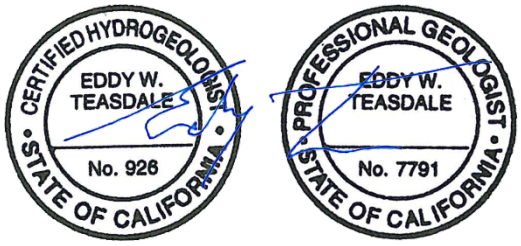
RED BLUFF SUBBASIN GROUNDWATER SUSTAINABILITY PLAN ANNUAL REPORT - 2021

PREPARED FOR

TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION GSA

TEHAMA COUNTY GSA-RED BLUFF

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APPENDICES

Appendix A Water Level Hydrographs of Representative Monitoring Wells for Groundwater Level

Appendix B Annual Report Water Level Data

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
af	Acre-Feet
amsl	Above mean sea level
CASGEM	California Statewide Groundwater Elevation Monitoring Online System
CVP	Central Valley Project
District	Tehama County Flood Control and Water Conservation District
DMS	Data Management System
DWR	Department of Water Resources
ft	feet
GAMA	Groundwater Ambient Monitoring and Assessment Program
GSP	Groundwater Sustainability Plan
GSA	Groundwater Sustainability Agency
MO	Measurable Objective
MT	Minimum Threshold
NAVD 88	North American Vertical Datum of 1988
PMAs	Projects and Management Actions
RMS	Representative Monitoring Sites
SGMA	Sustainable Groundwater Management Act
SMC	Sustainable Management Criteria
Subbasin	Red Bluff Groundwater Subbasin
SVSim	Sacramento Valley Groundwater-Surface Water Simulation Model
TNC	The Nature Conservancy
TSS	Technical Support Services
USGS	United States Geological Survey

EXECUTIVE SUMMARY

ES 1. Introduction

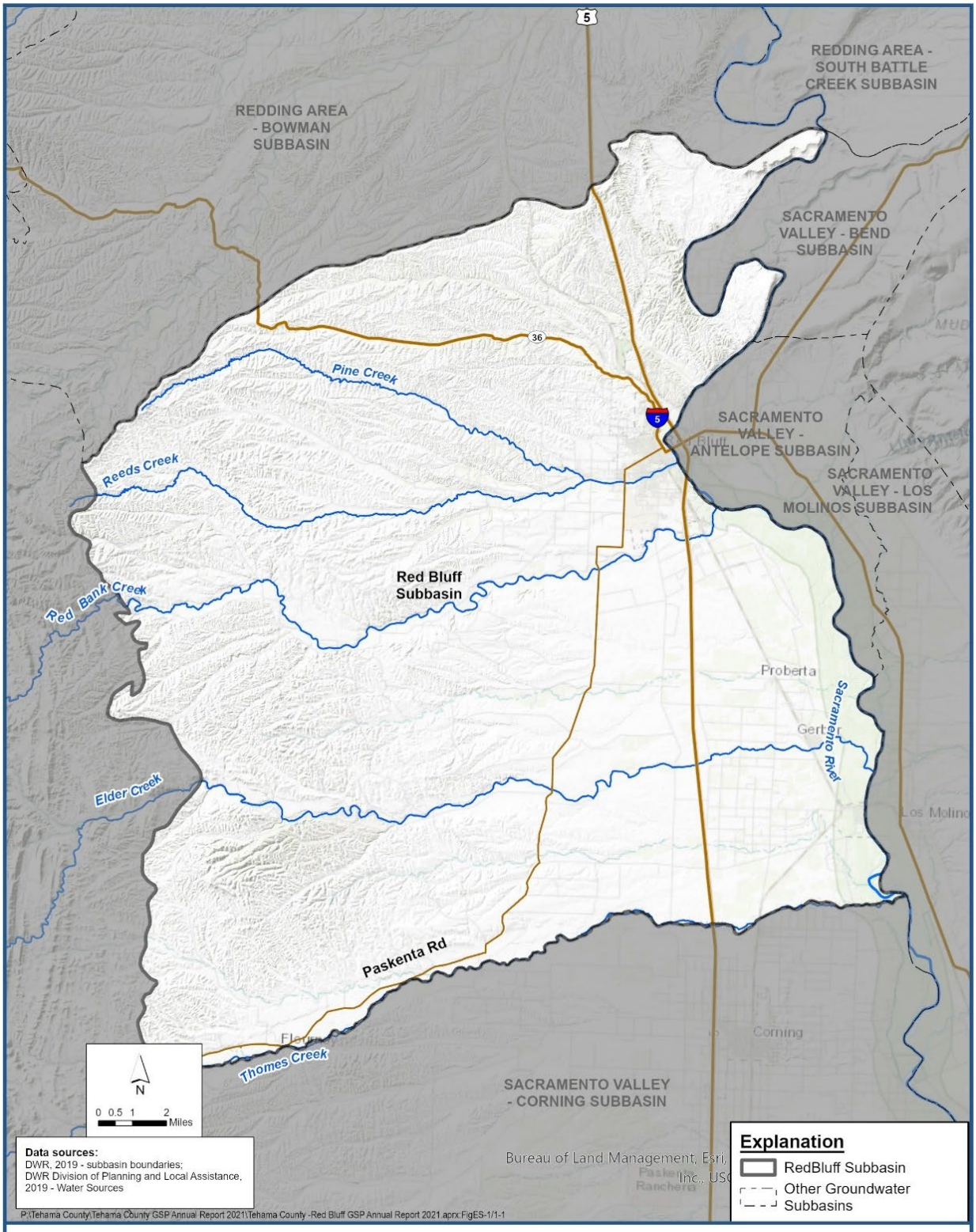
The annual report for the Red Bluff Subbasin (Subbasin) (5-021.50) was prepared on behalf of the Tehama County Flood Control and Water Conservation District (Tehama County FCWCD) Groundwater Sustainability Agency (GSA or District) to fulfill the statutory requirements of the Sustainable Groundwater Management Act (SGMA) legislation (Section 10728) and regulatory requirements developed by the California Department of Water Resources (DWR) included in the Groundwater Sustainability Plan (GSP) Regulations (Section 354.40 and Section 356.2). The Regulations require the GSA to submit an Annual Report to DWR by April 1st following the reporting year (October through September).

The Red Bluff Subbasin covers 271,800 acres and is in the Northern Sacramento Valley Groundwater Basin (**Figure ES-1**). Red Bluff is one of seven (7) groundwater subbasins within Tehama County. The Tehama County FCWCD is the exclusive GSA for six (6) of those subbasins: Antelope, Bend, Bowman, Los Molinos, Red Bluff, and South Battle Creek. The seventh, the Corning Subbasin, extends into Glenn County, and the GSP for that subbasin is being developed in a coordinated effort between the Tehama County FCWCD and the Corning Sub-basin GSA.

This report is the first Annual Report prepared to support the adopted Red Bluff Subbasin GSP submitted in January 2022. This Annual Report includes data elements for the current and previous reporting water years (2020-2021). Pursuant to GSP Regulations, the Annual Report includes:

1. Groundwater Elevation Data
2. Water Supply and Use
3. Change in Groundwater Storage
4. GSP Implementation Progress

All data and information in the annual report are for the Red Bluff Subbasin. This Annual Report coincides with one of the most severe and extensive droughts that has ever gripped the western United States. In December 2021, as the final GSP was being assembled, drought conditions throughout most of California, including in this subbasin were classified as “exceptional,” the most extreme classification defined by the U.S. Drought Monitor. Historically, observed impacts during exceptional drought generally include: widespread water supply shortages, depleted surface water supplies, extremely low federal and state surface water deliveries, curtailment of water rights, extremely high surface water prices, increased groundwater pumping to satisfy water demands, dry groundwater wells, increased well drilling and deepening, increased pumping costs, wildfire, decreased recreational opportunities, and poor water quality, among other potential impacts reported by the U.S. Drought Monitor. All of these conditions were experienced to some degree across California in 2021 and, at least in part, within the Subbasin.



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Subbasin Area Map

Figure ES-1

Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin

ES 2. Groundwater Elevations

Groundwater elevation data in the Upper and Lower Aquifers for the 2020-2021 water years were analyzed. The water year is defined as October through September. Groundwater elevation contour maps for seasonal low and seasonal high-water levels were prepared for the 2020-2021 water years. Seven Representative Monitoring Site (RMS) wells exist that monitor groundwater levels in the Upper Aquifer while only one RMS well is screened in in the Lower Aquifer. Through the TSS program, one additional well has already been installed and there are plans to install two more. In total the TSS wells will provide three additional wells to both the Upper and Lower Aquifers. Seasonal high groundwater elevations were at or above the measurable objectives during the 2020-2021 water years.

ES 3. Water Supply and Use

Table ES-1 includes groundwater use data by sector for the 2020 and 2021 water years. The agricultural sector had the greatest increase in use, going from 120,000 af in 2020 to 140,000 af in 2021 whereas native vegetation decreased significantly from 3,300 to 2,100 af. Urban water use remained largely unchanged increasing slightly from 5,500 to 5,800 af.

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

Sector	2020 (D) (af)	2021 (C) (af)
Agricultural	120,000	140,000
Urban	5,500	5,800
Native Vegetation	3,300	2,100
Total	**128,800**	**147,900**

D: Dry Sacramento Valley Water Year as defined by DWR..

C: Critical Sacramento Valley Water Year as defined by DWR..

Surface water use by sector and source for the 2020 and 2021 water years is presented in **Table ES-2**. Both urban and native vegetation sectors contributed to no surface water use in either 2020 or 2021. Agricultural surface water use declined significantly between years going from 3,700 to 1,100 af.

Table ES-2. Surface Water Use in Each Water Year by Water Use Sector and Source				
Sector	2020 (D) (af)		2021 (C) (af)	
	Supply Source			
	CVP	Local	CVP	Local
Agricultural	3,600	100	940	160
Urban	0	0	0	0
Native Vegetation	0	0	0	0
Total	**3,700**		**1,100**	

D: Dry Sacramento Valley Water Year as defined by DWR.

C: Critical Sacramento Valley Water Year as defined by DWR.

ES 4. Groundwater Storage

Changes in groundwater storage values were calculated based on water years for the Upper and Lower Aquifers. Groundwater storage change was estimated for the 2020 water year based on the change in seasonal high groundwater levels between the 2019 and 2020 water years. Likewise, 2021 storage change was calculated based on the change in seasonal high groundwater levels between 2020 and 2021 water years. Change in storage calculations are described further in Sections 2.1. **Table ES-3** presents the annual storage change values for each principal aquifer.

Table ES-3. Change in Groundwater Storage Based on Seasonal High Groundwater Levels		
Aquifer	2020 (D) (af)	2021 (C) (af)
Upper Aquifer	-28,000	-69,000
Lower Aquifer	-21,000	-95,000
Total	**-49,000**	**-164,000**

D: Dry Sacramento Valley Water Year as defined by DWR.

C: Critical Sacramento Valley Water Year as defined by DWR.

ES 5. GSP Implementation Progress

Implementation of the GSP focused primarily on enactment of projects and management actions (PMAs). PMAs were developed to manage groundwater conditions in the Subbasin and achieve groundwater sustainability objectives described in the GSP. Due to the recent adoption of the GSP, no progress towards the implementation of PMAs has occurred. In coordination with DWR the subbasin is scheduled for an Airborne Electromagnetic (AEM) Survey in Spring 2022. Additionally, DWR is scheduled to install two nested monitoring wells for monitoring of both the Upper and Lower Aquifers. The GSA has also scheduled a well survey to better establish the vertical datum of three RMS wells.

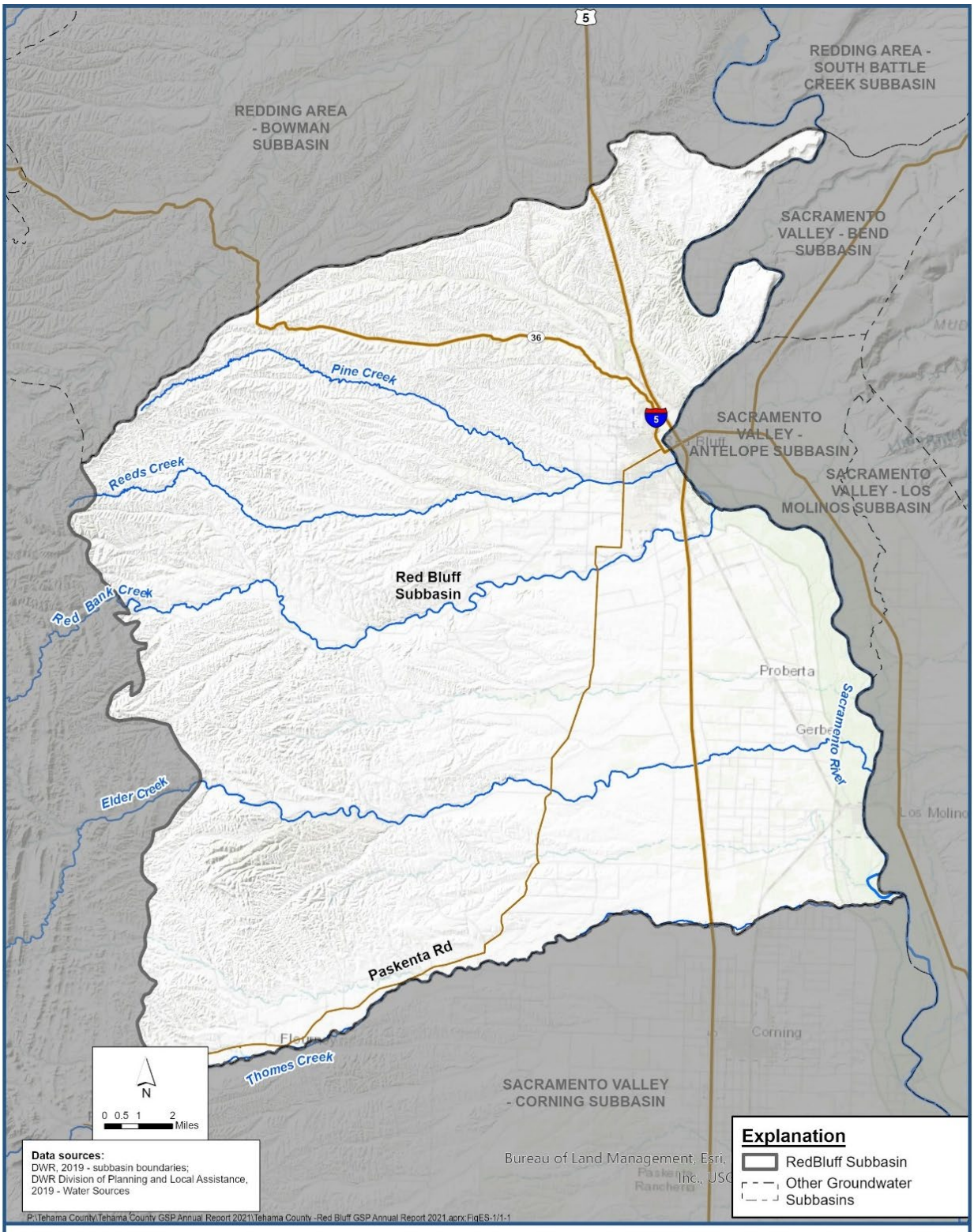
1. GENERAL INFORMATION

The annual report for the Red Bluff Subbasin (Subbasin) (5-021.50) was prepared on behalf of the Tehama County Flood Control and Water Conservation District (Tehama County FCWCD), Groundwater Sustainability Agency (GSA) to fulfill the statutory requirements of the Sustainable Groundwater Management Act (SGMA) legislation (Section 10728) and regulatory requirements developed by the California Department of Water Resources (DWR) included in the Groundwater Sustainability Plan (GSP) Regulations (Section 354.40 and Section 356.2). The Regulations require the GSA to submit an Annual Report to DWR by April 1st following the reporting year (October through September).

1.1. Subbasin Setting

The Red Bluff Subbasin (DWR Subbasin No. 5-021.50) covers 271,800 acres located in the Northern Sacramento Valley Groundwater Basin. The lateral extent of the Subbasin is defined by the Subbasin boundaries provided in Bulletin 118 (DWR, 2018). It is bounded on the north by the Bowman Subbasin (DWR Subbasin No. 5-006.01) on the east by the Bend Subbasin (DWR Subbasin No. 5-021.53), the Antelope Subbasin (DWR Subbasin No. 5-021.54), and the Los Molinos Subbasin (DWR Subbasin No. 5-021.56), on the south by the Corning Subbasin (DWR Subbasin No. 5-021.51) and on the west by the Coastal Mountain Range. The eastern and western boundaries of the Subbasin generally follow the Sacramento River and Coastal Mountain Range, respectively, and the southern boundary generally follows Thomes Creek. (**Figure 1-1**).

Native and riparian vegetation (84%) is the leading source of land use within the Subbasin with approximately 13% dedicated to agriculture, 2% dedicated to urban use, and 0.001% dedicated to refuge areas. The Subbasin's agricultural water users rely on both surface water and groundwater to irrigate their crops. 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.



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Subbasin Area Map

Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin

Figure 1-1

Fresh groundwater bearing geologic deposits in the Subbasin are subdivided from previous studies into two units: The Upper Aquifer and the Lower Aquifer (DWR, 2003; DWR, 2004). The two-aquifer designation is based on an examination of time-series groundwater elevation hydrographs, electric resistivity data from geophysical logs, lithologic logs, well construction details, and review of previous studies in the Subbasin. Generally, semi-confined, and confined aquifer conditions are encountered at depth and unconfined conditions are seen in the shallower porous media. The complexity of the geologic materials and the formations makes it difficult to define a singular widespread aquitard or distinctive change in geologic materials separating an Upper and Lower Aquifer. To delineate between areas with a higher likelihood of confined conditions, well construction data throughout the Subbasin were examined. Water bearing geologic units in the Upper Aquifer include the Quaternary formations and the upper portions of the Tehama and Tuscan Formations. Wells screened in the Upper Aquifer are largely for domestic purposes. The depth to the bottom of the Upper Aquifer is approximately 350-450 ft bgs.

The Lower Aquifer is defined as the freshwater bearing geologic units throughout the Subbasin from the bottom of model layer 5 at approximately 350-450 ft bgs, to the bottom of the Subbasin. The aquifer has confined to semi-confined conditions. Water bearing geologic units include the lower portions of the Tehama and Tuscan Formations. Wells screened in the Lower Aquifer are largely for non-domestic purposes.

