

ANNUAL REPORT | APRIL 2026

**RED BLUFF SUBBASIN (5-021.50)
GROUNDWATER SUSTAINABILITY PLAN
ANNUAL REPORT – 2025**

SUBMITTED BY



TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

**TEHAMA COUNTY FLOOD CONTROL AND
WATER CONSERVATION DISTRICT
GROUNDWATER SUSTAINABILITY AGENCY**

PREPARED BY



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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
AEM	Airborne electromagnetic
AF	acre-feet
AFY	acre-feet per year
AMSL	above mean sea level
Tehama County GSA	Tehama County Flood Control and Water Conservation District Groundwater Sustainability Agency
CVO	Central valley operations
DWR	Department of Water Resources
DMS	data management system
eWRIMS	Electronic Water Rights Information Management System
GPS	global positioning system
GSP	groundwater sustainability plan
GSA	groundwater sustainability agency
IM	Interim milestone
InSAR	Interferometric Synthetic Aperture Radar
MO	measurable objective
MT	minimum threshold
PMA	projects and management action
RMS	representative monitoring site
SI	sustainability indicator
SGM	sustainable groundwater management
SGMA	Sustainable Groundwater Management Act
SMC	sustainable management criteria
Subbasin	Red Bluff Subbasin
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TIHM	Tehama Integrated Hydrogeologic Model
UR	undesirable result
USBR	United States Bureau of Reclamation
UWMP	Urban Water Management Plan
WY	water year

EXECUTIVE SUMMARY

The Red Bluff Subbasin (Subbasin) (5-021.50) Annual Report was prepared on behalf of the Tehama County Flood Control and Water Conservation District GSA (Tehama County 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 Red Bluff Subbasin, located within Tehama County, as shown in **Figure ES-1**.

Measured conditions in the Subbasin are in compliance with minimum thresholds (MTs) for all applicable sustainability indicators (SIs). An MT is the quantitative value that represents the groundwater conditions measured at a representative monitoring site (RMS) that, when exceeded individually or in combination with MTs at other monitoring sites, may define an undesirable result(s) (UR) in the Subbasin 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 objectives (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 total dissolved solids (TDS) concentration increases beyond the MO established for that site, it moves in the direction of the MT. The SIs and SMC, including MTs, are summarized in **Table ES-1**. Note that seawater intrusion is not an applicable SI in this Subbasin. Each SI is measured at the RMS.

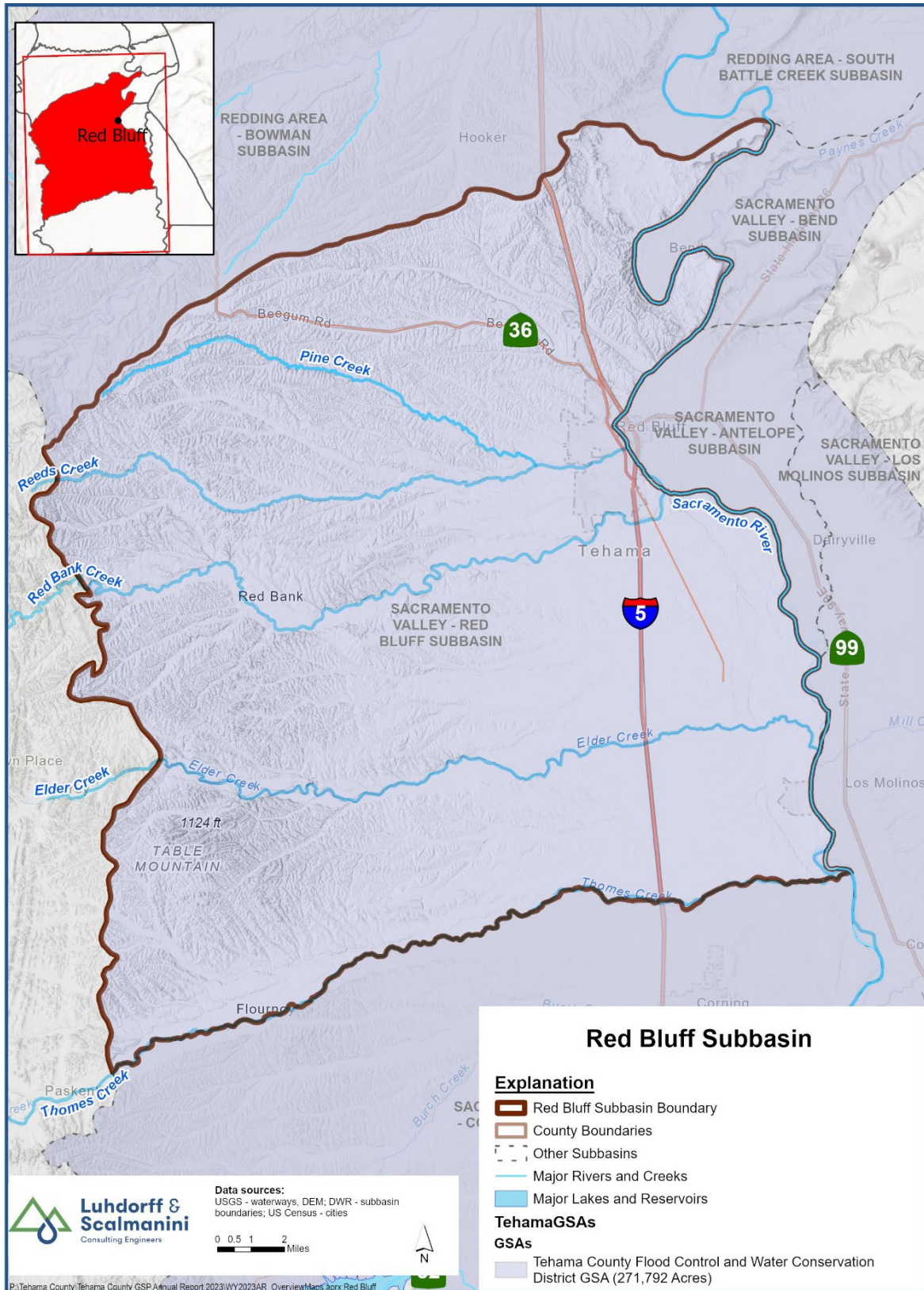


Figure ES-1. Red Bluff Subbasin and Groundwater Sustainability Agency Boundaries

Table ES-1. Red Bluff 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.	10 supply wells become dry (after the GSP revision) within a tessellation hexagon, or when water levels at any RMP in the future decline 7.5 feet or more over a five (5) year period.	Upper & Lower Aquifer: Spring 2015 groundwater elevation minus five feet (for wells with increasing or no groundwater trends) or projected spring 2042 groundwater elevation minus five feet for wells with declining groundwater elevations.	Focus Areas: 2020-2022 groundwater lows. Outside Focus Areas: 2020-2022 lows minus 20 feet.
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.	25% of groundwater elevations measured at the same RMS wells exceed the associated MT for two consecutive fall measurements.	Upper & Lower Aquifer: Amount of groundwater storage when groundwater elevations are at their MO.	Upper & Lower Aquifer: Amount of groundwater in storage when groundwater elevations are at their MT.
Degraded Water Quality			
No indication of undesirable results. One RMS well exceeded the MO and MT in WY 2025.	At least 25% of RMS exceed the MT for water quality for two consecutive years at each well where it can be established that GSP implementation is the cause of the exceedance.	Upper & Lower Aquifer: California lower limit secondary MCL concentration for TDS of 500 mg/L measured at RMS wells.	Upper & Lower Aquifer: TDS concentration of 750 mg/L at all RMS wells.

Table ES-1. Red Bluff Subbasin Sustainability Indicator Summary			
2025 Status	Undesirable Result Identification	Measurable Objective (MO) Definition	Minimum Threshold (MT) Definition
Land Subsidence			
No indication of undesirable results. No InSAR pixel exceeded MT in WY 2025.	50% of RMS exceed the MT over a 5-year period, which is irreversible and caused by the lowering of groundwater elevations.	One foot over 20 years (zero inelastic subsidence, in addition to any measurement error). If InSAR data are used, the measurement error is 0.1 feet, and any measurement 0.1 feet or less would not be considered inelastic subsidence.	Two feet over 20 years (i.e., no more than 0.5 feet of cumulative subsidence over a five-year period (beyond the measurement error), solely due to lowering of groundwater elevations.
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.	25% of groundwater elevations, measured at the same RMS wells, exceed the associated MTs for 2 consecutive fall measurements.	Same as chronic lowering of groundwater levels.	Same as chronic lowering of groundwater levels.

Notes:

TDS is the primary water quality constituent of concern.

MO = Measurable Objective; MT = Minimum Threshold; RMS = representative monitoring site; mg/L = milligrams per liter; MCL = Maximum Contaminant Level; SMCL = Secondary Maximum Contaminant Level.

Current Groundwater Level and Storage Conditions

The WY 2025 groundwater conditions in the Subbasin are characterized by groundwater elevations that remained above the MOs in all measured RMS wells in spring and below the MOs in all RMS wells in fall 2025. However, all RMS wells remained above the corresponding MT in WY 2025, thus remaining 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 24 consecutive months, hence avoiding undesirable results as defined in the GSP.

Generally, groundwater elevations are, on average, 30 feet above the MT throughout the Subbasin and, on average, 14 feet above the MO in spring 2025 and 11 feet below the MO in fall 2025. Elevations are mostly near or slightly higher than those observed in recent dryer years. This positive trend is influenced by above-normal hydrologic conditions in WY 2023 through WY 2025, which supported the recovery of groundwater conditions relative to the dry period from WY 2020 to WY 2022, despite increased groundwater extraction.

Fluctuations in groundwater levels and storage within the Subbasin are influenced by the balance between aquifer recharge and extraction. Groundwater levels serve 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, diminished surface water supplies lead to increased extraction and reduced recharge, causing a decline in groundwater storage.

WY 2025 was classified as an above-normal WY and there was an increase in cumulative groundwater storage, totaling approximately 5,500 acre-feet (AF) in the Upper and Lower Aquifer. For context, over the past 36 years, the largest decrease in groundwater storage is estimated at -164,000 AF, and the highest increase is estimated at 130,000 AF. **Figure ES-2** shows groundwater pumping, as well as annual and cumulative changes in groundwater storage from WY 1990 to WY 2025.

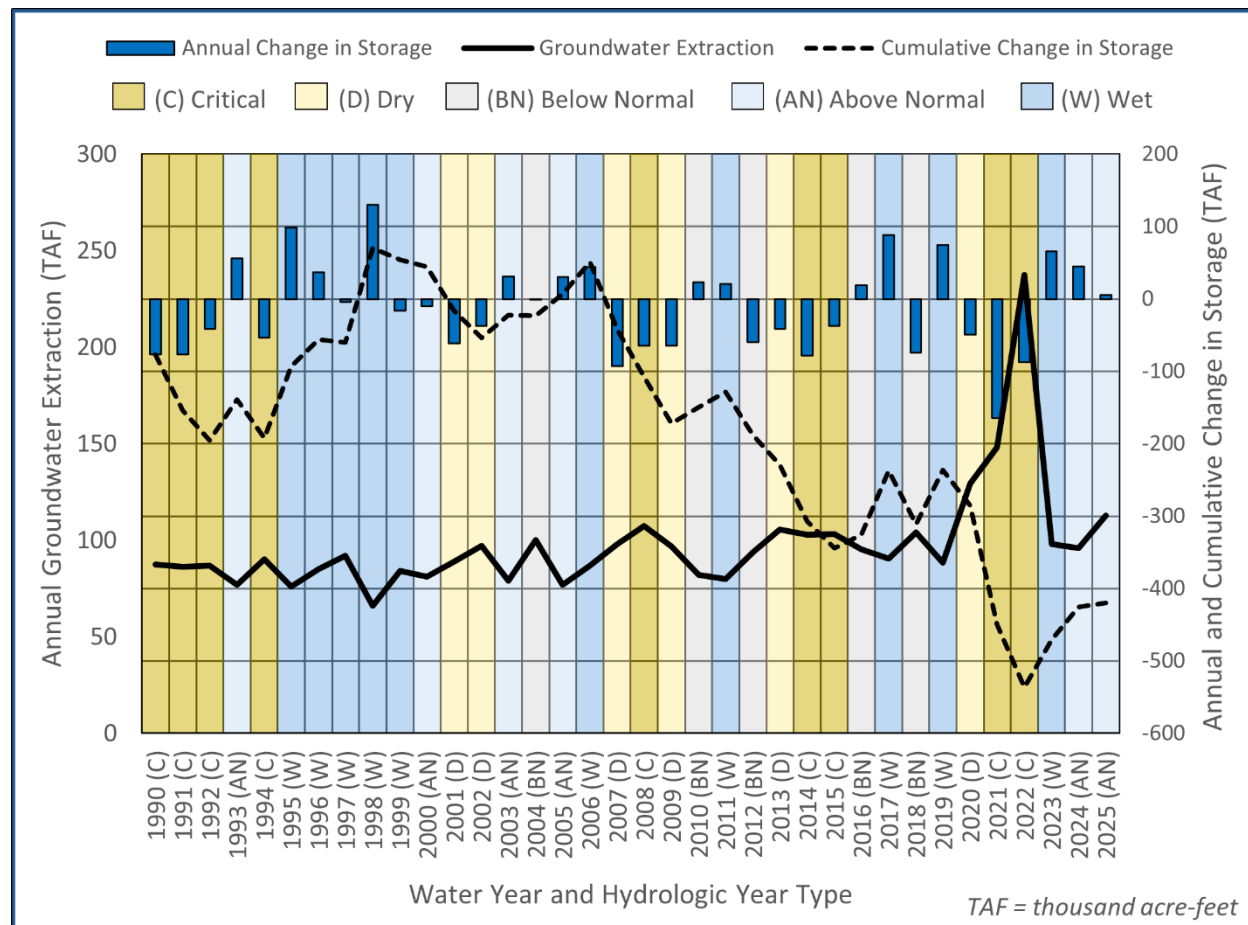


Figure ES-2. Red Bluff Subbasin Groundwater Pumping, Annual and Cumulative Change in Storage from WY 1990 to WY 2025

Water Use

Groundwater extraction was approximately 112,900 AF in WY 2025, higher than the 95,800 AF extracted in WY 2024. The Subbasin receives surface water supplies from the Central Valley Project (CVP) through the Corning Canal to the Proberta Water District and portions of the Thomes Creek Water District that overlie the Red Bluff Subbasin. The annual volume of surface water delivered to the Subbasin was about 1,500 AF in WY 2025, slightly lower than the 1,700 AF delivered in WY 2024. The decrease in surface water estimates in WY 2025 compared to WY 2024 is attributed to a potential decrease in precipitation in WY 2025 compared to WY 2024, where decreased precipitation is not able to meet evapotranspiration demands.

Groundwater provides the majority (99%) of the total water use in the Subbasin, and surface water is the source for the remainder (1%). Groundwater also met the demand for municipal and rural residential users. 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 budget approach has been used to estimate the remaining unmeasured

volume of groundwater extraction. **Table ES-2** provides a summary of water use by water sector. Numbers are rounded to the nearest 100.

Table ES-2. Red Bluff Subbasin Total Water Use by Water Use Sector for WY 2025					
Sector	Groundwater (AF)	Surface Water (AF)	Total (AF)	Percent of Total Water Use	Total Sector Area (acres)
Agricultural	95,300	1,500	96,800	85%	34,000
Municipal	6,000	0	6,000	5%	0
Rural Residential	11,600	0	11,600	10%	n/a*
Total	112,900	1,500	114,400	100%	
Percent of Total Water Use	99%	1%	100%		

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

GSP Implementation Progress

The main activities and updates since the previous annual report are as follows:

- The Tehama County GSA completed the WY 2025 Annual Report and other critical tasks.
- The Tehama County GSA coordinated a proposal seeking funding through DWR’s SGM Grant Program. Coordination efforts included planning and refining project and management actions (PMAs), evaluating and ranking PMAs, and preparing and submitting the grant application. The grant application was submitted in December 2022, and a final award list was released by DWR in September 2023; results are summarized in **Appendix G**.
- An airborne electromagnetic (AEM) survey by DWR took place in the summer of 2022. The data collected provides a better understanding of aquifer characteristics and will help support future efforts to refine the current hydrogeologic conceptual model. Data are available at: <https://data.cnra.ca.gov/dataset/aem>.
- All sustainability indicators (SIs) are above their MTs (see summary **Table 5-1**).
- Progress has been made on six PMAs since the last annual report (**Appendix G**).

Several other actions continue in the Subbasin to fulfill the requirements of the GSP. These include:

- Monitoring and recording groundwater levels and groundwater quality.
- Maintaining and updating the data management system (DMS) with newly collected data.
- Annual reporting of Subbasin conditions and submission to DWR as required by SGMA.
- Ongoing intra- and inter-basin coordination.

Since 2023, the Tehama County GSA in the Subbasin has been prepared to implement future projects to address recommended corrective actions, which will largely be funded by the SGM Implementation Grant

Program. The ongoing implementation of PMAs, outlined in **Section 5**, aims to address these corrective actions effectively through the periodic evaluation of the GSP, which is due in January 2027.

Following DWR's review of the Red Bluff Subbasin Water Year 2024 Annual Report, they requested additional information on August 1, 2025, to address deficiencies in groundwater level monitoring and reporting, ensure complete and regulation-compliant seasonal measurements at representative monitoring sites, and support evaluation of progress toward achieving the Subbasin's sustainability goal. The Red Bluff GSAs' response to DWR's review can be found in **Section 5.1** (the letter is in **Appendix H**).

1 GENERAL INFORMATION §356.2(A)

The annual report for the Red Bluff Subbasin (Subbasin) (5-021.57) was prepared on behalf of the Tehama Flood Control and Water Conservation District and the Tehama County Groundwater Sustainability Agency (Tehama 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 the Groundwater Sustainability Agencies (GSAs) to submit an annual report to DWR by April 1st 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. For information on Red Bluff Subbasin and GSP Implementation, Technical Advisory Committee meeting schedules and recordings, and other resources, the public should visit the (<https://tehamacountywater.org/gsa/>) website.

1.1 Report Contents

This report is the fifth annual report prepared for the Red Bluff Subbasin GSP, submitted in January 2022 (revision submitted in April 2024). 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 425-square-mile (271,800-acre) area in the southern region of Tehama County. The Subbasin is managed by the Tehama County GSA.

The Subbasin is shown in **Figure 1-1** and **Figure 1-2**. The Subbasin is located in the northern portion of the Sacramento Groundwater Basin (**Figure 1-1**). The Subbasin’s northern boundary is the Bowman Subbasin, on the east by the Bend Subbasin, the Antelope Subbasin, and the Los Molinos Subbasin, and on the west by the Coastal Mountain Range (DWR, 2018), **Figure 1-2**. Several surface water features are located in the Subbasin, including the Pine, Reeds, Red Bank, Elder, and Thomes Creeks. Groundwater generally flows from northeast to southwest.

The Red Bluff GSP estimates the sustainable yield of the Subbasin to be 150,000 acre-feet (AF) based on historical groundwater pumping averages of 80,000 acre-feet per year AFY and an annual decrease in storage of 272,000 AFY (Tehama County GSA, 2021). Water use in the Subbasin is dominated by agriculture (85%). Municipal and household water use accounts for 15% of the water used. Groundwater constitutes the majority (99%) of the Subbasin’s water supplies, with surface water comprising the remaining portion (1%).

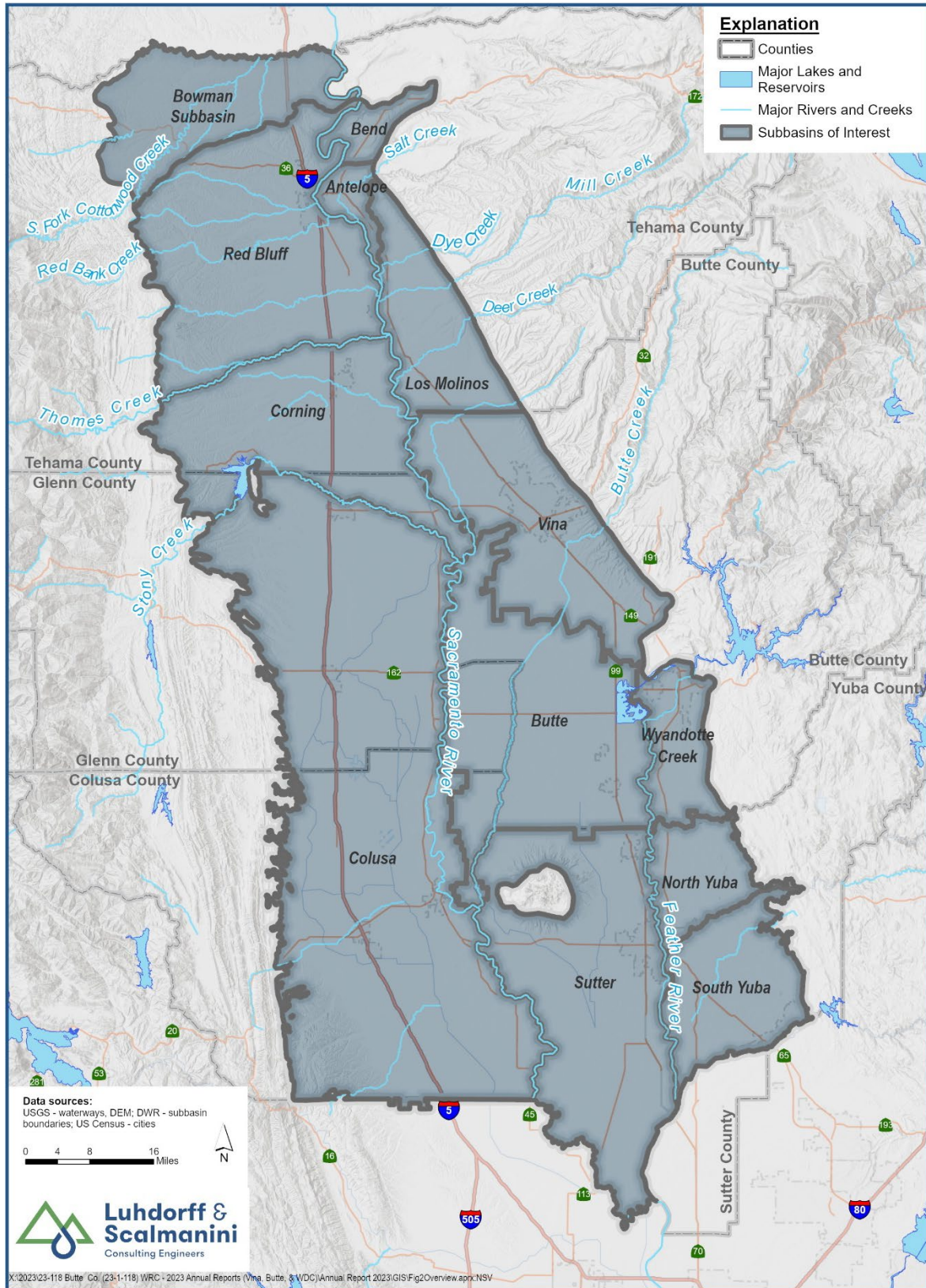


Figure 1-1. Subbasins in the North Sacramento Valley

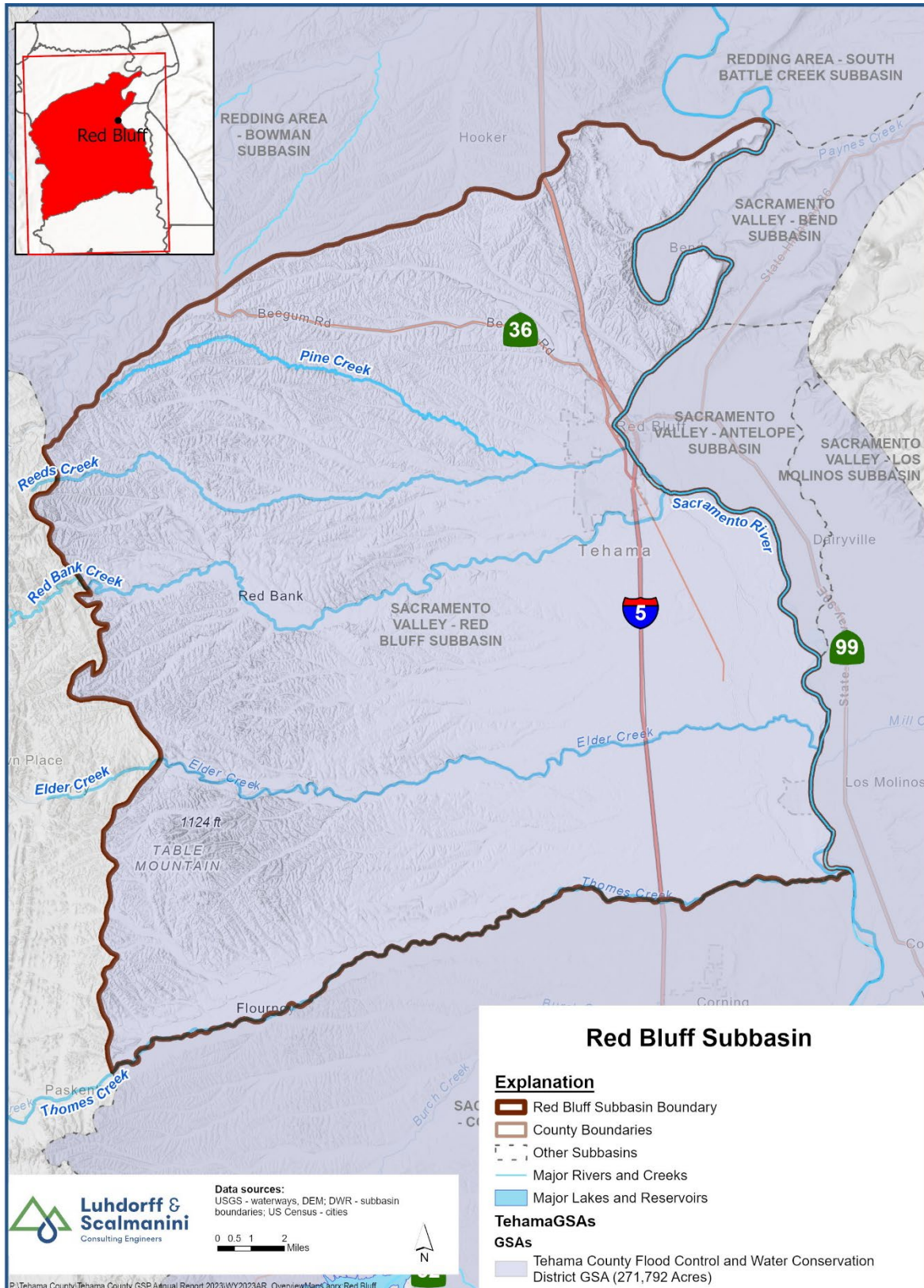


Figure 1-2. Red Bluff Subbasin and Groundwater Sustainability Agency Boundaries

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 into the season. Consequently, groundwater levels are usually highest in spring and lowest during the irrigation season in the summer months. Fall groundwater measurements (typically taken in October) provide an indication of groundwater conditions after the primary irrigation season.

Groundwater levels in the Subbasin are monitored at representative monitoring site (RMS) wells selected in the GSP to represent localized groundwater conditions for specified areas of the Subbasin. RMS wells include a mixture of domestic wells, irrigation wells, and dedicated observation wells. In total, 10 RMS wells are used to monitor conditions in the Upper and Lower Aquifer. **Appendix A** includes hydrographs depicting groundwater elevations and the approximate locations of the RMS wells. The sustainable management criteria (SMC) described in **Appendix B** are assigned to groundwater levels at the RMS wells.

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

Spring and fall 2025 groundwater elevation measurements for RMS wells in the Upper Aquifer and Lower Aquifer systems are summarized in **Table 5-2**. The groundwater level monitoring methods are consistent with the protocols described in the Red Bluff GSP. Depending on the well, groundwater elevations are measured using steel tape, an electric sounder, or pressure transducers. The accuracy of groundwater level measurements is typically either 0.01 feet or 0.1 feet, depending on the equipment used.

The following sub-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 Upper Aquifer, as shown in **Figures 2-1** through **2-2**; however, due to a lack of monitoring wells in the lower aquifer, contouring was not possible. Spring contours are intended to generally represent seasonal high groundwater elevations (shallower depth to water), and fall contours are intended to generally represent

seasonal low groundwater elevations (deeper depth to water). Groundwater elevation contours were developed by creating a continuous groundwater elevation surface based on available monitoring well data 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 Upper Aquifer (**Figures 2-1 and 2-2**) each show that groundwater elevations are generally higher in the western areas of the Subbasin versus the eastern, indicating a general gradient – and thus groundwater flow – from the west to the east. The contour maps illustrate several general features of the groundwater flow system in the Red Bluff Subbasin, including:

- Overall, west-to-east groundwater flow is consistent with recharge from the Northern Coastal Mountain Ranges.
- Movement of water towards the Sacramento River in both the fall and the spring.
- The higher concentration of contours in the central portion of the Subbasin indicates a steeper gradient and could suggest higher groundwater flow. Nonetheless, the contours are consistent with the current understanding of recharge coming from the Northern Coastal Mountain Ranges foothills. New sources of information and data may improve understanding of this area.

