Salinas Valley Groundwater Basin
Upper Valley Aquifer Subbasin
Water Year 2021 Annual Report
Submitted in Support of Groundwater Sustainability Plan Implementation

Salinas Valley Basin
Groundwater Sustainability Agency

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ABBREVIATIONS AND ACRONYMS

AEM..................airborne electromagnetic
AF ....acre-feet
AF/yr. ....acre-feet per year
CAO ....County Administrative Office
CBI ....Consensus Building Institute
CCRWQCB.......Central Coast Regional Water Quality Control Board
COC ....Constituent(s) of concern
DAC ....Disadvantaged Communities
DDW ....Division of Drinking Water
D-TAC ....Drought Operations Technical Advisory Committee
DWR ....California Department of Water Resources
eWRIMS ....Electronic Water Rights Information Management System
GEMS ....Groundwater Extraction Management System
GSA...................Groundwater Sustainability Agency
GSP or Plan.......Groundwater Sustainability Plan
ILRP ....Irrigated Lands Regulatory Program
InSAR ....Interferometric Synthetic-Aperture Radar
ISW ....interconnected surface water
MCL ....Maximum Contaminant Level
MCWRA ....Monterey County Water Resources Agency
mg/L ....milligram/Liter
MOU ....Memorandum of Understanding
RMS ....Representative Monitoring Site(s)
SGMA ....Sustainable Groundwater Management Act
SLOFCWCD.....San Luis Obispo County Flood Control and Water Conservation District
SMC ....Sustainable Management Criteria/Criterion
SMCL................Secondary Maximum Contaminant Level
Subbasin ....Upper Valley Aquifer Subbasin
SVBGSA...........Salinas Valley Basin Groundwater Sustainability Agency
SVIHM..............Salinas Valley Integrated Hydrologic Model
SWRCB.............State Water Resources Control Board
WY ....Water Year

EXECUTIVE SUMMARY

The Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) is required to submit an annual report for the Upper Valley Aquifer Subbasin (Subbasin) to the California Department of Water Resources (DWR) by April 1 of each year following SVBGSA's 2022 adoption and submittal of its Groundwater Sustainability Plan (GSP or Plan). This Annual Report covers data collected through Water Year (WY) 2021, from October 1, 2019, to September 30, 2021.

As described in the GSP, DWR lists the Subbasin as a medium priority subbasin. The goal of the Upper Valley Subbasin GSP is to balance the needs of all water users in the Subbasin while complying with SGMA.

In WY 2021, groundwater conditions remained similar to conditions in recent years, with slight changes in conditions related to specific sustainability indicators. WY 2021 is classified as a dry year.

The groundwater data for WY 2021 are summarized below:

- Groundwater extractions for reporting year 2021 (November 1, 2020 through October 31, 2021) were approximately 122,300 acre-feet (AF).
- Groundwater elevations decreased slightly during this dry water year, with most wells showing elevations above their minimum thresholds but still below their measurable objectives.
- There was 1 groundwater quality constituent of concern (COC) that exceeded its minimum thresholds for the Division of Drinking Water (DDW) municipal wells in WY 2021. There were no exceedances in the Irrigated Lands Regulatory Program (ILRP) irrigation or on-farm domestic wells.
- No subsidence was detected in the Subbasin.
- SVBGSA established a monitoring network of shallow groundwater elevations for interconnected surface water (ISW). None of the monitoring wells exceeded their minimum thresholds, and 1 well surpassed the measurable objective.

SVBGSA has taken numerous actions to implement the GSP. These include:

- **Coordination and engagement** –SVBGSA worked throughout the year with the Upper Valley Aquifer Subbasin Planning Committee to develop the Upper Valley Subbasin GSP, submitted to DWR in January 2022. In addition, SVBGSA strengthened its relationship with Monterey County Water Resources Agency (MCWRA), contracted the

Consensus-Building Institute (CBI) to develop a work program for meaningful engagement with underrepresented communities, and continued to regularly engage stakeholders through its Advisory Committee and Board of Directors.

- **Data and monitoring** – including selecting one data gap to request a monitoring well through DWR's Technical Support Services and participating in DWR's planning for an airborne electromagnetic (AEM) survey across the Salinas Valley.
- **Planning activities** – during WY 2021, SVBGSA continued to draft the Upper Valley Subbasin GSP through working with the Upper Valley Aquifer Subbasin Planning Committee. SVBGSA reviewed DWR's recommended corrective action on the water quality undesirable result on the 180/400-Foot Aquifer Subbasin GSP, and addressed it in the Upper Valley Subbasin GSP.
- **Project implementation activities** – MCWRA continued to convene MCWRA's Drought Technical Advisory Committee (D-TAC).

1 INTRODUCTION

1.1 Purpose

The 2014 California Sustainable Groundwater Management Act (SGMA) requires that, following adoption of a Groundwater Sustainability Plan (GSP), Groundwater Sustainability Agencies (GSAs) annually report on the condition of the basin and show that the GSP is being implemented in a manner that will likely achieve the sustainability goal for the basin.

The sustainability goal of the Upper Valley Subbasin is to manage groundwater resources for long-term community, financial, and environmental benefits to the Subbasin's residents and businesses. The goal of this GSP is to ensure long-term viable water supplies while maintaining the unique cultural, community, and business aspects of the Subbasin. It is the express goal of this GSP to balance the needs of all water users in the Subbasin.

This report fulfills that requirement for the Salinas Valley – Upper Valley Aquifer Subbasin (Subbasin). This is the first annual report and includes monitoring data for Water Years (WY) 2020 to 2021, which is the period from October 1, 2019, to September 30, 2021. This Annual Report includes a description of basin conditions through text, hydrographs, groundwater elevation contour maps, calculated estimates of change in groundwater in storage, and maps of the distribution of groundwater extraction across the Subbasin. It compares WY 2021 data to Sustainability Management Criteria (SMC) as a measure of the Subbasin's groundwater conditions with respect to the sustainability goal that must be reached by the end of 2042.

1.2 Upper Valley Aquifer Subbasin Groundwater Sustainability Plan

In 2017, local GSA-eligible entities formed the Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) to develop and implement the GSPs for the Salinas Valley. SVBGSA is a Joint Powers Authority with membership comprising the County of Monterey, Monterey County Water Resources Agency (MCWRA), City of Salinas, City of Soledad, City of Gonzales, City of King, Castroville Community Services District, and Monterey One Water.

The SVBGSA developed the GSP for the Upper Valley Aquifer Subbasin, identified as California Department of Water Resources (DWR) subbasin 3-004.05. SVBGSA has exclusive jurisdiction of the Upper Valley Subbasin. DWR has designated the Upper Valley Subbasin as a medium priority basin, which indicates that continuation of present water management practices would probably result in significant adverse impacts.

SVBGSA developed the GSP for the Upper Valley Subbasin in concert with the 5 other Salinas Valley Subbasin GSPs that fall partially or entirely under its jurisdiction: the 180/400-Foot Aquifer Subbasin (DWR subbasin 3-004.01), the Eastside Aquifer Subbasin (DWR subbasin 3-

004.02), the Forebay Aquifer Subbasin (DWR subbasin 3-004.04), the Langley Area Subbasin (DWR subbasin 3-004.09), and the Monterey Subbasin (DWR subbasin 3-004.10). This Annual Report covers all the 237,670 acres of the Upper Valley Subbasin, as shown on Figure 1.

1.3 Organization of This Report

This Annual Report corresponds to the requirements of GSP Regulations § 356.2. The Report first outlines the subbasin conditions, including several components of the Regulations: groundwater elevations, groundwater extractions, surface water use, total water use, and change in groundwater storage. The Report then addresses GSP implementation by reporting on actions taken to implement the Plan and progress toward interim milestones.

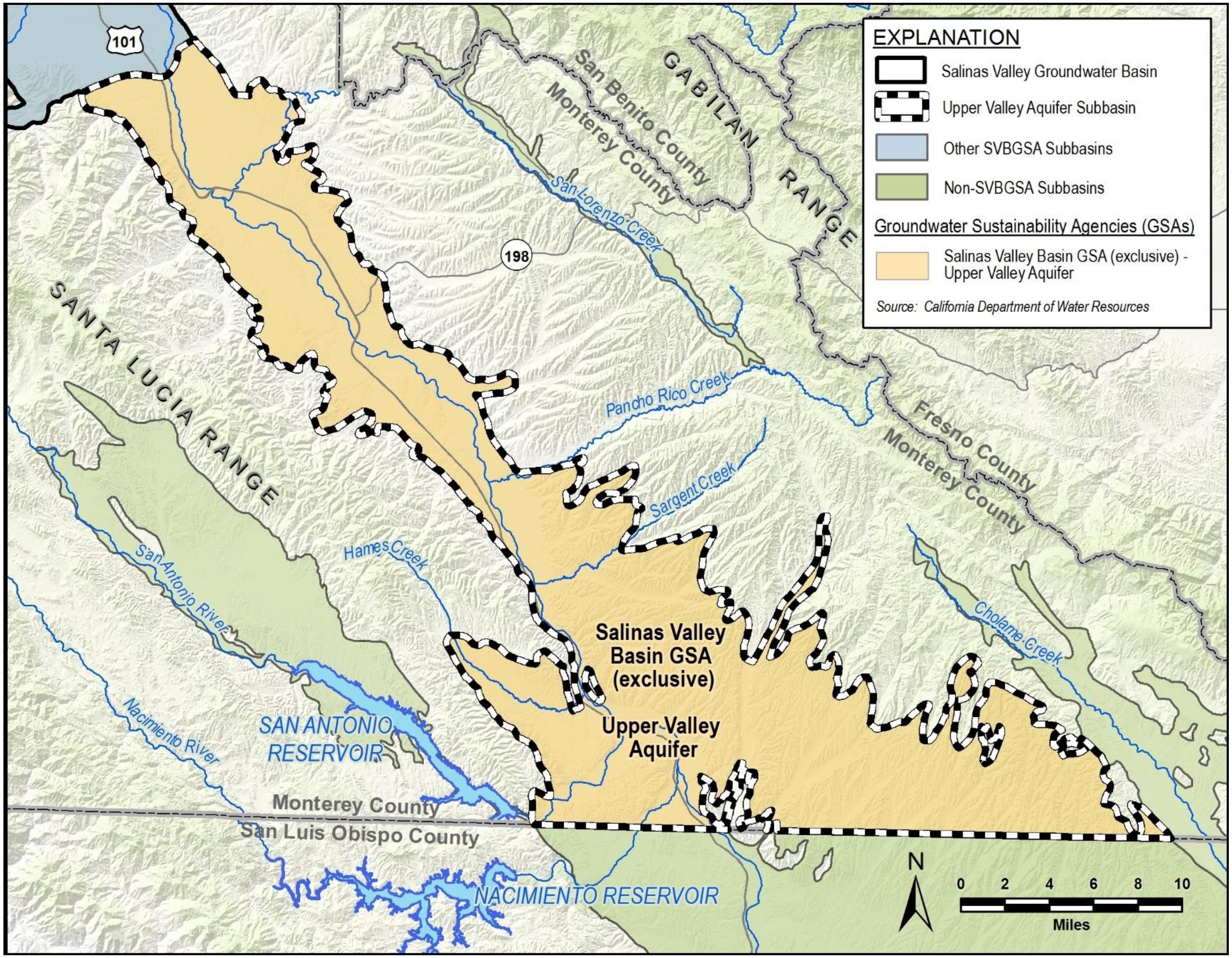

Figure 1. Upper Valley Aquifer Subbasin

2 SUBBASIN SETTING

The Upper Valley Aquifer Subbasin is located in southeastern Monterey County and in the southern portion of the Salinas Valley. The Salinas River runs through the Upper Valley Subbasin and releases from San Antonio and Nacimiento Reservoirs drain into the Salinas River near the southwestern corner of the Subbasin. The only municipality in the Subbasin is King City. The Subbasin encompasses most of MCWRA's Upper Valley Subarea, but it is almost double the total acreage of the Upper Valley Subarea. The geology of the Upper Valley Subbasin is Subbasin is characterized by alluvium, terrace deposits, and the Paso Robles Formation. The eastern boundary of the Subbasin is marked by the contact between the alluvium and Paso Robles Formation with the rocks of the Gabilan Range's Pancho Rico and Monterey Formations (DWR, 2004; Jennings *et al.*, 2010; Rosenberg, 2001). The western boundary of the Upper Valley Subbasin is the contact between the alluvium and the sedimentary rocks of the Monterey Formation in the Santa Lucia Range. The Subbasin's northwestern boundary with the Forebay Aquifer Subbasin is south of the town of Greenfield and generally coincides with the narrowing of the Valley floor and shallowing of the base of the groundwater basin (DWR, 2004). The southern boundary with San Luis Obispo County and the Paso Robles Area Subbasin represents a jurisdictional divide between Monterey County and San Luis Obispo County.

2.1 Principal Aquifers and Aquitards

The Upper Valley Subbasin's principal aquifer is unconfined and is represented by alluvium and the Paso Robles Formation, where deposits west of the Salinas River are typically coarser grained than those to the east. These primary water-bearing units are laterally equivalent to those found in the 180/400-Foot and Forebay Aquifer Subbasins.

2.2 Natural Groundwater Recharge and Discharge

Groundwater can discharge from the aquifers where surface water and groundwater are interconnected. There are potential locations of interconnected surface water (ISW) mainly along the Salinas River and partially along some of its tributaries. In these areas groundwater dependent ecosystems may depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface and may discharge groundwater through evapotranspiration. Natural groundwater recharge occurs through deep percolation of surface water deep percolation of excess applied irrigation water, and deep percolation of precipitation.

2.3 Precipitation and Water Year Type

Precipitation that falls within the Subbasin contributes to runoff and percolation components of the water budget. The precipitation gage at the Salinas Airport (National Oceanographic and

Atmospheric Administration Station USW00023233) recorded 9.18 inches of rainfall in WY 2020 and 5.79 inches in WY 2021. For comparison, the average rainfall from WY 1980 to WY 2021 at this gage is 11.98 inches of precipitation.

The SVBGSA adopted the methodology used by MCWRA for determining the Subbasin’s water year type. The MCWRA assigns a water year type of either dry, dry-normal, normal, wet-normal, or wet based on an indexing of annual mean flows at the USGS stream gage on the Arroyo Seco near Soledad (USGS Gage 11152000) (MCWRA, 2005). Using the MCWRA method, WY 2020 was a dry-normal year and WY 2021 was a dry year.

3 2021 DATA AND SUBBASIN CONDITIONS

This section details the Subbasin conditions and WY 2021 data. Where WY 2021 data are not available, it includes the most recent data available. SVBGSA stores monitoring date in a data management system. Monitoring data are included in this Annual Report and are submitted to DWR.

3.1 Water Supply and Use

Within the Subbasin, water is used for agricultural, urban, industrial use, and wetlands and native vegetation. Most of the water in the Subbasin is used for agriculture. Only a relatively small amount of water is used by wetlands and native vegetation.

The water supply in the Upper Valley Subbasin is a combination of groundwater, surface water, and some recycled water. Groundwater is the main water source in the Subbasin. The Salinas River and its tributaries provide surface water for agricultural use. Recycled water is used in the San Ardo Oil Field, where Chevron U.S.A. Inc. operates a reverse osmosis plant that treats a portion of the produced water generated during production.

3.1.1 Groundwater Extraction

Urban and agricultural groundwater extractions are compiled using MCWRA's Groundwater Extraction Management System (GEMS), which collects data from groundwater wells with an internal discharge pipe diameter greater than 3 inches within Zones 2, 2A, and 2B. However, these zones only cover half of the total acreage of the Subbasin as shown on Figure 3. SVBGSA will work with MCWRA to fill this data gap during GSP implementation.

Table 1 presents groundwater extractions by water use sector, including the method of measurement and accuracy of measurement in the Upper Valley Aquifer Subbasin. Urban use data from MCWRA aggregates municipal wells, small public water systems, and industrial wells. Agricultural use accounted for 98% of groundwater extraction in 2021; urban and industrial use accounted for 2%. It is important to note that agricultural pumping is reported by MCWRA for the period November 1 through October 31, whereas urban pumping is reported on a calendar year basis. No groundwater was extracted for managed wetlands or managed recharge. Groundwater use by natural vegetation is assumed to be small and was not estimated for this report. The total reported groundwater extraction in reporting year 2021 was 122,300 acre-feet per year (AF/yr.) in the Subbasin. This total is for the Upper Valley Subbasin not the MCWRA Upper Valley Subarea; therefore, the pumping total is not identical to what MCWRA publishes in their annual Groundwater Extraction Summary Reports. Figure 2 illustrates the general location and volume of groundwater extractions in the Subbasin.

Table 1. 2021 Groundwater Extraction by Water Use Sector (AF/yr.)

Water Use Sector	Groundwater Extraction	Method of Measurement	Accuracy of Measurement
Urban	3,000	MCWRA's Groundwater Reporting Program allows 3 different reporting methods: water flowmeter, electrical meter, or hour meter. For 2021, 84% of extractions were calculated using a flowmeter, 16% electrical meter and <1%-hour meter.	MCWRA ordinances 3717 and 3718 require annual flowmeter calibration, and that flowmeters be accurate to within +/- 5%. The same ordinance requires annual pump efficiency tests. SVBGSA assumes an electrical meter accuracy of +/- 5%.
Agricultural	119,300		
Managed Wetlands	0	N/A	N/A
Managed Recharge	0	N/A	N/A
Natural Vegetation	0	*De minimis* and not estimated.	Unknown
Total	**122,300**		

Note: Agricultural pumping is reported on a MCWRA reporting year basis whereas urban is reported in calendar-year basis. N/A = Not Applicable.

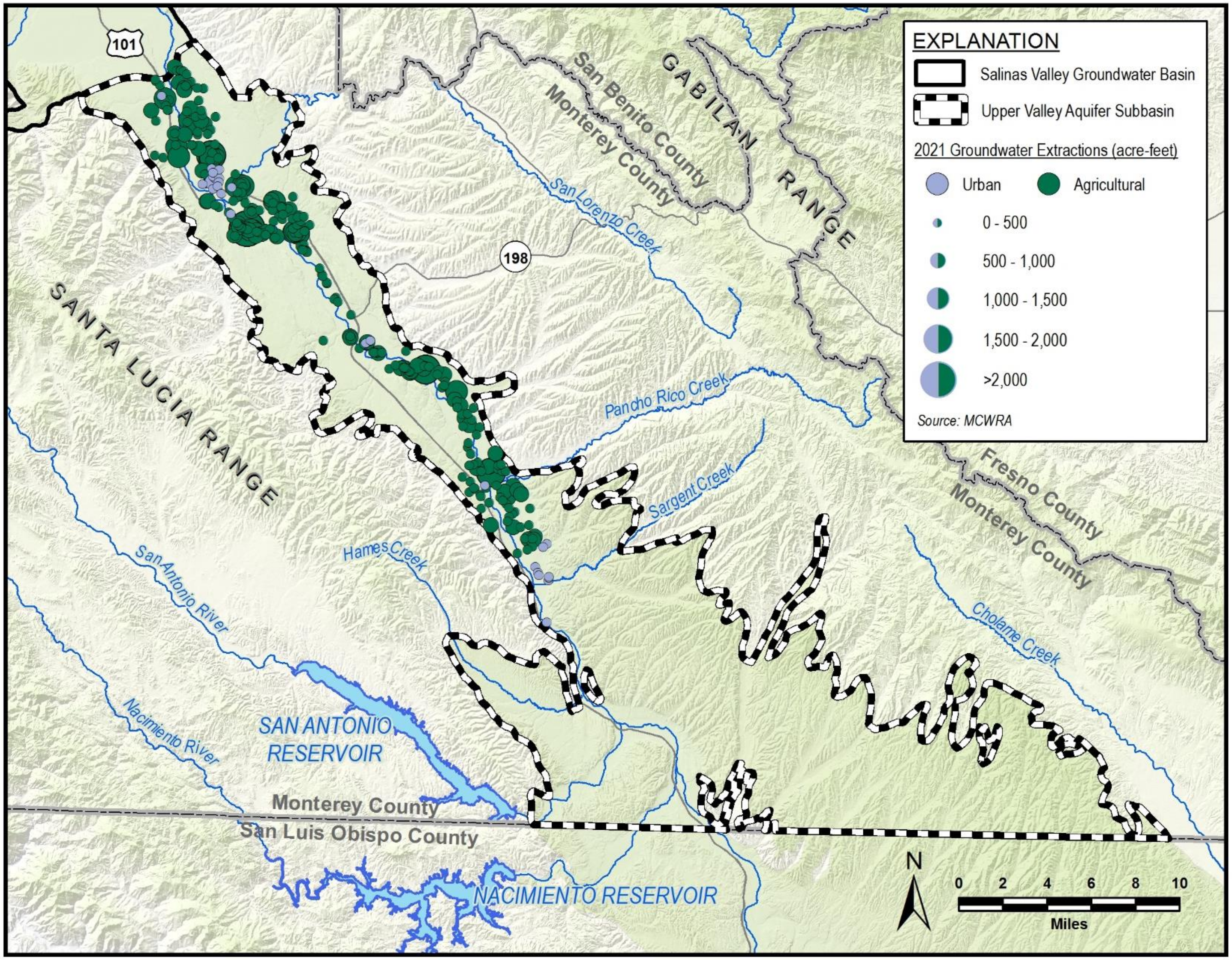

Figure 2. General Location and Volume of Groundwater Extractions

3.1.2 Surface Water Supply

Salinas River diversion data are obtained from the SWRCB Electronic Water Rights Information Management System (eWRIMS) website. The data are reported annually and include diversions from the Salinas River and its tributaries. Surface water diversions reported to eWRIMS were approximately 64,800 AF/yr in WY 2021. All surface water is used for irrigation and is reported as a Statement of Diversion and Use.

3.1.3 Recycled Water Supply

Chevron U.S.A. Inc. operates a reverse osmosis plant in the San Ardo Oil Field. A portion of the produced water generated during oil production is treated by the reverse osmosis plant and further treated by constructed wetlands. The effluent is then discharged to a groundwater recharge basin pursuant to a permit issued by the Central Coast Regional Water Quality Control Board (CCRWQCB). Effluent discharged into the recharge basin was approximately 1,600 AF/yr in WY 2021.

3.1.4 Total Water Use

Total water use is the sum of groundwater extractions and surface water use and is summarized in Table 2.

Many growers and residents have noted that some irrigation is reported both to SWRCB as Salinas River diversions and to MCWRA as groundwater pumping. To avoid double counting, all surface water reported as a Statement of Diversion and Use are excluded from the total water use count for the Subbasin. Therefore, in WY 2021, total surface water use for the Subbasin is adjusted from the 64,800 AF/yr reported in eWRIMS to 0 AF/yr. It is possible that not all of the surface water diversions excluded are being reported to both SWRCB and MCWRA, in which case total water use may be up to that amount greater than calculated here. This accounting is done to calculate the total water use and is not meant to imply that SVBGSA classifies any or all the reported diversions as groundwater. SVBGSA will continue to work with stakeholders to refine the method used to resolve double counting.

Total water use was 123,900 AF/yr in WY 2022, as shown in Table 2.

Table 2. Total Water Use by Water Use Sector in WY 2021

Water Use Sector	Groundwater Extraction	Surface Water Use	Recycled Water	Method of Measurement	Accuracy of Measurement
Urban (includes industrial)	3,000	0	1,600	Direct	Estimated to be +/- 5%.
Agricultural	119,300	0	0	Direct	Estimated to be +/- 5%.
Managed Wetlands	0	0	0	N/A	N/A
Managed Recharge	0	0	0	N/A	N/A
Natural Vegetation	Unknown	Unknown	Unknown	N/A	N/A
SUBTOTALS	122,300	0	1,600		
TOTAL	**123,900**				

Note: Agricultural pumping is reported on the MCWRA reporting year basis whereas urban is reported in calendar-year basis. To avoid double counting with groundwater pumping reported to MCWRA, Statement of Diversion and Use surface water diversions reported in Section 3.1.2 are subtracted from the total water use. N/A = Not Applicable.

3.2 Groundwater Elevations

The current groundwater elevation monitoring network in the Upper Valley Subbasin contains 18 wells. All 18 wells are representative monitoring sites (RMS) and monitored by MCWRA. Locations of groundwater elevation representative monitoring network wells within the Subbasin are shown on Figure 3.

