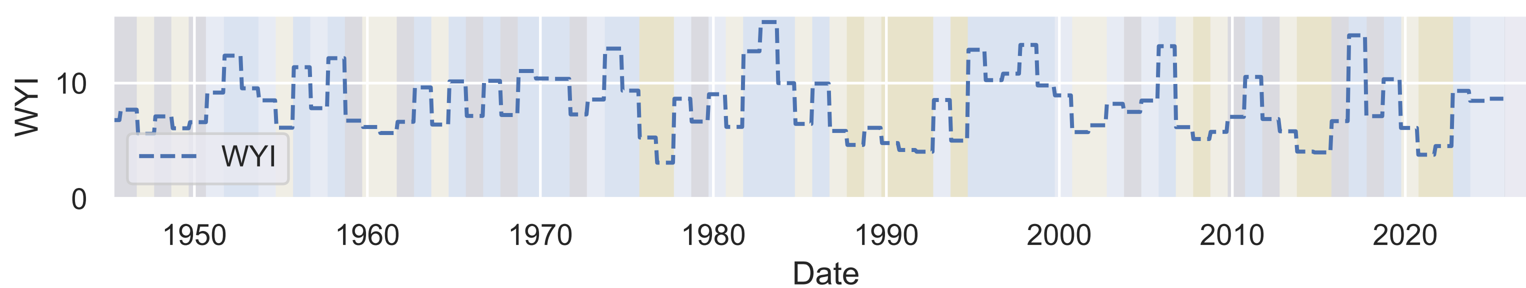
Sustainable Management Criteria:
IM (2027) = 93.0 ft AMSL
MO = 92.0 ft AMSL
MT = 20.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.



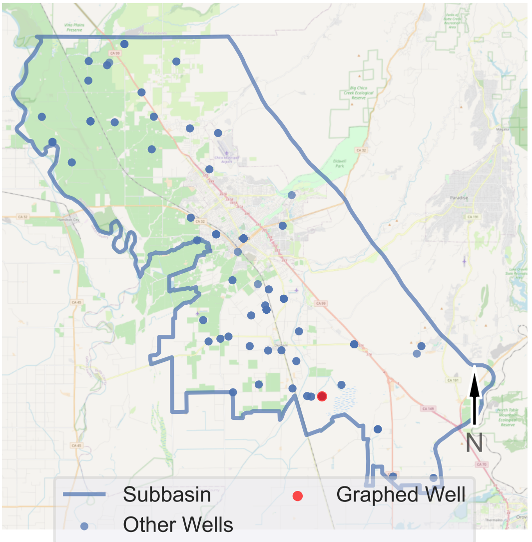
Perforation 1: 20.0 - 120.0 ft BGS





VINA Subbasin - State Well Number (SWN): 20N02E09L001M

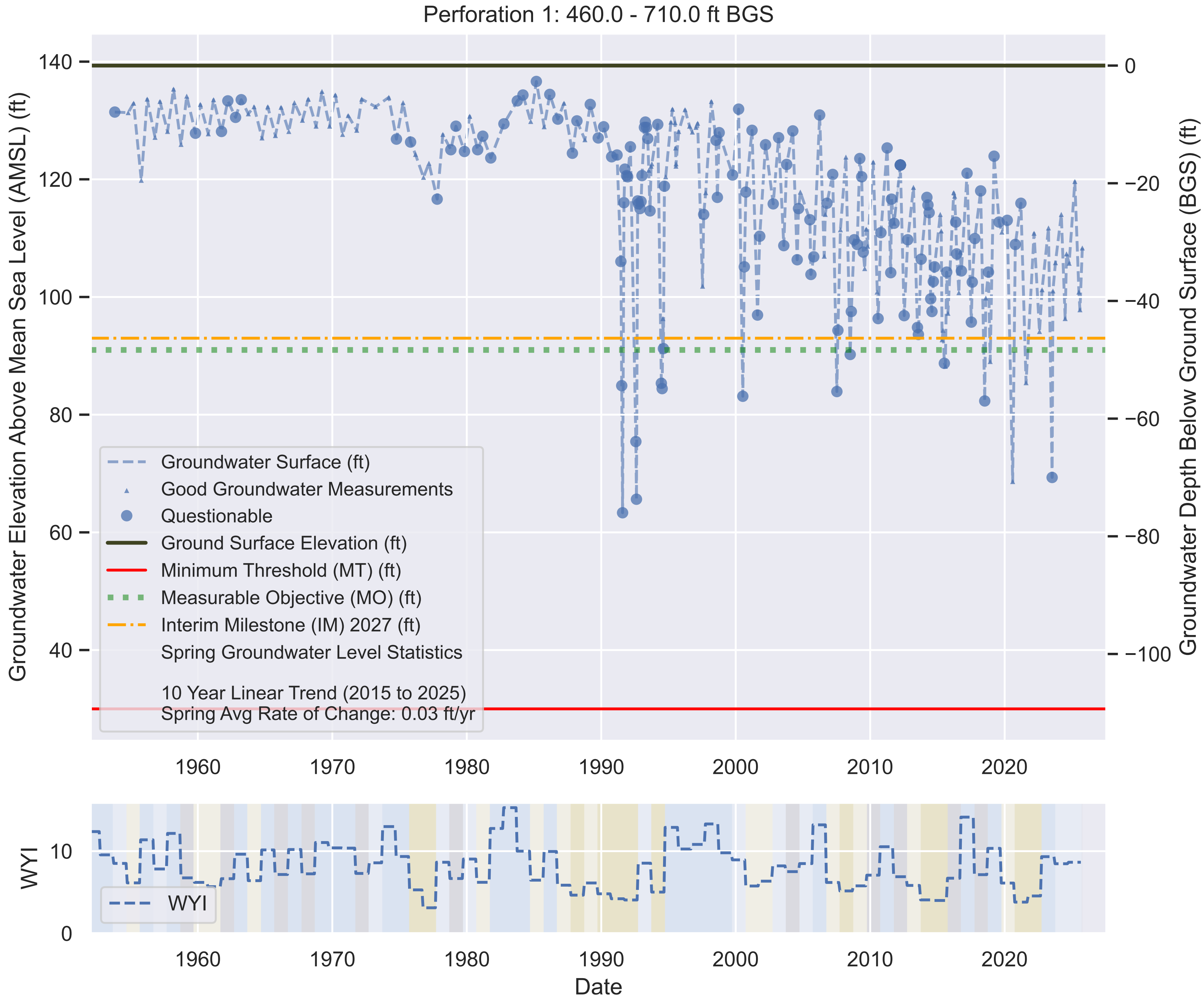
Well Location Map



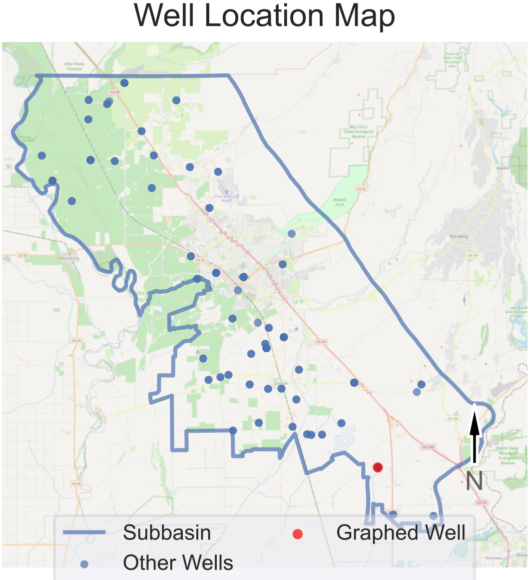
Sustainable Management Criteria:
IM (2027) = 93.0 ft AMSL
MO = 91.0 ft AMSL
MT = 30.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)



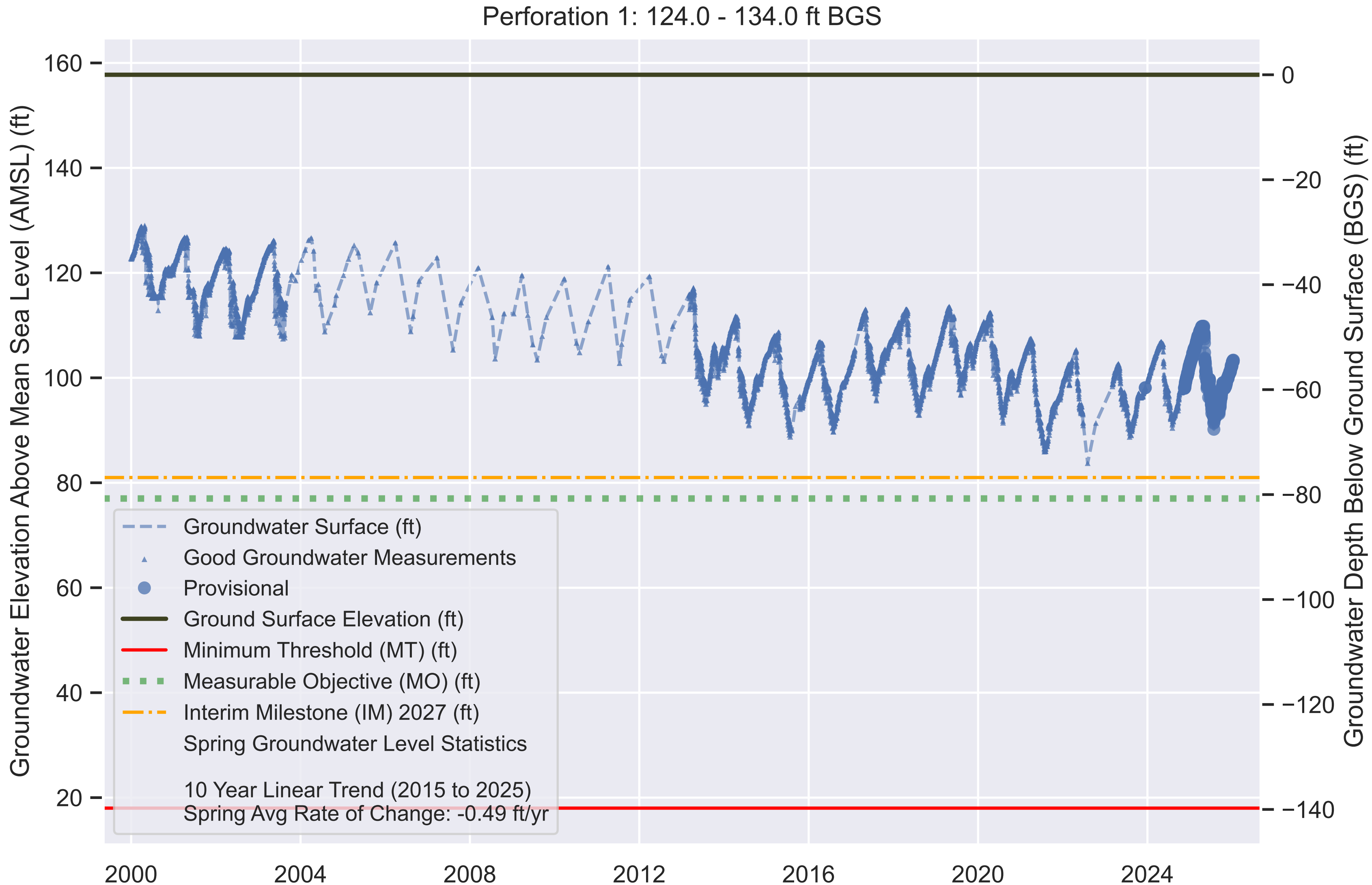
VINA Subbasin - State Well Number (SWN): 20N02E24C001M

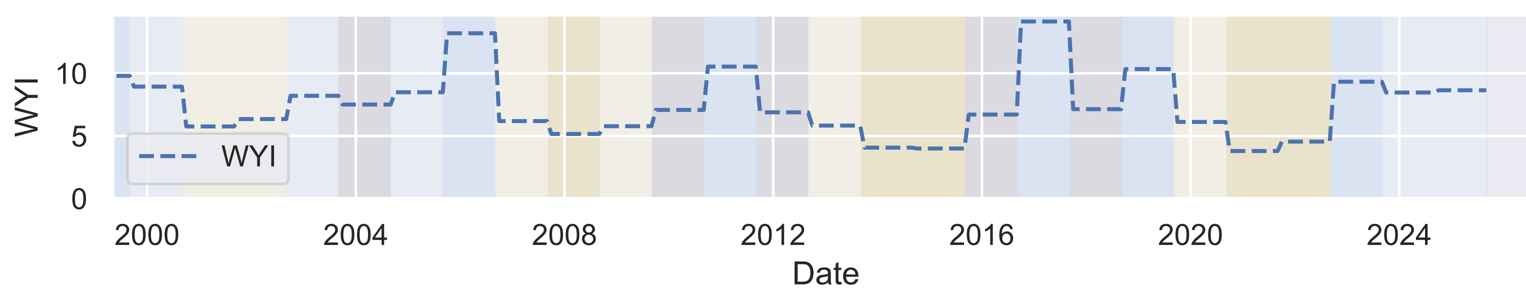


Sustainable Management Criteria:
IM (2027) = 81.0 ft AMSL
MO = 77.0 ft AMSL
MT = 18.0 ft AMSL

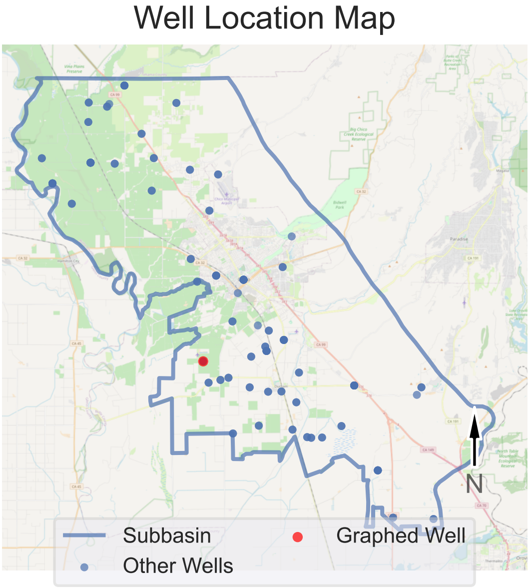
Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

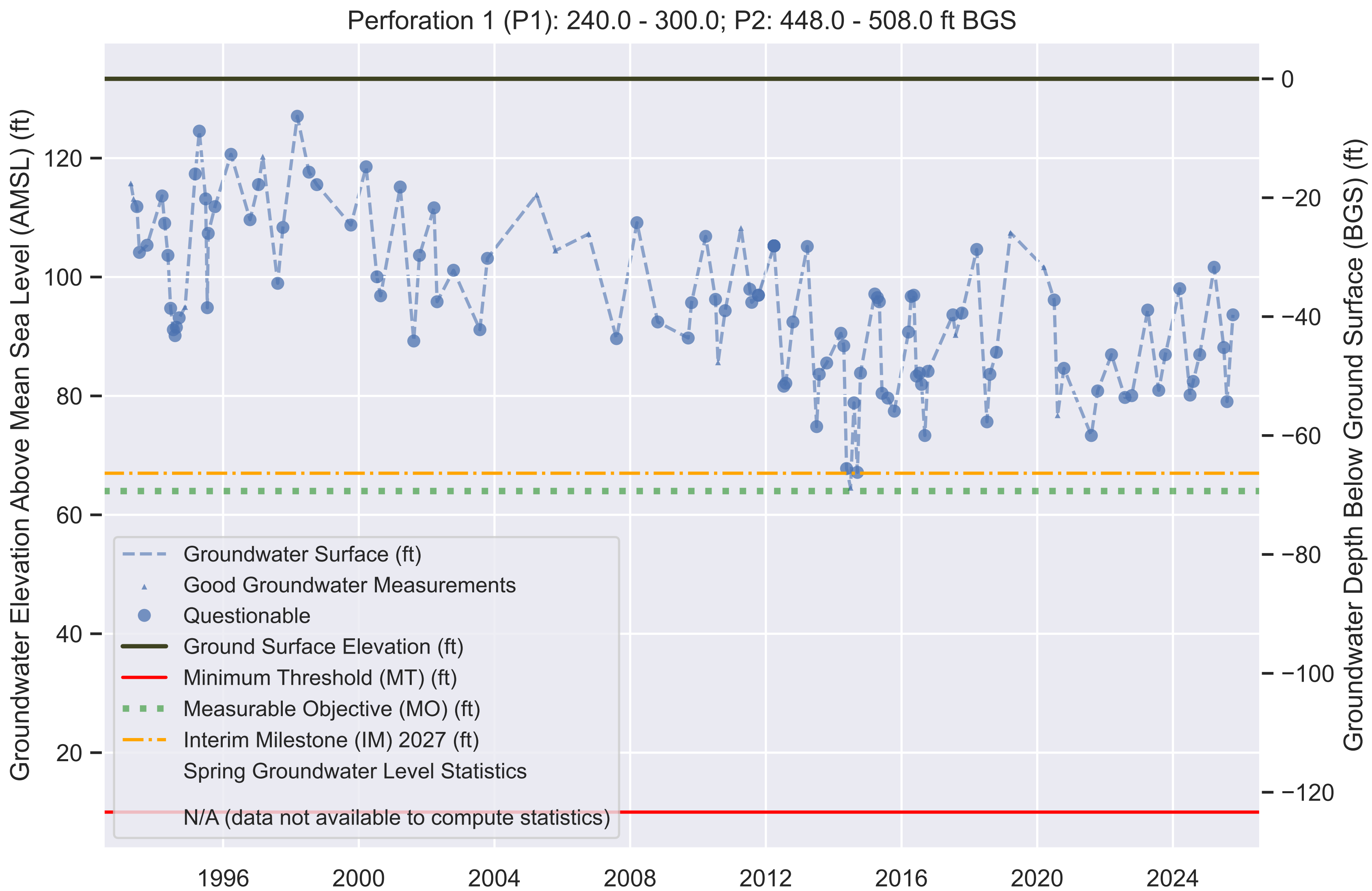
- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)





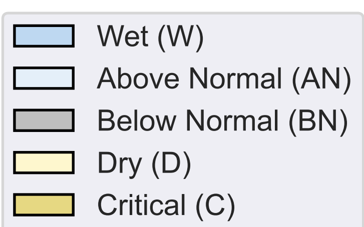
VINA Subbasin - State Well Number (SWN): 21N01E21C001M

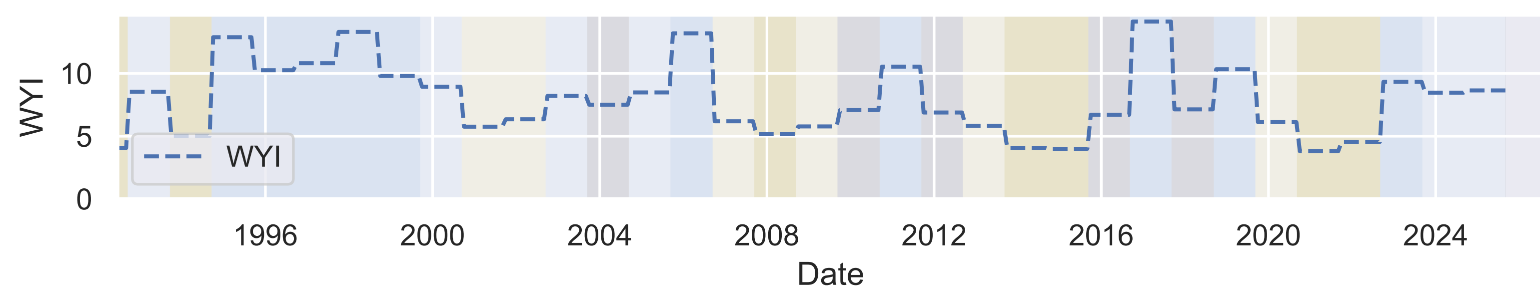




Sustainable Management Criteria:
IM (2027) = 67.0 ft AMSL
MO = 64.0 ft AMSL
MT = 10.0 ft AMSL

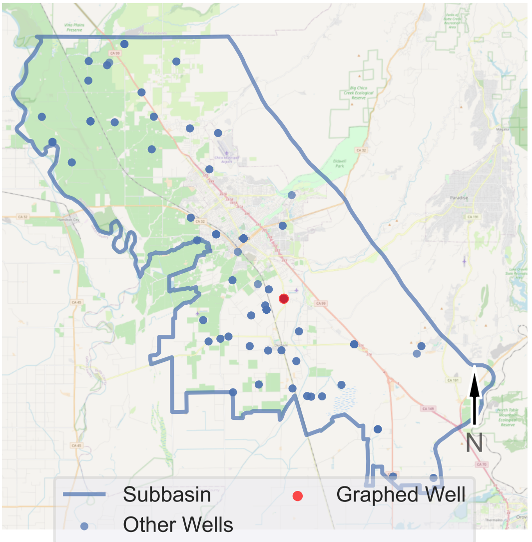
Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.



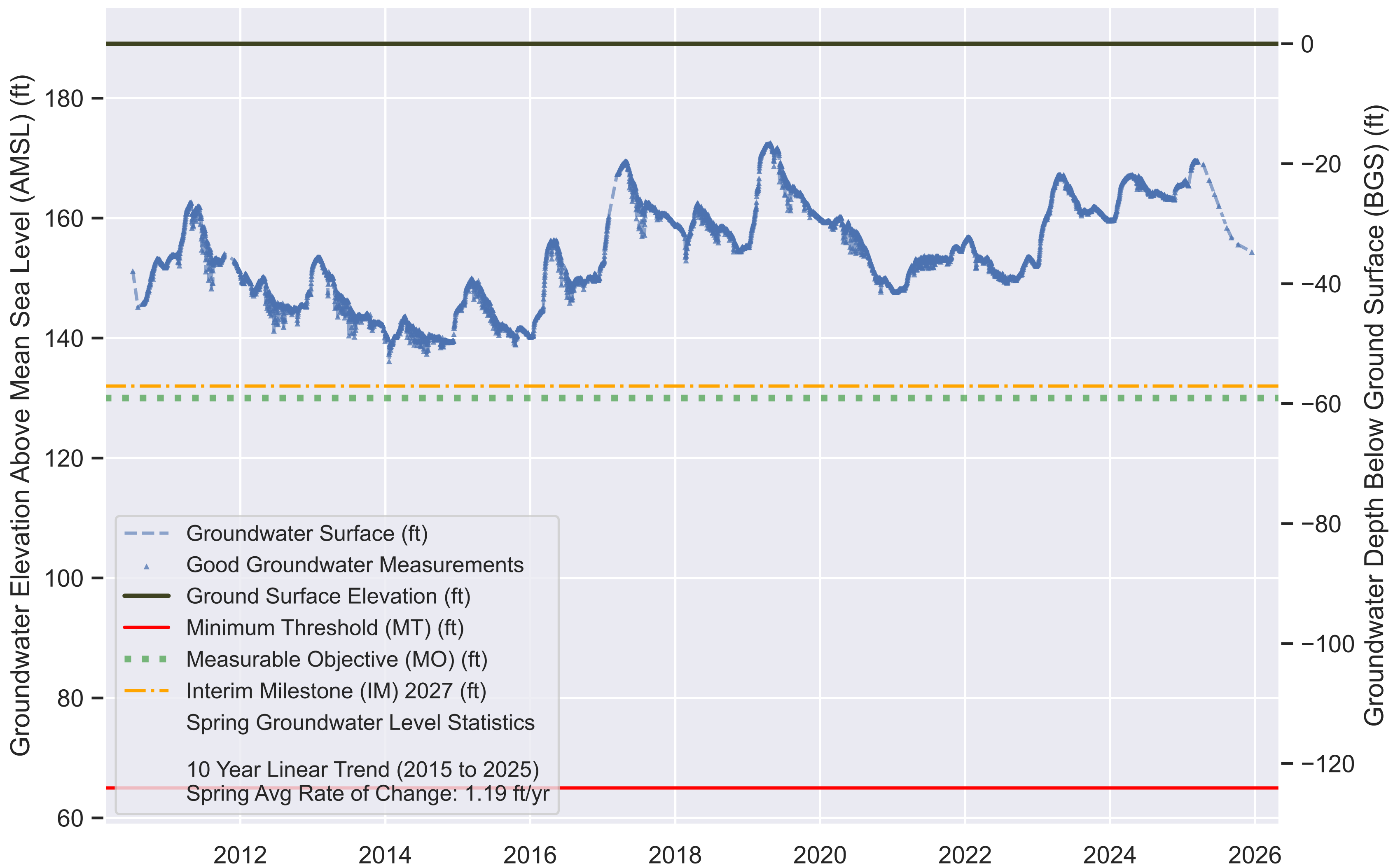


VINA Subbasin - State Well Number (SWN): 21N02E18C003M

Well Location Map

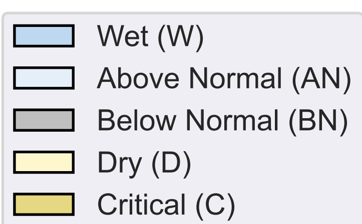


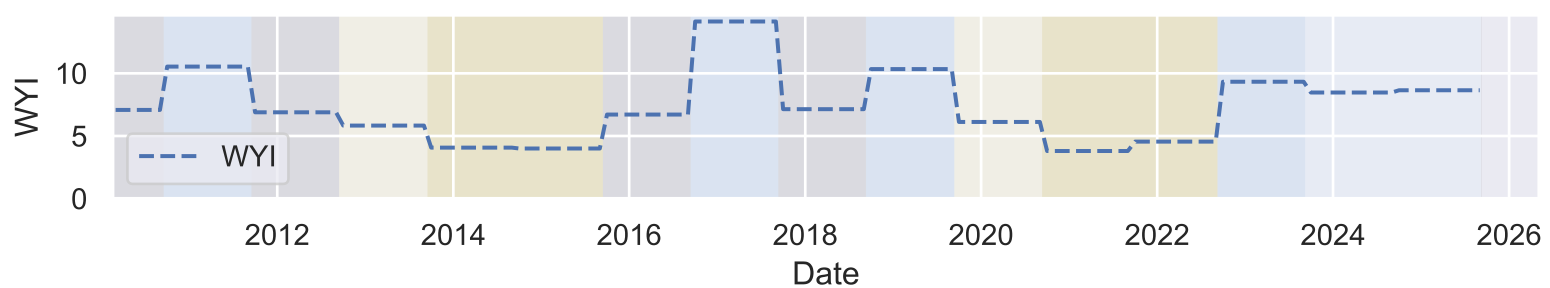
Perforation 1 (P1): 130.0 - 140.0; P2: 160.0 - 170.0; P3: 190.0 - 200.0 ft BGS



Sustainable Management Criteria:
IM (2027) = 132.0 ft AMSL
MO = 130.0 ft AMSL
MT = 65.0 ft AMSL

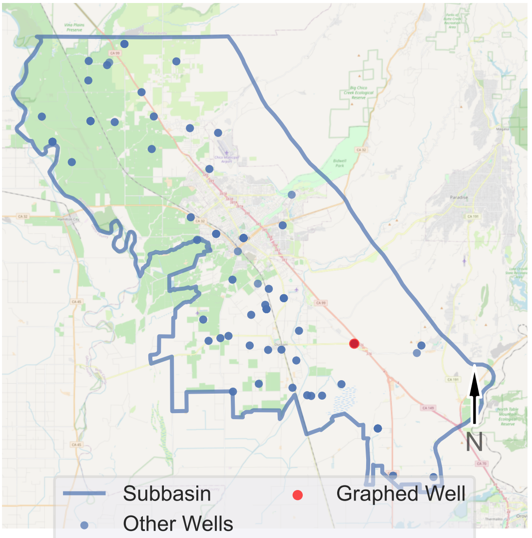
Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.





VINA Subbasin - State Well Number (SWN): 21N02E26E005M

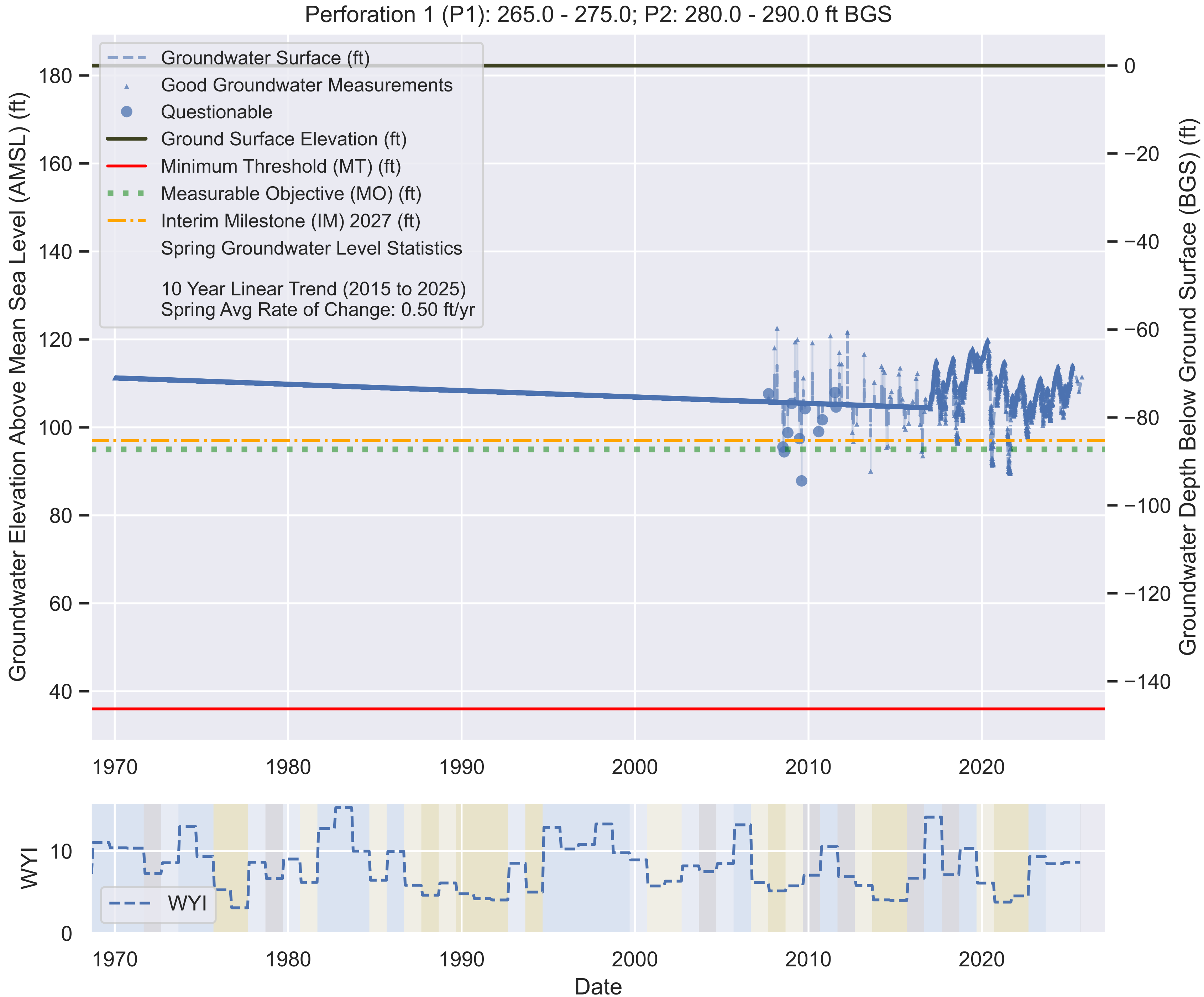
Well Location Map



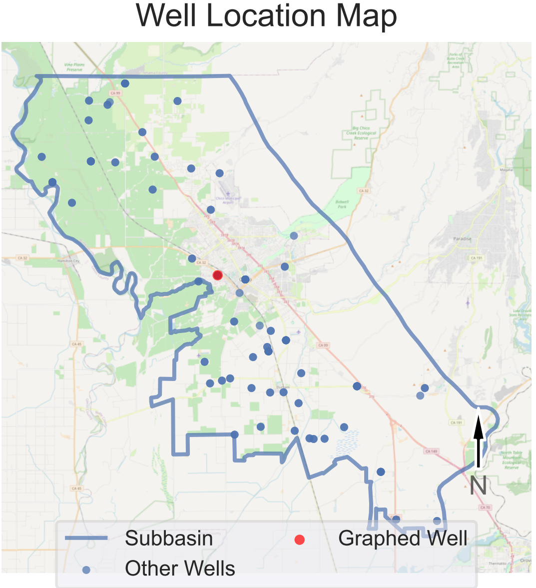
Sustainable Management Criteria:
IM (2027) = 97.0 ft AMSL
MO = 95.0 ft AMSL
MT = 36.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)