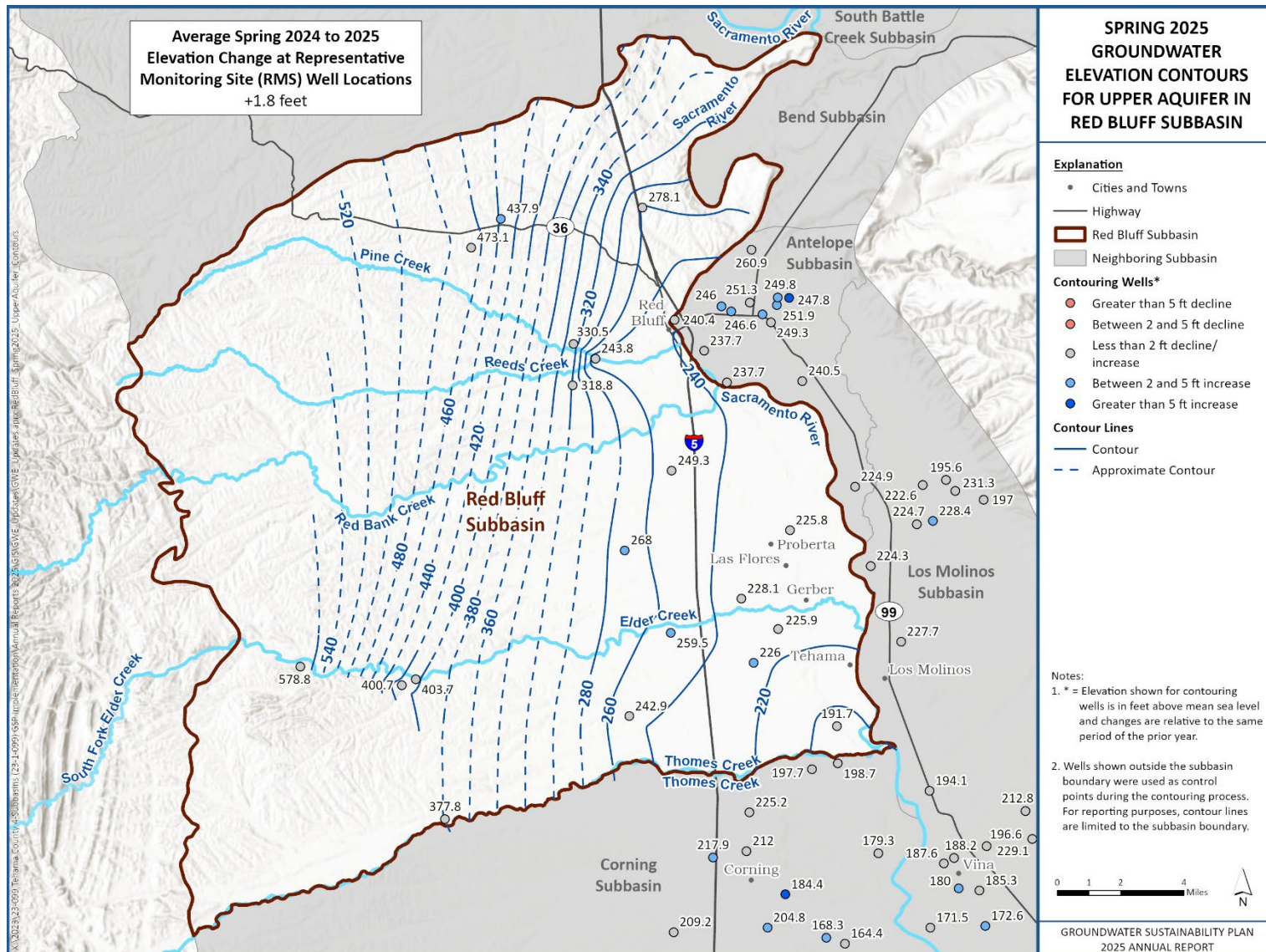


Figure 2-1. Red Bluff Subbasin Contours of Equal Groundwater Elevation for the Upper Aquifer, Spring 2025 (Seasonal High)

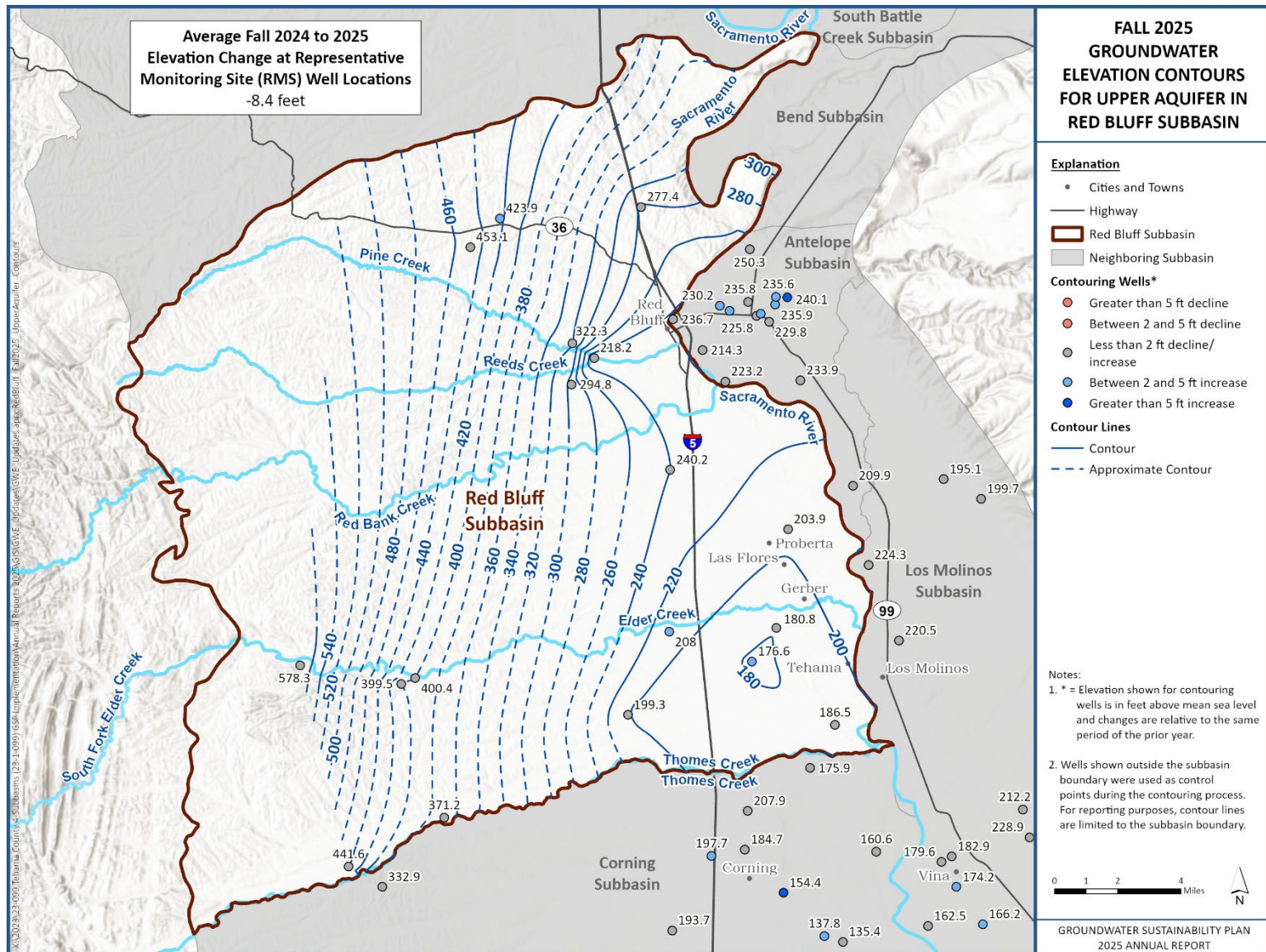


Figure 2-2. Red Bluff Subbasin Contours of Equal Groundwater Elevation for the Upper Aquifer, Fall 2025 (Seasonal Low)

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

Groundwater elevation hydrographs for each RMS well are presented in **Appendix A**. The pink trendline on each hydrograph illustrates general groundwater level changes during the spring months, a period typically free from groundwater pumping, thereby reflecting the least-influenced groundwater levels. Groundwater level records from recent spring seasons were used to calculate changes in groundwater levels, the average water level, and the average annual rate of change. The trendline was developed based on the available data and historical records for each specific monitoring site. While most sites have data spanning the past 22 years (Spring 2003 to Spring 2025), some long-established monitoring wells contain extended historical records (over 22 years), whereas newly installed wells have more limited datasets. **Appendix B** provides an explanation of the SMC terminology defined in Section 6 of the GSP (e.g., minimum threshold [MT], measurable objective [MO], interim milestone [IM]). **Table 5-1** summarizes the MOs, MTs, and identification of undesirable results (URs) 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 well. **Table 5-2** also summarizes the established MO and MT for groundwater elevations, the changes in groundwater elevations from WY 2024 to WY 2025, and the differences between the 2025 groundwater elevations and the MO.

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

Spring and fall 2025 groundwater elevations were generally near seasonal groundwater elevations in previous years. In WY 2025, the average seasonal high in the Upper Aquifer was 317 feet above mean sea level (AMSL), and the average seasonal low was 268 feet AMSL. In WY 2025, the average seasonal high in the Lower Aquifer was 220 feet AMSL, and the average seasonal low was 190 feet AMSL. In WY 2021 through 2024, the average seasonal high ranged from 282 ft to 308 ft.

All wells that were measured in spring 2025 remained at or above the MO, while all wells measured in fall 2025 fell below the MO. All measured groundwater elevations remained above the corresponding MT of that RMS well in WY 2025, avoiding undesirable results related to groundwater levels as defined in the GSP. On average, groundwater levels in RMS wells were roughly 40 feet higher than MT elevations in spring 2025 and 20 feet higher than MT elevations in fall 2025. All measured groundwater levels remained within the Subbasin's margin of operational flexibility and above the MTs.

3 WATER SUPPLY AND USE

As required by §356.2, this section summarizes water supply and use in the Subbasin, categorized by groundwater extraction volume, surface water supply, 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 2025 land use data and climate conditions. Water use data is available in **Appendix D**. The water use analysis methodology is discussed in **Appendix E**. Surface water use was estimated from historic deliveries when records were not available.

Table 3-1. Bowman Subbasin Groundwater Use by Water Use Sector for WY 2025		
Sector	Applied Groundwater (AF)	Percent of Total Groundwater Use
Agricultural	95,300	84%
Municipal	6,000	5%
Rural Residential	11,600	11%
Total	112,900	100%

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

Groundwater extraction in the Subbasin is summarized in **Table 3-1**. Groundwater extraction is obtained from pumping records where available, and the remaining groundwater extraction is estimated using the water use analysis approach described in the previous section and **Appendix E**. The majority of the Subbasin relies on groundwater supplies for agricultural irrigation.

Municipal water users extracted 6,000 AF in the Subbasin in WY 2025. Municipal water supplies are measured and provided by the City of Red Bluff, the City of Tehama, the El Camino Irrigation District, and the Proberta Water District. 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. 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 City of Red Bluff's 2020 Urban Water Management Plan (UWMP) (City of Red Bluff, 2020) is considered representative of the area. Water use in 2020 was 253 gallons per capita per day. Population estimates were based on average household sizes from the US census and aggregated to those living outside city water district boundaries. Population estimates from the 2020 Census were used to estimate residential groundwater pumping.

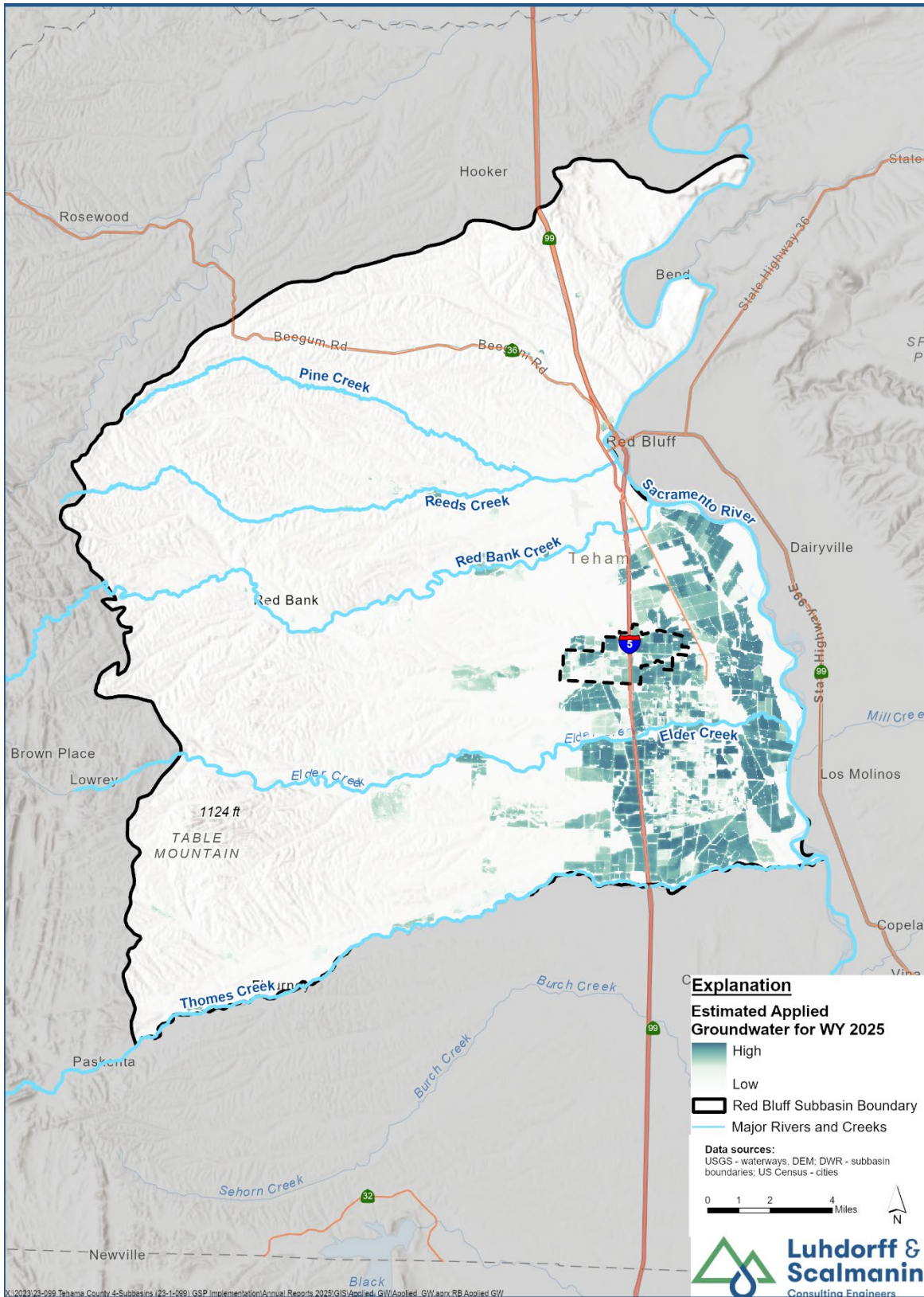


Figure 3-2. Red Bluff Subbasin Estimated Applied Groundwater – WY 2025

The total estimated groundwater extraction was approximately 112,900 AF in WY 2025, the majority of which was used to meet agricultural water demands (approximately 95,300 AF). The total groundwater extraction is more than the historical groundwater pumping average (97,100 AFY; **Table 4-1**) and higher than 81,900 AF, which was the average annual extraction of the last five above-normal WYs on record (1993, 2000, 2003, 2005, and 2024). **Figure 3-1** shows the water use sector and source. **Figure 3-2** shows the general areas where groundwater is applied in the Subbasin. About 84% of the total groundwater extraction was used by the agricultural sector, while the remaining 16% was used for municipal and rural residential water needs.

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

Surface water supplies used or available for use in the Subbasin 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 diversion data in similar water years.

Surface water provided about 2% of the agricultural water demand in the Subbasin for WY 2025. There are limited local supplies available within the Subbasin. Surface water Diversion records were estimated based on the historic State Water Resources Control Board’s (SWRCB) California Water Accounting, Tracking, and Reporting System (CalWATRS) (SWRCB, 2025) and local suppliers. Total surface water diversions and applied surface water for the Red Bluff Subbasin are estimated to be about 1,800 AF and 1,500 AF, respectively.

WY 2025 was an above-normal WY, similar to the hydrologic conditions in WY 2024. Despite receiving similar precipitation in WY 2025, surface water use decreased in WY 2025 (1,500 AF) compared to WY 2024 (1,700 AF).

Table 3-2. Red Bluff Subbasin Surface Water Use by Water Use Sector for WY 2025			
Sector	Diverted (AF)	Applied (AF)	Percent of Total Surface Water Use
Agricultural	1,800	1,500	100%
Municipal	0	0	0%
Total	1,800	1,500	100%

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

Groundwater supplied approximately 99% of the total water demand in the Subbasin in WY 2025. Surface water supplied approximately 1% of the total water demand in the Subbasin in WY 2025. 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. Red Bluff Subbasin Total Water Use by Water Use Sector for WY 2025					
Sector	Groundwater (AF)	Surface Water (AF)	Total (AF)	Percent of Total Water Use	Total Sector Area (acres)
Agricultural	95,300	1,500	96,800	85%	34,000
Municipal	6,000	0	6,000	5%	0
Rural Residential	11,600	0	11,600	10%	n/a*
Total	112,900	1,500	114,400	100%	
Percent of Total Water Use	99%	1%	100%		

*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. Red Bluff Subbasin Estimated Uncertainty in Water Use Estimates			
Water Budget Component	Data Source	Estimated Uncertainty (%)	Source
Groundwater Water			
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.

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

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., a 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 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 relatively stable or show a declining trend over time (despite recent positive trends). 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 typical of the Sacramento Valley. During normal to wet years, groundwater is withdrawn during the summer for irrigation and replenished during the winter through recharge of precipitation and surface water inflows, allowing groundwater storage to potentially rebound by the following spring. 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 lower stream levels.

In WY 2025, an above-normal WY, cumulative (Upper and Lower Aquifer) groundwater storage increased by approximately 5,500 AF. This increase is less than the increase that occurred in WY 2024 despite both years being classified as above-normal. The smaller increase is likely due to increased groundwater extraction in WY 2025 relative to WY 2024. However, factors such as flood irrigation with surface water and consistent stream flows resulted in higher groundwater levels in spring 2025 compared to spring 2024.

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 1990 through WY 2025 in **Table 4-1** and **Figure 4-1**. WY 2025 was an above-normal WY and saw an increase in groundwater storage, totaling approximately 5,500 AF in the Upper and Lower Aquifer. For context, over the past 36 years, the largest decrease in groundwater storage is estimated at -164,000 AF, and the highest increase was estimated at 130,000 AF.

The Tehama Integrated Hydrogeologic Model (TIHM) was used to estimate groundwater pumping, groundwater uptake, change in storage, and cumulative change in storage for WY 1990 through WY 2019 (Tehama County GSA, 2021).

It should be noted that the groundwater model was not used to estimate storage changes for WY 2020 through WY 2025. Therefore, future updates to the model may result in different estimates for WY 2020 through WY 2025 groundwater storage changes. The approach of using measured groundwater elevation changes to estimate storage changes is considered reasonable and cost-effective for the purposes of the annual report. **Table 4-1** includes estimates of annual groundwater pumping, annual storage change, and cumulative storage change for WY 1990 through WY 2025. Estimates of annual

groundwater pumping for WY 2022 through WY 2025 are described in **Section 3**, and **Appendix E**. Change in annual storage and cumulative change in storage for WY 2020 through WY 2025 was estimated based on the methods described in **Section 4.2**. Groundwater extractions for the entire period include pumping for agricultural, municipal, and rural residential purposes.

The annual and cumulative changes in groundwater storage are both calculated for the period from WY 2020 through WY 2025 based on the methodology described below in **Section 4.2**. This methodology differs from the methodology reported in the GSP; however, it is anticipated that the methodology described in **Section 4.2** will be utilized for future annual reports.

Table 4-1. Red Bluff Subbasin Groundwater Extraction and Change in Storage			
Water Year & Type	Groundwater Extraction (AFY)¹	Annual Groundwater Storage Change (AFY)	Cumulative Groundwater Storage Change (AFY)
1990 (C)	87,400	-77,000	-77,000
1991 (C)	86,300	-77,000	-154,000
1992 (C)	86,800	-41,000	-195,000
1993 (AN)	76,900	56,000	-139,000
1994 (C)	90,200	-53,000	-192,000
1995 (W)	76,000	99,000	-93,000
1996 (W)	85,000	37,000	-56,000
1997 (W)	92,000	-3,900	-59,900
1998 (W)	66,000	130,000	70,100
1999 (W)	84,000	-16,000	54,100
2000 (AN)	81,000	-9,500	44,600
2001 (D)	89,000	-61,000	-16,400
2002 (D)	97,000	-37,000	-53,400
2003 (AN)	79,000	31,000	-22,400
2004 (BN)	100,000	-1,000	-23,400
2005 (AN)	77,000	30,000	6,600
2006 (W)	87,000	44,000	50,600
2007 (D)	98,000	-93,000	-42,400
2008 (C)	107,400	-65,000	-107,400
2009 (D)	96,900	-65,000	-172,400
2010 (BN)	81,900	23,000	-149,400
2011 (W)	79,900	21,000	-128,400
2012 (BN)	93,800	-60,000	-188,400

Table 4-1. Red Bluff Subbasin Groundwater Extraction and Change in Storage			
Water Year & Type	Groundwater Extraction (AFY) ¹	Annual Groundwater Storage Change (AFY)	Cumulative Groundwater Storage Change (AFY)
2013 (D)	105,500	-41,000	-229,400
2014 (C)	102,800	-78,000	-307,400
2015 (C) ²	103,200	-37,000	-344,400
2016 (BN)	95,400	19,000	-325,400
2017 (W)	90,600	88,000	-237,400
2018 (BN)	104,200	-74,000	-311,400
2019 (W)	88,300	75,000	-236,400
2020 (D)	129,300	-49,000	-285,400
2021 (C) ²	148,100	-164,000	-449,400
2022 (C) ²	237,300	-87,000	-536,400
2023 (W)	98,000	66,000	-470,400
2024 (AN)	95,800	44,800	-425,600
2025 (AN)	112,900	5,500	-420,100
Historic Averages (1990-2024) ³			
1990-2024 (35 years)	97,100	-12,200	
W (10 years)	84,700	54,000	
AN (5 years)	81,900	30,500	
BN (5 years)	95,100	-18,600	
D (6 years)	102,600	-57,700	
C (10 years)	116,600	-75,400	

Notes:

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

¹Groundwater extraction and storage for WY 1990 through WY 2019 are from the Tehama Integrated Hydrologic Model (TIHM); groundwater extraction values for WY 2020 through WY 2021 are from the TIHM; groundwater extraction values for WY 2022 through WY 2025 are described in **Section 3**, and **Appendix E**. Annual change in storage values for WY 2020 through WY 2025 were estimated using the method described in **Section 4**.

² Indicated cutback year with reduced surface water supply availability.

³ The historical average calculation covers the period from 1990 to 2024, excluding the current water year.

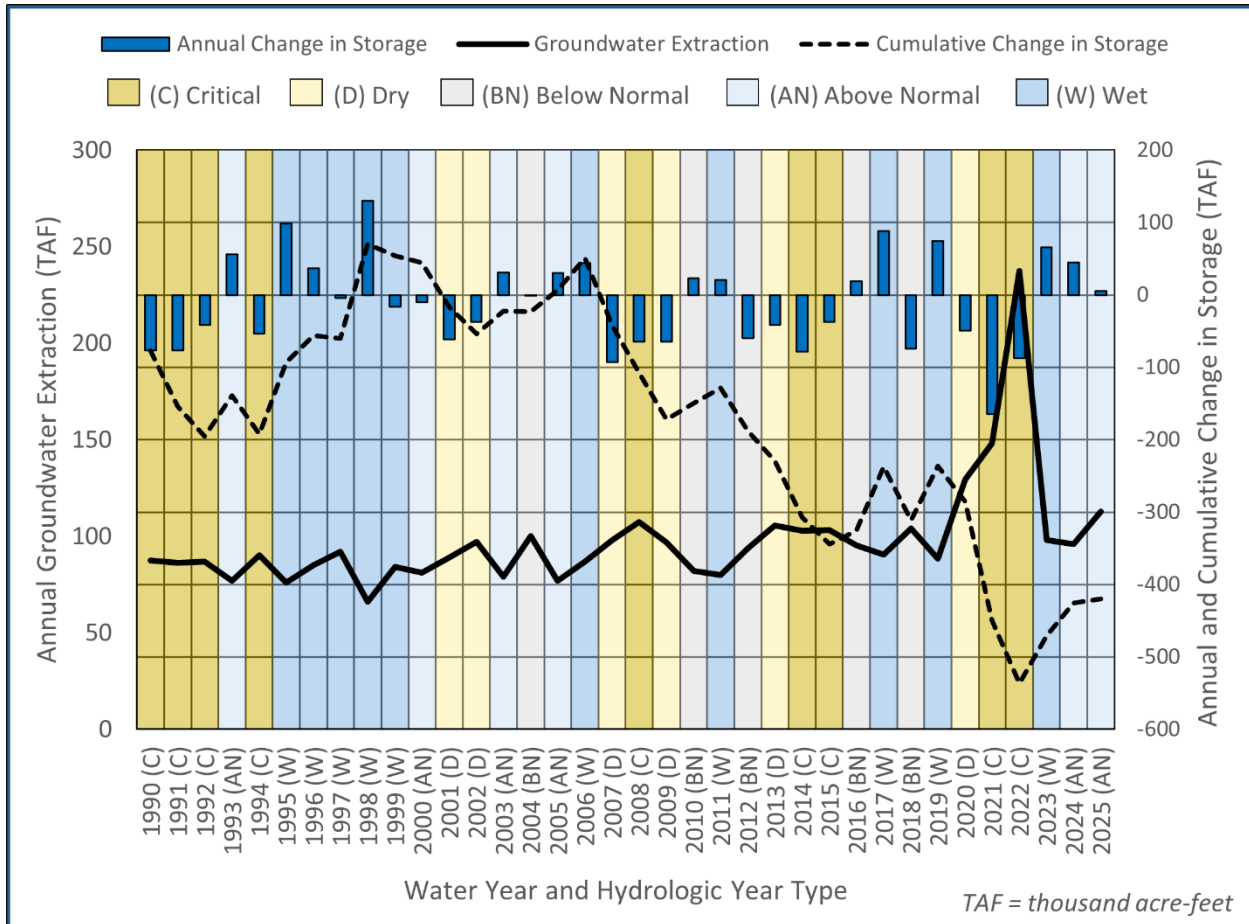


Figure 4-1. Red Bluff Subbasin Groundwater Extraction and Change in Groundwater Storage from WY 1990 to WY 2025

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

The spatial distribution of estimated changes in groundwater storage in the Upper Aquifer for the period from spring 2024 to spring 2025 is shown in **Figure 4-2**. 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. Groundwater level data obtained from the DWR Water Data Library (DWR, 2025) were generally recorded on a monthly to quarterly basis. For Water Year 2025, a raster surface representing seasonal high groundwater level changes was generated by spatially interpolating (kriging) data from selected wells across the subbasin. These seasonal high changes were calculated by subtracting groundwater levels recorded in spring 2024 from those recorded in spring 2025.

The selected wells represent sites with groundwater level records that are considered representative of subbasin conditions. In areas—mostly near the subbasin boundaries—where polygon-specific groundwater data were unavailable, interpolated raster pixel values from the selected wells were used for groundwater storage change calculations. In cases where multiple groundwater level records existed within a single polygon, an average groundwater level was assigned to that polygon. Groundwater storage change was then calculated by multiplying the change in seasonal high groundwater level (WY 2025 minus WY 2024) by the

specific yield value assigned to each polygon, and by the polygon area (in acres), resulting in groundwater storage changes from 2024 to 2025 expressed in AF. It should be noted that the groundwater model as described in the GSP was not used to estimate storage changes for WY 2021 through WY 2025. The approach of using measured groundwater elevation changes to estimate storage changes is considered reasonable and cost-effective for the purposes of the annual report.

Sufficient groundwater level data were not available to interpolate water level changes in the Lower Aquifer. Therefore, Lower Aquifer storage change was estimated using the Upper Aquifer storage change and the historical ratio of storage changes in the two aquifers. The summation of the changes in the Upper and Lower Aquifers provides the total groundwater storage change in the Subbasin.

Negative changes in storage values indicate lowering groundwater levels and depletion of groundwater storage, whereas positive changes in storage values represent rising groundwater levels and accretion of groundwater in storage. As shown in **Figure 4-2**, the change in storage within the Upper Aquifer from spring 2024 to spring 2025 was between 0 and 5,000 AF. The western and central portions of the Subbasin experienced a smaller positive change in storage, while most of the northeastern areas of the subbasin experienced a higher positive change in storage. Total groundwater storage change in the Upper Aquifer was estimated to be approximately 4,900 AF between spring 2024 and spring 2025. As shown in **Figure 4-3**, the change in storage within the Lower Aquifer from spring 2024 to spring 2025 was between 500 and -500 AF. Total groundwater storage change in the Lower Aquifer was estimated to be approximately 600 AF between spring 2024 and 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, and the calibrated storage coefficient parameter used to calculate the change in groundwater storage. As described in **Section 4.2**, the calibrated storage coefficient (0.0065 – 0.062) from the TIHM was used to calculate the change in storage. Based on a comparison of storage change estimates from the TIHM for similar water year types, the calculated storage change is reasonable; thus, the uncertainty of the estimated change in groundwater storage reported is typically 20-30% for integrated hydrologic models; therefore, the approach described in **Section 4.2** is considered to have similar uncertainty.