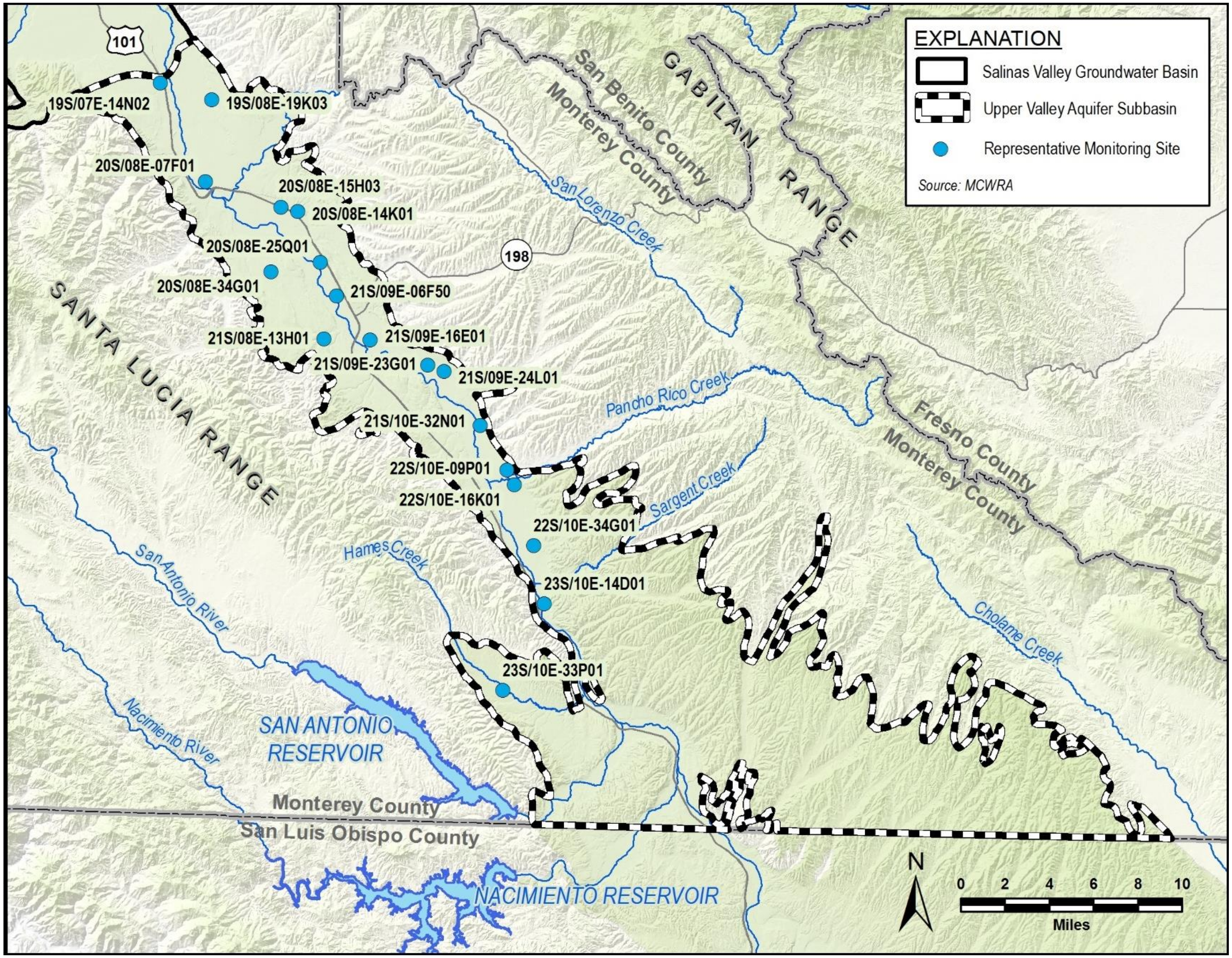

Figure 3. Locations of Representative Groundwater Elevation Monitoring Sites

Fall 2021 groundwater elevation data are presented in Table 3. The fall 2020 groundwater elevations are also included in Table 3 to provide all data since GSP submittal. In accordance with the GSP, this report uses groundwater elevations measured in the fall in order to approximate neutral groundwater conditions that are not heavily influenced by either summer irrigation pumping or winter rainfall recharge. These groundwater elevations are also used to compare to SMC, as described in Section 4.2.1, because minimum thresholds and measurable objectives. Fall groundwater elevation measurements are made from November to December and they are used to produce groundwater elevation contours. These fall contours are further discussed in Section 3.2.1.

Table 3. Groundwater Elevation Data

Monitoring Site	WY 2020 Elevation Data (ft)	WY 2021 Elevation Data (ft)
19S/07E-14N02	234.0	230.8
19S/08E-19K03	254.3	252.1
20S/08E-07F01	266.0	260.4
20S/08E-14K01	291.4	291.6
20S/08E-15H03	286.7	287.4
20S/08E-25Q01	315.1	314.2
20S/08E-34G01	383.6	378.5
21S/08E-13H01	395.5	394.0
21S/09E-06F50	330.8	331.6
21S/09E-16E01	345.1	344.7
21S/09E-23G01	358.6	358.6
21S/09E-24L01	364.3	364.1
21S/10E-32N01	377.1	377.2
22S/10E-09P01	401.0*	401.4
22S/10E-16K01	396.9	396.9
22S/10E-34G01	424.0	424.2
23S/10E-14D01	442.5*	442.5*
23S/10E-33P01	503.0*	500.4

*Groundwater elevation was estimated.

During GSP implementation, the SVBGSA is working to fill data gaps with additional wells to include in the monitoring network.

3.2.1 Groundwater Elevation Contours

The SVBGSA received groundwater elevation data from MCWRA for the Upper Valley Subbasin for fall 2021 and developed new contour maps for August 2021. The August contours represent seasonal low conditions and the fall contours represent seasonal high conditions. The true seasonal high usually occurs between January and March (MCWRA, 2015); however, the GSP adopts fall groundwater elevations as the seasonal high because GSP monitoring is based on MCWRA's existing monitoring networks that annually monitors groundwater elevations in the fall.

MCWRA contours only extend up to the MCWRA boundary of the Upper Valley Subarea, which covers the northern half of the Upper Valley Subbasin as shown on Figure 4. MCWRA currently does not collect groundwater elevation information in wells located outside their Subarea boundary. To fill this spatial data gap, groundwater elevations in the southern half of the Upper Valley Subbasin were interpolated using Paso Robles Area Subbasin data. Groundwater elevation data for the Paso Robles Area Subbasin are collected by the San Luis Obispo County Flood Control and Water Conservation District (SLOFCWCD). SLOFCWCD collects seasonal high measurements in April and seasonal low measurements in October. MCWRA's monthly program August data were used to produce the seasonal low groundwater elevation contours for the Upper Valley Subbasin. The October SLOFCWCD groundwater elevation data were used to approximate the contours from the MCWRA's Upper Valley Subarea (Figure 4) boundary to the southern boundary of the Upper Valley Subbasin.

Groundwater elevation contours for seasonal high and low groundwater conditions in the Upper Valley Subbasin are shown on Figure 5 and Figure 6, respectively. The contours indicate that groundwater flow directions are similar in the Upper Valley Subbasin during both seasonal low and seasonal high conditions, with groundwater elevations declining from the south to northwest.

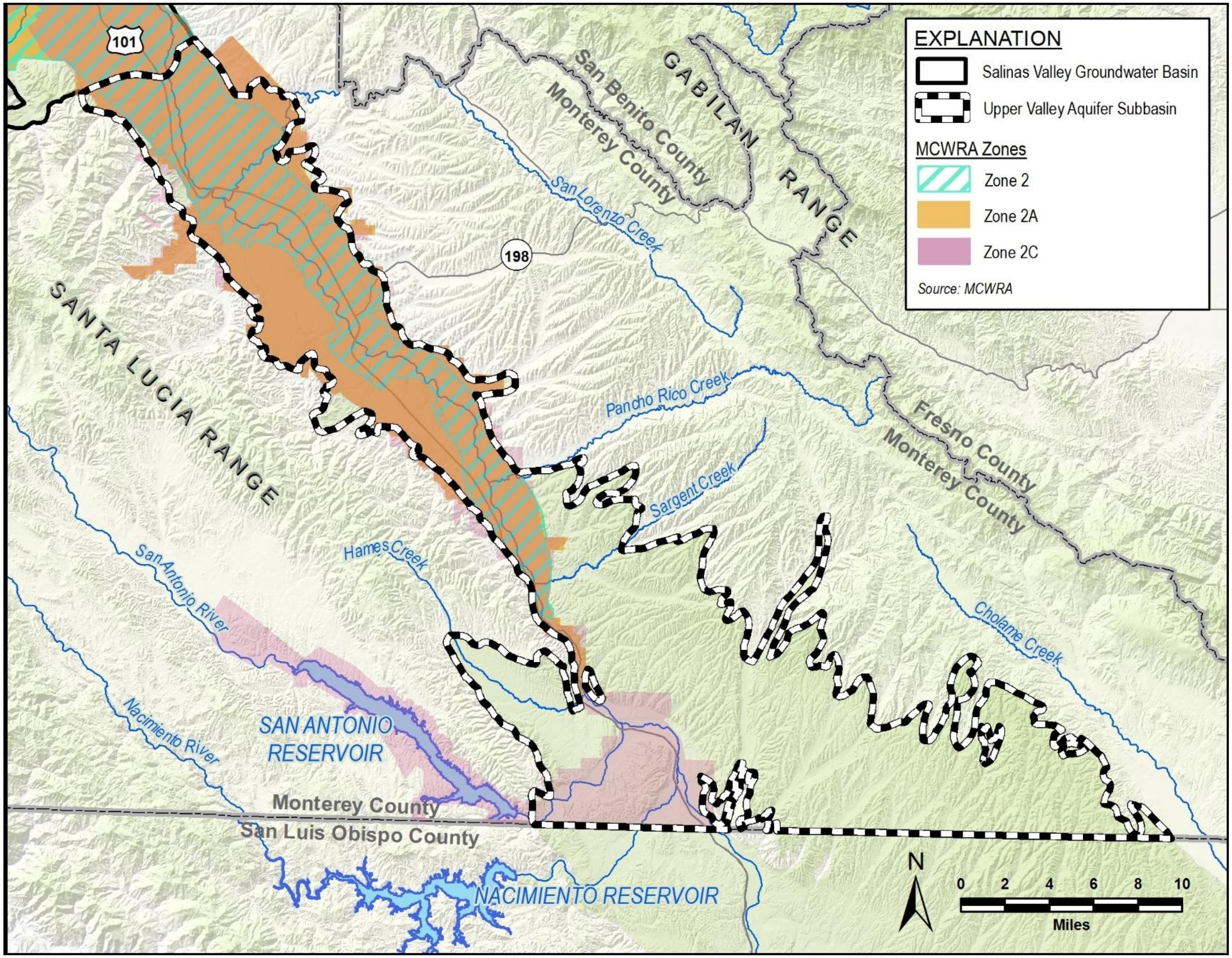

Figure 4. MCWRA Subarea Zones

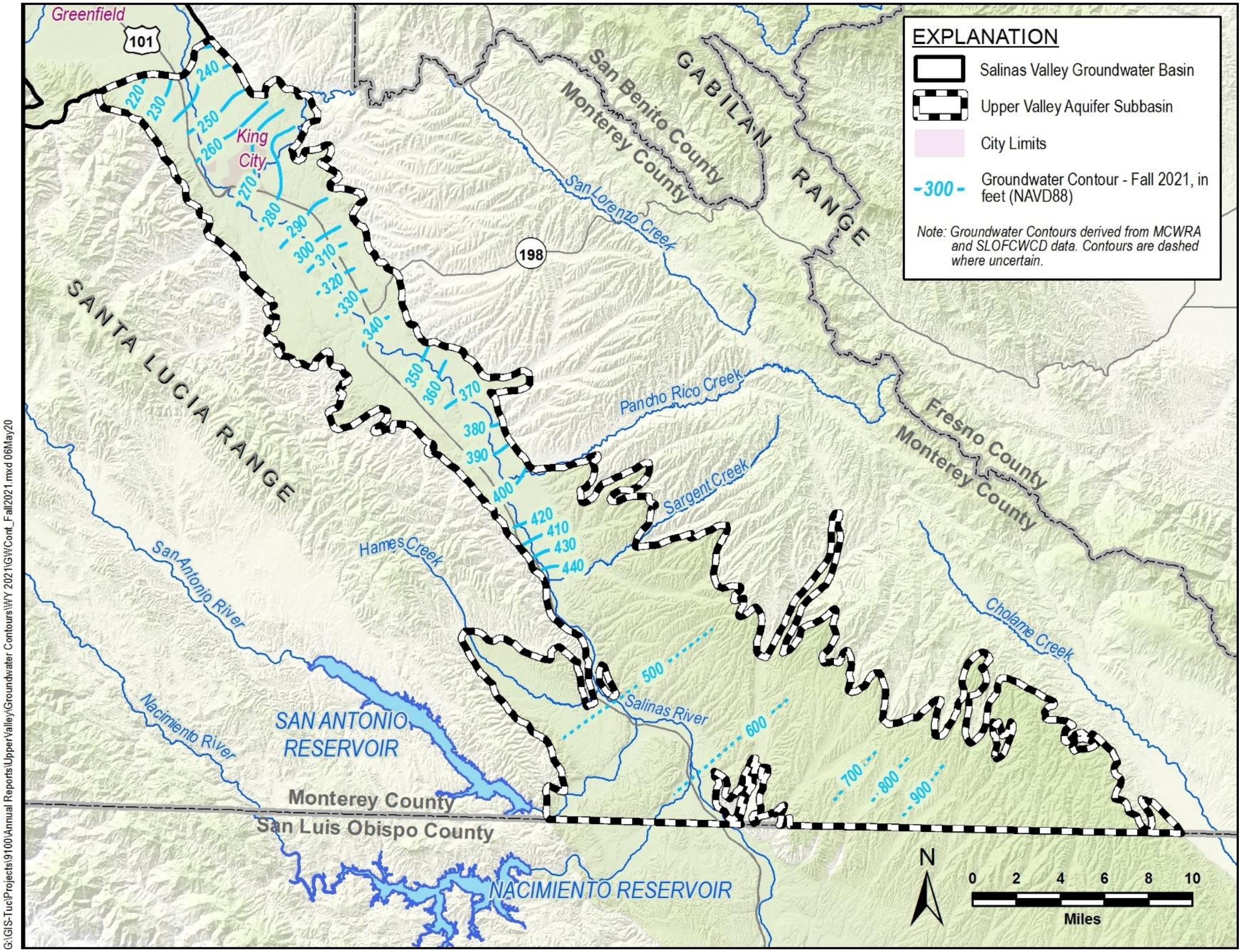

Figure 5. Seasonal High Groundwater Elevation Contour Map for the Upper Valley Aquifer Subbasin

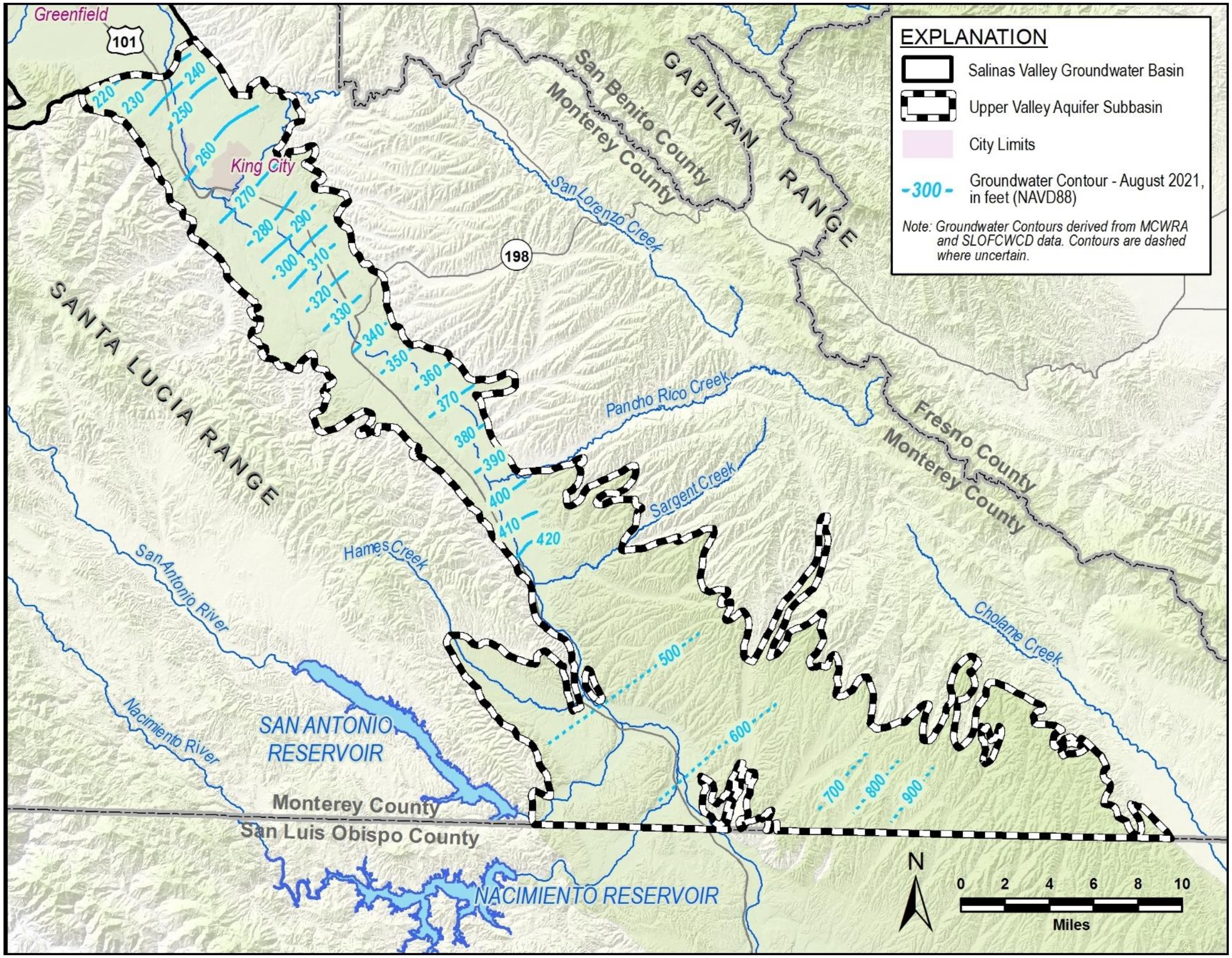

Figure 6. Seasonal Low Groundwater Elevation Contour Map for the Upper Valley Aquifer Subbasin

3.2.2 Groundwater Elevation Hydrographs

Temporal trends in groundwater elevations can be assessed with hydrographs that plot changes in groundwater elevations over time. Hydrographs for selected monitoring wells within the principal aquifer of the Upper Valley Subbasin are shown on Figure 7. These hydrographs were selected to show characteristic trends in groundwater elevation in the aquifer. The hydrographs indicate that groundwater elevations in the principal aquifer have generally remained stable throughout the Subbasin, dropping during periods of drought but later rebounding again. One of the wells that is drilled deeper in the Paso Robles Formation has kept declining in recent years. Hydrographs for all RMS are included in Appendix A.

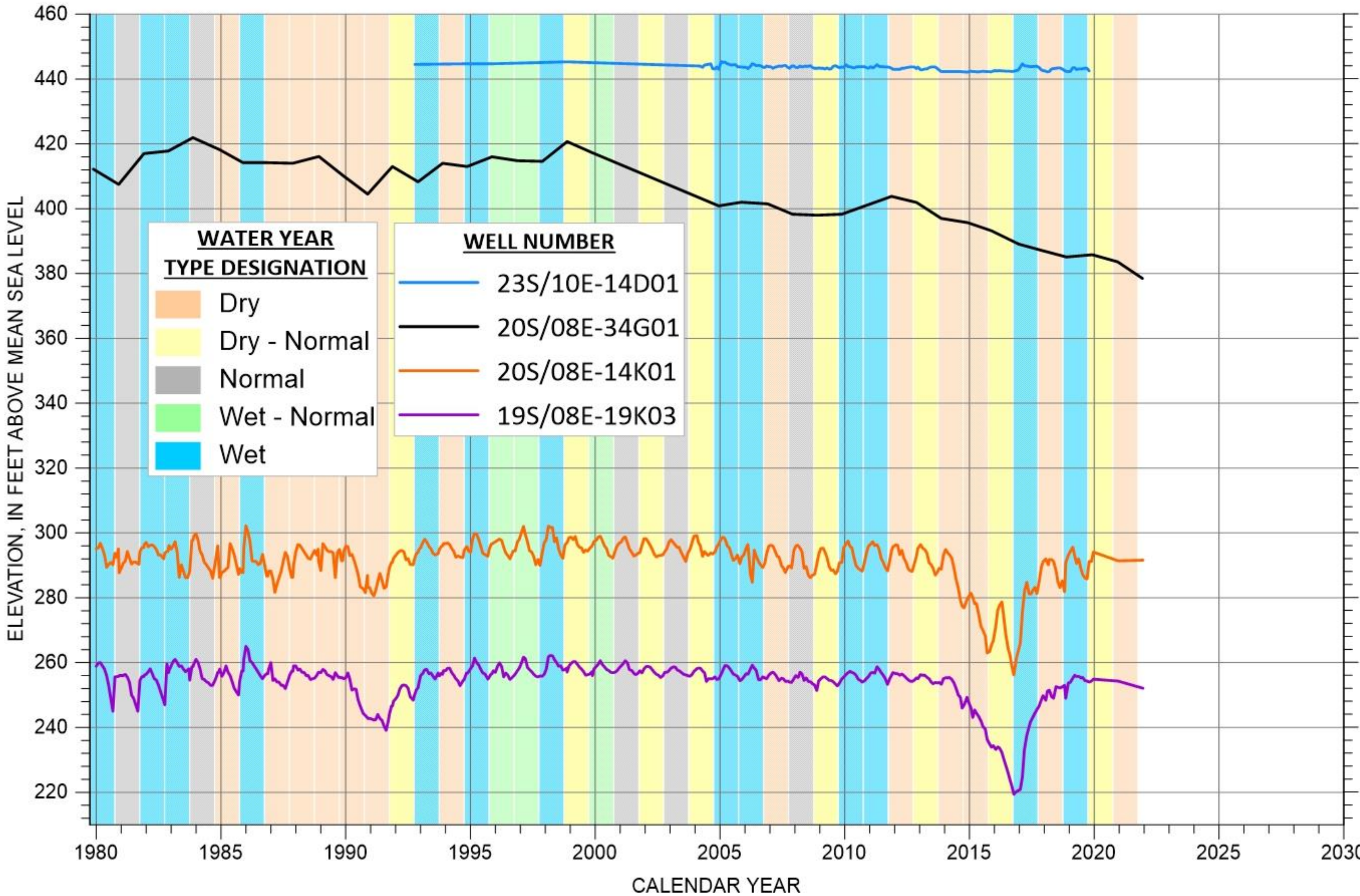

Figure 7. Groundwater Elevation Hydrographs for Selected Monitoring Wells

3.3 Change in Groundwater Storage

The Upper Valley Subbasin GSP adopted the concept of change in usable groundwater storage, defined as the annual average increase or decrease in groundwater that can be safely used for municipal, industrial, or agricultural purposes.

The change in storage calculation for the 2 years since GSP submittal is calculated using groundwater elevation contours produced by SVBGSA using data from MCWRA for fall 2019 and fall 2021. MCWRA uses groundwater elevations from November to December to produce their contours. Fall measurements occur at the end of the irrigation season and before groundwater levels increase due to seasonal recharge by winter rains. These measurements record annual changes in storage reflective of groundwater recharge and withdrawals in the Subbasin.

Average annual change in groundwater elevations in the Upper Valley Aquifer Subbasin from WY 2019 to WY 2021 was estimated by subtracting the fall 2019 groundwater elevations shown on Figure 8 from the fall 2021 groundwater elevations (Figure 5). This change was then multiplied by the storage coefficient for the Upper Valley Aquifer. MCWRA's State of the Basin Report approximates the storage coefficient to 0.10 for the Upper Valley Subarea (Brown and Caldwell, 2015). The resulting change in storage represents change over the 2-year period; this value is divided by 2 for the average annual change. The estimated change in storage due to groundwater elevation changes, in AF per acre, in the Upper Valley Subbasin is depicted on Figure 9. Since the groundwater elevation contours do not extend across the entire Subbasin, the storage change was not calculated in the areas that were not contoured, as indicated by the areas without color on Figure 9.

A summary of components used for estimating change in groundwater storage due to groundwater elevation changes is shown in Table 4. Annual groundwater storage change due to changes in groundwater elevation from fall 2019 to fall 202 decreased at an annual average rate of -4,900 AF/yr. for the portion of the Upper Valley Subbasin that overlaps with MCWRA's Upper Valley Subarea (Figure 4). As explained in Section 3.2.1, the contours in the southern half of the Subbasin are interpolated because of groundwater elevation monitoring data gaps. Therefore, the change in storage is only calculated for the portion of the Subbasin where groundwater elevation monitoring occurs. The negative signs in Table 4 indicate decline in groundwater levels or loss in storage.

Table 4. Parameters Used for Estimating Change in Groundwater Storage

Component	Values
Area of contoured portion of Subbasin (acres)	86,000
Storage coefficient	0.10
Average change in groundwater elevation from fall 2019 to fall 2021 (feet)	-1.14
Change in groundwater storage from fall 2019 to fall 2021 (AF)	-9,800
Total annual change in groundwater storage (AF/yr.)	**-4,900**

Note: Negative values indicate loss, positive values indicate gain.