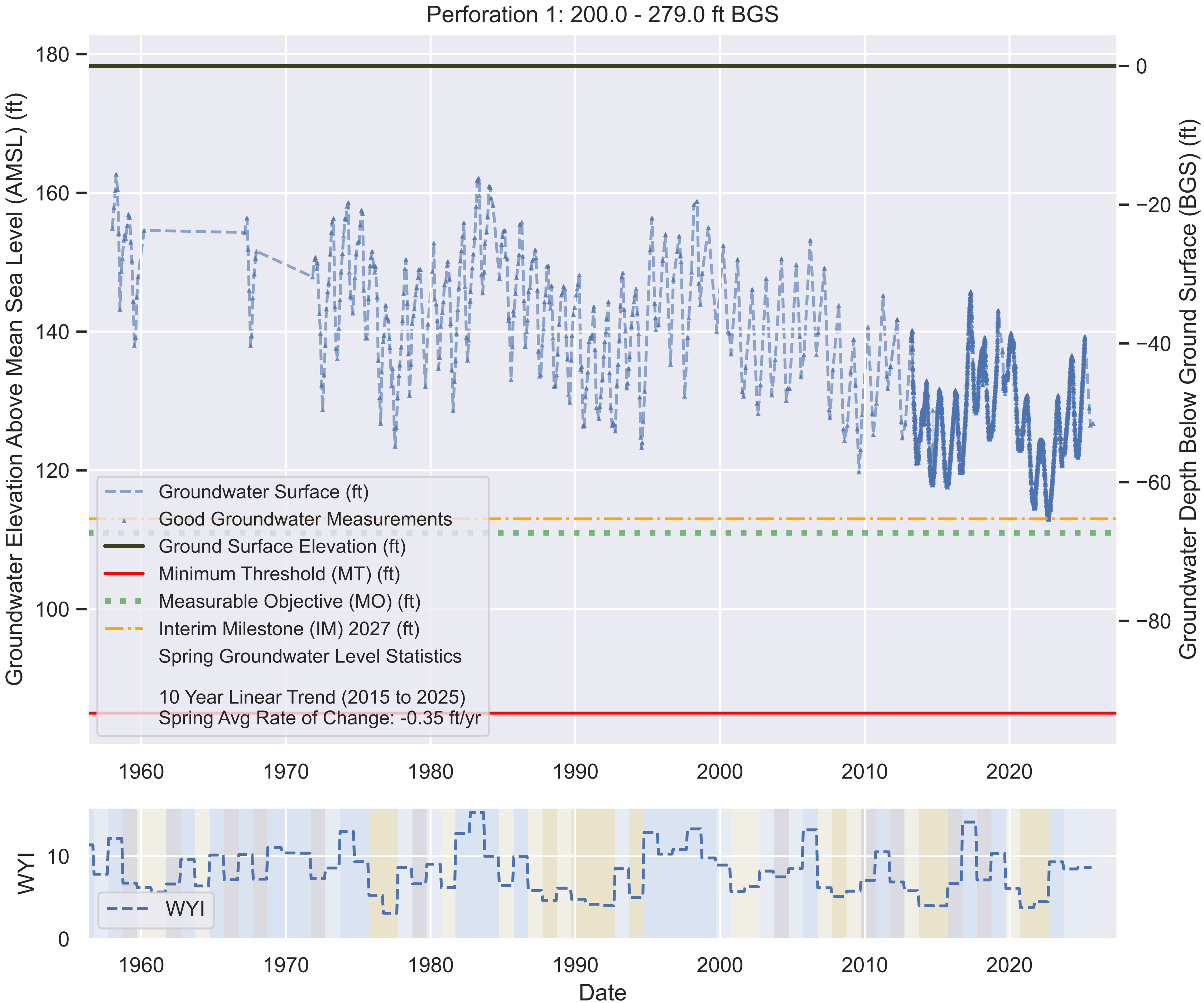


VINA Subbasin - State Well Number (SWN): 22N01E28J003M



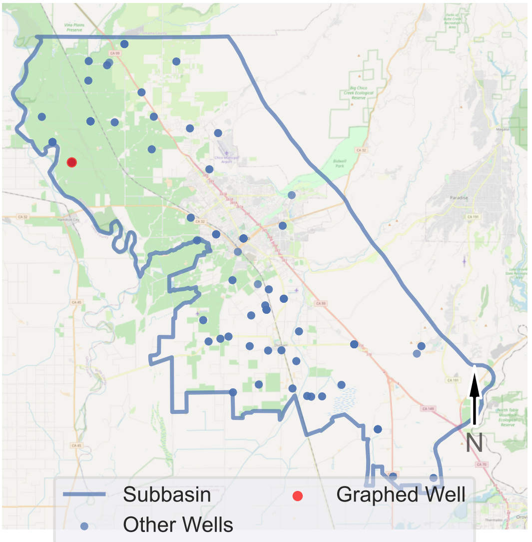
Sustainable Management Criteria:
IM (2027) = 113.0 ft AMSL
MO = 111.0 ft AMSL
MT = 85.0 ft AMSL

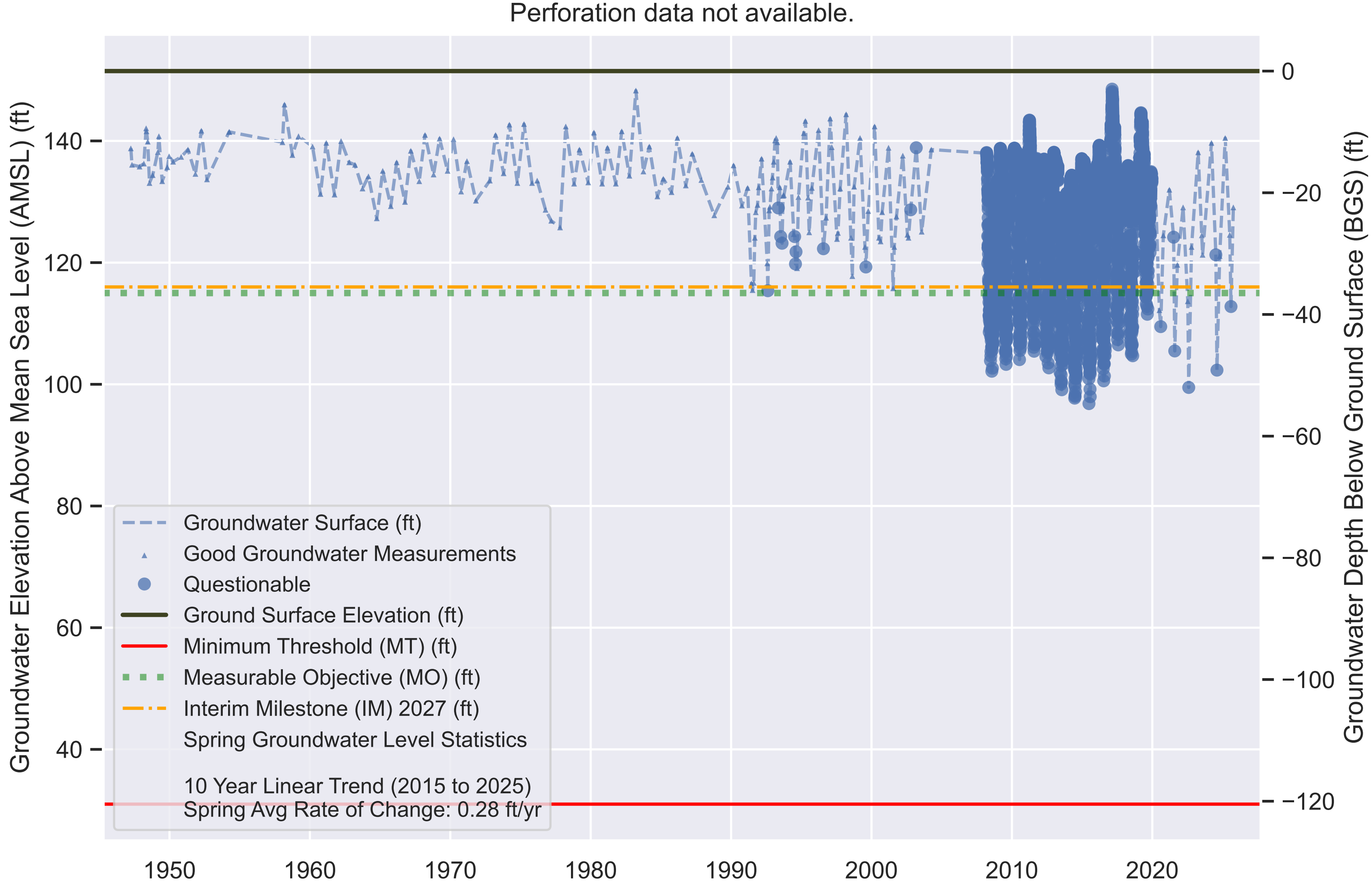
Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.



VINA Subbasin - State Well Number (SWN): 22N01W05M001M

Well Location Map

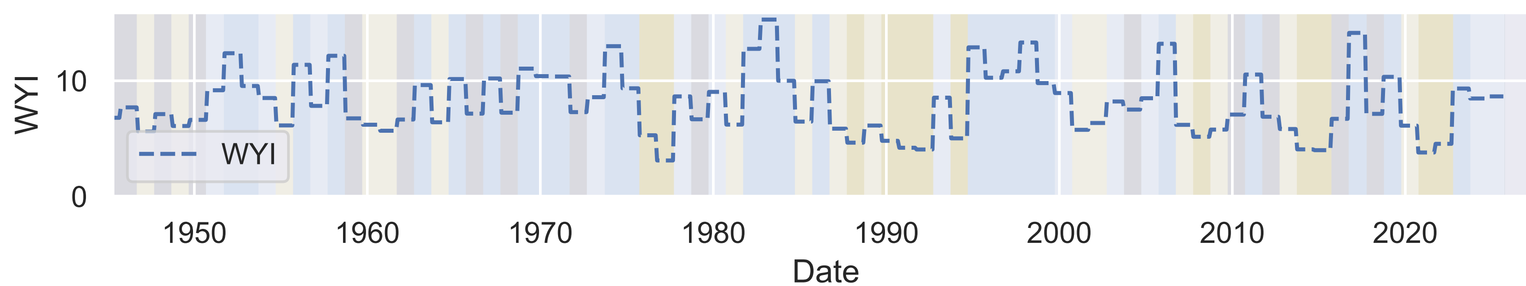




Sustainable Management Criteria:
IM (2027) = 116.0 ft AMSL
MO = 115.0 ft AMSL
MT = 31.0 ft AMSL

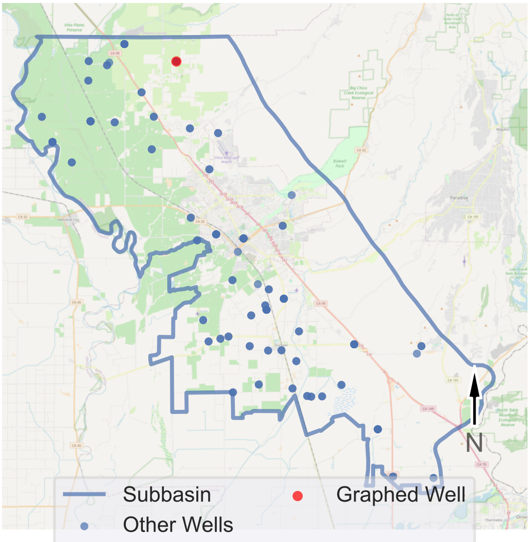
Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)



VINA Subbasin - State Well Number (SWN): 23N01E07H001M

Well Location Map

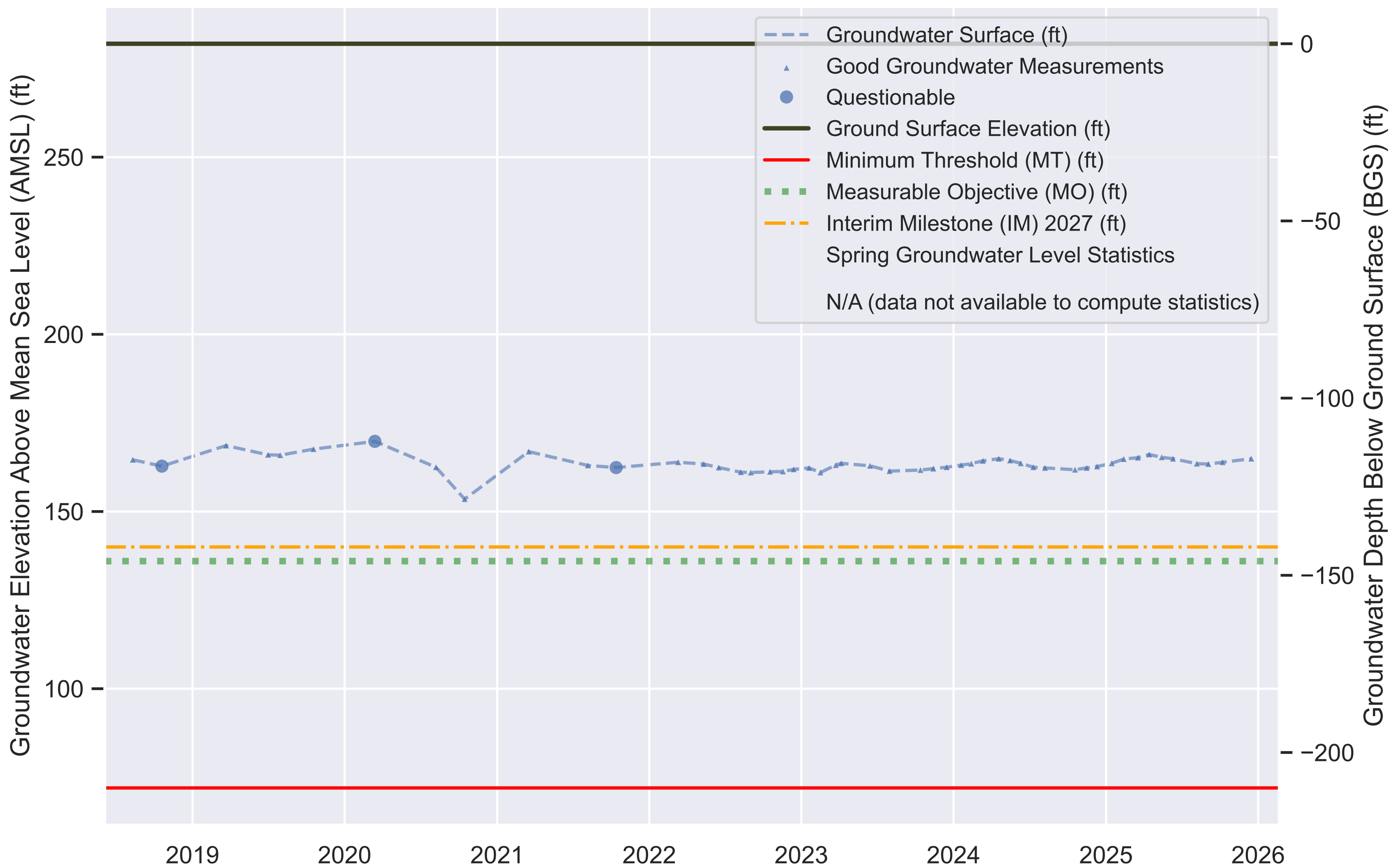


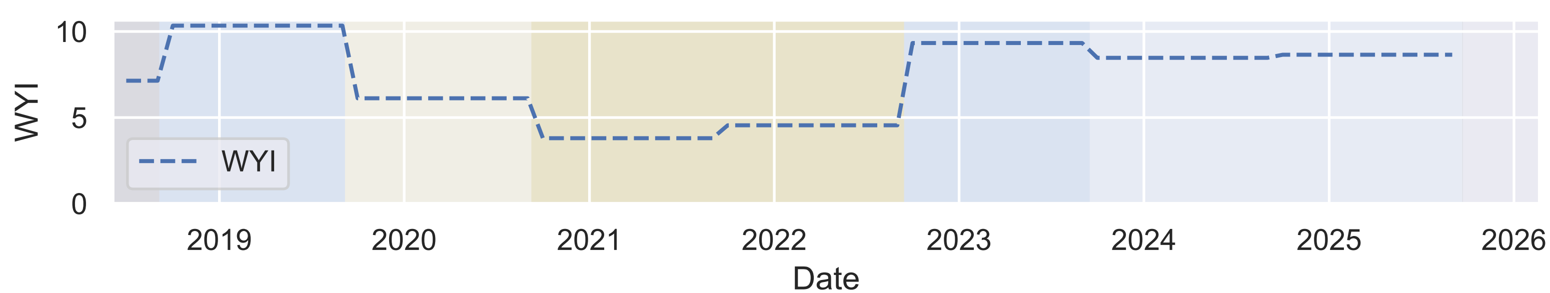
Sustainable Management Criteria:
IM (2027) = 140.0 ft AMSL
MO = 136.0 ft AMSL
MT = 72.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

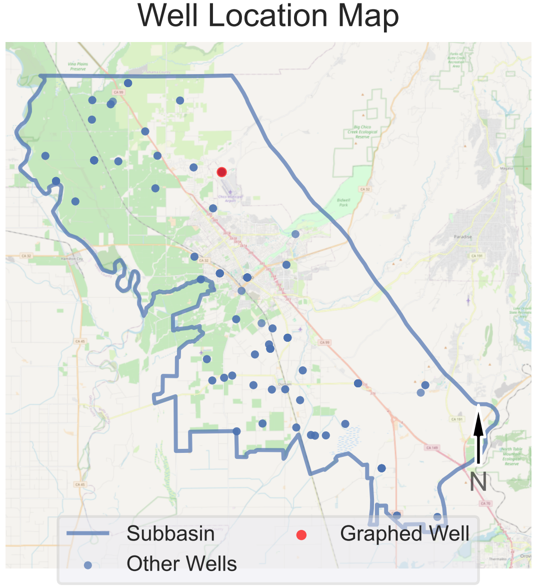
- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)

Perforation 1: 115.0 - 195.0 ft BGS



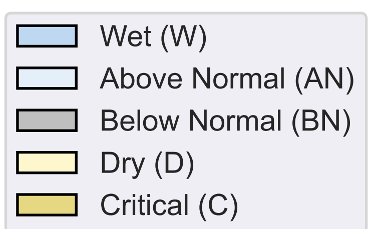


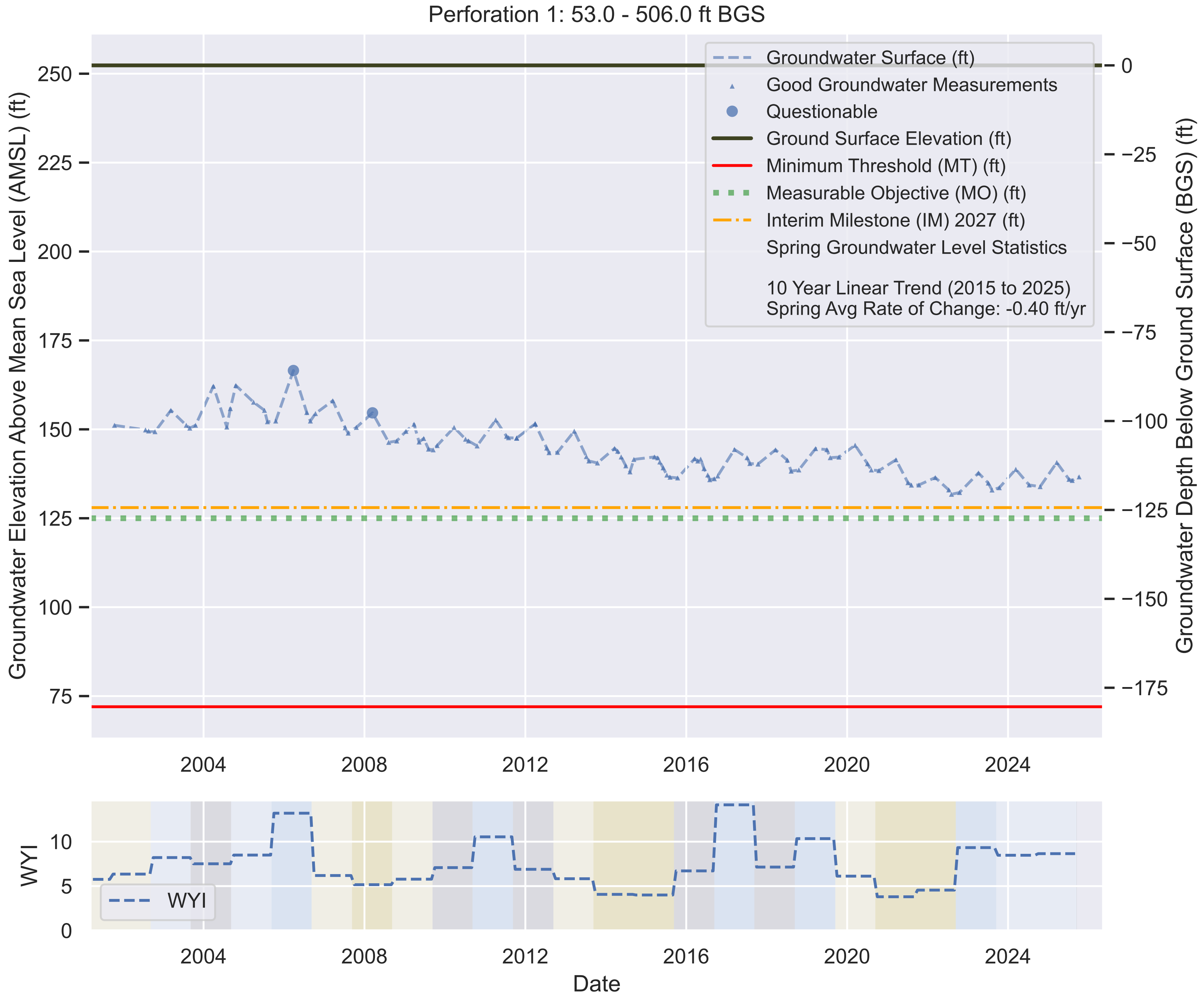
VINA Subbasin - State Well Number (SWN): 23N01E33A001M



Sustainable Management Criteria:
IM (2027) = 128.0 ft AMSL
MO = 125.0 ft AMSL
MT = 72.0 ft AMSL

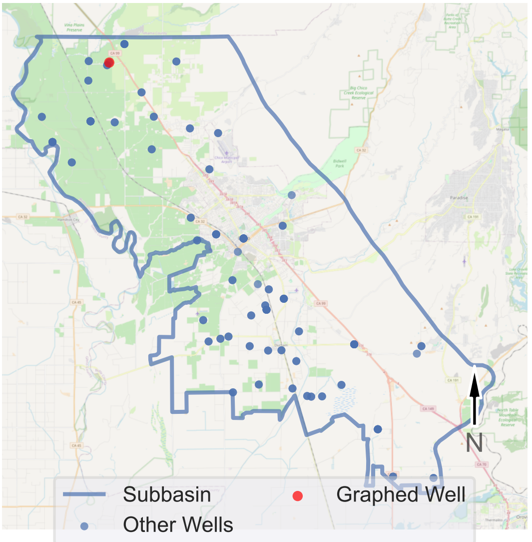
Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.





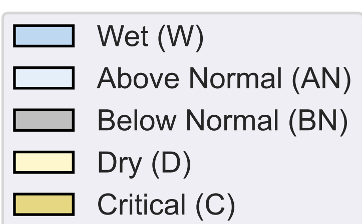
VINA Subbasin - State Well Number (SWN): 23N01W10E001M

Well Location Map

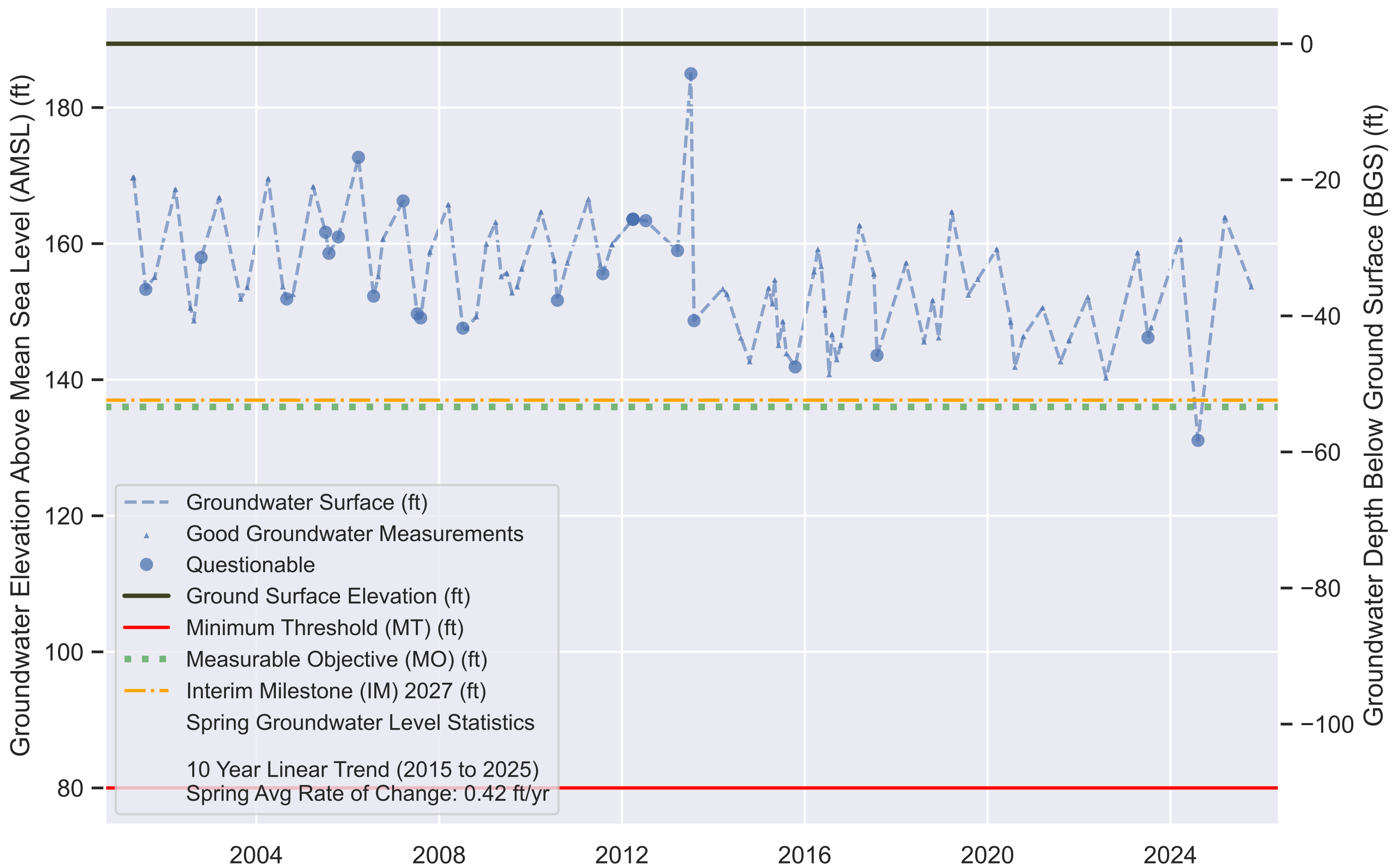


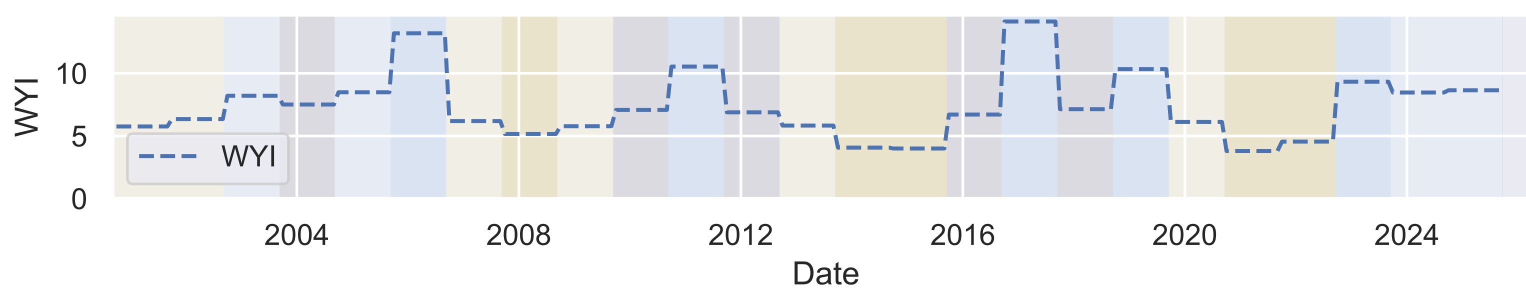
Sustainable Management Criteria:
IM (2027) = 137.0 ft AMSL
MO = 136.0 ft AMSL
MT = 80.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.



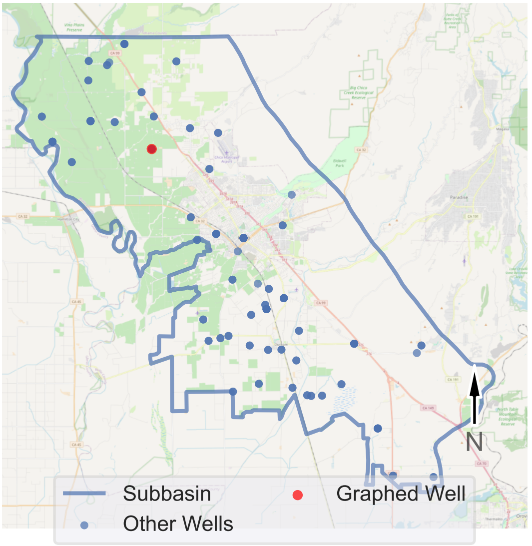
Perforation 1: 600.0 - 668.0 ft BGS





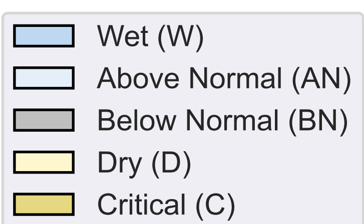
VINA Subbasin - State Well Number (SWN): 23N01W36P001M

Well Location Map

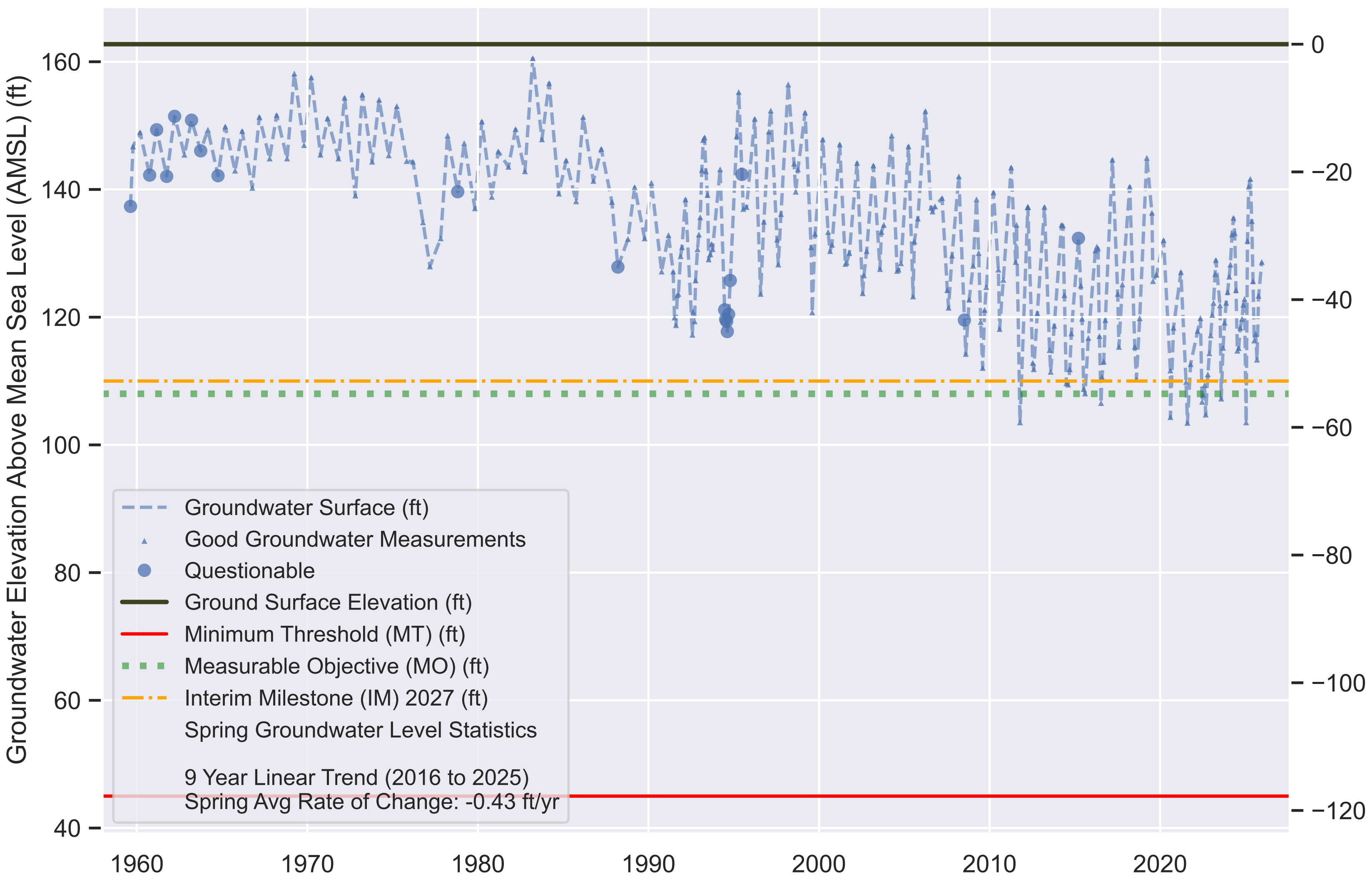


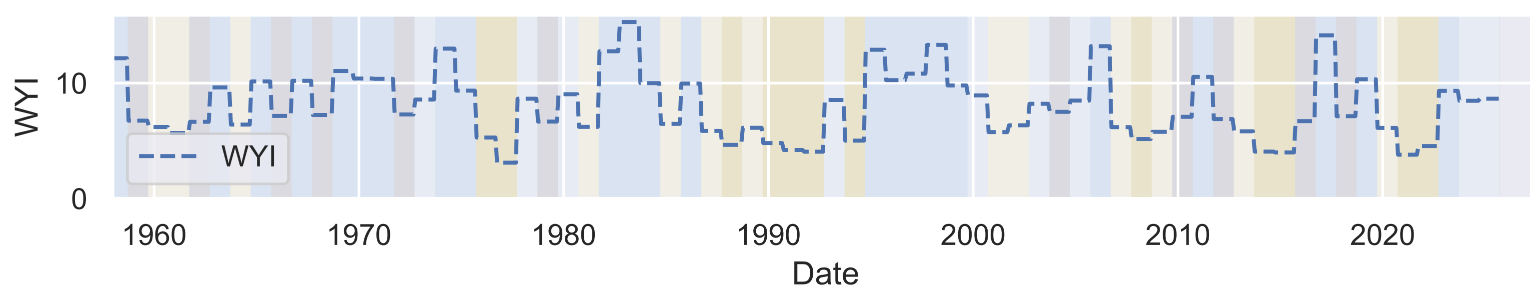
Sustainable Management Criteria:
IM (2027) = 110.0 ft AMSL
MO = 108.0 ft AMSL
MT = 45.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.