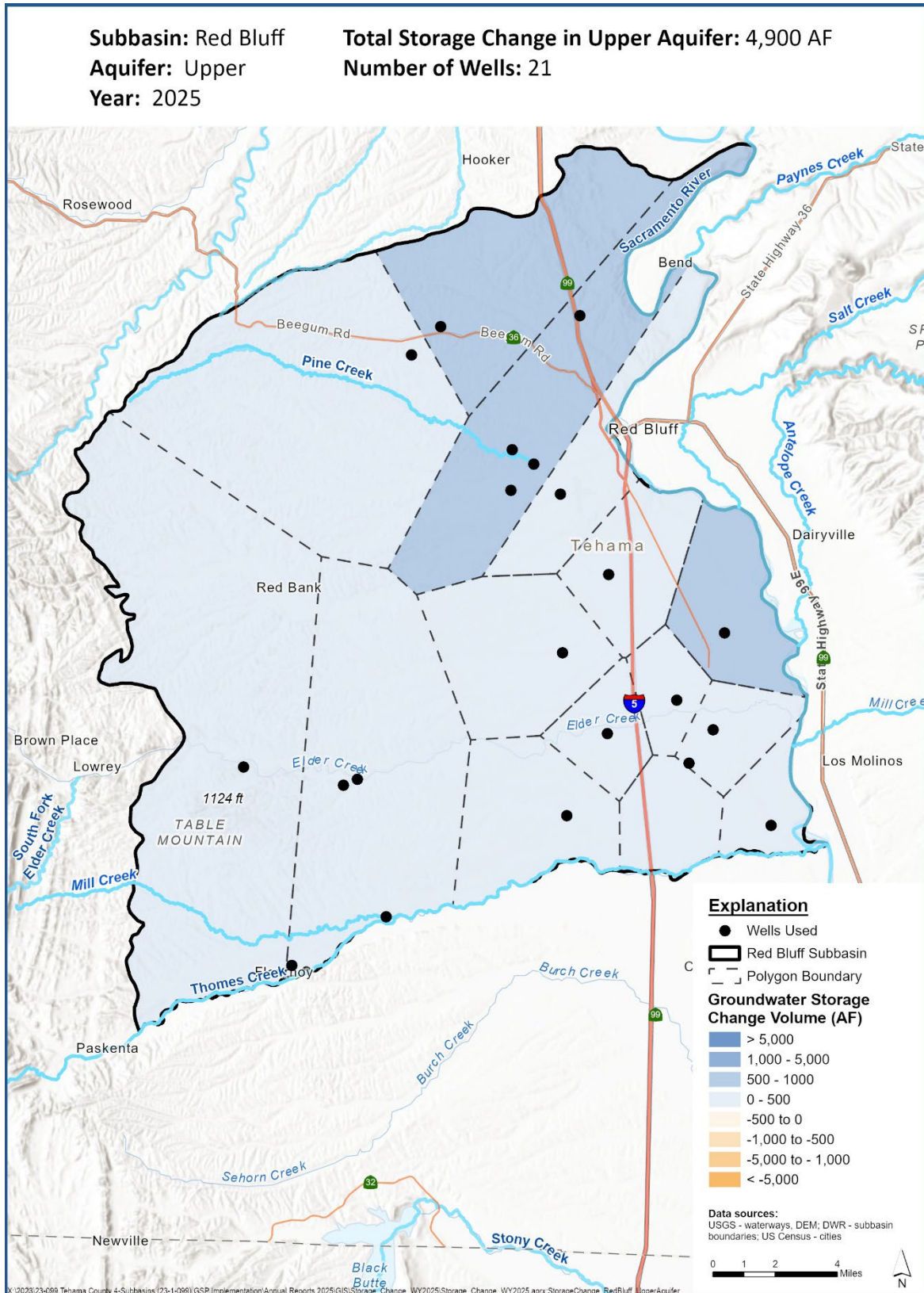


Figure 4-2. Red Bluff Subbasin Change in Groundwater Storage from Spring 2024 to Spring 2025 in the Upper Aquifer

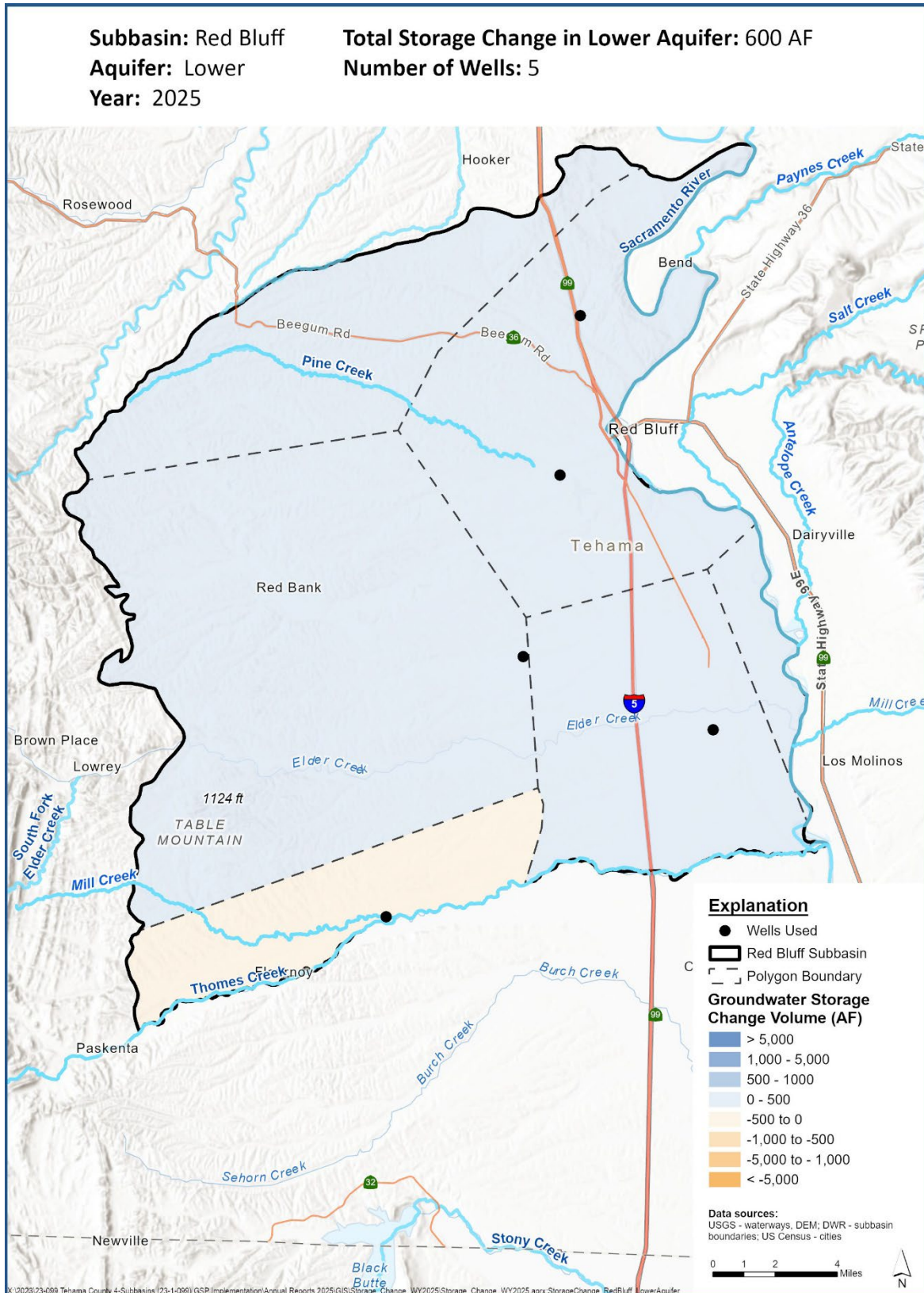


Figure 4-3. Red Bluff Subbasin Change in Groundwater Storage from Spring 2024 to Spring 2025 in the Lower Aquifer

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

5.1 Main Activities of Water Year 2025

The main activities and updates since the previous annual report are as follows:

- The Tehama County GSA completed the WY 2025 Annual Report and other critical tasks.
- The Tehama County GSA coordinated a proposal seeking funding through DWR's SGM Grant Program. Coordination efforts included planning and refining project and management actions (PMAs), evaluating and ranking PMAs, and preparing and submitting the grant application. The grant application was submitted in December 2022, and a final award list was released by DWR in September 2023; results are summarized in **Appendix G**.
- An airborne electromagnetic (AEM) survey by DWR took place in the summer of 2022. The data collected provides a better understanding of aquifer characteristics and will help support future efforts to refine the current hydrogeologic conceptual model. Data are available at: <https://data.cnra.ca.gov/dataset/aem>.
- All sustainability indicators (SIs) are above their MTs (see summary **Table 5-1**).
- Progress has been made on six PMAs since the last annual report (**Appendix G**).

Several other actions continue in the Subbasin to fulfill the requirements of the GSP. These include:

- Monitoring and recording groundwater levels and groundwater quality.
- Maintaining and updating the data management system (DMS) with newly collected data.
- Annual reporting of Subbasin conditions and submission to DWR as required by SGMA.
- Ongoing intra- and inter-basin coordination.

Also, since the previous annual report, DWR has provided corrective actions to the Red Bluff Subbasin GSP. The Tehama County GSA acknowledged and has addressed the two key recommended corrective actions listed in the DWR's [GSP determination letter](#).

(<https://sgma.water.ca.gov/portal/service/gspdocument/download/9963>) by revising the Red Bluff GSP. The revised GSP was submitted to DWR in April 2024. The corrective actions addressed in the revised GSP include:

- Providing more detailed explanation and justification regarding the selection of the SMCs for groundwater levels, particularly undesirable results and MT, and quantitatively describing the effects of those criteria on the interests of beneficial uses and users of groundwater.
- The GSA should revise the GSP to provide a reasonable assessment of overdraft conditions and include reasonable means to mitigate overdraft.

DWR issued a letter, received by the GSAs in August 2025, requesting additional information following its review of the Red Bluff Subbasin Water Year 2024 Annual Report. The request focuses on directing the

GSA to describe how required GSP monitoring will be fully implemented moving forward, including measures to prevent missed measurements and to ensure regulation-compliant seasonal groundwater level reporting supported by a detailed field monitoring plan. It should also be noted that although DWR’s review letter was dated August 2025, which did not provide the GSAs with sufficient time to meaningfully incorporate the recommended revisions prior to the close of Water Year 2024 (September 30), the GSAs had already begun proactively addressing items independent of DWR’s comments. Much of this work was initiated in advance of the formal review timeline and has been funded and implemented primarily through GSP Implementation grant funding.

DWR Comment 1: Department staff request that the GSA provide additional information describing how the GSA will perform the monitoring prescribed in its GSP and how any missed measurements over the water year still allow the GSA to monitor impacts to beneficial uses or users of groundwater, understand conditions relative to measurable objectives and minimum thresholds, quantify water budget components across the Subbasin, and represent and assess seasonal low and seasonal high groundwater conditions in the basin or plan area, in the next annual report.

GSA Response 1: The GSAs are enhancing groundwater monitoring by deploying telemetry systems to record water levels at 10-minute intervals and by expanding the representative monitoring well network to mitigate missed measurements. These efforts are supported by continued coordination on water level monitoring, including monitoring activities conducted by the GSAs in collaboration with DWR.

DWR Comment 2: Staff recommend the GSA provide the seasonal low as required by the GSP regulations in future annual reports. Additionally, staff recommend the GSA include the date of monitoring in its reporting of seasonal highs and lows in its annual reports and when providing these measurements in other contexts.

GSA Response 2: The GSAs are expanding the seasonal groundwater level evaluation windows to better capture seasonal high and low conditions (spring: February 1–May 1; fall: August 1–November 1). The GSAs will also update **Table 5.2** to include measurement dates and to explicitly report seasonal groundwater levels relative to applicable minimum thresholds. The DWR Letter is in **Appendix H**.

5.2 Progress Toward Achieving Interim Milestones

All SIs are in compliance with their MTs (see summary **Table 5-1**). An MT is the quantitative value that represents the groundwater conditions at an RMS site that, when exceeded individually or in combination with MTs at other monitoring sites, may cause an UR in the subbasin 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 value, 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 total dissolved solids (TDS) increases beyond the MO established for that site, it moves in the direction of the MT. Seawater Intrusion is not an applicable SI.

Groundwater elevations remained above the MOs in all wells measured in spring 2025; all wells measured in fall 2025 fell below their MO. No measured wells fell below their MTs in WY 2025 and avoided URs since

less than 25% of wells fell below their MTs for two consecutive years, hence avoiding undesirable results as defined in the GSP.

Overall, groundwater conditions in the Subbasin are on track to meet the first 5-year 2027 IMs for groundwater levels at each RMS well. Groundwater elevations are all above the MTs throughout the Subbasin, with elevations mostly near or slightly above those observed in recent years (**Appendix A**).

Table 5-1. Red Bluff 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.	10 supply wells become dry (after the GSP revision) within a tessellation hexagon, or when water levels at any RMP in the future decline 7.5 feet or more over a five (5) year period.	Upper & Lower Aquifer: Spring 2015 groundwater elevation minus five feet (for wells with increasing or no groundwater trends) or projected spring 2042 groundwater elevation minus five feet for wells with declining groundwater elevations.	Focus Areas: 2020-2022 groundwater lows. Outside Focus Areas: 2020-2022 lows minus 20 feet.
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.	25% of groundwater elevations measured at the same RMS wells exceed the associated MT for two consecutive fall measurements.	Upper & Lower Aquifer: Amount of groundwater storage when groundwater elevations are at their MO.	Upper & Lower Aquifer: Amount of groundwater in storage when groundwater elevations are at their MT.
Degraded Water Quality			
No indication of undesirable results One RMS well exceeded the MO and MT in WY 2025.	At least 25% of RMS exceed the MT for water quality for two consecutive years at each well where it can be established that GSP implementation is the cause of the exceedance.	Upper & Lower Aquifer: California lower limit secondary MCL concentration for TDS of 500 mg/L measured at RMS wells.	Upper & Lower Aquifer: TDS concentration of 750 mg/L at all RMS wells.

Table 5-1. Red Bluff Subbasin Sustainability Indicator Summary			
2025 Status	Undesirable Result Identification	Measurable Objective (MO) Definition	Minimum Threshold (MT) Definition
Land Subsidence			
No indication of undesirable results. No InSAR pixel exceeded MT in WY 2025.	50% of the RMS exceed the MT over a 5-year period, which is irreversible and is caused by the lowering of groundwater elevations.	One foot over 20 years (zero inelastic subsidence, in addition to any measurement error). If InSAR data are used, the measurement error is 0.1 feet, and any measurement 0.1 feet or less would not be considered inelastic subsidence.	Two feet over 20 years (i.e., no more than 0.5 feet of cumulative subsidence over a five-year period (beyond the measurement error), solely due to lowering of groundwater elevations.
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.	25% of groundwater elevations, measured at the same RMS wells, exceed the associated MTs for 2 consecutive fall measurements.	Same as chronic lowering of groundwater levels.	Same as chronic lowering of groundwater levels.

Notes:

TDS is the primary water quality constituent of concern.

MO = Measurable Objective; MT = Minimum Threshold; RMS = representative monitoring site; mg/L = milligrams per liter; MCL = Maximum Contaminant Level; SMCL = Secondary Maximum Contaminant Level.

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 for groundwater levels at each RMS well. In WY 2025, all groundwater elevations were above the established MTs (as indicated in **Table 5-2**). **Table 5-2** shows measurements from WY 2025 for spring seasonal highs (the highest measurement at each well between February and May of 2025) and fall seasonal lows (lowest measurement at each well between August and November 2025), along with MOs and MTs. It also compares the WY 2025 measurements to those from WY 2024 and to the MO and MTs. Higher water levels were observed in spring 2025 compared to spring 2024 due to above-normal conditions, which have helped to increase recharge and offset extraction, bolstering groundwater storage in the Subbasin.

Table 5-2. Red Bluff 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 vs. MO (ft)		2025 vs. MT (ft)		2025 vs. 2024 (ft)	
	2025 Measurements				MO	MT						
	Date Measured	Spring (Seasonal High)	Date Measured	Fall (Seasonal Low)			Spring	Fall	Spring	Fall	Spring (seasonal high)	Fall (seasonal low)
Upper Aquifer												
27N04W05G002M (RB-1U)	3/10/2025	437.93	8/8/2025	423.93	432.4	394	5.53	-8.47	43.93	29.93	2.10	-1.00
27N04W36G001M (RB-2U)	--	--	--	--	241.5	221	--	--	--	--	--	--
26N04W25J001M (RB-3U)	3/10/2025	267.96	--	--	257.1	255	10.86	--	12.96	--	4.00	--
25N03W11B001M (RB-4U)	3/11/2025	225.92	9/10/2025	180.76	203	169	22.92	-22.24	56.92	11.76	1.07	-14.79
25N03W19N001M (RB-5U)	3/10/2025	242.89	8/7/2025	199.28	224.2	187	18.69	-24.92	55.89	12.28	1.35	-10.59
25N05W24D001M (RB-6U)	3/17/2025	411.00	--	--	401.3	396	9.70	--	15.00	--	--	--
RB-7U	--	--	--	--	329.1	328	--	--	--	--	--	--
Lower Aquifer												
25N03W11B002M (RB-8L)	4/16/2025	220.51	9/10/2025	190.34	202	166	18.51	11.66	54.51	24.34	0.65	-7.04

MO = Measurable Objective, MT = Minimum Threshold, -- = Indicates Missing or Questionable Measurement, NA = Indicates non-determined MO, MT due to insufficient history

5.2.2 Degraded Water Quality SMC

The degraded water quality MT and MO are summarized in **Table 5-1**. TDS is the main constituent of concern in the Subbasin. TDS is measured at RMS wells throughout the Subbasin, and data was collected by the LSCE in fall 2024 and spring 2025. One of the eight RMS wells (RB-1U) was unavailable for monitoring in spring 2025; no alternatives were selected. TDS ranged from 100 mg/L to 990 mg/L in the fall of 2024 and 110 mg/L to 840 mg/L in the spring of 2025. One well exceeded the MO and MT for WY 2025 (RB-10L). A summary of groundwater quality monitoring data is available in **Appendix F**. Groundwater conditions are on track to avoid results related to water quality.

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 (DWR, 2024b) to assess this SMC. InSAR data were 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**), and from June 2015 to October 2025 to track net 10-year changes (**Figure 5-3**).

Conditions indicate that there has been minimal land subsidence over the period of record. Subsidence and uplift measured by InSAR ranged from -0.06 feet of subsidence to 0.01 feet within the Subbasin from October 2024 to October 2025. Subsidence and uplift measured by InSAR over the 5-year period from October 2020 to October 2025 ranged from -0.22 feet to 0.18 feet. Subsidence and uplift measured by InSAR over the 10-year period from June 2015 to October 2025 ranged from -0.41 feet to 0.16 feet. Groundwater conditions in the Subbasin are on track to meet the first 5-year 2027 IMs and avoid undesirable results for land subsidence.

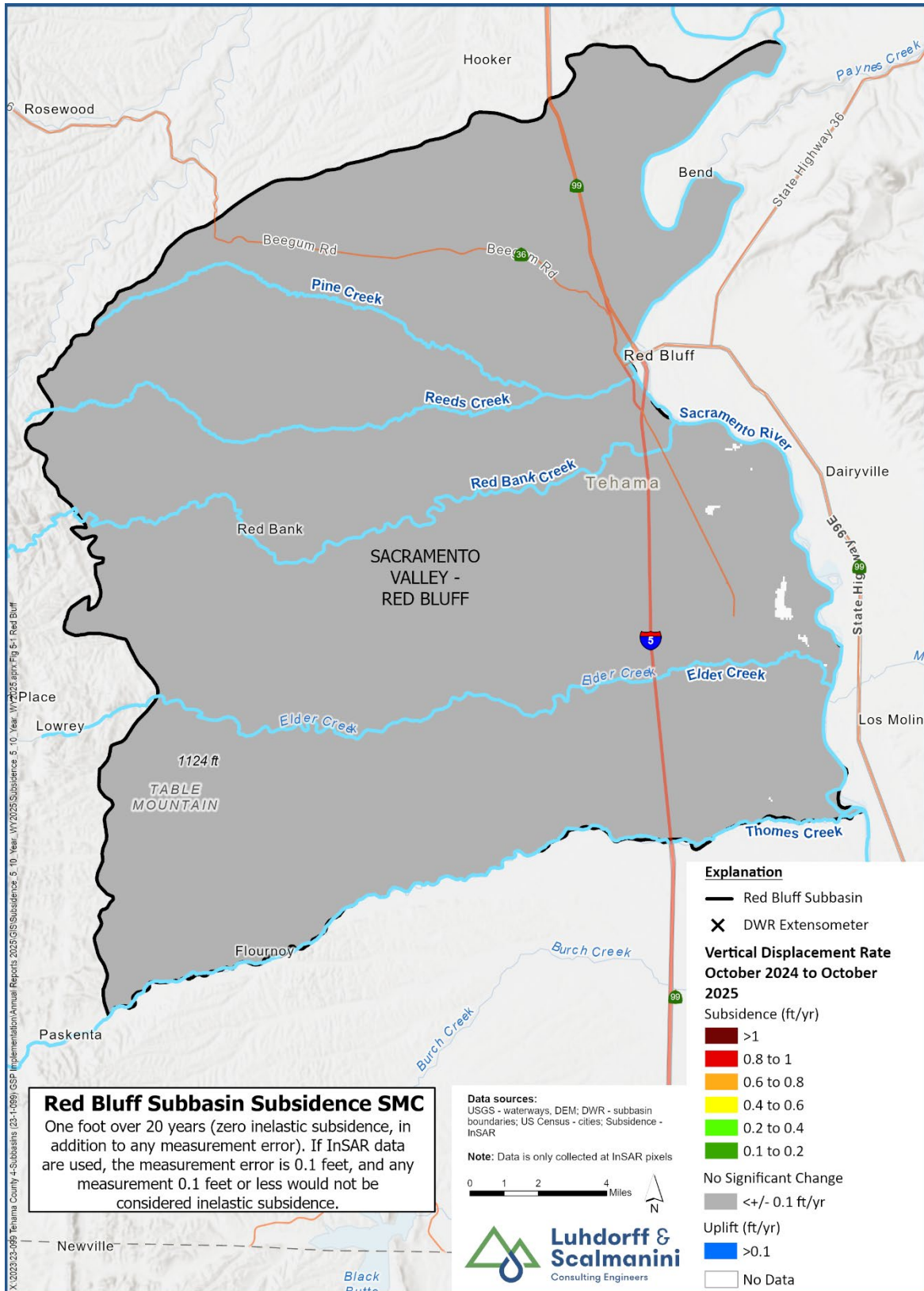


Figure 5-1. Red Bluff Subbasin Change in Subsidence from 10/2024 to 10/2025

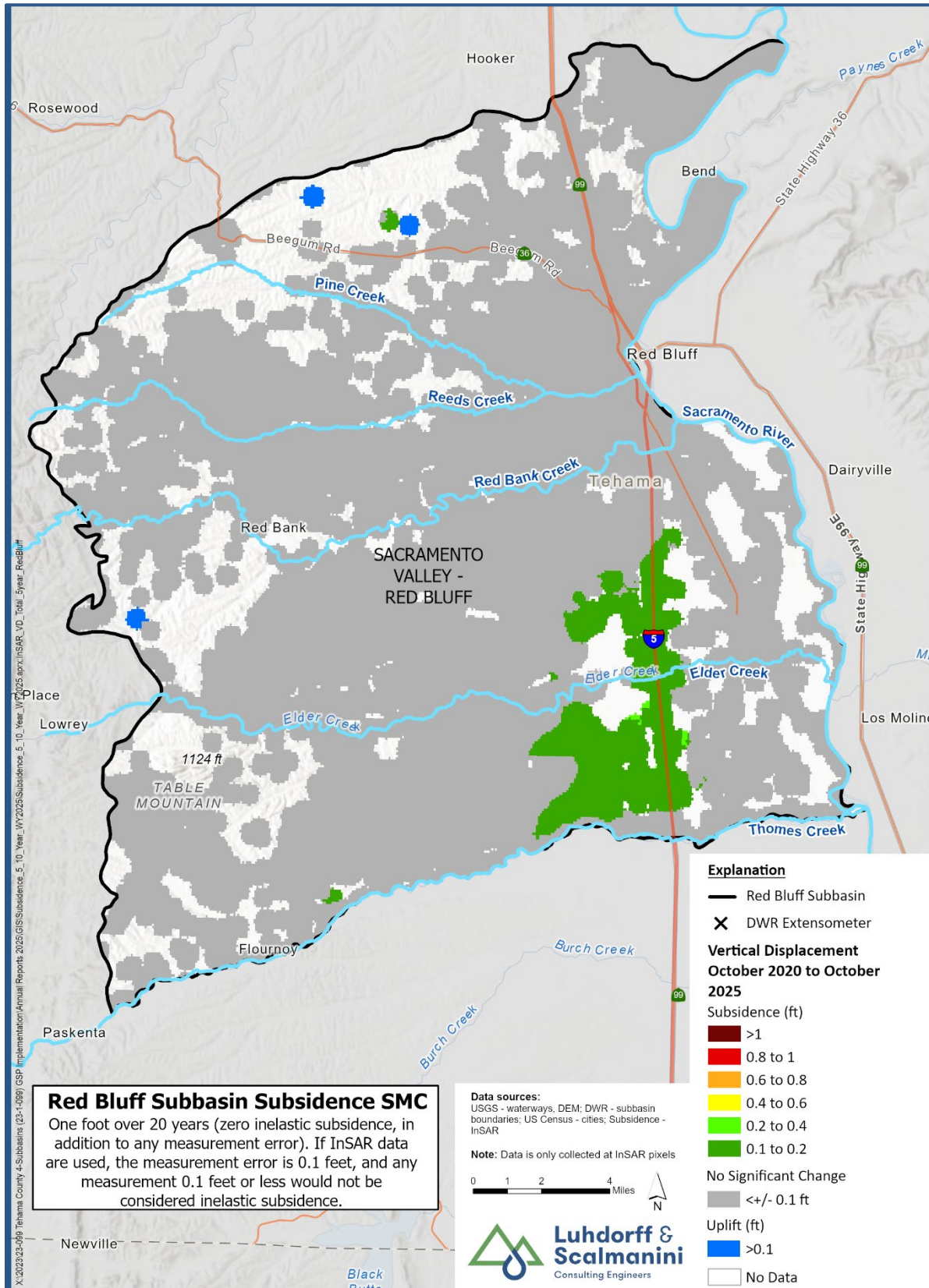


Figure 5-2. Red Bluff Subbasin Change in Subsidence from 10/2020 to 10/2025

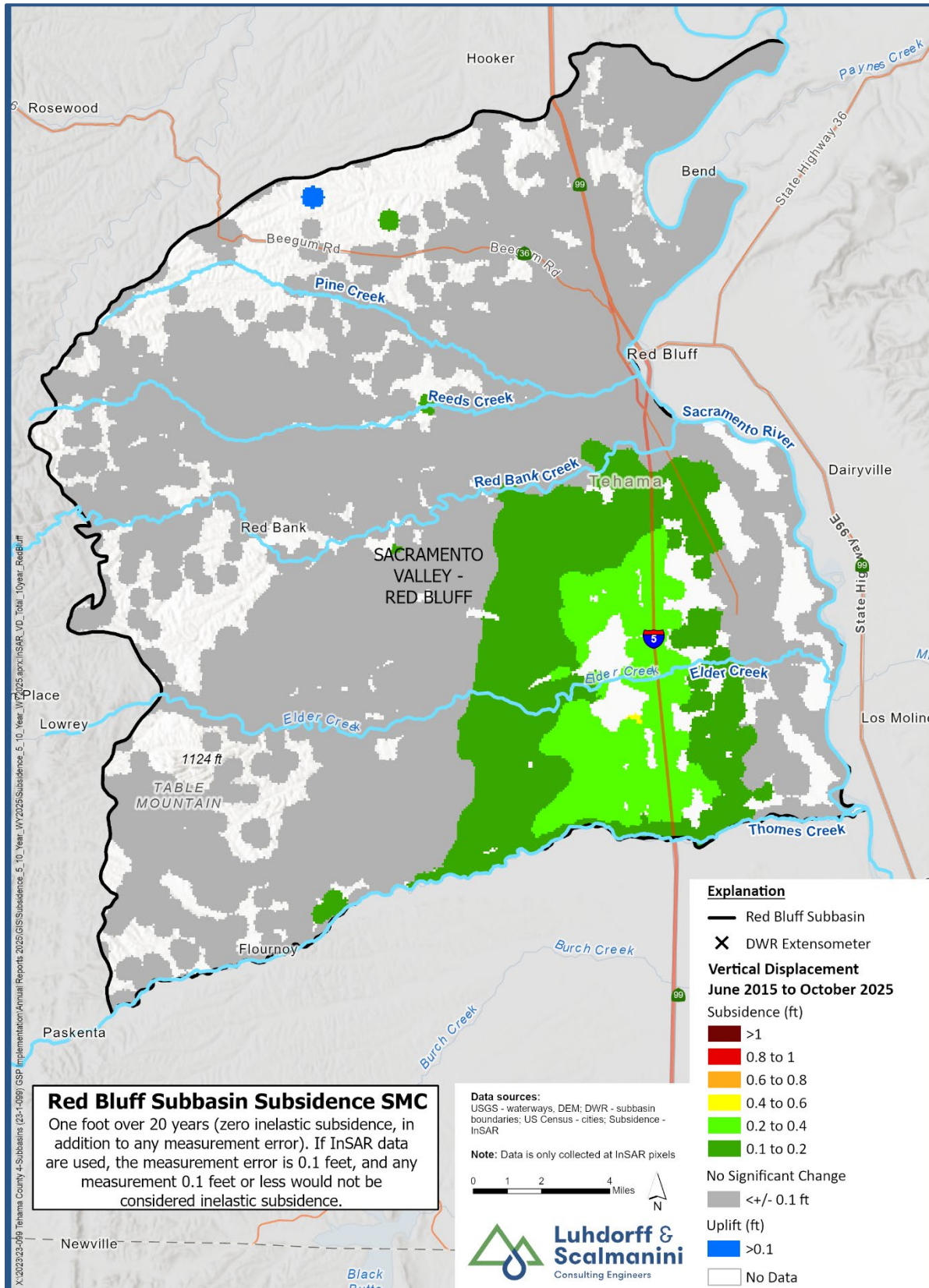


Figure 5-3. Red Bluff Subbasin Change in Subsidence from 06/2015 to 10/2025

5.2.4 Depletion of Interconnected Surface Water SMC

The depletion of interconnected surface water SMC utilizes the chronic lowering of groundwater levels SMC as a proxy (**Table 5-1**). A subset of groundwater levels is used for this SMC (**Table 5-3**), and all groundwater elevations were above the established MTs. The groundwater conditions in the Subbasin are on track to meet the first 5-year 2027 IMs for groundwater level elevations at each of the RMS wells.