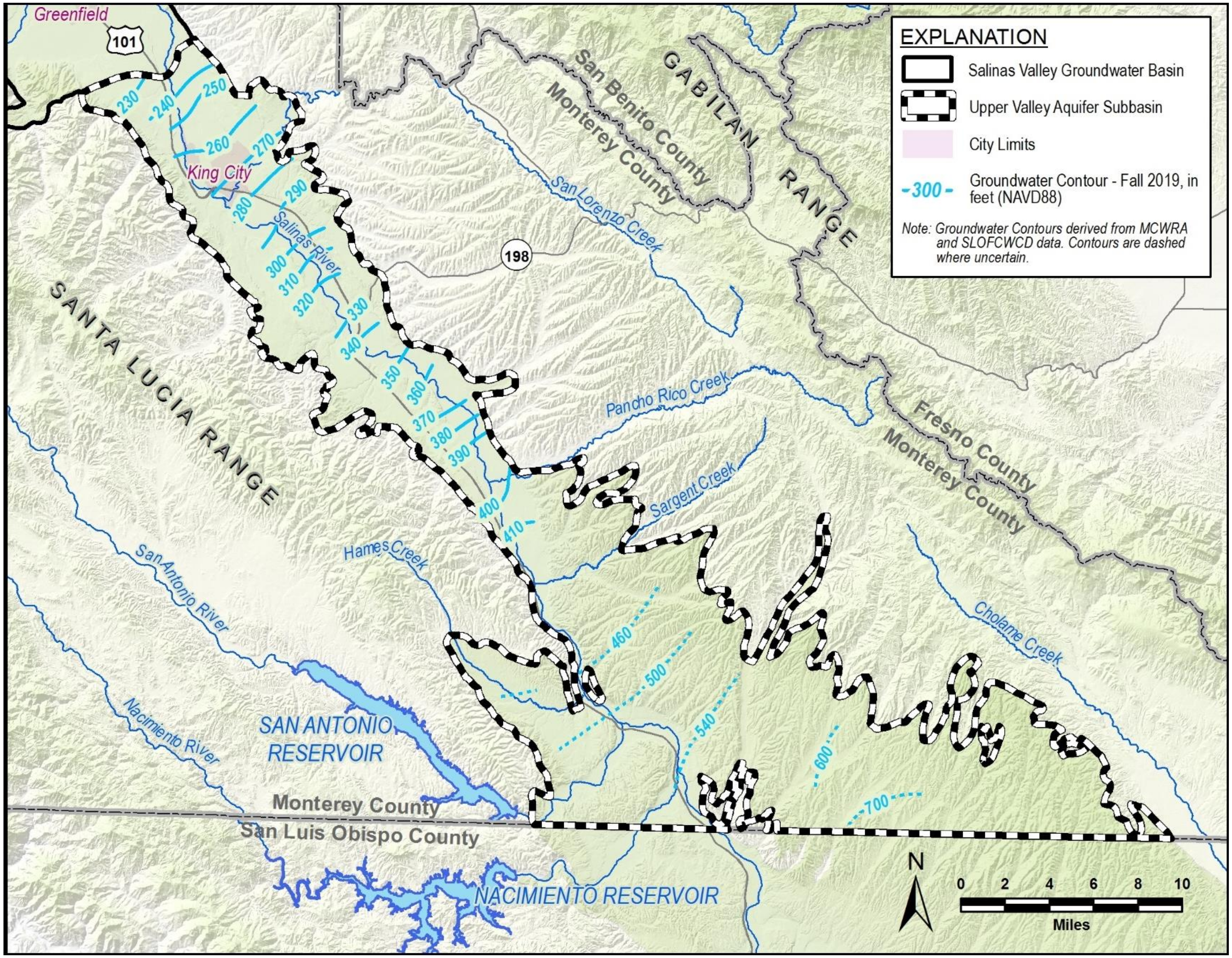

Figure 8. Fall 2019 Groundwater Elevation Contour Map for the Upper Valley Aquifer Subbasin

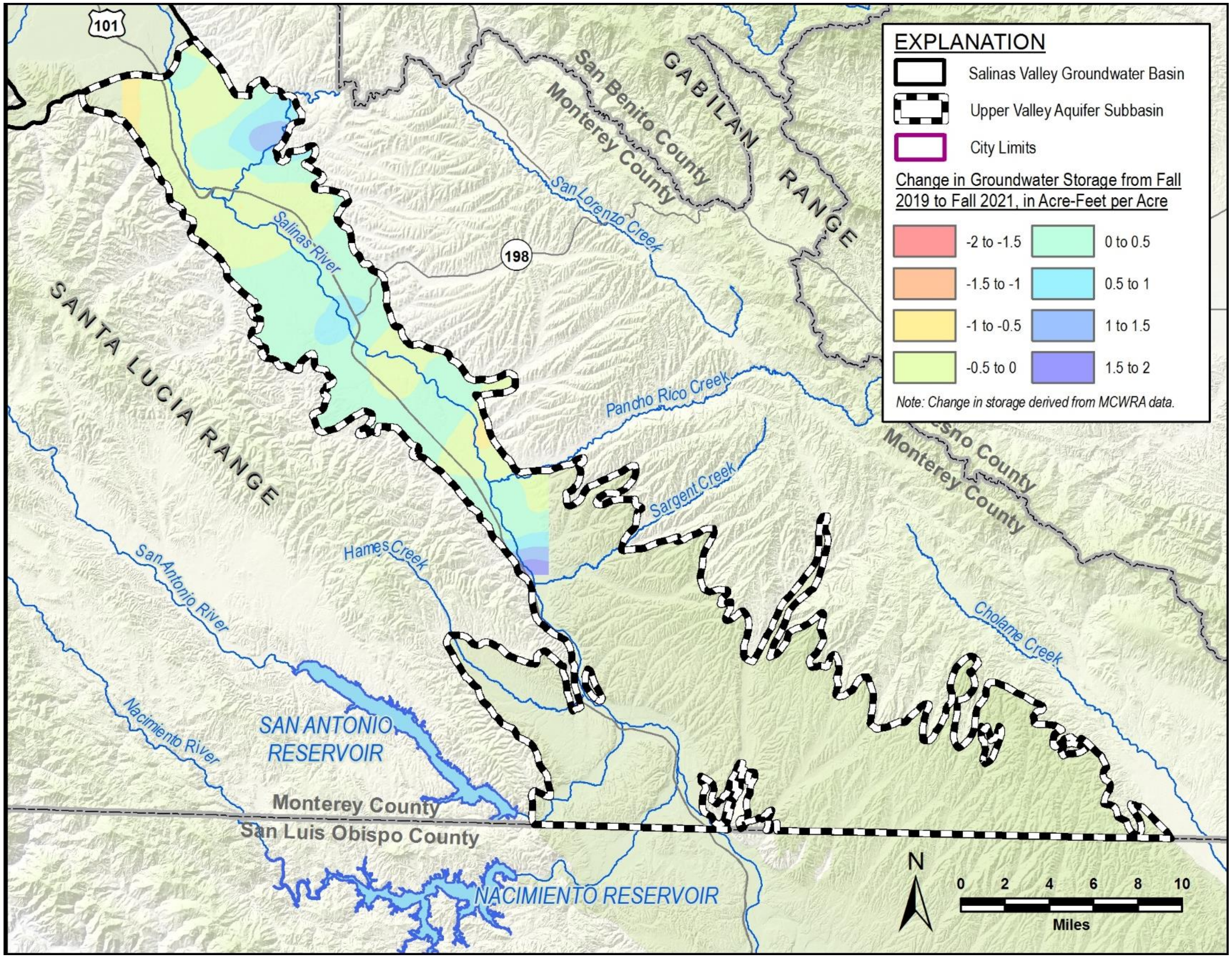

Figure 9. Average Annual Change in Groundwater Storage Between WY 2019 and WY 2021 in the Upper Valley Aquifer Subbasin

GSP Regulations also require that annual and cumulative changes in groundwater storage and groundwater use along with water year type data are plotted together, as shown on Figure 10. The annual and cumulative groundwater storage changes included on Figure 10 are based on average groundwater elevation changes for the area of the Subbasin that overlaps with MCWRA's Upper Valley Subarea (Figure 4). This figure includes groundwater extraction from 1995 to 2021, 1995 to 2016 average historical extraction, and the 2070 projected extraction from Chapter 6 of the GSP. Pumping increased since the previous year in reporting year 2021 and is slightly higher than the historical average and projected pumping. The orange line represents cumulative storage change since 1944 (e.g., zero is the amount of groundwater in storage in 1944, and each year the annual change in storage is added to produce the cumulative change in storage). The green line represents the annual change in storage from the previous year, so the 1995 annual change in storage value is based on change in storage from 1994. From WY 2021 to WY 2022, groundwater storage decreased, as shown by the green line, bringing the cumulative change in storage lower, as shown by the orange line.

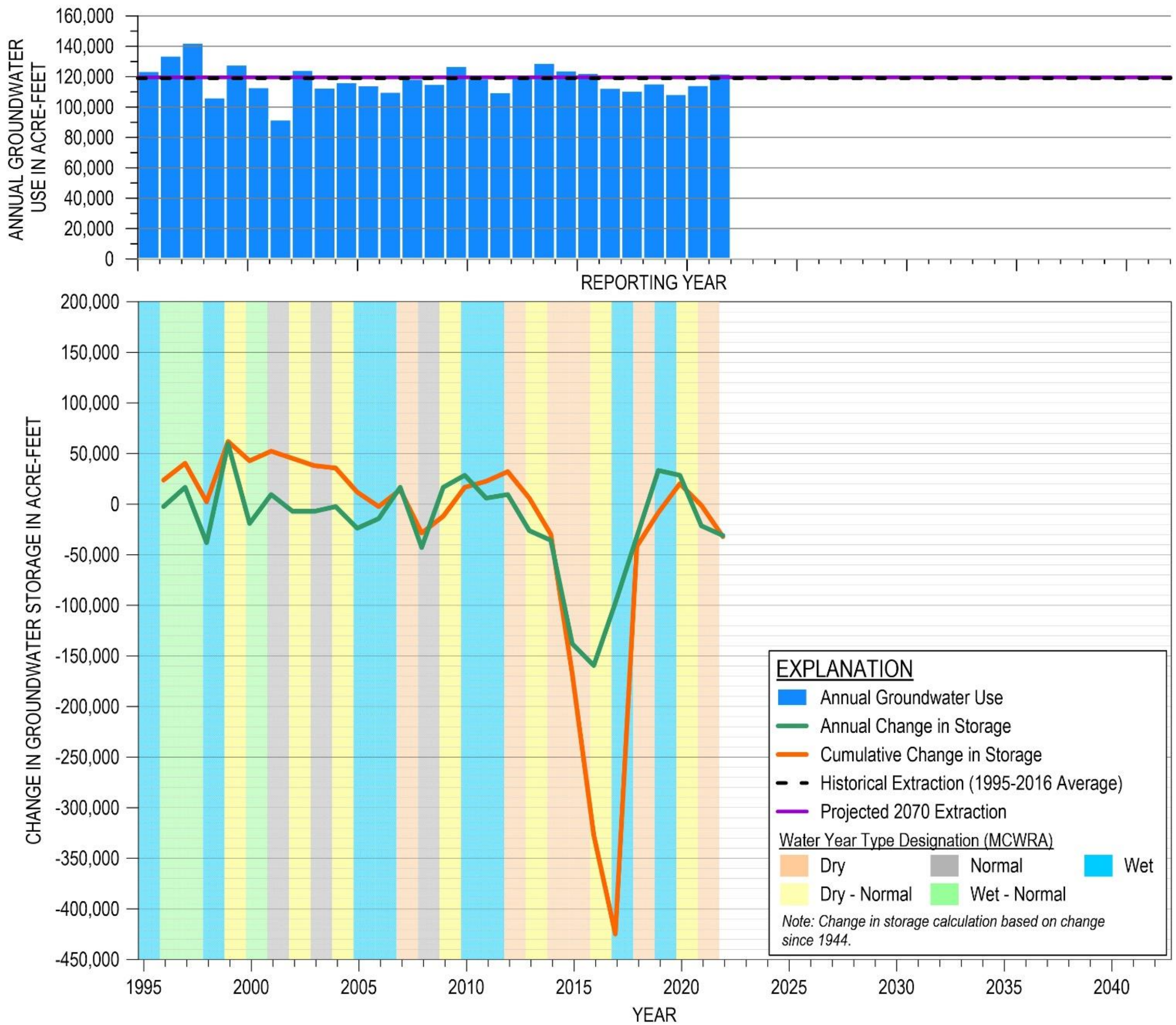

Figure 10. Groundwater Use and Annual and Cumulative Change in Groundwater Storage

3.4 Groundwater Quality

Degradation of groundwater quality is measured in public water system supply wells using data from the SWRCB Division of Drinking Water (DDW). Under the Irrigated Lands Regulatory Program (ILRP), water quality degradation is monitored for on-farm domestic wells and agricultural supply (irrigation) wells. Water quality data for both programs can be found on SWRCB's GAMA Groundwater Information System. The constituents of concern (COC) for municipal public water system supply wells and domestic wells have a Maximum Contaminant Level (MCL) or Secondary Maximum Contaminant Level (SMCL) established by the State's Title 22 Regulations. The COCs for agricultural supply wells include those that may lead to reduced crop production and are outlined in the Central Coast Regional Water Quality Control Board (CCRWQCB)'s Basin Plan (2019). As discussed in the GSP, each set of wells has its own COCs. Table 5 shows the number of wells that were sampled and that have exceeded the regulatory standard in WY 2021 for the COCs in the Upper Valley Subbasin listed in the GSP. None of the COCs in the Subbasin exceeded their regulatory standard.

Table 5. WY 2021 Groundwater Quality Data

Constituents of Concern (COC)	Regulatory Exceedance Standard	Standard Units	Number of Wells Sampled for COC in WY 2021	Number of Wells Exceeding Regulatory Standard in WY 2021
DDW Wells				
1,2,3-Trichloropropane (1,2,3 TCP)	0.005	UG/L	3	0
Benzo(a)pyrene	0.2	MG/L	3	0
Boron	1	MG/L	0	0
Cadmium	5	UG/L	3	0
Dinoseb	7	UG/L	2	0
Hexachlorobenzene	1	UG/L	0	0
Iron	300	UG/L	3	0
Lindane	0.2	UG/L	0	0
Manganese	50	UG/L	3	0
Nitrate (as nitrogen)	10	MG/L	20	0
Specific Conductance	1600	UMHOS/CM	3	0
Sulfate	500	MG/L	3	0
Total Dissolved Solids	1000	MG/L	4	0
Vinyl Chloride	0.5	UG/L	2	0
ILRP On-Farm Domestic Wells				
Chloride	250	MG/L	0	0
Nitrate (as nitrogen)	10	MG/L	0	0
Nitrate + Nitrite (sum as nitrogen)	10	MG/L	0	0
Specific Conductance	1600	UMHOS/CM	0	0
Sulfate	500	MG/L	0	0
Total Dissolved Solids	500	MG/L	0	0
ILRP Irrigation Supply Wells				
Chloride	350	MG/L	0	0

Note: MG/L= milligram/Liter, UG/L = micrograms/Liter, UMHOS/CM = micromhos/centimeter

3.5 Subsidence

Subsidence is measured using Interferometric Synthetic-Aperture Radar (InSAR) data. These data are provided by DWR on the SGMA data viewer portal (DWR, 2021). Figure 11 shows the annual subsidence for the Upper Valley Subbasin from October 2020 to October 2021. Data continue to show negligible subsidence. All land movement was within the estimated error of measurement of +/- 0.1 foot.

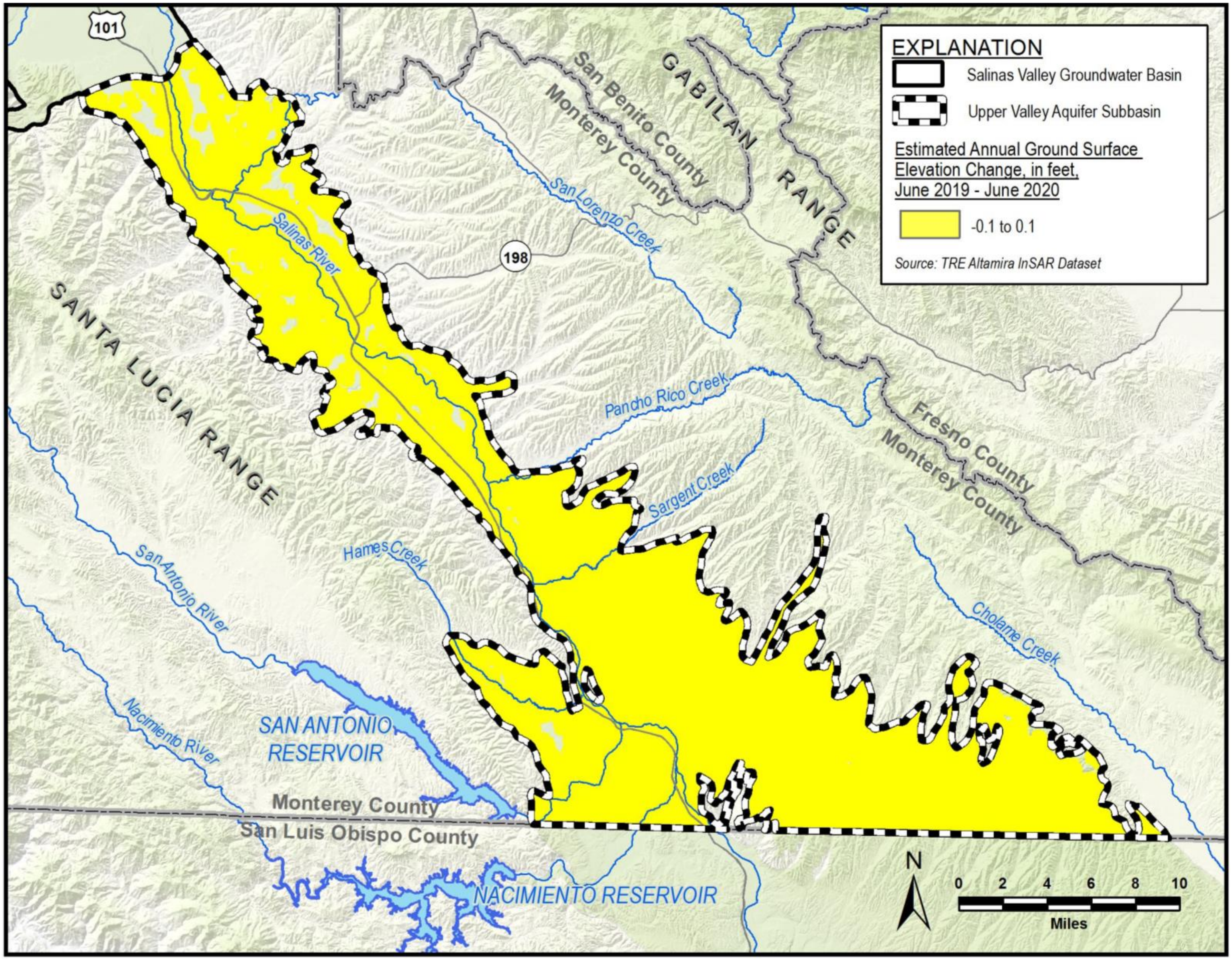

Figure 11. Annual Subsidence

3.6 Depletion of Interconnected Surface Water

As described in Section 4.4.5.1 of the GSP, there are locations of ISW mainly along the Salinas River and along some of its tributaries. SVBGSA is including 4 existing shallow wells in the ISW monitoring network to monitor interconnection in the Subbasin. These wells will be supplemented with a new shallow well that will be installed along the Salinas River near Hames Valley. The 4 existing monitoring wells and the 2020 and 2021 shallow groundwater elevations are listed in Table 6.

Table 6. Shallow Groundwater Elevation Data

Monitoring Well	WY 2020 Elevation Data (ft)	WY 2021 Elevation Data (ft)
19S/07E-14H01	249.2	245.9
20S/08E-07F01	266.0	260.4
21S/09E-16E01	345.1	344.7
23S/10E-14D01	442.5*	442.5*

*Groundwater elevation estimated.

Depletion of ISW along the Salinas River due to groundwater pumping was estimated using the Salinas Valley Integrated Hydrologic Model (SVIHM[1]), as described in Section 5.5.2 of the GSP. This analysis defines a "peak" conservation release period from June to September, reflecting when most conservation releases are made. However, releases can be made at any point during the full MCWRA conservation release period that occurs from April to October. Depletion of interconnected sections of the Salinas River is estimated separately for the peak conservation release period of June through September, and the non-peak conservation release period of October through May. Depletion of interconnected sections of other surface water bodies is estimated for the entire year. Along the Salinas River, average depletion of ISW is estimated to be 11,000 AF/yr. during peak conservation release period and 18,500 AF/yr. during the non-peak period. Average annual depletion of ISW along other surface water bodies in the Subbasin is estimated to be 1,100 AF/yr.

[1] These data (model and/or model results) are preliminary or provisional and are subject to revision. This model and model results are being provided to meet the need for timely best science. The model has not received final approval by the U.S. Geological Survey (USGS). No warranty, expressed or implied, is made by USGS or the U.S. Government as to the functionality of the model and related material nor shall the fact of release constitute any such warranty. The model is provided on the condition that neither USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the model.

4 ANNUAL PROGRESS TOWARD IMPLEMENTATION OF THE GSP

4.1 WY 2021 Groundwater Management Activities

This section details groundwater management activities that have occurred in WY 2021, independent of GSP implementation. These include activities of SVBGSA and MCWRA that promote groundwater sustainability and are important for reaching the GSP sustainability goal.

In WY 2021, SVBGSA and MCWRA undertook additional activities. Activities are separated into 4 main categories: coordination and engagement, data and monitoring, planning, and project and implementation activities.

4.1.1 Coordination and Engagement

SVBGSA continued robust stakeholder engagement and strengthened collaboration with key agencies and partners. SVBGSA worked throughout the year with the Upper Valley Aquifer Subbasin Planning Committee to develop the Upper Valley Subbasin GSP, submitted to DWR in January 2022.

SVBGSA also identified the need for an Integrated Implementation Committee to guide development of an Integrated Implementation Plan for 6 Subbasins within the Salinas Valley. The Integrated Implementation Committee will provide input on basin wide and regional projects and management actions and resolve neighboring basin concerns. The intent of the Committee is to ensure the Salinas Valley Basin is on a cohesive path to sustainability. Over the course of WY 2021, SVBGSA held 12 Valley-wide Board meetings and 11 Valley-wide Advisory Committee Meetings.

SVBGSA and MCWRA also increased coordination and collaboration through weekly meetings between agency leads and consultants. This resulted in increased awareness of each other’s activities, objectives, and challenges. MCWRA and SVBGSA have scoped the roles of the 2 agencies and are developing a Memorandum of Understanding (MOU) to be reviewed by each agency Board. The MOU will further outline how the 2 agencies will coordinate through the implementation of the GSPs.

SVBGSA conducted meetings throughout the year to reach out to additional agencies and stakeholders to coordinate. These included meetings with:

- NMFS on the effect of groundwater extraction on surface water depletion and steelhead and its habitat
- Monterey County Health Department on data and the existing well permitting and water quality monitoring programs

- CCRWQB on data and future coordination with the multiple agencies involved in water quality.
- Integrated Regional Water Management Plan, including coordinating with Central Coast Wetlands Group on watershed coordinator grant.

The SVBGSA contracted with Consensus Building Institute (CBI) to conduct a work program to help the SVBGSA better define a meaningful engagement strategy with Disadvantaged Communities (DACs) and to develop a work plan that aligned with GSP development and ultimately with SVBGSA long term goals around groundwater sustainability. CBI conducted interviews to gage primary groundwater issues of concern in DACs, identified possible SVBGSA focus with DACs, confirmed barriers to engagement with DACs, and identified outreach and education materials and approaches to achieve success with these communities over the long term. DACs are an important stakeholder for the SVBGSA to develop meaningful and long-term relationships with regard to groundwater sustainability.

4.1.2 Data and Monitoring

SVBGSA also undertook several efforts to move data collection and monitoring forward. During WY 2021:

- SVBGSA assessed data gaps and selected 2 to request be filled through DWR's Technical Support Services. SVBGSA evaluated land ownership and access. In doing so, SVBGSA worked with MCWRA to ensure the wells will be strategically located and contribute data that is useful for all agencies.
- SVBGSA and MCWRA began discussions on expanding and enhancing the GEMS program. This effort will primarily take place in 2022 and 2023. These early discussions focused on understanding the challenges to changing the program and steps involved.
- SVBGSA participated in DWR's planning for an airborne electromagnetic (AEM) survey across the Salinas Valley. SVBGSA undertook communication and engagement with stakeholders, and it gave feedback on flight lines.