1.2. Report Contents

This report is the first Annual Report prepared to support the adopted Red Bluff Subbasin GSP submitted in January 2022. As a result, the Annual Report includes data elements for the current reporting water year (WY), 2021, as well as a "bridge year", 2020. The historical water budget period of the GSP was 1990-2018, and 2019 was considered as a current water budget period. The bridge year closes the gap between the water budget period presented in the GSP and current reporting water year. Data elements presented in this report refer to water years (12-month periods of October through September) unless otherwise noted. Pursuant to of the GSP Regulations, the Annual Report includes:

1. Groundwater Elevation Data
2. Water Supply and Use
3. Change in Groundwater Storage
4. GSP Implementation Progress

2. GROUNDWATER ELEVATIONS - SECTION 356.2(B)(1)

Currently 35 wells are monitored as part of a broad network for groundwater levels and eight are RMS wells assigned Sustainability Management Criteria (SMC). The wells are measured at least in the spring and fall each year. Groundwater elevation data in each of the principal aquifers for

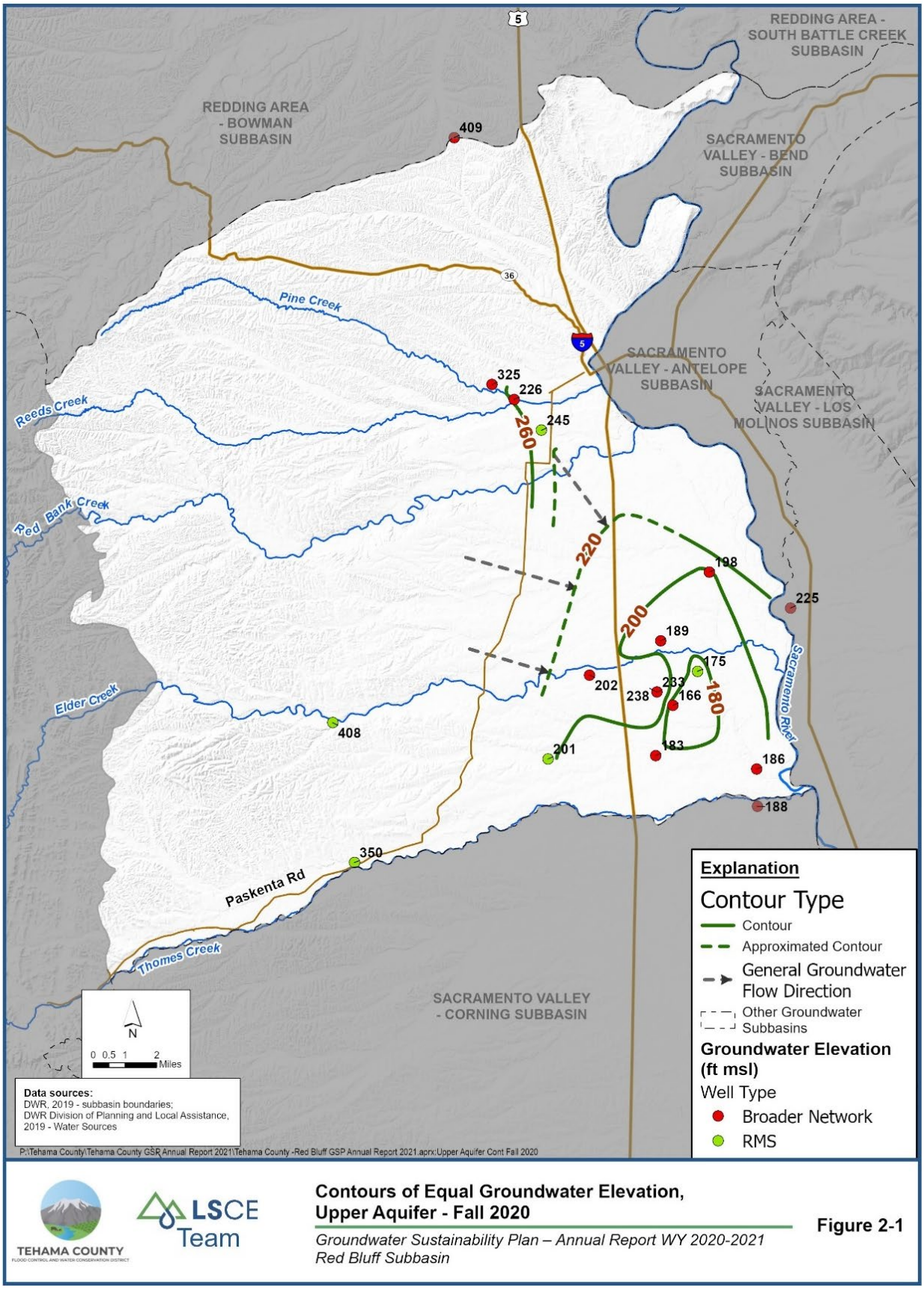
the 2020 and 2021 water years were analyzed. Hydrographs for these wells are included in Appendix A. Appendix B includes a copy of the monitoring data used to generate this Annual Report pursuant to GSP regulations (Section 354.40). Groundwater elevation contour maps for seasonal low and seasonal high-water levels were prepared for the 2020 and 2021 water years. Groundwater level data collected at RMS and other wells used to develop groundwater contours and RMS well hydrographs are collected by DWR, USGS, TNC, and the District and records are maintained by GAMA and CASGEM. Records of groundwater elevations are also maintained in the GSA's Data Management System (DMS).

2.1. Groundwater Elevation Contours - Section 356.2(b)(1)(A)

Seasonal high and seasonal low groundwater elevation contour maps for the 2020-2021 water years are presented for the Upper Aquifer on **Figures 2-1** through **2-4**. The seasonal high contours were prepared based on observed maximum springtime (February-May) water levels, while the seasonal low contours were prepared based on minimum water levels measured in July-October. Due to the limited number of wells in the subbasin and to resolve data gaps near the edge of the subbasin wells neighboring the Red Bluff subbasin were included in the contouring process. Wells were not displayed in contour maps if data did not exist at that well during the mapping period. Contours are shown solid if there is good confidence in the contour placement whereas contours are shown dashed if their position is inferred from data yet generally representative of the contour's true location. Contours are not drawn if confidence in contours is poor. Most notably this occurs on the western side of the subbasin near RMS wells RB-6U and RB-7U. Contours were not extended to these wells due to the great distances between these and other monitoring wells. For these reasons both wells were previously excluded when creating contours for the GSP and while water level measurements were shown at these wells in figures they were excluded from contours in this Annual Report as well. Groundwater elevations on the contour maps are shown as feet above mean sea level (ft amsl) based on the North American Vertical Datum of 1988 (NAVD 88). No contours were produced for the Lower Aquifer due to the limited number of available Lower Aquifer wells.

The contour maps illustrate several general features of the groundwater flow system in the Red Bluff Subbasin, including:

- A general groundwater flow moving from the northwest to southeast within the subbasin.
- Movement of water towards the Sacrament River most notably in Spring Contours.
- Steep groundwater gradients in the north and west sides of the subbasin with gradual gradients in the southeast part of the subbasin.
- Fall contours indicate water flow from the Sacramento River to the southeastern side of the subbasin.



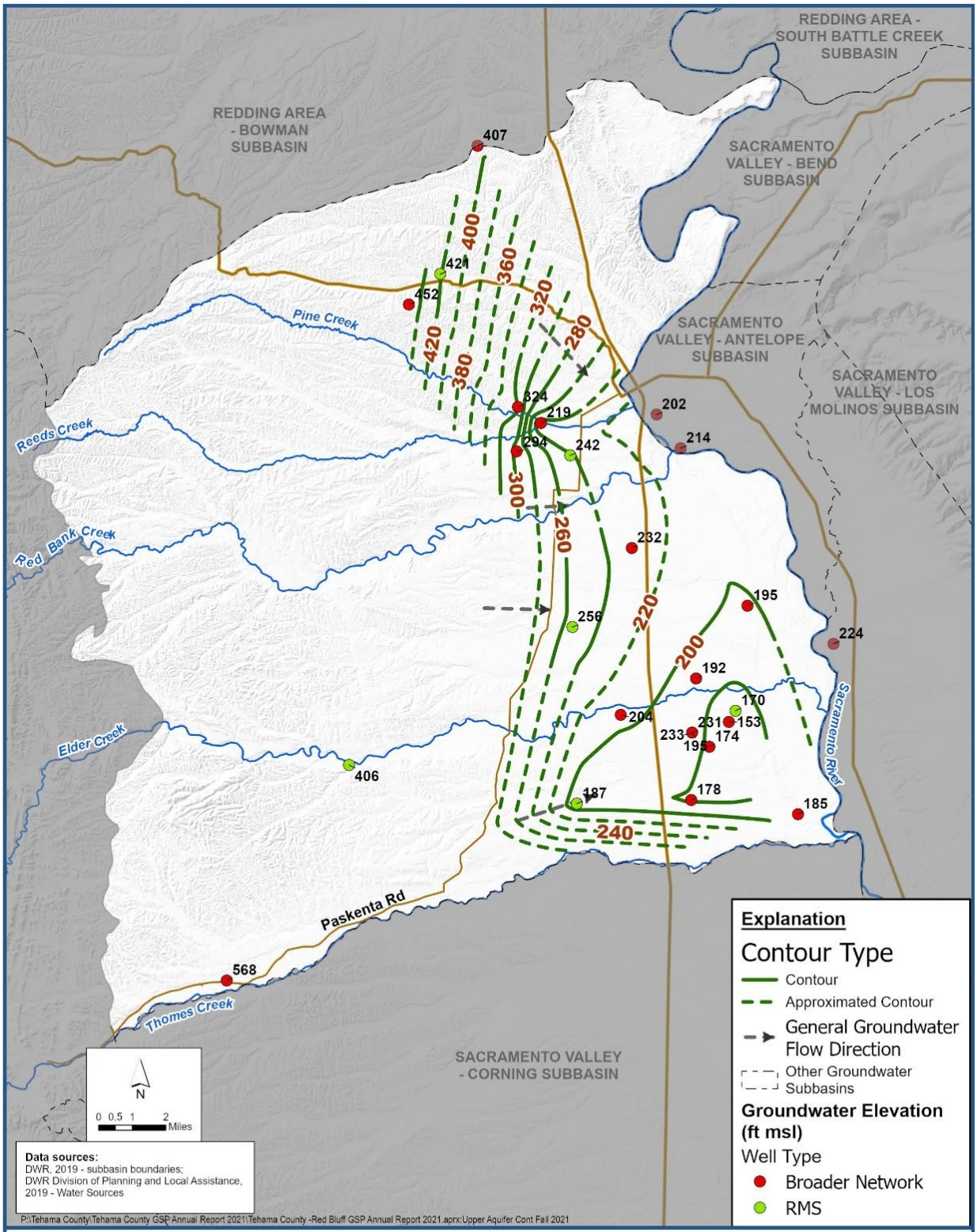
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Contours of Equal Groundwater Elevation, Upper Aquifer - Fall 2020

Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin

Figure 2-1



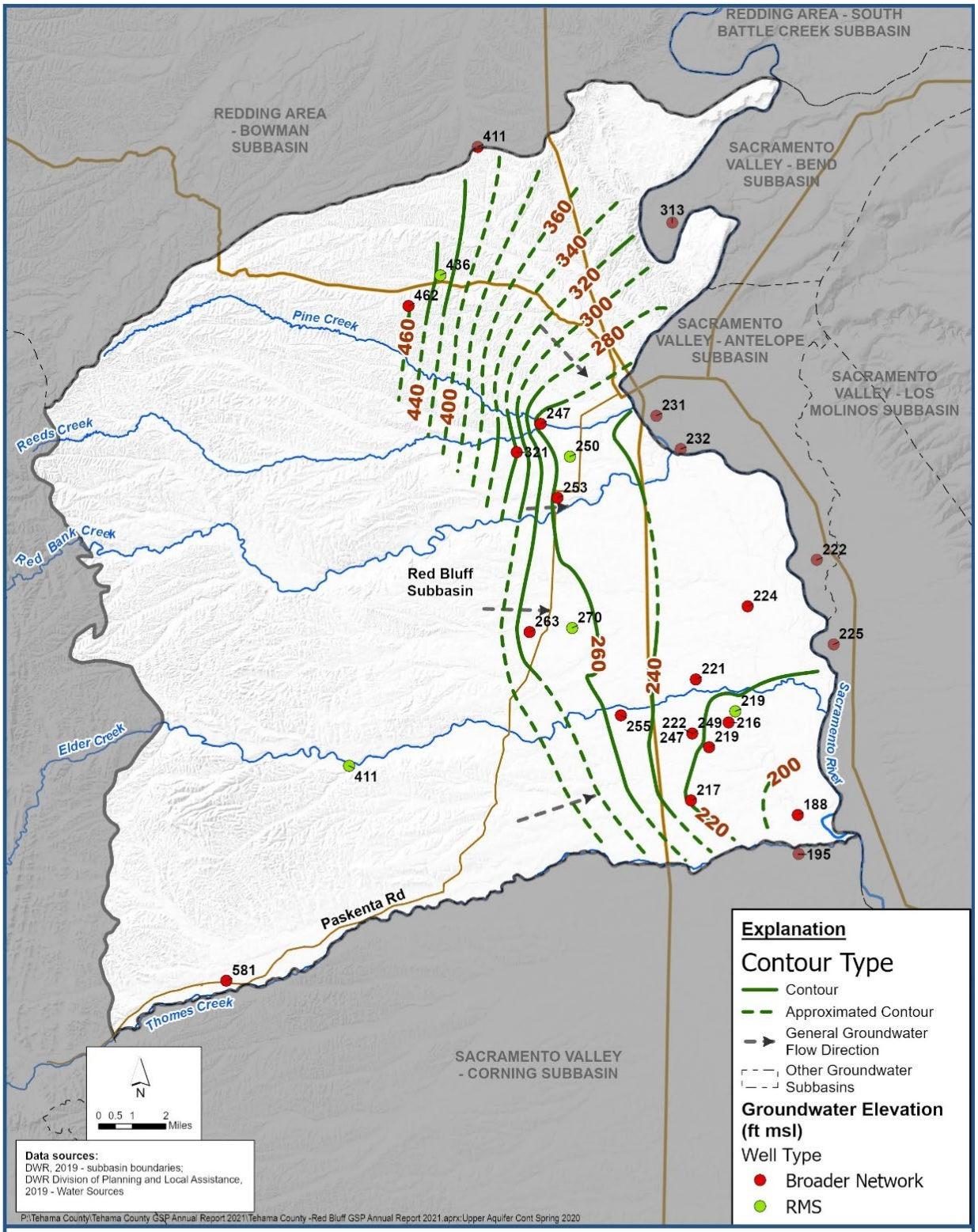
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Contours of Equal Groundwater Elevation, Upper Aquifer - Fall 2021

Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin

Figure 2-2



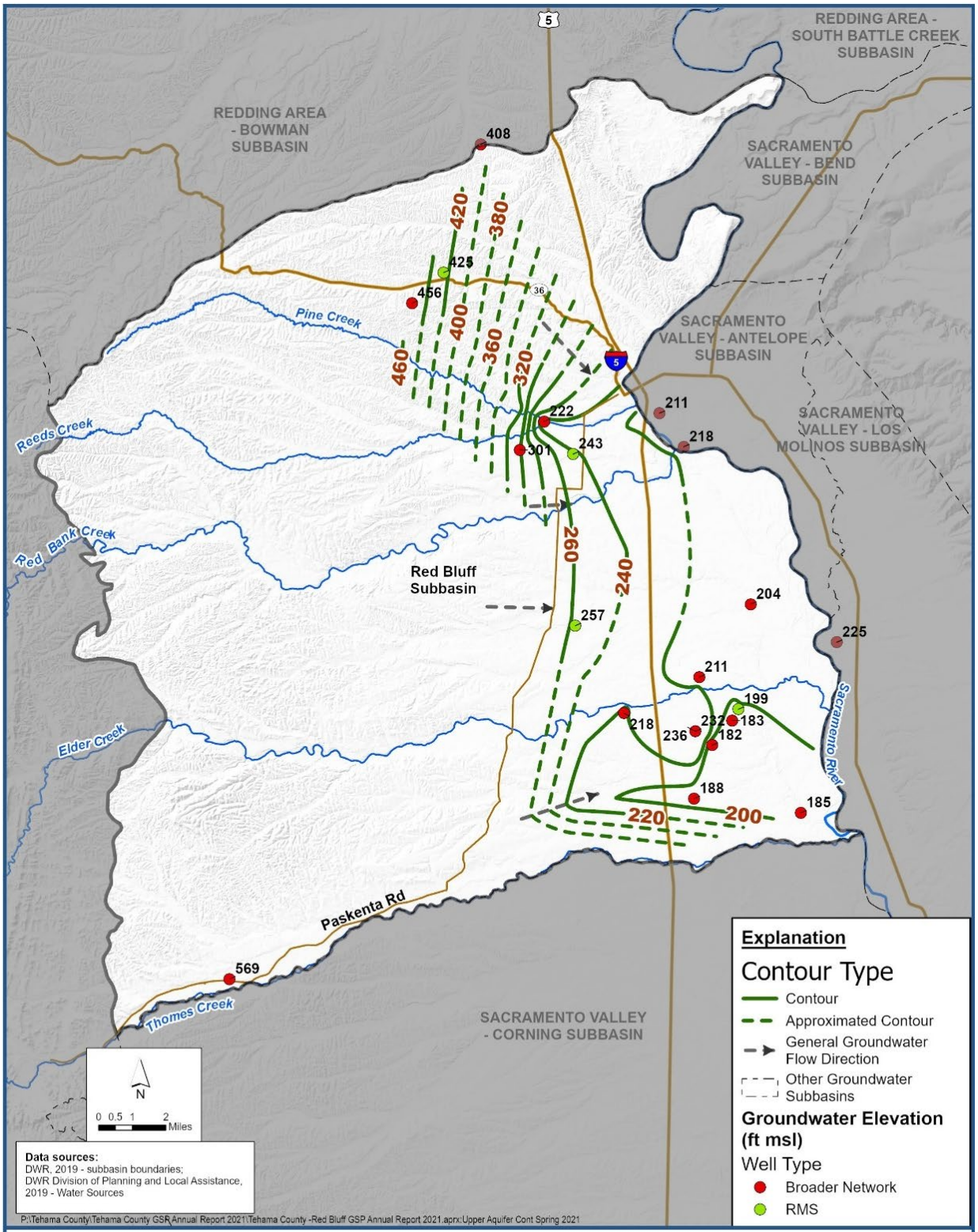
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Contours of Equal Groundwater Elevation, Upper Aquifer - Spring 2020

Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin

Figure 2-3



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Contours of Equal Groundwater Elevation, Upper Aquifer - Spring 2021