5.3 Progress Toward PMA Implementation

The Red Bluff Subbasin 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**.

Groundwater users in the Subbasin benefit from generally stable and shallow groundwater levels supported by the substantial recharge resulting from large volumes of surface water supplied throughout the Subbasin. Surface water supplies available to diverters in the Subbasin are used, when available, for irrigation and for the benefit of other recharge efforts and projects described in the GSP. Ongoing access to surface water supplies is crucial to preserving the sustainability of the Subbasin.

Table 5.3. Red Bluff Subbasin Measurable Objectives, Minimum Thresholds, Undesirable Results for depletion of Interconnected Surface Waters

State Well Number	Groundwater Elevation (feet above mean sea level)						2025 vs. MO (ft)		2025 vs. MT (ft)	
	2025 Measurements				MO	MT	Spring	Fall	Spring	Fall
	Date Measured	Spring (Seasonal High)	Date Measured	Fall (Seasonal Low)						
27N04W05G002M (RB-1U)	3/10/2025	437.93	8/8/2025	423.93	432.4	394	5.53	-8.47	43.93	29.93
27N04W36G001M (RB-2U)	--	--	--	--	241.5	221		--	--	--
26N04W25J001M (RB-3U)	3/10/2025	267.96	--	--	257.1	255	10.86	--	12.96	--
25N03W11B001M (RB-4U)	3/11/2025	225.92	9/10/2025	180.76	203	169	22.92	-22.24	56.92	11.76
25N03W19N001M (RB-5U)	3/10/2025	242.89	8/7/2025	199.28	224.2	187	18.69	-24.92	55.89	12.28
25N05W24D001M (RB-6U)	3/17/2025	411	--	--	401.3	396	9.7		15	--
RB-7U	--	--	--	--	329.1	328	--	--	--	--

MO = Measurable Objective, MT = Minimum Threshold, -- = Indicates missing or questionable measurements, NA = Indicates non-determined MO, MT due to insufficient history

6 CONCLUSIONS

The Tehama County GSA adopted and submitted the GSP to DWR in January 2022, with a revised GSP submitted in April 2024. Following the analysis of historical and current hydrogeological conditions presented in the GSP, the Tehama County GSA has been actively working on sustainable groundwater management in the Subbasin. As presented in **Section 5** of this report, recent progress made on activities applicable to the Tehama County GSA demonstrates the commitment of the Tehama County GSA to implement the GSP by allocating the necessary time and resources to achieve long-term sustainable management of the groundwater resources in the Red Bluff Subbasin.

7 REFERENCES

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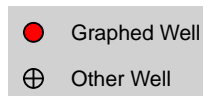
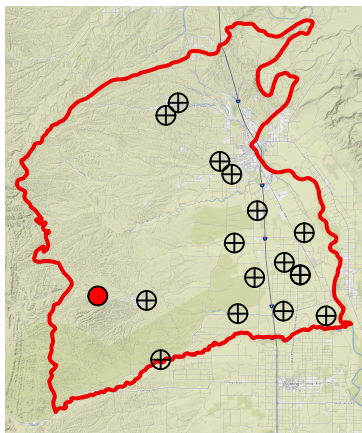
Water Year 2025 Annual Report

Appendix A

Characteristics and Hydrographs of Representative
Monitoring Site (RMS) Wells

Red Bluff Subbasin – State Well Number (SWN) 25N05W17K001M

Well Depth: 180 ft. Perforation top & bottom: 160 – 180 ft bgs

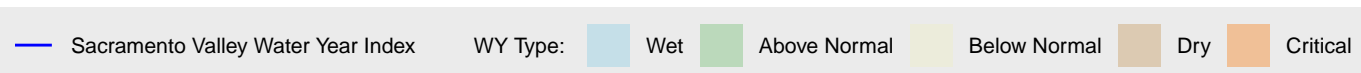
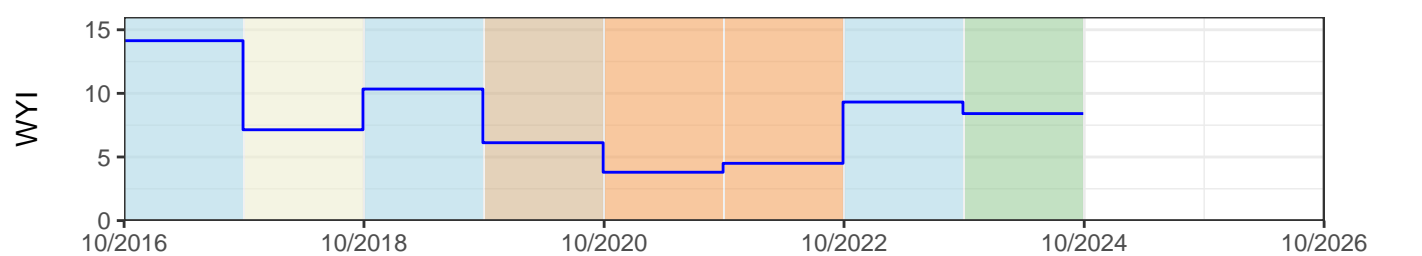
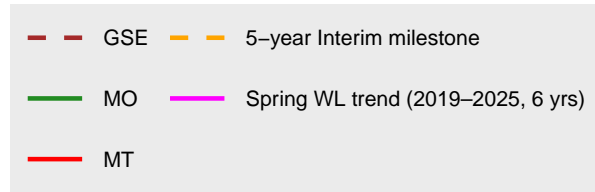


MO GWE: NA ft amsl
MO DTW: NA ft amsl

MT GWE: NA ft amsl
MT DTW: NA ft amsl

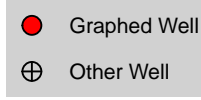
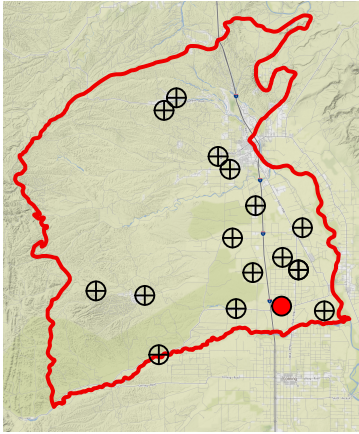
Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 6 years (2019 to 2025):
Change = -2.5 ft
Avg. rate of change = -0.42 ft/yr
Avg. water level = 579.45 ft amsl
5-yr Avg. rate (2021–2025):
= -0.25 ft/yr



Red Bluff Subbasin – State Well Number (SWN) 25N03W22L001M

Well Depth: 323 ft. Perforation top & bottom: 140 – 142 ft bgs

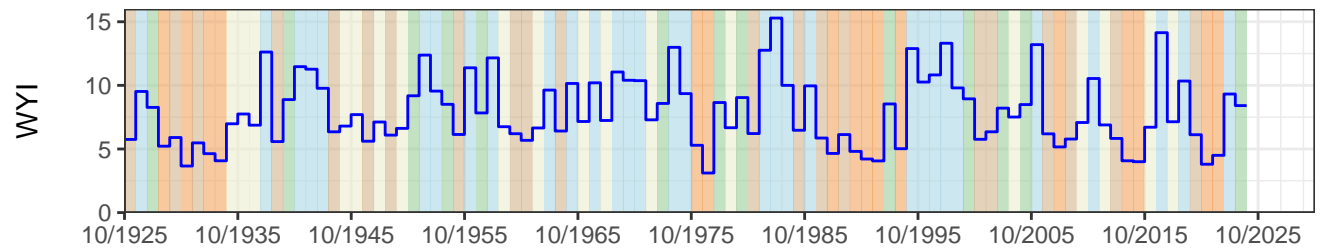
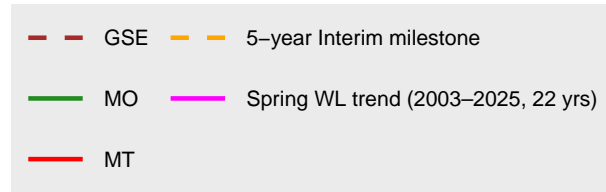
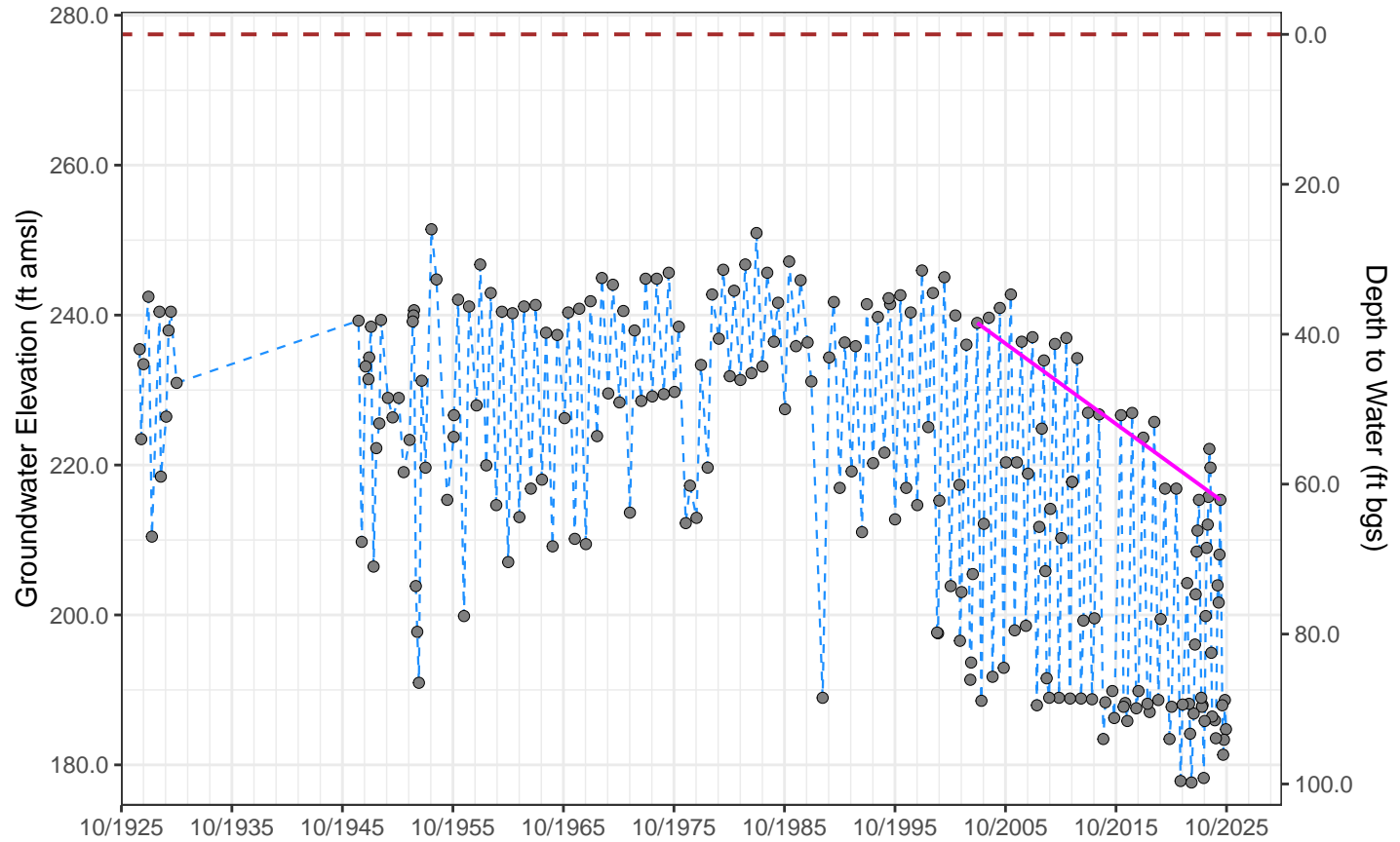


MO GWE: NA ft amsl
MO DTW: NA ft amsl

MT GWE: NA ft amsl
MT DTW: NA ft amsl

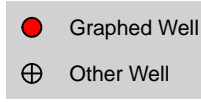
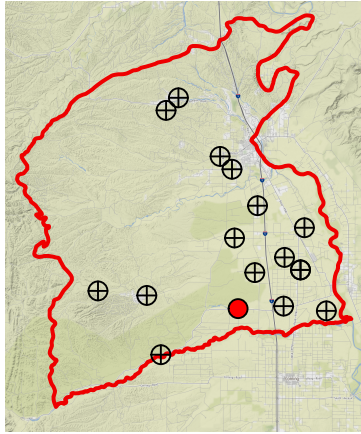
Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 22 years (2003 to 2025):
Change = -23.6 ft
Avg. rate of change = -1.07 ft/yr
Avg. water level = 228.39 ft amsl
5-yr Avg. rate (2021–2025):
= -0.38 ft/yr



Red Bluff Subbasin – State Well Number (SWN) 25N03W19N001M (RB-5U)

Upper Aquifer Well Depth: 370 ft. Perforation top & bottom: 135 – 358 ft bgs

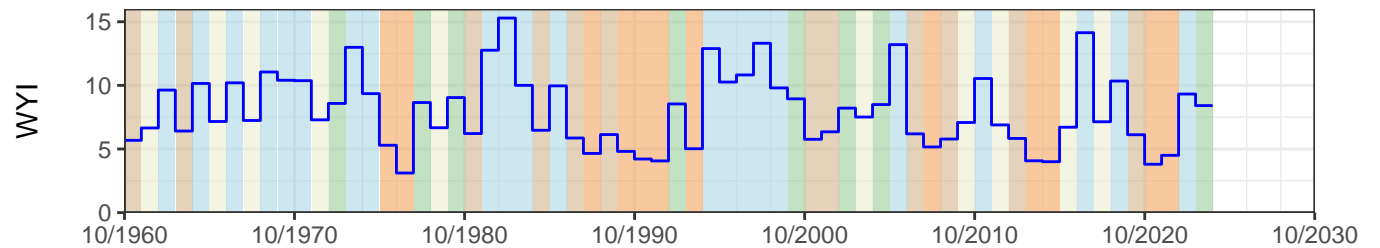
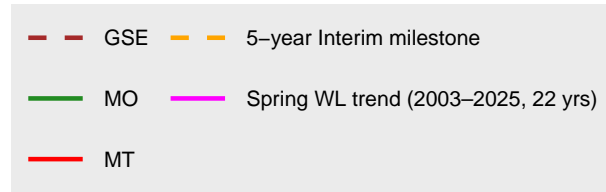
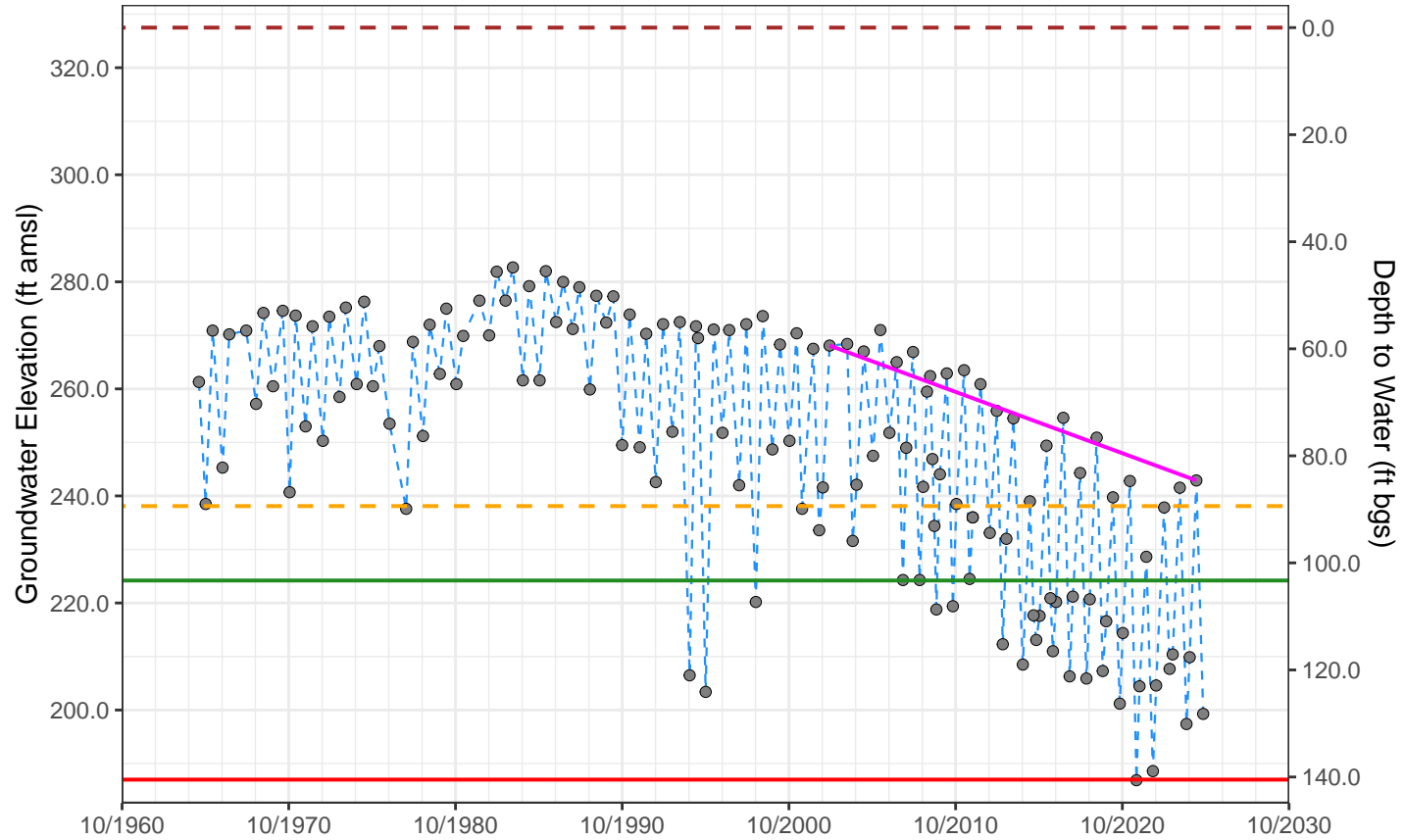


MO GWE: 224.2 ft amsl
MO DTW: 103.29 ft amsl

MT GWE: 187 ft amsl
MT DTW: 141 ft amsl

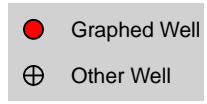
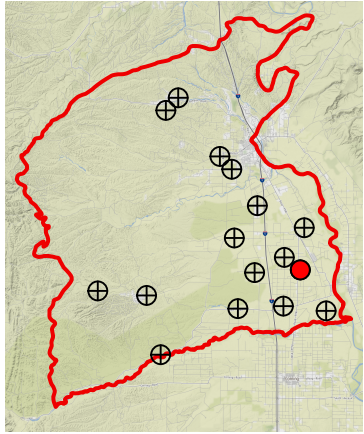
Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 22 years (2003 to 2025):
Change = -25.2 ft
Avg. rate of change = -1.15 ft/yr
Avg. water level = 253.82 ft amsl
5-yr Avg. rate (2021–2025):
= 0.02 ft/yr



Red Bluff Subbasin – State Well Number (SWN) 25N03W11B002M (RB-8L)

Lower Aquifer Well Depth: 789 ft. Perforation top & bottom: 680 – 750 ft bgs

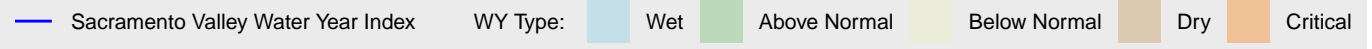
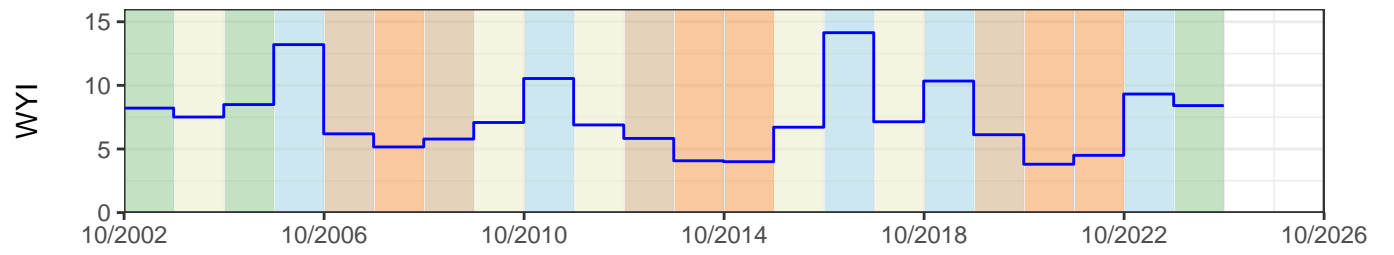
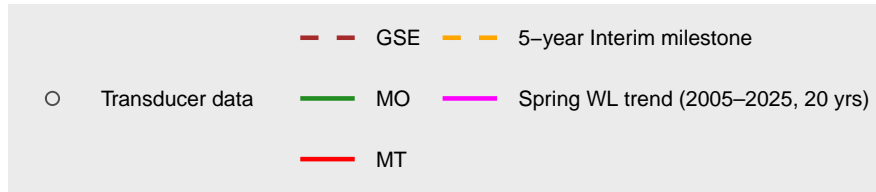
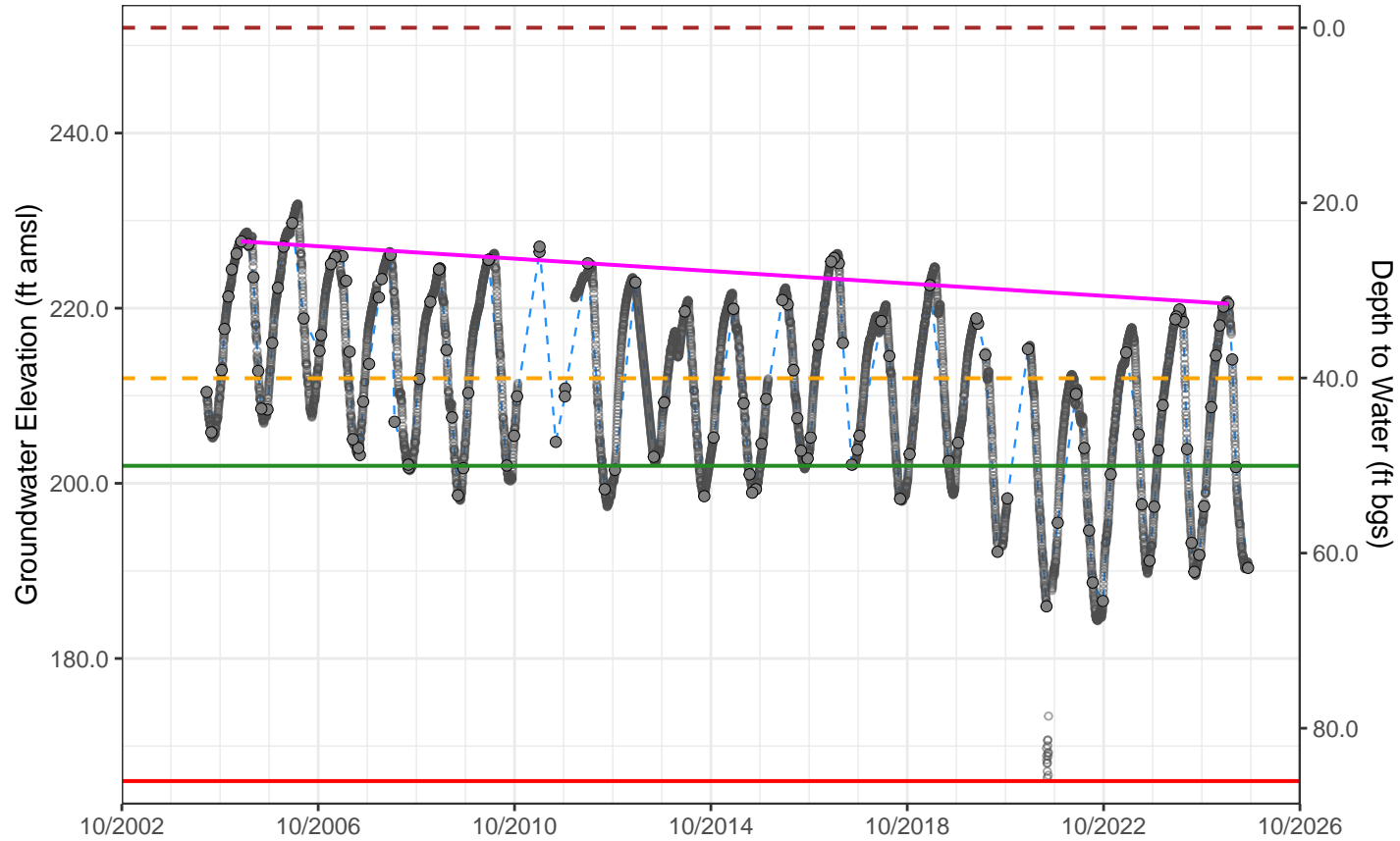


MO GWE: 202 ft amsl
MO DTW: 50.03 ft amsl

MT GWE: 166 ft amsl
MT DTW: 86 ft amsl

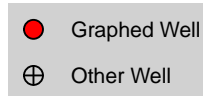
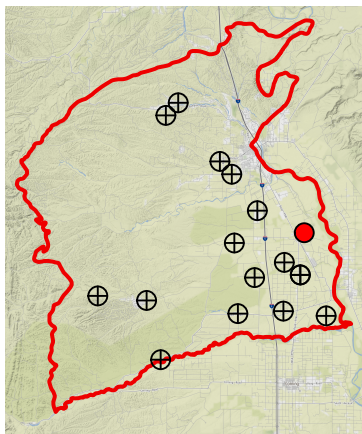
Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 20 years (2005 to 2025):
Change = -7.12 ft
Avg. rate of change = -0.36 ft/yr
Avg. water level = 221.98 ft amsl
5-yr Avg. rate (2021-2025):
= 1.29 ft/yr



Red Bluff Subbasin – State Well Number (SWN) 26N03W24M001M

Well Depth: 220 ft. Perforation top & bottom: 60 – 85 ft bgs

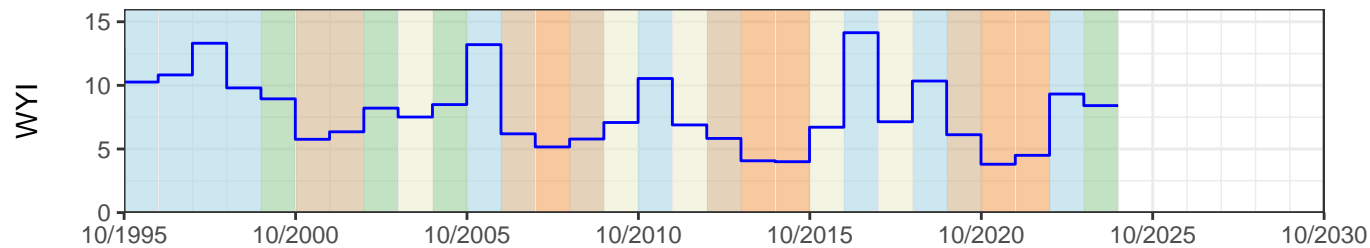
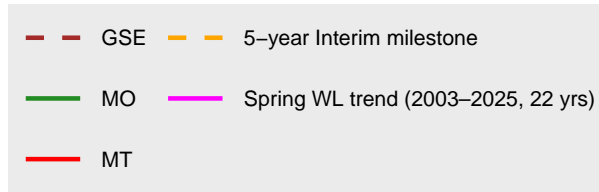
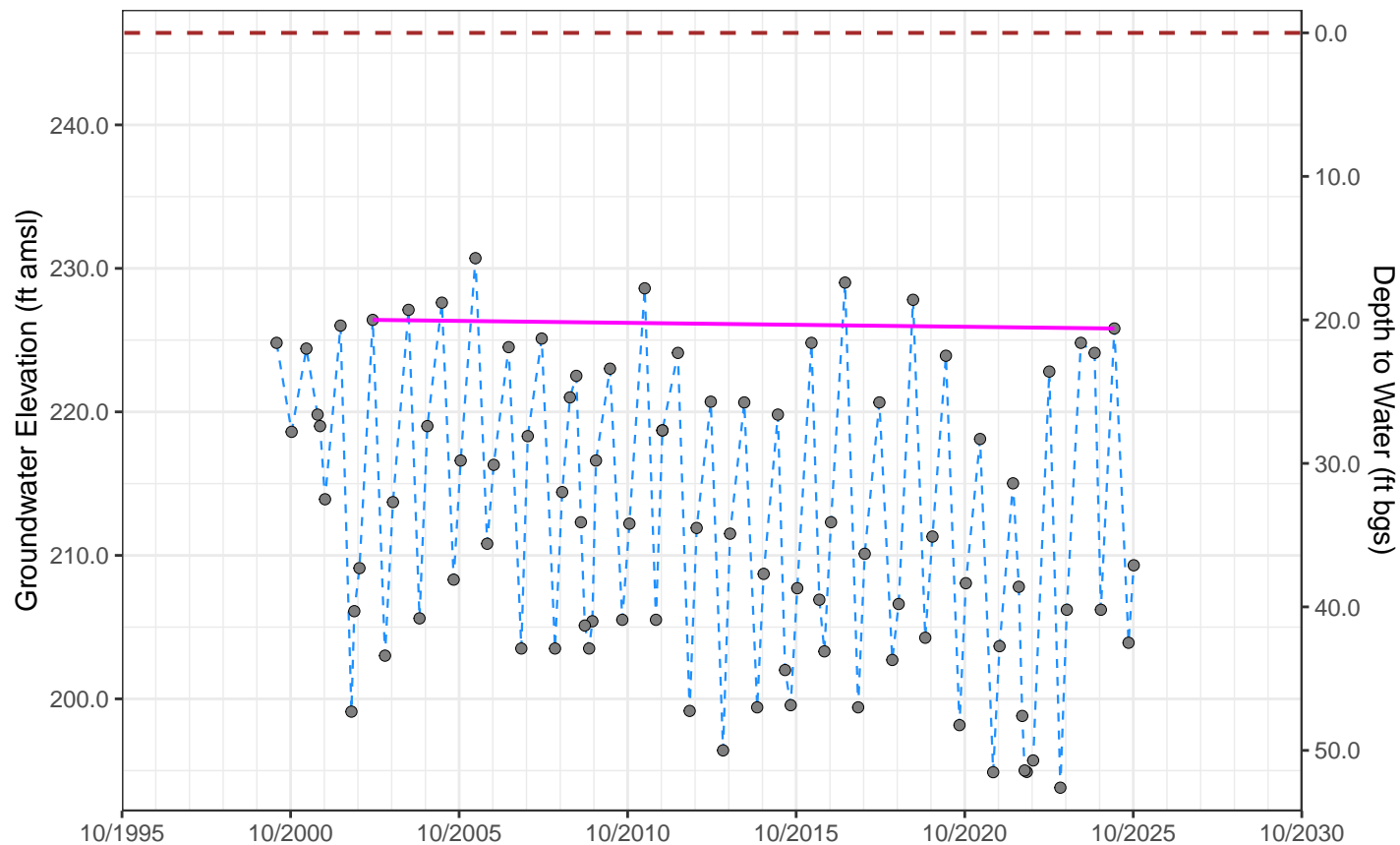