4.1.3 Planning

Throughout WY 2021, SVBGSA worked with the 7 members of the Upper Valley Planning Committee to draft the Upper Valley Subbasin GSP. SVBGSA engaged the Committee in an iterative process of chapter development: first educating the Committee on chapter topics, then facilitating discussions on each topic, and finally reviewing draft chapters. Stakeholders were involved in understanding the Subbasin, setting SMC, and developing a list of potential projects and management actions. It received public comments throughout the process and in September 2021 it initiated a 45-day public comment period for the full GSP. At the conclusion of the planning process in August 2021 for the Upper Valley GSP the SVBGSA will have held more than 37 planning meetings and technical workshops on each aspect of the Upper Valley Subbasin GSP.

In addition to regularly scheduled committee meetings, a series of workshops were held for the Upper Valley Subbasin Planning Committee as detailed in Table 7. Subject Matter Workshops Held During GSP Preparation. These workshops were informational for committee members, stakeholders, and the general public and cover pertinent topics to be included in the GSPs. Workshops were timed to specific chapter development for the GSP. Subject matter experts were brought in as necessary to provide the best available information to Subbasin Planning Committee members.

Table 7. Subject Matter Workshops Held During GSP Preparation

Topic	Date
Brown Act and Conflict of Interest	July 22, 2020
Sustainable Management Criteria	July 28, 2020
Water Law	August 10, 2020
Salinas Valley Watershed Overview	August 26, 2020
Web Map Workshop	September 30, 2020
Town Hall – Domestic Wells & Drinking Water	October 28, 2020
Pumping Allocations	November 18, 2020
Funding Mechanisms	January 27, 2021
Water Budgets	February 24, 2021
Communications and Implementation	March 31, 2021
Technical Modeling Workshop – SVIHM & SVOM	June 30, 2021

As an agency, SVBGSA GSP planning efforts during WY 2021 focused on developing 4 additional groundwater sustainability plans besides the Upper Valley GSP, and the GSP Update for the 180/400-Foot Aquifer Subbasin that is currently under development. While SVBGSA developed these plans through a bottom-up process working with subbasin planning committees, it ensured that they aligned with the Upper Valley Subbasin GSP, particularly with regards to selecting SMC that would not prevent the Upper Valley Subbasin from avoiding undesirable results. For example, all adjacent subbasin GSPs selected groundwater level minimum thresholds that are based on not exceeding recent low levels.

In June 2021, SVBGSA received DWR's review and approval of the 180/400-Foot Aquifer Subbasin GSP. Since the Upper Valley Subbasin GSP and other Salinas Valley GSPs were under development, SVBGSA took action immediately to address the corrective action on the water quality undesirable result. SVBGSA sought legal advice, revised the undesirable result for the GSPs, and brought the revised language to the partner GSAs, subbasin planning committees, Advisory Committee, and Board of Directors for approval. This language was included in the Upper Valley Subbasin GSP.

4.1.4 GSP Implementation Activities

SVBGSA submitted the Upper Valley Subbasin GSP in January 2022. One activity during WY 2021 contributed to GSP Implementation in the Upper Valley Subbasin. MCWRA continued to convene the Drought Technical Advisory Committee (D-TAC). The D-TAC completed the development of standards and guiding principles for managing the operations of Nacimiento and San Antonio reservoirs during multi-year drought periods. The MCWRA Board of Directors adopted the standards and guiding principles on February 16, 2021. Moving forward, D-TAC will meet any time a drought trigger occurs to develop a recommended release schedule for Nacimiento and San Antonio Reservoirs.

4.2 Sustainable Management Criteria

The Upper Valley Aquifer Subbasin GSP includes descriptions of significant and unreasonable conditions, minimum thresholds, interim milestones, measurable objectives, and undesirable results for each of DWR's 5 sustainability indicators. The SVBGSA determined locally defined significant and unreasonable conditions based on public meetings and staff discussions. The SMC are individual criterion that will each be met simultaneously, rather than in an integrated manner. A brief comparison of the data presented in Section 3 and the SMC criteria are included for each sustainability indicator in the following sections.

Since the GSP addresses long-term groundwater sustainability, some of the metrics for the sustainability indicators may not be applicable in each individual future year. The GSP is developed to avoid undesirable results—under average hydrogeologic conditions—with long-term, deliberate management of groundwater. Pursuant to SGMA regulations (California Water Code § 10721(w)(1)), "Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods." Therefore, groundwater levels may temporarily exceed minimum thresholds during prolonged droughts, which could be more extreme than those that have been anticipated based on historical data and anticipated climate change conditions. Such temporary exceedances do not constitute an undesirable result.

Average hydrogeologic conditions are the anticipated future groundwater conditions in the Subbasin, averaged over the planning horizon and accounting for anticipated climate change. Future groundwater conditions are based on historical precipitation, evapotranspiration, and streamflow, as well as reasonably anticipated climate change and sea level rise. The average hydrogeologic conditions include reasonably anticipated wet and dry periods.

The 2 solid green lines on Figure 12 show the anticipated average precipitation for 2030 and 2070, accounting for reasonable future climatic change (DWR, 2018). Measured annual precipitation for WY 2020 and 2021 are shown as the 2 blue dots and the dashed blue line shows the average measured precipitation since GSP implementation. This figure shows that WY 2021 was below the average hydrologic conditions expected for the Subbasin. Furthermore, average rainfall since GSP implementation has not risen to the anticipated future average conditions. As a result, it is not anticipated that all measurable objectives have been achieved this year because these measurable objectives were based on managing to average future climatic conditions. This does not mean that minimum thresholds should be exceeded. However, WY 2021 was dry, and therefore it is more likely that minimum thresholds are exceeded in 2021. Because the Subbasin is not expected to achieve sustainability until 2042, the current minimum threshold exceedances do not imply unsustainable groundwater management. However, areas with current minimum threshold exceedances should be monitored, and should demonstrate progress toward measurable objectives as conditions approach expected average conditions.

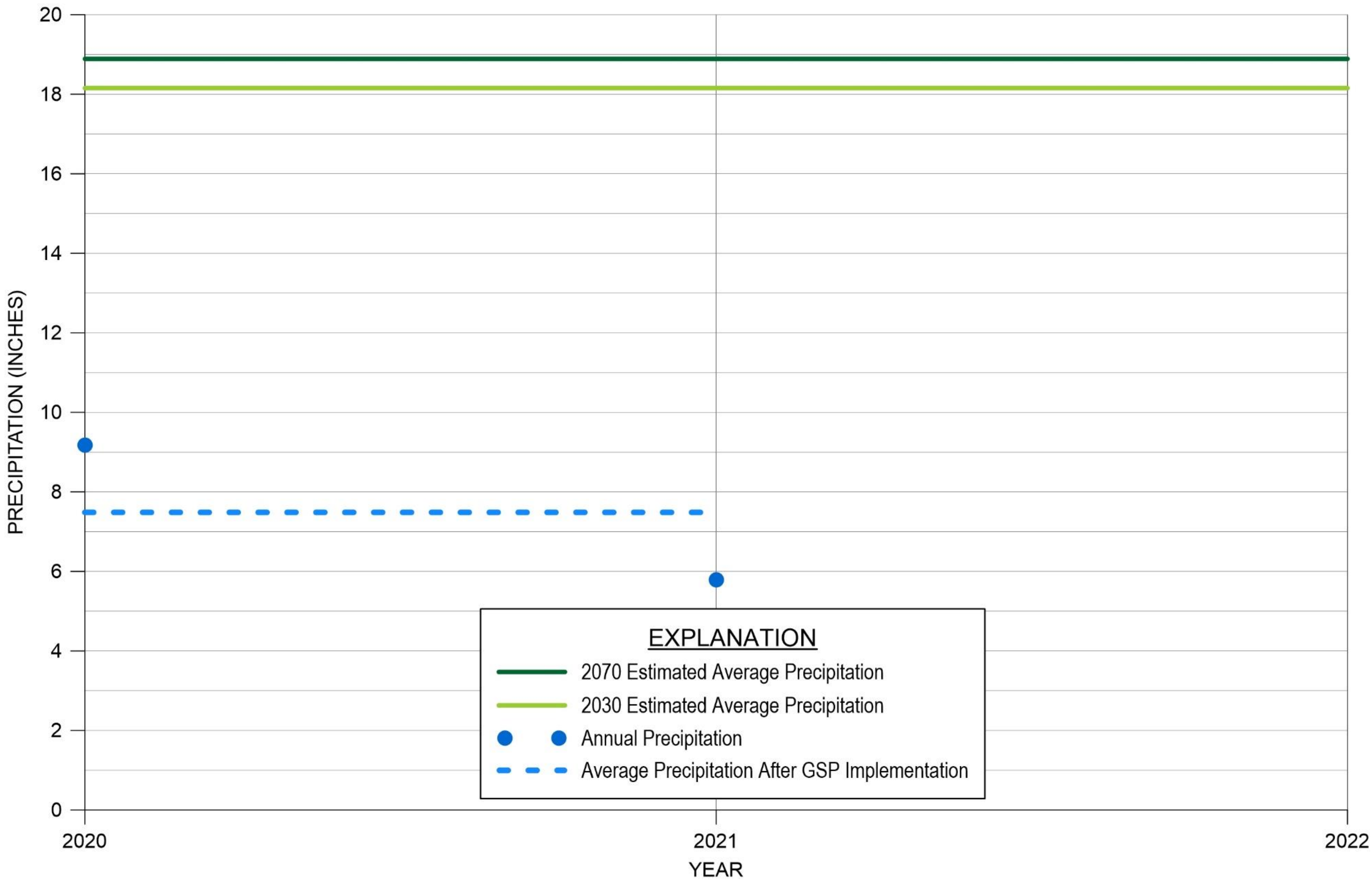

Figure 12. Comparison of Average Precipitation Since GSP Implementation and Estimated Future Average Precipitation

4.2.1 Chronic Lowering of Groundwater Levels SMC

4.2.1.1 Minimum Thresholds

Section 8.6.2.1 of the Upper Valley Subbasin GSP describes the information and methodology used to establish minimum thresholds for chronic lowering of groundwater levels. In the Upper Valley Subbasin, the minimum thresholds were set to 5 feet below the lowest groundwater elevation between 2021 and 2016 at each representative monitoring well. The minimum threshold values for each well within the groundwater elevation monitoring network are provided in Table 8. Fall groundwater elevation data are color-coded on this table: red cells mean the groundwater elevation is below the minimum threshold, yellow cells mean the groundwater elevation is above the minimum threshold but below the measurable objective, and green cells mean the groundwater elevation is above the measurable objective. In WY 2021, two wells in the Subbasin exceeded their minimum threshold as indicated by the red cells below.

Table 8. Groundwater Elevation Data, Minimum Thresholds, and Measurable Objectives

Below Minimum Threshold		Above Minimum Threshold		Above Measurable Objective	
Monitoring Site	**Minimum Threshold (feet)**	**WY 2020 Elevation Data**	**WY 2021 Elevation Data**	**Interim Milestone at Year 2027 (feet)**	**Measurable Objective (feet) (goal to reach at 2042)**
19S/07E-14N02	187.7	234.0	230.8	233.9	232.6
19S/08E-19K03	215.5	254.3	252.1	255.2	256.1
20S/08E-07F01	216.9	266.0	260.4	267.5	267.3
20S/08E-14K01	258.4	291.4	291.6	294.2	294.6
20S/08E-15H03	247.0	286.7	287.4	290.5	290.4
20S/08E-25Q01	309.7	315.1	314.2	314.8	316.7
20S/08E-34G01	384.1	383.6	378.5	390.3	403.8
21S/08E-13H01	387.9*	395.5	394.0	397.1	397.1*
21S/09E-06F50	322.9	330.8	331.6	331.8	332.7*
21S/09E-16E01	330.0	345.1	344.7	345.4	344.7
21S/09E-23G01	347.9	358.6	358.6	359.1	361.6
21S/09E-24L01	352.5	364.3	364.1	362.5	364.7
21S/10E-32N01	368.0	377.1	377.2	377.4	378.1
22S/10E-09P01	383.6	401.0*	401.4	401.2	401.7
22S/10E-16K01	375.5	396.9	396.9	400.3	400.8
22S/10E-34G01	419.4	424.0	424.2	424.7	425.0
23S/10E-14D01	437.2	442.5*	442.5*	442.7	443.3
23S/10E-33P01	506.7	503.0*	500.4	509.3	528.0

*Groundwater elevation was estimated.

4.2.1.2 Measurable Objectives and Interim Milestones

The measurable objectives for chronic lowering of groundwater levels represent target groundwater elevations that are higher than the minimum thresholds. These measurable objectives provide operational flexibility to ensure that the Subbasin can be managed sustainably over a reasonable range of hydrologic variability. Measurable objectives for the chronic lowering of groundwater levels are summarized in Table 8. None of the RMS wells had groundwater elevations higher than their measurable objective in WY 2021 and are represented by the green cells in Table 8.

To help reach measurable objectives, SVBGSA set interim milestones at 5-year intervals. The 2027 interim milestones for groundwater elevations are also shown in Table 10. The WY 2021 groundwater elevations in 2 wells are already higher than the 2027 interim milestones.

4.2.1.3 Undesirable Result

The chronic lowering of groundwater levels undesirable result is a quantitative combination of groundwater elevation minimum threshold exceedances. For the Subbasin, the groundwater elevation undesirable result is:

More than 15% of the groundwater elevation minimum thresholds are exceeded.

Table 8 shows that 11% of wells exceed their minimum threshold but do not exceed the 20-year planning horizon undesirable result. Groundwater elevation minimum threshold exceedances, compared with the 2042 undesirable result, is shown on Figure 13. If a value is in the shaded red area, it would constitute an undesirable result in 2042. This graph will be updated annually with new data to demonstrate the sustainability indicator’s direction toward sustainability.

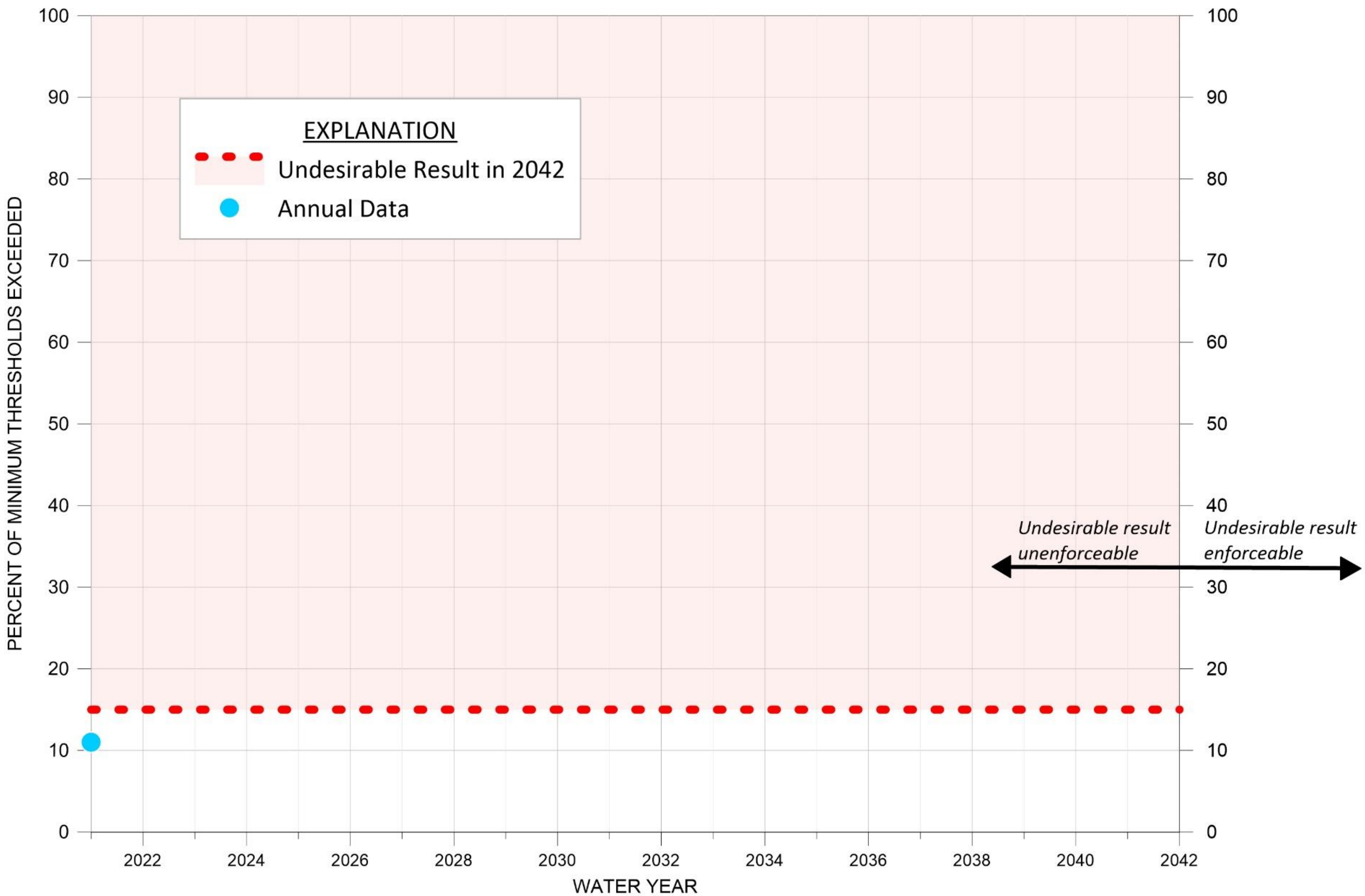

Figure 13. Groundwater Elevation and Storage Exceedances Compared to 2042 Undesirable Result

4.2.2 Reduction in Groundwater Storage SMC

4.2.2.1 Minimum Thresholds

The reduction in groundwater storage SMC is established by proxy using groundwater elevations. The minimum thresholds for reduction in groundwater storage are measured using groundwater elevations as proxies; therefore, the minimum thresholds are identical to the minimum thresholds for groundwater level RMS wells, which are described in Section 4.2.1.1.

4.2.2.2 Measurable Objective and Interim Milestones

The measurable objectives and interim milestones for reduction in groundwater storage are the same as those for groundwater elevations that are described in Section 4.2.1.2.

4.2.2.3 Undesirable Result

The criteria used to define undesirable results for reduction of groundwater storage are based on minimum thresholds established for chronic lowering of groundwater levels. The reduction of storage undesirable result is:

> *More than 15% of groundwater elevation minimum thresholds are exceeded. The undesirable result for reduction in groundwater storage is established by proxy using groundwater elevations.*

Based on the groundwater elevation data presented in Section 4.2.1, less than 15% of wells exceeded their minimum thresholds. The 2021 groundwater storage as measured by proxy using groundwater elevations did not exceed the 20-year planning horizon undesirable result as shown on Figure 13. If a value is in the shaded red area, it would constitute an undesirable result in 2042.

4.2.3 Degraded Groundwater Quality SMC

4.2.3.1 Minimum Thresholds

The degraded groundwater quality minimum threshold for each COC is based on the number of supply wells monitored that had higher concentrations of constituents than the regulatory standards for drinking water and irrigation water during the last sampling. Section 8.8.2.1 of the Upper Valley Subbasin GSP describes the information and methodology used to establish minimum thresholds for degraded groundwater quality. The minimum threshold values for each well within the groundwater quality monitoring network are provided in Table 9. Table 9 also shows the WY 2021 exceedances of the regulatory standard discussed in Section 3.4 and the running total of regulatory standard exceedances used to measure against the minimum thresholds. Only the latest sample for each COC at each well is used for the running total. The minimum thresholds are set at zero additional exceedances of each constituent, based on the exceedances in 2019. These conditions were determined to be significant and unreasonable because groundwater quality in exceedance of these will cause a financial burden on groundwater users. Public water systems with COC concentrations above the MCL or SMCL are required to add treatment to the drinking water supplies or drill new wells. Agricultural wells with COCs that significantly reduce crop production will reduce grower’s yields and profits.

In WY 2021, there was 1 exceedance of the minimum thresholds established for DDW public water system supply wells and none for the ILRP on-farm domestic and irrigation wells. The last column in Table 9 includes the number of exceedances above the minimum thresholds, the COCs that exceeded the minimum threshold are highlighted in orange. The negative numbers in the last column indicate wells that once exceeded the regulatory limit are no longer exceeding the limit.

Table 9. Minimum Thresholds and Measureable Objectives for Degradation of Groundwater Quality

Constituents of Concern (COC)	Minimum Threshold/ Measurable Objective (existing exceedances of Regulatory Standard in 2019)	WY 2021 Exceedances of Regulatory Standard (new exceedances based on wells monitored in WY 2021)	Total of Exceedances of Regulatory Standard	Number of Exceedances above Minimum Threshold
DDW Wells				
1,2,3-Trichloropropane	4	0	4	0
Benzo(a)Pyrene	1	0	1	0
Boron	2	0	0	-2
Cadmium	1	0	1	0
Dinoseb	1	0	1	0
Hexachlorobenzene	1	0	1	0
Iron	8	0	8	0
Lindane	2	0	2	0
Manganese	6	0	6	0
Nitrate (as nitrogen)	8	0	8	0
Specific Conductance	5	0	6	1
Sulfate	4	0	4	0
Total Dissolved Solids	7	0	6	-1
Vinyl Chloride	1	0	1	0
ILRP On-Farm Domestic Wells				
Chloride	7	0	7	0
Nitrate (as nitrogen)	30	0	29	-1
Nitrate + Nitrite (sum as nitrogen)	11	0	11	0
Specific Conductance	33	0	33	0
Sulfate	26	0	26	0
Total Dissolved Solids	35	0	35	0
ILRP Irrigation Supply Wells				
Chloride	13	0	13	0

4.2.3.2 Measurable Objectives and Interim Milestones

The measurable objectives for degradation of groundwater quality represent a target number of groundwater quality exceedances in the Subbasin. SGMA does not require the improvement of groundwater quality. Therefore, the Upper Valley GSP includes measurable objectives identical to the minimum thresholds, as defined in Table 9. Interim milestones are also set at the minimum threshold levels. Although there was 1 groundwater quality minimum threshold exceedance in WY 2021, the groundwater quality data already meet the 2027 interim milestones because this exceedance is not due to GSA actions.

4.2.3.3 Undesirable Result

The degradation of groundwater quality undesirable result is a quantitative combination of groundwater quality minimum threshold exceedances. Any groundwater quality degradation as a direct result of GSP implementation is unacceptable. Some groundwater quality changes are expected to occur independent of SGMA activities; because these changes are not related to SGMA activities they do not constitute an undesirable result. The degradation of groundwater quality undesirable result is:

> *Future or new minimum thresholds exceedances are caused by a direct result of GSA groundwater management action(s), including projects or management actions and regulation of groundwater extraction.*

Table 9 shows 1 constituent exceeded its minimum threshold in WY 2021. Since SVBGSA has yet to implement any projects or management actions in the Subbasin, this exceedance is not due to GSA actions. Therefore, the groundwater quality data do not exceed the 20-year planning horizon undesirable result. The groundwater quality minimum threshold exceedances, compared with the 2042 undesirable results, is shown on Figure 14. If a value is in the shaded red area, it would constitute an undesirable result in 2042. This graph is updated annually with new data to demonstrate the sustainability indicator’s direction toward sustainability.