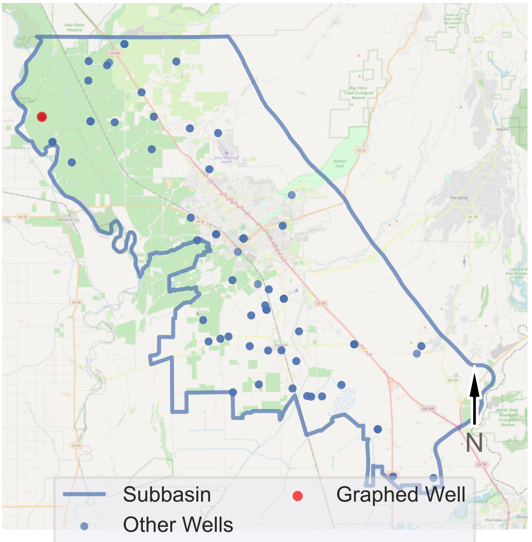
Perforation data not available.

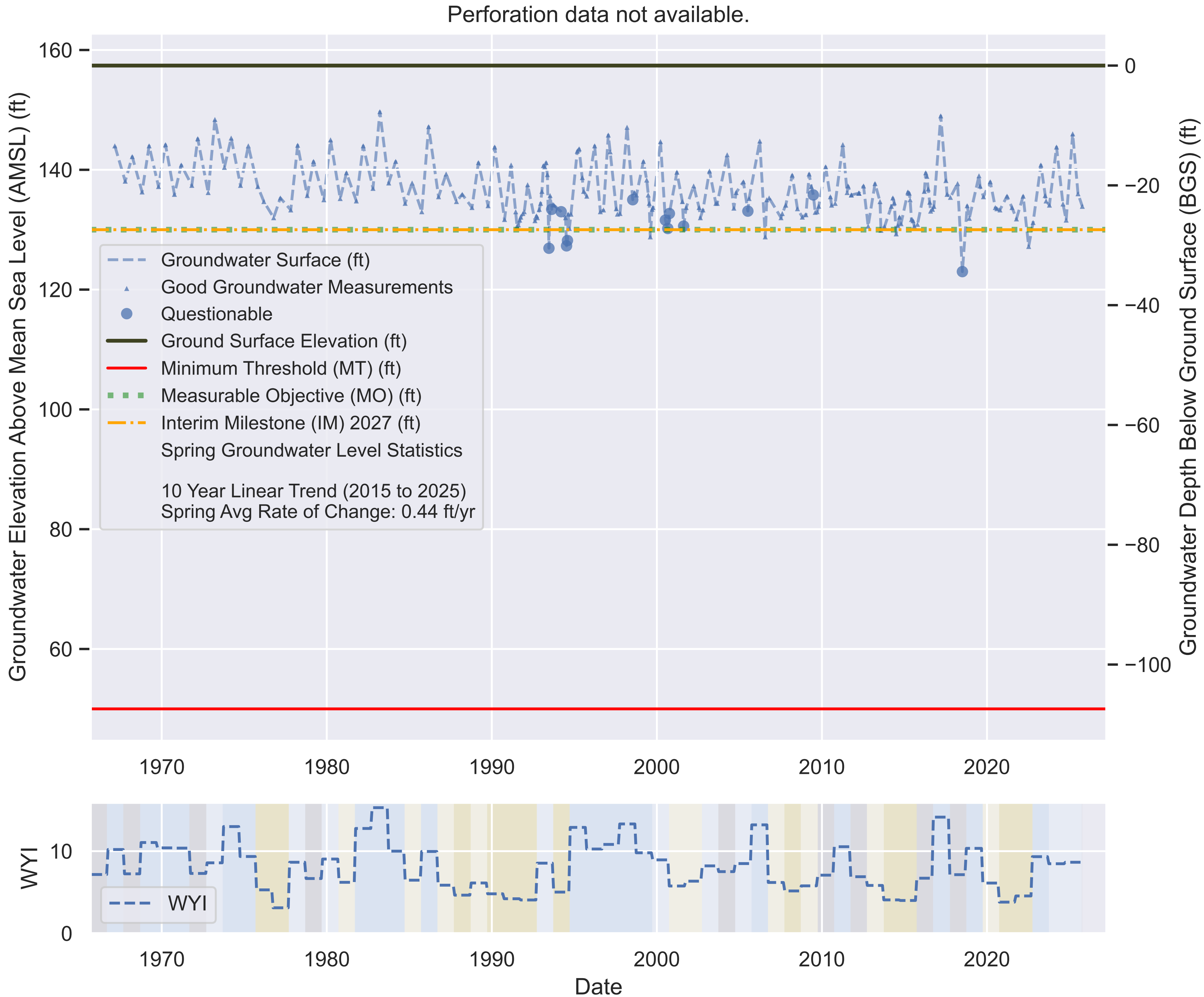




VINA Subbasin - State Well Number (SWN): 23N02W25C001M

Well Location Map





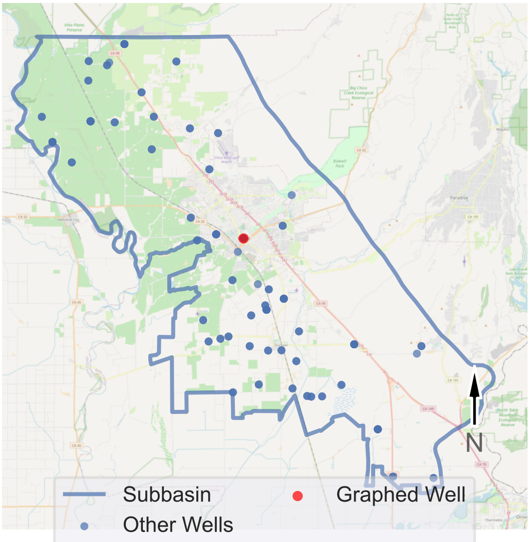
Sustainable Management Criteria:
IM (2027) = 130.0 ft AMSL
MO = 130.0 ft AMSL
MT = 50.0 ft AMSL

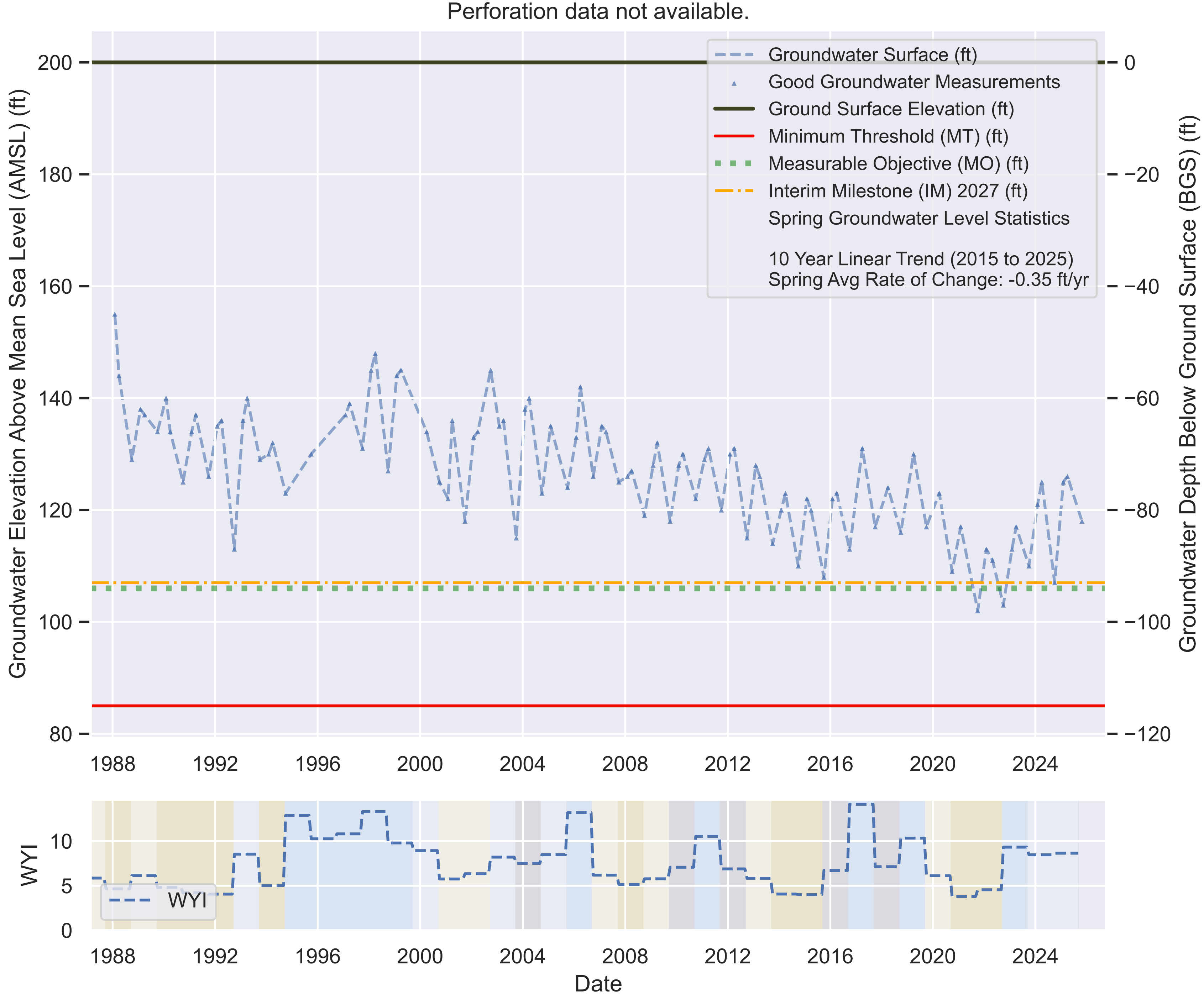
Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)

VINA Subbasin - State Well Number (SWN): CWSCH01b

Well Location Map



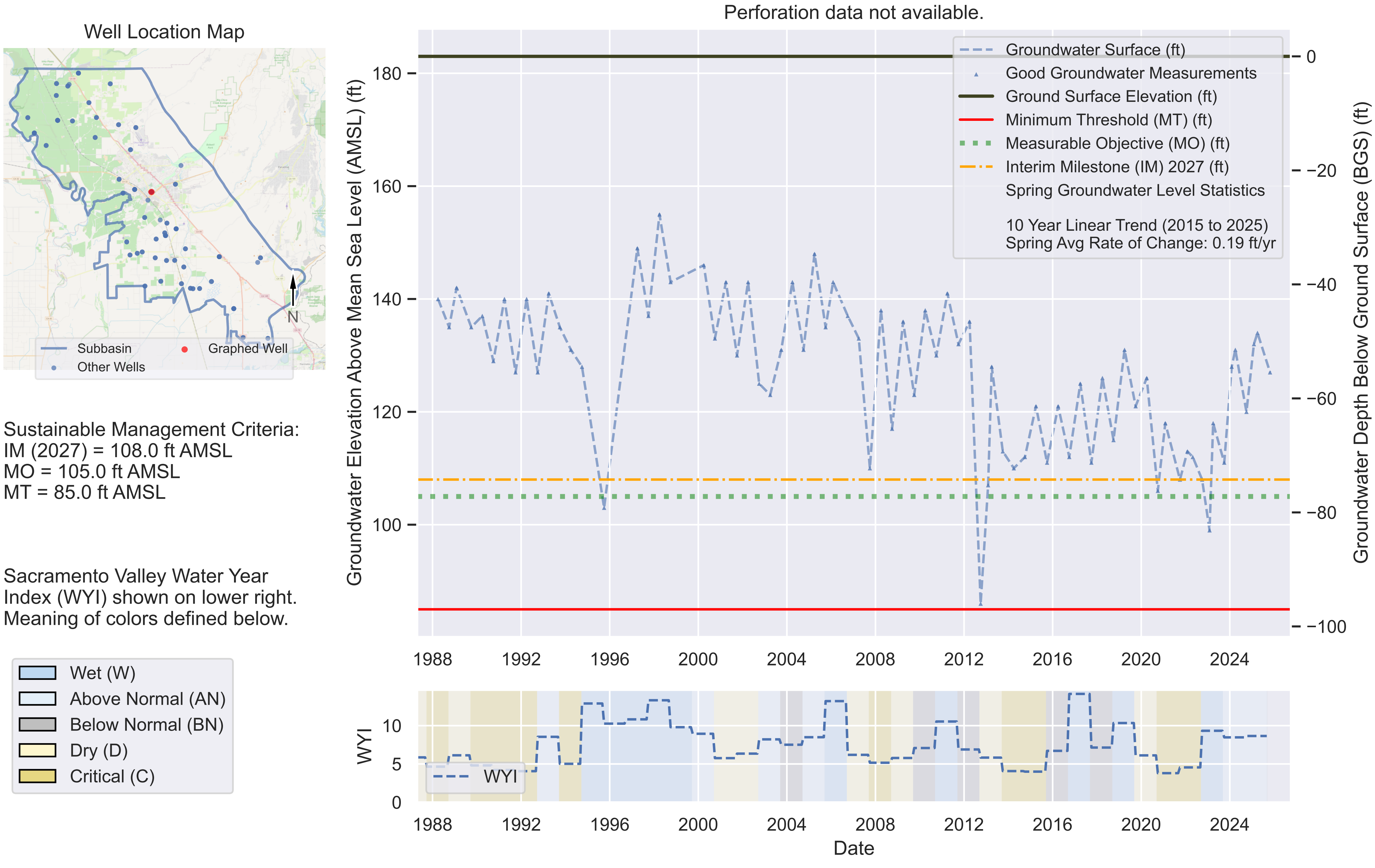


Sustainable Management Criteria:
IM (2027) = 107.0 ft AMSL
MO = 106.0 ft AMSL
MT = 85.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)

VINA Subbasin - State Well Number (SWN): CWSCH02



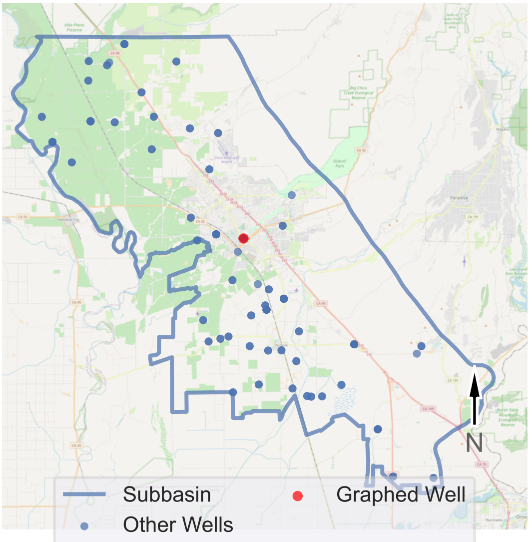
Sustainable Management Criteria:
IM (2027) = 108.0 ft AMSL
MO = 105.0 ft AMSL
MT = 85.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)

VINA Subbasin - State Well Number (SWN): CWSCH03

Well Location Map

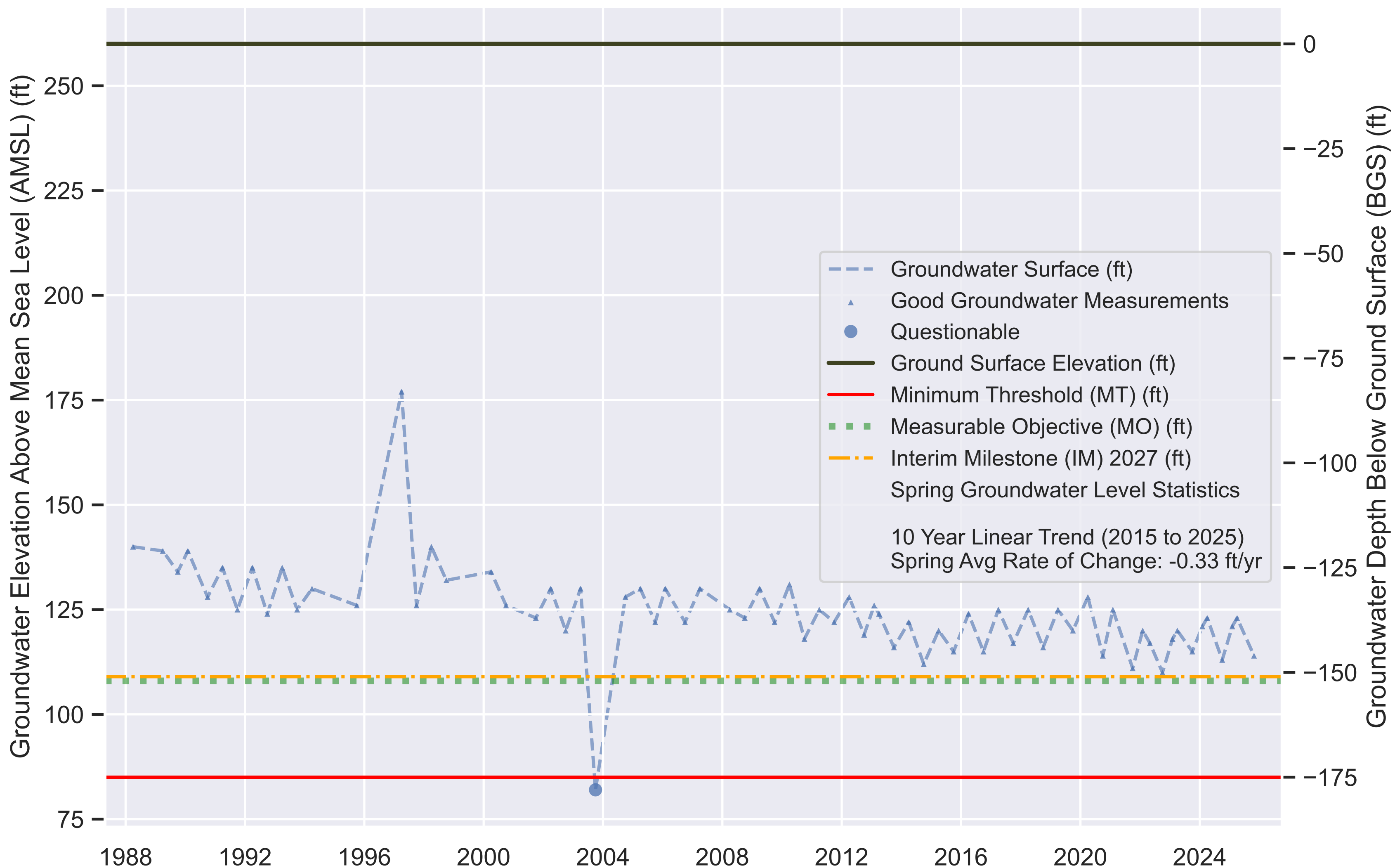


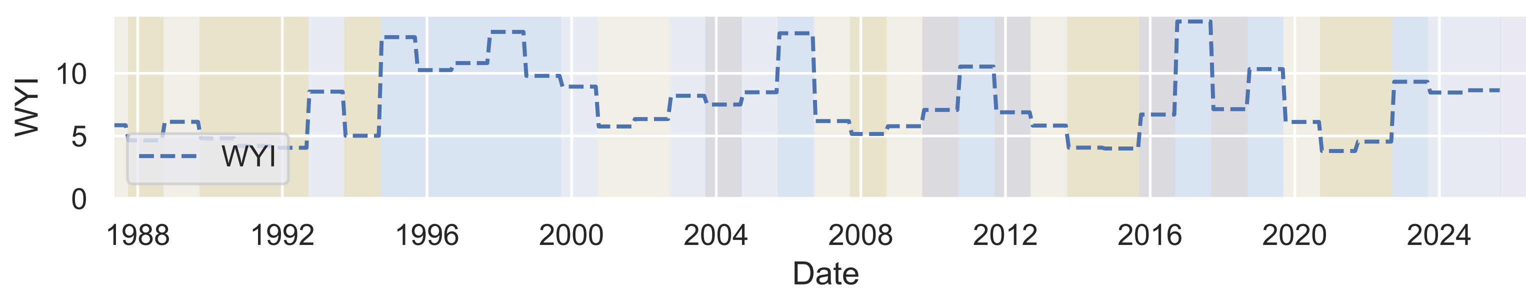
Sustainable Management Criteria:
IM (2027) = 109.0 ft AMSL
MO = 108.0 ft AMSL
MT = 85.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

Wet (W)	
Above Normal (AN)	
Below Normal (BN)	
Dry (D)	
Critical (C)	

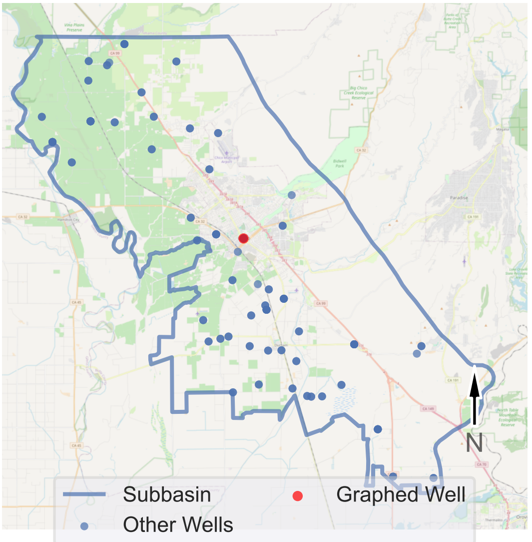
Perforation data not available.

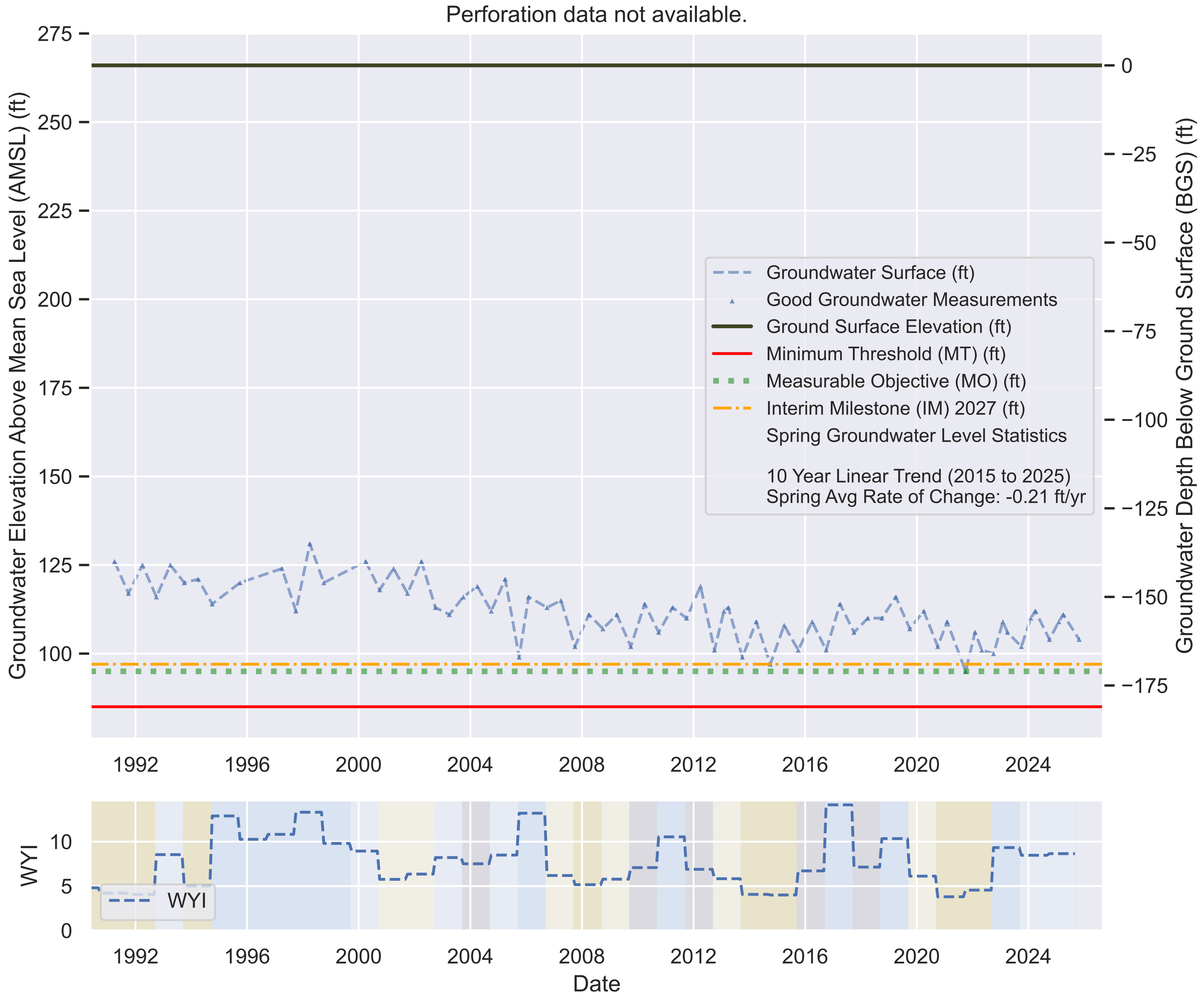




VINA Subbasin - State Well Number (SWN): CWSCH07

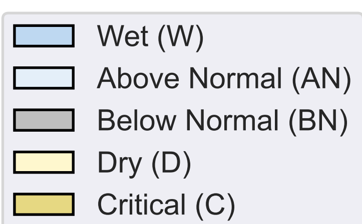
Well Location Map





Sustainable Management Criteria:
IM (2027) = 97.0 ft AMSL
MO = 95.0 ft AMSL
MT = 85.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.



Water Year 2025 Annual Report

Appendix B

Explanation of Sustainable Management Criteria

Appendix B: Explanation of Sustainable Management Criteria

The Sustainable Groundwater Management Act (SGMA) requires a Groundwater Sustainability Plan (GSP) to define Sustainable Management Criteria (SMC) for the groundwater subbasin. The SMC offer guideposts and guardrails for groundwater managers seeking to achieve sustainable groundwater management. SGMA defines sustainable groundwater management as “the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results,” where the planning and implementation horizon is 50 years with the first 20 years spent working toward achieving sustainable groundwater management and the following 30 years (and beyond) spent maintaining it (California Water Code §10721).

“Undesirable Results” are associated with up to six Sustainability Indicators (SI), including groundwater levels, groundwater storage, water quality, seawater intrusion, land subsidence, and interconnected surface water. SGMA defines undesirable results as those having significant and unreasonable negative impacts. Failure to avoid undesirable results on the part of the GSAs may lead to intervention by the State. Once the sustainability goal and undesirable results have been locally identified, projects and management actions are formulated to achieve the sustainability goal and avoid undesirable results.

SI and associated undesirable results, if significant and unreasonable

The associated undesirable results for each SI have been defined similarly across the Butte Subbasin. In turn, the rationale and approach for determining Minimum Thresholds and Measurable Objectives for each SI are the same across the Butte Subbasin.

The terminology for describing SMC is defined as follows:

Undesirable Results – Significant and unreasonable negative impacts associated with each SI.

Minimum Threshold (MT) – Quantitative threshold for each SI used to define the point at which undesirable results may begin to occur.

Measurable Objective (MO) – Quantitative target that establishes a point above the MT that allows for a range of active management to prevent undesirable results.

Margin of Operational Flexibility – The range of active management between the MT and the MO.

Interim Milestones (IMs) – Targets set in increments of five years over the implementation period of the GSP offering a path to sustainability.

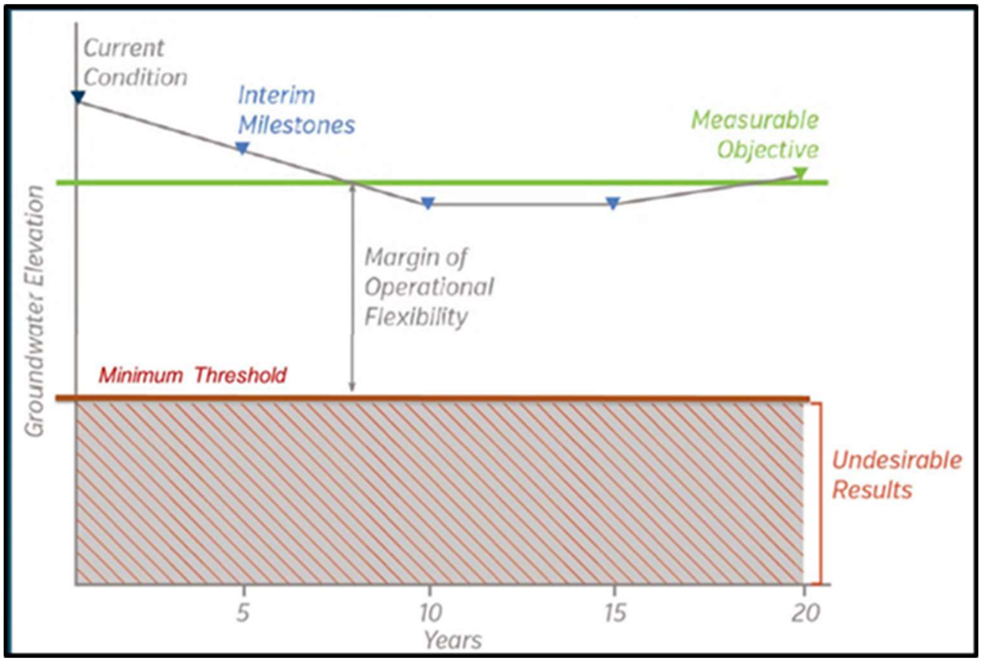


Illustration of Terms Used for Describing Sustainable Management Criteria Using the Groundwater Level SI

The Figure above illustrates these terms for the groundwater level SI.

SI are intended to be measured and compared against quantifiable SMC throughout a monitoring framework of Representative Monitoring Site (RMS) wells. Ongoing monitoring of SI can:

Determine compliance with the adopted GSP

Offer a means to evaluate the effectiveness of projects and management actions over time

Allow for course correction and adaptation in five-year updates

Facilitate understanding among diverse stakeholders

Support decision-making on the part of the GSAs into the future

The SMC for the Butte Subbasin is fully explained and defined in Section 3 of the GSP

available here: https://sgma.water.ca.gov/portal/gsp/preview/98

Water Year 2025 Annual Report

Appendix C

GSP Annual Reporting Elements Guide

Groundwater Sustainability Plan Annual Report Elements Guide

Basin Name			
GSP Local ID			
California Code of Regulations - GSP Regulation Sections	***Groundwater Sustainability Plan Elements***	**Document *page number(s) that address the applicable GSP element.***	***Notes: Briefly describe the GSP element does not apply.***
Article 5	**Plan Contents**		
Subarticle 4	***Monitoring Networks***		
§ 354.40	**Reporting Monitoring Data to the Department**		
	Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.	37-39	
	Note: Authority cited: Section 10733.2, Water Code. Reference: Sections 10728, 10728.2, 10733.2 and 10733.8, Water Code.		
Article 7	**Annual Reports and Periodic Evaluations by the Agency**		
§ 356.2	**Annual Reports**		
	Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:		
	(a) General information, including an executive summary and a location map depicting the basin covered by the report.	5-16	
	(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:		
	(1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:		
	(A) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.	17-20	
	(B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.	21; 45-65	
	(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.	21-24	
	(3) Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.	25	
	(4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.	25-26	
	(5) Change in groundwater in storage shall include the following:		
	(A) Change in groundwater in storage maps for each principal aquifer in the basin.	26-31	
	(B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.	28	
	(c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.	32-43	

Water Year 2025 Annual Report

Appendix D

DWR Upload Tables

A. Groundwater Extractions

Total Groundwater Extractions (AF)	Water Use Sector Urban (AF)	Water Use Sector Industrial (AF)	Water Use Sector Agricultural (AF)	Water Use Sector Managed Wetlands (AF)	Water Use Sector Managed Recharge (AF)	Water Use Sector Native Vegetation (AF)	Water Use Sector Other (AF)	Water Use Sector Other Description
261,600	18,400	0	240,200	0	0	0	3,000	Rural Residential

B. Groundwater Extraction Methods

Meters Volume (AF)	Meters Description	Meters Type	Meters Accuracy (%)	Meters Accuracy Description	Electrical Records Volume (AF)	Electrical Records Description	Electrical Records Type	Electrical Records Accuracy (%)	Electrical Records Accuracy Description	Land Use Volume (AF)	Land Use Description	Land Use Type	Land Use Accuracy (%)	Land Use Accuracy Description	Groundwater Model Volume (AF)	Groundwater Model Description	Groundwater Model Type	Groundwater Model Accuracy (%)	Groundwater Model Accuracy Description	Other Method(s) Volume (AF)	Other Method(s) Description	Other Method(s) Type	Other Method(s) Accuracy (%)	Other Method(s) Accuracy Description
18,400	Metered Municipal Wells	Direct	5-10 %	Metered connection maintained by California Water Service and Durham Irrigation District.	0					240,200	Land use estimates were derived from crop mapping and CropScape survey results	Estimate	20-30 %	Typical uncertainty for water balance calculation	0					3,000	Rural residential groundwater extraction is estimated based on California Water Service Company's 2020 Urban Water Management Plan 2020 usage of an average per capita water use of 181 gallons per capita per day. Population data from the 2020 census was coupled with water district boundary data to identify total population not serviced by municipal supplies	Estimate	10-20 %	Uncertainties are from population estimates and gallon per capita per day estimates

C. Surface Water Supply

Total Surface Water Supply (AF)	Methods Used To Determine	Water Source Type Central Valley Project (AF)	Water Source Type State Water Project (AF)	Water Source Type Colorado River Project (AF)	Water Source Type Local Supplies (AF)	Water Source Type Local Imported Supplies (AF)	Water Source Type Recycled Water (AF)	Water Source Type Desalination (AF)	Water Source Type Other (AF)	Water Source Type Other Description
25,800	Diversions for local supplies are estimated based on historic State Water Resource Control Board eWRIMS (Electronic Water Rights Information Management System) data for total diversions. Surface water delivery estimates are based on historic deliveries in the area that have occurred in dry and critical years	0	0	0	25,800	0	0	0	0	

D. Total Water Use

Total Water Use (AF)	Methods Used To Determine	Water Source Type Groundwater (AF)	Water Source Type Surface Water (AF)	Water Source Type Recycled Water (AF)	Water Source Type Reused Water (AF)	Water Source Type Other (AF)	Water Source Type Other Description	Water Use Sector Urban (AF)	Water Use Sector Industrial (AF)	Water Use Sector Agricultural (AF)	Water Use Sector Managed Wetlands (AF)	Water Use Sector Managed Recharge (AF)	Water Use Sector Native Vegetation (AF)	Water Use Sector Other (AF)	Water Use Sector Other Description
287,400	Methods used are a combination of estimates based on land use and population/ per capita water use, metered municipal water use, and estimates based on historic water rights data for dry and critical years	261,600	25,800	0	0	0		18,400	0	266,000	0	0	-	3,000	Rural Residential

Water Year 2025 Annual Report

Appendix E

Water Use Analysis Methodology

TECHNICAL MEMORANDUM

To: Luhdorff and Scalmanini Consulting Engineers

From: Davids Engineering, Inc.