MO GWE: NA ft amsl
MO DTW: NA ft amsl

MT GWE: NA ft amsl
MT DTW: NA ft amsl

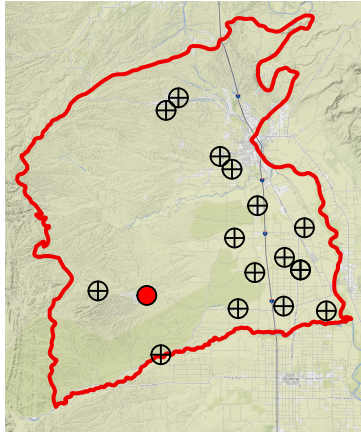
Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 22 years (2003 to 2025):
Change = -0.6 ft
Avg. rate of change = -0.03 ft/yr
Avg. water level = 224.07 ft amsl
5-yr Avg. rate (2021-2025):
= 1.92 ft/yr



Red Bluff Subbasin – State Well Number (SWN) 25N05W24D001M (RB-6U)

Upper Aquifer Well Depth: 183 ft. Perforation top & bottom: 143 – 183 ft bgs



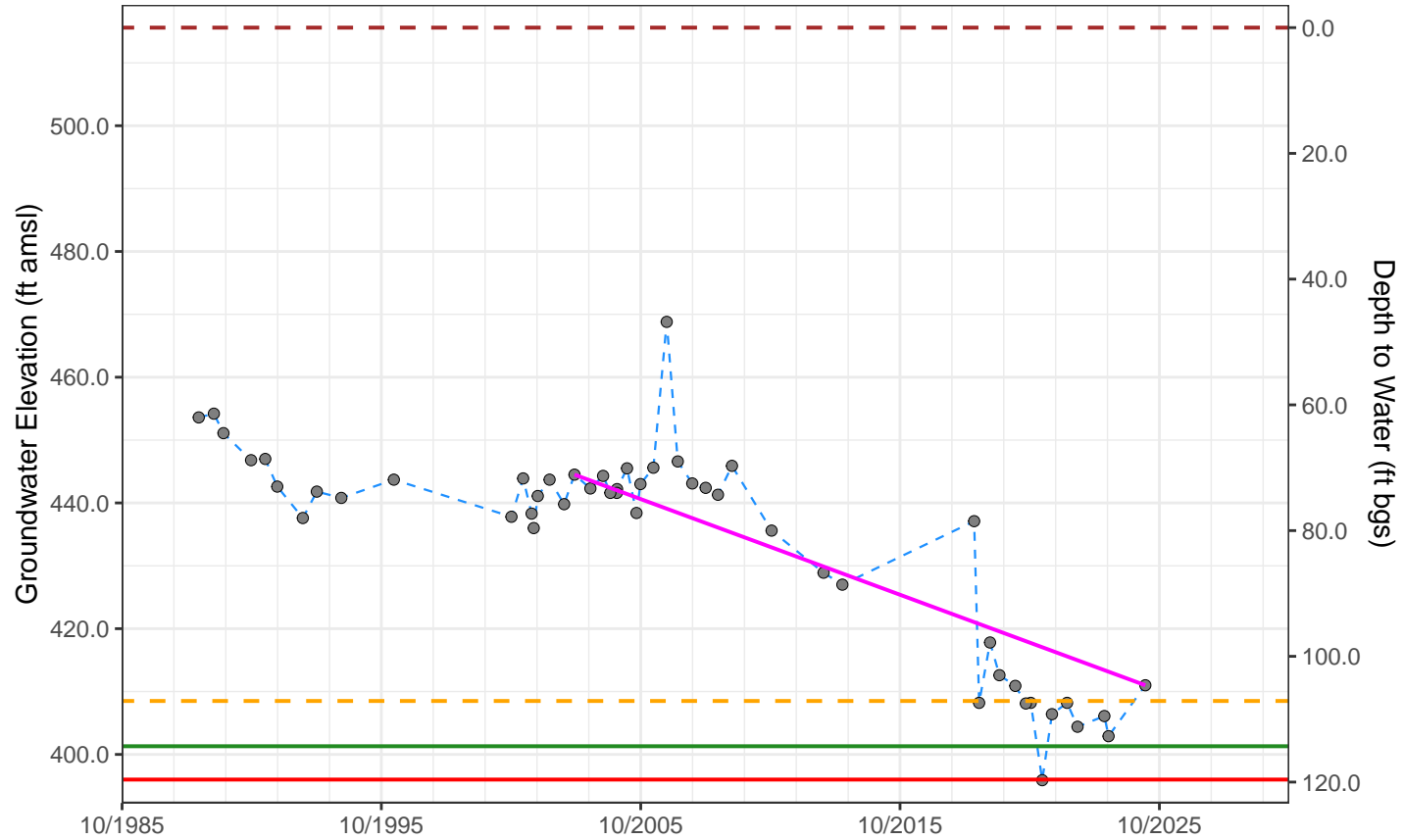
- Graphed Well
- ⊕ Other Well

MO GWE: 401.3 ft amsl
MO DTW: 114.3 ft amsl

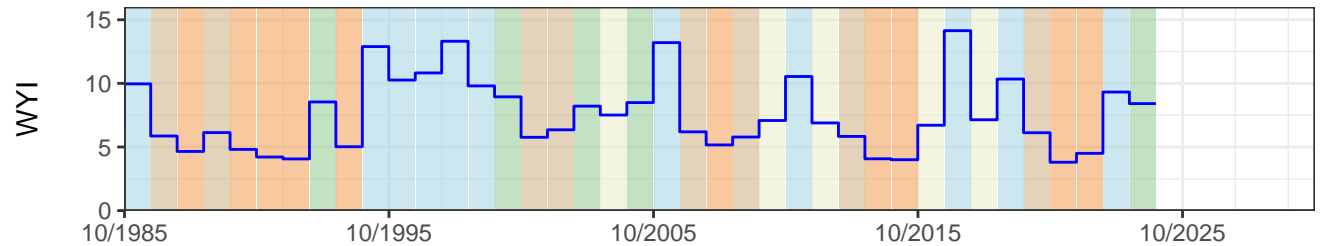
MT GWE: 396 ft amsl
MT DTW: 120 ft amsl

Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 22 years (2003 to 2025):
Change = -33.5 ft
Avg. rate of change = -1.52 ft/yr
Avg. water level = 429.88 ft amsl
5-yr Avg. rate (2021–2025):
= 3.78 ft/yr



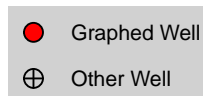
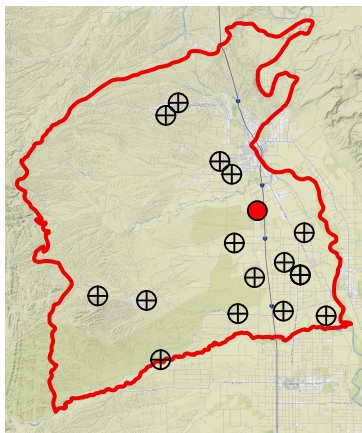
- - - GSE
- - - 5-year Interim milestone
- MO
- Spring WL trend (2003–2025, 22 yrs)
- MT



- Sacramento Valley Water Year Index
- WY Type: ■ Wet ■ Above Normal ■ Below Normal ■ Dry ■ Critical

Red Bluff Subbasin – State Well Number (SWN) 26N03W17B001M

Well Depth: 180 ft. Perforation top & bottom: 160 – 180 ft bgs

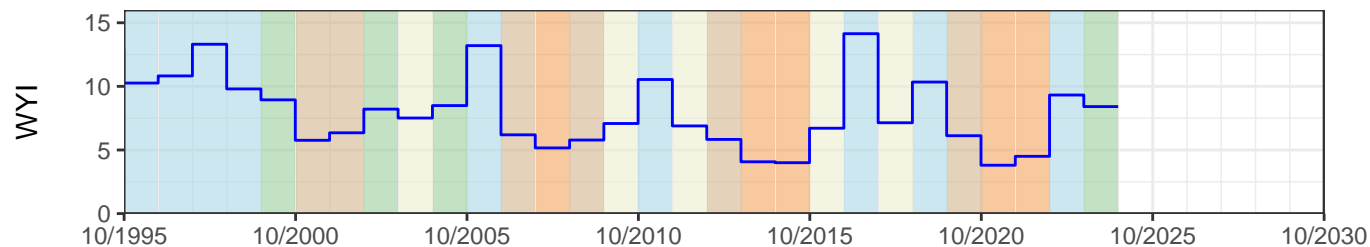
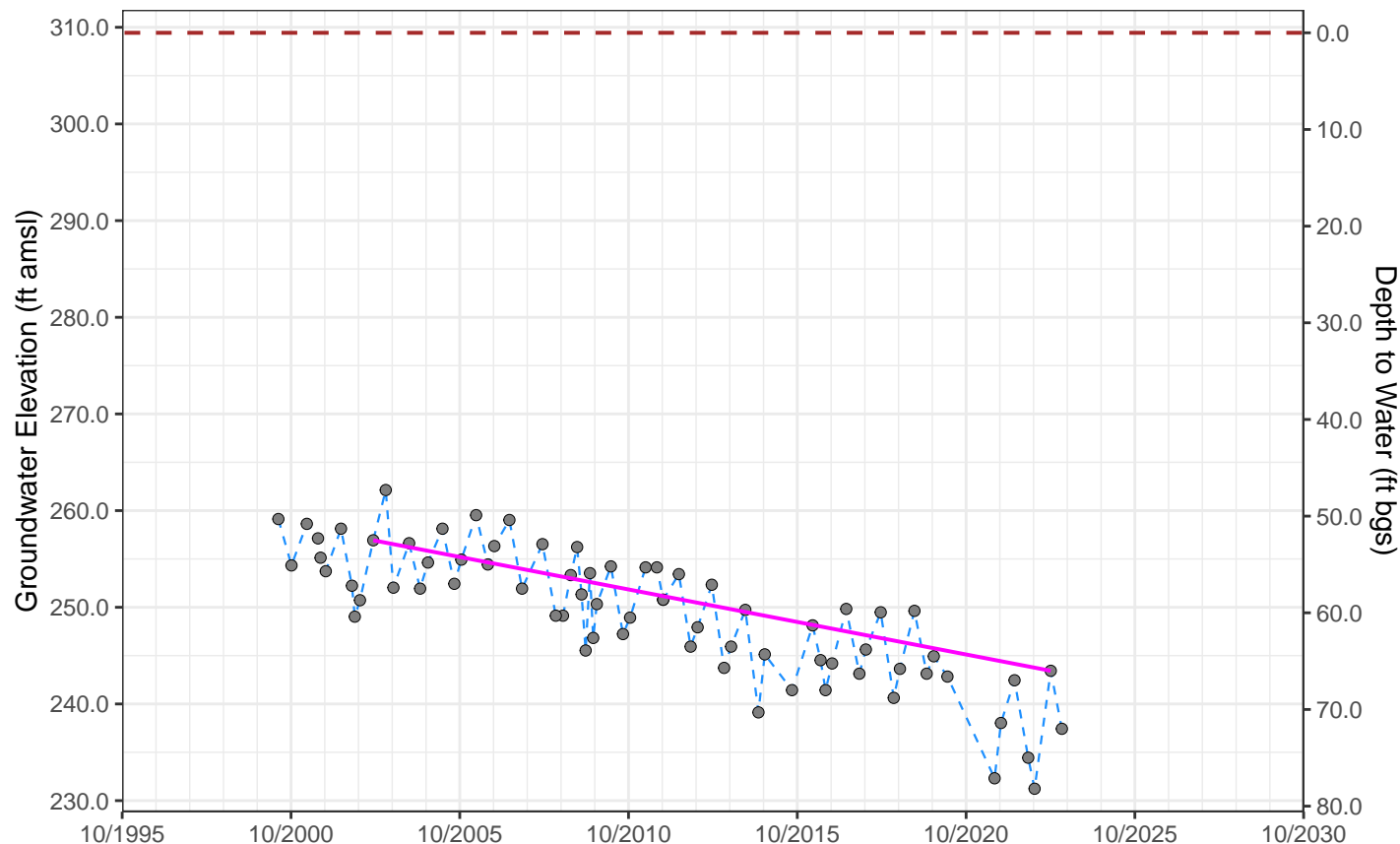


MO GWE: NA ft amsl
MO DTW: NA ft amsl

MT GWE: NA ft amsl
MT DTW: NA ft amsl

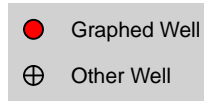
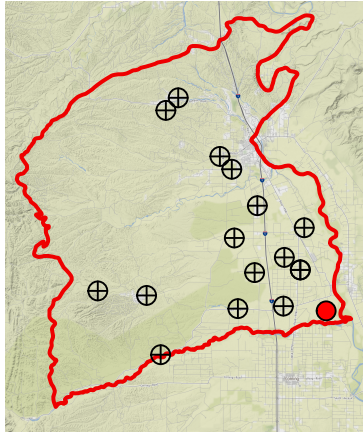
Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 20 years (2003 to 2023):
Change = -13.5 ft
Avg. rate of change = -0.68 ft/yr
Avg. water level = 252.24 ft amsl
5-yr Avg. rate (2019–2023):
= -1.55 ft/yr



Red Bluff Subbasin – State Well Number (SWN) 25N02W30G001M

Well Depth: 62 ft. Perforation top & bottom: 52 – 62 ft bgs

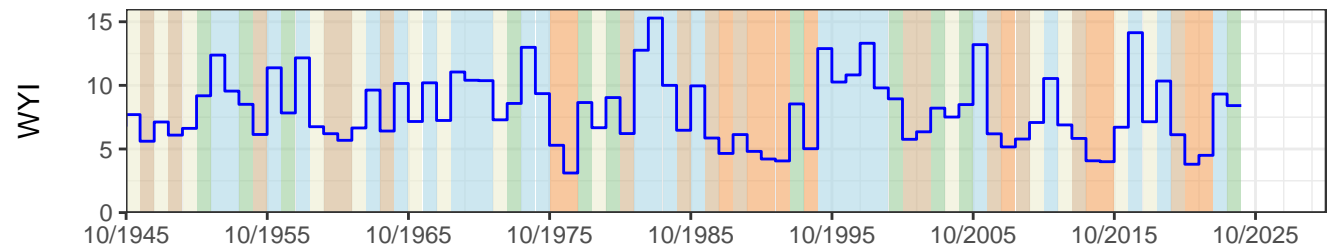
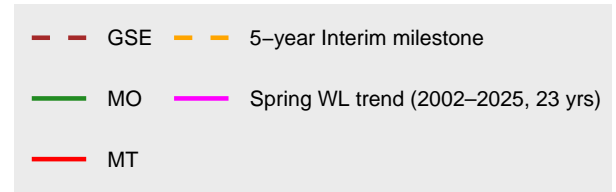
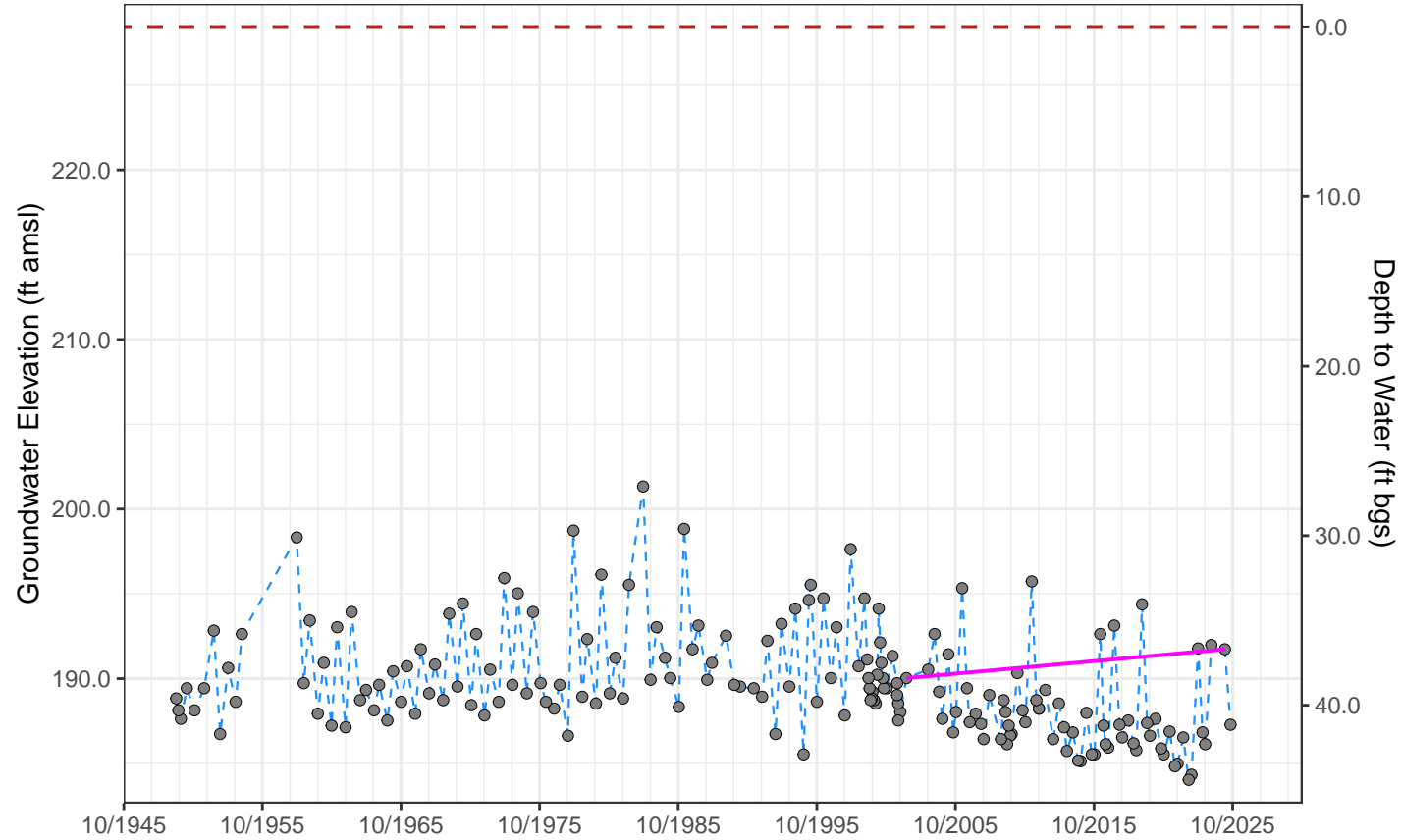


MO GWE: NA ft amsl
MO DTW: NA ft amsl

MT GWE: NA ft amsl
MT DTW: NA ft amsl

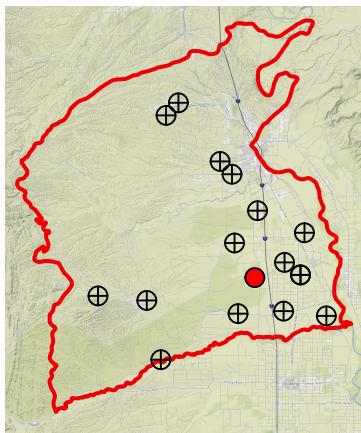
Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 23 years (2002 to 2025):
Change = 1.7 ft
Avg. rate of change = 0.07 ft/yr
Avg. water level = 190.35 ft amsl
5-yr Avg. rate (2021–2025):
= 1.21 ft/yr



Red Bluff Subbasin – State Well Number (SWN) 25N03W08E001M

Well Depth: 420 ft. Perforation top & bottom: 55 – 134 ft bgs



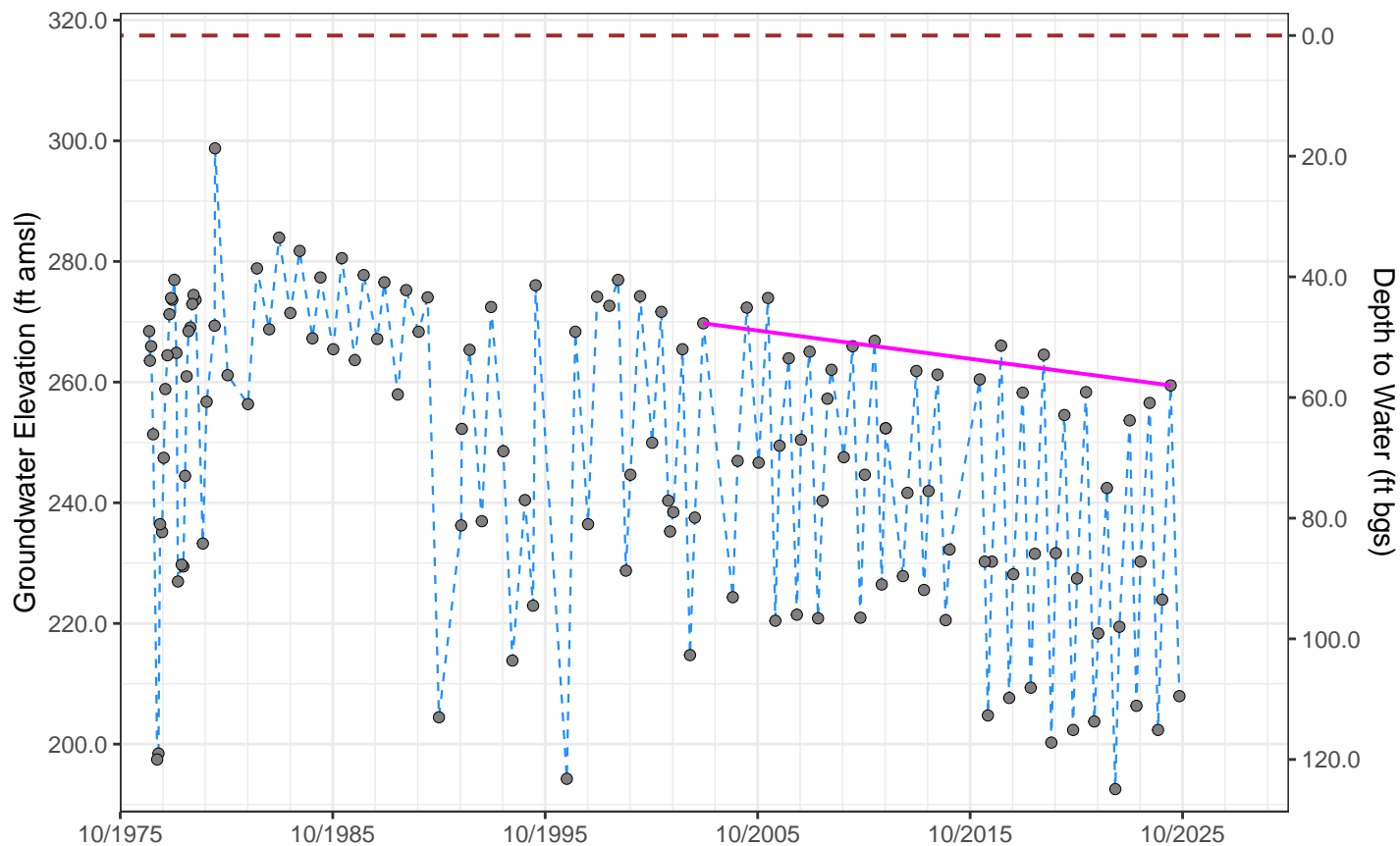
- Graphed Well
- ⊕ Other Well

MO GWE: NA ft amsl
MO DTW: NA ft amsl

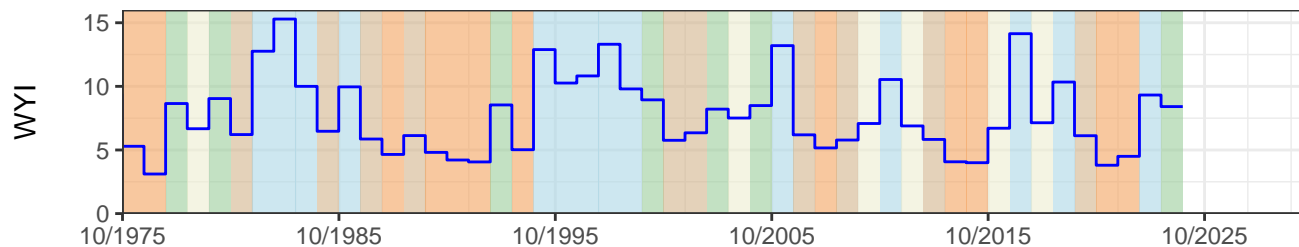
MT GWE: NA ft amsl
MT DTW: NA ft amsl

Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 22 years (2003 to 2025):
Change = -10.3 ft
Avg. rate of change = -0.47 ft/yr
Avg. water level = 261.86 ft amsl
5-yr Avg. rate (2021–2025):
= 0.27 ft/yr



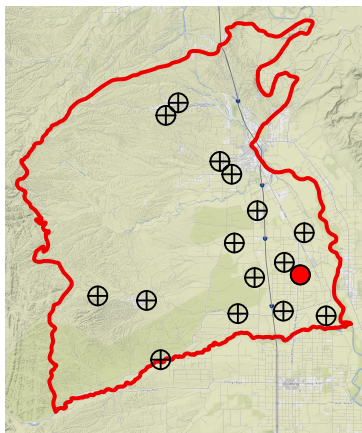
- GSE
- MO
- MT
- 5-year Interim milestone
- Spring WL trend (2003–2025, 22 yrs)



- Sacramento Valley Water Year Index
- WY Type: ■ Wet ■ Above Normal ■ Below Normal ■ Dry ■ Critical

Red Bluff Subbasin – State Well Number (SWN) 25N03W11B001M (RB-4U)