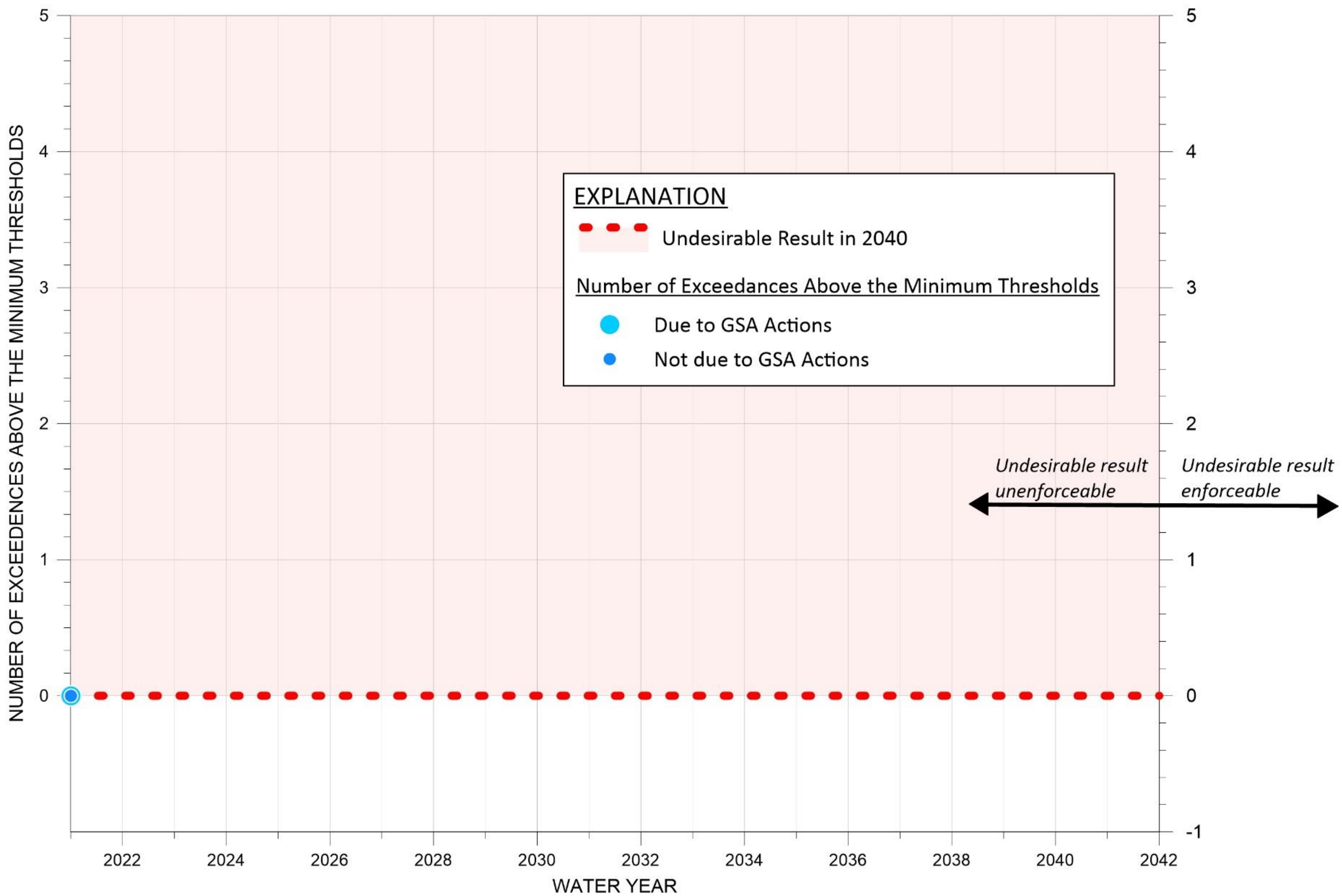

Figure 14. Groundwater Quality Minimum Threshold Exceedances Compared to the 2042 Groundwater Quality Undesirable Result

4.2.4 Land Subsidence SMC

4.2.4.1 Minimum Thresholds

Accounting for measurement errors in the InSAR data, the minimum threshold for land subsidence in the GSP is zero net long-term subsidence, with no more than 0.1 foot per year of estimated land movement to account for InSAR errors. Section 8.9.2.1 of the Upper Valley Aquifer Subbasin GSP describes the information and methodology used to establish minimum thresholds for subsidence. A single minimum threshold is set for the entire Subbasin. Annual subsidence data from October 2020 to October 2021 demonstrated less than the minimum threshold of 0.1 foot/year, as shown on Figure 11.

4.2.4.2 Measurable Objectives and Interim Milestones

The measurable objectives for ground surface subsidence represent target subsidence rates in the Subbasin. Because the minimum thresholds of zero net long-term subsidence are the best achievable outcome, the measurable objectives are identical to the minimum thresholds: zero net long-term subsidence, with no more than 0.1 foot per year of estimated land movement to account for InSAR errors. Figure 11 demonstrates that data from October 2020 to October 2021 showed less than the measurable objective of no more than 0.1 foot per year of measured subsidence is being met. The interim milestones are identical to minimum threshold of 0.1 foot per year. The latest subsidence data shows that the 2027 subsidence interim milestone is already being met.

4.2.4.3 Undesirable Result

The ground surface subsidence undesirable result is a quantitative combination of subsidence minimum threshold exceedances. For the Upper Valley Subbasin, no long-term subsidence is acceptable. Therefore, the land subsidence undesirable result is:

> *There is an exceedance of the minimum threshold for land subsidence due to lowered groundwater elevations.*

Data from October 2020 to October 2021 showed subsidence was below the minimum threshold of 0.1 foot per year. The latest land subsidence data, therefore, does not exceed the 20-year planning horizon undesirable result. Maximum measured subsidence in the Subbasin, compared with the 2042 change in subsidence undesirable results goal, is shown on Figure 15. If a value is in the shaded red area, it would constitute an undesirable result in 2042.

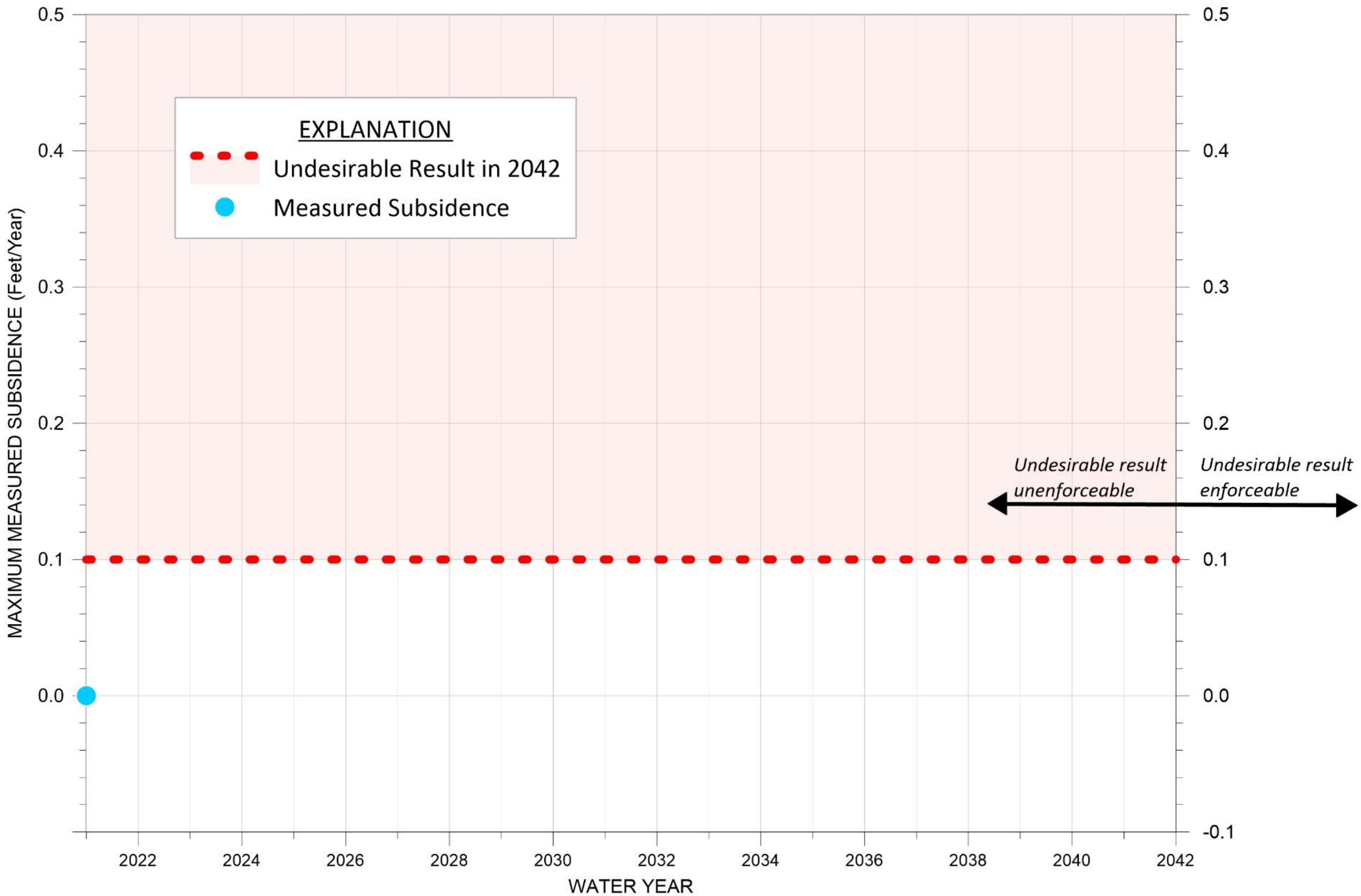

Figure 15. Maximum Measured Subsidence Compared to the 2042 Undesirable Result

4.2.5 Depletion of Interconnected Surface Water SMC

4.2.5.1 Minimum Thresholds

As described in Section 8.10.2.1 of the GSP, the minimum thresholds for depletion of ISW are established by proxy using shallow groundwater elevations and are established to maintain consistency with chronic lowering of groundwater elevation and reduction in groundwater storage minimum thresholds. ISW minimum thresholds were set to 2016 shallow groundwater elevations and are included in Table 10. Shallow groundwater elevation data are color-coded on this table: red cells mean the groundwater elevation is below the minimum threshold, yellow cells mean the groundwater elevation is above the minimum threshold but below the measurable objective, and green cells mean the groundwater elevation is above the measurable objective. In WY 2021, none of the existing monitoring wells exceeded their minimum threshold. When the new monitoring well is drilled, SMC will be determined using interpolated values from the groundwater elevation contour maps.

Minimum thresholds are not established for times when flow in a river is due to conservation releases from a reservoir. Conservation releases are meant to recharge the Salinas Valley groundwater basin; therefore, depletion of conservation releases is a desired outcome and the minimum thresholds and measurable objectives do not apply to these flows.

Table 10. Shallow Groundwater Elevation Data, ISW Minimum Thresholds, and ISW Measurable Objectives (in feet)

Below Minimum Threshold		Above Minimum Threshold		Above Measurable Objective	
Monitoring Site	Minimum Threshold	WY 2020 Elevation Data	WY 2021 Elevation Data	Interim Milestone at Year 2027	Measurable Objective (goal to reach at 2042)
19S/07E-14H01	213.7	249.2	245.9	249.4	250.0*
20S/08E-07F01**	216.9	266.0	260.4	266.3	267.3
21S/09E-16E01**	330.0	345.1	344.7	345.0	344.7
23S/10E-14D01**	437.2	442.5*	442.5*	442.7	443.3

*Groundwater elevation estimated.

**Monitoring well is also an RMS for chronic lowering of groundwater elevations, and SMC for groundwater level and ISW are identical.

4.2.5.2 Measurable Objectives and Interim Milestones

The measurable objectives for depletion of ISW target groundwater elevations that are higher than the minimum thresholds. The measurable objectives are established to maintain consistency with the chronic lowering of groundwater elevation and reduction in groundwater storage minimum thresholds, which are also established based on groundwater elevations. The measurable objectives for existing monitoring wells are listed in Table 10 and are set to

2011 shallow groundwater elevations. The green cell in Table 10 represents the well with WY 2021 groundwater elevations higher than the measurable objective.

Table 10 also lists the 2027 interim milestones, which are set at 5-year intervals to help reach measurable objectives. The WY 2021 groundwater elevations in 1 well is already higher than the 2027 interim milestones.

4.2.5.3 Undesirable Result

The depletion of ISW undesirable result is a quantitative combination of minimum threshold exceedances. The undesirable result for depletion of ISW is:

> *There is an exceedance of the minimum threshold in a shallow groundwater monitoring well used to monitor interconnected surface water.*

Table 10. shows that there are no exceedances of the ISW minimum thresholds; therefore, the WY 2021 shallow groundwater elevations do not exceed the 20-year planning horizon undesirable result. The ISW minimum threshold exceedances, compared with the 2042 undesirable results, is shown on Figure 16. If a value is in the shaded red area, it would constitute undesirable result in 2042. This graph is updated annually with new data to demonstrate the sustainability indicator’s direction toward sustainability.

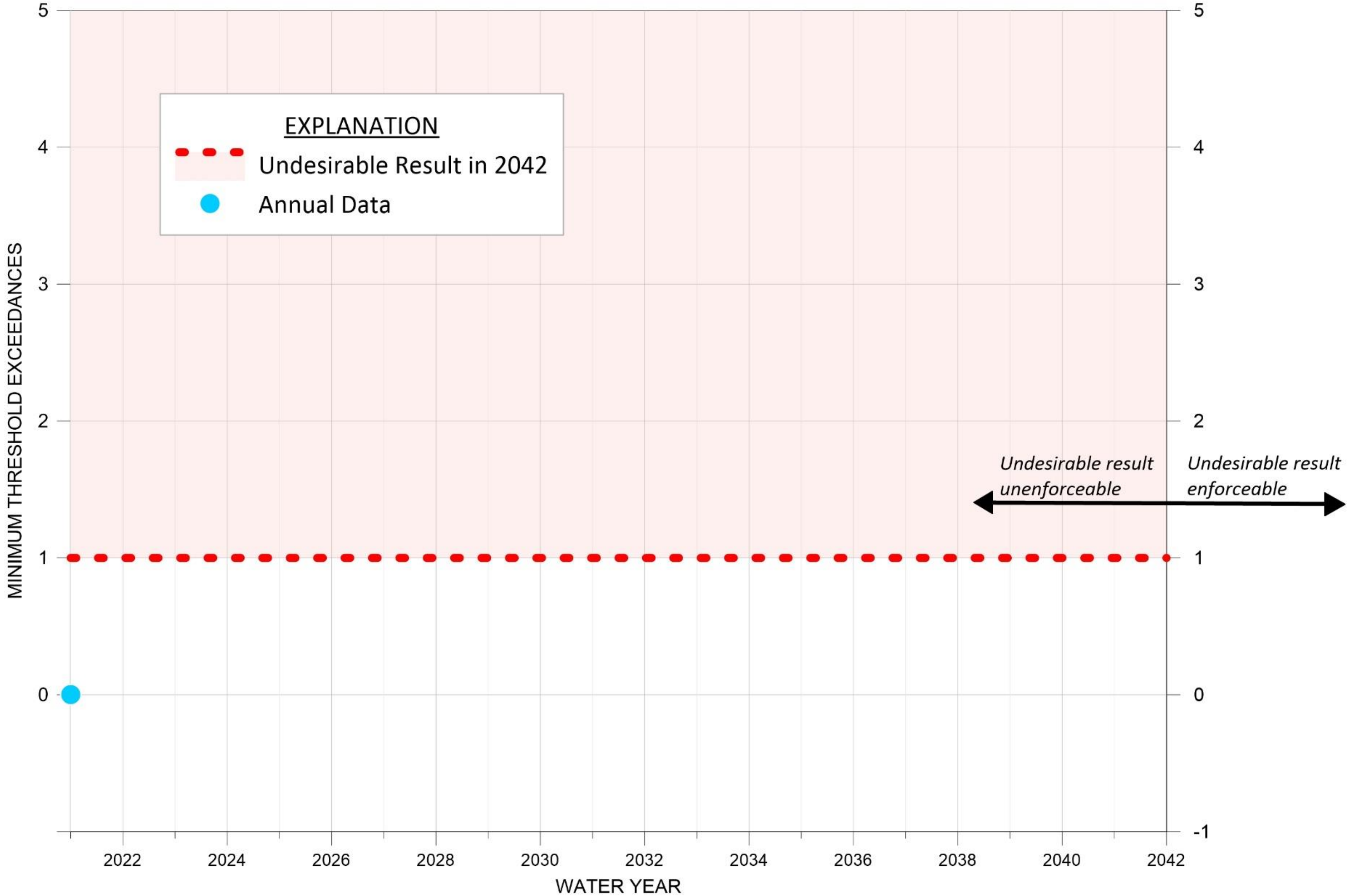

Figure 16. Shallow Groundwater Elevation Exceedances Compared to 2042 Undesirable Result

5 CONCLUSION

This 2021 Annual Report updates data and information for the Upper Valley Subbasin GSP from WY 2019 to WY 2021 with the best available data. It covers GSP implementation activities up to September 30, 2021. All GSP implementation and annual reporting meets the regulations set forth in the SGMA GSP Regulations.

Results show little change in groundwater sustainability indicators when compared to the current conditions described in the GSP. WY 2021 was classified as dry. Groundwater elevations decreased in WY 2021, with most wells showing elevations above their minimum thresholds but all wells were below their measurable objectives. Change in groundwater storage, as measured by groundwater elevation changes, decreased from WY 2019 to WY 2021. Groundwater quality data showed 1 exceedance of minimum thresholds in DDW wells only. Negligible subsidence was observed in WY 2021. Finally, the existing shallow wells used to monitor depletion of ISW were all above their minimum thresholds.

SVBGSA has continued to actively engage stakeholders and has started planning activities to implement the GSP. In addition to the collaborative development of the Upper Valley GSP through the Upper Valley Subbasin Planning Committee, since GSP submittal the SVBGSA continues to engage stakeholders through its participatory Advisory Committee and Board of Directors. It has also begun to fill data gaps to start implementing the Upper Valley Subbasin GSP.

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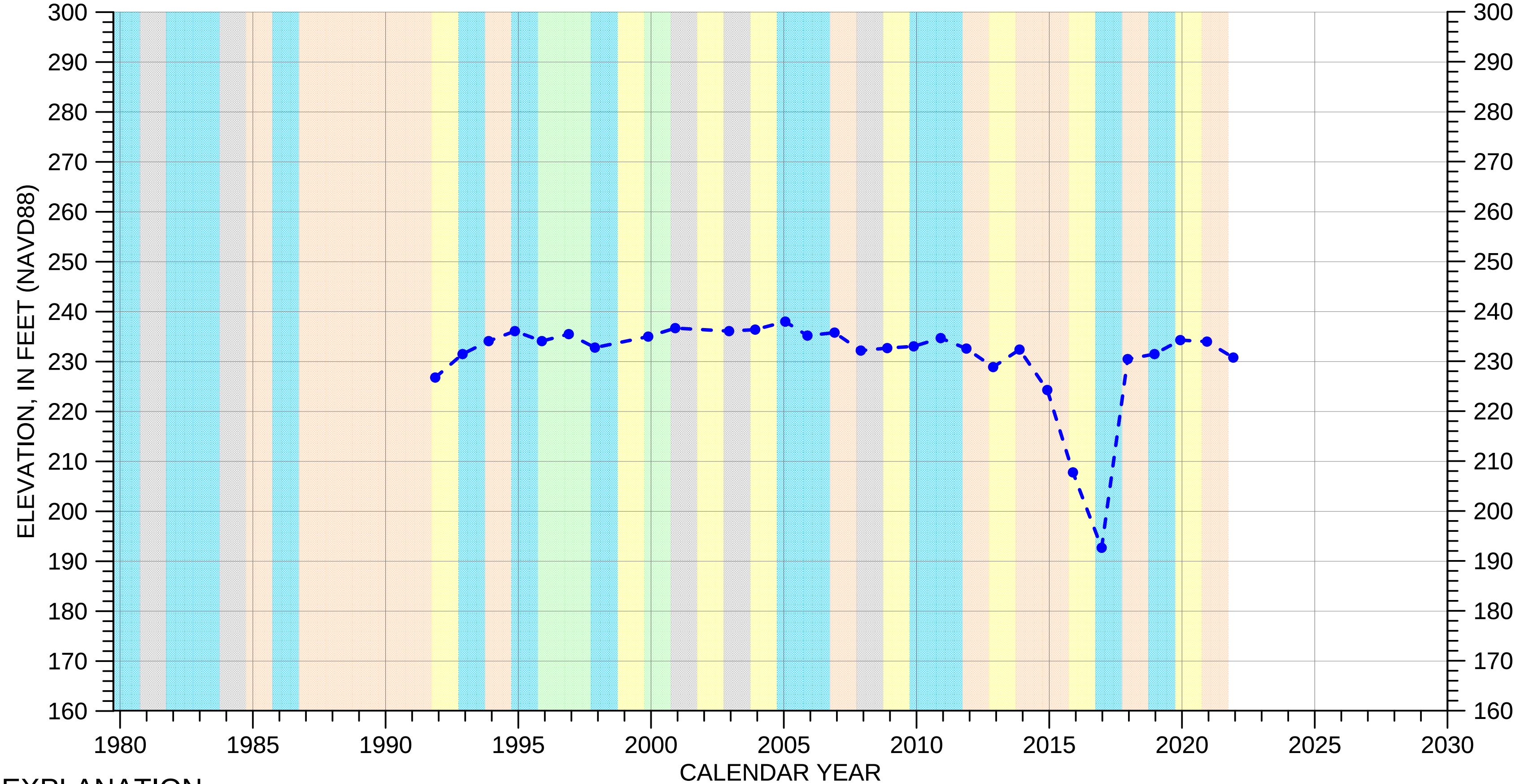
APPENDIX A. HYDROGRAPHS OF REPRESENTATIVE MONITORING SITE WELLS

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 19S/07E-14N02

Upper Valley Aquifer Subbasin



Perforated interval unknown

Well bottom 88 feet msl

EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface (316 FT MSL)

WATER YEAR TYPE DESIGNATION

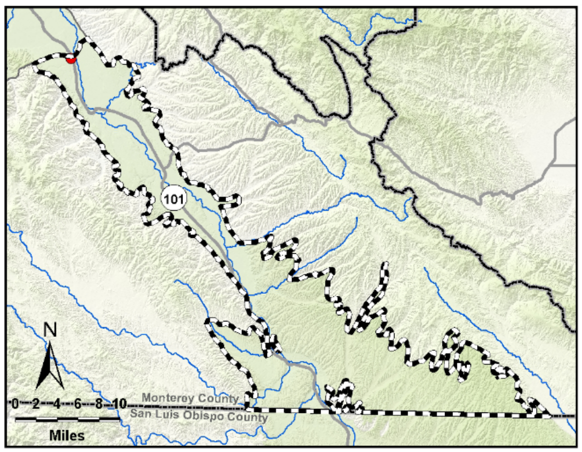
DRY

DRY - NORMAL

NORMAL

WET - NORMAL

WET



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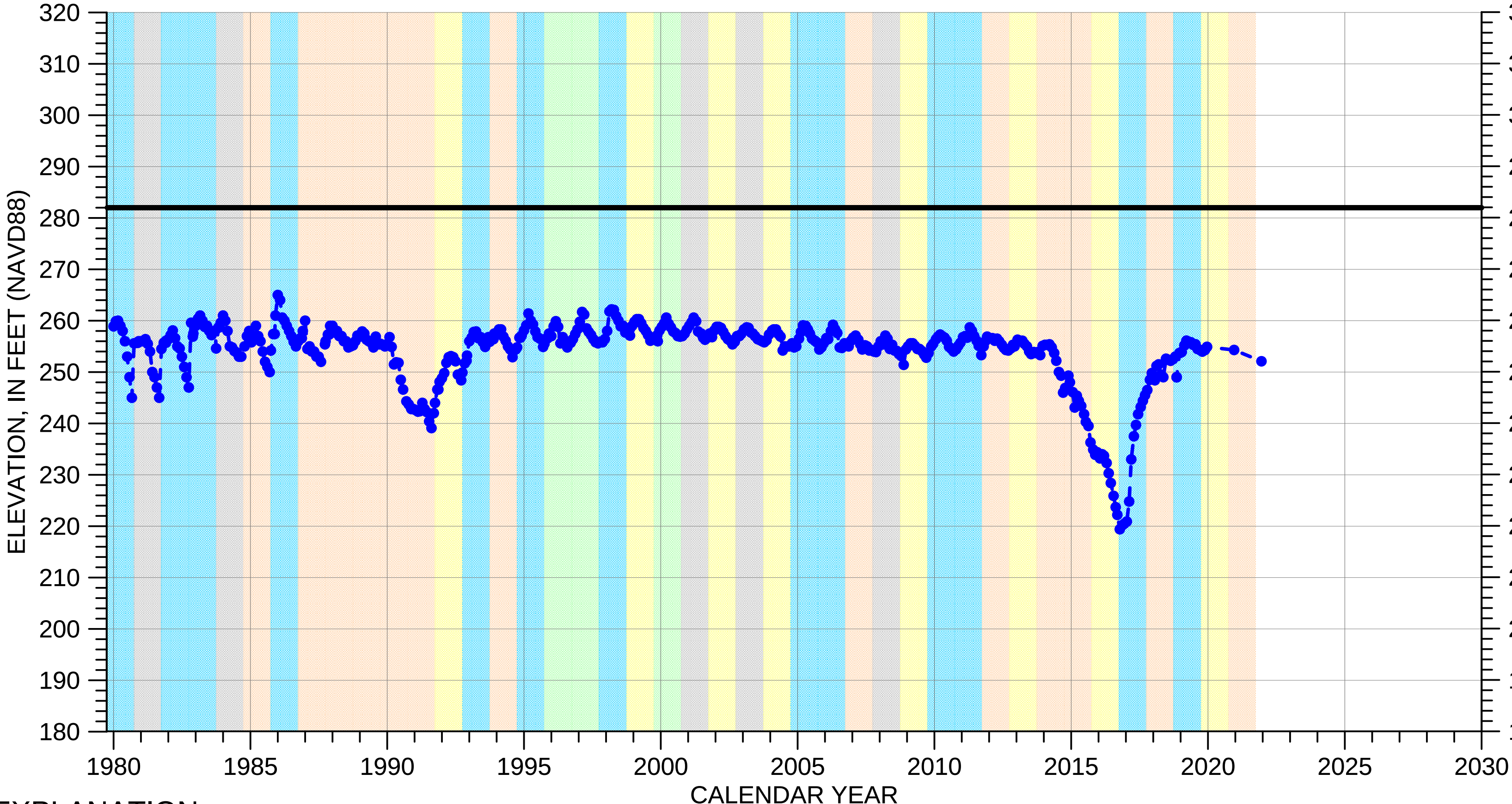
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 19S/08E-19K03