Date: March 3, 2025

Subject: **Water Use Analysis Methodology**

1 Introduction

Pursuant to the Groundwater Sustainability Plan (GSP) regulations (23 CCR[1] Section 356.2), the GSP Annual Report for the Butte Subbasin (Subbasin) includes quantification of water supplies and water uses in the reporting year, including groundwater extraction by water use sector[2]. Water supplies and water uses in the Subbasin have been quantified based on the best available data sources and information, either collected from measured records or estimated where necessary.

While some groundwater extraction in the Subbasin is measured, most groundwater extraction is unmeasured, including extraction from privately owned wells. For the Butte Subbasin Annual Report (Annual Report), the approach used to estimate unmeasured groundwater extraction for the agricultural water use sector is referred to as the Groundwater Extraction Estimates from Earth Observations (GEEEO) process. In this approach, a spatial water use analysis is computed on a monthly basis using current land use data, climate conditions (e.g., precipitation and evapotranspiration), crop water demands, and other local information, allowing for estimation of total water use and estimated groundwater extraction, after accounting for the use of other available water supplies.

This approach differs from the water budget methodology used in GSP development, where the Butte Basin Groundwater Model (BBGM) was used to generate historical, current, and projected water budgets for the Subbasin. The shift toward the GEEEO process is due to the time and cost constraints associated with updating the GSP groundwater model annually. Despite this change, key inputs and results from the GEEEO process have been compared with those of the GSP groundwater model to ensure consistency in the water use analyses.

This technical memorandum (TM) describes the methodology and data sources used in the GEEEO process. Results of the GEEEO process are documented in the Annual Report.

[1] California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2. Groundwater Sustainability Plans.
[2] Water use sectors are identified in the GSP Regulations as “categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation” (23 CCR Section 351(al)).

2 GEEEO Process and Computational Approach

2.1 Computational Approach

The GEEEO process utilizes available geospatial data and information to quantify water use, including groundwater extraction volumes, spatially across the Subbasin:

1. First, geospatial evapotranspiration (ET) information at a pixel-scale is used to quantify the total consumptive water use and total applied water requirements during a given time period in a given area of the Subbasin, and geospatial land use information is used to help identify where irrigation water may have been applied (i.e., whether the area in question features irrigated agricultural land, versus idled land or undeveloped vegetation).
2. After quantifying total applied water requirements, available surface water supply and groundwater extraction data is incorporated into the GEEEO process by distributing that water out to specific regions where that water is applied (e.g., irrigated lands in surface water supplier service areas).
3. The remaining groundwater extraction needed to meet applied water demands is then calculated based on the difference between total applied water requirements and available water supply information, with consideration for effective precipitation.
4. Finally, the pixel-scale results can then be aggregated to the desired spatial or temporal domains of interest.

The result is a spatially distributed water use analysis calculated with a finer spatial resolution than was possible in the GSP water budgets. The pixel-scale water budget results provide greater insight into where water use occurs in the Subbasin and are configurable to create water use summaries for any region of the Subbasin. Additional details about the GEEEO computational approach are provided in Attachment A, generally following the process described in Hessels et al. (2022).

2.2 Spatial Resolution

GEEEO quantifies water use and groundwater extraction volumes with pixel-scale resolution (30 meters (m) x 30 m), corresponding to the spatial resolution of satellite imagery used in developing many of the GEEEO inputs. For those inputs that are not available at the 30 m x 30 m resolution, available data and information is distributed as averages over the area where that information is applicable (e.g., district-reported surface water deliveries are distributed as an average acre-feet per acre (AF/ac) over irrigated lands in that district's service area[3]). Additional information about the spatial resolution of specific data sources is provided in Section 3.

The fine spatial resolution of the GEEEO inputs and computations allows for highly configurable GEEEO results summaries. For the Annual Report, results are summarized by subregions that are defined to roughly correspond with the boundaries of the water budget regions in the GSP groundwater model, with distinction between water districts, managed wetlands and refuge areas, and out-of-district lands.

[3] Future refinements to the GEEEO process could potentially incorporate field-scale surface water delivery records to improve spatial detail of results rather than equally distributing surface water deliveries across the irrigated lands within the district's service area.

2.3 Period and Timestep

For each Annual Report, the GEEEO process operates from 2016 through the current reporting year[4] on a monthly timestep, although only the results from the current reporting year are included in the Annual Report. The period and timestep are set according to data availability and reporting needs. However, the GEEEO process is configurable to operate on different timescales (e.g., daily or weekly). The start year is currently limited by the availability of geospatial ET information from OpenET, although further historical ET information is expected to be available in the near future.

3 Data Sources

The GEEEO process uses data sources and information that capture the unique, local conditions within the Subbasin to the extent available. Details about the data and information used in the GEEEO process are described below.

3.1 Evapotranspiration

ET, or consumptive water use, is the major driver of water use in the Subbasin, particularly agricultural use. In this context, consumptive water use is defined as "*the part of water withdrawn that is evaporated, transpired, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from the immediate water environment*" (ASCE, 2016). Unlike surface runoff or infiltration of water into the groundwater system (through seepage, deep percolation, managed recharge, or other means), ET is water that cannot be recovered or directly reused in the Subbasin.

In the GEEEO process, ET is quantified from satellite-based remote sensing analyses available from OpenET. OpenET is a multi-agency web-based geospatial information system (GIS) utility that quantifies ET over time with a spatial resolution of 30 m x 30 m (approximately 0.22 acres). OpenET information is available in raster coverages of the Subbasin on both a daily and monthly timestep from 2016 through present.[5] The GEEEO process utilizes monthly rasters of the ensemble ET from OpenET to calculate total water use for the Annual Report.

While OpenET is a new utility, the underlying methodologies to quantify ET apply a variety of well-established modeling approaches that are widely used in government and research applications. The OpenET modeling approaches are also similar to the approaches used to quantify ET in the GSP groundwater model. Additional information about the OpenET team, data sources, and methodologies are available at: https://openetdata.org/.

3.2 Land Use

Areas in each water use sector in the Subbasin were identified using the most recent and reliable spatial land use data in the region, including:

1. Statewide crop mapping, available from the California Department of Water Resources (DWR) (DWR, 2024)

---

[4] Annual Reports are required to be submitted by April 1 each year following the adoption of the GSP. The current reporting year for each Annual Report is the preceding water year (i.e., October 1 through September 30)

[5] OpenET raster information is typically available within about one month after the period has ended.

2. CropScape Cropland Data Layer coverage, available from the United States Department of Agriculture (USDA, 2024).

Land use data from these sources were compiled into 30 m x 30 m raster coverages of the Subbasin. To prepare the GEEEO process inputs, DWR data, which includes extensive ground-truthing review of results, is preferentially used to identify agricultural land (including irrigated and non-irrigated lands) and urban areas, and then USDA data is utilized to back-fill gaps of non-irrigated, idled, and non-developed land in the Subbasin. Local refinements are also applied, as needed, to account for local land use information.

These land use data sources and applications were similar to those used in development of the GSP water budgets. Comparisons were made to evaluate the consistency of the datasets and with earlier land use analyses; good correspondence was found for the major land use classes found in the Subbasin.

DWR data is typically available in provisional form approximately two years after a given year has passed. USDA data is typically available for the prior year in early- to mid-February. When data for the current reporting year is not yet available, raster coverages of the Subbasin are generally assembled utilizing land use data from the most recent, hydrologically similar year (i.e., similar water supply conditions and similar cropping patterns, to the extent possible). Idling of annual and ponded crops in a given year may also be locally refined through comparison with USDA data for the current reporting year or through an analysis of vegetation coverage in the current reporting year. However, it is noted that land use data is only used in the GEEEO process to identify areas in each water use sector where water is applied. The total water use for lands in the agricultural and managed wetlands water use sectors are determined through an analysis of OpenET data, regardless of the precise land use classification.

3.3 Precipitation

Spatial precipitation estimates were extracted from the Parameter-elevation Regressions on Independent Slopes Model (PRISM), developed by the PRISM Climate Group at Oregon State University. PRISM quantifies spatial precipitation estimates, among other climate parameters, based on available weather station data and modeled spatial relationships with topography and other factors influencing weather and climate.

PRISM data is available in raster coverages of the Subbasin on both a daily and monthly timestep, with a spatial resolution of 4 kilometer (km) x 4 km. The GEEEO process utilizes monthly rasters for the Annual Report analysis, and the precipitation results for each 4 km pixel are applied to each of the 30 m pixels within it (i.e., downscaled) for which ET and land use data are available. Additional information about the PRISM data and methodologies are available at: https://prism.oregonstate.edu. PRISM precipitation data is consistent with the historical precipitation inputs to the GSP groundwater model.

To calculate effective precipitation and, subsequently, evapotranspiration from precipitation (ETPR), PRISM precipitation data, estimated crop rooting depths, and soil property information are used as inputs. Estimated rooting depths are taken from the ranges listed in Appendix B of ASCE 70 (2016). For crops not listed in ASCE 70, rooting depths are based on the rooting depths of similar crops and professional judgement. Relevant soil properties include total soil depth, depth to restrictive layer, and available water holding capacity. Estimated soil properties are aggregated from the USDA soil survey geographic database (SSURGO) (Soil Survey Staff, 2025). ETPR is computed using the input parameters (soil, precipitation, and rooting depth) and either the U.S. Bureau of Reclamation (USBR) method (Stamm, 1967) or the National Engineering Handbook Part 623 method (USDA, 1993), depending on local data availability, results, and conditions. For the USBR method, the effective precipitation bins have been modified from the original bins outlined in the USBR method documentation to match regional hydrology patterns..

3.4 Local Water Supply Data

As described in Section 2, available surface water supply and groundwater extraction data is incorporated into the GEEEO process to quantify the amount of known water supply available, prior to estimating the remaining groundwater extraction needed to meet demand. Where field-scale delivery measurements are available, the water supply volume delivered was distributed evenly across all irrigated areas of that field. Where field-scale delivery measurements are not available and only diversion volumes or aggregated delivery volumes for a larger area are available, water supply data is distributed evenly over the area where that water can be delivered for irrigation (e.g., average AF/ac over lands where that water is available for use).

Surface water supply and groundwater extraction data are collected from both publicly available and local sources. Information gathered may include, where applicable:

1. Water supply contract delivery records, from the United States Bureau of Reclamation (USBR), State Water Project (SWP), or other publicly available sources as applicable.
2. Water rights diversions records, from the State Water Resources Control Board (SWRCB) through the Electronic Water Rights Information Management System (eWRIMS)
3. Data requests to local water agencies and water users, requesting surface water diversions, surface water deliveries, surface water outflows, groundwater pumping records, or other available water use data. At the most detailed possible level, these include field-scale volumetric delivery measurements taken by Water or Irrigation District water operators, as required per the Water Conservation Act of 2009.

In cases where current surface water data is not available, general information on surface water inflows and outflows may be gathered from other local sources as available (e.g., Agricultural Water Management Plan water budgets). More information about surface water data sources is described in the Annual Report.

While groundwater extraction data is not available in many parts of the Subbasin, local data is requested each year so that new data can be incorporated into the GEEEO process as it becomes available. It is noted that while groundwater extraction for municipal water supply systems is generally reported for urban areas in the Annual Report based on SWRCB and locally provided data, groundwater extraction for municipal areas is not directly included in the GEEEO process due to underlying differences in how the majority of water is used in urban areas. This also applies to estimates of rural residential groundwater use (e.g., domestic water use pumped through private domestic wells) outside of urban areas. The data sources and approaches used to quantify municipal and rural residential groundwater extraction are described in the Annual Report.

3.5 Other Agronomic Data

Other agronomic and climate-related data that is incorporated into the GEEEO process includes:

1. Representative consumptive use fractions for crops (i.e., fraction of total applied water that is consumed through ET). Values are based on typical irrigation methods and efficiencies for crops.
2. Conveyance system fractions for subregions (i.e., fraction of diverted water that is delivered, accounting for losses).
3. Reuse fractions for subregions (i.e., fraction of delivered water that is reused).

Information gathered from local sources is used where available, otherwise representative values for agronomic practices in the region are used.

4 References

American Society of Civil Engineers (ASCE). 2016. ASCE Manuals and Reports on Engineering Practice No. 70, Evaporation, Evapotranspiration, and Irrigation Water Requirements (Second Edition).

California Department of Water Resources (DWR). 2024. Provisional 2022 Statewide Crop Mapping GIS Data, Updated January 2024. Available at: https://data.cnra.ca.gov/dataset/statewide-crop-mapping.

Hessels, T., Davids J. C., and Bastiaanssen W. 2022. Scalable Water Balances from Earth Observations (SWEO): Results from 50 Years of Remote Sensing in Hydrology. Water International, 47(6), 866-886.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database for California. Available online. Accessed January 15, 2025.

Stamm, G.G. (1967). Problems and Procedures in Determining Water Supply Requirements for Irrigation Projects. In Irrigation of Agricultural Lands (eds R.M. Hagan, H.R. Haise and T.W. Edminster). https://doi.org/10.2134/agronmonogr11.c45

United States Department of Agriculture (USDA). 2024. CropScape – 2023 Cropland Data Layer, Released January 2024. Available at: https://nassgeodata.gmu.edu/CropScape/.

United States Department of Agriculture (USDA); National Agricultural Statistics Service (NASS). 2024. 2023 Nationwide Crop Mapping GIS Data, Released January 31, 2024. Available at: https://croplandcros.scinet.usda.gov/.

United States Department of Agriculture (USDA). 1993. National Engineering Handbook (NEH). Chapter 2, part 623, Irrigation water requirements. Washington, D.C.: U.S. Dept. Of Agriculture, Soil Conservation Service.

Attachment A. GEEEO Computational Approach Details

Figures A-1 and A-2, below, present a schematic of the GEEEO computational approach as it has been developed and is being generally applied to support Annual Report Development.

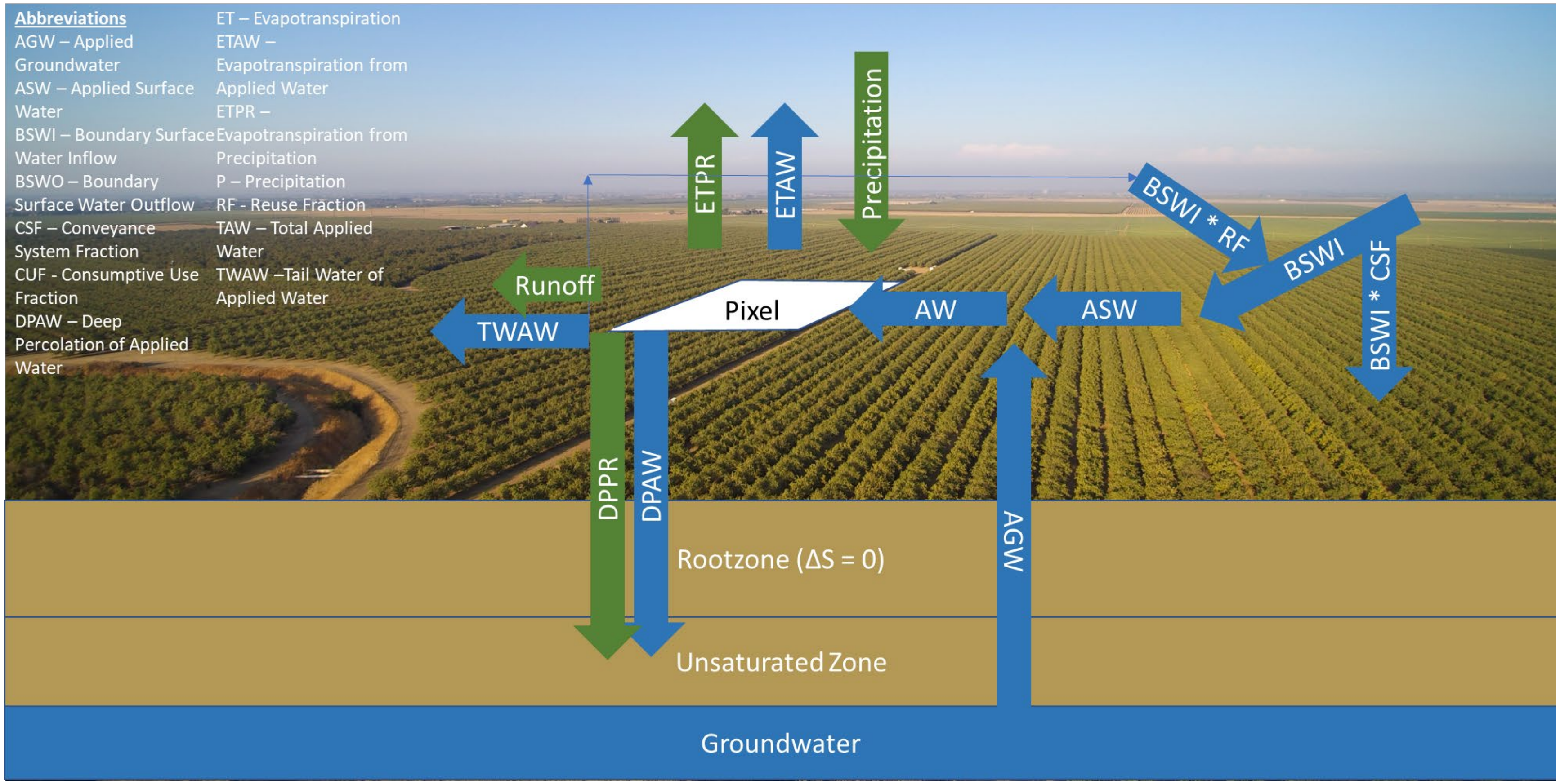


Figure A-1. Inflows and Outflows to Each 30 m x 30 m Pixel in the GEEEO Process.

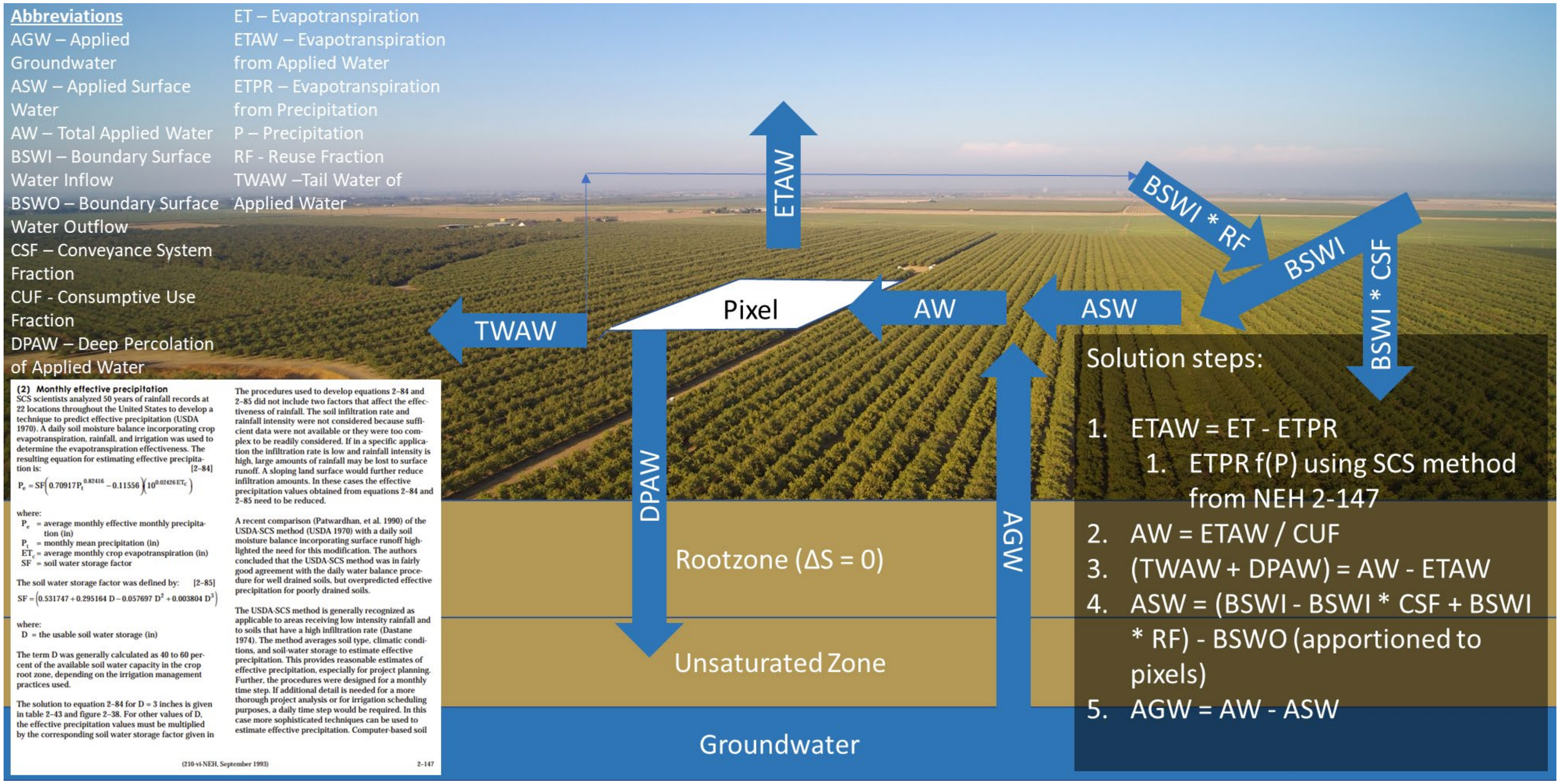


Figure A-2. Solution Steps for Calculating Applied Groundwater (AGW) in Each 30 m x 30 m Pixel in the GEEEO Process.

Water Year 2025 Annual Report

Appendix F

Water Quality

Water and Resource Conservation Kamela Loeser, Director

308 Nelson Avenue
Oroville, California 95965

T: 530.552.3595
F: 530.538.3807

buttecounty.net/waterresourceconservation
bcwater@buttecounty.net

TECHNICAL MEMORANDUM

2025 Groundwater Quality Trend Monitoring Program Results

Prepared by: Kelly Peterson, Water Resources Scientist, Department of Water and Resource Conservation

Background and Purpose

The Butte County Department of Water and Resource Conservation (WRC) continued its groundwater quality trend monitoring within the County in August of 2025to provide information on groundwater quality conditions for salinity, measured as specific conductivity (SC). Conductivity is a basic groundwater quality characteristic to evaluate a subbasin for evidence of saline intrusion: as conductivity increases, salinity increases. Conductivity measures the ability of water to pass an electrical current, such as those from dissolved ions i.e. salts and other inorganic chemicals. Overtime with regular measurements, comparisons to baseline conditions can show trends in changing conditions.

Originally required by Chapter 33A, the Basin Management Objective Program, ran by the County has been monitoring wells for evidence of saline intrusion since 2001. In 2014, SGMA required Groundwater Sustainability Agencies (GSAs) to develop and submit Groundwater Sustainability Plans (GSPs) to the California Department of Water Resources (DWR) by 2022. The Butte, Vina and Wyandotte Creek Subbasin GSPs include a conductivity monitoring plan to avoid groundwater quality degradation (Davids, 2021; Geosyntec Consultants, Inc., 2021a; Geosyntec Consultants, Inc., 2021b). With the onset of SGMA, Chapter 33A was sunset in 2019, however the Department continues to conduct the Groundwater Quality Trend Monitoring Program to support the GSAs with their monitoring needs and to fulfill the program's original objectives of:

- Establishing a baseline of information to reveal trends over time of Butte County groundwater quality. Measurements taken serve as initial indicators of changes in water quality that may warrant further investigation or testing.

- Ensuring that groundwater resources are well managed by documenting the quality of local groundwater. Availability and distribution of this information will be a useful educational tool.

The purpose of this memo is to summarize the groundwater quality conditions for salinity, measured as specific conductance in the Butte, Vina and Wyandotte Creek Subbasins during the fourth year (2025) of groundwater quality monitoring related to their respective Groundwater Sustainability Plans (GSPs) per the Sustainable Groundwater Management Act (SGMA) of 2014.

The network of wells changed significantly in 2022 as a result of the GSPs. The redefined network targeted inclusion of deep wells (where available) within each subbasin to track the migration of connate water upwelling from deep portions of the aquifer.

Conductivity is affected by temperature and increases as water temperatures increase. The terms "specific" and "electrical" conductivity are often used interchangeably in the literature to report the same measurement, however; specific conductivity refers to conductivity measured with a temperature compensation factor and standardized to 25°C. Electrical conductivity (EC) however, generally refers to measurements that are not standardized to a specific temperature, unless specified. The equipment that has been used to measure groundwater conductivity measurements by the WRC since 2022 reports values as SC.

Salinity is the only water quality constituent for which sustainable management criteria (SMC) goals were set in all three subbasins and is measured in the field as SC. Each subbasin specifically defines how conductivity measurements are reported as related to the SMC in each respective GSP. In the Vina, and Wyandotte Creek Subbasins, specific conductivity is identified for the SMC, while in the Butte Subbasin GSP electrical conductivity is identified for the SMC. For the Butte Subbasin, these measurements can therefore be reported as EC @ 25°C for comparison to their SMC.

Methodology

Conductivity measurements are taken at each monitoring well once per year. The wells are typically measured within the month of August during the peak of the irrigation season.

In 2021, the Department purchased a Solinst 107 temperature, level and conductivity (TLC) meter which includes a probe that measures SC in microsiemens (µs) / centimeter (cm), as well as temperature and water level (similar to an electric sounder) on a 1,000-foot-long laser-marked flat tape with markings every 1/100th ft. This meter has been used since 2022 to conduct conductivity monitoring at various depths within the monitoring wells. The Solinst SC meter is only lowered in wells without pumping equipment i.e. observation wells, in order to avoid potential damage to the equipment through entanglement in the wiring or pumps.

At the beginning of each monitoring day the meter was calibrated with known standard solutions according to the manufacturer's specifications. At each site, the probe is lowered to the water surface and a depth to water measurement is recorded. It is then lowered to the midpoint of each screened interval(s) within the well to record the conductivity of the water entering the well from that portion of the aquifer. In prior reports (2022 and 2023), conductivity measurements from each screened interval were depicted in the graphs. Since 2024, the average of the conductivity measurements collected at the midpoint of every screened interval within each well is displayed in the graphs, unless there are variances in where measurements were recorded. For example, if one of the measurements was not taken within a screened interval due to limits of the equipment (i.e the length of the tape the SC probe is attached to was too short to reach a screened interval) the data taken outside of the screened interval was not included in reported average and is noted as such in the graphs. If not all measurements were able to be taken within the screened intervals for other reasons such as obstructions within the well preventing the equipment from reaching the screened depths, the measurements were deemed as questionable measurements and depicted as such in the graphs.

For most of the remaining wells in the monitoring network with pumps, the Solinst probe was used in the field to measure a water sample collected from a spigot or sprinkler after the well was purged of standing water by pumping it for at least 20 minutes. One exception, well 19N01W28A001M located in the Glenn County portion of the Butte Subbasin was measured with a Hach Sension 156 meter by Glenn County staff after being purged; however it was only pumped for 10 minutes before the sample was collected to measure.

Some water quality monitoring sites do have intermittent conductivity data collected by other entities, however most sites do not. Data in the graphs referred to as "Other Data" or "Historic SC" reflects any other SC data located for the well and is sourced from a variety of entities including DWR's 2020 Northern Sacramento Valley Groundwater Quality Assessment (DWR, 2020), data retrieved from DWR's Water Data Library (WDL) website (DWR, 2025) and data provided by DWR's Northern Region Office Water Quality Section where available. Methodologies of how these measurements were collected vary; however in cases where data included both field and lab conductance values on the same date, the average of the two is reported; most variance of the two values is minimal (under 50 µs/cm) with only one well reporting a variance of about 225 µs/cm.

Monitoring Network

The GSPs define the groundwater quality monitoring Representative Monitoring Site (RMS) well networks to include wells distributed spatially throughout the Subbasins, focusing on the inclusion of wells screened deep enough to capture changes in conductivity in the deeper portions of the aquifer, where any changes in conductivity would be expected to be detected first. There are however a few shallower wells within the network, due to a lack of deeper wells available. Modifications to the networks have been made including the removal and addition of wells for various reasons as described in more detail below and in **Table 1.**

In 2025, the overall revised monitoring network in the Vina Subbasin included seven RMS wells as identified in the GSP. One RMS well, 28J005 was removed from the network in 2024 due to an obstruction preventing the equipment from reaching the mid-point of the screening interval to measure conductivity. Based on field observations, and a video logging survey conducted by DWR in 2025, well 28J005, drilled in 1955, has filled in with sediment approximately 600 feet above the first screened interval.

In 2025, the overall revised monitoring network in the Butte Subbasin included seven RMS wells as identified in the GSP and one additional new well added to the network in 2024. One deep multicompletion well, 20N01E18L001M, an extensometer site used to monitor potential inelastic subsidence was removed from the network in 2024 due to obstructions from the extensometer elements preventing the equipment from reaching the mid-point of the deepest screening interval to measure conductivity. This obstruction was confirmed from a video logging survey conducted by DWR in 2023. Another multi-completion well at the same location, 20N01E18L002M measuring the intermediate zones of the aquifer, was added to the network in 2024 and measured without issue; however in 2025, this well had sediment preventing the equipment from reaching the deepest screened interval in the well. The sediment obstruction was confirmed from a video logging survey conducted by DWR in 2025.

In 2025, the overall revised monitoring network in Wyandotte Creek Subbasin included two RMS wells as identified in the GSP; 18N04E08M001M and 18N04E19D001-3M. As depicted in **Table 1.** four RMS wells identified in the GSP were removed from the monitoring network for the following reasons:

- Two RMS wells were removed from the network per the request of the landowners, 28L001M in 2022 and 16Q001M in 2023.
- RMS well 13B002M was removed from the monitoring network in 2022 due to an inoperable pump.
- Well CWS-02 was removed from the monitoring network in 2023 due to water quality issues at the well which have persisted.

Well 06E002M was added to the network in 2022. This well was historically measured for groundwater quality as part of the Butte County Basin Management Objective (BMO) program. One more additional well, 09N002M was added into the monitoring network in 2023.

A map of each subbasin and the revised network of 2025 groundwater quality sites is shown in **Figure 1.** As part of their GSP Periodic Evaluations (due in January 2027), the GSAs will continue to consider modifications to the groundwater quality RMS network.

The monitoring network details including well type, monitoring equipment, total well depth, depth of the screened zones(s) in each well and notes are provided in **Table 1.** The portion of the state well number in bold indicates the RMS well identification numbers for each well, where applicable.

Most wells in the network are located with Butte County with the exception of two wells; 17N01W10A001M located in Colusa County and 19N01W28A001M located in Glenn County. The RMS wells within the Butte Subbasin are predominantly multi-completion wells (multiple wells at a single location screened at different depths below the ground surface) with the exception of 18N01E35L001M, a single observation well and 19N01W28A001M, a shallow irrigation well. One RMS well in the Butte Subbasin 19N01E35B002M is also an extensometer site which continuously monitors for potential inelastic land subsidence. The RMS wells within the Vina Subbasin are all multi-completion wells sampling from the deepest completion at each location. In the Wyandotte Creek subbasin, there are a variety of well use types in the monitoring network including irrigation, municipal and observation wells.

Sustainable Management Criteria

In these three subbasins, the groundwater quality SMC are established to address degraded groundwater quality caused by groundwater pumping where the potential exists for movement of underlying brackish water from greater depths, upward into the freshwater aquifer where groundwater pumping for beneficial uses occurs. One objective of the groundwater quality monitoring program is to measure conductivity levels in the RMS wells and compare those to the Measurable Objectives (MO) and Minimum Thresholds (MT) set for each RMS well as identified in the GSPs, as a way to gauge whether undesirable results are occurring in the subbasin. In each subbasin's GSP, MTs were established to be protective of water uses and users. When considering MTs, it is important to note that in the case of groundwater levels, exceedance of a MT is caused by groundwater levels dropping below the threshold. However, for groundwater quality, exceedance of a MT is counterintuitively caused by measuring levels higher than the threshold. The MT for groundwater quality is a highest allowable value, rather than lowest.