Upper Aquifer Well Depth: 255 ft. Perforation top & bottom: 150 – 180 ft bgs



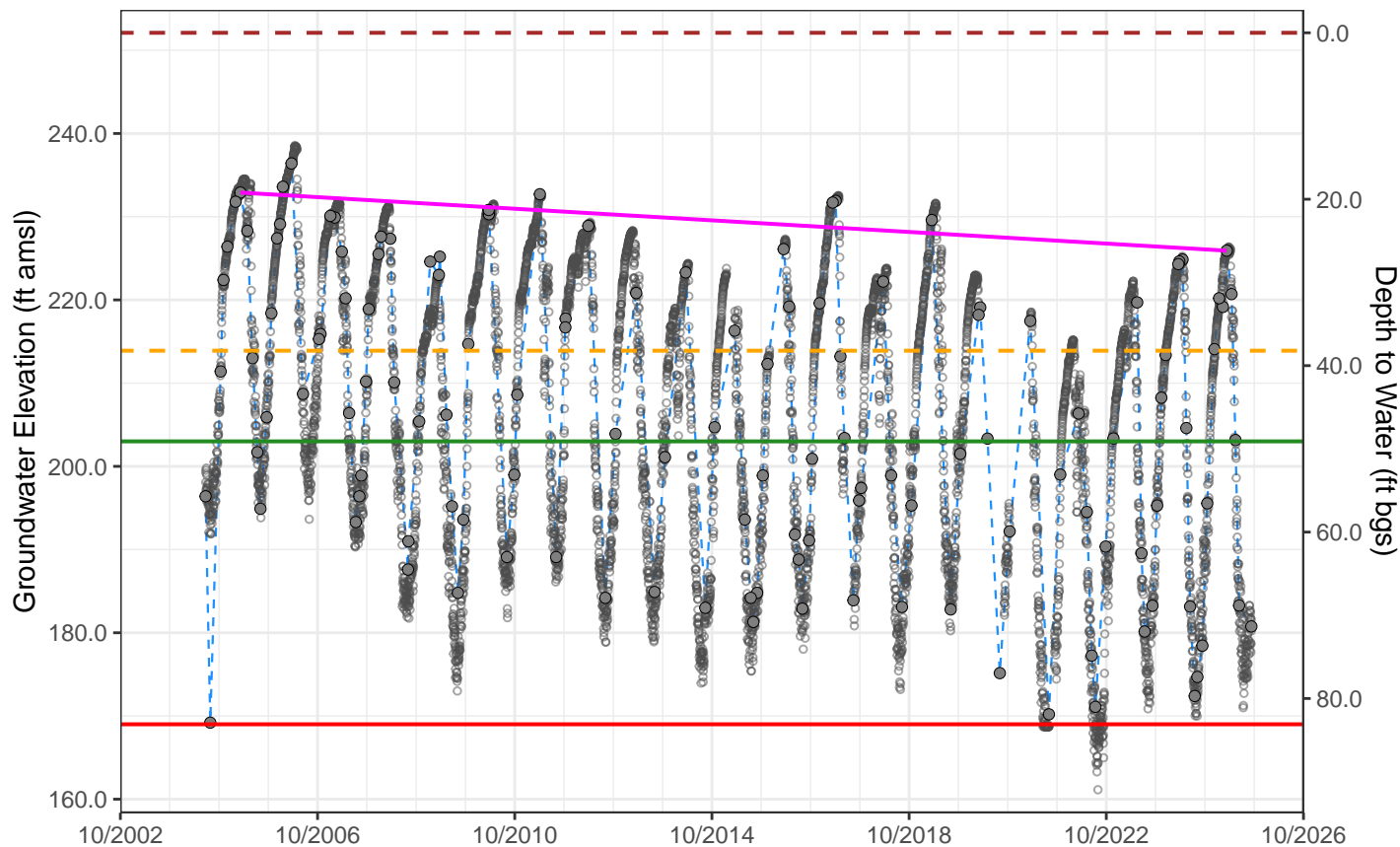
- Graphed Well
- ⊕ Other Well

MO GWE: 203 ft amsl
MO DTW: 49.1 ft amsl

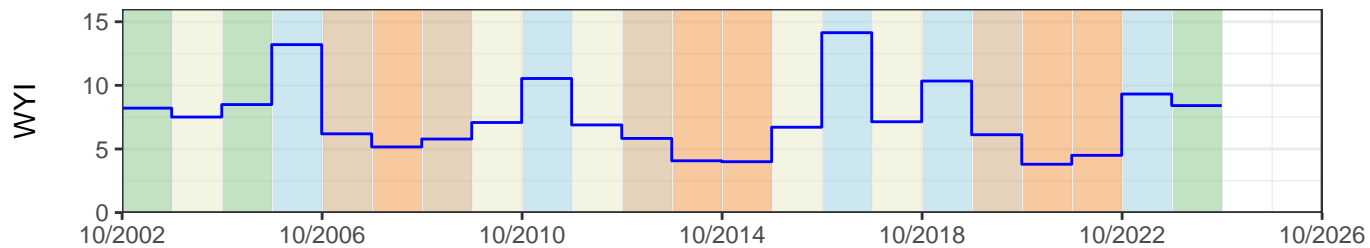
MT GWE: 169 ft amsl
MT DTW: 83 ft amsl

Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 20 years (2005 to 2025):
Change = -6.98 ft
Avg. rate of change = -0.35 ft/yr
Avg. water level = 225.43 ft amsl
5-yr Avg. rate (2021–2025):
= 2.11 ft/yr



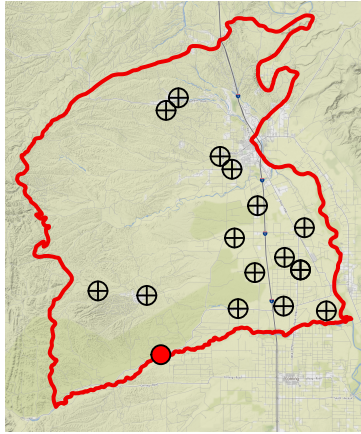
- GSE
- 5-year Interim milestone
- Transducer data
- MO
- Spring WL trend (2005–2025, 20 yrs)
- MT



- Sacramento Valley Water Year Index
- WY Type: Wet Above Normal Below Normal Dry Critical

Red Bluff Subbasin – State Well Number (SWN) MW Well (RB-7U)

Upper Aquifer Well Depth: 240 ft. Perforation top & bottom: Unknown



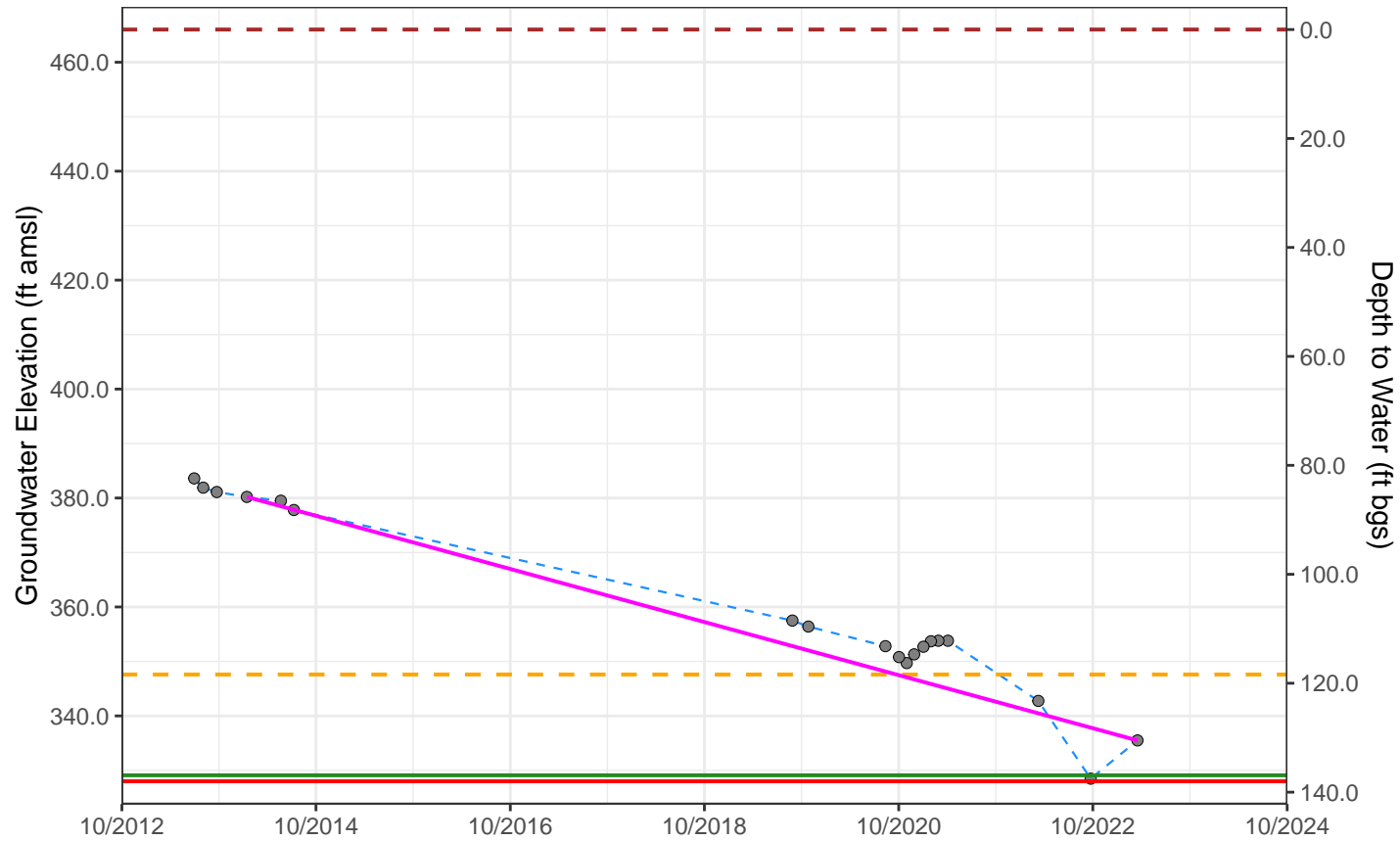
- Graphed Well
- ⊕ Other Well

MO GWE: 329.1 ft amsl
MO DTW: 136.9 ft amsl

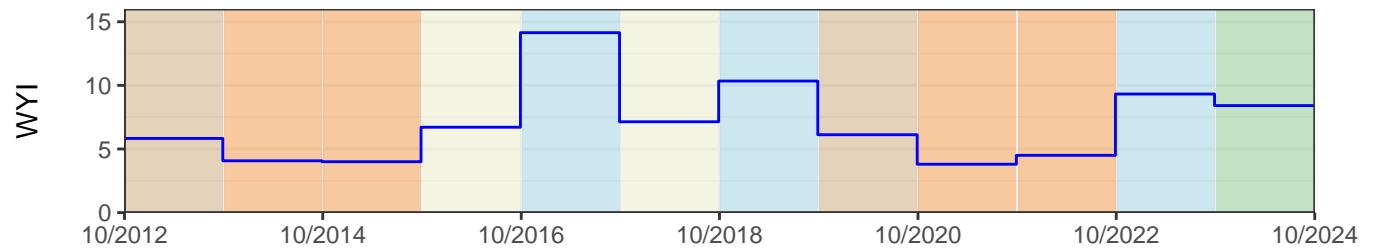
MT GWE: 328 ft amsl
MT DTW: 138 ft amsl

Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 9 years (2014 to 2023):
Change = -44.7 ft
Avg. rate of change = -4.97 ft/yr
Avg. water level = 353.06 ft amsl
5-yr Avg. rate (2021–2023):
= -9.15 ft/yr



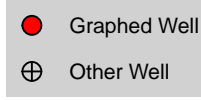
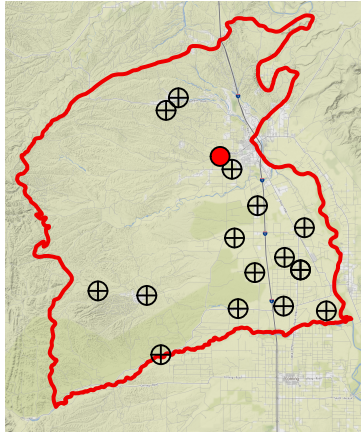
- GSE
- 5-year Interim milestone
- MO
- MT
- Spring WL trend (2014–2023, 9 yrs)



- Sacramento Valley Water Year Index
- WY Type: Wet
- Above Normal
- Below Normal
- Dry
- Critical

Red Bluff Subbasin – State Well Number (SWN) 27N04W26J002M

Well Depth: 136 ft. Perforation top & bottom: Unknown

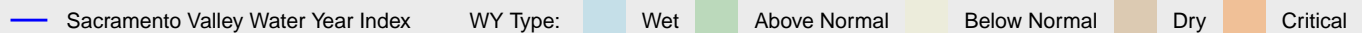
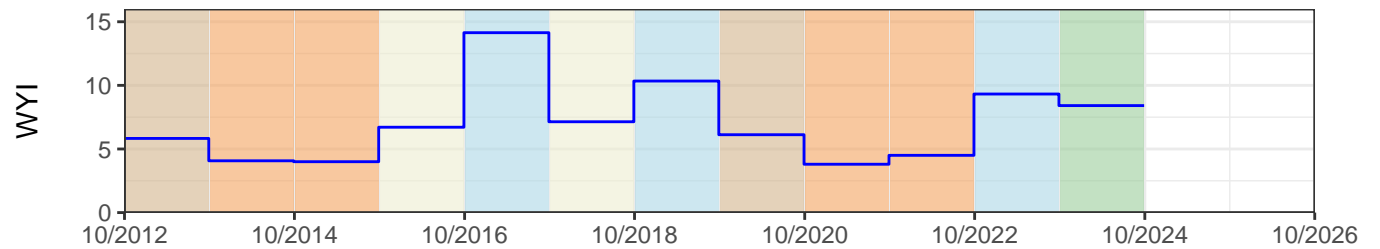
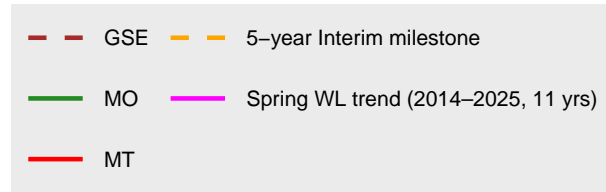
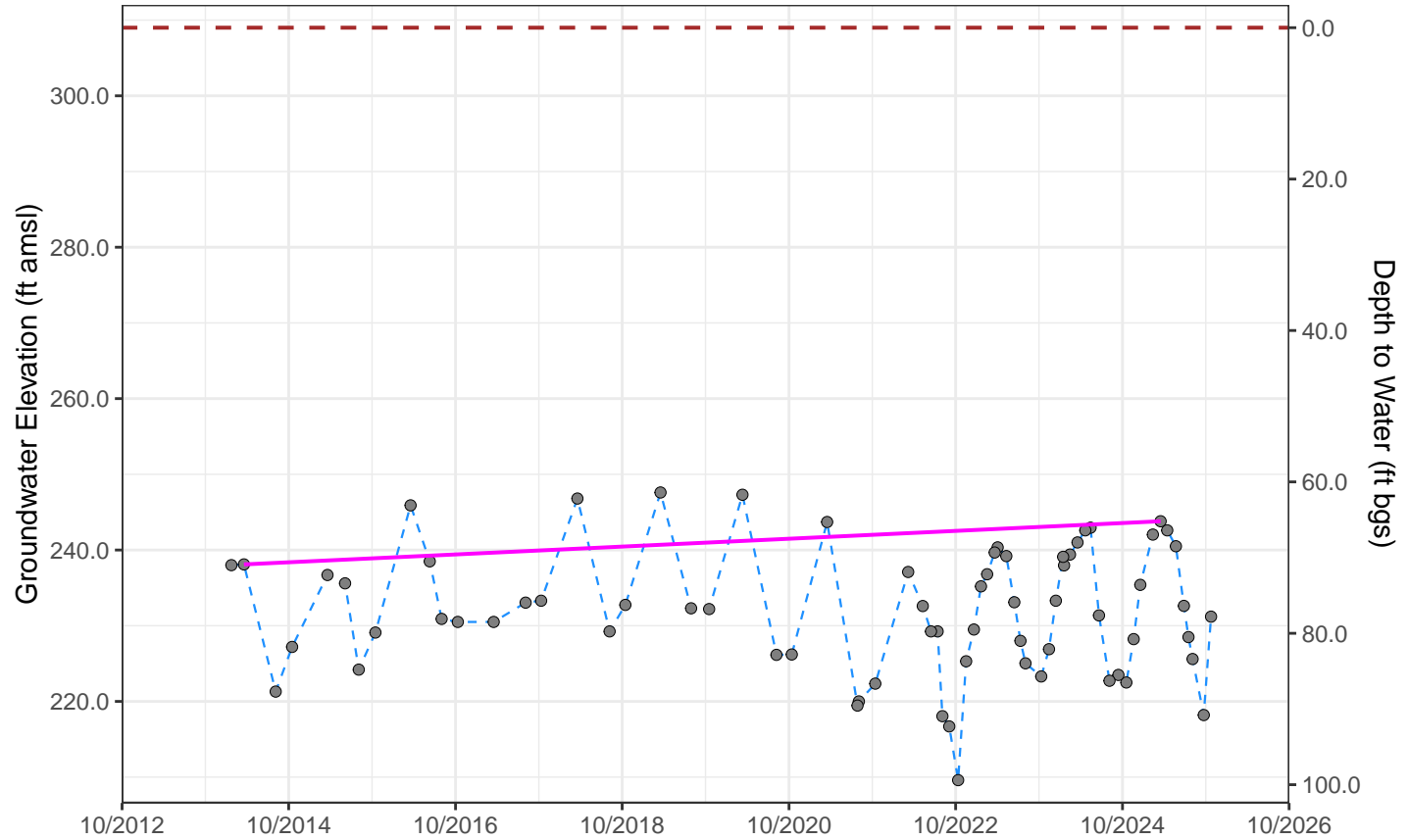


MO GWE: NA ft amsl
MO DTW: NA ft amsl

MT GWE: NA ft amsl
MT DTW: NA ft amsl

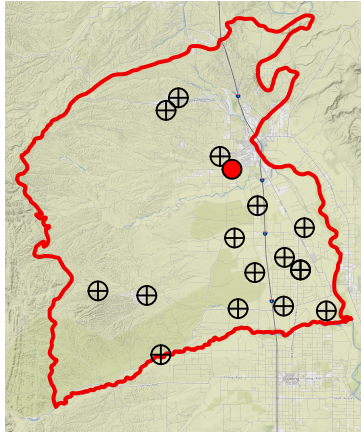
Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 11 years (2014 to 2025):
Change = 5.7 ft
Avg. rate of change = 0.52 ft/yr
Avg. water level = 241.7 ft amsl
5-yr Avg. rate (2021–2025):
= 0.03 ft/yr



Red Bluff Subbasin – State Well Number (SWN) 27N04W36G001M (RB-2U)

Upper Aquifer Well Depth: 155 ft. Perforation top & bottom: 135 – 155 ft bgs



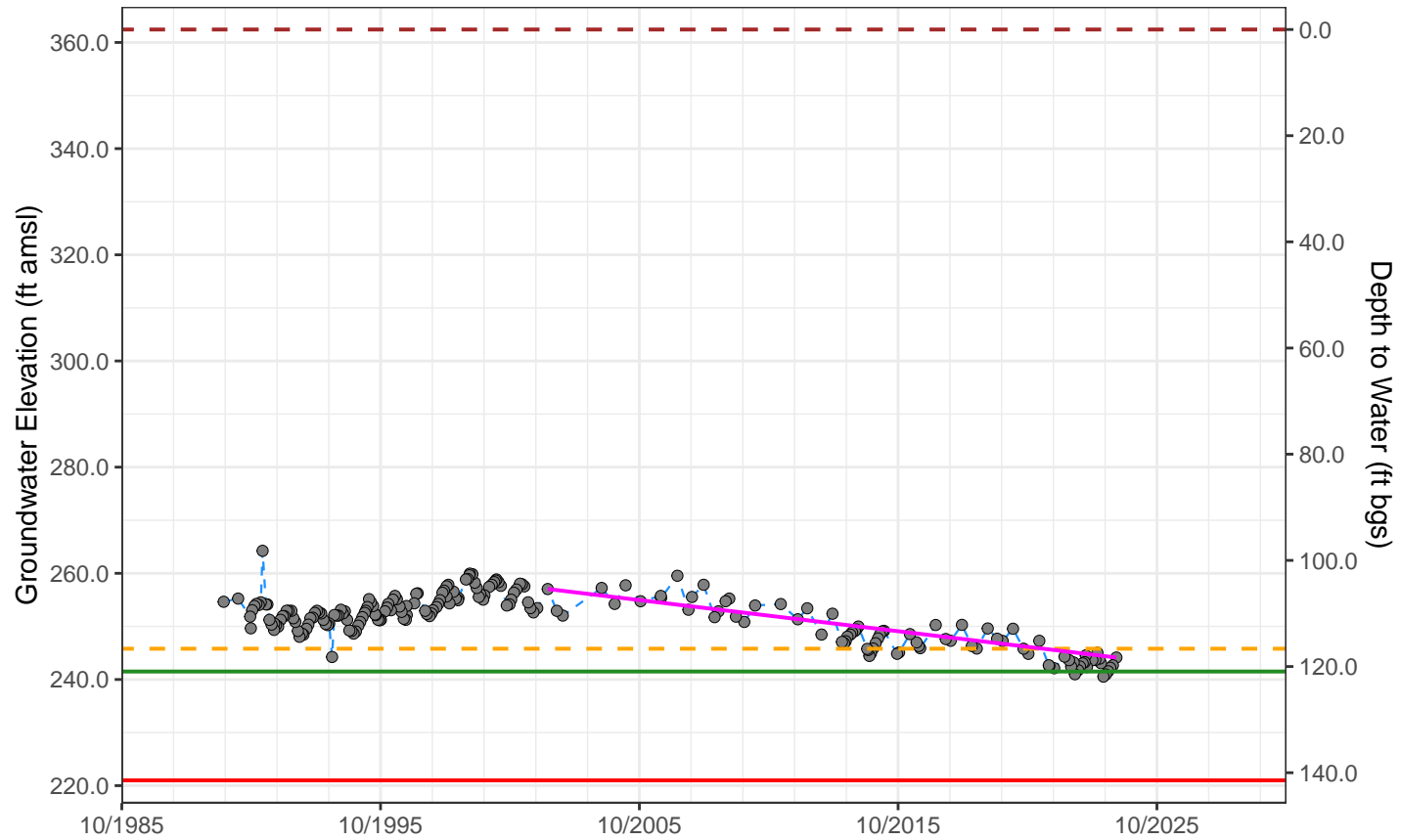
- Graphed Well
- ⊕ Other Well

MO GWE: 241.5 ft amsl
MO DTW: 120.94 ft amsl

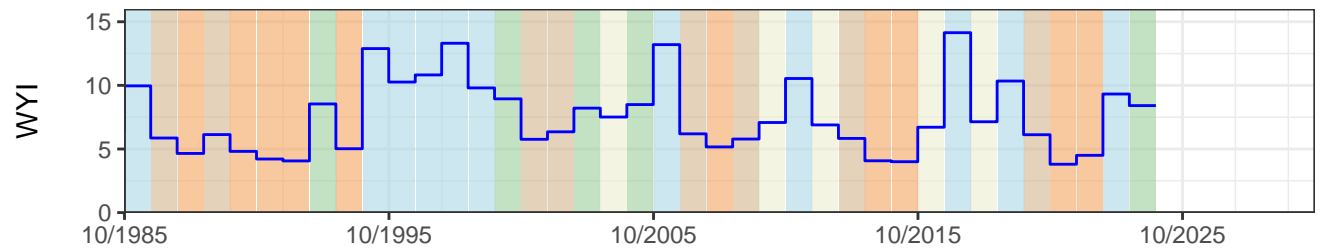
MT GWE: 221 ft amsl
MT DTW: 141 ft amsl

Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 22 years (2002 to 2024):
Change = -12.9 ft
Avg. rate of change = -0.59 ft/yr
Avg. water level = 251.73 ft amsl
5-yr Avg. rate (2020–2024):
= -1.36 ft/yr



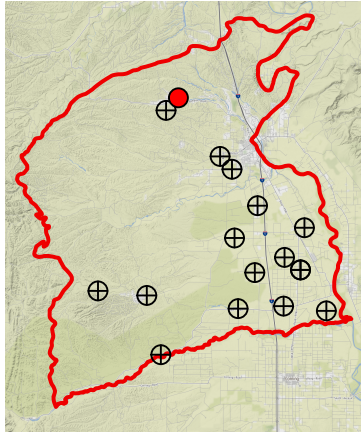
- GSE
- 5-year Interim milestone
- MO
- Spring WL trend (2002–2024, 22 yrs)
- MT



- Sacramento Valley Water Year Index
- WY Type: Wet Above Normal Below Normal Dry Critical

Red Bluff Subbasin – State Well Number (SWN) 27N04W05G002M (RB-1U)

Upper Aquifer Well Depth: 260 ft. Perforation top & bottom: 231 – 251 ft bgs



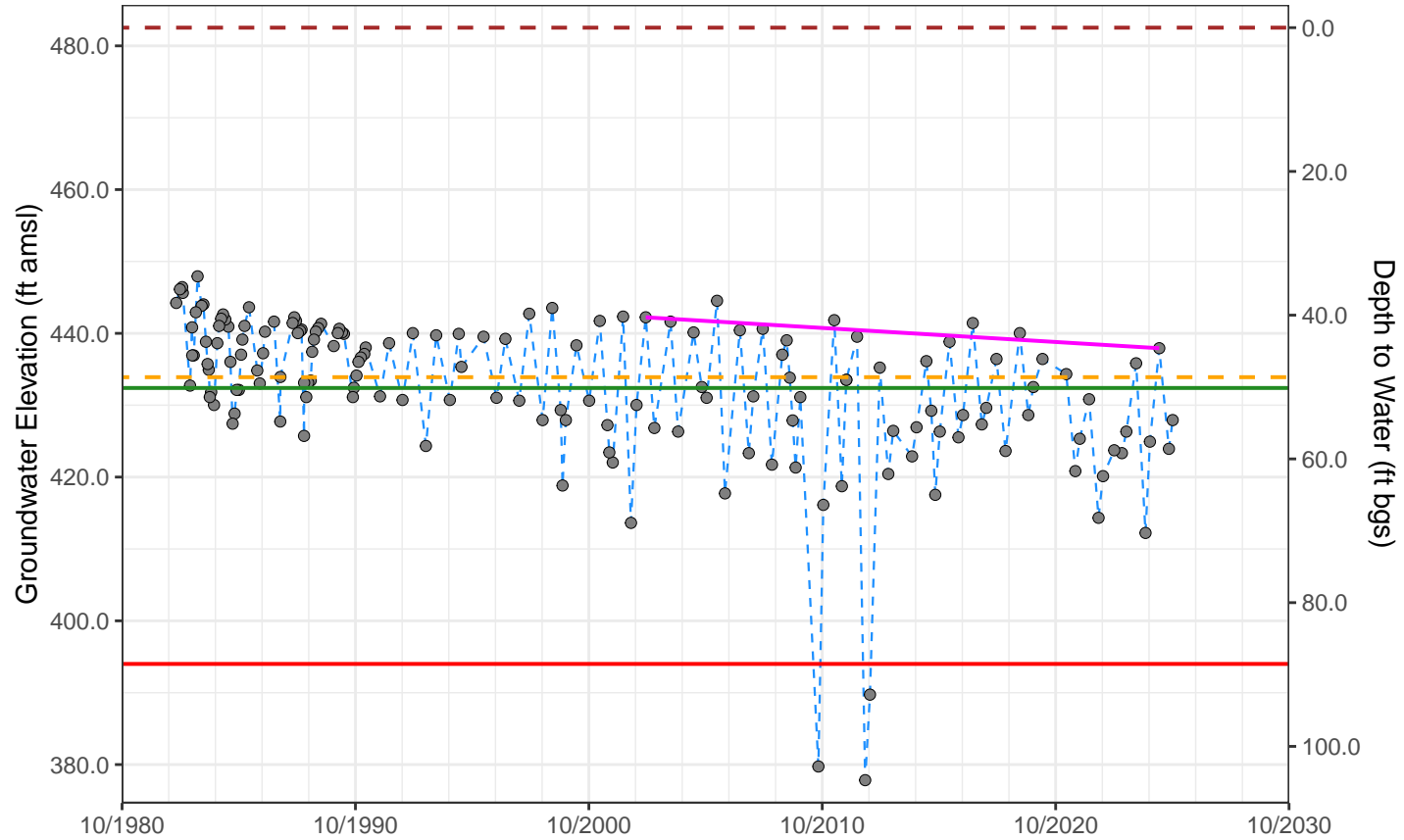
- Graphed Well
- ⊕ Other Well

MO GWE: 432.4 ft amsl
MO DTW: 50.13 ft amsl

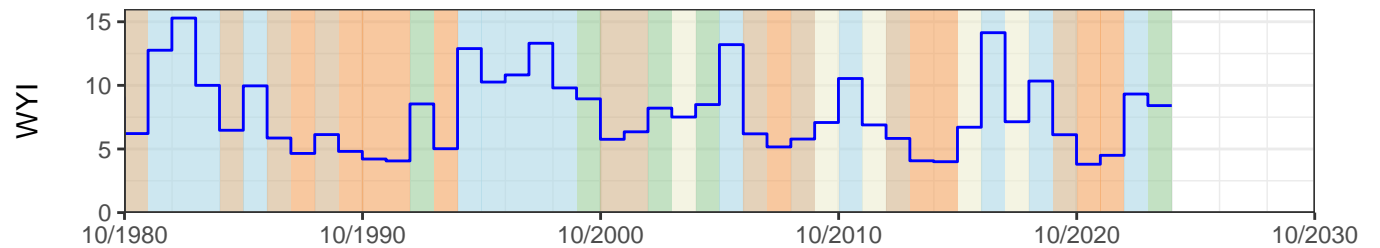
MT GWE: 394 ft amsl
MT DTW: 88 ft amsl

Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 22 years (2003 to 2025):
Change = -4.3 ft
Avg. rate of change = -0.2 ft/yr
Avg. water level = 437.96 ft amsl
5-yr Avg. rate (2021–2025):
= 0.9 ft/yr



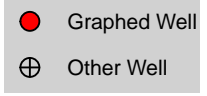
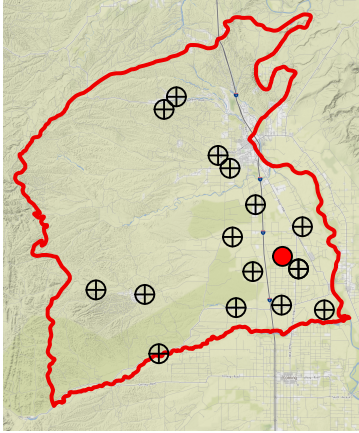
- GSE
- 5-year Interim milestone
- MO
- Spring WL trend (2003–2025, 22 yrs)
- MT



- Sacramento Valley Water Year Index
- WY Type: Wet Above Normal Below Normal Dry Critical