Upper Valley Aquifer Subbasin

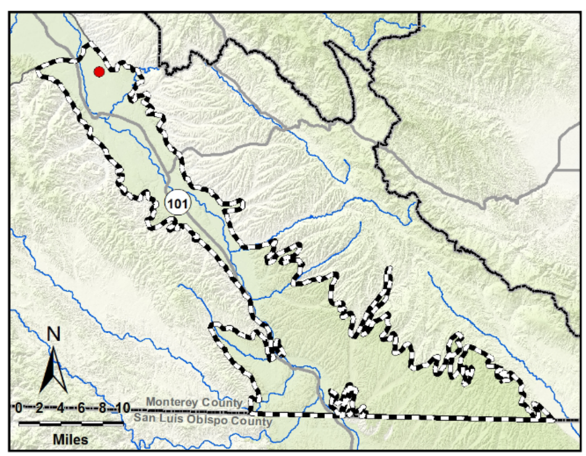


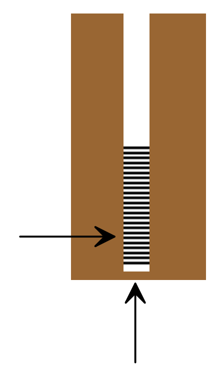
EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET





Perforated from 152 to 104 feet msl

Well bottom 70 feet msl

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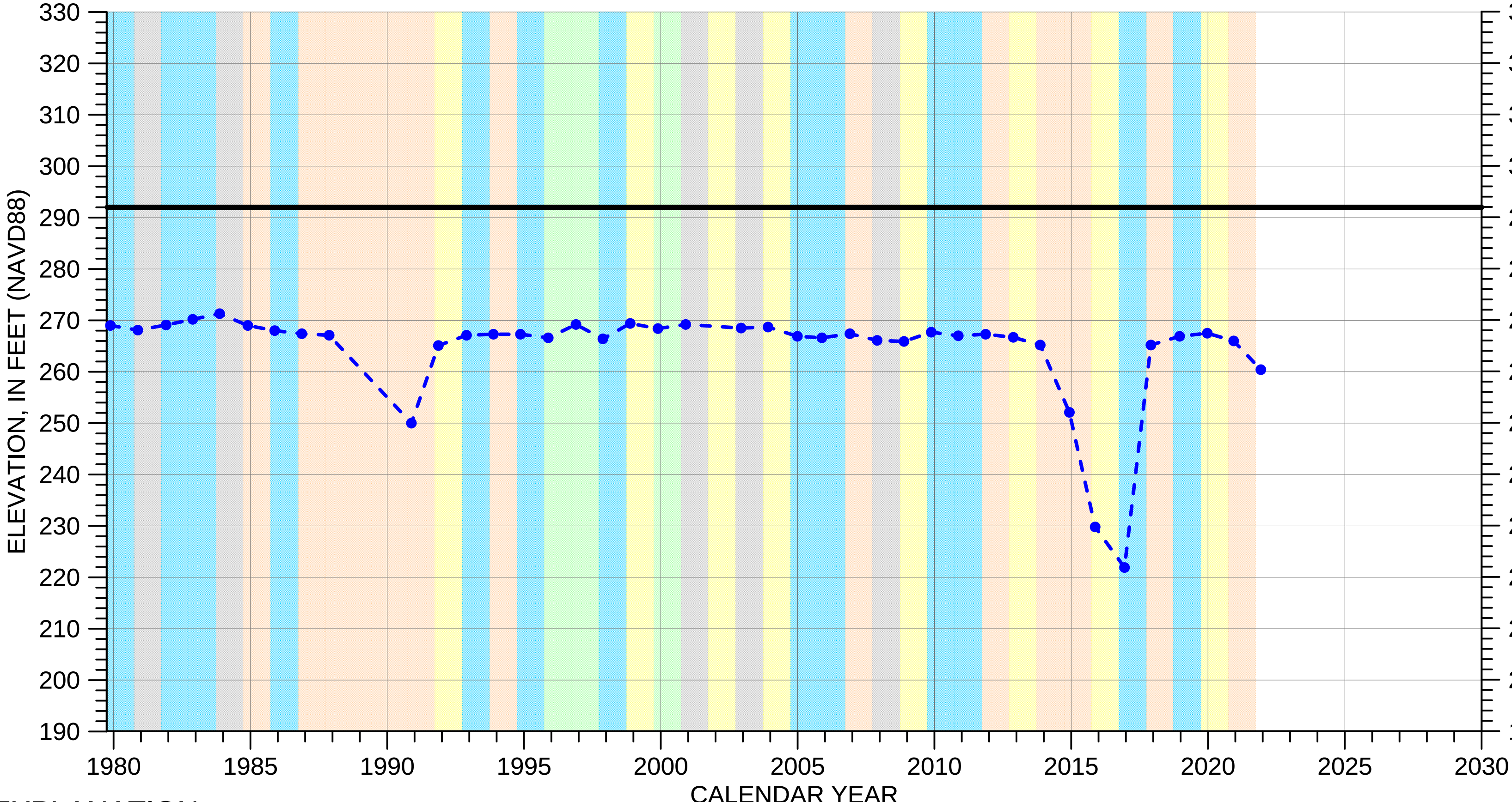
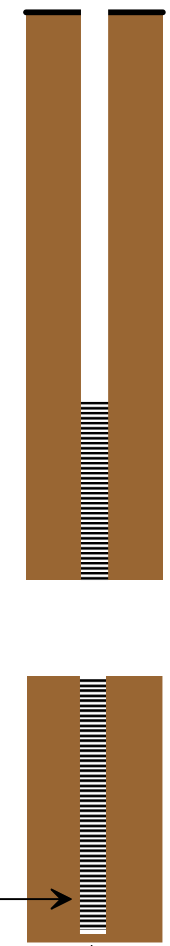
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 20S/08E-07F01

Upper Valley Aquifer Subbasin





EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface

WATER YEAR TYPE DESIGNATION

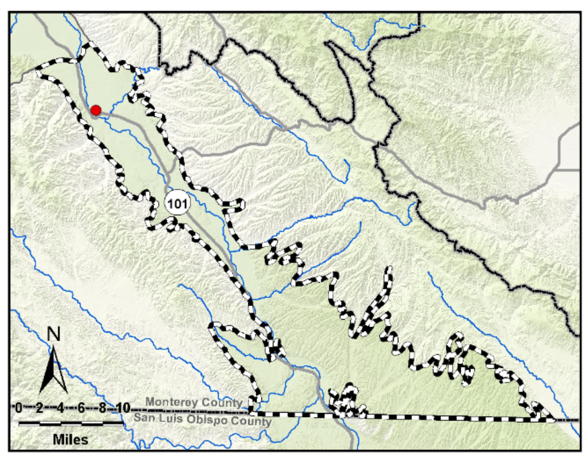
DRY

DRY - NORMAL

NORMAL

WET - NORMAL

WET



Perforated from 222 to 107 feet msl

Well bottom 103 feet msl

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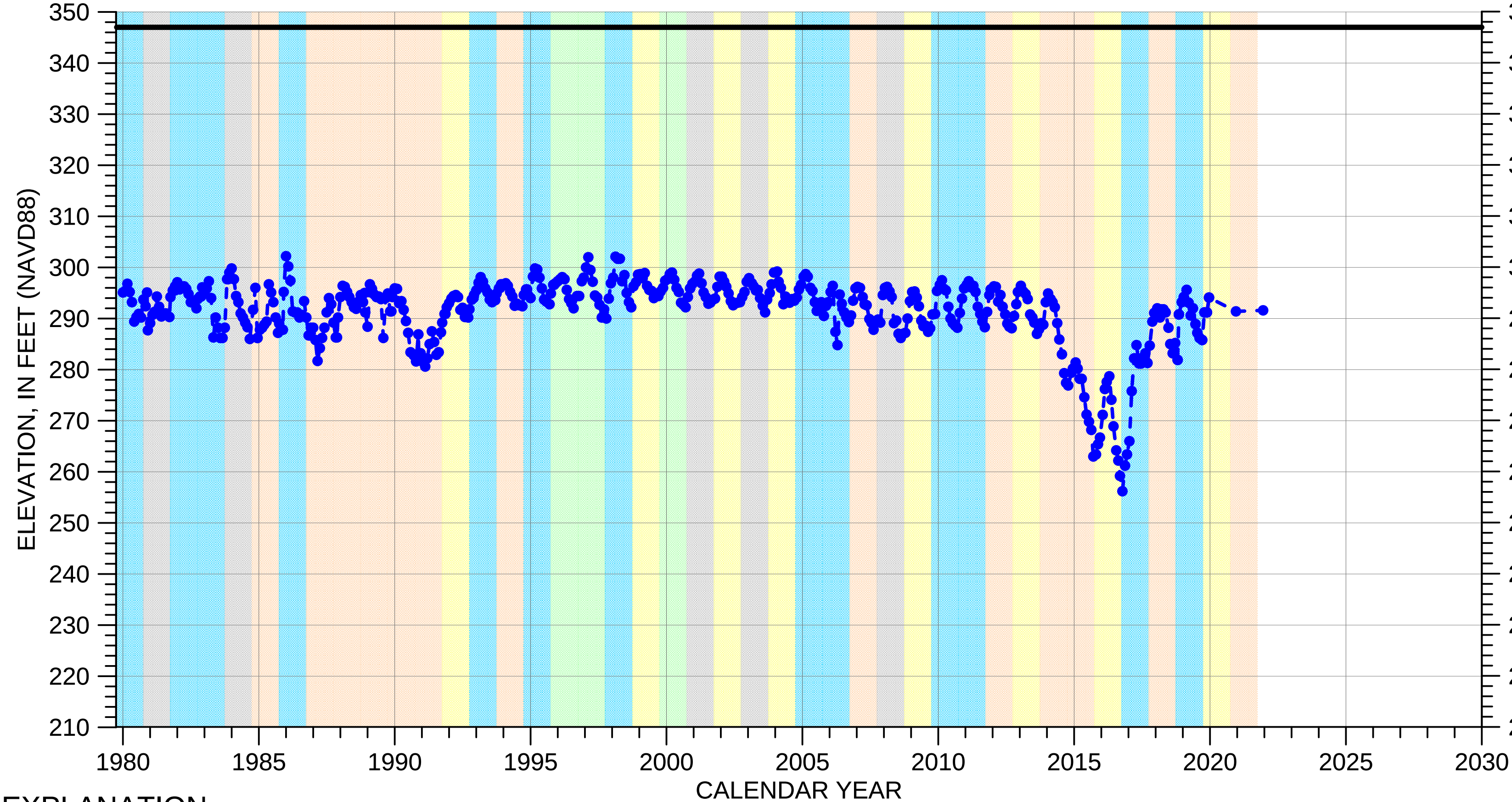
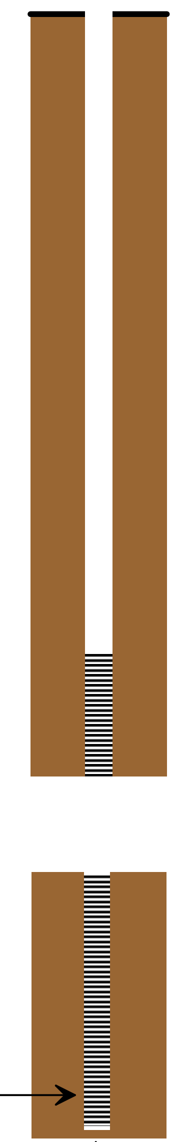
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 20S/08E-14K01

Upper Valley Aquifer Subbasin



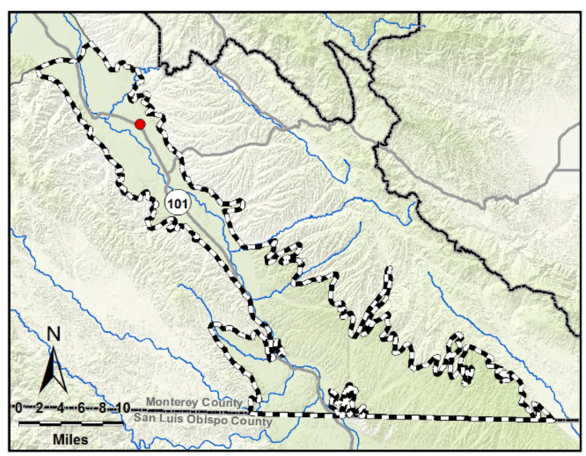


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET



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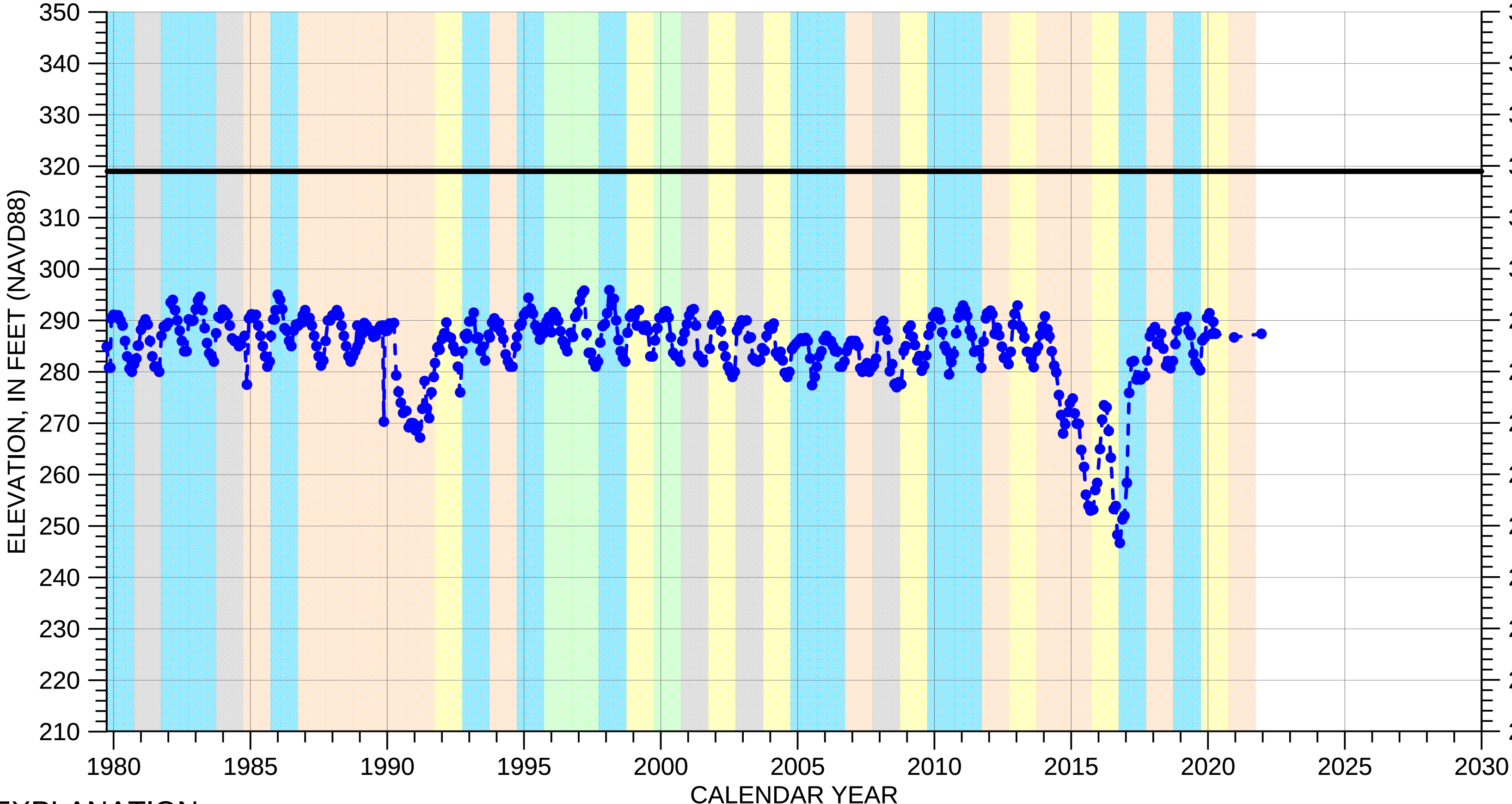
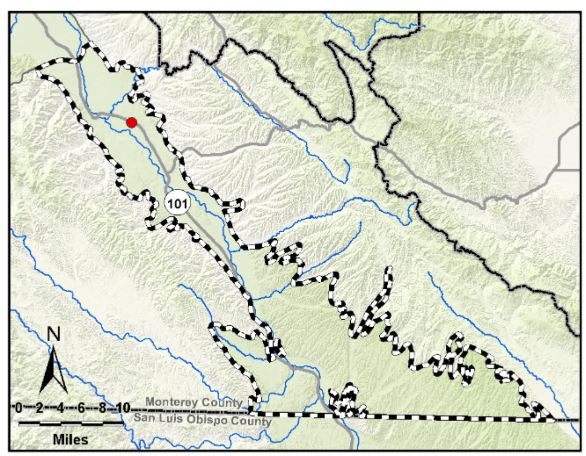
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 20S/08E-15H03

Upper Valley Aquifer Subbasin



EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface



WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET

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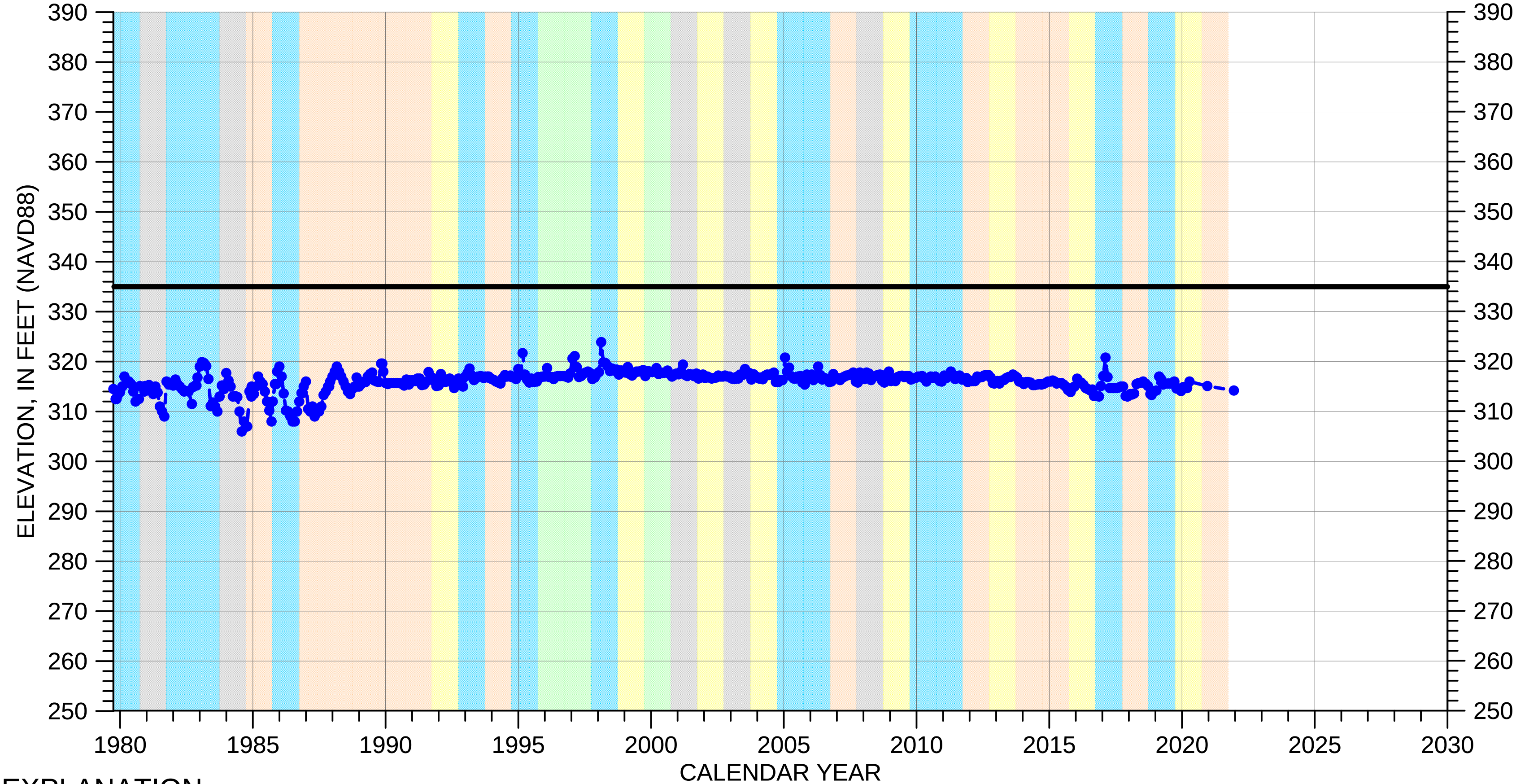
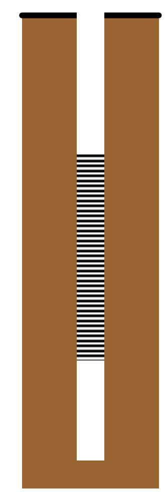
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 20S/08E-25Q01

Upper Valley Aquifer Subbasin





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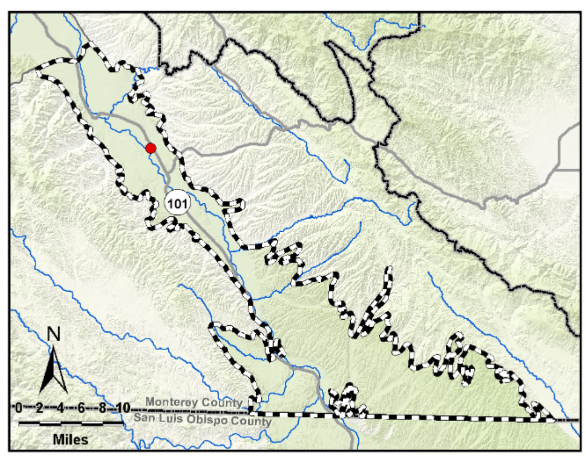
EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

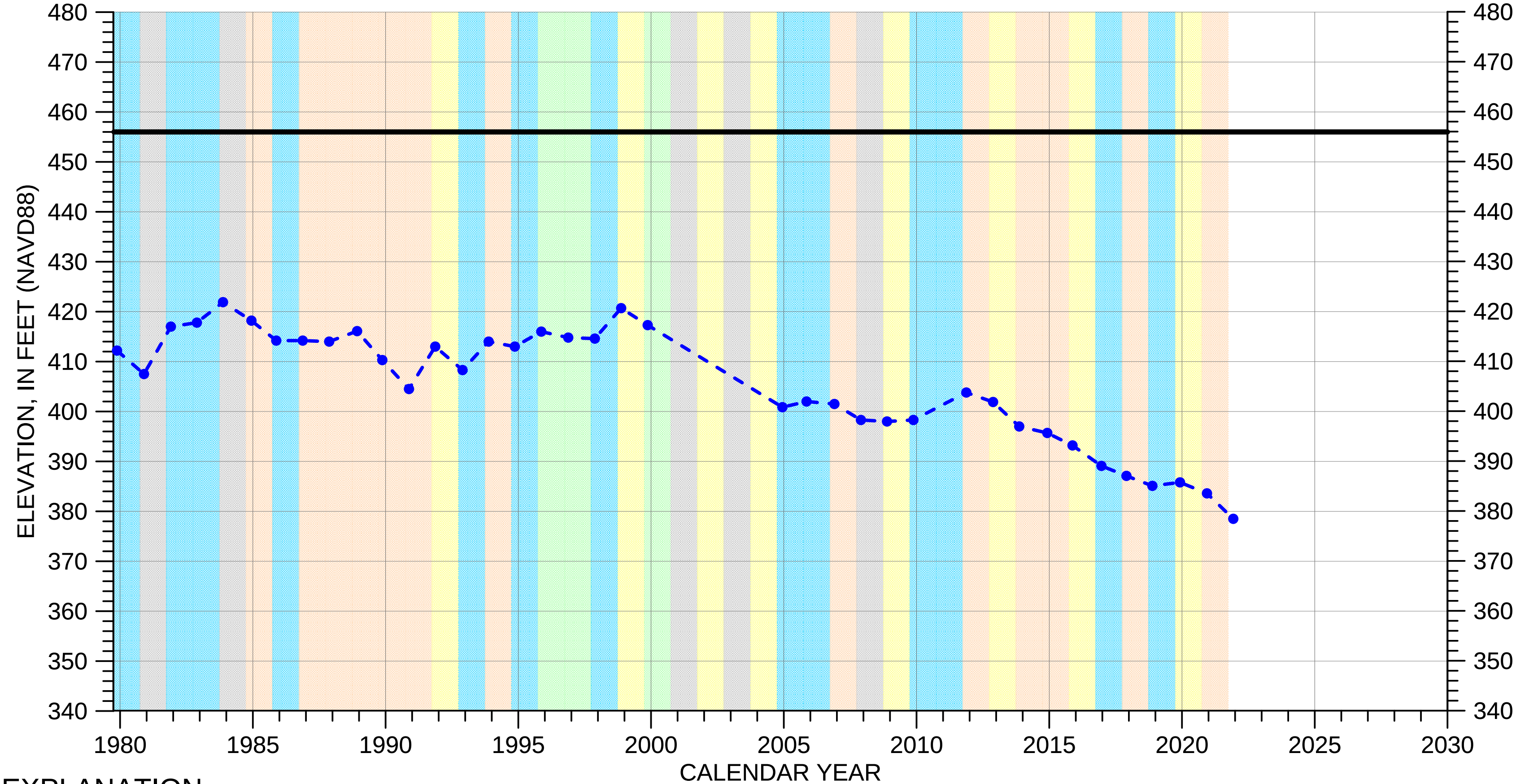
WATER YEAR TYPE DESIGNATION

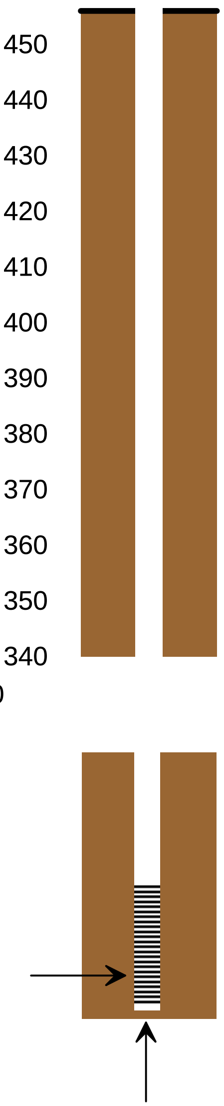
- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET



HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 20S/08E-34G01

Upper Valley Aquifer Subbasin



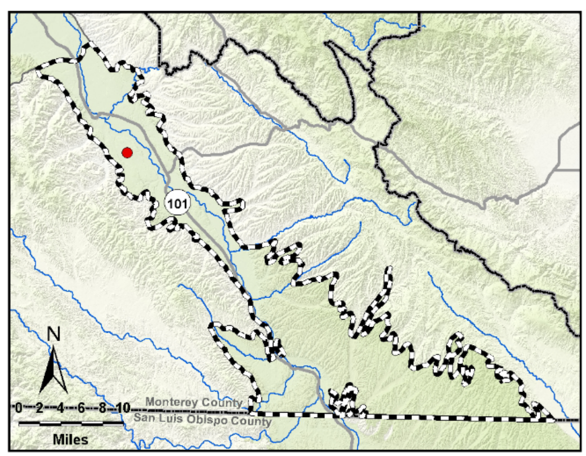


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET



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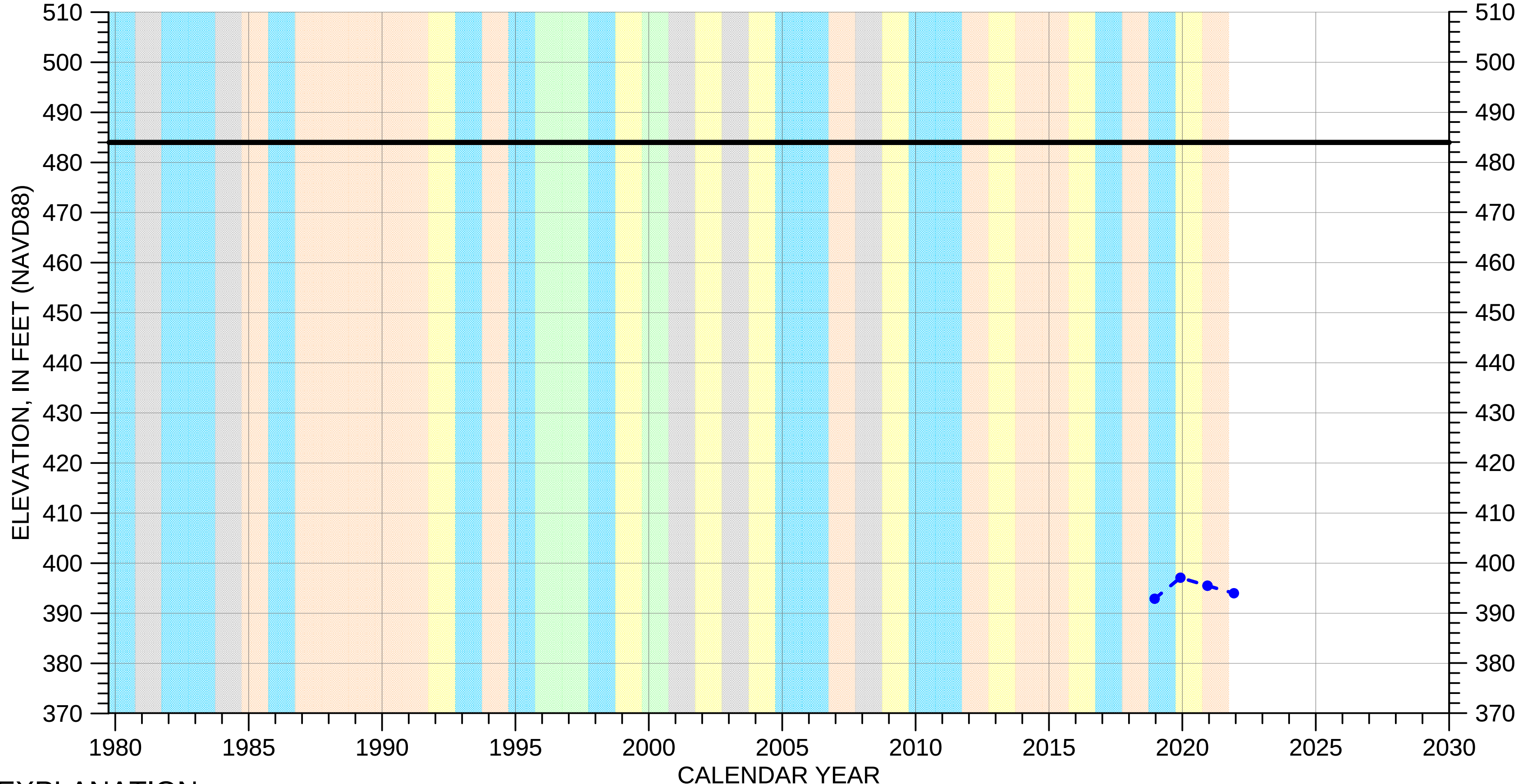
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 21S/08E-13H01

Upper Valley Aquifer Subbasin



EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface

WATER YEAR TYPE DESIGNATION

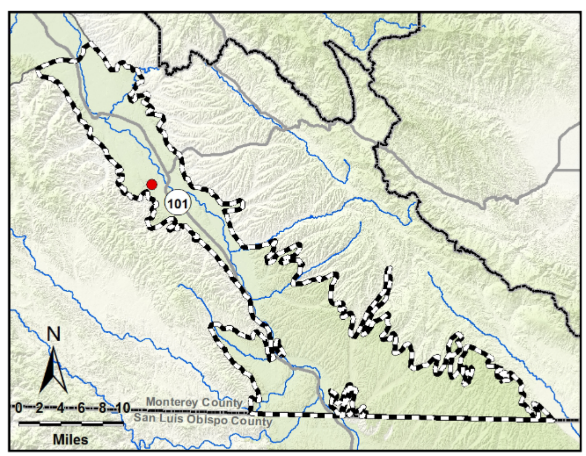
DRY

DRY - NORMAL

NORMAL

WET - NORMAL

WET



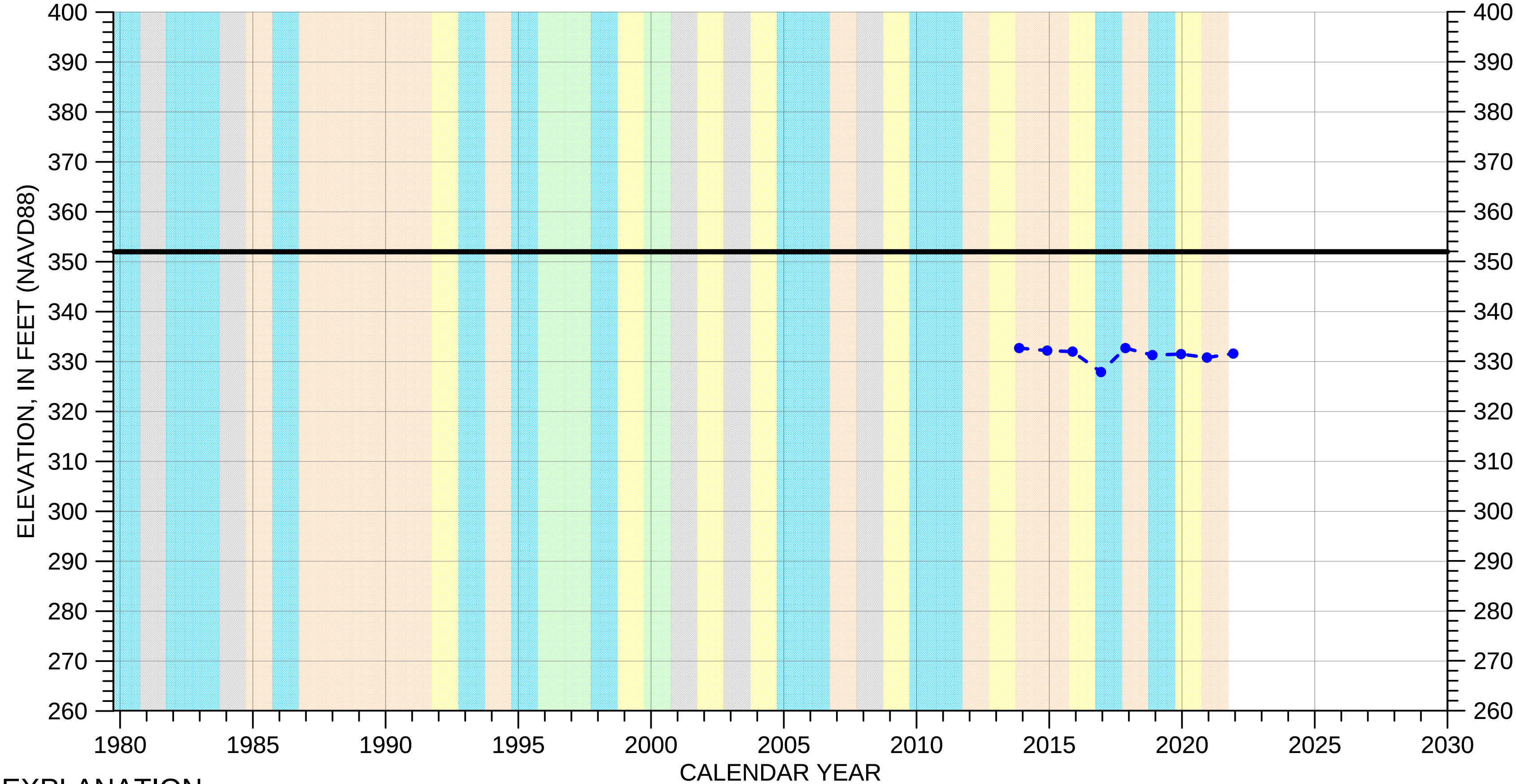
Perforated interval unknown

Well bottom elevation unknown

\\luc-data\public\projects\9100_Salinas_GSP\ProjectData\Analysis\water_levels\Hydrographs_MCWRANEW\GRFs_Ch5\21S_08E-13H01.grf

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 21S/09E-06F50

Upper Valley Aquifer Subbasin

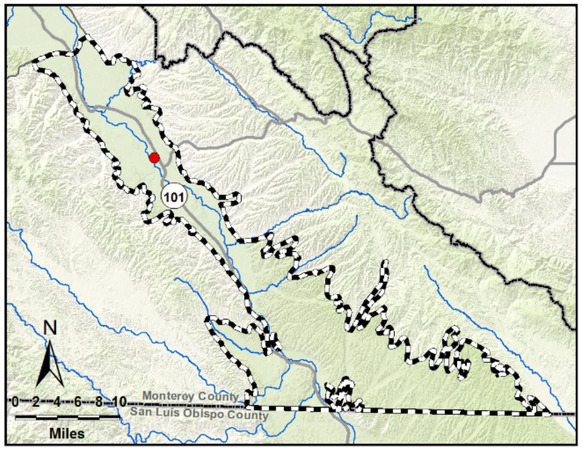


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET



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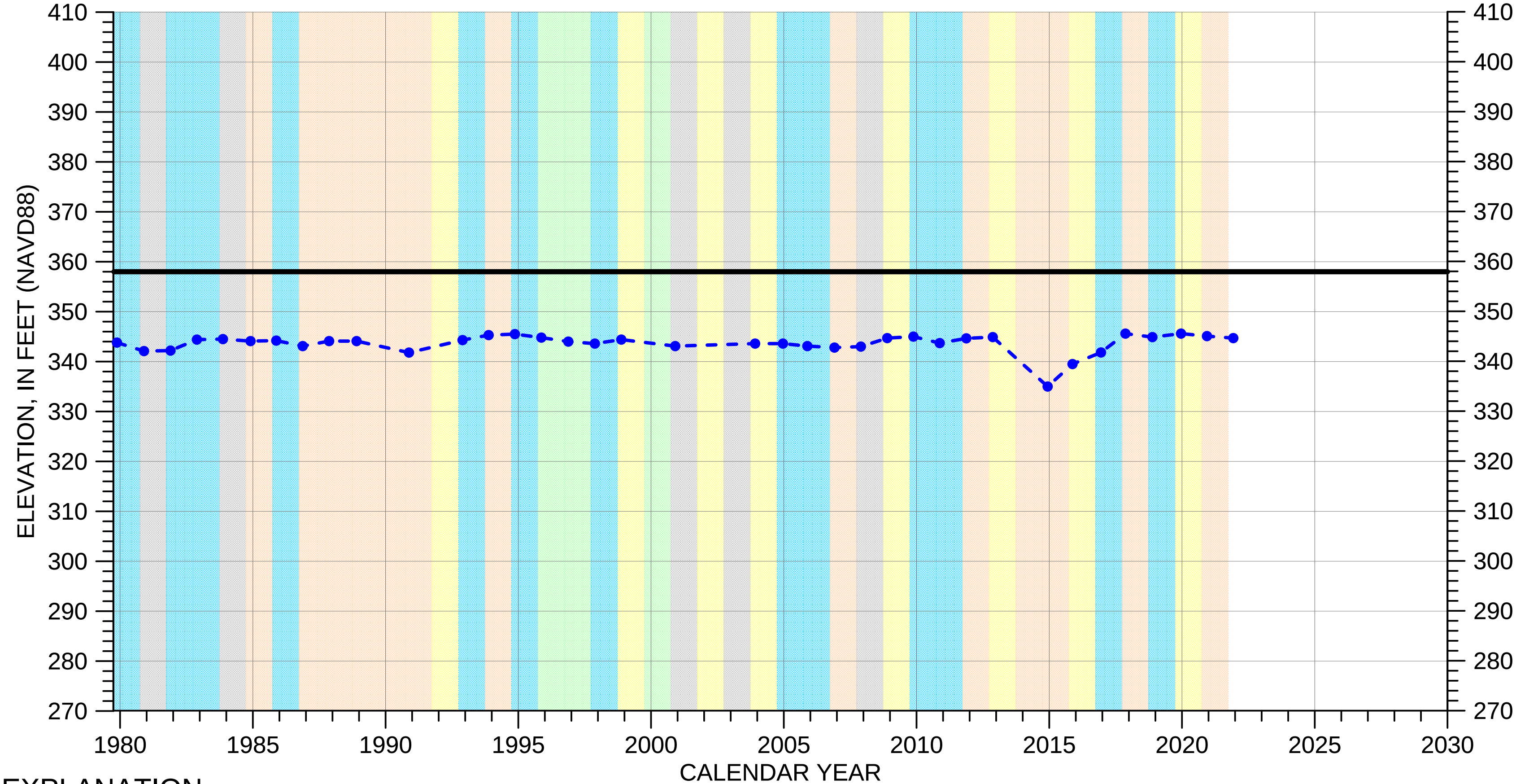
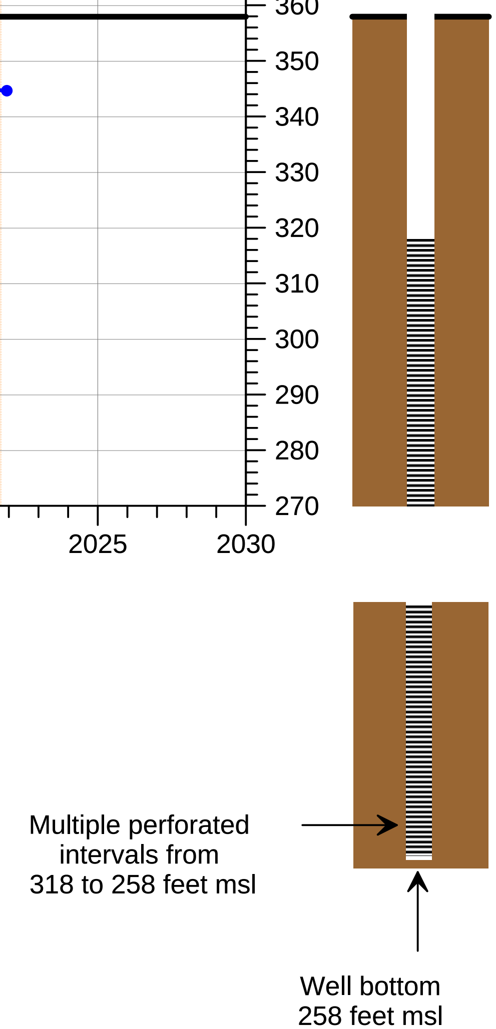
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 21S/09E-16E01

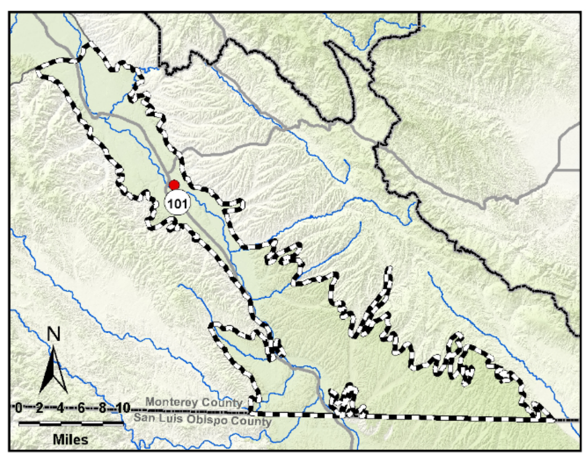
Upper Valley Aquifer Subbasin





EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface



WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET

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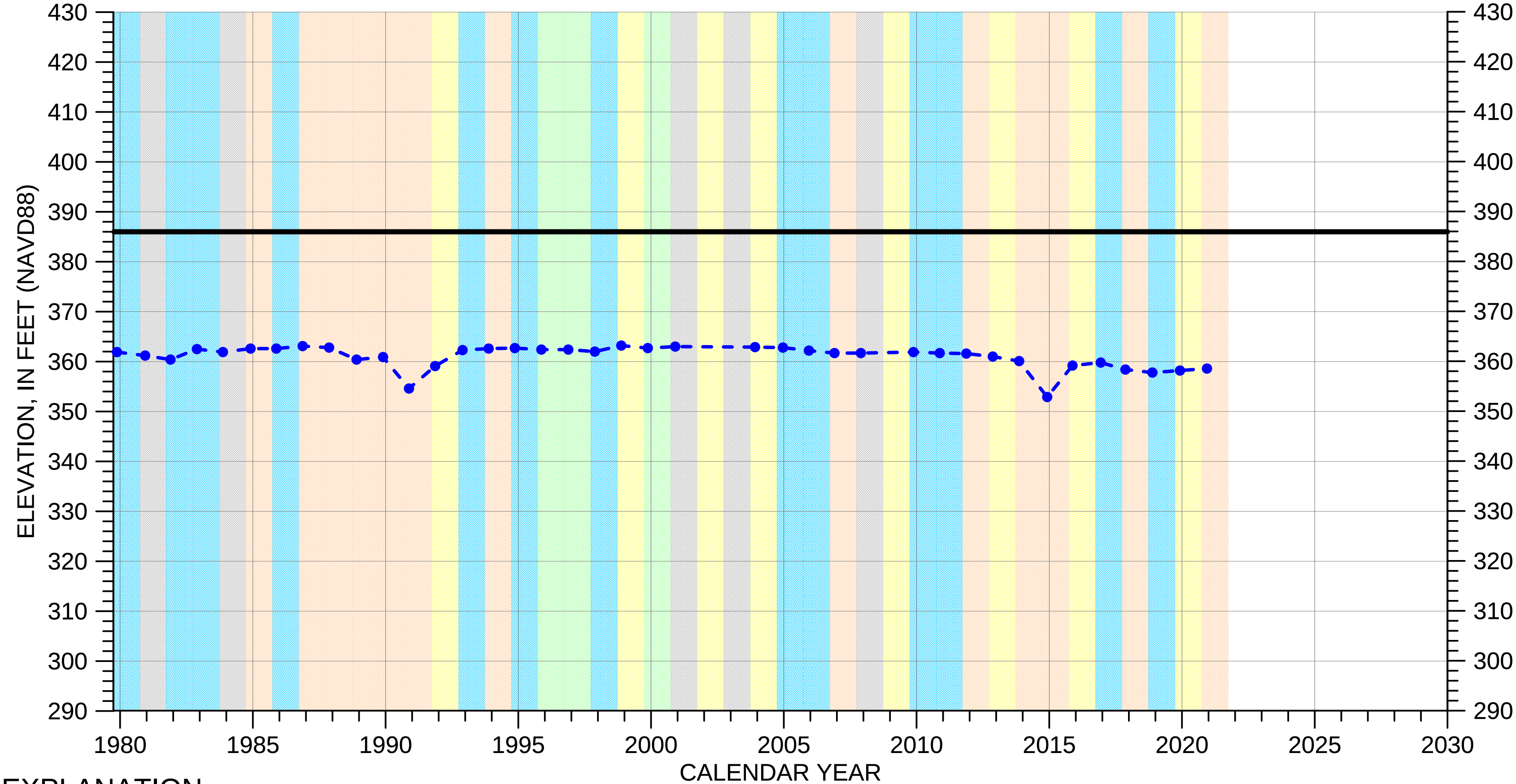
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 21S/09E-23G01