As shown in **Table 2**., in the Bute Subbasin the MO for each RMS well for salinity is set at 700 µs/cm for agricultural use, consistent with the historic Butte County BMO program. The MTs at the RMS wells are set as either the higher of 900 µs/cm or the measured historical high, whichever was greater in the Butte Subbasin. This MT was set based on best available data, the 19-year dataset of the Butte County BMO program, and maximum contamination levels established by the State. The occurrence of an Undesirable Result occurs in the Butte Subbasin if 25% of RMS wells exceed their MTs for 24 consecutive months.

As shown in **Table 2**., in the Vina and Wyandotte Creek Subbasins, the MOs for salinity are set at 900 µs/cm and the MTs are 1,600 µs/cm, which is the upper limit of the Secondary Maximum Contaminant Level (SMCL) based on State Secondary Drinking Water Standards. Secondary Drinking Water Standards are set on the basis of aesthetic concerns, values exceeding this number are typically unacceptable for drinking water. The occurrence of an Undesirable Result occurs in the Vina and Wyandotte Creek Subbasins when two RMS wells within each Subbasin exceeds their MTs for two consecutive non-dry years.

Table 1. 2025 Groundwater Quality Trend Monitoring Network Information

Subbasin	State Well Number	RMS well?	Well Type	Monitoring Equipment	Total Well Depth (feet)	Depth of Screened Zone(s) (feet)	Notes
Butte	**17N01E24A003M**	Yes	Observation	Solinst 107	833	770 - 790	
	17N01W10A001M	Yes	Observation	Solinst 107	820	770 – 780, 790-800	
	18N01E35L001M*	Yes	Observation	Solinst 107	899	816 – 836	
	19N01E35B002M*	Yes	Observation	Solinst 107	980	930 – 950	
	19N01W28A001M	Yes	Irrigation	Hach Sension156	140	120 – 140	
	19N02E13Q003M	Yes	Observation	Solinst 107	690	670 – 680	
	20N01E18L001M	Yes	Observation	Solinst 107	1,000	767 – 810, 873–894	Removed from the network due to obstruction.
	20N01E18L002M	No	Observation	Solinst 107	581	510 – 530, 550-560	Added in 2024 to supplement network
	21N01W13J001M	Yes	Observation	Solinst 107	830	780 – 820	
Vina	20N02E**24C003M**	Yes	Observation	Solinst 107	520	484 – 505	
	21N01E**13L002M**	Yes	Observation	Solinst 107	771	735 - 760	
	21N02E**18C001M**	Yes	Observation	Solinst 107	914	770 – 780, 830–840,	
	21N02E**26E003M**	Yes	Observation	Solinst 107	660	610 – 620	
	22N01E**28J005M**	Yes	Observation	Solinst 107	948	740 - 800	Removed from the network due to obstruction.
	23N01W**03H002M**	Yes	Observation	Solinst 107	553	510 – 540	
	23N01W**28M002M**	Yes	Observation	Solinst 107	1,031	791–801, 881–891, 951–961, 1011–1021	
	23N01W**31M001M**	Yes	Observation	Solinst 107	1,055	969–979, 1,020-1,030	
Wyandotte Creek	17N03E**13B002M**	Yes	Irrigation	Solinst 107	320	120 – 320	Removed from the network due to inoperable pump.
	17N04E**09N002M**	No	Irrigation	Solinst 107	325	100 – 112	Added in 2023 to supplement network
	18N04E**08M001M**	Yes	Irrigation	Solinst 107	~350	168–204, 208 - 244	
	18N04E**19D001M**	Yes	Observation	Solinst 107	744	700 – 720	
	18N04E**19D002M**				594	430–450, 550–570	
	18N04E**19D003M**				220	120 – 130,	
	18N04E**28L001M**	Yes	Irrigation	Solinst 107	190	n/a	Removed from the network due to landowner request.
	19N03E**16Q001M**	Yes	Residential	Solinst 107	120	100 – 120	Removed from the network due to landowner request.
	19N04**E06E002M**	No	Municipal	Solinst 107	196	110–130, 164–174	Added in 2022 to supplement network
	CWS-02	Yes	Municipal	Solinst 107	340	60 – 190, 300-322	Removed from the network due to water quality issues.

** Extensometer sites that measure inelastic land subsidence.*

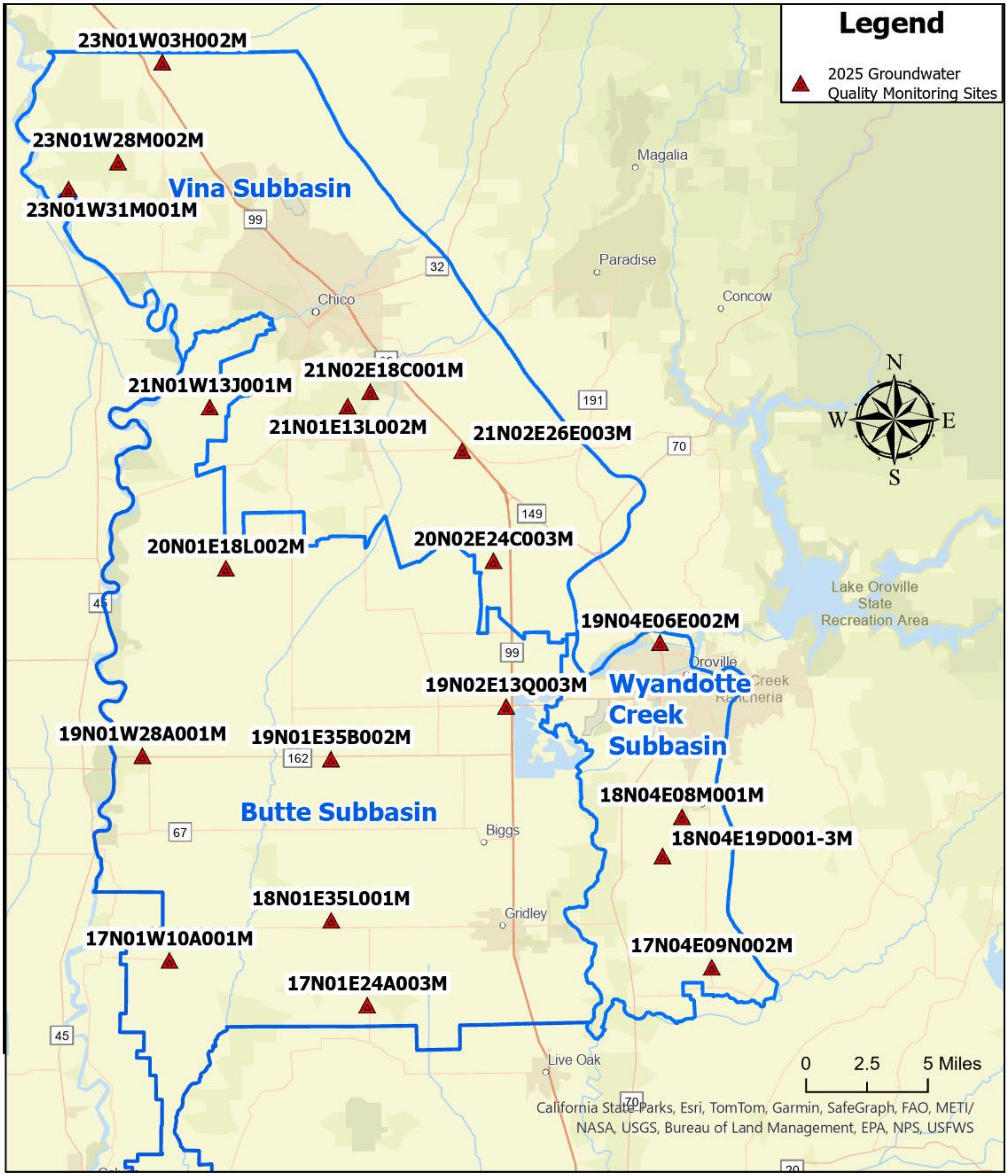

Legend
2025 Groundwater Quality Monitoring Sites
Vina Subbasin
Butte Subbasin
Wyandotte Creek Subbasin
23N01W03H002M
23N01W28M002M
23N01W31M001M
21N01W13J001M
21N02E18C001M
21N01E13L002M
21N02E26E003M
20N01E18L002M
20N02E24C003M
19N04E06E002M
19N02E13Q003M
19N01W28A001M
19N01E35B002M
18N04E08M001M
18N04E19D001-3M
18N01E35L001M
17N01W10A001M
17N04E09N002M
17N01E24A003M
Magalia
Paradise
Concow
Chico
Oroville
Biggs
Gridley
Live Oak
Lake Oroville State Recreation Area
N
S
E
W
0 2.5 5 Miles
California State Parks, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USFWS

Figure 1. Groundwater Quality Trend Monitoring well locations in the Vina, Butte and Wyandotte Creek Subbasins in 2025

Table 2. 2022 GSP Measurable Objectives, Minimum Thresholds for Conductivity [microsiemens (µs) / centimeter (cm)] and definition of Undesirable Results in each Subbasin

Subbasin	Measurable Objective	Minimum Thresholds	Undesirable Result
Butte	700 µS/cm	The greater of 900 µS/cm or the measured historical high	25% of RMS wells exceed MTs for 24 consecutive months
Vina	900 µS/cm	1,600 µS/cm	2 RMS wells exceed their MT for two consecutive non-dry years
Wyandotte Creek	900 µS/cm	1,600 µS/cm	2 RMS wells exceed their MT for two consecutive non-dry years

Results

In 2025, the third non-dry water year type in a row, the majority of all wells monitored within each subbasin had groundwater quality conditions, measured as SC, that fell within the acceptable range of groundwater quality values set forth by the GSPs as summarized in Table 2. No major shifts occurred in the conductivity measurements in the sampled wells. Details of the monitoring results for each Subbasin are described below.

Butte Subbasin

In the Butte Subbasin the majority of RMS wells measured in 2025 had conductivity values that were lower than the MO of 700 µS/cm and therefore lower than each well's MT. The MTs vary per well since they are based on historic data, if available. **Figure 2.** displays the overall results for the 2025 water quality wells within the Butte Subbasin. Graphs of historic data for individual wells for previous years can be found in **Appendix A.** Results from one RMS well, 17N01W10A001M, a deep multi-completion well located in Colusa County, has had conductivity measurements slightly higher than the MT in 2023, 2024 and again in 2025. Historic (DWR, 2020, DWR 2023a) and recent data for this well are shown in **Figure 3.** This well is near the Sutter Buttes mountain range in an area known for high concentrations of conductivity (Davids, 2021). Future plans of the GSAs may include the formation of the Sutter Buttes Water Quality Interbasin Working Group as described in more detail in section 6.1.2.2 of the Butte Subbasin GSP (Davids, 2021) to focus on collaborative discussions, consensus building and planning to address groundwater quality matters associated with the unique geology of the Sutter Buttes area.

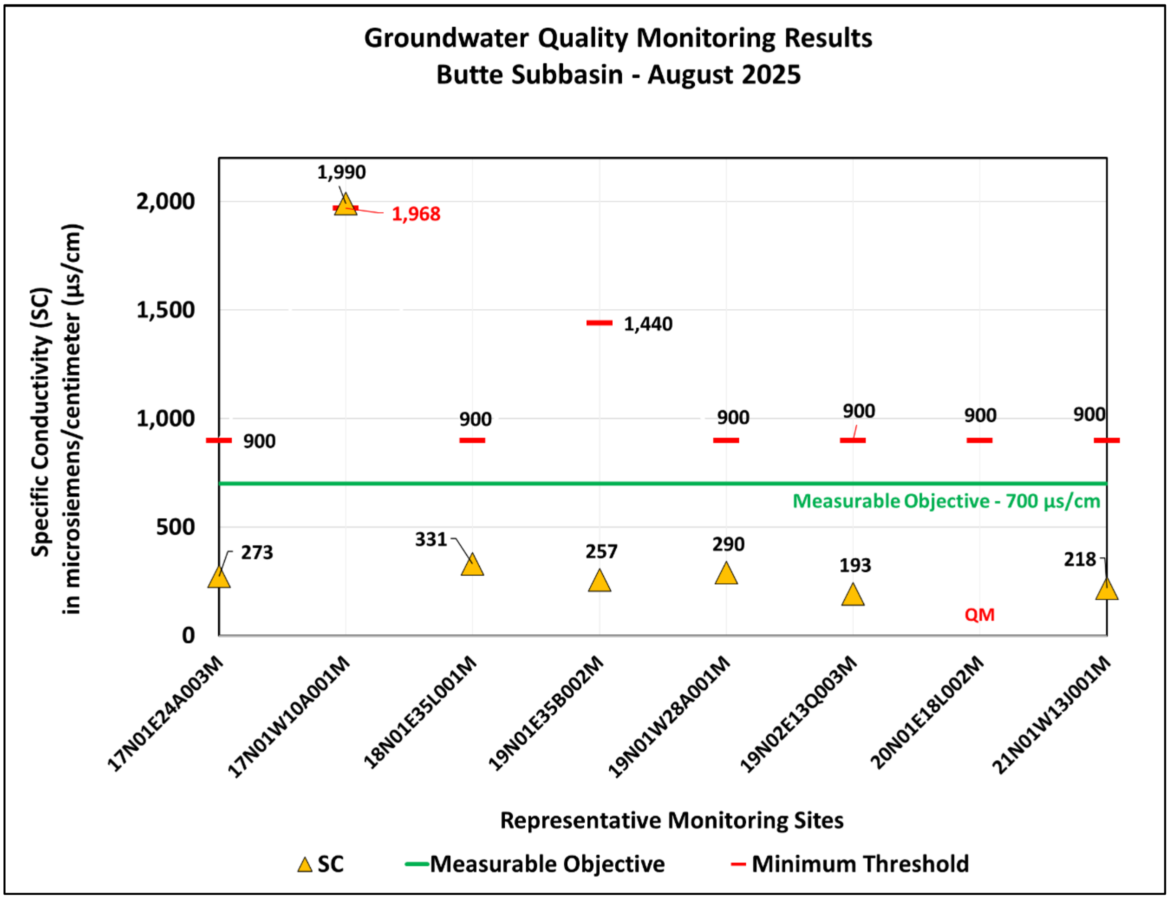


Figure 2. Groundwater quality monitoring results in the Butte Subbasin for the 2025 water year

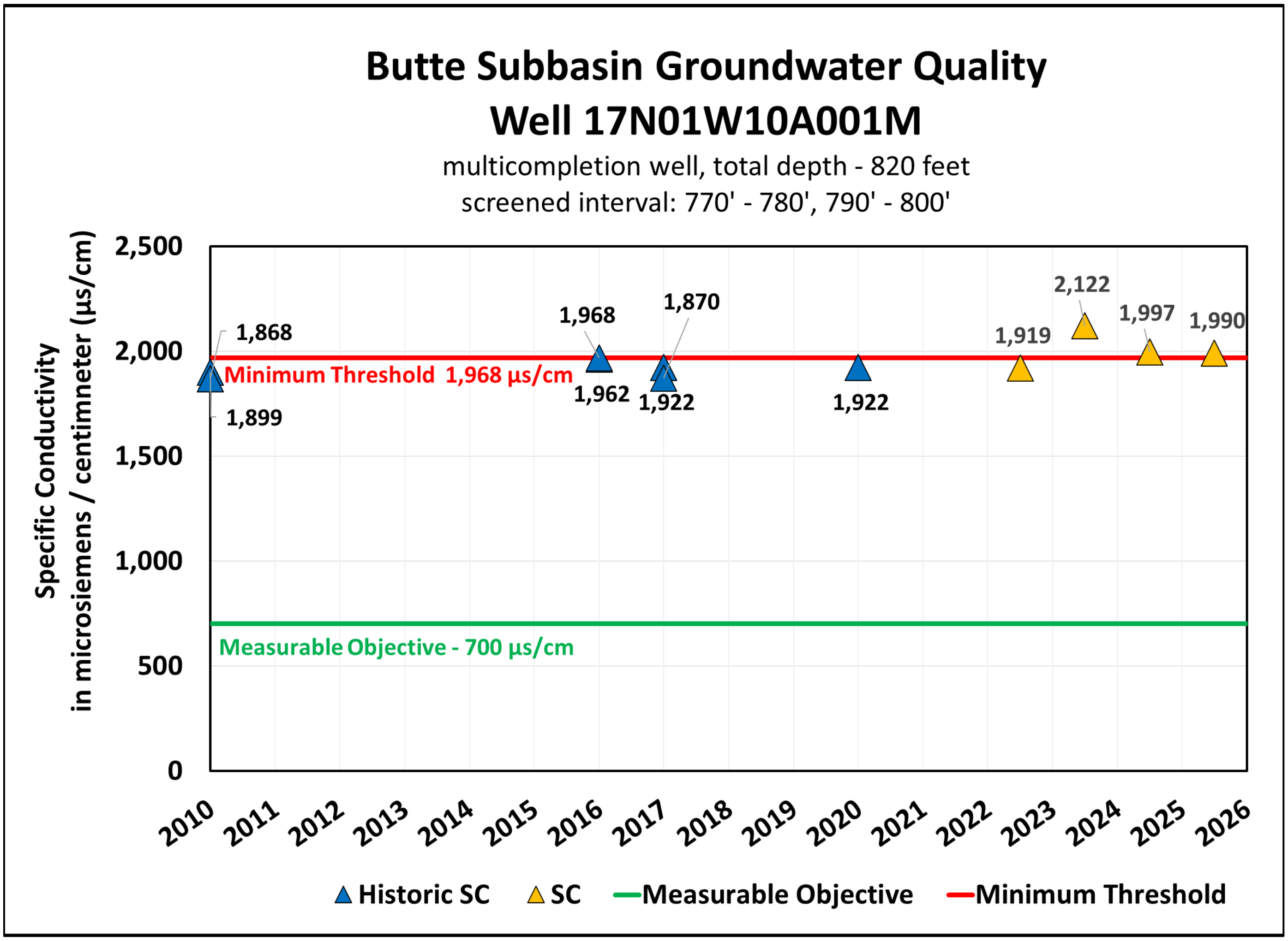


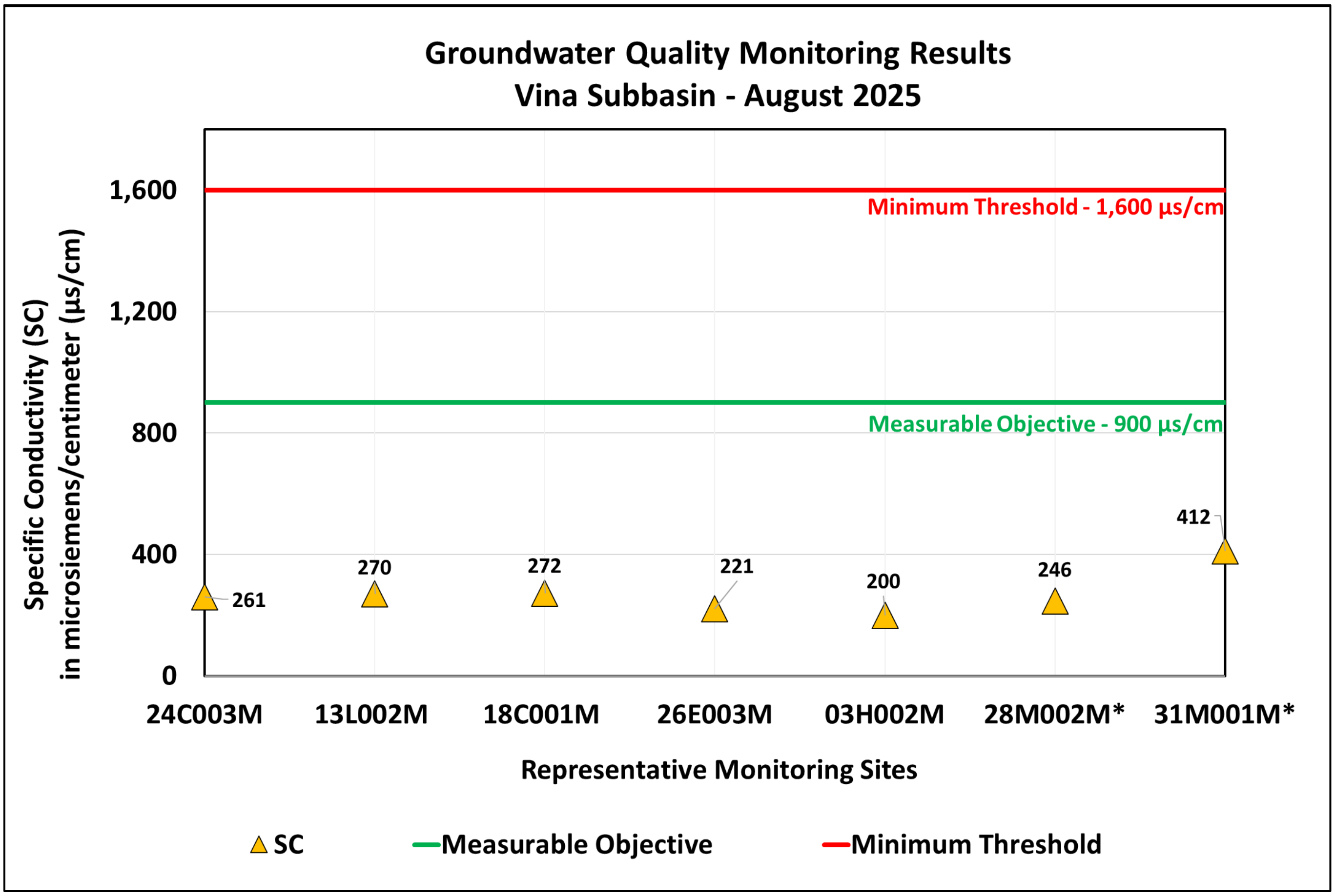
Figure 3. Current and historic groundwater quality data for well 17N01W10A001M in the Butte Subbasin.

Vina Subbasin

In the Vina Subbasin all RMS wells measured in 2025 had conductivity values that were lower than the MO of 900 µS/cm and therefore lower than the MT of 1,600 µS/cm as shown in **Figure 4.** Two wells, 28M002M, and 31M001M the length of the tape the SC probe is attached to was too short to reach the last screened intervals of the wells. The graphs reflect an average of the SC measurements recorded at the other screened intervals.

Wyandotte Creek Subbasin

In the Wyandotte Creek Subbasin the majority of RMS wells measured in 2025 had conductivity values that were lower than the MO of 900 µS/cm and therefore lower than the MT of 1,600 µS/cm as shown in **Figures 5. and 6.**



** Indicates a measurement was not taken within a screened interval due to limits of the equipment. Data taken outside of the screened interval is not included in the average.*

Figure 4. Groundwater quality monitoring results in the Vina Subbasin for the 2025 water year

In the multi-completion well drilled in 2021 by DWR through the Technical Support Services program to measure three distinct zones of the aquifer in one location, there were two zones, intermediate (19D002M) and deep (19D001M), which exhibited high conductivity levels in 2025, exceeding the MT depicted in **Figure 6**. This multicompletion well was constructed after the GSA set the sustainable management criteria for water quality. Both zones of this well had high levels of conductivity, greater than the MT when initially developed, prior to the adoption of the GSP and again when the wells were re-tested months after their initial development. ss shown in **Figure 6**. as ‘Other Data’. Anecdotally, this general area of the subbasin is known to have geologic formations bearing groundwater with high concentrations of salinity and natural gas. Better characterization of naturally occurring salinity is needed to help improve appropriate monitoring and management of groundwater with respect to water quality in this Subbasin. The Butte County Technical Advisory Committee may consider making recommendations to the GSA regarding changes to the monitoring network of wells and collection of additional long-term data in the future. DWR has recently collected groundwater quality measurements at 19D002M (intermediate zone of the multicompletion well in the Wyandotte Creek Subbasin) as depicted in **Figure 6.** DWR has also indicated that there are plans to deploy continuous data loggers to record hourly conductivity data in the wells in the future which will highlight any changes during the peak irrigation season as compared to baseline conditions throughout the water year.

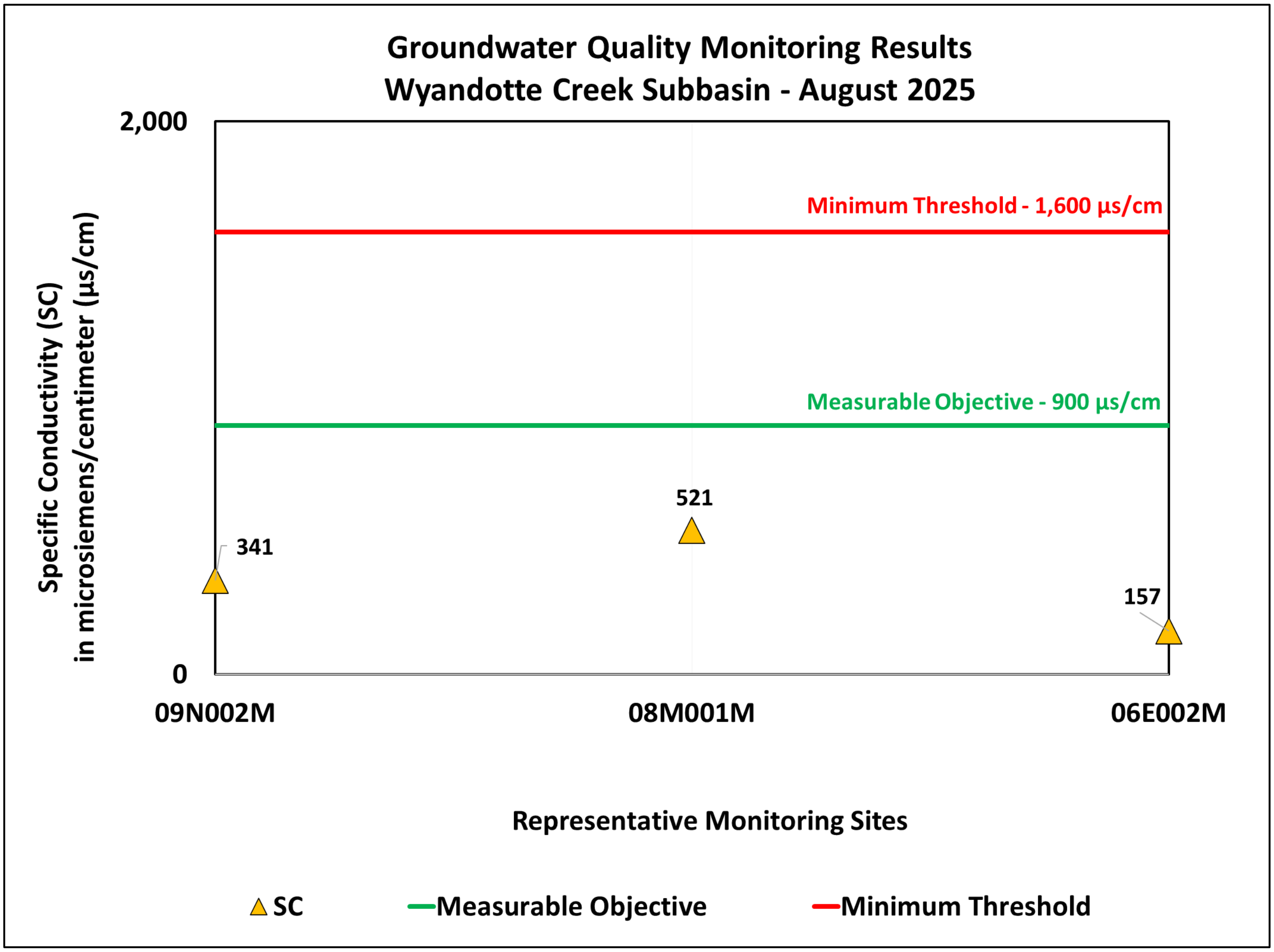


Figure 5. Groundwater quality monitoring results in the Wyandotte Creek Subbasin excluding 19D001-3M for the 2025 water year

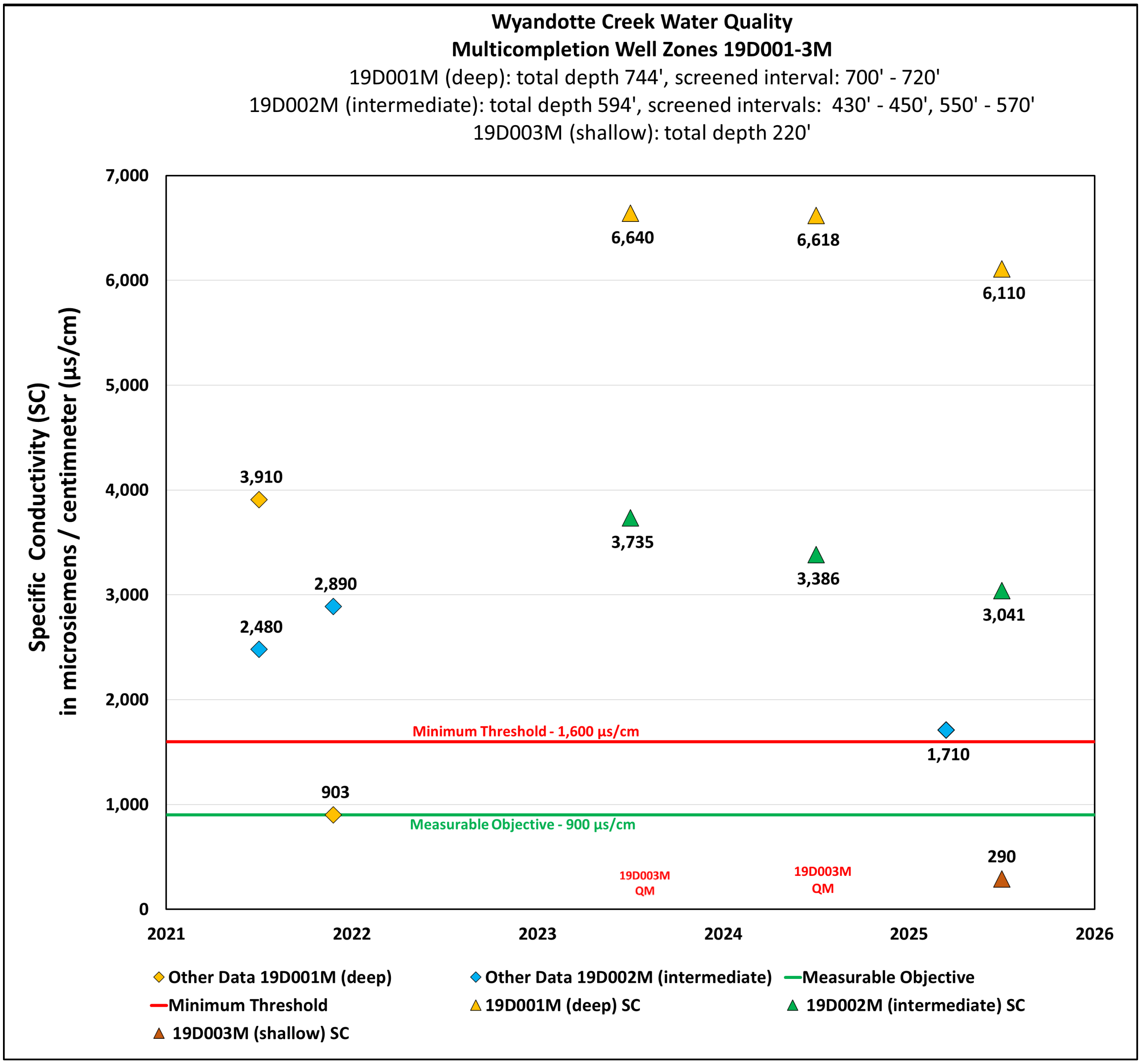


Figure 6. Current and historic groundwater quality data for zones in RMS well 19D001-3M in the Wyandotte Creek Subbasin.

Discussion

Groundwater quality monitoring serves to establish baseline levels for salinity (via conductivity) throughout the Subbasins so that any future changes may be identified and further investigation and or additional monitoring can subsequently be developed. **Table 3.** below summarizes the status of monitoring results in relation to exceedances of MTs and whether or not Undesirable Results occurred based on the SMC established for each subbasin. While there was one RMS well in exceedance of a MT for conductivity within the Butte Subbasin over the past 24 months, this does not indicate the presence of Undesirable Results in the Subbasin for degraded water quality, as only one well exceeded the MT over 24 months, not two, as described in the GSP. Importantly, the observed conductivity in the well is in the range of previously observed historical levels and does not indicate a changed condition or upward trend. The WRC may consider adding another

Table 3. Conductivity monitoring results and the presence of Undesirable Results since 2022 in relation to each well's Minimum Thresholds in the Butte, Vina and Wyandotte Creek Subbasins.