Red Bluff Subbasin – State Well Number (SWN) 26N03W34P001M

Well Depth: 315 ft. Perforation top & bottom: 107 – 225 ft bgs

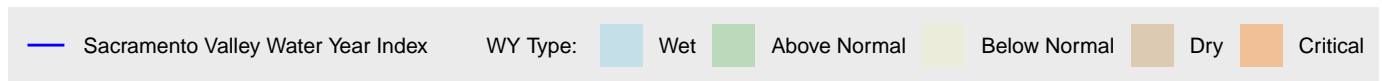
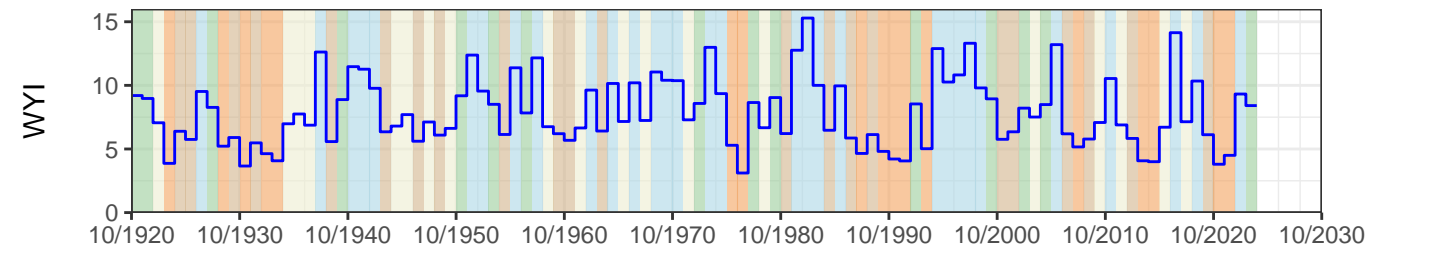
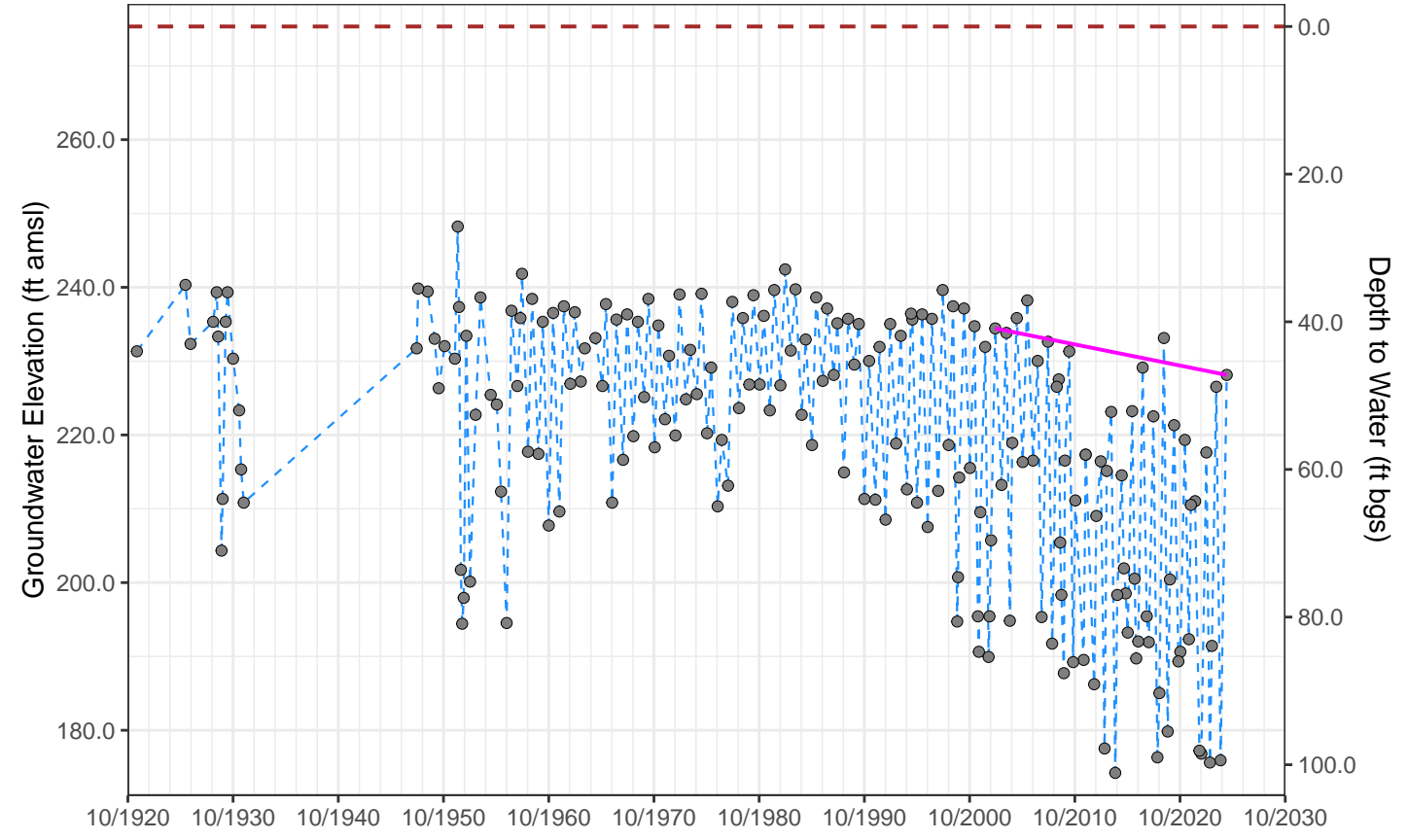


MO GWE: NA ft amsl
MO DTW: NA ft amsl

MT GWE: NA ft amsl
MT DTW: NA ft amsl

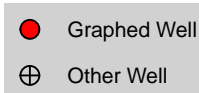
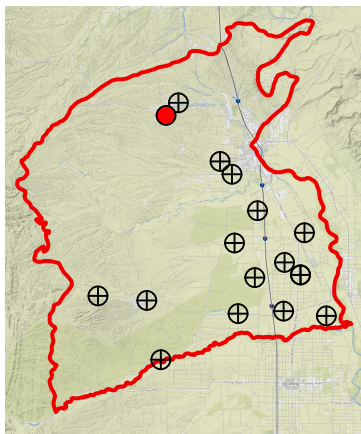
Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 22 years (2003 to 2025):
Change = -6.3 ft
Avg. rate of change = -0.29 ft/yr
Avg. water level = 226.19 ft amsl
5-yr Avg. rate (2021–2025):
= 2.2 ft/yr



Red Bluff Subbasin – State Well Number (SWN) 27N04W07B001M

Well Depth: 410 ft. Perforation top & bottom: 390 – 410 ft bgs

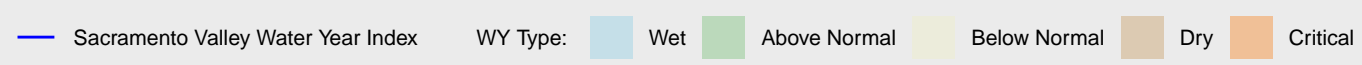
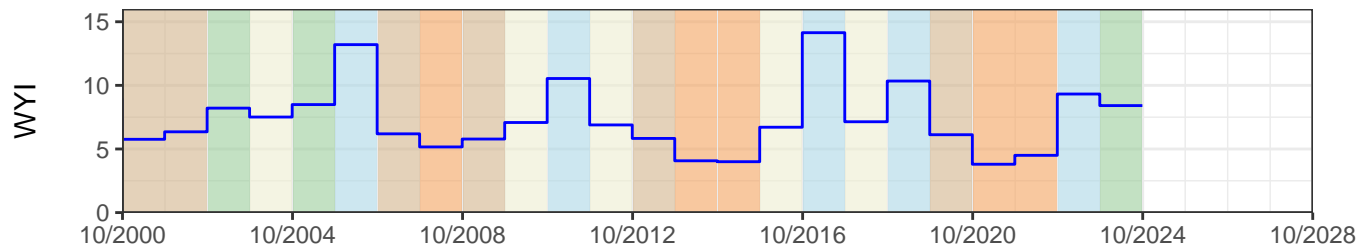
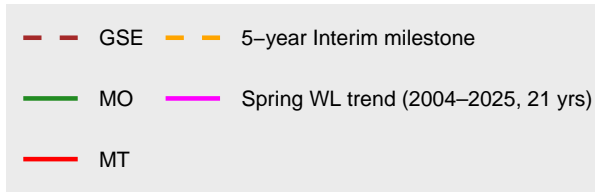
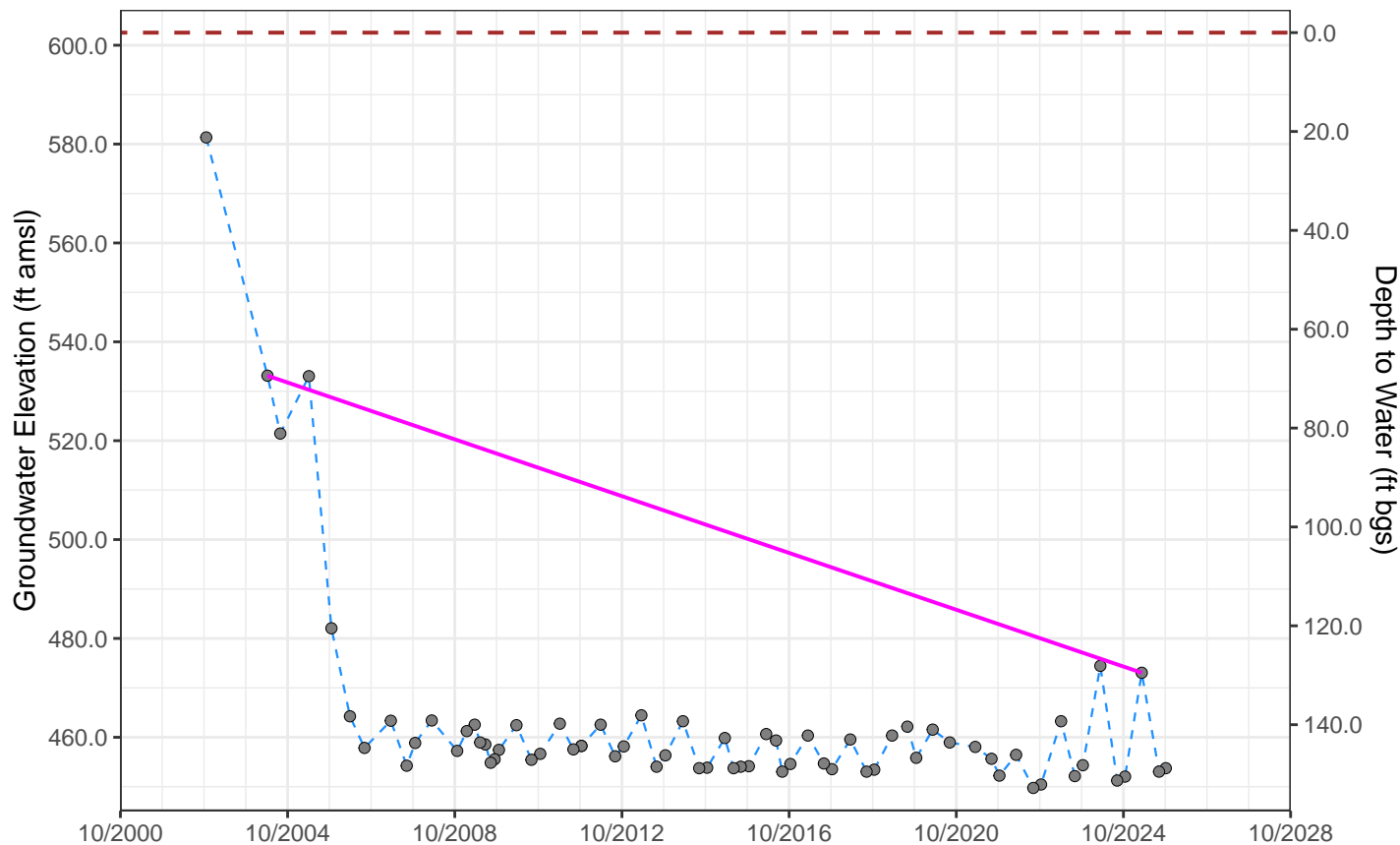


MO GWE: NA ft amsl
MO DTW: NA ft amsl

MT GWE: NA ft amsl
MT DTW: NA ft amsl

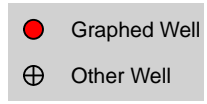
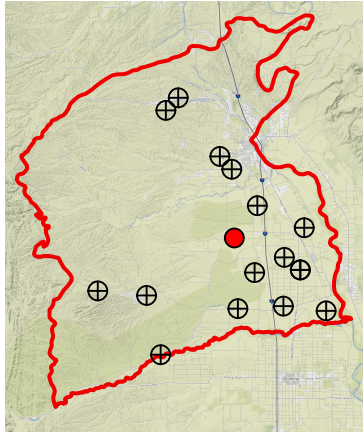
Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 21 years (2004 to 2025):
Change = -60.1 ft
Avg. rate of change = -2.86 ft/yr
Avg. water level = 469.22 ft amsl
5-yr Avg. rate (2021–2025):
= 3.75 ft/yr



Red Bluff Subbasin – State Well Number (SWN) 26N04W25J001M (RB-3U)

Upper Aquifer Well Depth: 128 ft. Perforation top & bottom: 116 – 124 ft bgs

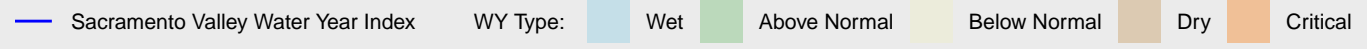
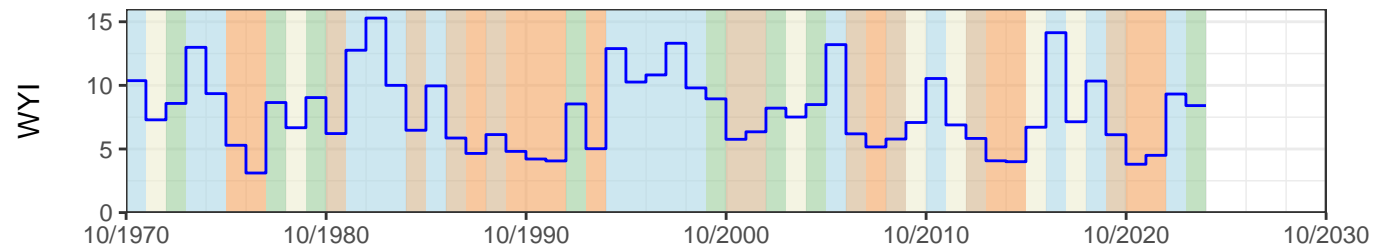
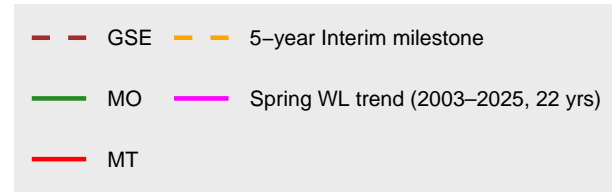
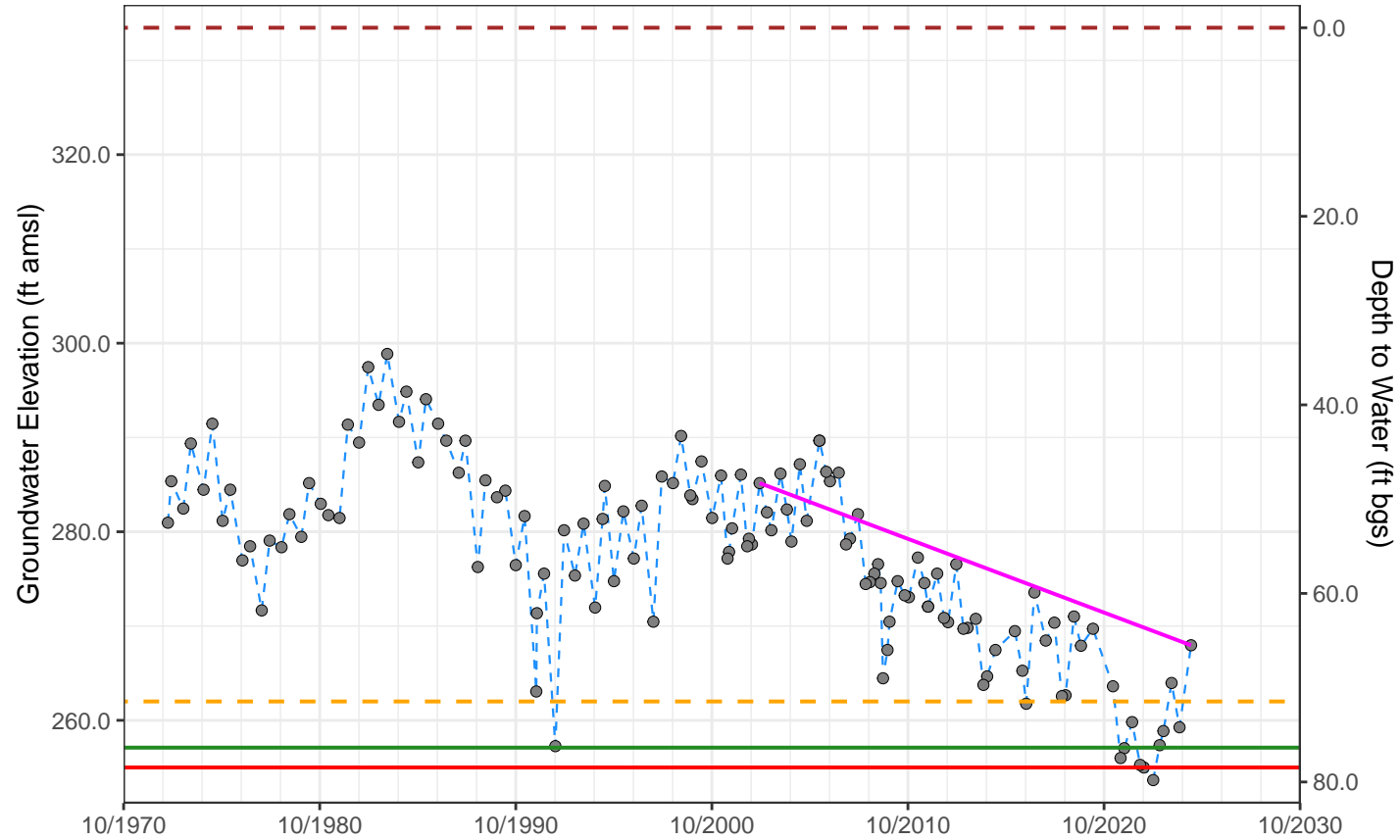


MO GWE: 257.1 ft amsl
MO DTW: 76.36 ft amsl

MT GWE: 255 ft amsl
MT DTW: 78 ft amsl

Acronyms:
GSE: Ground Surface Elevation
GWE: Groundwater Elevation
MO: Minimum Objective
MT: Minimum Threshold
DTW: Depth to Water
bgs: Below Ground Surface
amsl: Above Mean Sea Level
NA: Not Available
WY: Water Year

Statistics of spring water levels for past 22 years (2003 to 2025):
Change = -17.2 ft
Avg. rate of change = -0.78 ft/yr
Avg. water level = 273.84 ft amsl
5-yr Avg. rate (2021–2025):
= 1.09 ft/yr



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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 Red Bluff Subbasin. In turn, the rationale and approach for determining Minimum Thresholds and Measurable Objectives for each SI are the same across the Red Bluff 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.

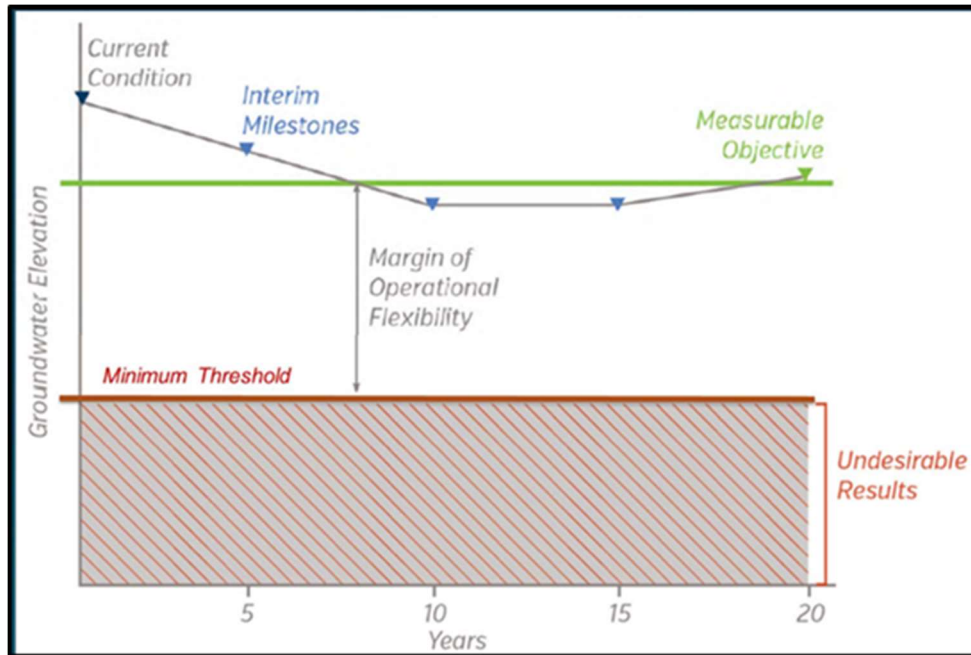


Illustration of Terms Used for Describing Sustainable Management Criteria Using the Groundwater Level SI

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 Red Bluff Subbasin is fully explained and defined in Section 3 of the GSP available here: <https://sgma.water.ca.gov/portal/gsp/preview/134>

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Appendix C

GSP Annual Reporting Elements Guide

Groundwater Sustainability Plan Annual Report Elements Guide

Basin Name			
GSP Local ID			
<i>California Code of Regulations - GSP Regulation Sections</i>	<i>Groundwater Sustainability Plan Elements</i>	<i>Document page number(s) that address the applicable GSP element.</i>	<i>Notes: Briefly describe the GSP element does not apply.</i>
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.	38-43	
	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.	5-15	
	(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.	16-19	
	(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.	20; 46-64	
	(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.	21-23	
	(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.	23	
	(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.	23-24	
	(5) Change in groundwater in storage shall include the following:		
	(A) Change in groundwater in storage maps for each principal aquifer in the basin.	24-31	
	(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	

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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
112,900	6,000	0	95,300		0	-	11,600	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
3,600	Metered Municipal Wells	Direct	5%	Metered connection maintained by the City of Red Bluff, the City of Tehama, the El Camino Irrigation District, and the Proberta Water District	0					95,300	Land use estimates were derived from crop mapping and CropScape survey results	Estimate	20%	Typical uncertainty for water balance calculation	0					11,600	Rural residential groundwater extraction is estimated based on City of Red Bluff's 2020 Urban Water Management Plan 2020 usage of an average per capita water use of 253 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	15%	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
1,500	Diversions for local supplies are estimated based on historic State Water Resource Control Board CalWATRS (California Accounting, Tracking, Reporting 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. Note: values reflect applied water only.	0	0	0	1,500	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
144,400	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	112,900	1,500	0	0	0		6,000	0	96,800	-	0	-	11,600	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 CCR¹ Section 356.2), the GSP Annual Report for the Red Bluff Subbasin (Subbasin) includes quantification of water supplies and water uses in the reporting year, including groundwater extraction by water use sector². 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 Red Bluff 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 Tehama Integrated Hydrogeologic Model (TIHM) 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(a)).

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 area³). 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 year⁴ 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

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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.

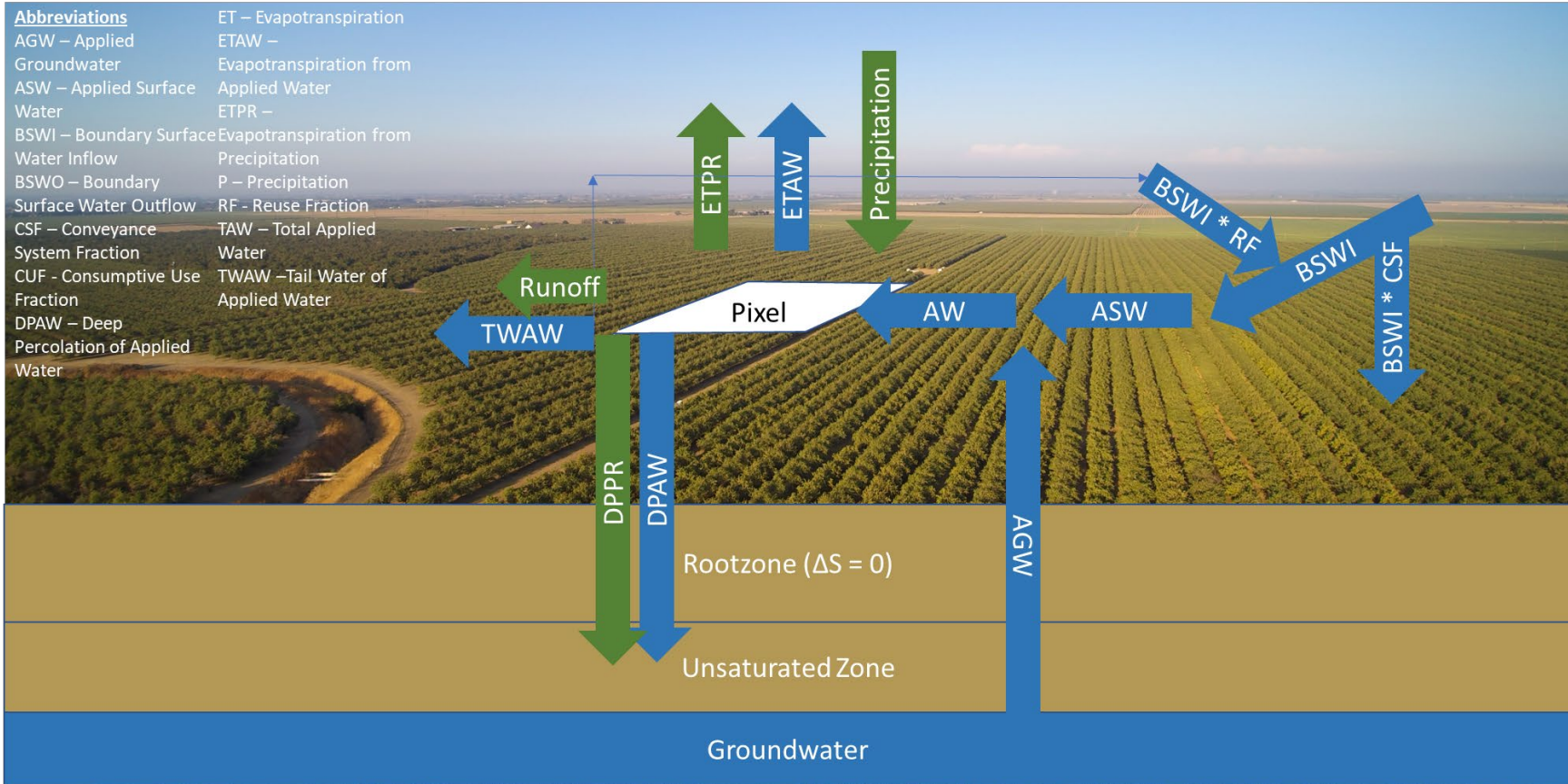


Figure A-1. Inflows and Outflows to Each 30 m x 30 m Pixel in the GEEEO Process.

Abbreviations
 AGW – Applied Groundwater
 ASW – Applied Surface Water
 AW – Total Applied Water
 BSWI – Boundary Surface Water Inflow
 BSWO – Boundary Surface Water Outflow
 CSF – Conveyance System Fraction
 CUF - Consumptive Use Fraction
 DPAW – Deep Percolation of Applied Water

ET – Evapotranspiration
 ETAW – Evapotranspiration from Applied Water
 ETPR – Evapotranspiration from Precipitation
 P – Precipitation
 RF - Reuse Fraction
 TAW – Tail Water of Applied Water

(2) Monthly effective precipitation
 SCS scientists analyzed 50 years of rainfall records at 22 locations throughout the United States to develop a technique to predict effective precipitation (USDA 1970). A daily soil moisture balance incorporating crop evapotranspiration, rainfall, and irrigation was used to determine the evapotranspiration effectiveness. The resulting equation for estimating effective precipitation is: [2-84]

$$P_e = SF \left(0.70917 P_m^{0.82424} - 0.11556 \right) \left(10^{0.02428 D} \right)$$

 where:
 P_e = average monthly effective precipitation (in)
 P_m = monthly mean precipitation (in)
 ET_c = average monthly crop evapotranspiration (in)
 SF = soil water storage factor
 The soil water storage factor was defined by: [2-85]

$$SF = (0.531747 + 0.255164 D - 0.057697 D^2 + 0.003804 D^3)$$

 where:
 D = the usable soil water storage (in)
 The term D was generally calculated as 40 to 60 percent of the available soil water capacity in the crop root zone, depending on the irrigation management practices used.
 The solution to equation 2-84 for $D = 3$ inches is given in table 2-43 and figure 2-38. For other values of D , the effective precipitation values must be multiplied by the corresponding soil water storage factor given in

The procedures used to develop equations 2-84 and 2-85 did not include two factors that affect the effectiveness of rainfall. The soil infiltration rate and rainfall intensity were not considered because sufficient data were not available or they were too complex to be readily considered. If in a specific application the infiltration rate is low and rainfall intensity is high, large amounts of rainfall may be lost to surface runoff. A sloping land surface would further reduce infiltration amounts. In these cases the effective precipitation values obtained from equations 2-84 and 2-85 need to be reduced.

A recent comparison (Patwardhan, et al. 1990) of the USDA-SCS method (USDA 1970) with a daily soil moisture balance incorporating surface runoff highlighted the need for this modification. The authors concluded that the USDA-SCS method was in fairly good agreement with the daily water balance procedure for well drained soils, but overpredicted effective precipitation for poorly drained soils.