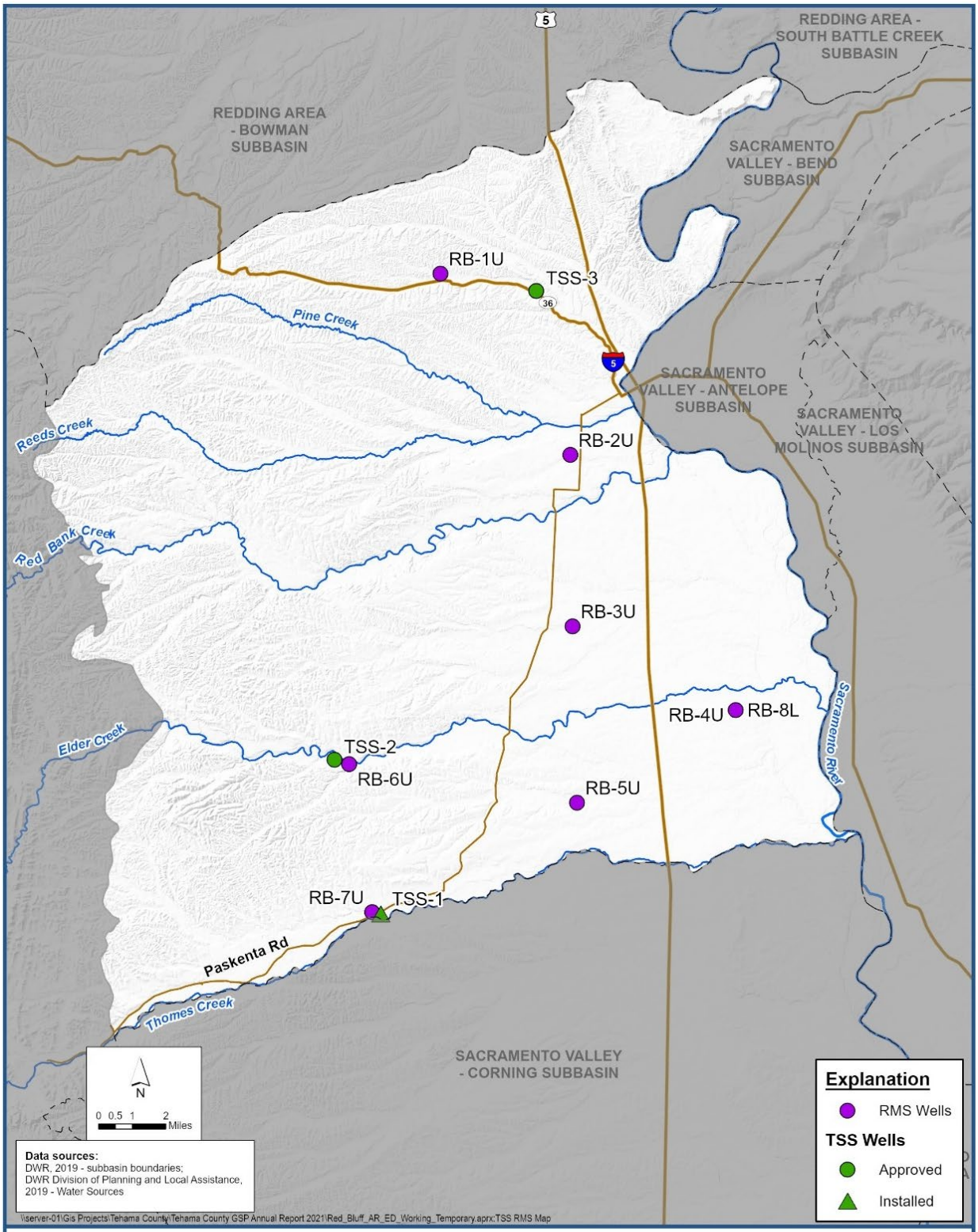
Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin

Figure 2-4

2.2. Groundwater Elevation Hydrographs - Section 356.2(b)(1)(B)

Hydrographs of groundwater elevations were prepared for all eight RMS wells in both the Upper and Lower Aquifers. RMS wells are distributed throughout the Subbasin to provide broad spatial coverage of the Subbasin. **Figure 2-5** shows the distribution of the current RMS wells and the locations of the constructed TSS well and two approved TSS slated for installation. The process for selecting these sites is documented in the Red Bluff Subbasin GSP. Long-term fluctuations in groundwater levels (and groundwater in storage) occur when there is an imbalance between the volume of water recharged into the aquifer and the volume of water removed from the aquifer, either by extraction or natural discharge to surface water bodies. If, over a period of years, the amount of water recharged to the aquifer exceeds the amount of water removed from the aquifer, then groundwater levels will increase and groundwater storage increases (i.e., positive change in storage). Conversely, if, over time, the amount of water removed from the aquifer exceeds the amount of water recharged then groundwater levels decline. 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.

The eight RMS wells in the Upper and Lower Aquifers, all had seasonal high groundwater elevations that are above the minimum thresholds (MT) during the 2020 and 2021 water years. Wells such as RB-4U, RB-5U and RB-8L regularly show seasonal low water levels that fall below the measurable objectives (MO) and all wells maintained seasonal highs above this level.



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Red Bluff RMS Network

Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin

Figure 2-5

3. WATER SUPPLY AND USE

Water supply and use information are presented below. Water use data by sector (required per Section 356.2) is summarized in Section 3 and categorized by groundwater extraction, surface water supply and total supply using the best data available. Water use sectors are broadly identified as agricultural, urban, and native vegetation land uses.

3.1. Groundwater Extraction - Section 356.2(b)(2)

Groundwater extraction by water use sector is reported for the 2020 and 2021 water years. Groundwater extraction data was estimated from modeled results using the Tehama IHM model. The model estimates groundwater extraction based on available land use information, climate data and access to surface water. The Tehama IHM model was developed to support GSP development through adaptation of the Sacramento Valley Groundwater-Surface Water Simulation Model (SVSim, version BETA 3-19-2020). Direct measurements of groundwater extraction data could not be used in the model calibration to determine accuracy due to the limited number of observations. Instead, water levels and stream flows were used to calibrate the model resulting in a normalized root mean of squared residual error of 5%. Additional information about the Tehama IHM development process is described in the GSP (Appendix 2-J). Groundwater extraction in the Red Bluff Subbasin for water years 2020 and 2021 in both the Upper and Lower Aquifers was estimated on an element-basis by simulating groundwater pumping. The general location and volume of groundwater extractions are presented in **Figures 3-1** through **3-4**. **Table 3-1** includes groundwater use data by sector for each year. In all annual report tables numbers are rounded to two significant digits consistent with the uncertainty associated with the methods and sources used in the analysis. The exception to this rule applies to totals of other numbers presented in the tables. The 2020 water year is denoted as “D” (Dry) and the 2021 year as “C” (Critical). The agricultural sector had the greatest increase in use from 120,000 af to 140,000 af, whereas native vegetation decreased significantly from 3,300 to 2,100 af. Urban groundwater use remained largely unchanged increasing slightly from 5,500 to 5,800 af. The large increase in agricultural sector use is likely due to the increased water demand of crops during dryer conditions as well as the need for growers to offset decreased surface water delivers during droughts.

Table 3-1. Groundwater Use in Each Water Year by Water Use Sector

Sector	2020 (D) (af)	2021 (C) (af)
Agricultural	120,000	140,000
Urban	5,500	5,800
Native Vegetation	3,300	2,100
Total	**128,800**	**147,900**

D: Dry Sacramento Valley Water Year as defined by DWR.

C: Critical Sacramento Valley Water Year as defined by DWR.

3.2. Surface Water Supply - Section 356.2(b)(3)

Surface water use by sector and source for the 2020 and 2021 water years is presented in **Table 3-2**. Surface water data was obtained from real world observations when available and was otherwise estimated from model results. Surface water did not contribute to urban or native vegetation sectors in either 2020 or 2021. Agricultural surface water use declined significantly going from 3,700 in 2020 to 1,100 af in 2021. This decline is likely due to decreased access to or increased cost of surface water. CVP supplies accounted for the majority of surface water use in both years although supplies were reduced in 2021.

Table 3-2. Surface Water Use in Each Water Year by Water Use Sector and Source

Sector	2020 (D) (af)		2021 (C) (af)	
	Supply Source			
	CVP	Local	CVP	Local
Agricultural	3,600	100	940	160
Urban	0	0	0	0
Native Vegetation	0	0	0	0
Total	**3,700**		**1,100**	

D: Dry Sacramento Valley Water Year as defined by DWR.

C: Critical Sacramento Valley Water Year as defined by DWR.

3.3. Total Water Use by Sector - Section 356.2(b)(4)

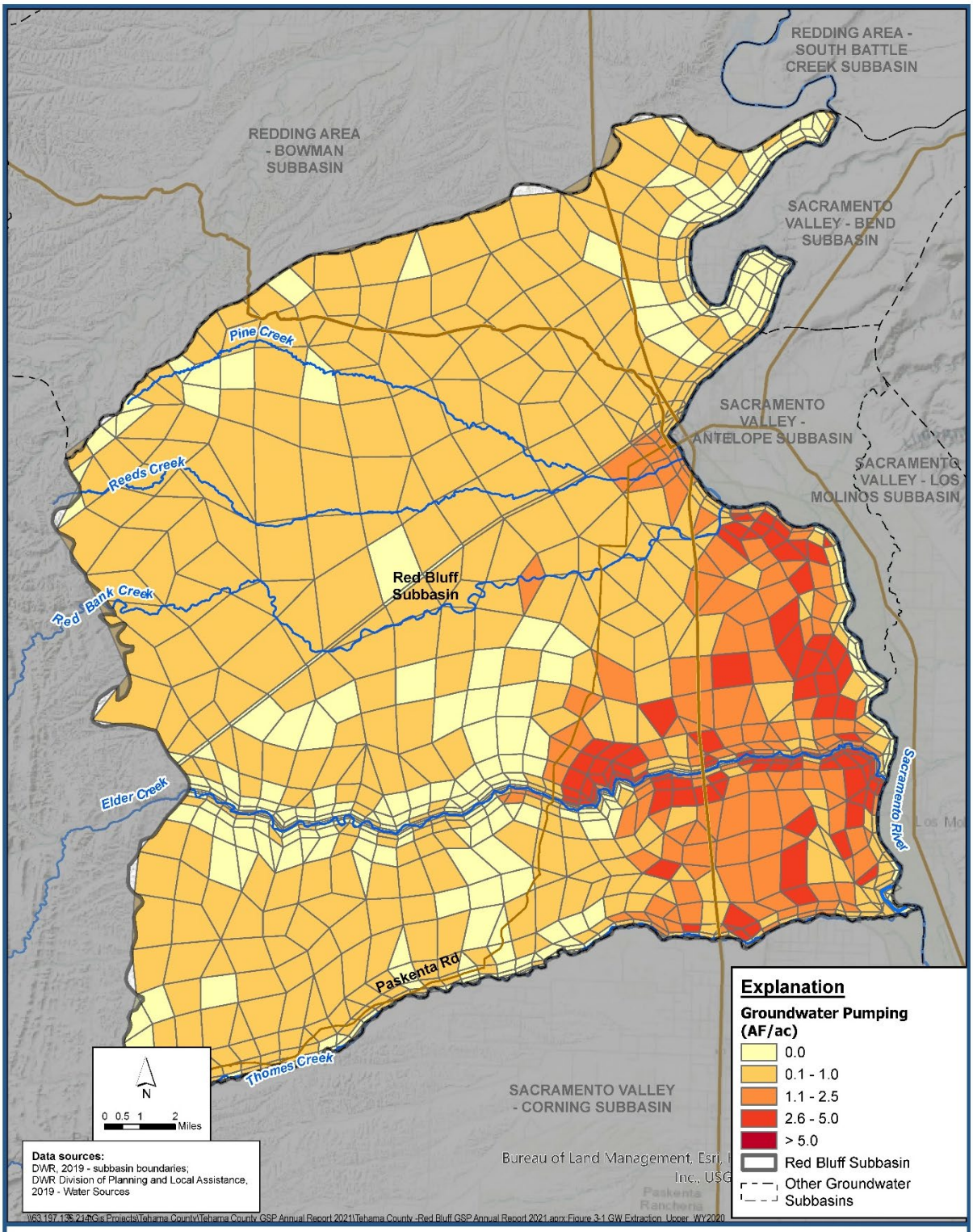
Total water use by sector for the 2020 and 2021 water years is included in **Table 3-3**. Total water use is summarized from results presented in Section 3.1 and 3.2. Total agricultural water use increased from 123,700 to 141,100 af from the 2020 to 2021 water years. By comparison urban water use remained nearly unchanged going from 5,500 to 5,800 from 2020 to 2021 and native vegetation water use declined significantly from 3,300 af to 2,100 af. Overall water use increased from 132,500 af to 149,000 af.

Table 3-3. Total Water Use in the 2021 Water Year by Water Use Sector

Sector	2020 (D) (af)	2021 (C) (af)
Agricultural	123,700	141,100
Urban	5,500	5,800
Native Vegetation	3,300	2,100
Total	**132,500**	**149,000**

D: Dry Sacramento Valley Water Year as defined by DWR.

C: Critical Sacramento Valley Water Year as defined by DWR.



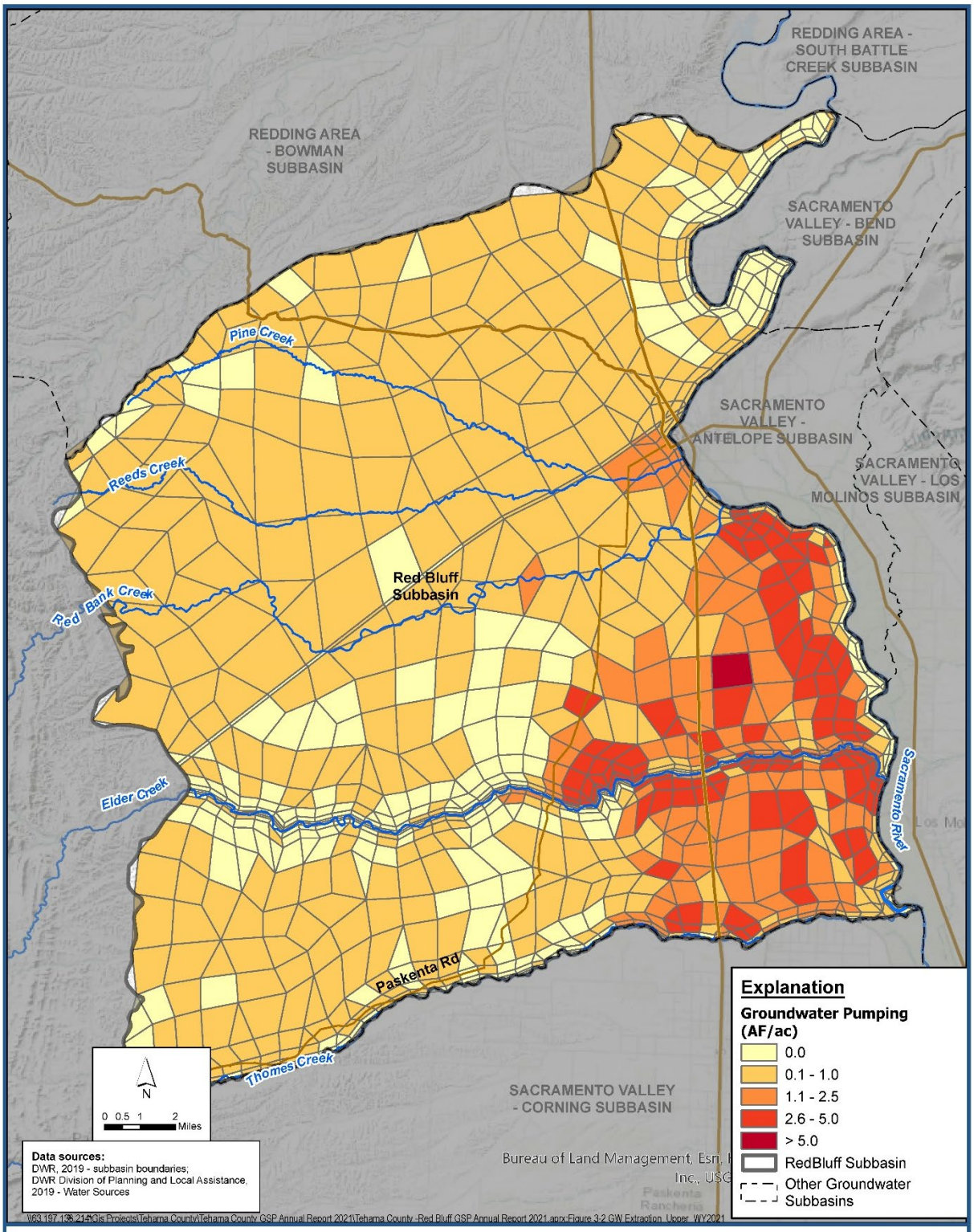
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Groundwater Extraction in the Upper Aquifer - Water Year 2020

Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin

Figure 3-1



\\63.197.13\...\GIS Projects\Tehama County\Tehama County GSP Annual Report 2021\Tehama County -Red Bluff GSP Annual Report 2021.aprx:Figure 3-2 GW Extraction_Upper_WY2021

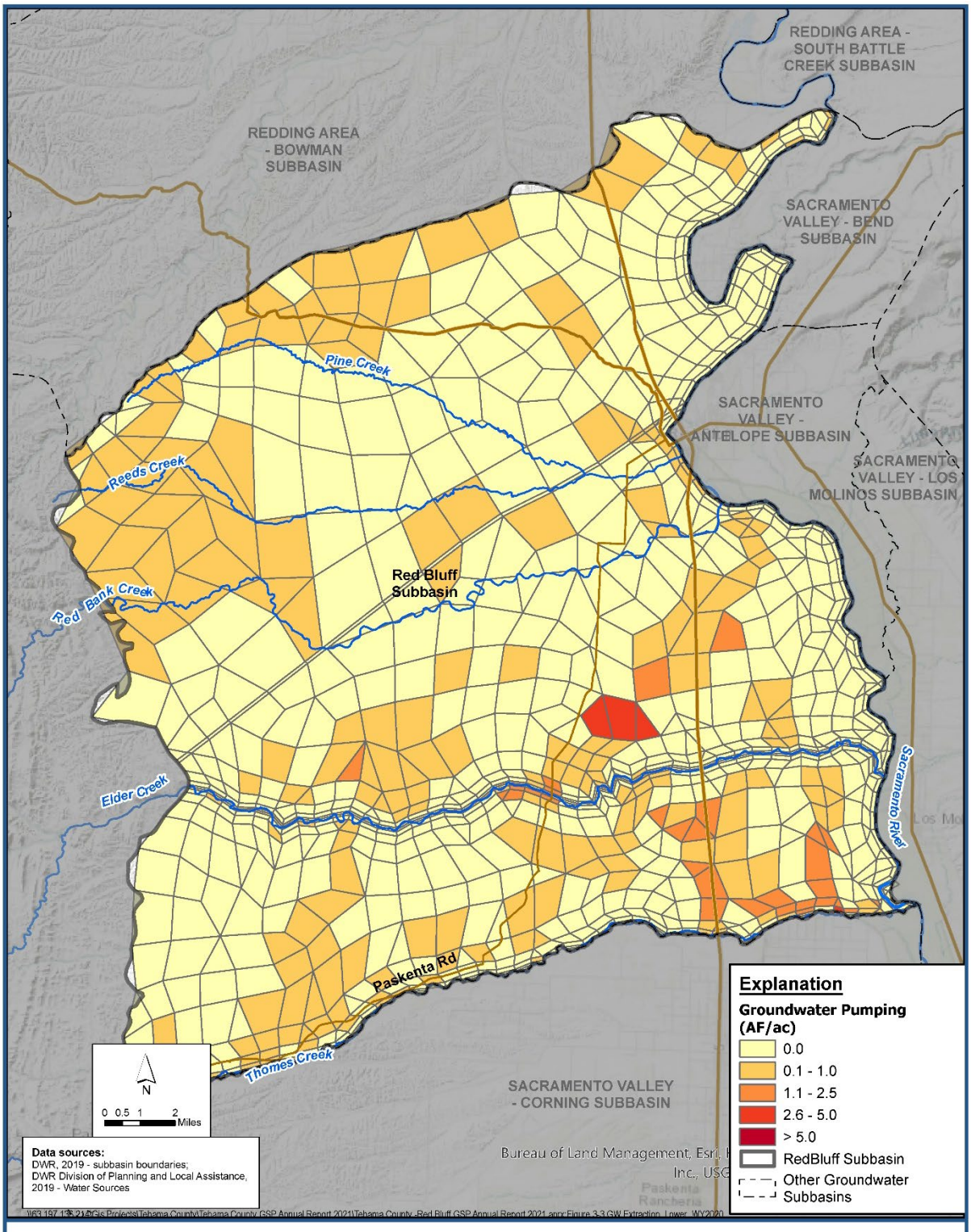
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Groundwater Extraction in the Upper Aquifer - Water Year 2021

Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin

Figure 3-2



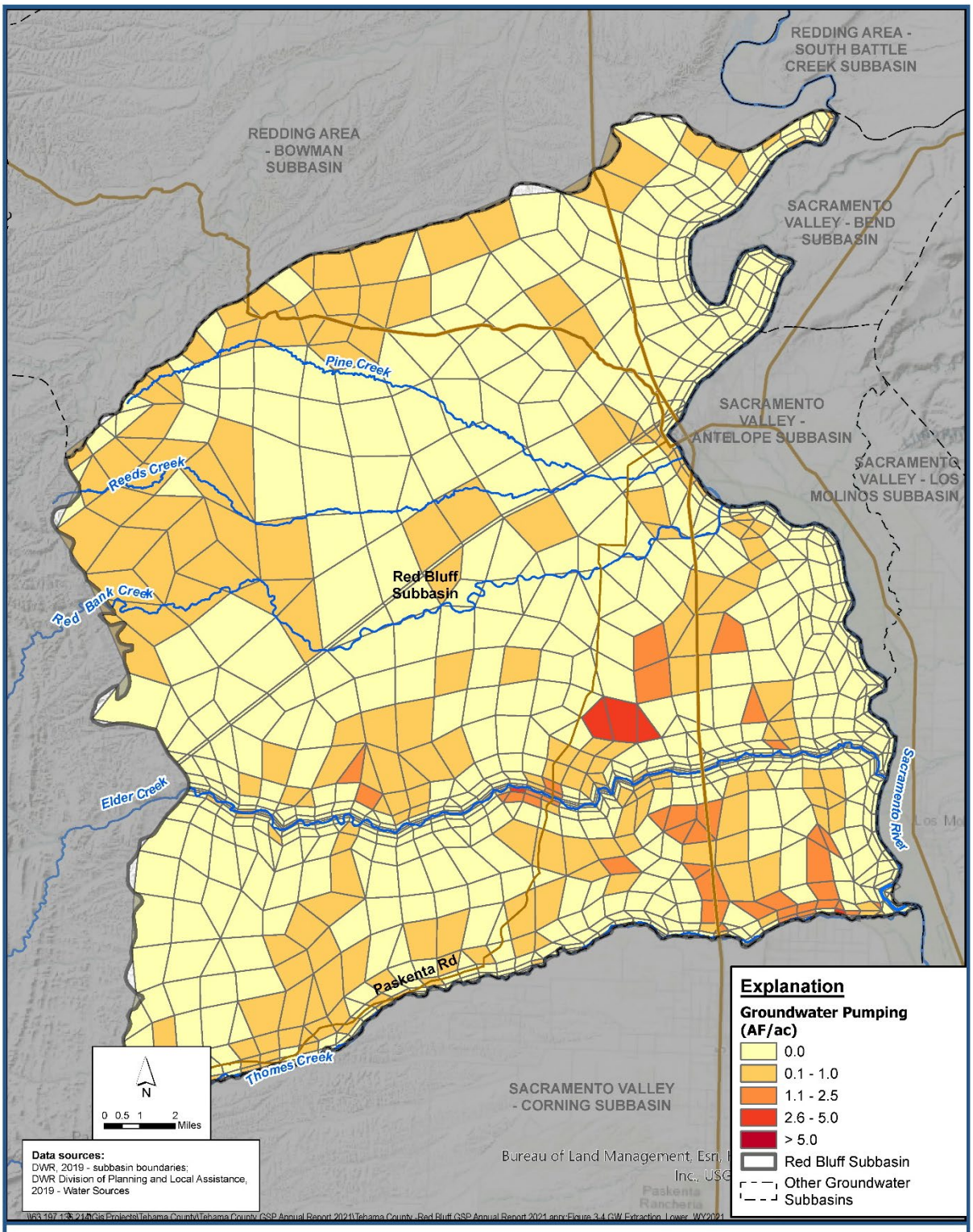
TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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Groundwater Extraction in the Lower Aquifer - Water Year 2020

Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin

Figure 3-3



TEHAMA COUNTY

LSCE Team

Groundwater Extraction in the Lower Aquifer - Water Year 2021

Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin

Figure 3-4

4. GROUNDWATER STORAGE

Changes in groundwater storage values were calculated for the 2020 and 2021 water years for the Upper and Lower Aquifers. Groundwater storage change was estimated based on the change in seasonal high groundwater levels (spring to spring). Seasonal high measurements made in the winter and spring provide a more reliable method to calculate change in groundwater storage than measurements made from seasonal low measurements that may be influenced by residual groundwater pumping. Storage change in the 2020 water year was estimated based on the change in seasonal high groundwater levels between the 2019 and 2020 water years. Likewise, 2021 storage change was calculated based on the change in seasonal high groundwater levels between 2020 and 2021 water years. While contour maps show wells over a large area of the subbasin water level change was calculated within a smaller monitoring area to exclude areas of poor data density. As the groundwater level monitoring network improves this area will expand to include more of the subbasin. A groundwater elevation surface was generated using either natural neighbor or kriging interpolation methods. The average groundwater level change over the monitored area was applied to the subbasin extent. Lastly, groundwater model aquifer properties, storage coefficients, were used to calculate change in storage. This represents a departure from change in storage calculations made in the GSP where the groundwater model was utilized to calculate groundwater storage changes. **Table 4-1** presents the annual storage change values for both the Upper and Lower Aquifers.

Table 4-1. Change in Groundwater Storage Based on Seasonal High Groundwater Levels

Aquifer	2020 (D) (af)	2021 (C) (af)
Upper Aquifer	-28,000	-69,000
Lower Aquifer	-21,000	-95,000
Total	**-49,000**	**-164,000**

D: Dry Sacramento Valley Water Year as defined by DWR.

C: Critical Sacramento Valley Water Year as defined by DWR.

Since there are a limited number of monitoring wells in the Lower Aquifer within the subbasin an average change in groundwater elevations from Lower Aquifer wells within and near the subbasin was applied to the entire subbasin. Aquifer properties for the Lower Aquifer were obtained from the groundwater model to calculate change in storage.

It should be noted that although fundamentally the approach is similar to that used to estimate groundwater storage change in the GSP, the groundwater model was not used to estimate storage changes for 2020 and 2021. Therefore, future updates to the model may result in different estimates for 2020 and 2021 groundwater storage changes. The approach of using spring groundwater elevation contours is considered reasonable and cost effective for the purposes of the annual report. **Table 4-2** includes estimates of annual groundwater pumping, groundwater uptake, storage change and cumulative storage change for water years 1990-2021. Change in storage and cumulative change in storage for water years 2020-2021 was estimated based on the above method. The Tehama IHM Model was used to estimate groundwater pumping and groundwater uptake for all water years. Change in storage and cumulative change in storage were Model estimated for water years 1990-2019.

Table 4-2. Change in Groundwater Storage Based on Tehama IHM Model

Water Year & Type[1]	Groundwater Pumping (af)	Groundwater Uptake (af)	Annual Groundwater Storage Change (af)	Cumulative Groundwater Storage Change (af)
1990 (C)	-78,000	-9,400	-77,000	-77,000
1991 (C)	-80,000	-6,300	-77,000	-150,000
1992 (C)	-81,000	-5,800	-41,000	-200,000
1993 (AN)	-69,000	-7,900	56,000	-140,000
1994 (C)	-83,000	-7,200	-53,000	-190,000
1995 (W)	-66,000	-10,000	99,000	-93,000
1996 (W)	-72,000	-13,000	37,000	-56,000
1997 (W)	-79,000	-13,000	-3,900	-60,000
1998 (W)	-50,000	-16,000	130,000	70,000
1999 (W)	-67,000	-17,000	-16,000	54,000
2000 (AN)	-66,000	-15,000	-9,500	45,000
2001 (D)	-76,000	-13,000	-61,000	-16,000
2002 (D)	-86,000	-11,000	-37,000	-53,000
2003 (AN)	-67,000	-12,000	31,000	-22,000
2004 (BN)	-87,000	-13,000	-1,000	-23,000
2005 (AN)	-64,000	-13,000	30,000	6,600
2006 (W)	-71,000	-16,000	44,000	51,000
2007 (D)	-86,000	-12,000	-93,000	-42,000
2008 (C)	-98,000	-9,400	-65,000	-110,000
2009 (D)	-90,000	-6,900	-65,000	-170,000
2010 (BN)	-74,000	-7,900	23,000	-150,000
2011 (W)	-70,000	-9,900	21,000	-130,000
2012 (BN)	-85,000	-8,800	-60,000	-190,000
2013 (D)	-99,000	-6,500	-41,000	-230,000
2014 (C)	-99,000	-3,800	-78,000	-310,000
2015 (C)	-100,000	-3,200	-37,000	-340,000
2016 (BN)	-92,000	-3,400	19,000	-330,000

Table 4-2. Change in Groundwater Storage Based on Tehama IHM Model				
Water Year & Type[1]	Groundwater Pumping (af)	Groundwater Uptake (af)	Annual Groundwater Storage Change (af)	Cumulative Groundwater Storage Change (af)
2017 (W)	-84,000	-6,600	88,000	-240,000
2018 (BN)	-100,000	-4,200	-74,000	-310,000
2019 (W)	-82,000	-6,300	75,000	-240,000
2020 (D)	-126,000	-3,300	-49,000	-290,000
2021 (C)	-146,000	-2,100	-164,000	-450,000
Average	**-84,000**	**-9,200**	**-14,000**	

All volumes are rounded to two significant figures

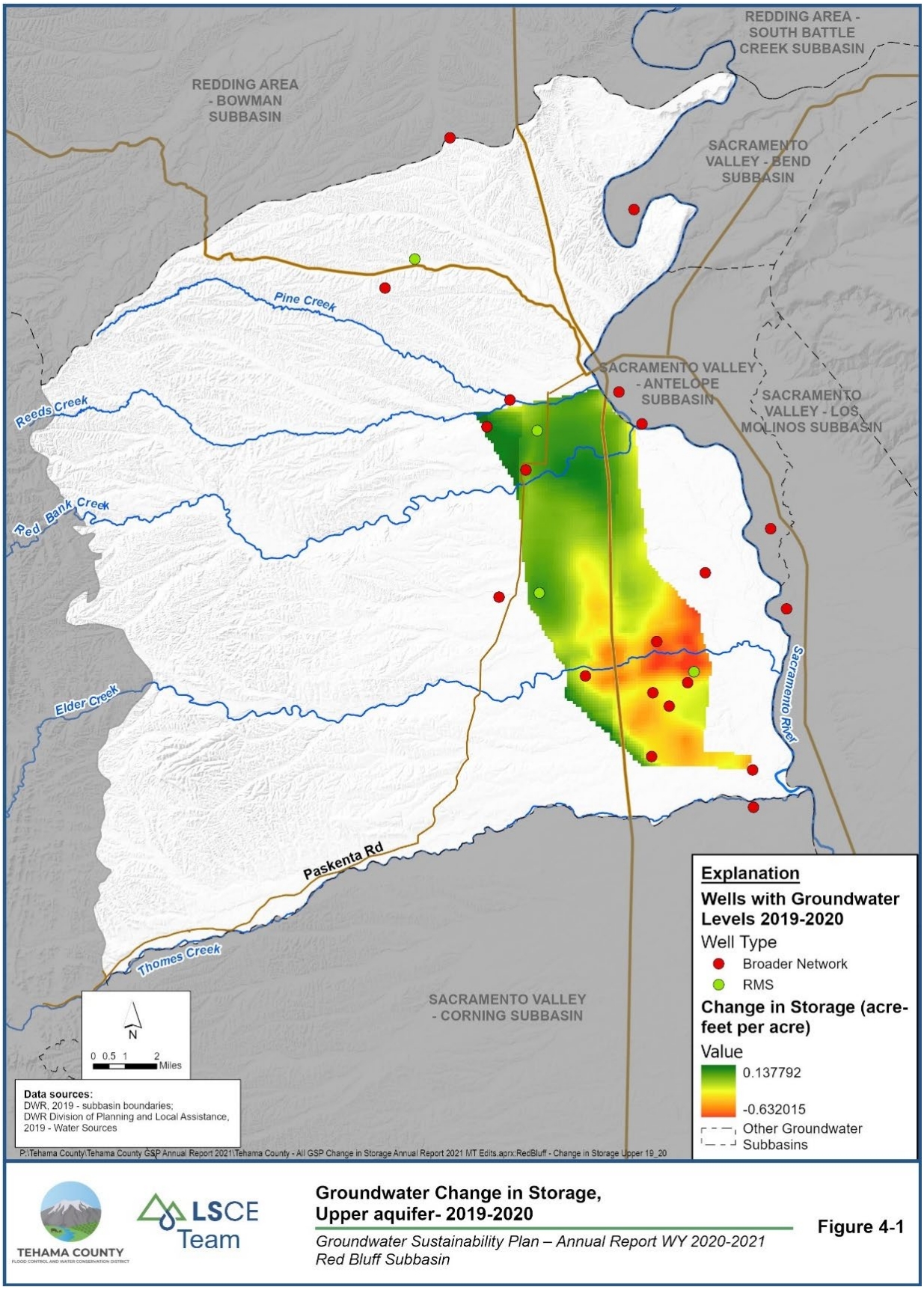
1. Sacramento Valley Water Year Type is provided by DWR for years 1990-2020. Water year 2021 meets the criteria to be considered a critical water, as shown in CDEC resources, but has not officially been assigned that designation by DWR. Wet (W), Above Normal (AN, Below Normal (BN), Dry (D), Critical (C)
2. Storage change in water years 2020-2021 was estimated using seasonal high spring to spring water levels and in all other years was estimated using the Tehama IHM Model.

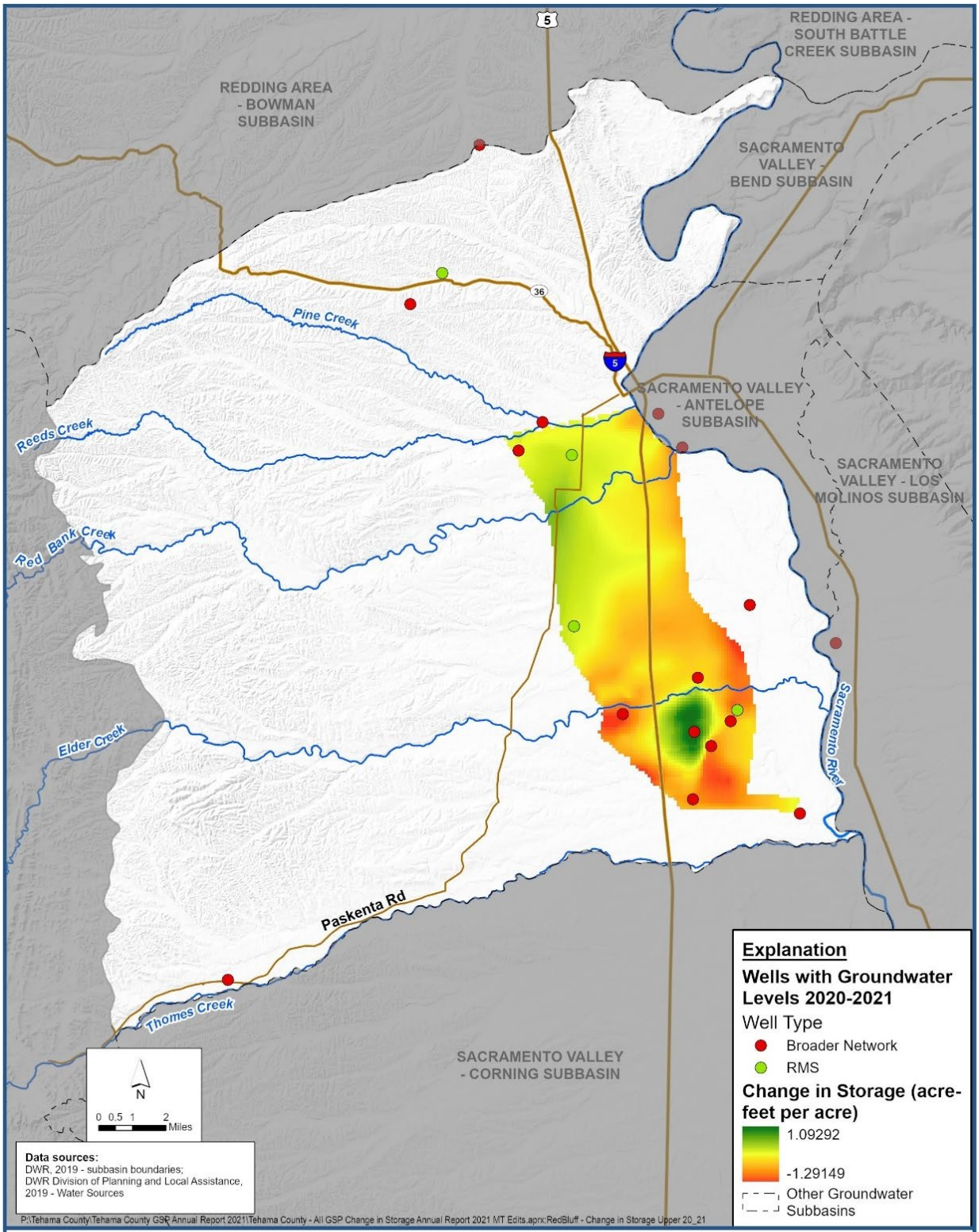
4.1. Groundwater Storage Maps - Section 356.2(b)(5)(A)

Figures 4-1 and **4-2** present the distribution of storage change in the Upper Aquifer for the 2020 and 2021 water years, respectively. Maps include the groundwater wells used to calculate change in storage. Groundwater storage change is not shown on **Figures 4-1** and **4-2** outside the established monitoring area to avoid extrapolating beyond the control points (i.e., reliable monitoring well data). Lower Aquifer storage change maps were not prepared because groundwater elevation surfaces were not created due to lack of sufficient Lower Aquifer wells.