Subbasin	State Well Number	2022 Dry Year	2023 Non-Dry Year	2024 Non-Dry Year	2025 Non-Dry Year	Undesirable Result Identification	Indication of Undesirable Results?
		Was measurement above the Minimum Threshold?					
Butte	**17N01E24A003M**	No	No	No	No	When 25% of RMS wells (2 of 8) exceed their MT for 24 consecutive months	No
	17N01W10A001M	No	**Yes**	**Yes**	**Yes**		
	18N01E35L001M	No	No	QM	No		
	19N01E35B002M	No	No	No	No		
	19N01W28A001M	n/a	No	No	No		
	19N02E13Q003M	No	No	No	No		
	20N01E18L001M	Removed from the network in 2022					
	21N01W13J001M	n/a	No	No	No		
Vina	20N02E**24C003M**	No	No	QM	No	When 2 RMS wells exceed their MT for two consecutive non-dry years.	No
	21N01E**13L002M**	No	No	No	No		
	21N02E**18C001M**	No	No	No	No		
	21N02E**26E003M**	No	No	No	No		
	22N01E**28J005M**	Removed from the network in 2022					
	23N01W**03H002M**	No	No	No	No		
	23N01W**28M002M**	No	No	No	No		
	23N01W**31M001M**	No	No	No	No		
Wyandotte Creek	**CWS-02**	No	Removed from the network in 2022				
	17N03E**13B002M**	Removed from the network in 2022					
	18N04E**08M001M**	QM	QM	No	No	When 2 RMS wells exceed their MT for two consecutive non-dry years.	No
	18N04E**19D001-3M**	QM	QM	QM	**Yes**		
	18N04E**28L001M**	Removed from the network in 2022					
	19N03E**16Q001M**	No	Removed from the network in 2023				

Note: The portion of the State Well number in bold is the RMS well identification number. QM indicates a questionable measurement and n/a indicates the well was not measured. Multicompletion well 18N04E19D001-3M is reported as an average of all three zones

well to the monitoring network given the obstructions observed in 20N01E18L001-2M over the past few years.

DWR has indicated there are plans to install continuous data loggers in all four multicompletion wells at the 17N01W10A001-4M well and to conduct monthly water quality monitoring at the shallow-intermediate zoned portion of multicompletion well 17N01E24A004M. WRC may include any data available from this effort in future reports.

There were no RMS wells in exceedance of any MTs in the Vina Subbasin in 2025 and therefore no indication of Undesirable Results as defined in the GSP. The WRC may consider adding another well to the monitoring network given the obstructions observed in 28J005M over the past few years. DWR has indicated there are plans to conduct monthly water quality monitoring at the shallow-intermediate zoned portion of multicompletion well 28M004M. WRC will include any data available from this effort in future reports.

There were two zones within the multicompletion well 18N04E19D001-3M in the Wyandotte Creek Subbasin in exceedance of the MTs in 2025; however, this does not indicate the presence of Undesirable Results in the subbasin for degraded water quality, as only one well exceeded the Minimum Threshold for one year, not two, as described in the SMC. These completions monitor the deep and intermediate zones in this multi-completion well drilled in 2021 by DWR through their Technical Support Services program. When the well was first developed, the baseline conductivity was 3,910 µs/cm and 2,480 µs/cm respectively, roughly 1.5 and 2.5 times higher than the MT for these wells as shown in **Figure 6**. Approximately four months after initial development, DWR conducted additional water quality sampling after the well had time to settle. Results indicated a drop in conductivity to 903 µs/cm for 19D001M (deep zone) but an increase in 19D002M (intermediate zone) to 2,890 µs/cm. Baseline conditions at these wells are not well understood, but clearly exhibit naturally occurring high levels of conductivity. Revisiting the sustainable management criteria of this well seems appropriate. Additional characterization through additional data collection of naturally occurring salinity is needed to help improve appropriate monitoring and management of groundwater with respect to groundwater quality in this Subbasin. The WRC may consider adding other wells to the monitoring network given the low number of wells currently in the monitoring network. DWR has indicated there are plans to install continuous data loggers in all three multicompletion wells at the 19D001-3M well. WRC may include any data available from this effort in future reports.

Additional monitoring will continue to be conducted by DWR and other agencies to track constituents not managed under the current GSPs, or WRC's Groundwater Quality Trend Monitoring Program, including a variety of minerals, metals, pesticides and herbicides. Data from ongoing monitoring by various state and federal agencies will be available to the GSAs to augment local datasets and their understanding of groundwater quality and can be found on the State Board's Groundwater Ambient Monitoring and Assessment (GAMA) program at https://www.waterboards.ca.gov/gama.

The County will continue to work with the GSAs within the Butte, Vina and Wyandotte Creek Subbasins as available, to recommend modifications to the monitoring networks, to conduct monitoring to support data collection that compliments the GSAs SGMA requirements, and to ensure that conductivity data is shared with the GSAs.

References

California Department of Water Resources (DWR), Northern Regional Office. 2020. Northern Sacramento Valley Dedicated Monitoring Well Groundwater Quality Assessment Technical Information Record (TIR) NRO-2019-01. Red Bluff, CA

California Department of Water Resources (DWR). 2025. Available at: https://wdl.water.ca.gov/waterdatalibrary/Map.aspx

Davids Engineering (Davids). 2021. Butte Subbasin Groundwater Sustainability Plan. Available at: https://sgma.water.ca.gov/portal/gsp/preview/98

Geosyntec Consultants, Inc. 2021a. Vina Groundwater Sustainability Plan. Available at: https://sgma.water.ca.gov/portal/gsp/preview/86.

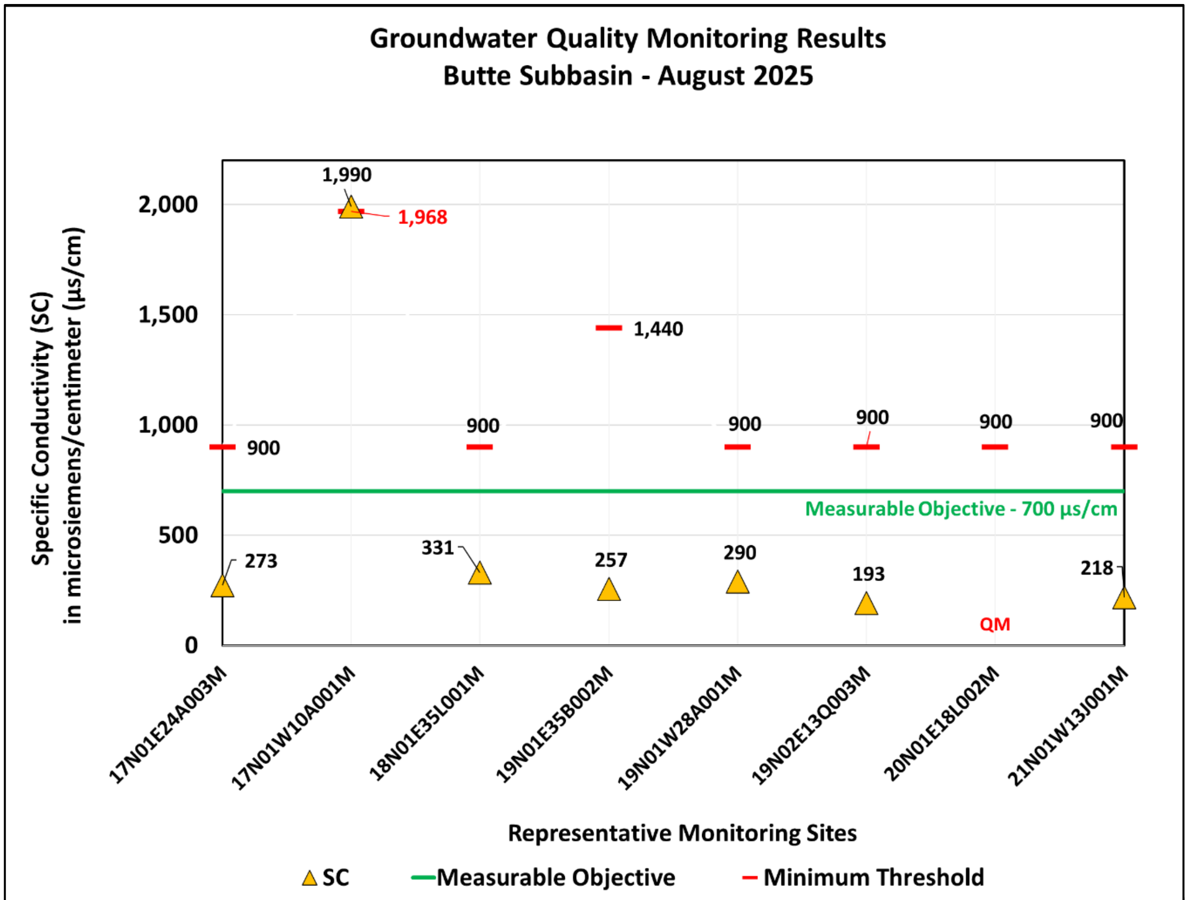
Geosyntec Consultants, Inc. 2021b. Wyandotte Creek Groundwater Sustainability Plan. Available at: https://sgma.water.ca.gov/portal/gsp/preview/99.

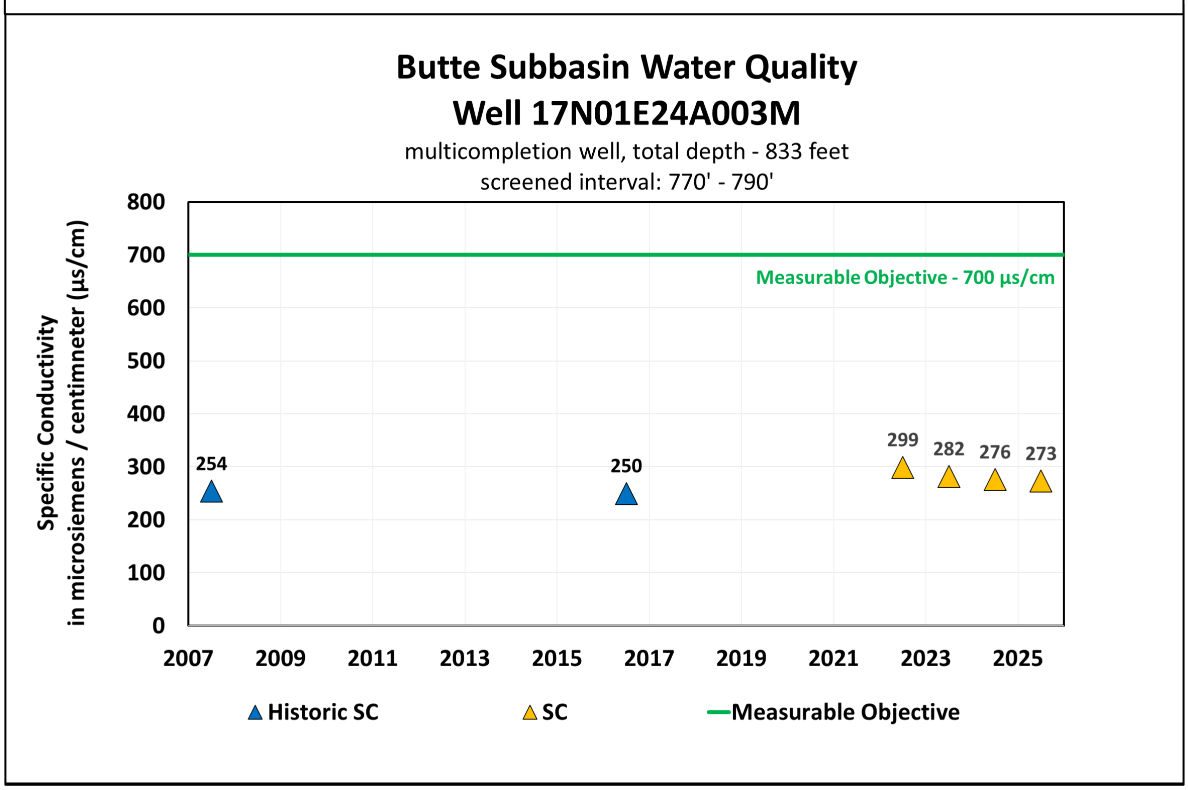
Appendix A

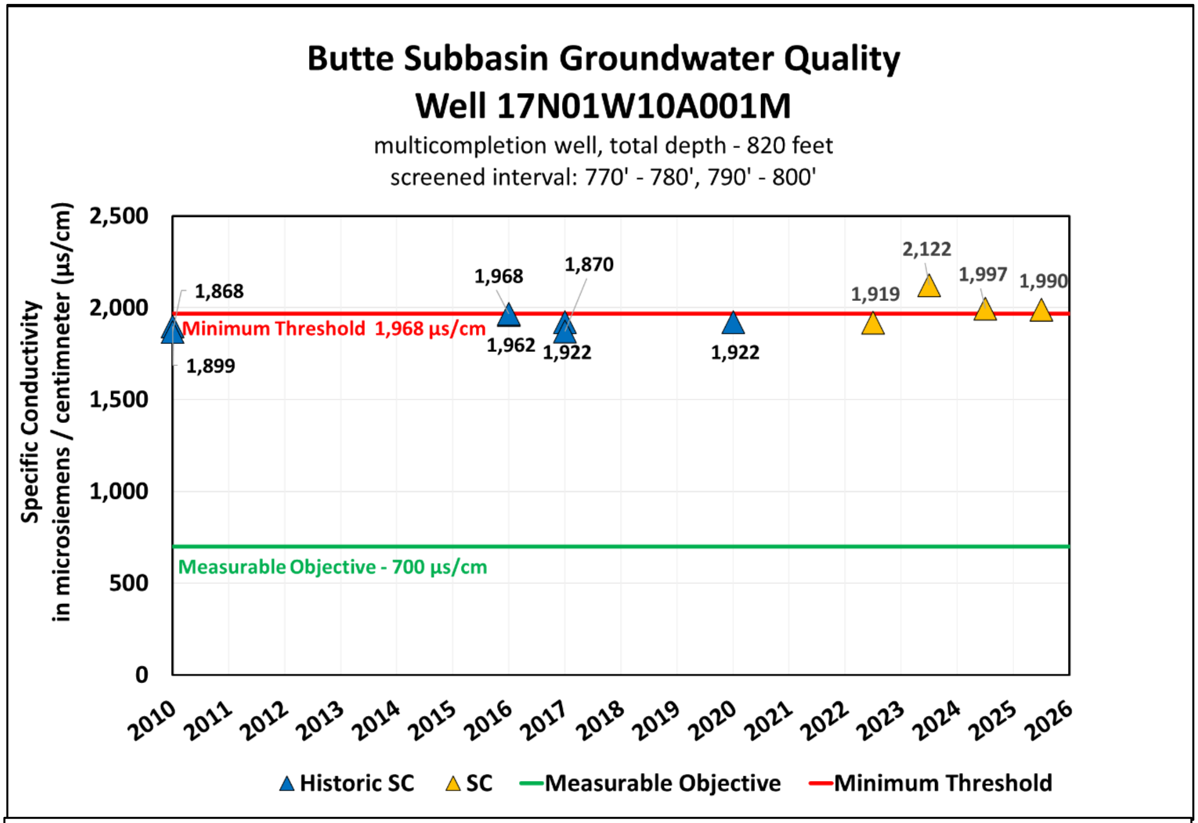
2025 Butte, Vina and Wyandotte Creek Subbasin Groundwater Quality Monitoring Results

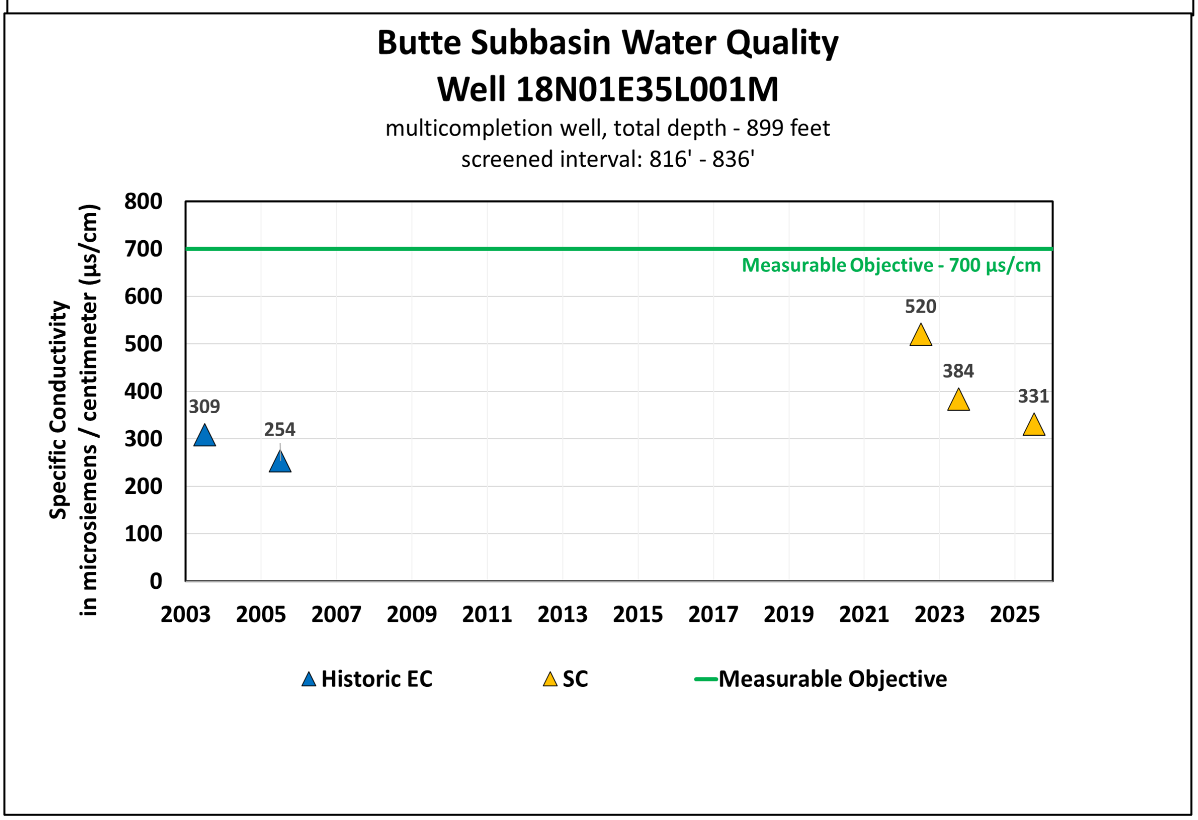
Appendix A. Historical and current conductivity data for individual wells in the Butte, Vina and Wyandotte Creek Subbasin's 2025 water quality monitoring network.

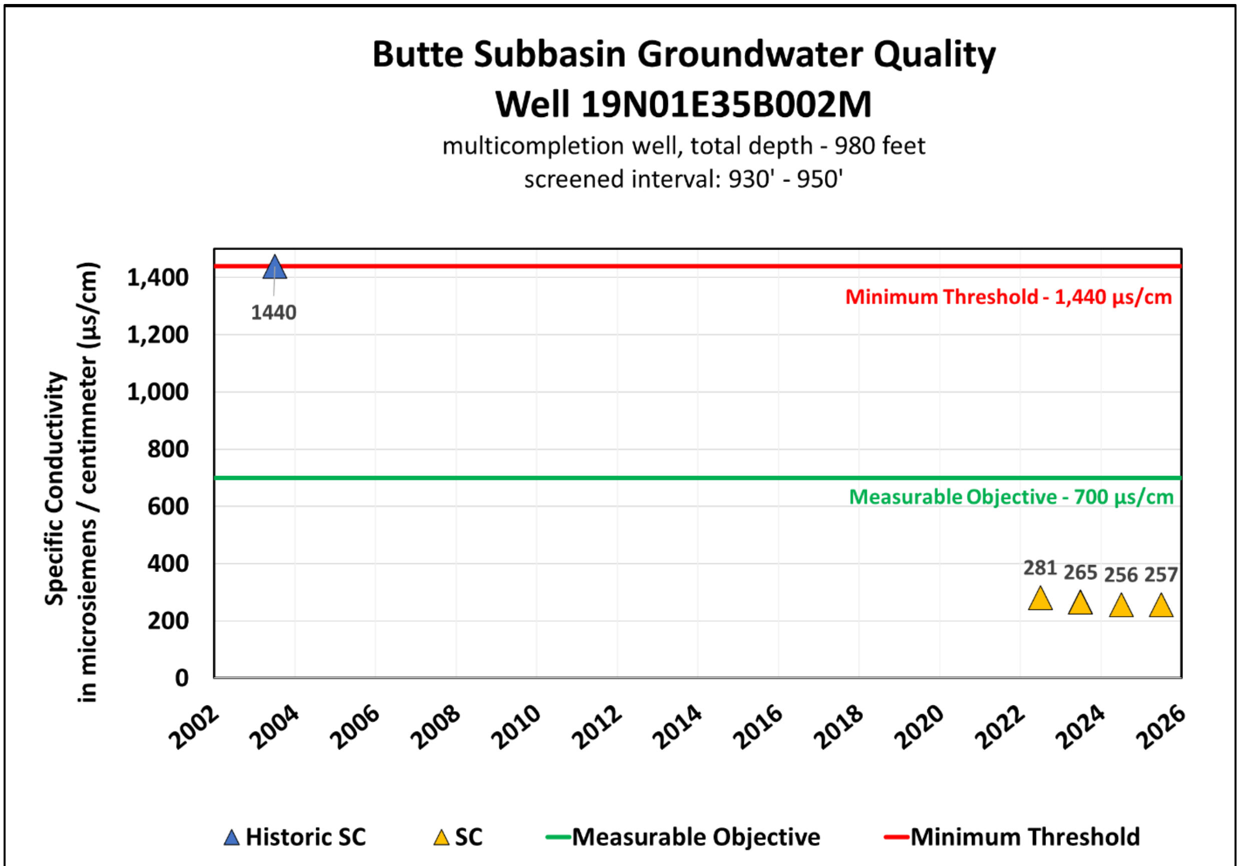
Butte Subbasin

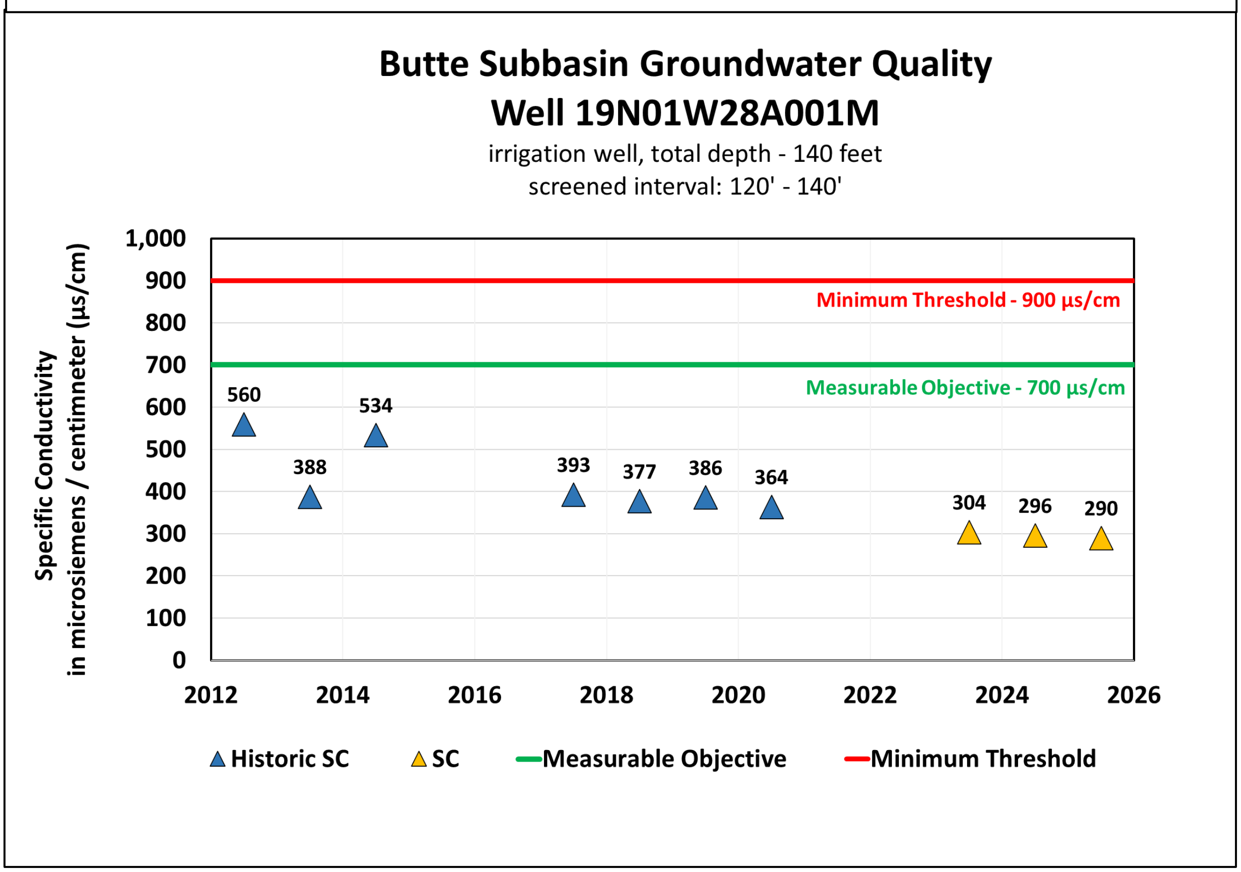


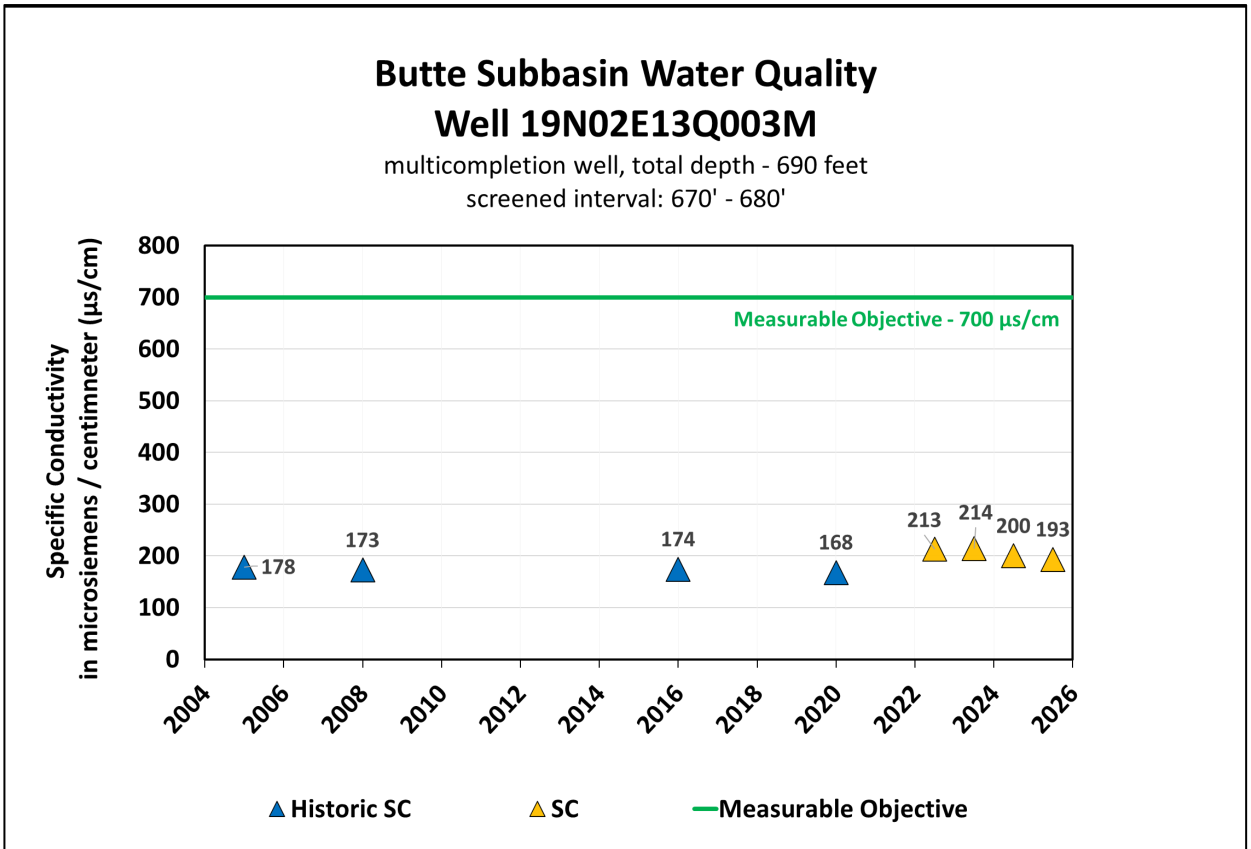



Butte Subbasin Groundwater Quality
Well 17N01W10A001M
multicompletion well, total depth - 820 feet
screened interval: 770' - 780', 790' - 800'
Specific Conductivity
in microsiemens / centimneter (µs/cm)
2,500
2,000
1,500
1,000
500
0
1,868
1,899
1,968
1,962
1,870
1,922
1,922
1,919
2,122
1,997
1,990
Minimum Threshold 1,968 µs/cm
Measurable Objective - 700 µs/cm
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Historic SC
SC
Measurable Objective
Minimum Threshold

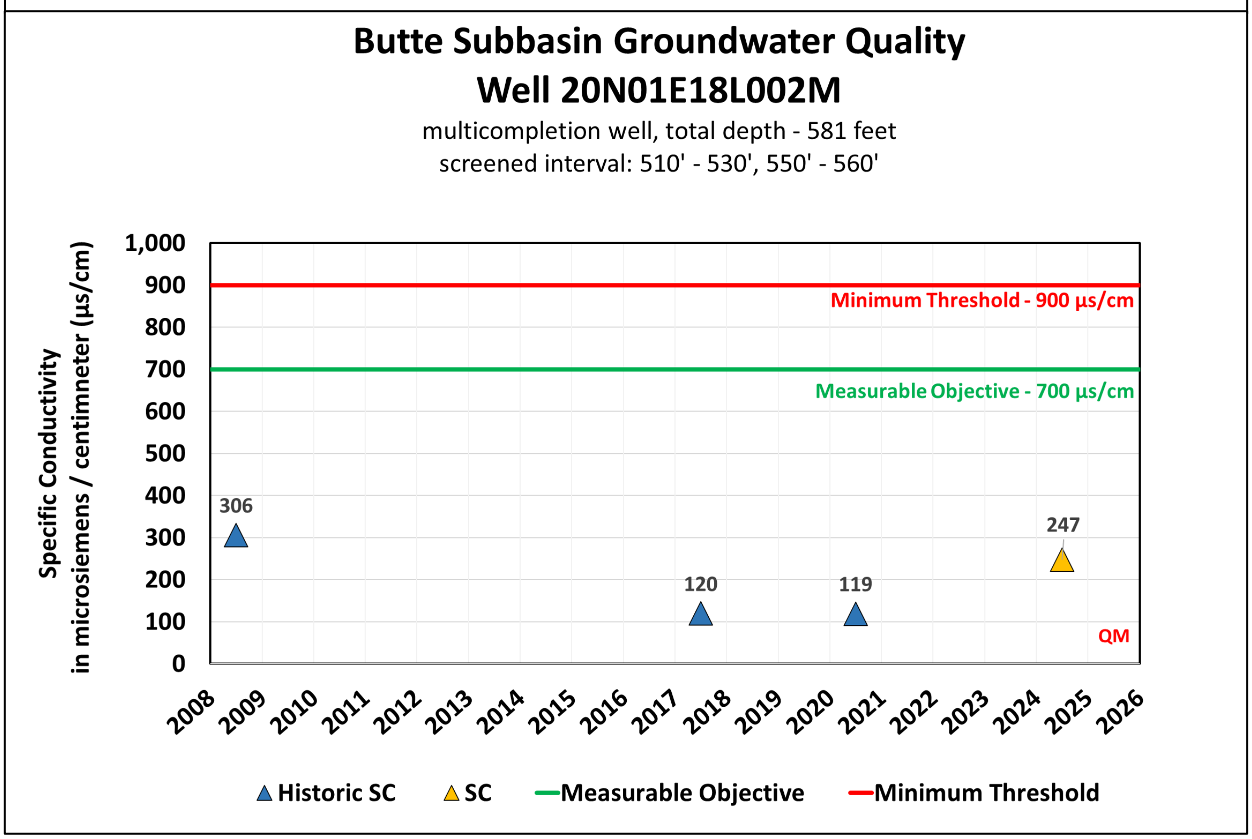

Butte Subbasin Water Quality
Well 18N01E35L001M
multicompletion well, total depth - 899 feet
screened interval: 816' - 836'
Specific Conductivity
in microsiemens / centimeter (µs/cm)
800
700
600
500
400
300
200
100
0
Measurable Objective - 700 µs/cm
309
254
520
384
331
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
2023
2025
Historic EC
SC
Measurable Objective


Butte Subbasin Groundwater Quality
Well 19N01E35B002M
multicompletion well, total depth - 980 feet
screened interval: 930' - 950'
Specific Conductivity
in microsiemens / centimneter (µs/cm)
1,400
1,200
1,000
800
600
400
200
0
1440
Minimum Threshold - 1,440 µs/cm
Measurable Objective - 700 µs/cm
281
265
256
257
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
Historic SC
SC
Measurable Objective
Minimum Threshold