The USDA-SCS method is generally recognized as applicable to areas receiving low intensity rainfall and to soils that have a high infiltration rate (Dastane 1974). The method averages soil type, climatic conditions, and soil-water storage to estimate effective precipitation. This provides reasonable estimates of effective precipitation, especially for project planning. Further, the procedures were designed for a monthly time step. If additional detail is needed for a more thorough project analysis or for irrigation scheduling purposes, a daily time step would be required. In this case more sophisticated techniques can be used to estimate effective precipitation. Computer-based soil

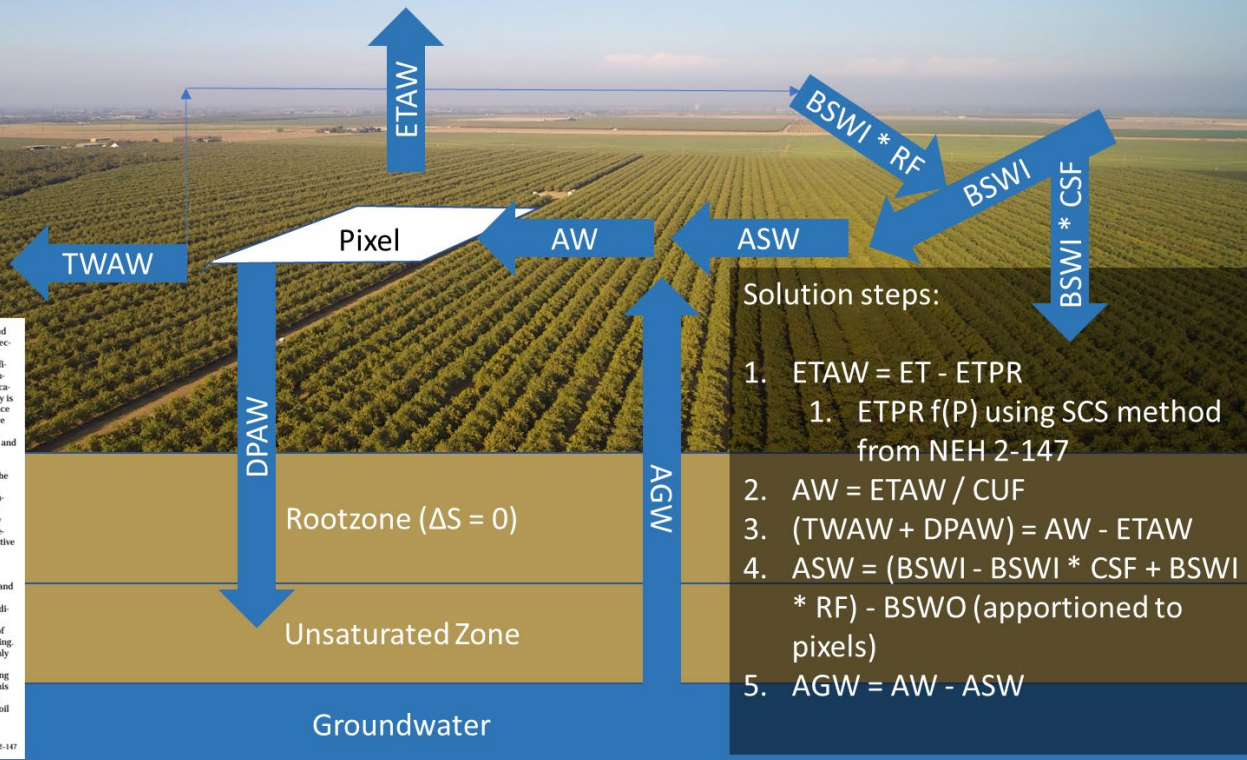


Figure A-2. Solution Steps for Calculating Applied Groundwater (AGW) in Each 30 m x 30 m Pixel in the GEEEO Process.

Water Year 2025 Annual Report

Appendix F

Water Quality

Measurable Objectives, Minimum Thresholds, and Water Quality of Representative Monitoring Site Wells

Representative Monitoring Site (RMS) ID	TDS (mg/L)				
	MO	MT	Fall 2024	Spring 2025	Exceed MT?
<i>Upper Aquifer</i>					
RB-1U	500	750	170	NS	No
RB-2U	500	750	100	110	No
RB-4U	500	750	290	260	No
RB-6U	500	750	260	270	No
RB-7U	500	750	240	180	No
RB-9U	500	750	200	180	No
<i>Lower Aquifer</i>					
RB-8L	500	750	280	230	No
RB-10L	500	750	990	840	Yes

NS = not sampled

November 12, 2024

Lab No. : CH 2479969

Customer No. : 7010503

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
 550 Salem Street, Suite 3
 Chico, CA 95928

Laboratory Report

Introduction: This report package contains a total of 10 pages divided into 3 sections:

- Case Narrative (1 page) : An overview of the work performed at FGL.
- Sample Results (8 pages) : Results for each sample submitted.
- Quality Control (1 page) : Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab No.	Matrix
RB-1U	10/22/2024	10/23/2024	CH 2479969-001	GW
RB-2U	10/22/2024	10/23/2024	CH 2479969-002	GW
RB-4U	10/23/2024	10/23/2024	CH 2479969-003	GW
RB-6U	10/22/2024	10/23/2024	CH 2479969-004	GW
RB-7U	10/23/2024	10/23/2024	CH 2479969-005	GW
RB-8L	10/23/2024	10/23/2024	CH 2479969-006	GW
RB-9U	10/23/2024	10/23/2024	CH 2479969-007	GW
RB-10L	10/23/2024	10/23/2024	CH 2479969-008	GW

Sampling and Receipt Information:

All samples were received in acceptable condition and within temperature requirements, unless noted on the Condition Upon Receipt (CUR) form. All samples were received, prepared and analyzed within the method specified holding times. All samples arrived on ice. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the associated Chain of Custody and Condition Upon Receipt Form.


Quality Control: All samples were prepared and analyzed according to established quality control criteria. Any exceptions are noted in the Quality Control Section of this report.

Test Summary

SM 2540 C Preparation and analysis performed by FGL-Santa Paula (FGL-SP ELAP# 1573)

Certification: I certify that this data package is in compliance with ELAP standards, both technically and for completeness, except for any conditions listed above and in the QC Section. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature. This report shall not be reproduced except in full, without the written approval of the laboratory.

KD: SMH

Approved By **Kelly A. Dunnahoo, B.S.**  Digitally signed by Kelly A. Dunnahoo, B.S.
 Title: Laboratory Director
 Date: 2024-11-12



November 12, 2024

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB-1U
Project : Red Bluff

Lab No. : CH 2479969-001

Customer No. : 7010503

Sampled On : October 22, 2024 at 12:02

Sampled By : Christian H./Leeah S

Received On : October 23, 2024 at 16:10

Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	170	20	mg/L		1		10/25/2024	15:45	ctl	SM 2540 C	10/28/2024	11:15	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



November 12, 2024

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB-2U
Project : Red Bluff

Lab No. : CH 2479969-002
Customer No. : 7010503

Sampled On : October 22, 2024 at 12:32
Sampled By : Christian H./Leeah S
Received On : October 23, 2024 at 16:10
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	100	20	mg/L		1		10/25/2024	15:45	ctl	SM 2540 C	10/28/2024	11:15	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



November 12, 2024

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB-4U
Project : Red Bluff

Lab No. : CH 2479969-003
Customer No. : 7010503

Sampled On : October 23, 2024 at 08:23
Sampled By : Christian H./Leeah S
Received On : October 23, 2024 at 16:10
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	290	20	mg/L		1		10/28/2024	12:45	ctl	SM 2540 C	10/29/2024	11:20	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



November 12, 2024

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB-6U
Project : Red Bluff

Lab No. : CH 2479969-004
Customer No. : 7010503

Sampled On : October 22, 2024 at 13:23
Sampled By : Christian H./Leeah S
Received On : October 23, 2024 at 16:10
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	260	20	mg/L		1		10/25/2024	15:45	ctl	SM 2540 C	10/28/2024	11:15	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



November 12, 2024

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB-7U
Project : Red Bluff

Lab No. : CH 2479969-005
Customer No. : 7010503

Sampled On : October 23, 2024 at 11:59
Sampled By : Christian H./Leeah S
Received On : October 23, 2024 at 16:10
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	240	20	mg/L		1		10/25/2024	17:00	ctl	SM 2540 C	10/28/2024	11:15	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



November 12, 2024

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB-8L
Project : Red Bluff

Lab No. : CH 2479969-006
Customer No. : 7010503

Sampled On : October 23, 2024 at 08:28
Sampled By : Christian H./Leeah S
Received On : October 23, 2024 at 16:10
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	280	20	mg/L		1		10/25/2024	17:00	ctl	SM 2540 C	10/28/2024	11:15	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



November 12, 2024

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB-9U
Project : Red Bluff

Lab No. : CH 2479969-007
Customer No. : 7010503

Sampled On : October 23, 2024 at 11:34
Sampled By : Christian H./Leeah S
Received On : October 23, 2024 at 16:10
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	200	20	mg/L		1		10/25/2024	17:00	ctl	SM 2540 C	10/28/2024	11:15	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



November 12, 2024

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB-10L
Project : Red Bluff

Lab No. : CH 2479969-008
Customer No. : 7010503

Sampled On : October 23, 2024 at 11:26
Sampled By : Christian H./Leeah S
Received On : October 23, 2024 at 16:10
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	990	20	mg/L		1		10/25/2024	15:45	ctl	SM 2540 C	10/28/2024	11:15	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

November 12, 2024

Luhdorff & Scalmanini Consulting

Lab No. : CH 2479969

Customer No. : 7010503

Quality Control - Wet Chem

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Wet Chem								
Solids, Total Dissolved	2540CE	10/25/2024:212117CTL (CH 2479969-008) (CH 2479969-008)	Blank	mg/L		ND	<20	
			LCS	mg/L	991.1	97.1%	90-110	
			Dup	mg/L		2.02%	5	
			Dup	mg/L		0.4%	5	
			Blank	mg/L		ND	<20	
		10/28/2024:212176CTL (CH 2479969-003) (CH 2479969-003)	LCS	mg/L	991.1	102%	90-110	
			Dup	mg/L		0.8%	5	
			Dup	mg/L		1.20%	5	
			Blank	mg/L		ND	<20	
			LCS	mg/L	991.1	101%	90-110	
Dup	mg/L		2.61%	5				
Dup	mg/L		0.2%	5				

Definition

- Blank : Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.
- DQO : Data Quality Objective - This is the criteria against which the quality control data is compared.
- Dup : Duplicate Sample - A random sample with each batch is prepared and analyzed in duplicate. The relative percent difference is an indication of precision for the preparation and analysis.
- LCS : Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery.
- ND : Non-detect - Result was below the DQO listed for the analyte.

2479969

Inter-Laboratory Condition Upon Receipt (Attach to COC) Sample Receipt at:

CC CH STK VI

- Number of ice chests/packages received: 07C Shipping tracking #(s): _____
- Temp IR Gun ID #: 2chuo
- Were samples received on ice? Yes No Temps: 5.3^oC / _____ / _____ / _____
Surface water SWTR bact samples: A sample that has a temperature upon receipt of >10° C, whether iced or not, should be flagged unless the time since sample collection has been less than two hours.
- Do the number of bottles received agree with the COC? Yes No N/A
- Were samples received intact? (i.e. no broken bottles, leaks etc.) Yes No
- VOAs checked for Headspace? Yes No N/A
- Were all analyses within holding times at time of receipt? Yes No
- Verify sample date, time and sampler name Yes No

Sign and date the COC, place in a ziplock and put in the same ice chest as the samples.

Sample Receipt Review completed by (initials): FDU

Sample Receipt at SP:

- Number of ice chests/packages received: 3 Shipping tracking #(s): 502171895
502171904
502171891
- Temp IR Gun ID #: TH7109
- Were samples received on ice? Yes No Temps: 2^oC / _____ / _____ / _____
Acceptable is above freezing to 6°C. If many packages are received at one time check for tests/H.T.'s/rushes/
- Do the number of bottles received agree with the COC? Yes No N/A
- Were samples received intact? (i.e. no broken bottles, leaks etc.) Yes No

Sign and date the COC, obtain LIMS sample numbers, select methods/tests and print labels.

Sample Verification, Labeling and Distribution:

- Were all requested analyses understood and acceptable? Yes No
- Did bottle labels correspond with the client's ID's? Yes No
- Were all bottles requiring sample preservation properly preserved? Yes No N/A FGL
[Exception: Oil & Grease, VOA and CrVI verified in lab]
- VOAs checked for Headspace? Yes No N/A
- Have rush or project due dates been checked and accepted? Yes No N/A
- Were all analyses within holding times at time of receipt? Yes No

Attach labels to the containers and include a copy of the COC for lab delivery.

Sample Receipt, Login and Verification completed by (initials): WU

Discrepancy Documentation:

Any items above which are "No" or do not meet specifications (i.e. temps) must be resolved.

- Person Contacted: _____ Phone Number: _____
Initiated By: _____ Date: _____
Problem: _____
Resolution: _____
- Person Contacted: _____ Phone Number: _____
Initiated By: _____
Problem: _____
Resolution: _____

(7010503)
Luhdorff & Scalmanini Consulting
CH 2479969

iv 10/25/2024 07:47:24



CH 2479969

May 30, 2025

Lab No. : CH 2574338

Customer No. : 7010503

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
 550 Salem Street, Suite 3
 Chico, CA 95928

Laboratory Report

Introduction: This report package contains a total of 9 pages divided into 3 sections:

- Case Narrative (1 page) : An overview of the work performed at FGL.
- Sample Results (7 pages) : Results for each sample submitted.
- Quality Control (1 page) : Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab No.	Matrix
RB - 2U	05/13/2025	05/14/2025	CH 2574338-001	GW
RB - 4U	05/14/2025	05/14/2025	CH 2574338-002	GW
RB - 6U	05/13/2025	05/14/2025	CH 2574338-003	GW
RB - 7U	05/14/2025	05/14/2025	CH 2574338-004	GW
RB - 8L	05/14/2025	05/14/2025	CH 2574338-005	GW
RB - 9U	05/14/2025	05/14/2025	CH 2574338-006	GW
RB - 10L	05/14/2025	05/14/2025	CH 2574338-007	GW

Sampling and Receipt Information:

All samples were received in acceptable condition and within temperature requirements, unless noted on the Condition Upon Receipt (CUR) form. All samples were received, prepared and analyzed within the method specified holding times. All samples arrived on ice. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the associated Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to established quality control criteria. Any exceptions are noted in the Quality Control Section of this report.

Test Summary

SM 2540 C Preparation and analysis performed by FGL-Santa Paula (FGL-SP ELAP# 1573)

Certification: I certify that this data package is in compliance with ELAP standards, both technically and for completeness, except for any conditions listed above and in the QC Section. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature. This report shall not be reproduced except in full, without the written approval of the laboratory.

KD: SMH

Approved By **Kelly A. Dunnahoo, B.S.**

 Digitally signed by Kelly A. Dunnahoo, B.S.
 Title: Laboratory Director
 Date: 2025-05-30



May 30, 2025

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB - 2U
Project : Red Bluff

Lab No. : CH 2574338-001

Customer No. : 7010503

Sampled On : May 13, 2025 at 12:49

Sampled By : E Davis

Received On : May 14, 2025 at 11:58

Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	110	20	mg/L		1		05/16/2025	12:00	ctl	SM 2540 C	05/19/2025	12:00	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



May 30, 2025

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB - 4U
Project : Red Bluff

Lab No. : CH 2574338-002

Customer No. : 7010503

Sampled On : May 14, 2025 at 09:35

Sampled By : E Davis

Received On : May 14, 2025 at 11:58

Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	260	20	mg/L		1		05/16/2025	15:00	ctl	SM 2540 C	05/19/2025	12:00	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



May 30, 2025

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB - 6U
Project : Red Bluff

Lab No. : CH 2574338-003
Customer No. : 7010503

Sampled On : May 13, 2025 at 13:29
Sampled By : E Davis
Received On : May 14, 2025 at 11:58
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	270	20	mg/L		1		05/16/2025	11:00	ctl	SM 2540 C	05/19/2025	12:00	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



May 30, 2025

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB - 7U
Project : Red Bluff

Lab No. : CH 2574338-004
Customer No. : 7010503

Sampled On : May 14, 2025 at 08:15
Sampled By : E Davis
Received On : May 14, 2025 at 11:58
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	180	20	mg/L		1		05/16/2025	12:00	ctl	SM 2540 C	05/19/2025	12:00	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



May 30, 2025

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB - 8L
Project : Red Bluff

Lab No. : CH 2574338-005
Customer No. : 7010503

Sampled On : May 14, 2025 at 09:30
Sampled By : E Davis
Received On : May 14, 2025 at 11:58
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	230	20	mg/L		1		05/19/2025	13:30	ctl	SM 2540 C	05/20/2025	11:30	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



May 30, 2025

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB - 9U
Project : Red Bluff

Lab No. : CH 2574338-006
Customer No. : 7010503

Sampled On : May 14, 2025 at 09:00
Sampled By : E Davis
Received On : May 14, 2025 at 11:58
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	180	20	mg/L		1		05/16/2025	12:00	ctl	SM 2540 C	05/19/2025	12:00	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution



May 30, 2025

Luhdorff & Scalmanini Consulting

Attn: Eddy Teasdale
550 Salem Street, Suite 3
Chico, CA 95928

Description : RB - 10L
Project : Red Bluff

Lab No. : CH 2574338-007
Customer No. : 7010503

Sampled On : May 14, 2025 at 08:50
Sampled By : E Davis
Received On : May 14, 2025 at 11:58
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
							Date	Time	Who	Method	Date	Time	Who
Wet Chemistry													
Total Dissolved Solids (TFR)	840	20	mg/L		1		05/19/2025	13:30	ctl	SM 2540 C	05/20/2025	11:30	ctl

DQF Flags Definition:

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

May 30, 2025

Luhdorff & Scalmanini Consulting

Lab No. : CH 2574338

Customer No. : 7010503

Quality Control - Wet Chem

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Wet Chem								
Solids, Total Dissolved	2540CE	05/16/2025:205380CTL (SP 2507959-001) (SP 2507959-001)	Blank	mg/L		ND	<20	
			LCS	mg/L	991.1	104%	90-110	
			Dup	mg/L		0.2%	5	
			Dup	mg/L		1.99%	5	
			Blank	mg/L		ND	<20	
			LCS	mg/L	991.1	102%	90-110	
		(VI 2543351-001) (VI 2543351-001)	Dup	mg/L		3.26%	5	
			Dup	mg/L		0.4%	5	
			Blank	mg/L		ND	<20	
			LCS	mg/L	991.1	98.4%	90-110	
			Dup	mg/L		0.4%	5	
			Dup	mg/L		0.6%	5	
		05/19/2025:205460CTL (VI 2543427-002) (VI 2543427-002)	Blank	mg/L		ND	<20	
			LCS	mg/L	991.1	101%	90-110	
Dup	mg/L			2.50%	5			
Dup	mg/L			0.9%	5			

Definition

- Blank : Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.
- DQO : Data Quality Objective - This is the criteria against which the quality control data is compared.
- Dup : Duplicate Sample - A random sample with each batch is prepared and analyzed in duplicate. The relative percent difference is an indication of precision for the preparation and analysis.
- LCS : Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery.
- ND : Non-detect - Result was below the DQO listed for the analyte.



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CHAIN OF CUSTODY
AND ANALYSIS REQUEST DOCUMENT

Client: **Luhdorff & Scalmanini Consulting**
 Customer Number: **7010503**
 Address: **Attn: Eddy Teasdale**
550 Salem Street, Suite 3
Chico, CA 95928
 Phone: **(530)661-0109** Fax:
 Email Address: **eteasdale@lsce.com**
 Contact Person: **Eddy Teasdale**
 Project Name: **Red Bluff**
 Purchase Order Number:
 Quote Number:

Lab Number: **25741338** TEST DESCRIPTION AND ANALYSES REQUESTED

Rush Analysis: 5 Day 4 Day 3 Day 2 Day 24 hour
 Rush pre-approval by lab (initials): _____
 Electronic Data Transfer: No State Client Other: _____

Sampler(s): **Christian Hoover**
Leah Jackson **E Davis**
 Sampling Fee: _____ Pickup Fee: _____
 Compositor Setup Date: _____ Time: _____

Samp Num	Location Description	Date Sampled	Time Sampled
1	RB-1U		
2	RB-2U	5/13/25	1249
3	RB-4U	5/14/25	0935
4	RB-6U	5/15/25	1329
5	RB-7U	5/14/25	0815
6	RB-8L	5/14/25	0930
7	RB-9U	5/14/25	0900
8	RB-10L	5/14/25	0850

Method of Sampling: Composite (C) Grab (G)	Number of Containers	Type of Containers: (G)Glass (P)Plastic (V)VOA (MT)Metal Tube	Potable (P) Non-Potable (NP) Ag Water (AgW)	(SW) Surface Water (MW) Monitoring Well (GW) Ground Water (TB) Travel Blank (WW) Waste Water (DW) Drinking Water (S) Soil (SLG) Sludge (SLD) Solid (O) Oil	Bact: (Sys) System (SRC) Source (W) Waste	Bact: (ROUT)Routine (RPT)Repeat (OTH)Other (RPL)Replace	(LT) Leaf Tissue (PET) Petiole Tissue (PRD) Produce	Preservative: (1) NaOH + ZnAc, (2) NaOH, (3) HCl (4) H2SO4, (5) HNO3, (6) Na2S2O3, (7) Other	Total Dissolved Solids
G	1	P	NP	GW					X
	1								
	1								
	1								
	1								
	1								
	1								
	1								

Relinquished	Date:	Time:	Relinquished	Date:	Time:	Relinquished	Date:	Time:
GA	5/14/25	11:58	KHL	5-14-25	1700	GLS	5/15/25	1405
Received By:	Date:	Time:	Received By:	Date:	Time:	Received By:	Date:	Time:
RHL	5-14-25	1158	GCS	5-14-25	1700	CDA	5/15/25	1405

Corporate Offices & Laboratory
 853 Corporation Street
 Santa Paula, CA 93060
 TEL: (805)392-2000
 CA ELAP Certification No. 1573

Office & Laboratory
 2500 Stagecoach Road
 Stockton, CA 95215
 TEL: (209)942-0182
 CA ELAP Certification No. 1563

Office & Laboratory
 563 E. Lindo Avenue
 Chico, CA 95926
 TEL: (530)343-5818
 CA ELAP Certification No. 2670

Office & Laboratory
 3442 Empresa Drive, Suite D
 San Luis Obispo, CA 93401
 TEL: (805)783-2940
 CA ELAP Certification No. 2775

Office & Laboratory
 9411 W. Goshen Avenue
 Visalia, CA 93291
 TEL: (559)734-9473
 CA ELAP Certification No. 2810

Inter-Laboratory Condition Upon Receipt (Attach to COC) Sample Receipt at:

CC CH STK VI

- Number of ice chests/packages received: 0tc Shipping tracking #(s): _____
- Temp IR Gun ID #: 2
- Were samples received on ice? Yes No Temps: 4.1 / _____ / _____ / _____ / _____
Surface water SWTR bact samples: A sample that has a temperature upon receipt of >10° C, whether iced or not, should be flagged unless the time since sample collection has been less than two hours.
- Do the number of bottles received agree with the COC? Yes No N/A
- Were samples received intact? (i.e. no broken bottles, leaks etc.) Yes No
- VOAs checked for Headspace? Yes No N/A
- Were all analyses within holding times at time of receipt? Yes No
- Verify sample date, time and sampler name Yes No

Sign and date the COC, place in a ziplock and put in the same ice chest as the samples.

Sample Receipt Review completed by (initials): RH

Sample Receipt at SP:

- Number of ice chests/packages received: 6 Shipping tracking #(s): 903012820/2/7/8/
05/796
- Temp IR Gun ID #: 269
- Were samples received on ice? Yes No Temps: 2 / _____ / _____ / _____ / _____
Acceptable is above freezing to 6°C. If many packages are received at one time check for tests/H.T.'s/rushes/
- Do the number of bottles received agree with the COC? Yes No N/A
- Were samples received intact? (i.e. no broken bottles, leaks etc.) Yes No

Sign and date the COC, obtain LIMS sample numbers, select methods/tests and print labels.

Sample Verification, Labeling and Distribution:

- Were all requested analyses understood and acceptable? Yes No
- Did bottle labels correspond with the client's ID's? Yes No
- Were all bottles requiring sample preservation properly preserved? Yes No N/A FGL
[Exception: Oil & Grease, VOA and CrVI verified in lab]
- VOAs checked for Headspace? Yes No N/A
- Have rush or project due dates been checked and accepted? Yes No N/A
- Were all analyses within holding times at time of receipt? Yes No

Attach labels to the containers and include a copy of the COC for lab delivery.

Sample Receipt, Login and Verification completed by (initials): CDA

Discrepancy Documentation:

Any items above which are "No" or do not meet specifications (i.e. temps) must be resolved.

- Person Contacted: _____ Phone Number: _____
Initiated By: _____ Date: _____
Problem: _____
Resolution: _____
- Person Contacted: _____ Phone Number: _____
Initiated By: _____
Problem: _____
Resolution: _____

(7010503)
Luhdorff & Scalmanini Consulting
CH 2574338

iv 05/15/2025 06:46:37



CH 2574338

Water Year 2025 Annual Report

Appendix G

PMA Progress

Water Year 2025 Annual Report

Appendix H

DWR Letter



CALIFORNIA DEPARTMENT OF WATER RESOURCES

SUSTAINABLE GROUNDWATER MANAGEMENT OFFICE

715 P Street, 8th Floor | Sacramento, CA 95814 | P.O. Box 942836 | Sacramento, CA 94236-0001

August 1, 2025

Justin Jenson
Red Bluff Subbasin – Plan Manager
9380 San Benito Avenue
Gerber, CA 96035-9701
jjenson@tcpw.ca.gov

RE: Review of Annual Report for the Red Bluff Subbasin, Water Year 2024

Dear Justin Jenson,

As the basin point of contact for the groundwater sustainability plan (GSP) in the Red Bluff Subbasin (Subbasin), this letter is to inform you that the Department of Water Resources (Department) has completed the review of the annual report for the Subbasin for Water Year 2024.

The Sustainable Groundwater Management Act (SGMA) requires on April 1, following the adoption of a GSP and annually thereafter, an annual report be submitted to the Department. (Wat. Code § 10728). Once an annual report has been submitted, the Department is required to: notify the submitting agency of receipt within 20 days, notify the submitting agency in writing if additional information is required, and review the information to determine whether the basin's GSP is being implemented in a manner likely to achieve the sustainability goal for the basin (23 CCR § 355.8).

The Department noted that the annual report provided an update on all the applicable sustainable management criteria for the Basin/Subbasin, as required by GSP Regulations (23 CCR § 356.2). The Department expects this information will continue to be provided in subsequent annual reports, along with a description of progress made toward implementing the Plan for each of the applicable sustainable indicators.

Based on the review of the annual report, the Department requests additional information pursuant to 23 CCR § 355.8.(b). Department staff identified several shortcomings related to the GSA's monitoring efforts and information obtained from that monitoring provided in this annual report.

The GSP indicates that the GSA has selected eight representative monitoring site (RMS) locations for the chronic lowering of groundwater levels. The annual report indicates the GSA performed spring (seasonal high) monitoring on five of the eight RMS wells, and fall (seasonal low) monitoring on four of the eight RMS wells. Additionally, data for two of the RMS wells (Site Code 400428N1221665W002: 11B02 Intermediate; and Site Code: 400428N1221665W001: 11B01 Shallow) has never been submitted to the Department's Monitoring Network Module. Failure to collect data from a significant

number of representative monitoring sites will likely affect the ability of the GSA to evaluate whether undesirable results are occurring and could affect the ability of the GSA to achieve its sustainability goal. The lack of such information also may hinder or prevent the Department from tracking plan implementation and assessing the continued likelihood of achieving sustainability.

Therefore, Department staff request that the GSA provide additional information describing how the GSA will perform the monitoring prescribed in its GSP and how any missed measurements over the water year still allow the GSA to monitor impacts to beneficial uses or users of groundwater,¹ understand conditions relative to measurable objectives and minimum thresholds,² quantify water budget components across the Subbasin,³ and represent and assess seasonal low and seasonal high groundwater conditions in the basin or plan area,⁴ in the next annual report.

Based on the issues identified above, the additional information that must be submitted in all future annual reports includes a detailed field plan or program to perform required monitoring and prevent missed measurements during future sampling events to avoid the creation of new or additional data gaps within the monitoring network. This may include replacing inaccessible or damaged wells.

Inclusion of the information requested in future annual reports is particularly relevant when the Department initiates a periodic review of a GSP. Periodic reviews utilize annual report information to examine basin condition trends and assess whether or not GSP implementation remains on track to achieve sustainability. Failure to provide the additional information requested may prevent the Department from determining whether the Plan is being implemented in a manner that will likely achieve the sustainability goal for the basin, which may result in DWR determining that a Plan or its implementation is inadequate and referral to the State Water Resources Control Board under SGMA's state intervention provisions.

Additionally, a minor issue was noted during the review:

- The annual report's monitoring summary table⁵ provides values for Representative Monitoring Sites (RMS) that are labeled as the 2024 'spring (seasonal high)' and 'fall (seasonal low)', however Department staff note that based on data submitted to the SGMA Portal,⁶ measurements taken by the GSA in August are lower than those taken in October in many RMS, and note that the table presents the higher elevation October measurements, which are not the seasonal low. Staff recommend the GSA provide the seasonal low as required by the GSP regulations⁷ in future annual reports. Additionally, staff recommend

¹ 23 CCR § 354.34 (b)(1).

² 23 CCR 354.34 (b)(2).

³ 23 CCR 354.34 (b)(3).

⁴ 23 CCR 354.34 (c)(1)(B).

⁵ 2024 Red Bluff Annual Report, Table 5.2, p. 25.

⁶ <https://sgma.water.ca.gov/SgmaWell/>.

⁷ 23 CCR § 354.34 (c)(1)(B).

the GSA include the date of monitoring in its reporting of seasonal highs and lows in its annual reports and when providing these measurements in other contexts.

Please contact the assigned DWR basin point-of-contact or sgmps@water.ca.gov if you have questions about this notice or the annual reporting process. The Department looks forward to receiving your Water Year 2025 Annual Report by April 1, 2026.

Thank You,

Paul Gosselin

Paul Gosselin
Deputy Director
Sustainable Groundwater Management