4.2. Subbasin Water Budget - Section 356.2(b)(5)(B)

A graph depicting water year type, groundwater pumping, groundwater uptake, the annual change in groundwater storage, and the cumulative change in groundwater storage is presented on **Figure 4-3**.


REDDING AREA - SOUTH BATTLE CREEK SUBBASIN
REDDING AREA - BOWMAN SUBBASIN
SACRAMENTO VALLEY - BEND SUBBASIN
SACRAMENTO VALLEY - ANTELOPE SUBBASIN
SACRAMENTO VALLEY - LOS MOLINOS SUBBASIN
SACRAMENTO VALLEY - CORNING SUBBASIN
Pine Creek
Reeds Creek
Red Bank Creek
Elder Creek
Thomes Creek
Paskenta Rd
Sacramento River
N
0 0.5 1 2 Miles
Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources
P:\Tehama County\Tehama County GSP Annual Report 2021\Tehama County - All GSP Change in Storage Annual Report 2021 MT Edits.aprx:RedBluff - Change in Storage Upper 19_20
Explanation
Wells with Groundwater Levels 2019-2020
Well Type
Broader Network
RMS
Change in Storage (acre-feet per acre)
Value
0.137792
-0.632015
Other Groundwater Subbasins
TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT
LSCE Team
Groundwater Change in Storage, Upper aquifer- 2019-2020
Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin
Figure 4-1



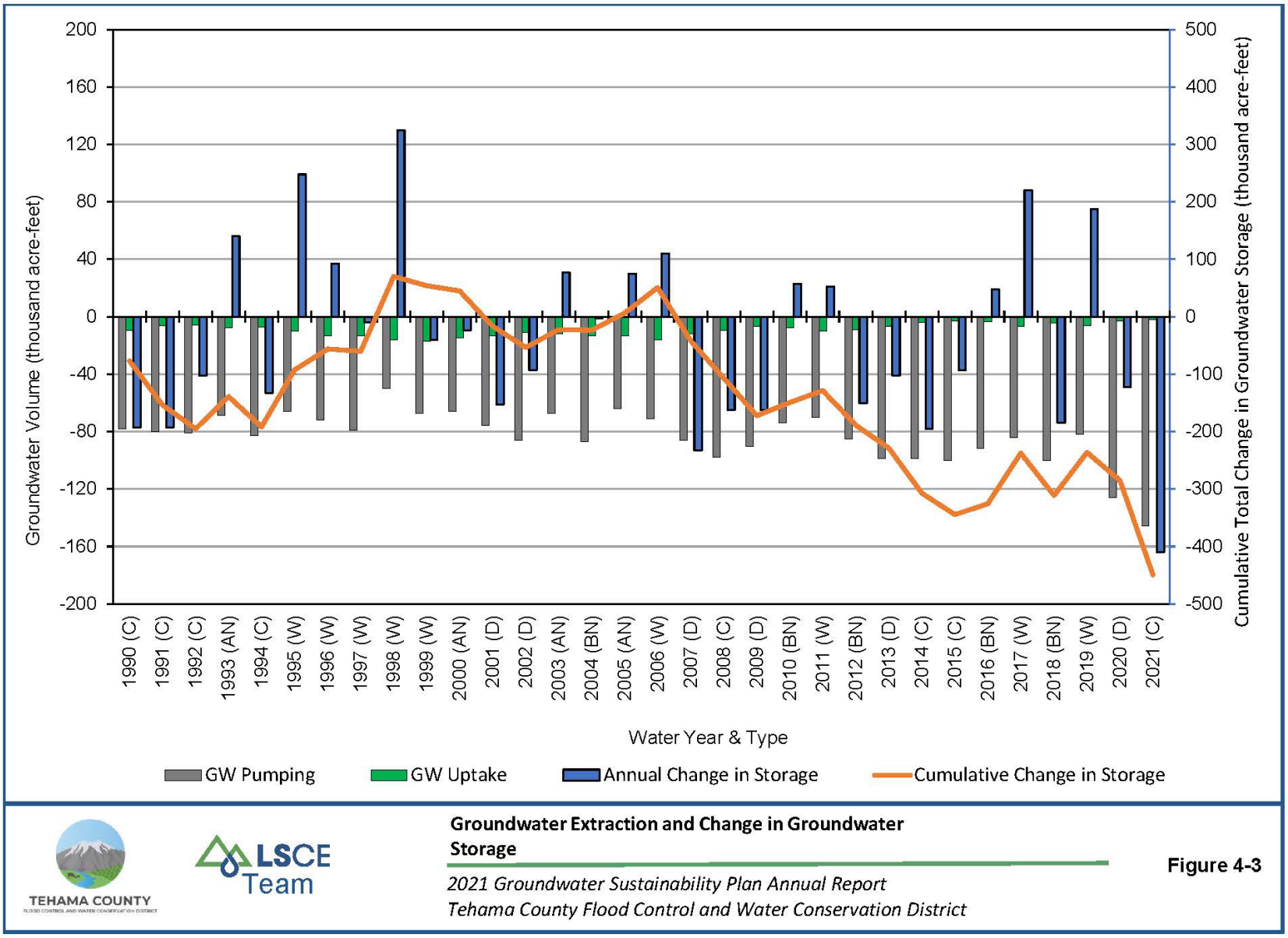
TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Groundwater Change in Storage, Upper Aquifer - 2020-2021

Groundwater Sustainability Plan – Annual Report WY 2020-2021
Red Bluff Subbasin

Figure 4-2



Groundwater Extraction and Change in Groundwater Storage

Figure 4-3

2021 Groundwater Sustainability Plan Annual Report
Tehama County Flood Control and Water Conservation District

5. GSP IMPLEMENTATION PROGRESS - SECTION 356.2(B)

The GSP for the Red Bluff Subbasin was adopted by the GSA in December 2021 and submitted to DWR in January 2022. This is the first annual report to be prepared since the GSP was submitted. The GSP implementation progress reported in this report covers ongoing work during GSP development since late 2021.

Projects and management actions (PMAs) were developed to manage groundwater conditions in the Subbasin and achieve groundwater sustainability objectives described in the GSP. Due to the recent adoption of the GSP, progress towards the implementation of PMAs has not progressed since GSP adoption. The GSA in the Red Bluff Subbasin is continuing to engage stakeholders in the subbasin as they coordinate to develop a workplan for 2022 and discuss implementation priorities.

Finally, ongoing activities include monitoring and reporting, updating, and maintaining the subbasin's DMS, outreach to stakeholders, inter-basin coordination, and coordination with outside efforts to improve characterization of the subbasin (such as DWR's Airborne Electromagnetic Survey Program expected to collect data in the subbasin in May 2022).

As part of the GSA's efforts to address data gaps in the subbasin, Airborne Electromagnetic (AEM) Surveys are scheduled by DWR in summer of 2022. The data collected will provide a better understanding of aquifer characteristics and will help refine current hydrogeologic conceptual models. Additionally, the GSA is coordinating with DWR to install two additional TSS monitoring wells pending completion of similar monitoring wells in neighboring subbasins. These new monitoring wells will be screened in the Upper and Lower Aquifers and will be incorporated in the RMS well network. Lastly, the GSA is scheduled to survey RMS wells RB-6U, RB-7U and RB-4 to establish more accurate vertical datum. This surveying will take place before the end of the year.

6. CONCLUSIONS

Recent progress made on all of the above-mentioned activities applicable to the GSA since late 2021 demonstrates the commitment of the GSA to implement the GSP by allocating the necessary time and resources to achieve long-term sustainable management of the groundwater resources in the subbasin.

7. REFERENCES

California Department of Water Resources. 2004. Sacramento Valley Groundwater Basin, Red Bluff Subbasin, California's Groundwater, Bulletin 118. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/5_021_50_RedBluffSubbasin.pdf.

California Department of Water Resources. 2003. Tehama County Groundwater Inventory. Pre-Publication Draft.

California Department of Water Resources. 2018. Groundwater Basin Boundary Assessment Tool. https://gis.water.ca.gov/app/bbat/.

California Department of Water Resources. 2019. SVSim: Sacramento Valley Groundwater-Surface Water Simulation Model. https://data.cnra.ca.gov/dataset/svsim.

Tehama County Flood Control and Water Conservation District. 2022. Red Bluff Groundwater Sustainability Plan. https://tehamacountywater.org/gsa/groundwater-sustainability-plans-public-draft/#red-bluff-subbasin-final-gsp.

APPENDIX A

Water Level Hydrographs of Representative Monitoring Wells for Groundwater Level

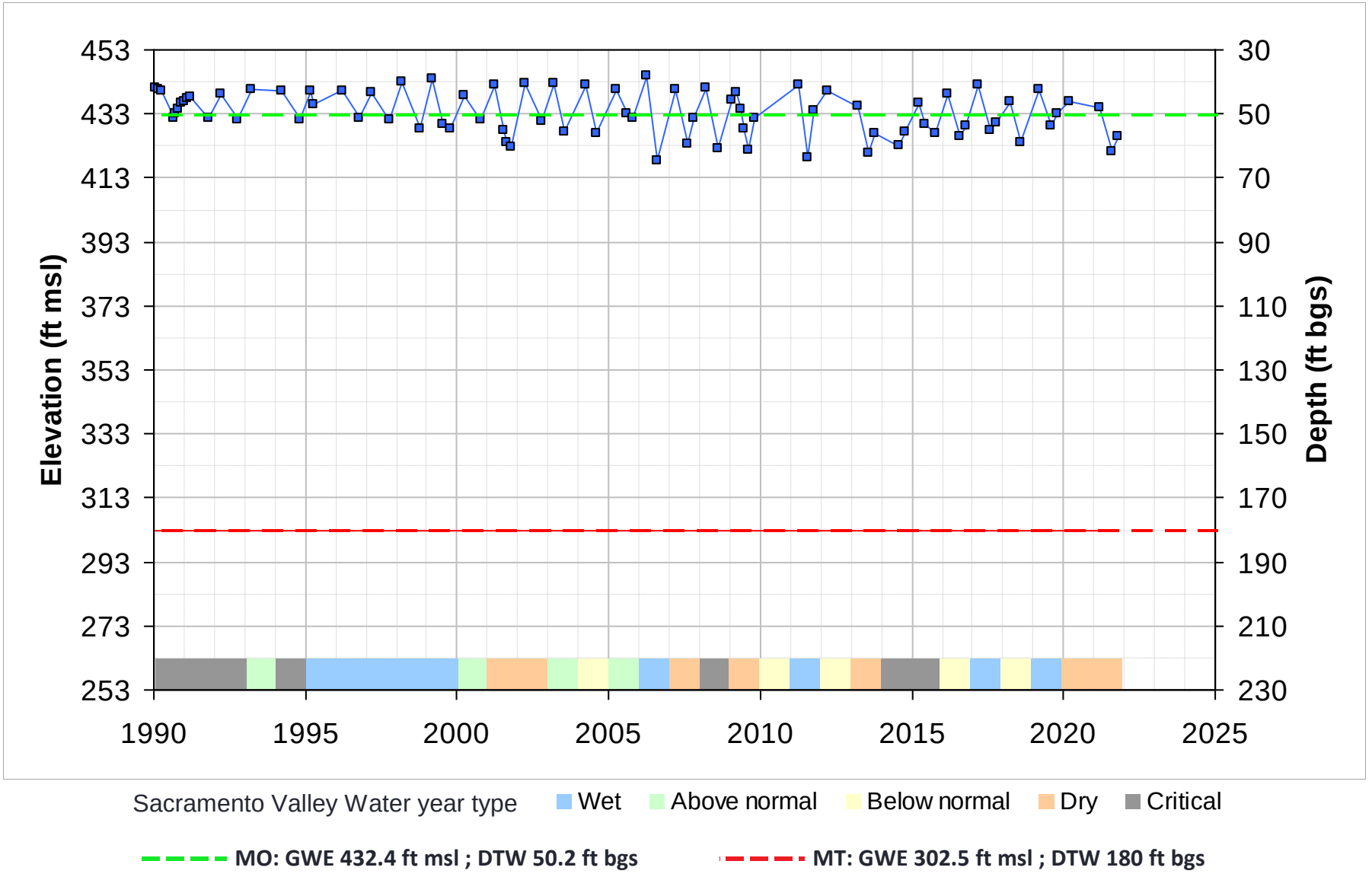
See Figure 2-5 to see the location of wells.

RB-1U (Red Bluff Subbasin - Upper Aquifer)

SWN: 27N04W05G002M

Well Depth (ft): 260; Screens (ft bgs): 231 - 251

Well Type: Domestic

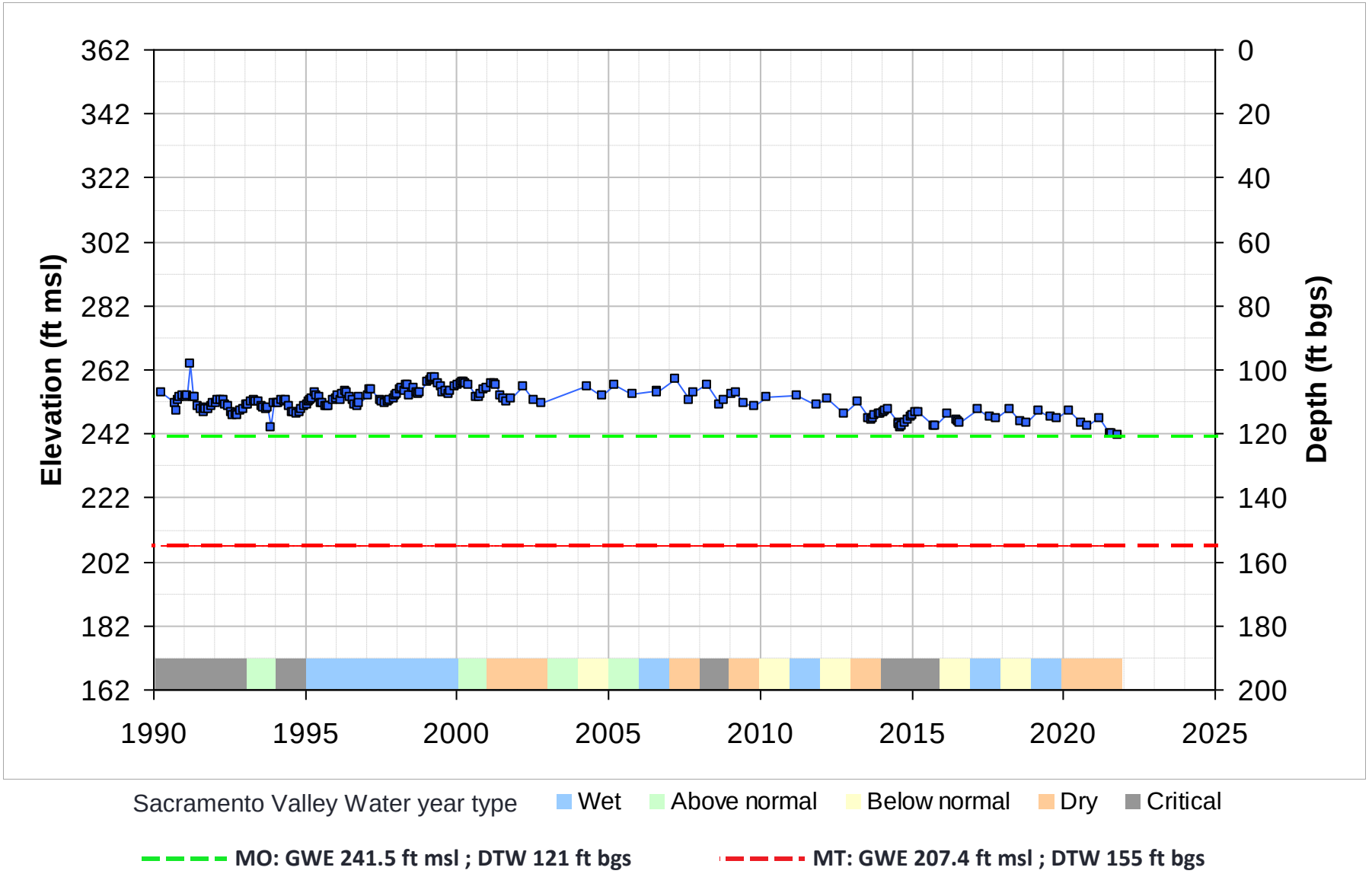


RB-2U (Red Bluff Subbasin - Upper Aquifer)

SWN: 27N04W36G001M

Well Depth (ft): 155; Screens (ft bgs): 135 - 155

Well Type: Domestic



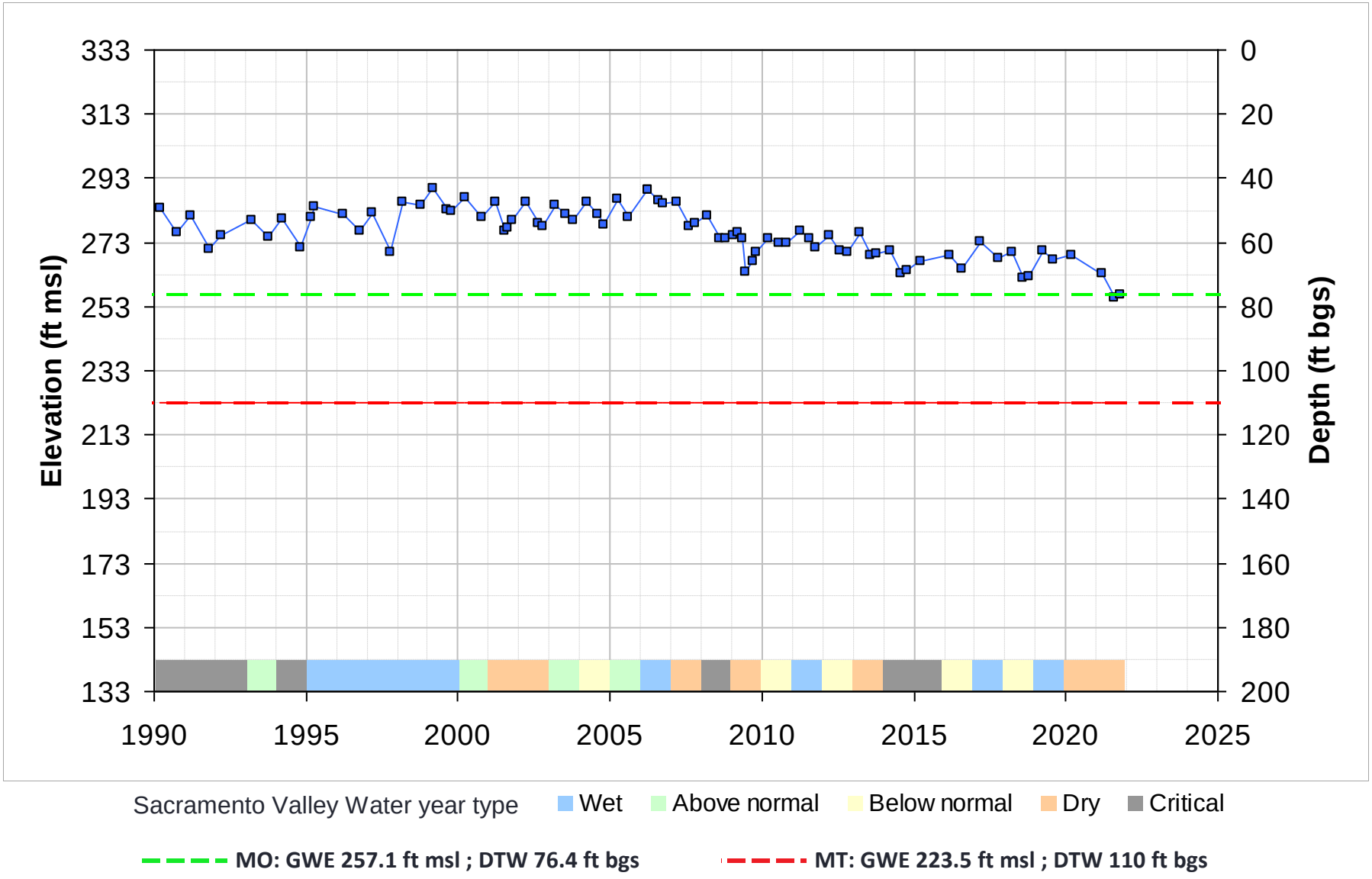
LSCE

RB-3U (Red Bluff Subbasin - Upper Aquifer)