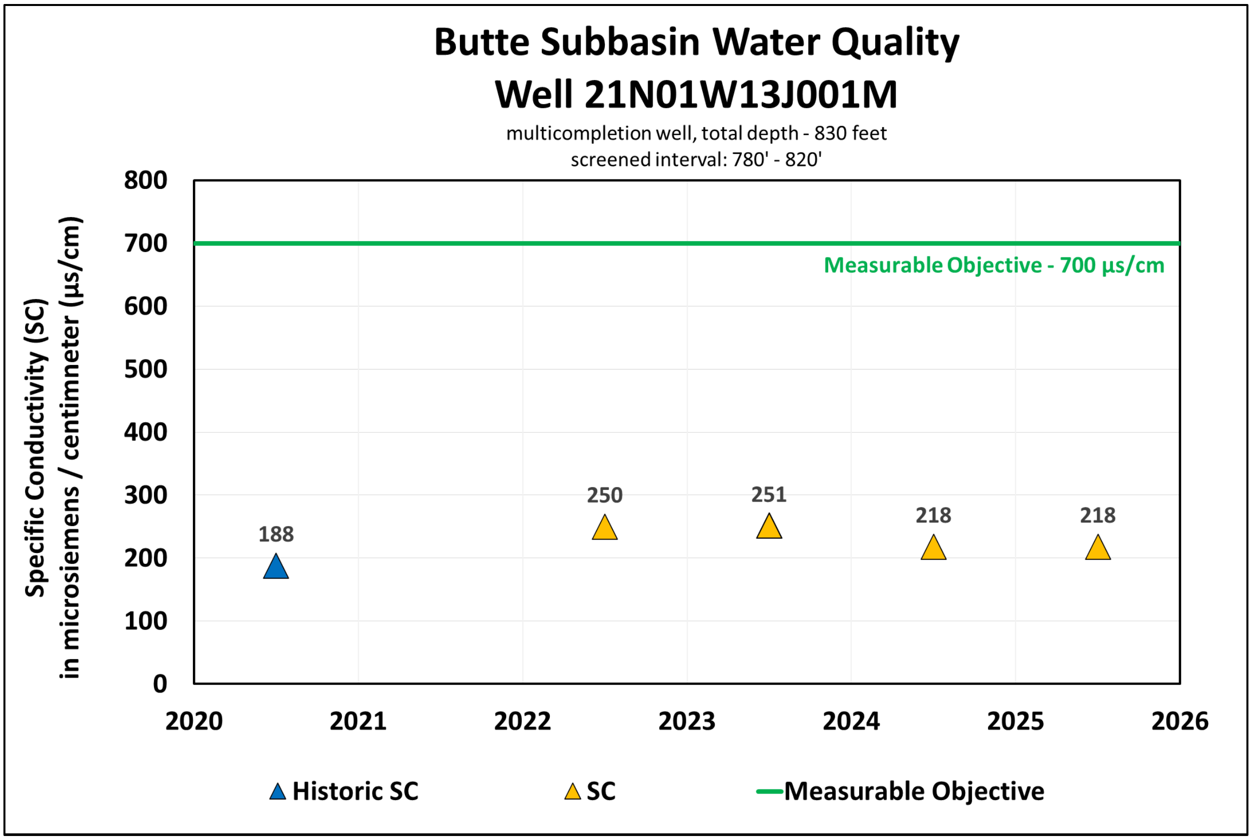

Butte Subbasin Groundwater Quality
Well 19N01W28A001M
irrigation well, total depth - 140 feet
screened interval: 120' - 140'
Specific Conductivity
in microsiemens / centimneter (µs/cm)
1,000
900
800
700
600
500
400
300
200
100
0
Minimum Threshold - 900 µs/cm
Measurable Objective - 700 µs/cm
560
388
534
393
377
386
364
304
296
290
2012
2014
2016
2018
2020
2022
2024
2026
Historic SC
SC
Measurable Objective
Minimum Threshold



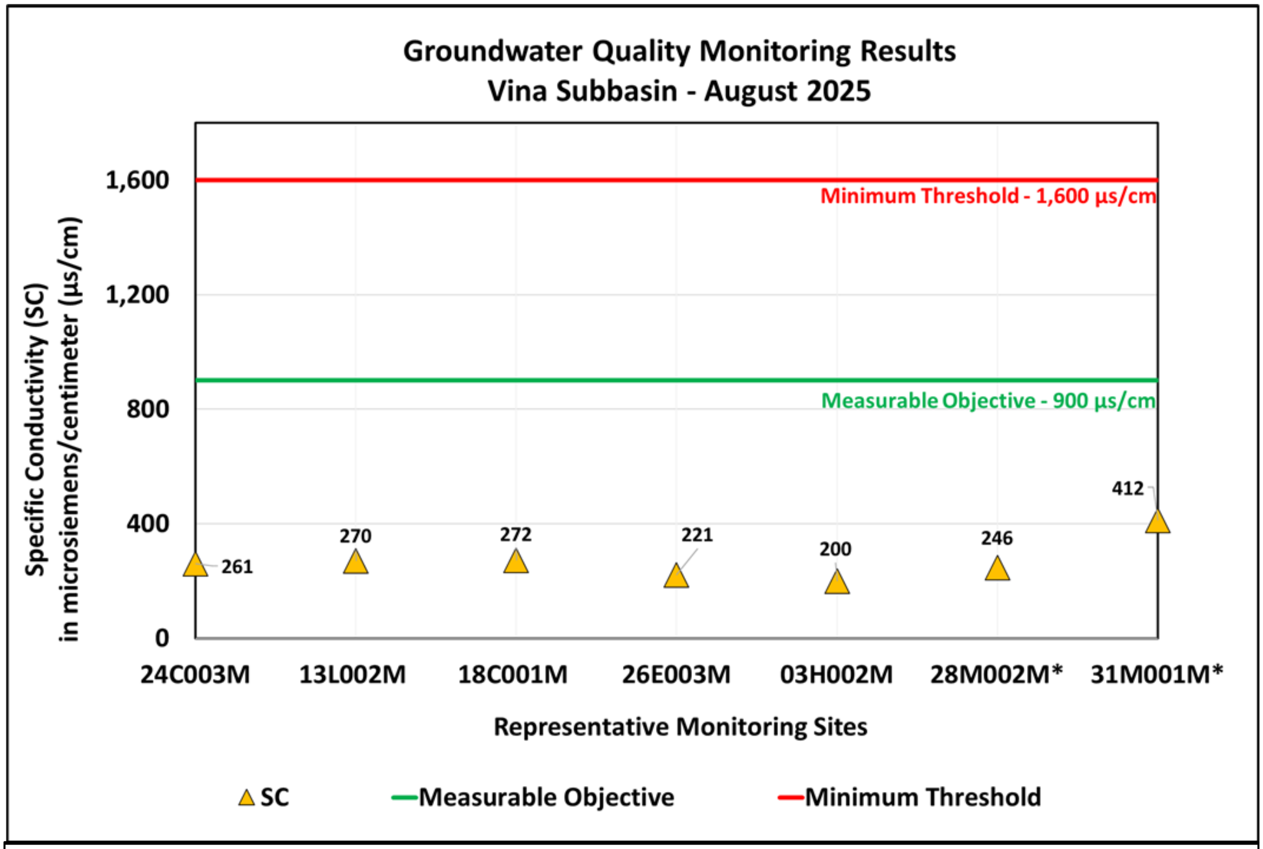
Butte Subbasin Water Quality
Well 19N02E13Q003M
multicompletion well, total depth - 690 feet
screened interval: 670' - 680'
Specific Conductivity
in microsiemens / centimneter (µs/cm)
Measurable Objective - 700 µs/cm
178
173
174
168
213
214
200
193
Historic SC
SC
Measurable Objective

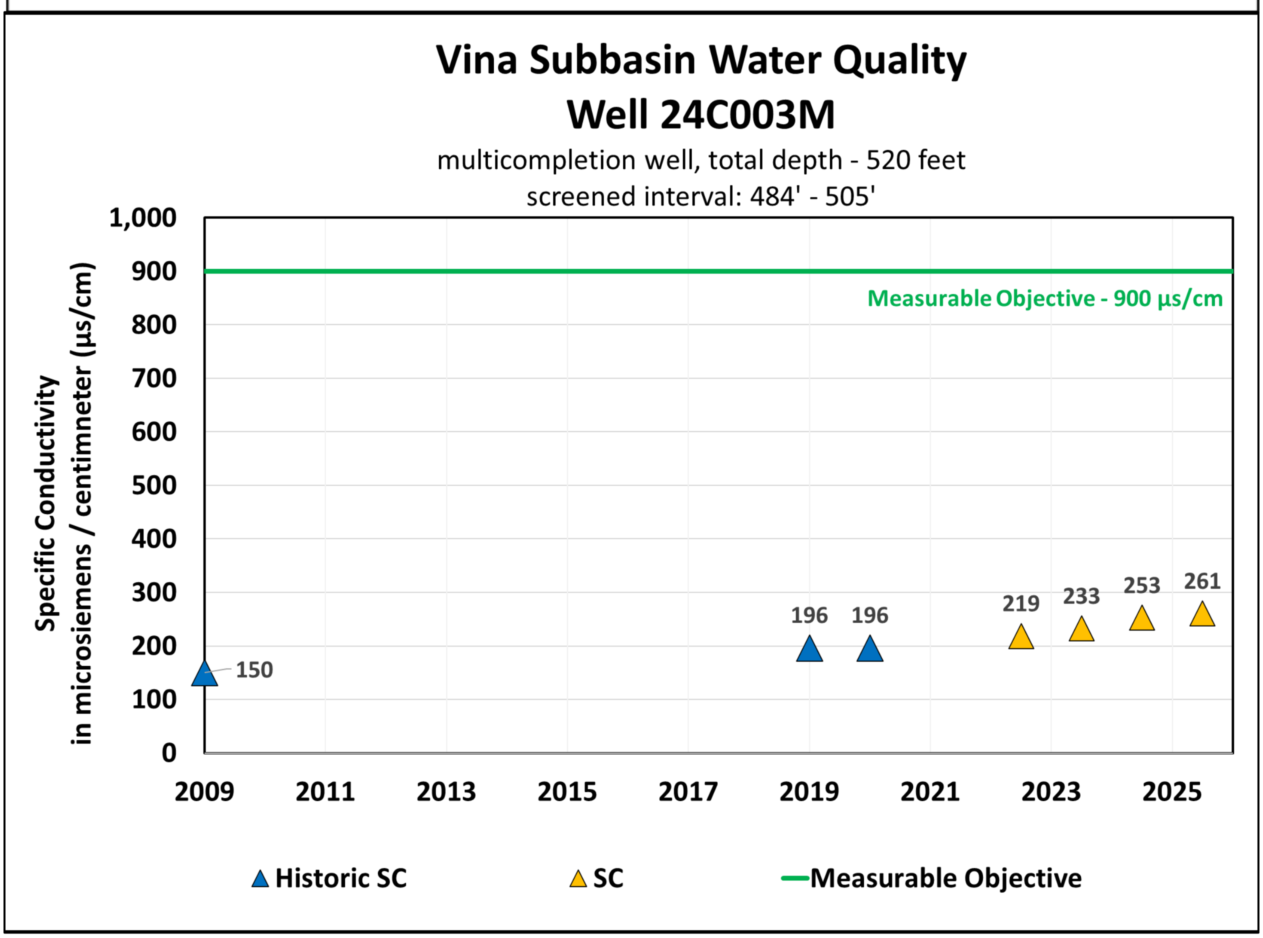


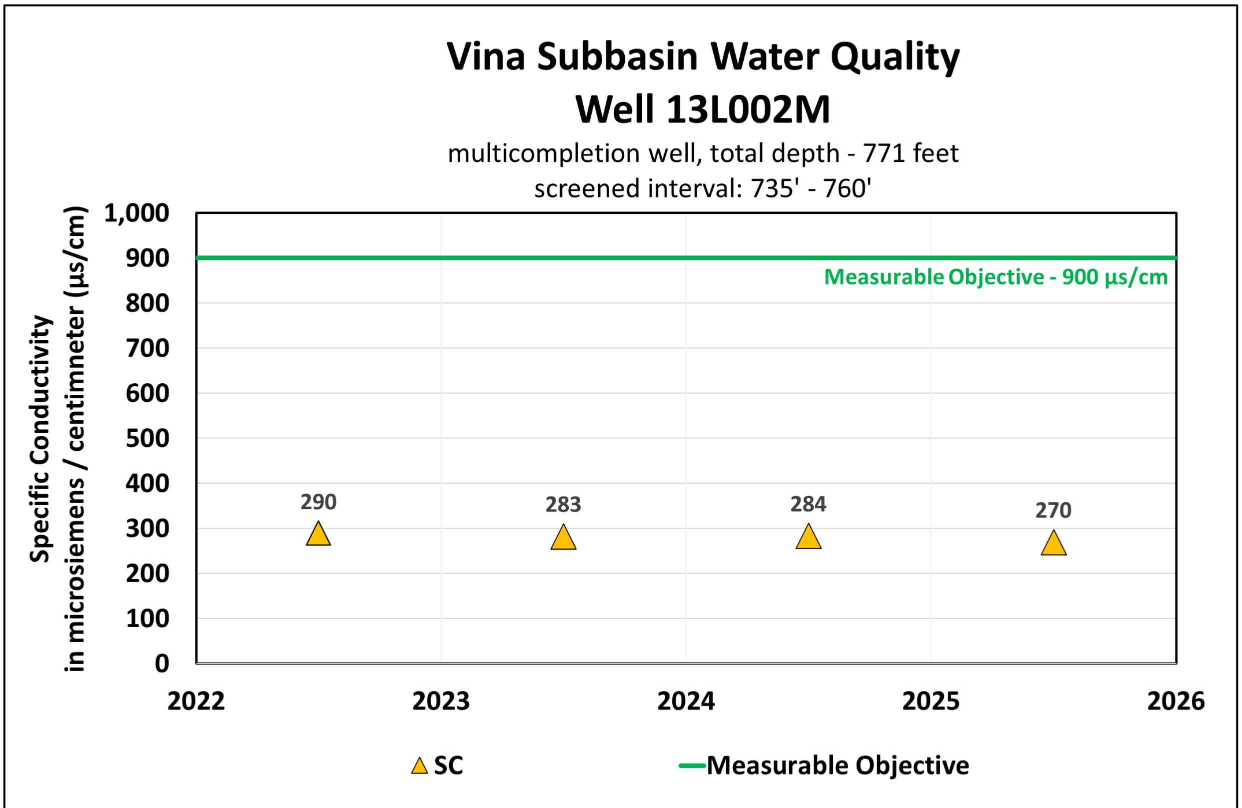
Butte Subbasin Groundwater Quality
Well 20N01E18L002M
multicompletion well, total depth - 581 feet
screened interval: 510' - 530', 550' - 560'
Specific Conductivity
in microsiemens / centimneter (µs/cm)
Minimum Threshold - 900 µs/cm
Measurable Objective - 700 µs/cm
306
120
119
247
QM
Historic SC
SC
Measurable Objective
Minimum Threshold

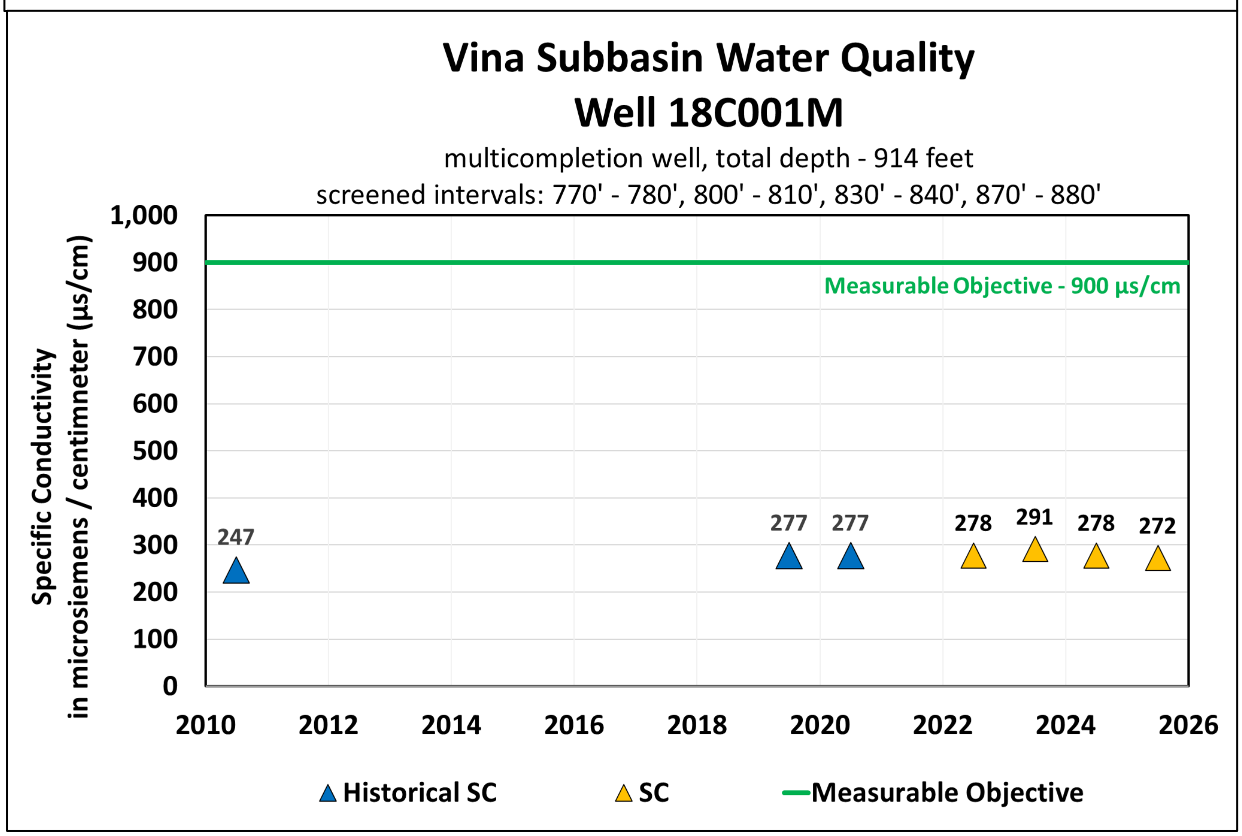

Butte Subbasin Water Quality
Well 21N01W13J001M
multicompletion well, total depth - 830 feet
screened interval: 780' - 820'
Specific Conductivity (SC)
in microsiemens / centimneter (µs/cm)
800
700
600
500
400
300
200
100
0
2020
2021
2022
2023
2024
2025
2026
Measurable Objective - 700 µs/cm
188
250
251
218
218
Historic SC
SC
Measurable Objective

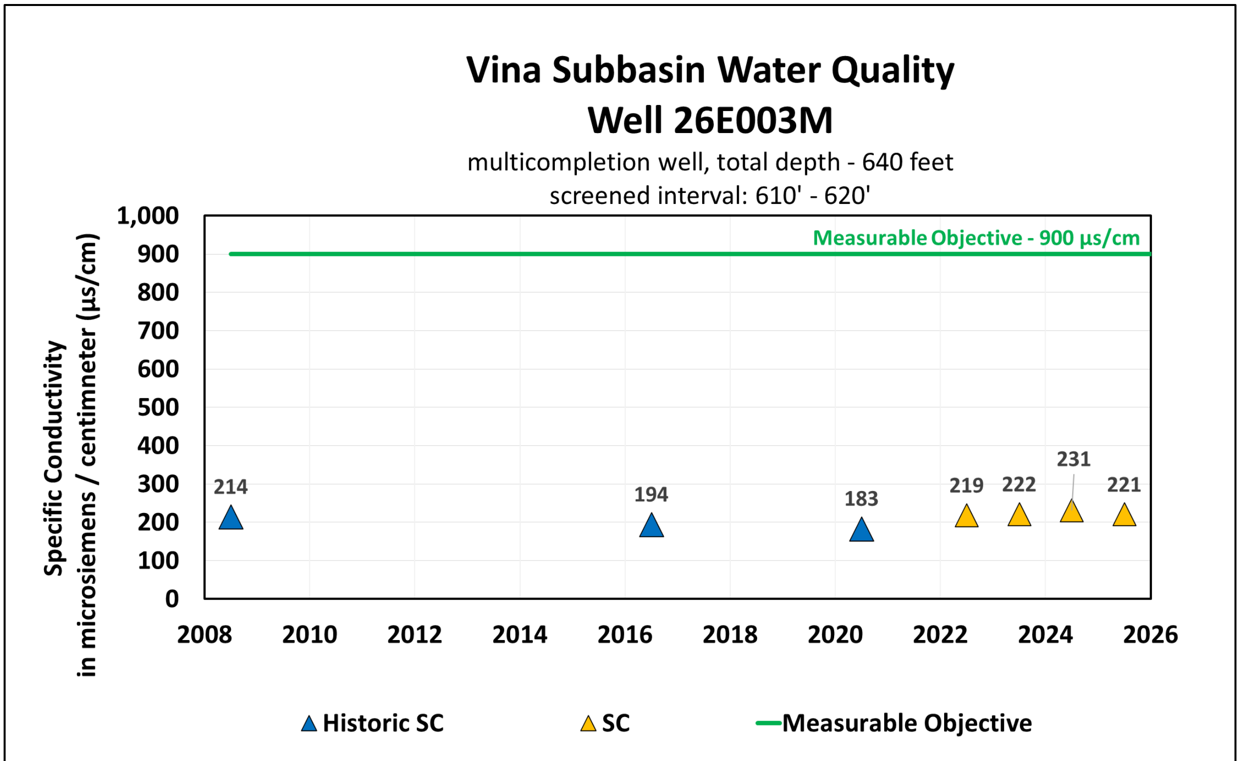
Vina Subbasin

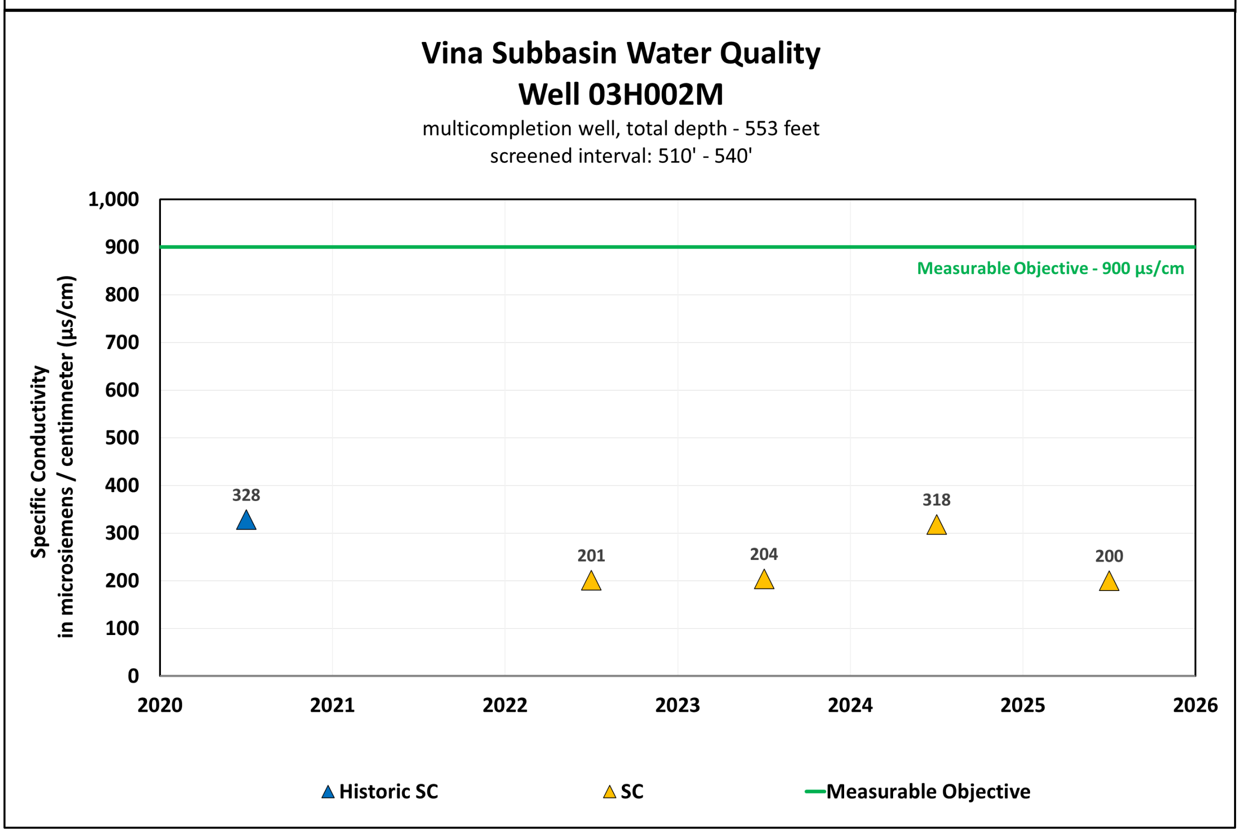


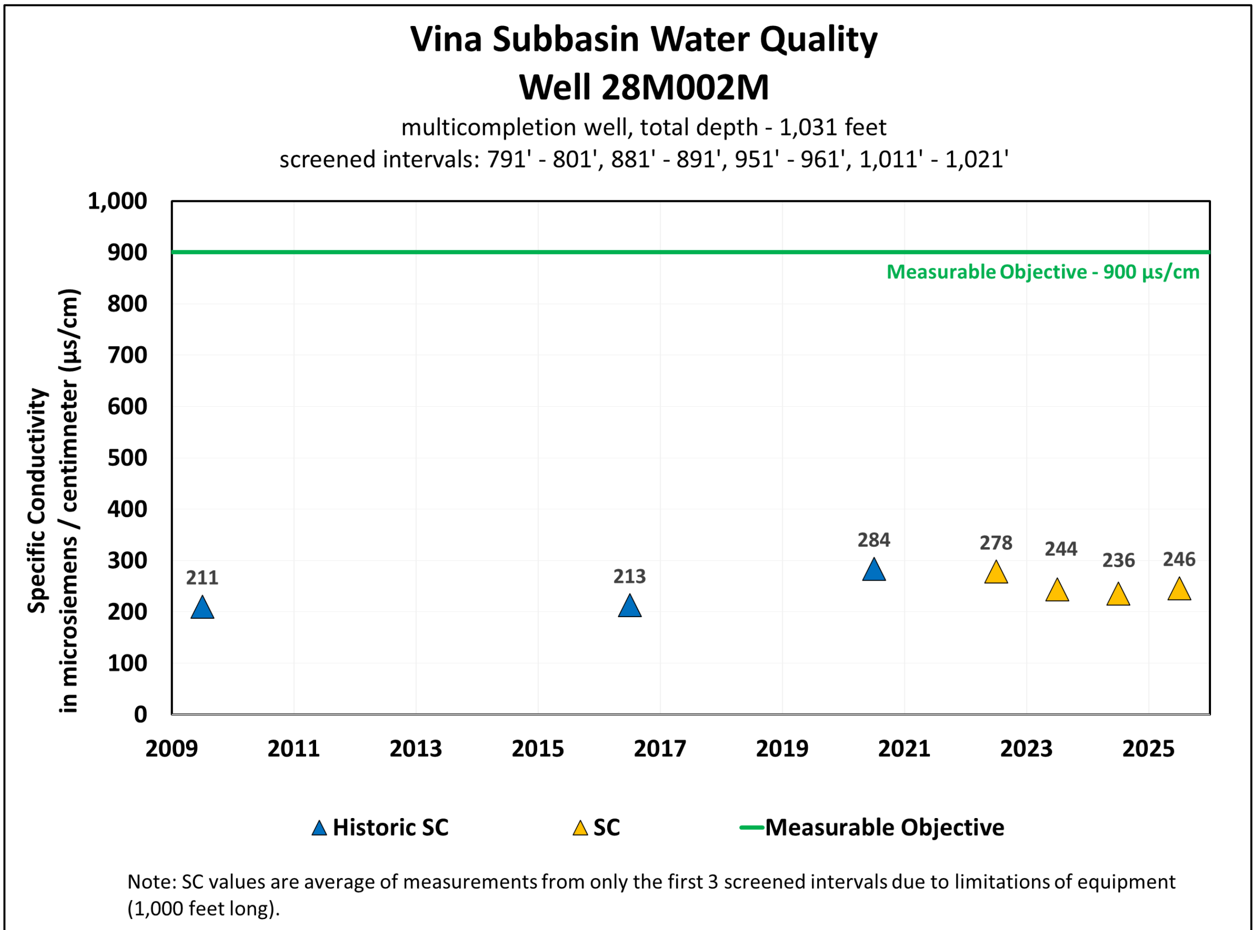



Vina Subbasin Water Quality
Well 13L002M
multicompletion well, total depth - 771 feet
screened interval: 735' - 760'
Specific Conductivity
in microsiemens / centimneter (µs/cm)
1,000
900
800
700
600
500
400
300
200
100
0
Measurable Objective - 900 µs/cm
290
283
284
270
2022
2023
2024
2025
2026
SC
Measurable Objective

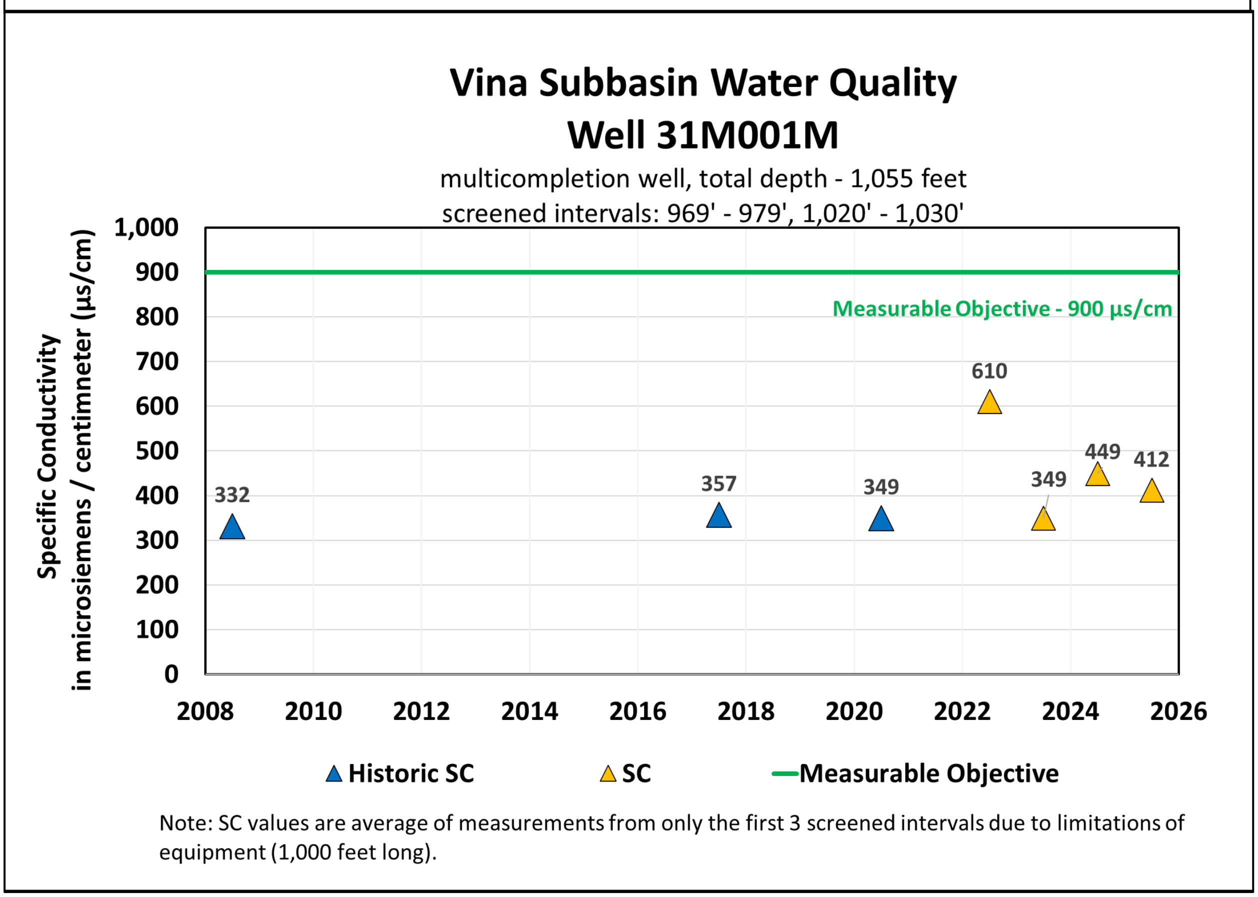

Vina Subbasin Water Quality
Well 18C001M
multicompletion well, total depth - 914 feet
screened intervals: 770' - 780', 800' - 810', 830' - 840', 870' - 880'
Specific Conductivity
in microsiemens / centimneter (µs/cm)
1,000
900
800
700
600
500
400
300
200
100
0
Measurable Objective - 900 µs/cm
247
277
277
278
291
278
272
2010
2012
2014
2016
2018
2020
2022
2024
2026
Historical SC
SC
Measurable Objective


Vina Subbasin Water Quality
Well 26E003M
multicompletion well, total depth - 640 feet
screened interval: 610' - 620'
Specific Conductivity
in microsiemens / centimneter (µs/cm)
Measurable Objective - 900 µs/cm
214
194
183
219
222
231
221
1,000
900
800
700
600
500
400
300
200
100
0
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
Historic SC
SC
Measurable Objective


Vina Subbasin Water Quality
Well 03H002M
multicompletion well, total depth - 553 feet
screened interval: 510' - 540'
Specific Conductivity
in microsiemens / centimneter (µs/cm)
Measurable Objective - 900 µs/cm
328
201
204
318
200
1,000
900
800
700
600
500
400
300
200
100
0
2020
2021
2022
2023
2024
2025
2026
Historic SC
SC
Measurable Objective

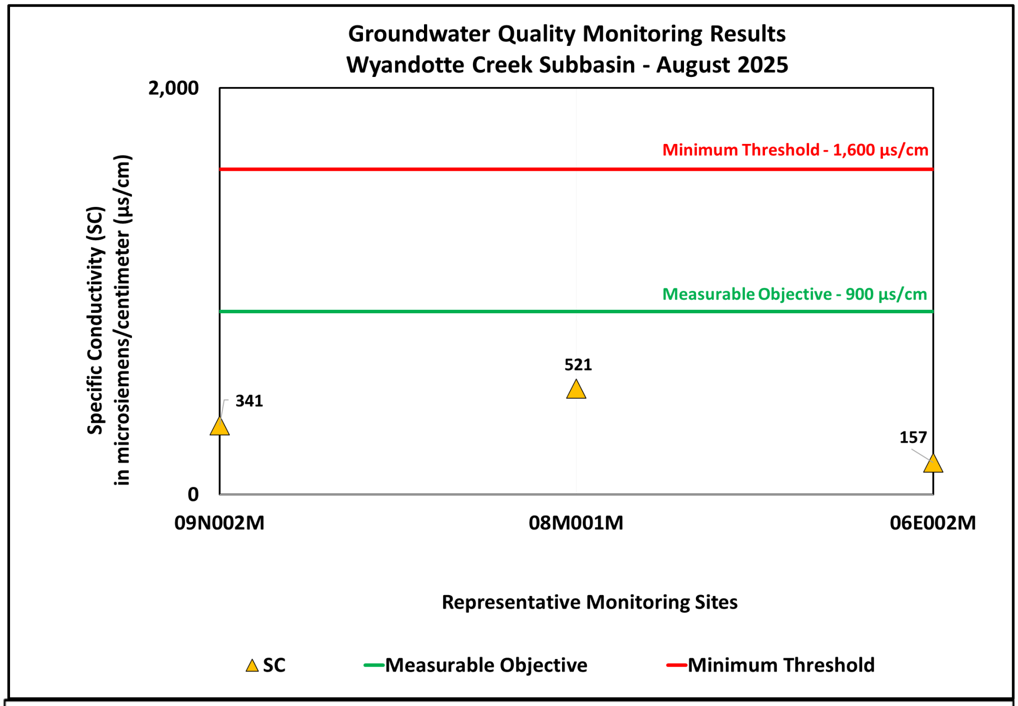


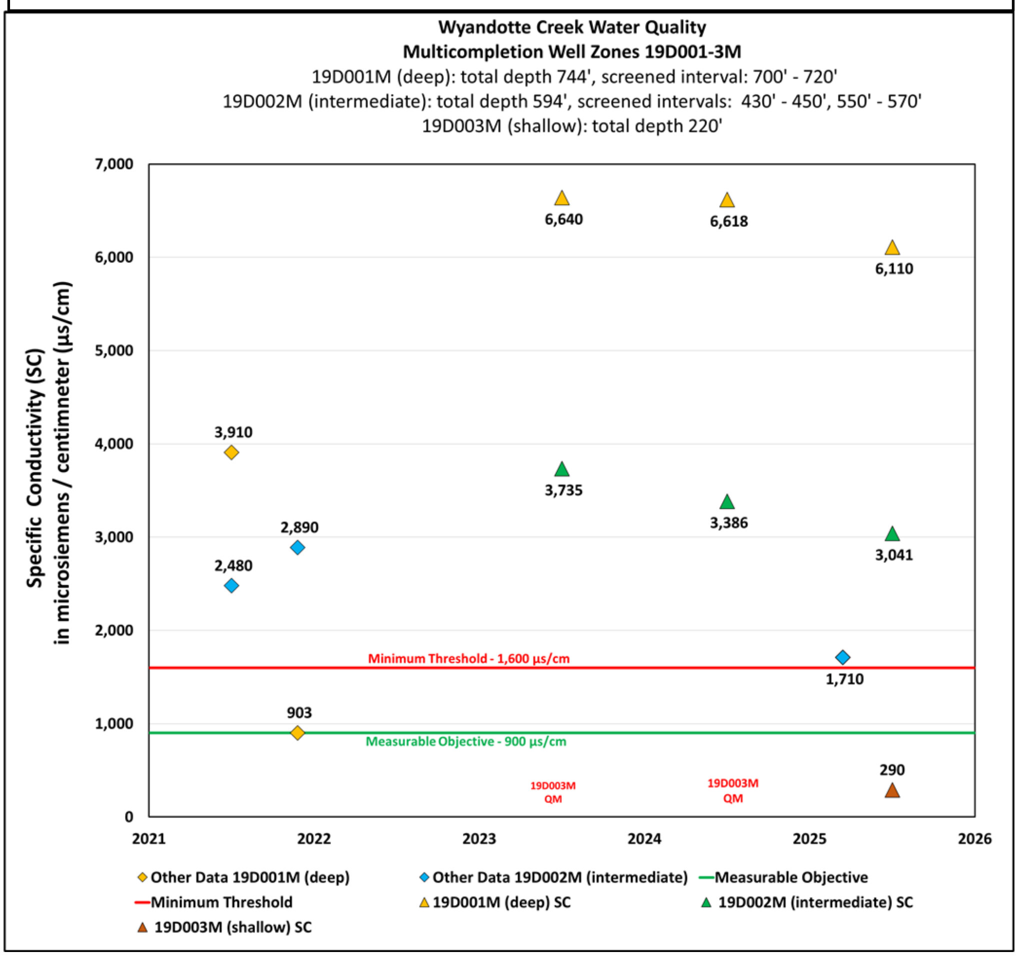
Vina Subbasin Water Quality
Well 28M002M
multicompletion well, total depth - 1,031 feet
screened intervals: 791' - 801', 881' - 891', 951' - 961', 1,011' - 1,021'
Specific Conductivity in microsiemens / centimneter (µs/cm)
Measurable Objective - 900 µs/cm
211
213
284
278
244
236
246
Historic SC
SC
Measurable Objective
Note: SC values are average of measurements from only the first 3 screened intervals due to limitations of equipment (1,000 feet long).