SWN: 26N04W25J001M

Well Depth (ft): 128; Screens (ft bgs): 116 - 124

Well Type: Domestic



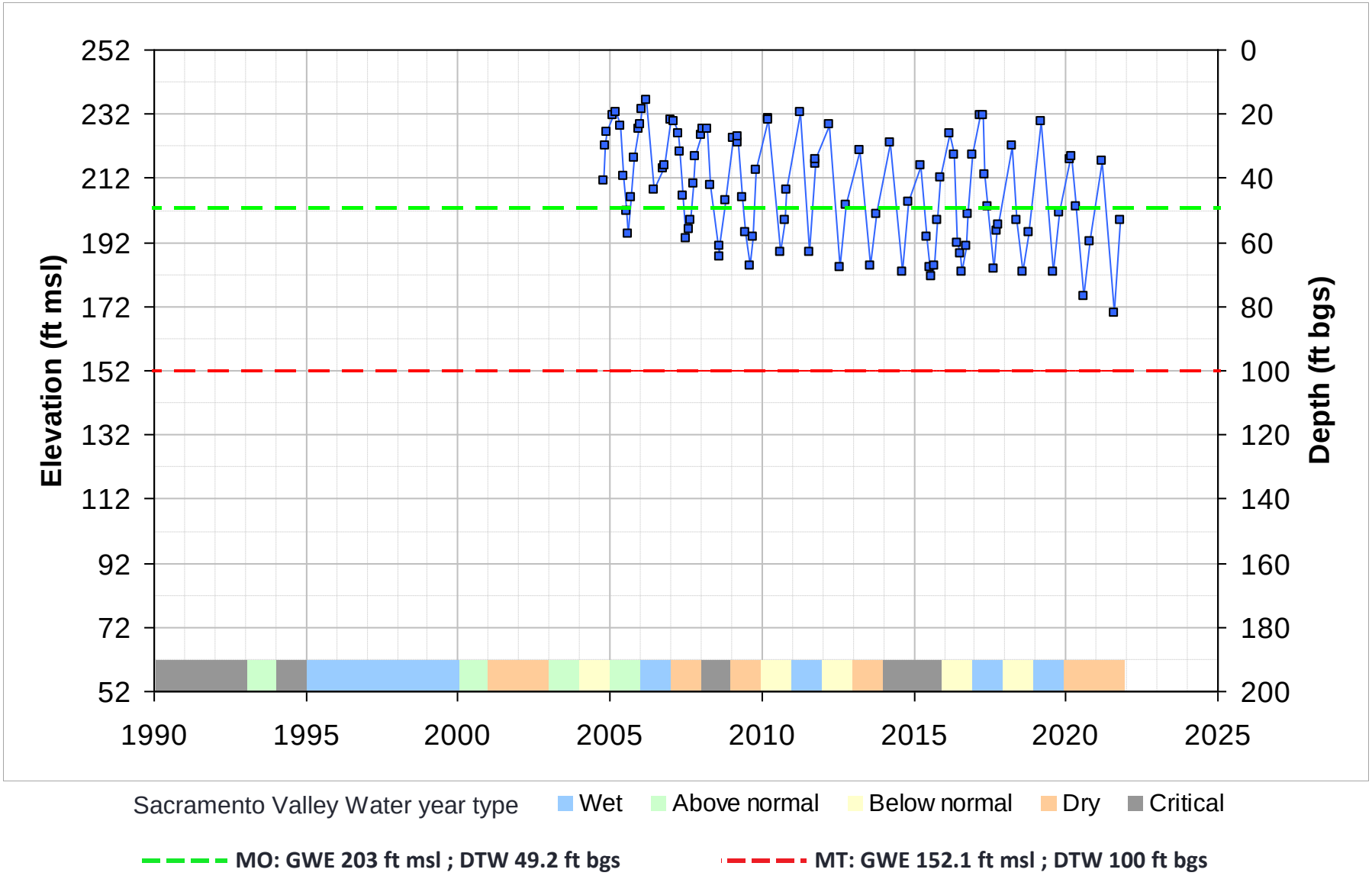
LSCE

RB-4U (Red Bluff Subbasin - Upper Aquifer)

SWN: 25N03W11B001M

Well Depth (ft): 255; Screens (ft bgs): 150 - 180

Well Type: Monitoring



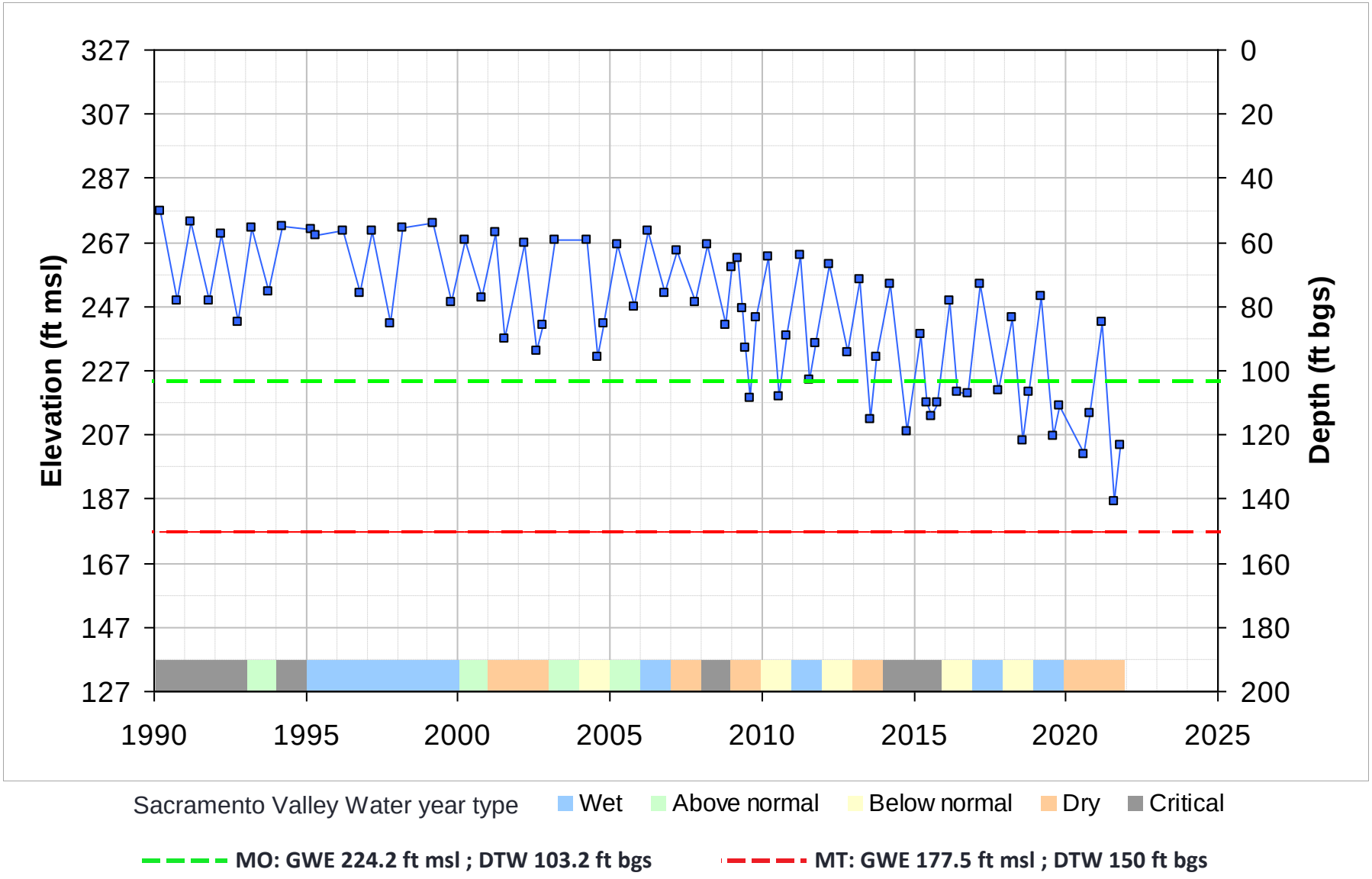
LSCE

RB-5U (Red Bluff Subbasin - Upper Aquifer)

SWN: 25N03W19N001M

Well Depth (ft): 370; Screens (ft bgs): 135 - 358

Well Type: Irrigation



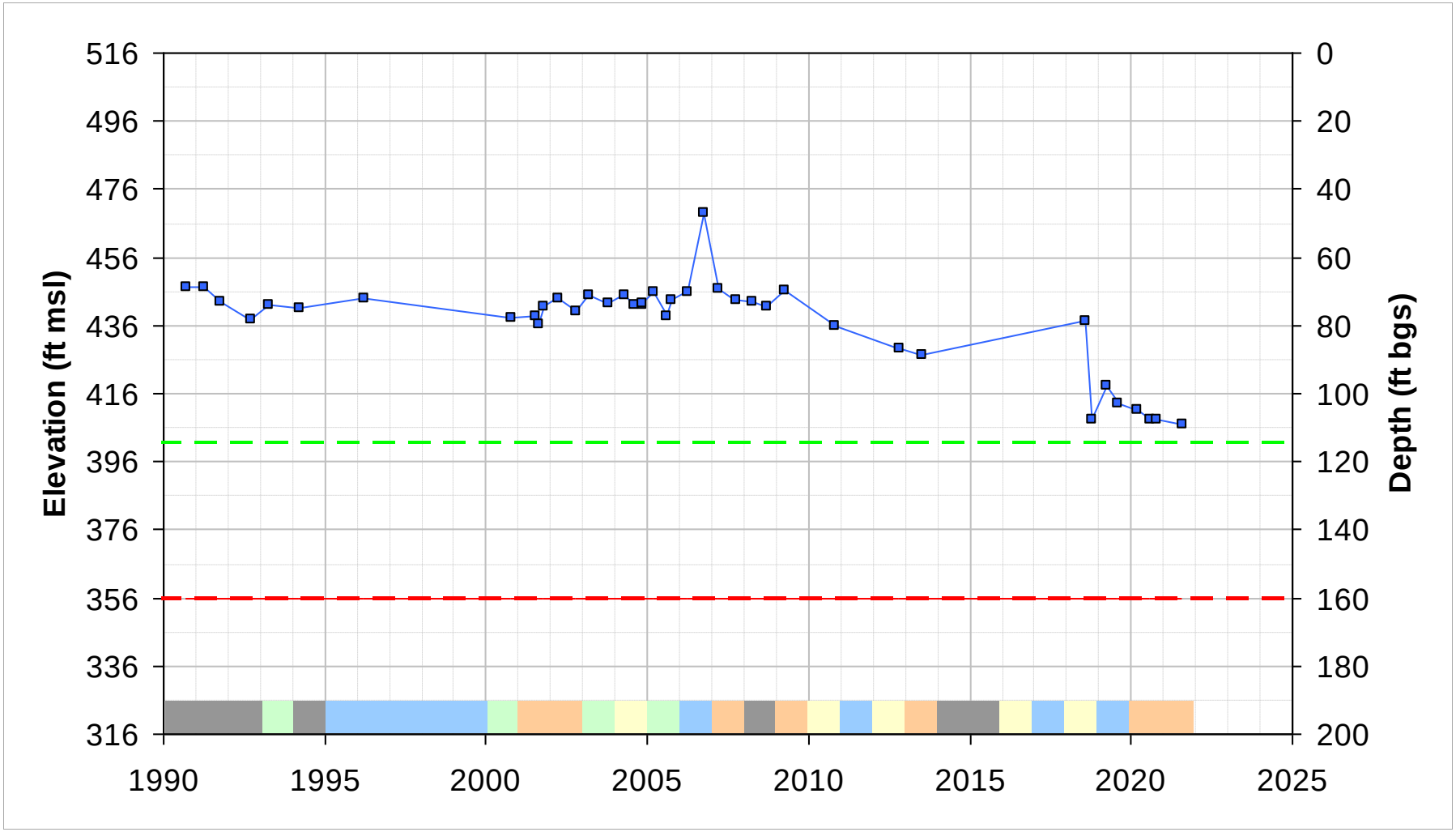
LSCE

RB-6U (Red Bluff Subbasin - Upper Aquifer)

SWN: 25N05W24D001M

Well Depth (ft): 183; Screens (ft bgs): 143 - 183

Well Type: Industrial



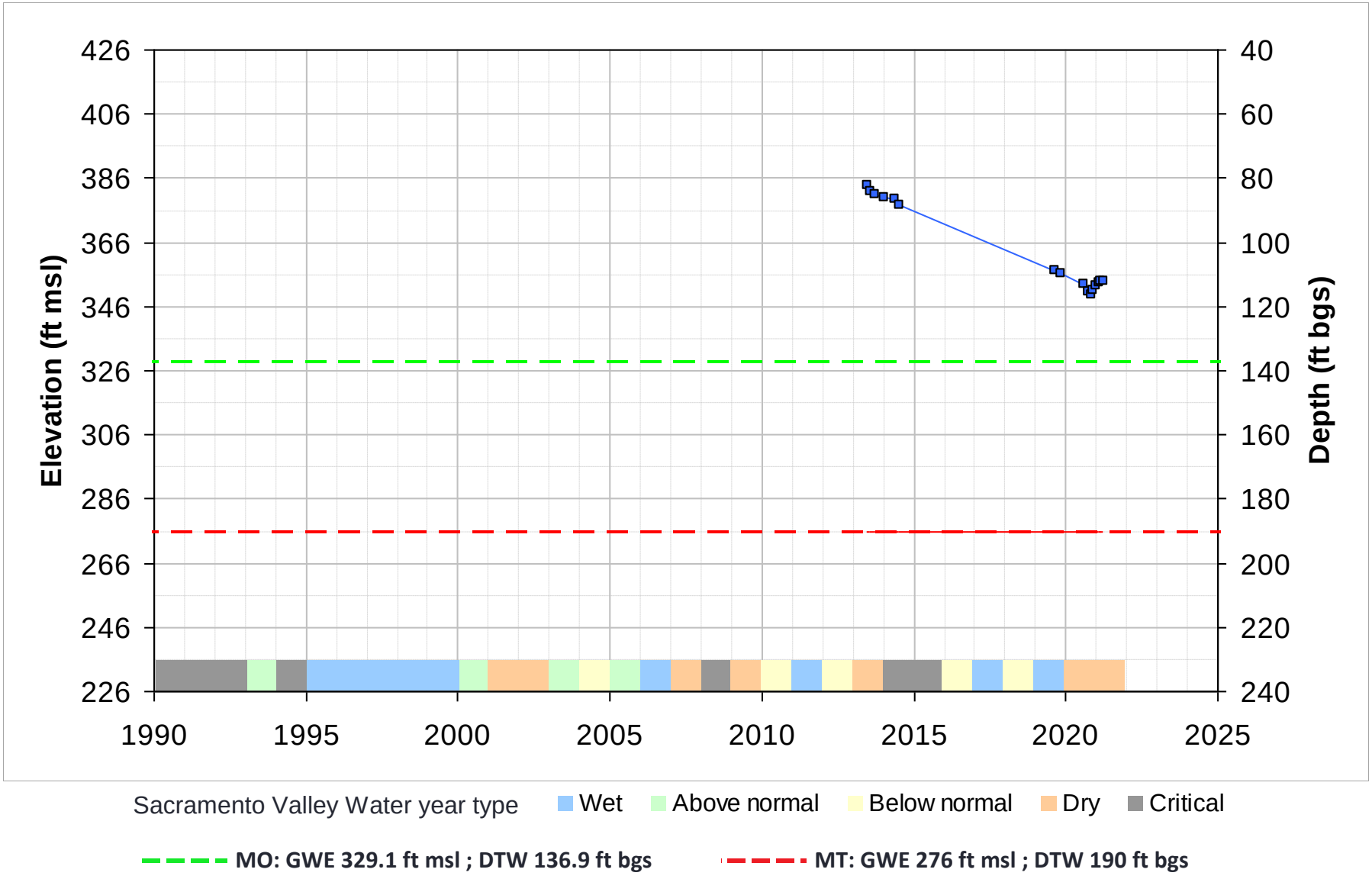
LSCE

RB-7U (Red Bluff Subbasin - Upper Aquifer)

SWN: NA

Well Depth (ft): 240; Screens (ft bgs): N/A

Well Type: Domestic



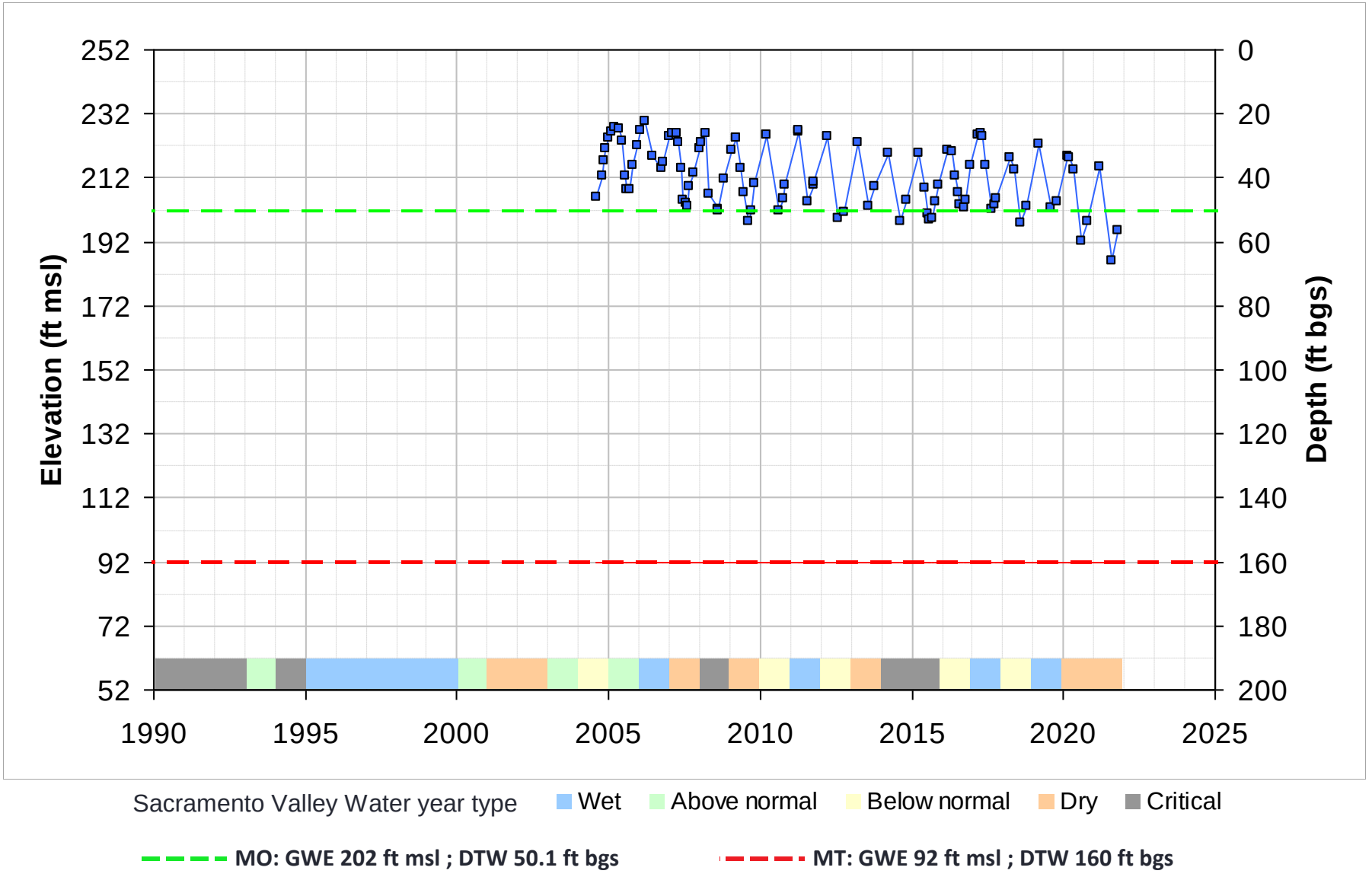
LSCE

RB-8L (Red Bluff Subbasin - Lower Aquifer)

SWN: 25N03W11B002M

Well Depth (ft): 789; Screens (ft bgs): 680 - 750

Well Type: Monitoring



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APPENDIX B

Annual Report Water Level Data

Data sources:

CA Department of Water Resources

Tehama County Flood Control and Water Conservation District

United States Geological Survey

The Nature Conservancy

LSCE

Table B-1 Water Level Data for Upper Aquifer

Well ID	Measure Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD[1]	Comments	QA_CD	Method
24N05W20K001M	3/9/2020	596.10	595.00	13.90	15.00	581.10				ST
24N05W20K001M	3/18/2021	596.10	595.00	12.00	13.10	583.00				ST
24N05W20K001M	8/6/2021	596.10	595.00	26.00	27.10	569.00				ST
24N05W20K001M	10/15/2021	596.10	595.00	27.30	28.40	567.70				ST
25N02W30G001M	3/9/2020	228.73	228.43	40.80	41.10	187.63				ES
25N02W30G001M	8/4/2020	228.73	228.43	42.55	42.85	185.88				ES
25N02W30G001M	10/12/2020	228.73	228.43	42.90	43.20	185.53				ES
25N02W30G001M	3/16/2021	228.73	228.43	41.55	41.85	186.88				ES
25N02W30G001M	8/3/2021	228.73	228.43	43.60	43.90	184.83				ES
25N02W30G001M	10/12/2021	228.73	228.43	43.45	43.75	184.98				ES
25N02W31G002M	3/9/2020	224.00	223.00	27.60	28.60	195.40				ST
25N02W31G002M	8/5/2020	224.00	223.00	35.20	36.20	187.80				ST
25N02W31G002M	10/13/2020	224.00	223.00	32.90	33.90	190.10				ST
25N02W31G002M	3/19/2021	224.00	223.00	29.10	30.10	193.90				ST
25N02W31G002M	8/4/2021	224.00	223.00	37.40	38.40	185.60	8			ST
25N03W08E001M	3/9/2020	317.45	317.45	62.90	62.90	254.55				ST
25N03W08E001M	8/6/2020	317.45	317.45	115.10	115.10	202.35	2			ST
25N03W08E001M	10/12/2020	317.45	317.45	90.00	90.00	227.45	2			ST
25N03W08E001M	3/16/2021	317.45	317.45	59.10	59.10	258.35				ST
25N03W08E001M	8/4/2021	317.45	317.45	113.70	113.70	203.75	6			ST
25N03W08E001M	10/12/2021	317.45	317.45	99.10	99.10	218.35				ST
25N03W10L001M	2/27/2020	278.43	276.43	56.40	58.40	220.03		NB		ES
25N03W10L001M	3/11/2020	278.43	276.43	54.40	56.40	222.03		NB		ES

[1]WL QM CD: 1-Pumping, 2-Nearby pump operating, 3-Casing leaking or wet, 4-Pumped recently, 6-Other, 8-Oil or foreign substance in casing

Table B-1 Water Level Data for Upper Aquifer										
Well ID	Measure Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD[1]	Comments	QA_CD	Method
25N03W10L001M	5/5/2020	278.43	276.43	74.80	76.80	201.63				ES
25N03W10L001M	10/15/2020	278.43	276.43	88.19	90.19	188.24				ES
25N03W10L001M	3/17/2021	278.43	276.43	54.96	56.96	221.47				ES
25N03W10L001M	8/2/2021	278.43	276.43	-2.00	0.00	278.43				ES
25N03W10L001M	10/22/2021	278.43	276.43	81.78	83.78	194.65				ES
25N03W10L003M	2/27/2020	277.73	276.43	52.80	54.10	223.63		NB		ES
25N03W10L003M	3/11/2020	277.73	276.43	53.00	54.30	223.43		NB		ES
25N03W10L003M	5/5/2020	277.73	276.43	71.30	72.60	205.13				ES
25N03W10L003M	8/3/2020	277.73	276.43	103.49	104.79	172.94				ES
25N03W10L003M	10/15/2020	277.73	276.43	84.90	86.20	191.53				ES
25N03W10L003M	3/17/2021	277.73	276.43	52.70	54.00	223.73				ES
25N03W10L003M	8/2/2021	277.73	276.43	109.95	111.25	166.48				ES
25N03W10L003M	10/22/2021	277.73	276.43	82.57	83.87	193.86				ES
25N03W10L004M	2/27/2020	277.73	276.43	30.80	32.10	245.63		NB		ES
25N03W10L004M	3/11/2020	277.73	276.43	27.60	28.90	248.83		NB		ES
25N03W10L004M	5/5/2020	277.73	276.43	34.22	35.52	242.21				ES
25N03W10L004M	8/3/2020	277.73	276.43	41.80	43.10	234.63				ES
25N03W10L004M	10/15/2020	277.73	276.43	43.22	44.52	233.21				ES
25N03W10L004M	3/17/2021	277.73	276.43	36.74	38.04	239.69				ES
25N03W10L004M	8/2/2021	277.73	276.43	44.46	45.76	231.97				ES
25N03W10L004M	10/22/2021	277.73	276.43	45.40	46.70	231.03				ES
25N03W10L005M	2/27/2020	277.53	276.43	29.40	30.50	247.03		NB		ES
25N03W10L005M	3/11/2020	277.53	276.43	29.30	30.40	247.13		NB		ES

[1]WL QM CD: 1-Pumping, 2-Nearby pump operating, 3-Casing leaking or wet, 4-Pumped recently, 6-Other, 8-Oil or foreign substance in casing

Table B-1 Water Level Data for Upper Aquifer										
Well ID	Measure Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD[1]	Comments	QA_CD	Method
25N03W10L005M	5/5/2020	277.53	276.43	33.21	34.31	243.22				ES
25N03W10L005M	8/3/2020	277.53	276.43	38.45	39.55	237.98				ES
25N03W10L005M	10/15/2020	277.53	276.43	38.05	39.15	238.38				ES
25N03W10L005M	3/17/2021	277.53	276.43	34.52	35.62	241.91				ES
25N03W10L005M	8/2/2021	277.53	276.43	43.82	44.92	232.61				ES
25N03W10L005M	10/22/2021	277.53	276.43	40.90	42.00	235.53				ES
25N03W11B001M	2/28/2020	254.20	252.10	33.90	36.00	218.20		NB		ES
25N03W11B001M	3/11/2020	254.20	252.10	33.00	35.10	219.10		NB		ES
25N03W11B001M	5/4/2020	254.20	252.10	48.77	50.87	203.33				ES
25N03W11B001M	8/3/2020	254.20	252.10	76.95	79.05	175.15				ES
25N03W11B001M	10/15/2020	254.20	252.10	59.91	62.01	192.19				ES
25N03W11B001M	3/17/2021	254.20	252.10	34.63	36.73	217.47				ES
25N03W11B001M	8/2/2021	254.20	252.10	81.90	84.00	170.20				ES
25N03W11B001M	10/25/2021	254.20	252.10	53.09	55.19	199.01				ES
25N03W11B002M	2/28/2020	253.93	252.03	33.20	35.10	218.83		NB		ES
25N03W11B002M	3/11/2020	253.93	252.03	33.80	35.70	218.23		NB		ES
25N03W11B002M	5/4/2020	253.93	252.03	37.35	39.25	214.68				ES
25N03W11B002M	8/3/2020	253.93	252.03	59.85	61.75	192.18				ES
25N03W11B002M	10/15/2020	253.93	252.03	53.76	55.66	198.27				ES
25N03W11B002M	3/17/2021	253.93	252.03	36.70	38.60	215.33				ES
25N03W11B002M	8/2/2021	253.93	252.03	66.08	67.98	185.95				ES
25N03W11B002M	10/25/2021	253.93	252.03	56.53	58.43	195.50				ES
25N03W11B003M	2/28/2020	253.65	252.05	32.70	34.30	219.35		NB		ES

[1]WL QM CD: 1-Pumping, 2-Nearby pump operating, 3-Casing leaking or wet, 4-Pumped recently, 6-Other, 8-Oil or foreign substance in casing

Table B-1 Water Level Data for Upper Aquifer

Well ID	Measure Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD[1]	Comments	QA_CD	Method
25N03W11B003M	3/11/2020	253.65	252.05	36.40	38.00	215.65		NB		ES
25N03W11B003M	5/4/2020	253.65	252.05	42.24	43.84	209.81				ES
25N03W11B003M	8/3/2020	253.65	252.05	93.86	95.46	158.19				ES
25N03W11B003M	10/15/2020	253.65	252.05	66.04	67.64	186.01				ES
25N03W11B003M	3/17/2021	253.65	252.05	39.00	40.60	213.05				ES
25N03W11B003M	8/2/2021	253.65	252.05	102.42	104.02	149.63				ES
25N03W11B003M	10/25/2021	253.65	252.05	64.50	66.10	187.55				ES
25N03W11F001M	3/10/2020	258.43	258.43	42.40	42.40	216.03	8			ST
25N03W11F001M	8/4/2020	258.43	258.43	113.70	113.70	144.73	8			ST
25N03W11F001M	3/16/2021	258.43	258.43	46.30	46.30	212.13	8			ST
25N03W11F001M	8/4/2021	258.43	258.43	105.00	105.00	153.43	8			ST
25N03W11F001M	10/12/2021	258.43	258.43	75.00	75.00	183.43				ST
25N03W15A001M	3/10/2020	269.63	268.93	49.90	50.60	219.03				ST
25N03W15A001M	8/4/2020	269.63	268.93	103.40	104.10	165.53	3			ST
25N03W15A001M	10/13/2020	269.63	268.93	87.50	88.20	181.43	3			ST
25N03W15A001M	3/16/2021	269.63	268.93	52.00	52.70	216.93				ST
25N03W15A001M	8/4/2021	269.63	268.93	95.30	96.00	173.63				ST
25N03W15A001M	10/12/2021	269.63	268.93	87.30	88.00	181.63				ST
25N03W19N001M	3/9/2020	328.09	327.49	87.75	88.35	239.74	2			ES
25N03W19N001M	8/6/2020	328.09	327.49	126.30	126.90	201.19				ES
25N03W19N001M	10/12/2020	328.09	327.49	113.10	113.70	214.39				ES
25N03W19N001M	3/16/2021	328.09	327.49	84.70	85.30	242.79				ES
25N03W19N001M	8/6/2021	328.09	327.49	140.60	141.20	186.89				ES

[1]WL QM CD: 1-Pumping, 2-Nearby pump operating, 3-Casing leaking or wet, 4-Pumped recently, 6-Other, 8-Oil or foreign substance in casing

Table B-1 Water Level Data for Upper Aquifer

Well ID	Measure Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD[1]	Comments	QA_CD	Method
25N03W19N001M	10/12/2021	328.09	327.49	123.05	123.65	204.44				ES
25N03W22L001M	3/10/2020	277.95	277.45	60.60	61.10	216.85				ST
25N03W22L001M	8/4/2020	277.95	277.45	94.00	94.50	183.45				ST
25N03W22L001M	10/12/2020	277.95	277.45	89.70	90.20	187.75				ST
25N03W22L001M	3/16/2021	277.95	277.45	60.60	61.10	216.85				ST
25N03W22L001M	8/4/2021	277.95	277.45	99.60	100.10	177.85				ST
25N03W22L001M	10/12/2021	277.95	277.45	89.40	89.90	188.05				ST
26N02W17E001M	3/10/2020	241.41	240.41	18.30	19.30	222.11				ST
26N02W17E001M	10/14/2020	241.41	240.41	19.70	20.70	220.71				ST
26N02W17E001M	3/15/2021	241.41	240.41	19.20	20.20	221.21				ST
26N02W17E001M	10/11/2021	241.41	240.41	20.70	21.70	219.71				ST
26N02W29R001M	3/10/2020	234.00	230.40	5.00	8.60	225.40				ES
26N02W29R001M	8/4/2020	234.00	230.40	5.00	8.60	225.40				ES
26N02W29R001M	9/4/2020	234.00	230.40	4.97	8.57	225.43				ES
26N02W29R001M	9/11/2020	234.00	230.40	5.20	8.80	225.20				ES
26N02W29R001M	9/18/2020	234.00	230.40	5.10	8.70	225.30				ES
26N02W29R001M	9/23/2020	234.00	230.40	5.20	8.80	225.20				ES
26N02W29R001M	10/2/2020	234.00	230.40	5.10	8.70	225.30				ES
26N02W29R001M	10/9/2020	234.00	230.40	5.10	8.70	225.30				ES
26N02W29R001M	10/16/2020	234.00	230.40	5.10	8.70	225.30				ES
26N02W29R001M	10/23/2020	234.00	230.40	5.10	8.70	225.30				ES
26N02W29R001M	10/30/2020	234.00	230.40	5.10	8.70	225.30				ES
26N02W29R001M	11/6/2020	234.00	230.40	5.15	8.75	225.25				ES

[1]WL QM CD: 1-Pumping, 2-Nearby pump operating, 3-Casing leaking or wet, 4-Pumped recently, 6-Other, 8-Oil or foreign substance in casing

Table B-1 Water Level Data for Upper Aquifer										
Well ID	Measure Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD[1]	Comments	QA_CD	Method
26N02W29R001M	1/13/2021	234.00	230.40	5.15	8.75	225.25				ES
26N02W29R001M	3/15/2021	234.00	230.40	5.20	8.80	225.20				ES
26N02W29R001M	7/8/2021	234.00	230.40	5.30	8.90	225.10				ES
26N02W29R001M	7/12/2021	234.00	230.40	6.00	9.60	224.40				ES
26N02W29R001M	7/16/2021	234.00	230.40	6.30	9.90	224.10				ES
26N02W29R001M	7/20/2021	234.00	230.40	5.30	8.90	225.10				ES
26N02W29R001M	7/23/2021	234.00	230.40	5.40	9.00	225.00				ES
26N02W29R001M	7/26/2021	234.00	230.40	5.30	8.90	225.10				ES
26N02W29R001M	7/30/2021	234.00	230.40	5.30	8.90	225.10				ES
26N02W29R001M	8/3/2021	234.00	230.40	5.40	9.00	225.00				ES
26N02W29R001M	8/5/2021	234.00	230.40	5.30	8.90	225.10				ES
26N02W29R001M	8/11/2021	234.00	230.40	5.10	8.70	225.30				ES
26N02W29R001M	8/20/2021	234.00	230.40	5.40	9.00	225.00				ES
26N02W29R001M	8/27/2021	234.00	230.40	5.30	8.90	225.10				ES
26N02W29R001M	9/3/2021	234.00	230.40	5.30	8.90	225.10				ES
26N02W29R001M	9/10/2021	234.00	230.40	5.40	9.00	225.00				ES
26N02W29R001M	9/14/2021	234.00	230.40	5.40	9.00	225.00				ES
26N02W29R001M	9/17/2021	234.00	230.40	5.30	8.90	225.10				ES
26N02W29R001M	9/24/2021	234.00	230.40	5.40	9.00	225.00				ES
26N02W29R001M	9/28/2021	234.00	230.40	5.50	9.10	224.90				ES
26N02W29R001M	9/30/2021	234.00	230.40	5.40	9.00	225.00				ES
26N02W29R001M	10/7/2021	234.00	230.40	5.30	8.90	225.10				ES
26N02W29R001M	10/15/2021	234.00	230.40	5.30	8.90	225.10				ES

[1]WL QM CD: 1-Pumping, 2-Nearby pump operating, 3-Casing leaking or wet, 4-Pumped recently, 6-Other, 8-Oil or foreign substance in casing