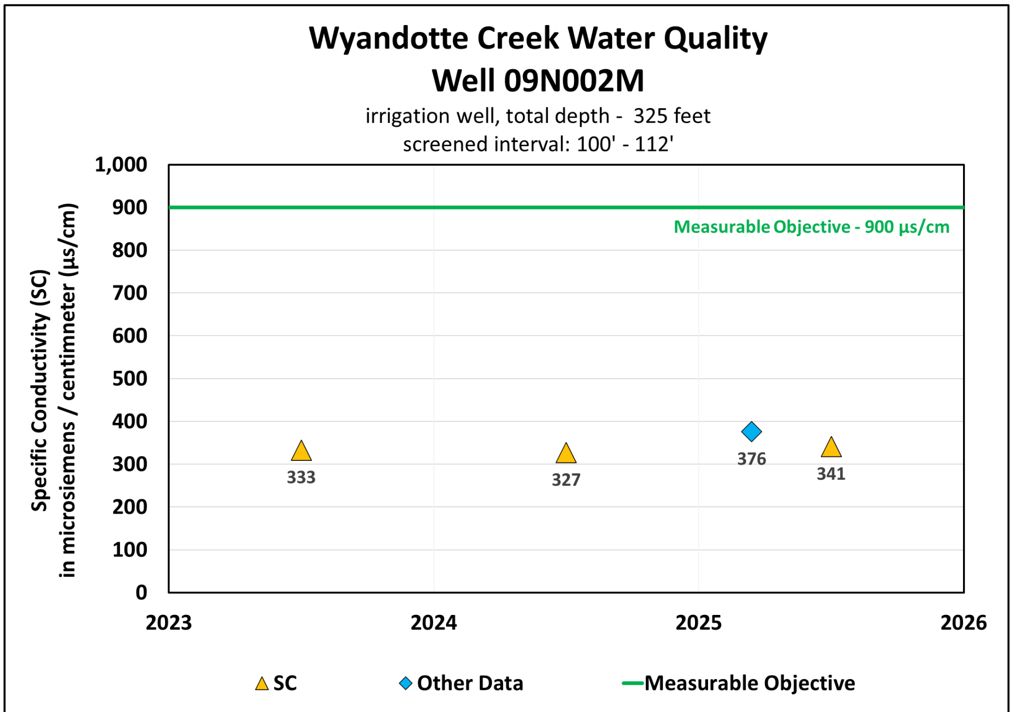


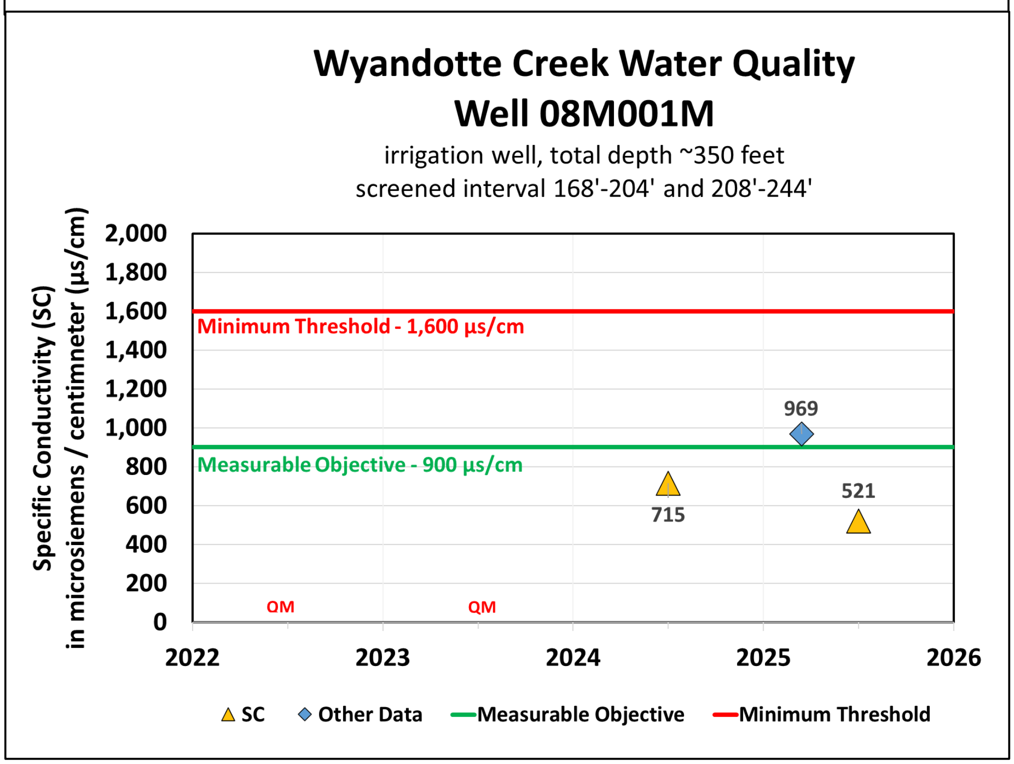
Vina Subbasin Water Quality
Well 31M001M
multicompletion well, total depth - 1,055 feet
screened intervals: 969' - 979', 1,020' - 1,030'
Specific Conductivity in microsiemens / centimneter (µs/cm)
Measurable Objective - 900 µs/cm
332
357
349
610
349
449
412
Historic SC
SC
Measurable Objective
Note: SC values are average of measurements from only the first 3 screened intervals due to limitations of equipment (1,000 feet long).

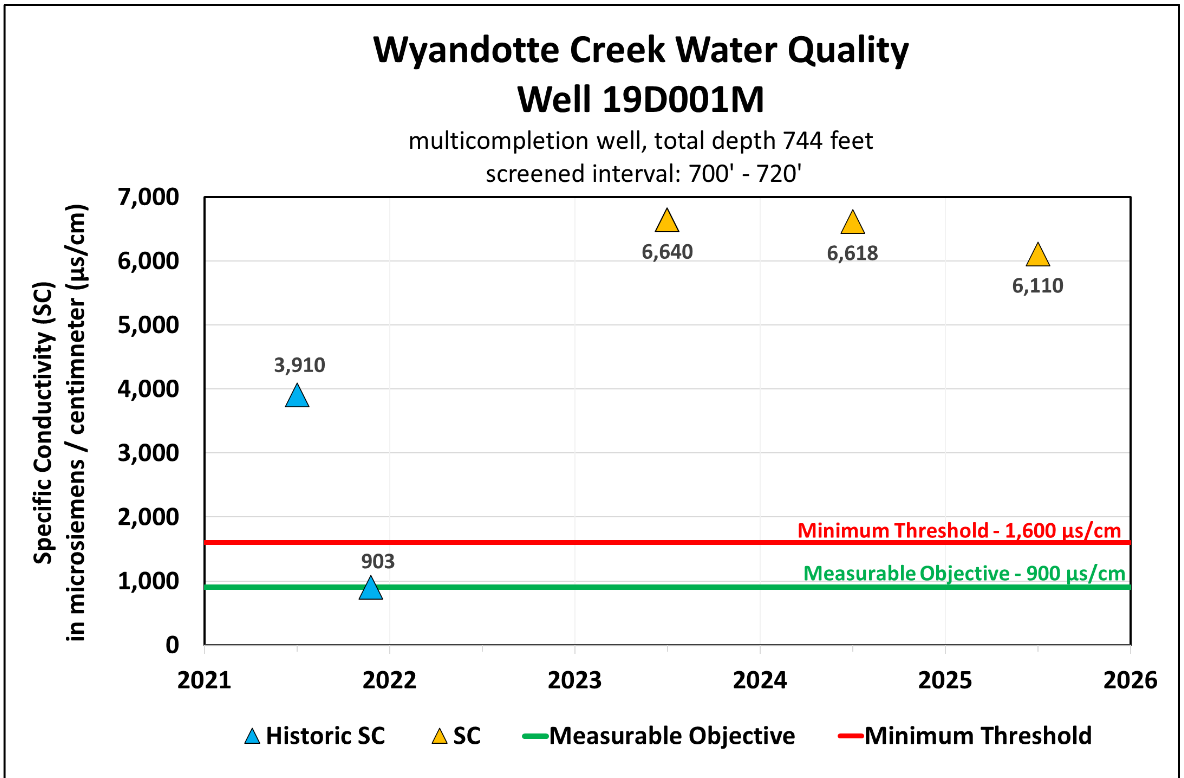
Wyandotte Creek Subbasin

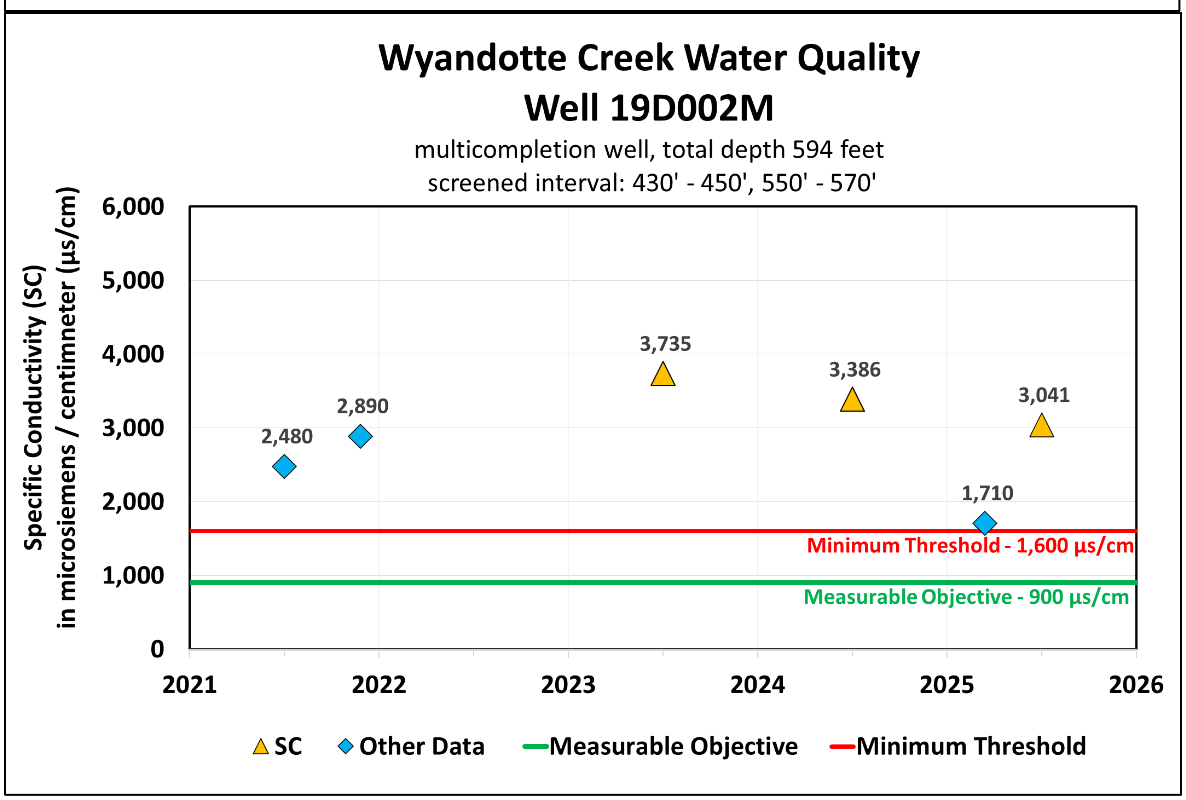


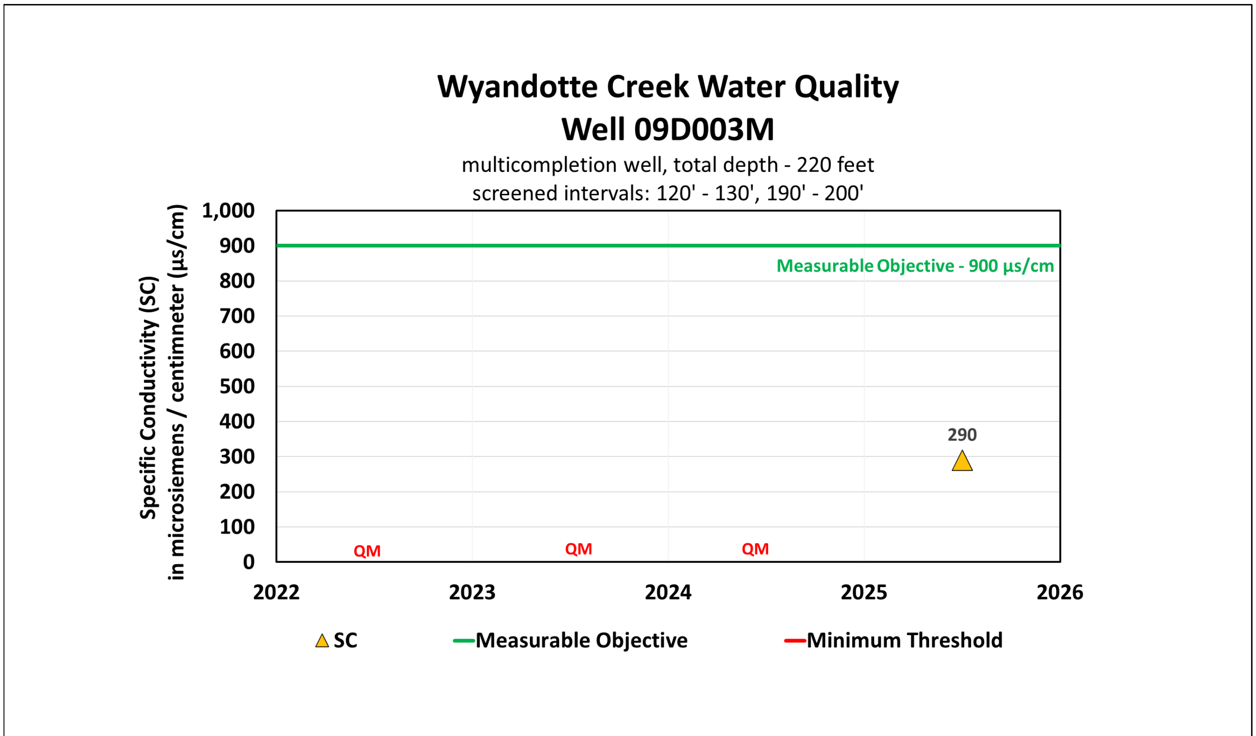


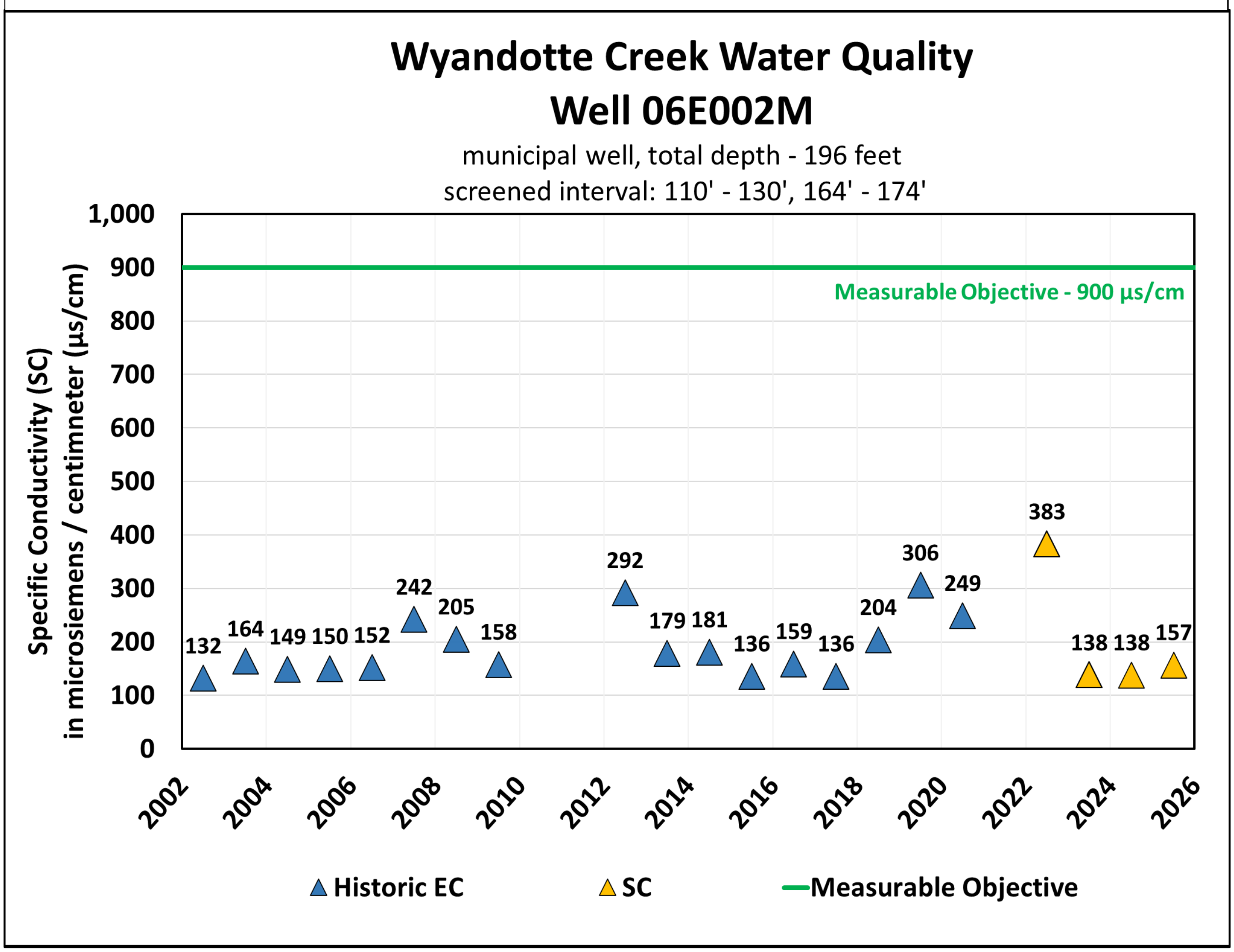

Wyandotte Creek Water Quality
Well 09N002M
irrigation well, total depth - 325 feet
screened interval: 100' - 112'
Specific Conductivity (SC)
in microsiemens / centimneter (µs/cm)
1,000
900
800
700
600
500
400
300
200
100
0
2023
2024
2025
2026
Measurable Objective - 900 µs/cm
333
327
376
341
SC
Other Data
Measurable Objective


Wyandotte Creek Water Quality
Well 08M001M
irrigation well, total depth ~350 feet
screened interval 168'-204' and 208'-244'
Specific Conductivity (SC)
in microsiemens / centimneter (µs/cm)
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
2022
2023
2024
2025
2026
Minimum Threshold - 1,600 µs/cm
Measurable Objective - 900 µs/cm
969
715
521
QM
QM
SC
Other Data
Measurable Objective
Minimum Threshold


Wyandotte Creek Water Quality
Well 19D001M
multicompletion well, total depth 744 feet
screened interval: 700' - 720'
Specific Conductivity (SC)
in microsiemens / centimneter (µs/cm)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2021
2022
2023
2024
2025
2026
6,640
6,618
6,110
3,910
903
Minimum Threshold - 1,600 µs/cm
Measurable Objective - 900 µs/cm
Historic SC
SC
Measurable Objective
Minimum Threshold


Wyandotte Creek Water Quality
Well 19D002M
multicompletion well, total depth 594 feet
screened interval: 430' - 450', 550' - 570'
Specific Conductivity (SC)
in microsiemens / centimneter (µs/cm)
6,000
5,000
4,000
3,000
2,000
1,000
0
2021
2022
2023
2024
2025
2026
3,735
3,386
3,041
2,890
2,480
1,710
Minimum Threshold - 1,600 µs/cm
Measurable Objective - 900 µs/cm
SC
Other Data
Measurable Objective
Minimum Threshold


Wyandotte Creek Water Quality
Well 09D003M
multicompletion well, total depth - 220 feet
screened intervals: 120' - 130', 190' - 200'
Specific Conductivity (SC)
in microsiemens / centimneter (µs/cm)
1,000
900
800
700
600
500
400
300
200
100
0
Measurable Objective - 900 µs/cm
290
QM
QM
QM
2022
2023
2024
2025
2026
SC
Measurable Objective
Minimum Threshold


Wyandotte Creek Water Quality
Well 06E002M
municipal well, total depth - 196 feet
screened interval: 110' - 130', 164' - 174'
Specific Conductivity (SC)
in microsiemens / centimneter (µs/cm)
1,000
900
800
700
600
500
400
300
200
100
0
Measurable Objective - 900 µs/cm
132
164
149
150
152
242
205
158
292
179
181
136
159
136
204
306
249
383
138
138
157
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
Historic EC
SC
Measurable Objective

Water Year 2025 Annual Report

Appendix G

PMA Progress

PMA DB ID	PMA ID	PMA Name	Lead GSA(s)	Basin	GSP	Implementation Date	Water Year *	Status *	Describe the project or management action's progress towards implementing the plan since the previous annual report. **	No Update - Provide an explanation.	Provide an explanation for withdrawing the PMA. **	Were new sources of funding acquired? **	Select Funding Sources **	Funding Source(s) Description **	Were quantifiable water supply benefits obtained from this PMA? **	Benefits (AF) **	Were other benefits obtained from this PMA? **	Describe the other benefits. **
279	5-021.57_PMA_1	Agricultural Irrigation Efficiency	Vina GSA	5-021.57 VINA	5-021.57 VINA		2025	Planning phase in progress	A Precision Irrigation Pilot program is underway as part of the Demand Reduction Strategies project funded by the SGM Grant Program. A group of representative orchards in the subbasin were identified for participation in the pilot to explore whether changes to irrigation can reduce non-beneficial ET without affecting yield. The planning study, led by Subject Matter Experts with extensive experience in irrigation technology and agronomy, is on schedule for completion by March 2026.			SGM Grant Program			NA	NA	NA	NA
280	5-021.57_PMA_2	Project: Residential Conservation	Vina GSA	5-021.57 VINA	5-021.57 VINA		2025	Active	Continued funding and customer outreach for CWS conservation programs			No			Yes	8	Yes	Customer education on water use efficiency
281	5-021.57_PMA_3	Project: Scoping for Flood MAR/Surface Water Supply and Recharge	Vina GSA;Rock Creek Reclamation District GSA	5-021.57 VINA	5-021.57 VINA		2025	Planning phase in progress	Project identification and feasibility analysis underway and funded by SGM Grant Program for recharge and water supply projects. Surface Water Supply feasibility study underway, to be completed by the end of 2025. Project identification and field investigation activities (i.e. tTEM) occurred for FloodMAR recharge concepts throughout the Vina subbasin at locations with willing landowners. Groundwater Recharge Investigation and Preliminary Design report expected to be complete by June 2026.			No			N/A	N/A	N/A	N/A
282	5-021.57_PMA_4	Project: Community Water Education Initiative	Vina GSA	5-021.57 VINA	5-021.57 VINA			No Update		No status provided at this time								
283	5-021.57_PMA_5	Project: Fuel Management for Watershed Health	Vina GSA	5-021.57 VINA	5-021.57 VINA			No Update		Not being pursued at this time								
284	5-021.57_PMA_6	Project: Paradise Irrigation District Intertie	Vina GSA	5-021.57 VINA	5-021.57 VINA			No Update		The GSAs nor PID are pursing this project at this time.								
285	5-021.57_PMA_7	Project: Agricultural Surface Water Supplies	Vina GSA	5-021.57 VINA	5-021.57 VINA		2025	Planning phase in progress	Surface Water Supply Feasibility Study underway, to be completed by the end of 2025. Work funded by SGM Grant Program. The study evaluates the feasibility of two specific projects: South Vina Extension, which would bring Feather River water through Western Canal Water District to the southern portion of the subbasin; and Ridge to Valley which would bring Paradise Irrigation District water to agricultural users along Comanche Creek.			No			N/A	N/A	N/A	N/A
286	5-021.57_PMA_8	Project: Streamflow Augmentation	Vina GSA	5-021.57 VINA	5-021.57 VINA		2025	On hold	Waiting on CDFW access approval									
287	5-021.57_PMA_9	Community Monitoring Program	Vina GSA	5-021.57 VINA	5-021.57 VINA		2025	Implementation	The Community Monitoring Program is underway. Outreach completed in June 2025 to recruit domestic well owners for participation in the monitoring network. Of 18 landowners who responded, 13 wells were inspected, and 8 have been prioritized for equipment installation based on geographic distribution, proximity to RMS wells, and vulnerability to going dry. Consultant team is coordinating directly with selected participants to schedule site visits and begin installations. Funded by the DWR Sustainable Groundwater Management Grant. Project is on schedule for completion by December 2026.			No			N/A	N/A	Yes	Addressing data gaps identified in the 2022 GSP
288	5-021.57_PMA_10	Project: Wastewater Recycling	Vina GSA	5-021.57 VINA	5-021.57 VINA		2025	In Progress	The City of Chico has funded and initiated a Recycled Water Feasibility Study (RWFS). The RWFS is scheduled to be complete by Spring 2026.			Yes, City of Chico			None to date	N/A	Increased understanding of recycled water opportunities within the subbasin.	Identification of a long list of recycled water project alternatives, completion of an alternatives analysis, identification of fatal flaws, and ultimately a recommendation for 1-2 recycled water projects. Completion of a RWFS is often a requirement of grant funding as well.
289	5-021.57_PMA_11	Project: Rangeland Management and Water Retention	Vina GSA	5-021.57 VINA	5-021.57 VINA		2025	Active	All cattle leases were suspended during the 2025 season for infrastructure (fencing and water) repair. Cattle will return in November 2025.			No			No		N/A	N/A
290	5-021.57_PMA_12	Project: Removal of Invasive Species	Vina GSA	5-021.57 VINA	5-021.57 VINA		2025	Active	Two springs enclosures were developed at just over ~10 acres and invasive species removal within those inclosures occurred			No			No		Yes	An increase in cover native species as invasive species are reduced.
291	5-021.57_PMA_13	Project: Surface Water Supply and Recharge	Vina GSA;Rock Creek Reclamation District GSA	5-021.57 VINA	5-021.57 VINA		2025	Planning phase in progress	Feasibility study underway to assess recharge potential along Lindo Channel. Fieldwork began in early 2025 with infiltration testing, stilling well installations, and domestic well monitoring setup. Modeling efforts have analyzed historical streamflow and weather data, evaluated environmental constraints, and developed a flow model for Big Chico Creek and Lindo Channel. Consultants are now running scenarios to estimate potential recharge under different flow conditions, including storm events and altered channel velocities. Recharge alternatives are under evaluation. Funded by the DWR Sustainable Groundwater Management Grant. Project is on schedule for completion by March 2026.			No			N/A	N/A	N/A	N/A
292	5-021.57_PMA_14	Extend Orchard Replacement	Vina GSA	5-021.57 VINA	5-021.57 VINA		2025	Planning Phase underway	A Pilot program is underway as part of the Demand Reduction Strategies project funded by the SGM Grant Program. The pilot will analyze water savings from historical fallowing practices. The feasibility study includes an economic analysis to evaluate the project's benefits/costs over the next 25-30 years if the program were to be implemented.			Planning funded by SGM Grant Program			NA	NA	NA	NA
293	5-021.57_PMA_15	Recharge from the Miocene Canal	Vina GSA	5-021.57 VINA	5-021.57 VINA			No Update		The Miocene Canal will not be rebuilt (after destruction from the 2018 Camp Fire).								
294	5-021.57_PMA_16	General Plan Updates	Vina GSA	5-021.57 VINA	5-021.57 VINA		2025	Ongoing	The County is in the process of preparing the Annual Update for the General Plan.			N/A			N/A	0	N/A	N/A
295	5-021.57_PMA_17	Domestic Well Mitigation	Vina GSA	5-021.57 VINA	5-021.57 VINA			No Update		not being pursued at this time								
296	5-021.57_PMA_18	Well Permitting Ordinance	Vina GSA	5-021.57 VINA	5-021.57 VINA		2025	In Progress	Grant funds have been awarded and RFP process is in progress. Projected kick-off for Well Ordiannce review is January, 2026.			Yes			N/A		N/A	N/A
297	5-021.57_PMA_19	Landscape Ordinance	Vina GSA	5-021.57 VINA	5-021.57 VINA			No Update		No changes to the Lanscape Ordinance has been made. The current Ordinance complies with DWR's Model Water Efficient Landscaping Ordiance.								
298	5-021.57_PMA_20	Prohibition of Groundwater Use for Ski (Recreational) Lakes	Vina GSA	5-021.57 VINA	5-021.57 VINA			No Update		No status provided at this time								
299	5-021.57_PMA_21	Expansion of Water Purveyors' Service Area	Vina GSA	5-021.57 VINA	5-021.57 VINA			No Update		No status provided at this time								
300	5-021.57_PMA_22	Groundwater Allocation	Vina GSA	5-021.57 VINA	5-021.57 VINA			No Update		No status provided at this time								