Table B-1 Water Level Data for Upper Aquifer										
Well ID	Measure Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD[1]	Comments	QA_CD	Method
26N02W29R002M	3/10/2020	234.20	230.40	5.65	9.45	224.75				ES
26N02W29R002M	8/4/2020	234.20	230.40	13.30	17.10	217.10				ES
26N02W29R002M	9/4/2020	234.20	230.40	14.82	18.62	215.58				ES
26N02W29R002M	9/11/2020	234.20	230.40	15.10	18.90	215.30				ES
26N02W29R002M	9/18/2020	234.20	230.40	15.00	18.80	215.40				ES
26N02W29R002M	9/23/2020	234.20	230.40	14.90	18.70	215.50				ES
26N02W29R002M	10/2/2020	234.20	230.40	14.75	18.55	215.65				ES
26N02W29R002M	10/9/2020	234.20	230.40	14.45	18.25	215.95				ES
26N02W29R002M	10/16/2020	234.20	230.40	14.20	18.00	216.20				ES
26N02W29R002M	10/23/2020	234.20	230.40	14.10	17.90	216.30				ES
26N02W29R002M	10/30/2020	234.20	230.40	14.05	17.85	216.35				ES
26N02W29R002M	11/6/2020	234.20	230.40	13.20	17.00	217.20				ES
26N02W29R002M	1/13/2021	234.20	230.40	9.70	13.50	220.70				ES
26N02W29R002M	3/15/2021	234.20	230.40	7.45	11.25	222.95				ES
26N02W29R002M	7/8/2021	234.20	230.40	15.30	19.10	215.10				ES
26N02W29R002M	7/12/2021	234.20	230.40	17.40	21.20	213.00				ES
26N02W29R002M	7/16/2021	234.20	230.40	17.80	21.60	212.60				ES
26N02W29R002M	7/20/2021	234.20	230.40	17.40	21.20	213.00				ES
26N02W29R002M	7/23/2021	234.20	230.40	17.50	21.30	212.90				ES
26N02W29R002M	7/26/2021	234.20	230.40	18.00	21.80	212.40				ES
26N02W29R002M	7/30/2021	234.20	230.40	18.90	22.70	211.50				ES
26N02W29R002M	8/3/2021	234.20	230.40	18.30	22.10	212.10				ES
26N02W29R002M	8/5/2021	234.20	230.40	18.30	22.10	212.10				ES

[1]WL QM CD: 1-Pumping, 2-Nearby pump operating, 3-Casing leaking or wet, 4-Pumped recently, 6-Other, 8-Oil or foreign substance in casing

Table B-1 Water Level Data for Upper Aquifer

Well ID	Measure Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD[1]	Comments	QA_CD	Method
26N02W29R002M	8/11/2021	234.20	230.40	18.60	22.40	211.80				ES
26N02W29R002M	8/20/2021	234.20	230.40	18.80	22.60	211.60				ES
26N02W29R002M	8/27/2021	234.20	230.40	18.70	22.50	211.70				ES
26N02W29R002M	9/3/2021	234.20	230.40	18.60	22.40	211.80				ES
26N02W29R002M	9/10/2021	234.20	230.40	18.30	22.10	212.10				ES
26N02W29R002M	9/14/2021	234.20	230.40	18.00	21.80	212.40				ES
26N02W29R002M	9/17/2021	234.20	230.40	17.90	21.70	212.50				ES
26N02W29R002M	9/24/2021	234.20	230.40	17.70	21.50	212.70				ES
26N02W29R002M	9/28/2021	234.20	230.40	17.40	21.20	213.00				ES
26N02W29R002M	9/30/2021	234.20	230.40	17.10	20.90	213.30				ES
26N02W29R002M	10/7/2021	234.20	230.40	17.20	21.00	213.20				ES
26N02W29R002M	10/15/2021	234.20	230.40	17.00	20.80	213.40				ES
26N03W17B001M	3/13/2020	310.13	309.43	66.60	67.30	242.83	4			ST
26N03W17B001M	8/5/2021	310.13	309.43	77.12	77.82	232.31	1			ES
26N03W17B001M	10/13/2021	310.13	309.43	71.40	72.10	238.03				ES
26N03W24M001M	3/11/2020	246.91	246.41	22.50	23.00	223.91				ES
26N03W24M001M	8/5/2020	246.91	246.41	48.24	48.74	198.17				ES
26N03W24M001M	10/13/2020	246.91	246.41	38.35	38.85	208.06				ES
26N03W24M001M	3/16/2021	246.91	246.41	28.30	28.80	218.11				ES
26N03W24M001M	8/5/2021	246.91	246.41	51.52	52.02	194.89				ES
26N03W24M001M	10/13/2021	246.91	246.41	42.74	43.24	203.67				ES
26N03W34P001M	3/10/2020	275.33	275.33	54.00	54.00	221.33				ST
26N03W34P001M	8/5/2020	275.33	275.33	86.00	86.00	189.33				ST

[1]WL QM CD: 1-Pumping, 2-Nearby pump operating, 3-Casing leaking or wet, 4-Pumped recently, 6-Other, 8-Oil or foreign substance in casing

Table B-1 Water Level Data for Upper Aquifer

Well ID	Measure Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD[1]	Comments	QA_CD	Method
26N03W34P001M	10/13/2020	275.33	275.33	84.70	84.70	190.63	3			ST
26N03W34P001M	3/16/2021	275.33	275.33	56.00	56.00	219.33				ST
26N03W34P001M	8/5/2021	275.33	275.33	83.00	83.00	192.33	3			ST
26N03W34P001M	10/13/2021	275.33	275.33	64.80	64.80	210.53				ST
26N04W01L001M	3/9/2020	373.45	372.45	119.70	120.70	252.75				ST
26N04W25J001M	3/9/2020	334.46	333.46	63.75	64.75	269.71				ES
26N04W25J001M	3/16/2021	334.46	333.46	69.85	70.85	263.61				ES
26N04W25J001M	8/5/2021	334.46	333.46	77.46	78.46	256.00				ES
26N04W25J001M	10/13/2021	334.46	333.46	76.42	77.42	257.04				ES
26N04W26K001M	3/9/2020	363.58	362.48	99.20	100.30	263.28	8			ST
26N04W26K001M	10/13/2020	363.58	362.48	107.80	108.90	254.68				ST
26N04W26K001M	3/16/2021	363.58	362.48	95.80	96.90	266.68	8			ST
27N03W28D002M	3/9/2020	263.20	263.00	31.90	32.10	231.10	8			ST
27N03W28D002M	10/14/2020	263.20	263.00	32.30	32.50	230.70	8			ST
27N03W28D002M	3/15/2021	263.20	263.00	33.60	33.80	229.40	8			ST
27N03W28D002M	8/4/2021	263.20	263.00	60.70	60.90	202.30				ST
27N03W28D002M	10/11/2021	263.20	263.00	52.30	52.50	210.70	8			ST
27N03W33A002M	3/9/2020	258.50	258.00	26.50	27.00	231.50				ST
27N03W33A002M	8/5/2020	258.50	258.00	42.20	42.70	215.80				ST
27N03W33A002M	3/15/2021	258.50	258.00	27.30	27.80	230.70				ST
27N03W33A002M	8/4/2021	258.50	258.00	44.20	44.70	213.80	8			ST
27N03W33A002M	10/11/2021	258.50	258.00	39.70	40.20	218.30	6			ST
27N03W36C002M	3/15/2021	261.60	261.00	26.50	27.10	234.50				ES

[1]WL QM CD: 1-Pumping, 2-Nearby pump operating, 3-Casing leaking or wet, 4-Pumped recently, 6-Other, 8-Oil or foreign substance in casing

Table B-1 Water Level Data for Upper Aquifer

Well ID	Measure Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD[1]	Comments	QA_CD	Method
27N03W36C002M	8/4/2021	261.60	261.00	33.01	33.61	227.99				ES
27N04W05G002M	3/9/2020	483.83	482.53	46.10	47.40	436.43				ST
27N04W05G002M	3/16/2021	483.83	482.53	48.20	49.50	434.33				ST
27N04W05G002M	8/5/2021	483.83	482.53	61.70	63.00	420.83				ST
27N04W05G002M	10/13/2021	483.83	482.53	57.20	58.50	425.33				ST
27N04W07B001M	3/9/2020	603.55	602.55	141.00	142.00	461.55				ST
27N04W07B001M	8/5/2020	603.55	602.55	143.60	144.60	458.95	1			ST
27N04W07B001M	3/16/2021	603.55	602.55	144.50	145.50	458.05				ST
27N04W07B001M	8/5/2021	603.55	602.55	146.90	147.90	455.65				ST
27N04W07B001M	10/13/2021	603.55	602.55	150.30	151.30	452.25				ST
27N04W26D001M	8/16/2020	395.20	395.00	69.60	69.80	325.40				ST
27N04W26D001M	4/12/2021	395.20	395.00	64.80	65.00	330.20				ST
27N04W26D001M	7/28/2021	395.20	395.00	70.80	71.00	324.20				ST
27N04W26D001M	10/19/2021	395.20	395.00	71.30	71.50	323.70				ST
27N04W26J002M	3/11/2020	313.00	309.00	61.70	65.70	247.30				ES
27N04W26J002M	8/7/2020	313.00	309.00	82.85	86.85	226.15				ES
27N04W26J002M	10/13/2020	313.00	309.00	82.80	86.80	226.20				ES
27N04W26J002M	3/17/2021	313.00	309.00	65.30	69.30	243.70				ES
27N04W26J002M	7/28/2021	313.00	309.00	89.55	93.55	219.45				ES
27N04W26J002M	8/3/2021	313.00	309.00	89.00	93.00	220.00				ES
27N04W26J002M	10/14/2021	313.00	309.00	86.65	90.65	222.35				ES
27N04W35E001M	3/9/2020	439.47	438.47	117.05	118.05	321.42				ES
27N04W35E001M	3/16/2021	439.47	438.47	118.75	119.75	319.72				ES

[1]WL QM CD: 1-Pumping, 2-Nearby pump operating, 3-Casing leaking or wet, 4-Pumped recently, 6-Other, 8-Oil or foreign substance in casing

Table B-1 Water Level Data for Upper Aquifer

Well ID	Measure Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD[1]	Comments	QA_CD	Method
27N04W35E001M	8/5/2021	439.47	438.47	144.22	145.22	294.25				ES
27N04W35E001M	10/13/2021	439.47	438.47	137.25	138.25	301.22				ES
27N04W36G001M	3/10/2020	364.24	362.44	112.88	114.68	249.56				ST
27N04W36G001M	8/5/2020	364.24	362.44	116.64	118.44	245.80				ST
27N04W36G001M	10/13/2020	364.24	362.44	117.61	119.41	244.83				ST
27N04W36G001M	3/16/2021	364.24	362.44	115.15	116.95	247.29				ST
27N04W36G001M	7/28/2021	364.24	362.44	119.76	121.56	242.68				ST
27N04W36G001M	8/4/2021	364.24	362.44	119.89	121.69	242.55				ST
27N04W36G001M	10/12/2021	364.24	362.44	120.32	122.12	242.12				ST
28N03W28G002M	3/9/2020	341.35	340.00	27.45	28.80	312.55	6	Cascading		ST
28N03W28G002M	8/5/2020	341.35	340.00	33.95	35.30	306.05	3			ST
28N03W28G002M	3/16/2021	341.35	340.00	22.25	23.60	317.75	3			ST
28N03W28G002M	7/28/2021	341.35	340.00	45.85	47.20	294.15				ES
28N04W16G001M	3/13/2020	603.73	602.53	191.42	192.62	411.11				ES
28N04W16G001M	8/4/2020	603.73	602.53	193.50	194.70	409.03				ES
28N04W16G001M	10/13/2020	603.73	602.53	193.67	194.87	408.86				ES
28N04W16G001M	3/22/2021	603.73	602.53	191.60	192.80	410.93				ES
28N04W16G001M	7/28/2021	603.73	602.53	194.64	195.84	407.89				ES
28N04W16G001M	8/3/2021	603.73	602.53	195.26	196.46	407.27				ES
28N04W16G001M	10/11/2021	603.73	602.53	194.98	196.18	407.55				ES
Thomes Creek Well	8/12/2020		466			113.2				
Thomes Creek Well	10/2/2020		466			115.2				
Thomes Creek Well	10/31/2020		466			116.3				

[1]WL QM CD: 1-Pumping, 2-Nearby pump operating, 3-Casing leaking or wet, 4-Pumped recently, 6-Other, 8-Oil or foreign substance in casing

Table B-1 Water Level Data for Upper Aquifer										
Well ID	Measure Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD[1]	Comments	QA_CD	Method
Thomes Creek Well	11/28/2020		466			114.7				
Thomes Creek Well	1/2/2021		466			113.3				
Thomes Creek Well	1/30/2021		466			112.3				
Thomes Creek Well	2/27/2021		466			112.2				
Thomes Creek Well	4/4/2021		466			112.2				

[1]WL QM CD: 1-Pumping, 2-Nearby pump operating, 3-Casing leaking or wet, 4-Pumped recently, 6-Other, 8-Oil or foreign substance in casing

Table B-2 Water Level Data for Lower Aquifer										
State Well Number	Measure. Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD	Comments	QA_CD	Method
25N03W10L003M	2/27/2020	277.73	276.43	52.80	54.10	223.63		NB		ES
25N03W10L003M	3/11/2020	277.73	276.43	53.00	54.30	223.43		NB		ES
25N03W10L003M	5/5/2020	277.73	276.43	71.30	72.60	205.13				ES
25N03W10L003M	8/3/2020	277.73	276.43	103.49	104.79	172.94				ES
25N03W10L003M	10/15/2020	277.73	276.43	84.90	86.20	191.53				ES
25N03W10L003M	3/17/2021	277.73	276.43	52.70	54.00	223.73				ES
25N03W10L003M	8/2/2021	277.73	276.43	109.95	111.25	166.48				ES
25N03W10L003M	10/22/2021	277.73	276.43	82.57	83.87	193.86				ES
25N03W11B002M	2/28/2020	253.93	252.03	33.20	35.10	218.83		NB		ES
25N03W11B002M	3/11/2020	253.93	252.03	33.80	35.70	218.23		NB		ES
25N03W11B002M	5/4/2020	253.93	252.03	37.35	39.25	214.68				ES
25N03W11B002M	8/3/2020	253.93	252.03	59.85	61.75	192.18				ES
25N03W11B002M	10/15/2020	253.93	252.03	53.76	55.66	198.27				ES
25N03W11B002M	3/17/2021	253.93	252.03	36.70	38.60	215.33				ES
25N03W11B002M	8/2/2021	253.93	252.03	66.08	67.98	185.95				ES
25N03W11B002M	10/25/2021	253.93	252.03	56.53	58.43	195.50				ES
25N03W11B003M	2/28/2020	253.65	252.05	32.70	34.30	219.35		NB		ES
25N03W11B003M	3/11/2020	253.65	252.05	36.40	38.00	215.65		NB		ES
25N03W11B003M	5/4/2020	253.65	252.05	42.24	43.84	209.81				ES
25N03W11B003M	8/3/2020	253.65	252.05	93.86	95.46	158.19				ES
25N03W11B003M	10/15/2020	253.65	252.05	66.04	67.64	186.01				ES
25N03W11B003M	3/17/2021	253.65	252.05	39.00	40.60	213.05				ES
25N03W11B003M	8/2/2021	253.65	252.05	102.42	104.02	149.63				ES
25N03W11B003M	10/25/2021	253.65	252.05	64.50	66.10	187.55				ES

Table B-2 Water Level Data for Lower Aquifer										
State Well Number	Measure. Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD	Comments	QA_CD	Method
26N02W29R002M	3/10/2020	234.20	230.40	5.65	9.45	224.75				ES
26N02W29R002M	8/4/2020	234.20	230.40	13.30	17.10	217.10				ES
26N02W29R002M	9/4/2020	234.20	230.40	14.82	18.62	215.58				ES
26N02W29R002M	9/11/2020	234.20	230.40	15.10	18.90	215.30				ES
26N02W29R002M	9/18/2020	234.20	230.40	15.00	18.80	215.40				ES
26N02W29R002M	9/23/2020	234.20	230.40	14.90	18.70	215.50				ES
26N02W29R002M	10/2/2020	234.20	230.40	14.75	18.55	215.65				ES
26N02W29R002M	10/9/2020	234.20	230.40	14.45	18.25	215.95				ES
26N02W29R002M	10/16/2020	234.20	230.40	14.20	18.00	216.20				ES
26N02W29R002M	10/23/2020	234.20	230.40	14.10	17.90	216.30				ES
26N02W29R002M	10/30/2020	234.20	230.40	14.05	17.85	216.35				ES
26N02W29R002M	11/6/2020	234.20	230.40	13.20	17.00	217.20				ES
26N02W29R002M	1/13/2021	234.20	230.40	9.70	13.50	220.70				ES
26N02W29R002M	3/15/2021	234.20	230.40	7.45	11.25	222.95				ES
26N02W29R002M	7/8/2021	234.20	230.40	15.30	19.10	215.10				ES
26N02W29R002M	7/12/2021	234.20	230.40	17.40	21.20	213.00				ES
26N02W29R002M	7/16/2021	234.20	230.40	17.80	21.60	212.60				ES
26N02W29R002M	7/20/2021	234.20	230.40	17.40	21.20	213.00				ES
26N02W29R002M	7/23/2021	234.20	230.40	17.50	21.30	212.90				ES
26N02W29R002M	7/26/2021	234.20	230.40	18.00	21.80	212.40				ES
26N02W29R002M	7/30/2021	234.20	230.40	18.90	22.70	211.50				ES
26N02W29R002M	8/3/2021	234.20	230.40	18.30	22.10	212.10				ES
26N02W29R002M	8/5/2021	234.20	230.40	18.30	22.10	212.10				ES
26N02W29R002M	8/11/2021	234.20	230.40	18.60	22.40	211.80				ES

Table B-2 Water Level Data for Lower Aquifer										
State Well Number	Measure. Date	RPE (ft amsl)	GSE (ft amsl)	DTW (ft bgs)	DTW (ft brp)	WSE (ft amsl)	WL QM CD	Comments	QA_CD	Method
26N02W29R002M	8/20/2021	234.20	230.40	18.80	22.60	211.60				ES
26N02W29R002M	8/27/2021	234.20	230.40	18.70	22.50	211.70				ES
26N02W29R002M	9/3/2021	234.20	230.40	18.60	22.40	211.80				ES
26N02W29R002M	9/10/2021	234.20	230.40	18.30	22.10	212.10				ES
26N02W29R002M	9/14/2021	234.20	230.40	18.00	21.80	212.40				ES
26N02W29R002M	9/17/2021	234.20	230.40	17.90	21.70	212.50				ES
26N02W29R002M	9/24/2021	234.20	230.40	17.70	21.50	212.70				ES
26N02W29R002M	9/28/2021	234.20	230.40	17.40	21.20	213.00				ES
26N02W29R002M	9/30/2021	234.20	230.40	17.10	20.90	213.30				ES
26N02W29R002M	10/7/2021	234.20	230.40	17.20	21.00	213.20				ES
26N02W29R002M	10/15/2021	234.20	230.40	17.00	20.80	213.40				ES