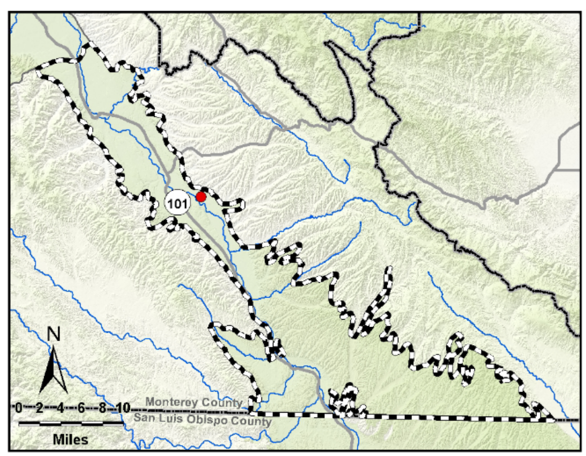
Upper Valley Aquifer Subbasin



Perforated interval unknown

EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface



WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET

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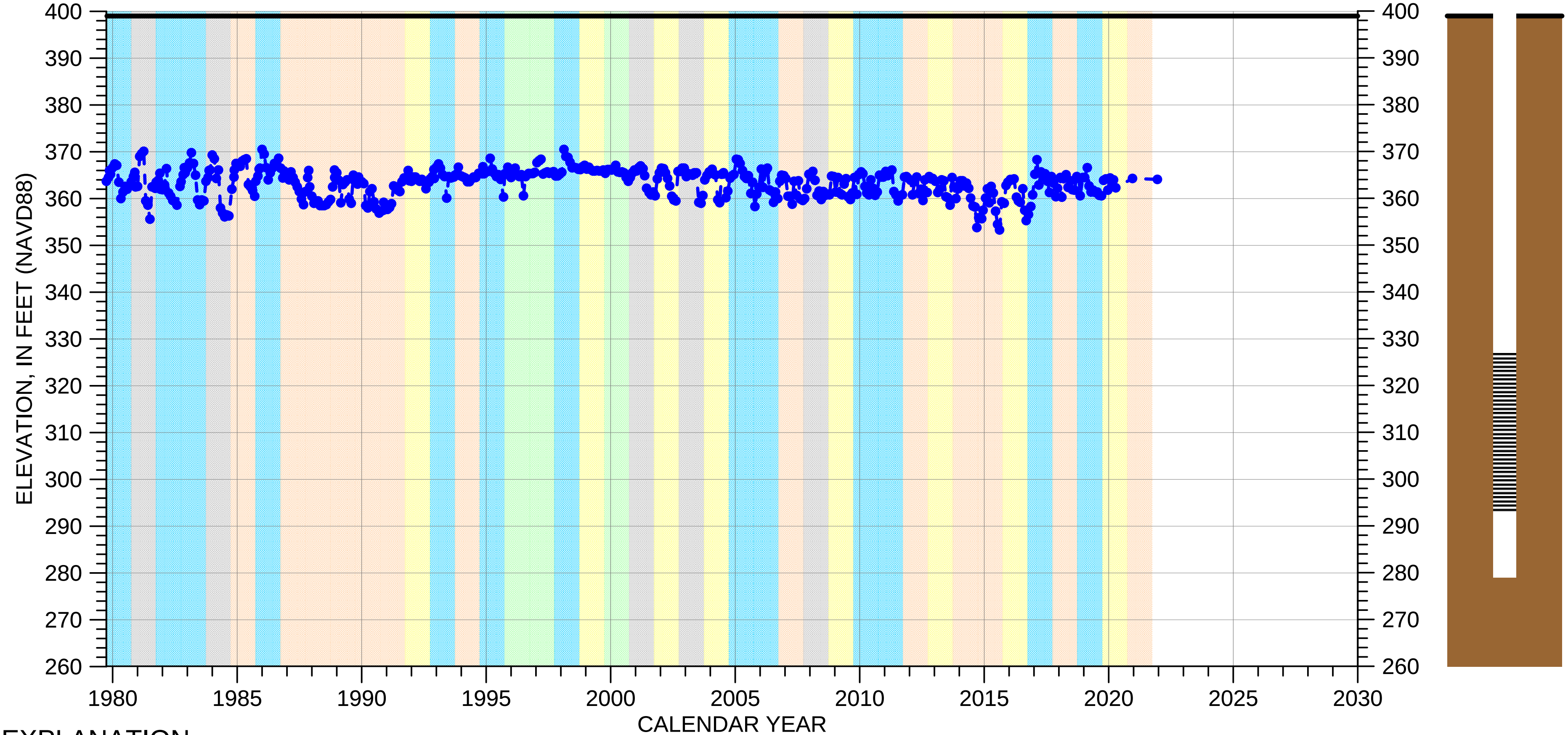
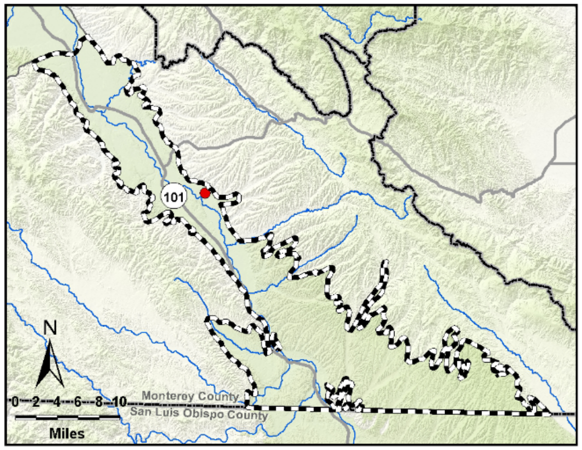
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 21S/09E-24L01

Upper Valley Aquifer Subbasin



EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface



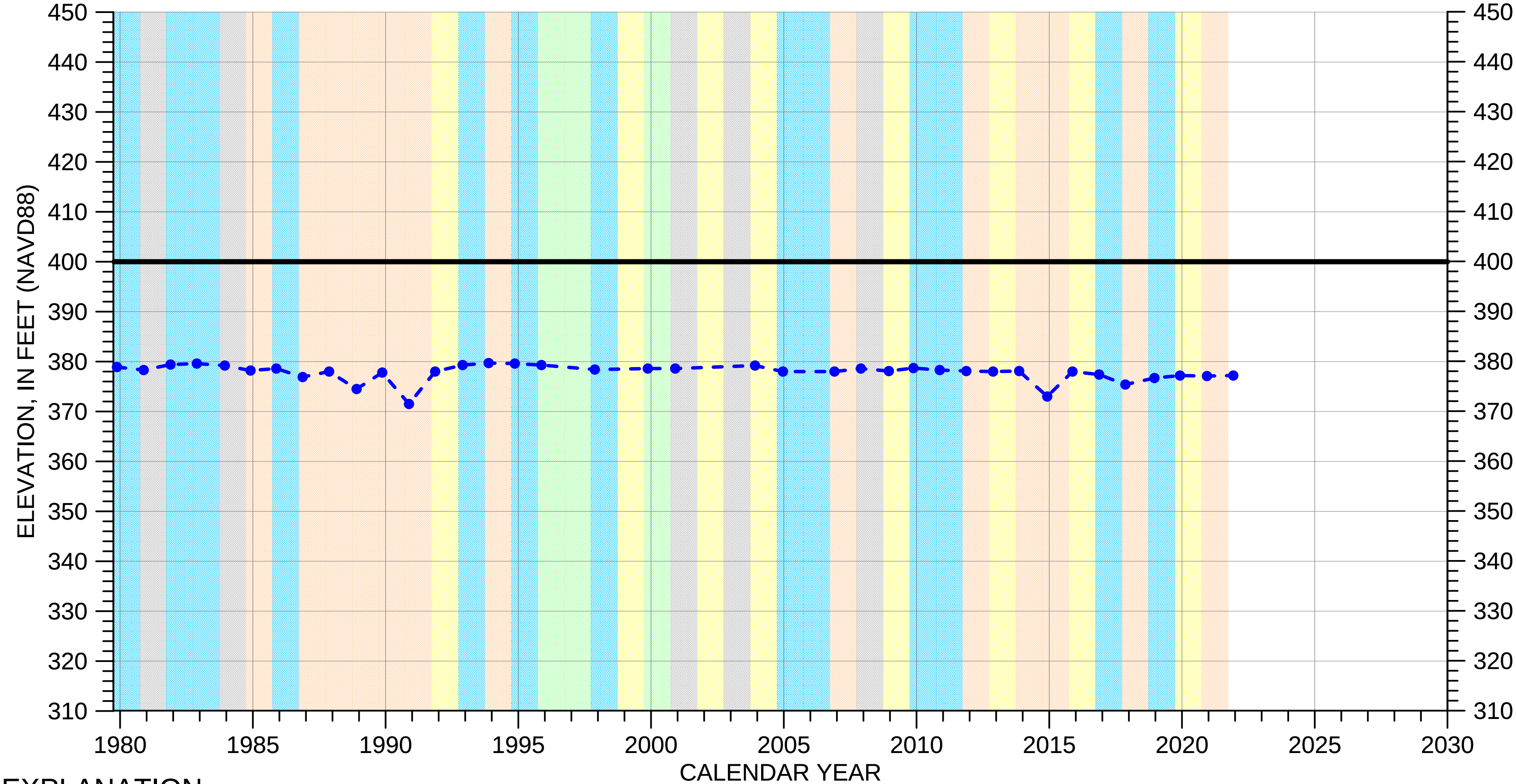
WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET

\\tuc-data\public\projects\9100_Salinas_GSP\ProjectData\Analysis\water_levels\Hydrographs_MCWRA\NEW\GRFs_Ch5\21S_09E-24L01.grf

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 21S/10E-32N01

Upper Valley Aquifer Subbasin

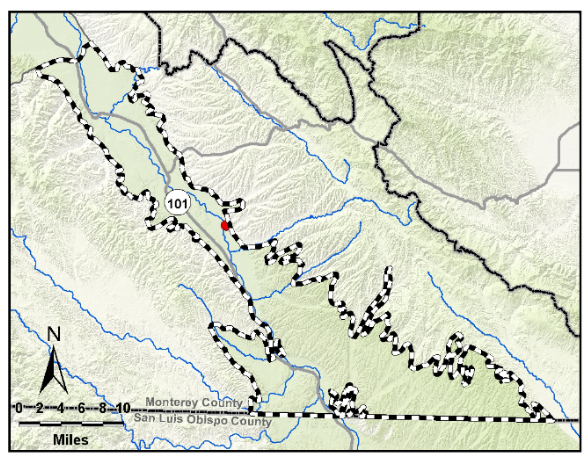


EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface



Perforated interval unknown

WATER YEAR TYPE DESIGNATION

DRY

DRY - NORMAL

NORMAL

WET - NORMAL

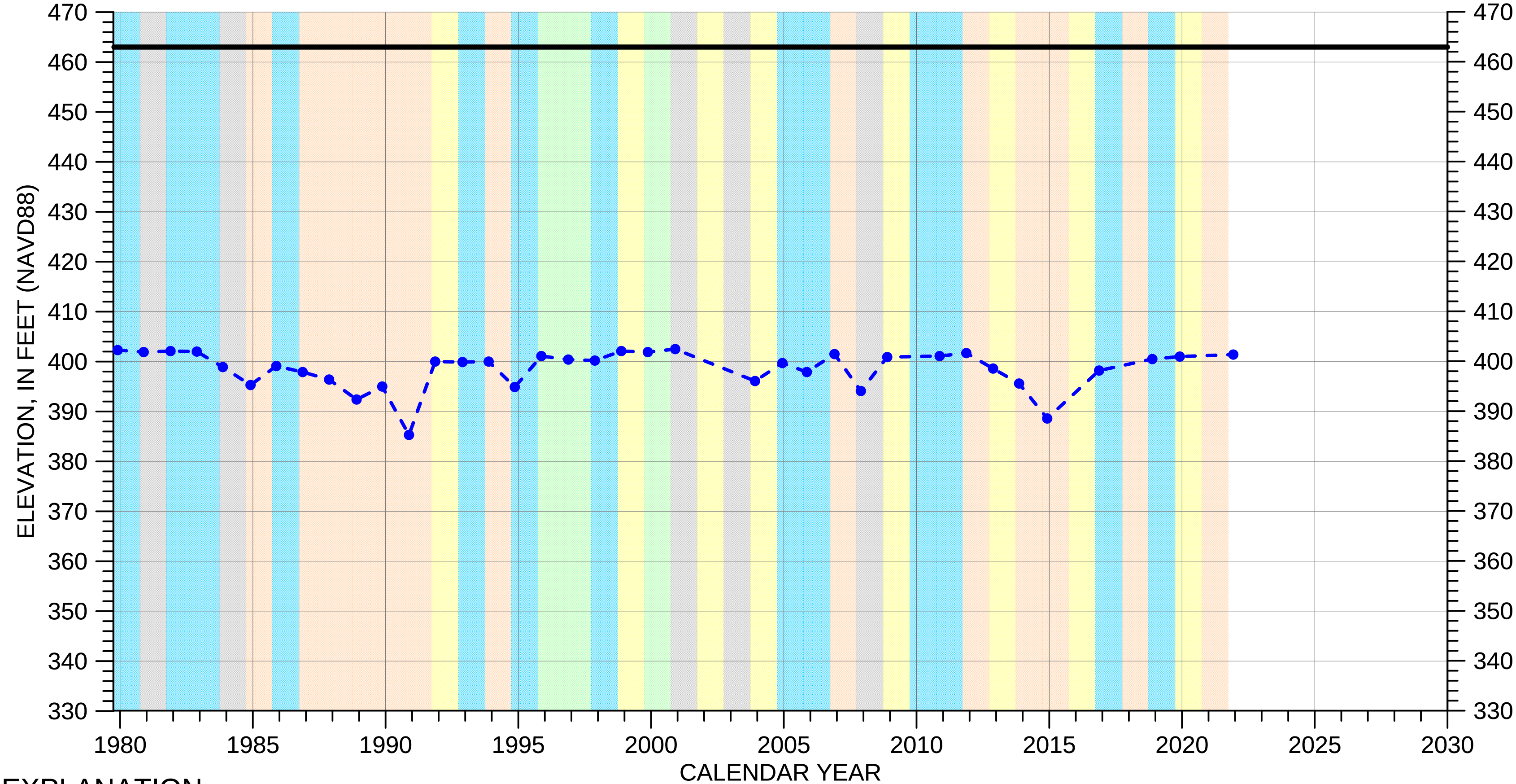
WET

Well bottom elevation unknown

\\uc-data\public\projects\9100_Salinas_GSP\ProjectData\Analysis\water_levels\Hydrographs_MCWRA\NEW\GRFs_Ch5\21S_10E-32N01.grf

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 22S/10E-09P01

Upper Valley Aquifer Subbasin



EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface

WATER YEAR TYPE DESIGNATION

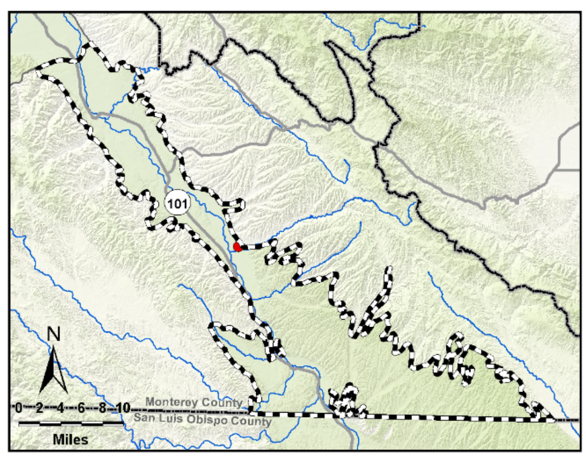
DRY

DRY - NORMAL

NORMAL

WET - NORMAL

WET



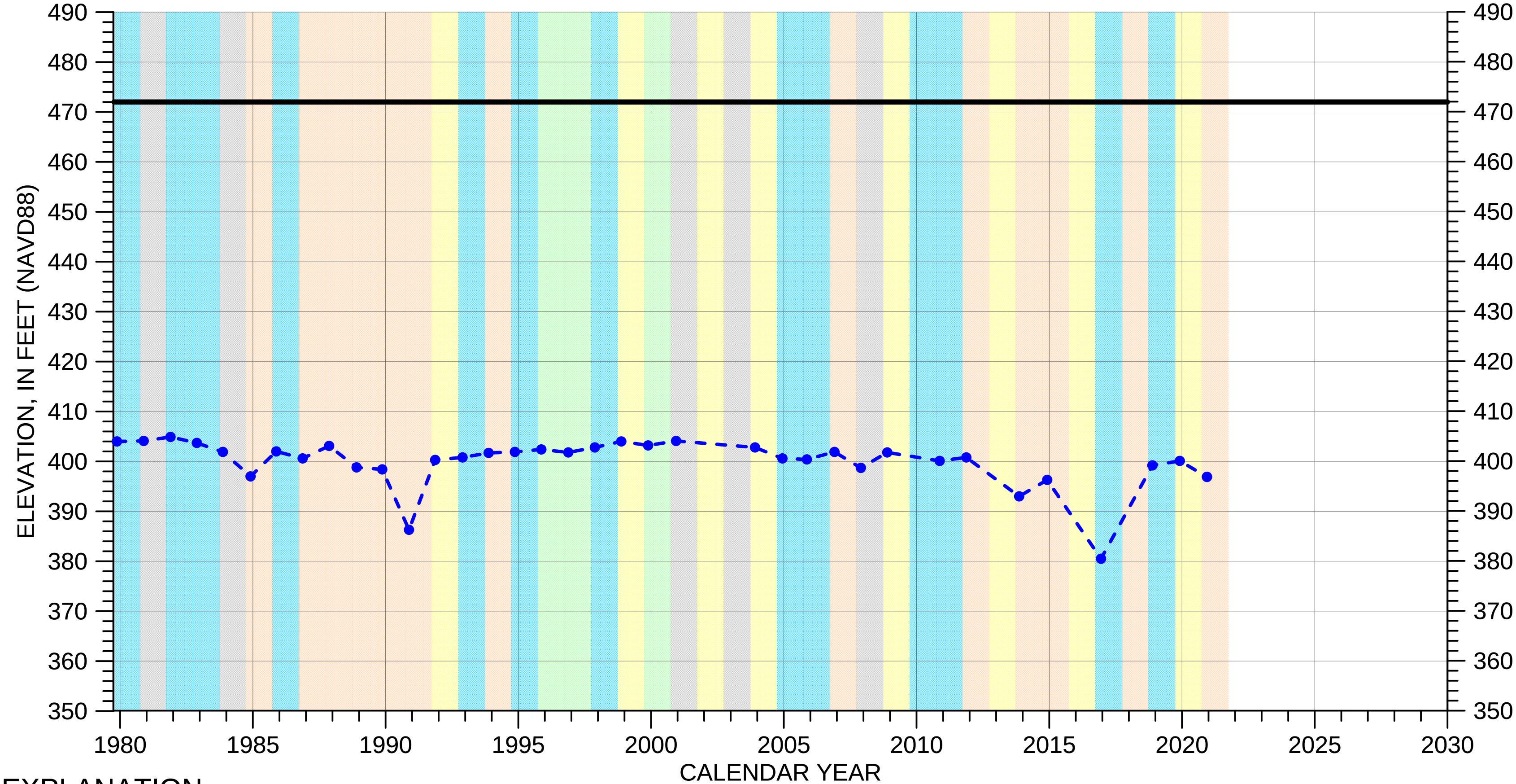
Perforated interval unknown

Well bottom elevation unknown

\\uc-data\public\projects\9100_Salinas_GSP\ProjectData\Analysis\water_levels\Hydrographs_MCWRANEW\GRFs_Ch5\22S_10E-09P01.grf

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 22S/10E-16K01

Upper Valley Aquifer Subbasin

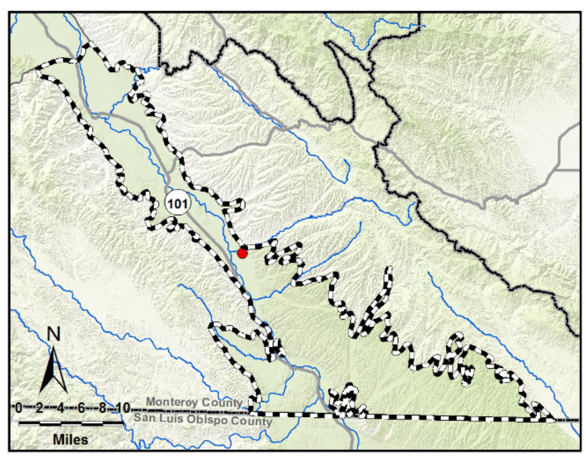


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET



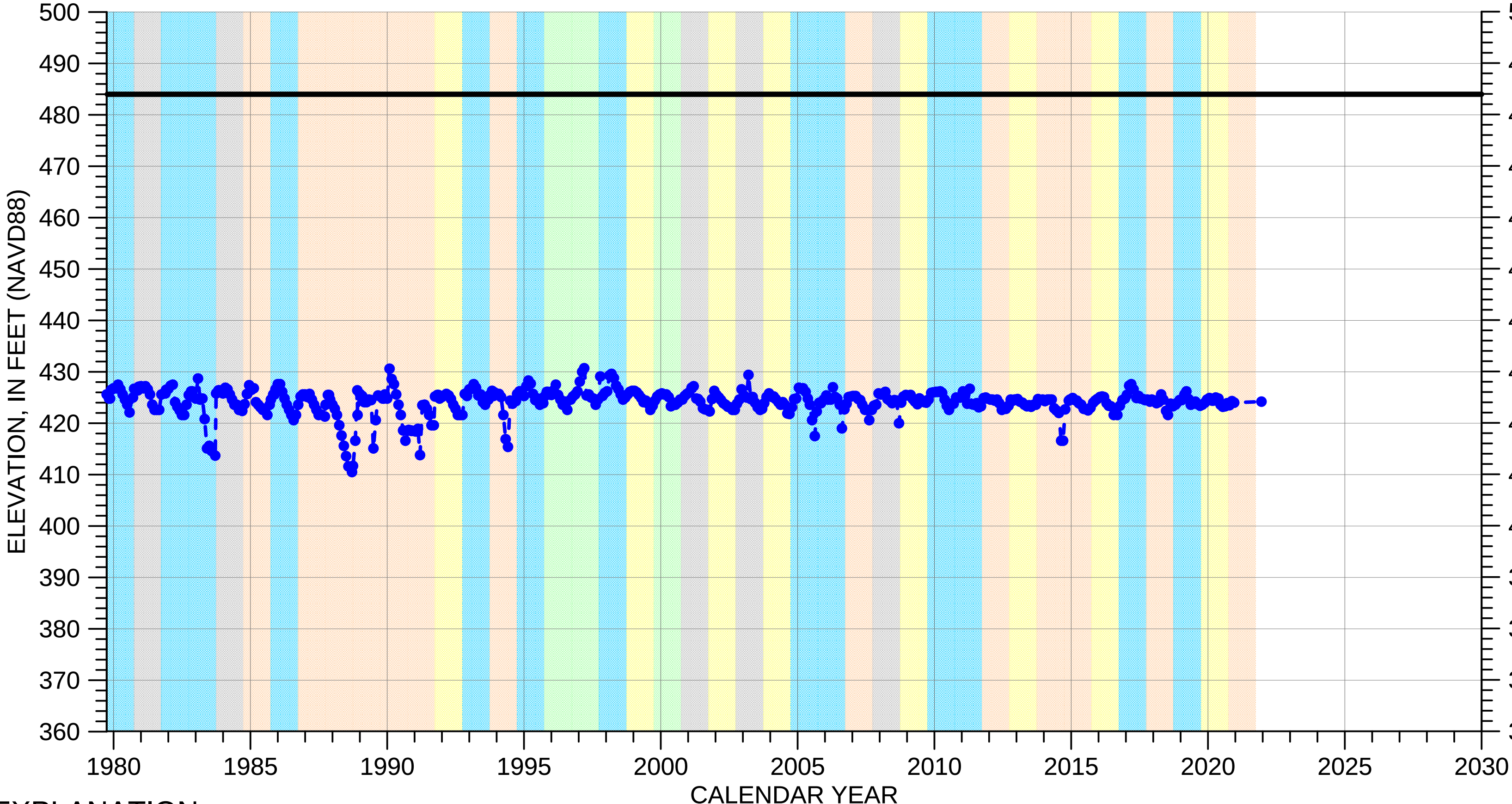
Perforated interval unknown

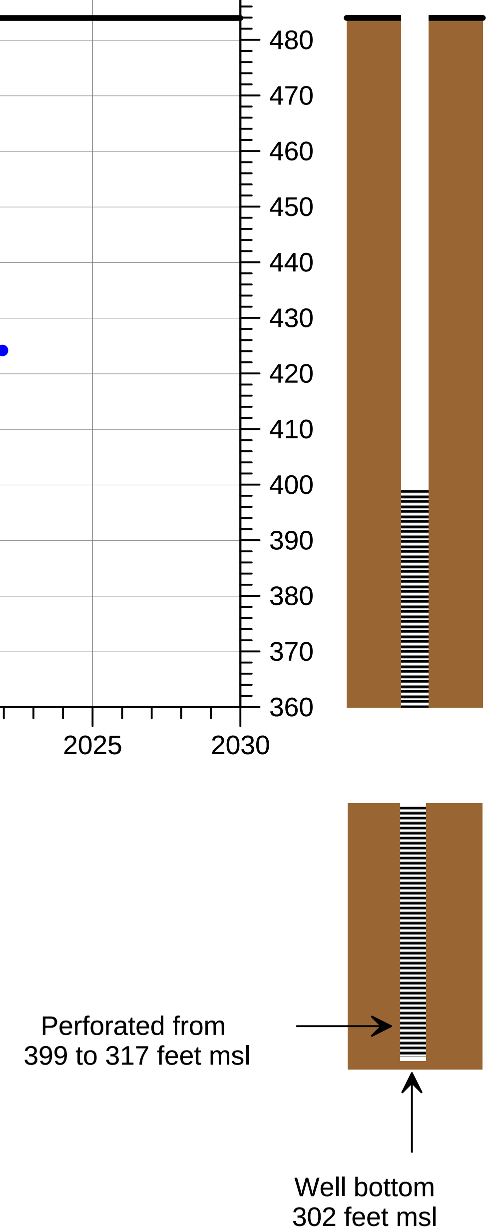
Well bottom elevation unknown

\\uc-data\public\projects\9100_Salinas_GSP\ProjectData\Analysis\water_levels\Hydrographs_MCWRANEWGRFs_Ch5\22S_10E-16K01.grf

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 22S/10E-34G01

Upper Valley Aquifer Subbasin



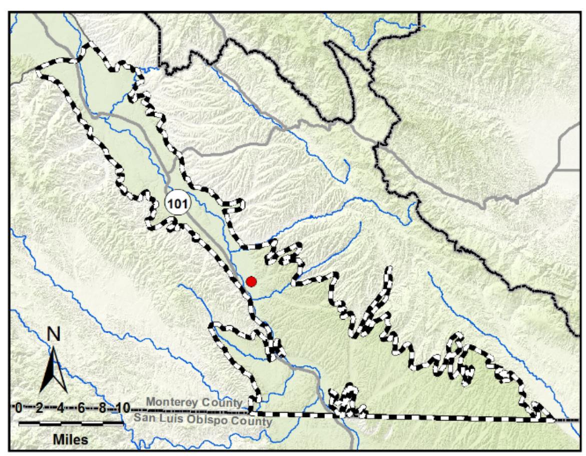


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET



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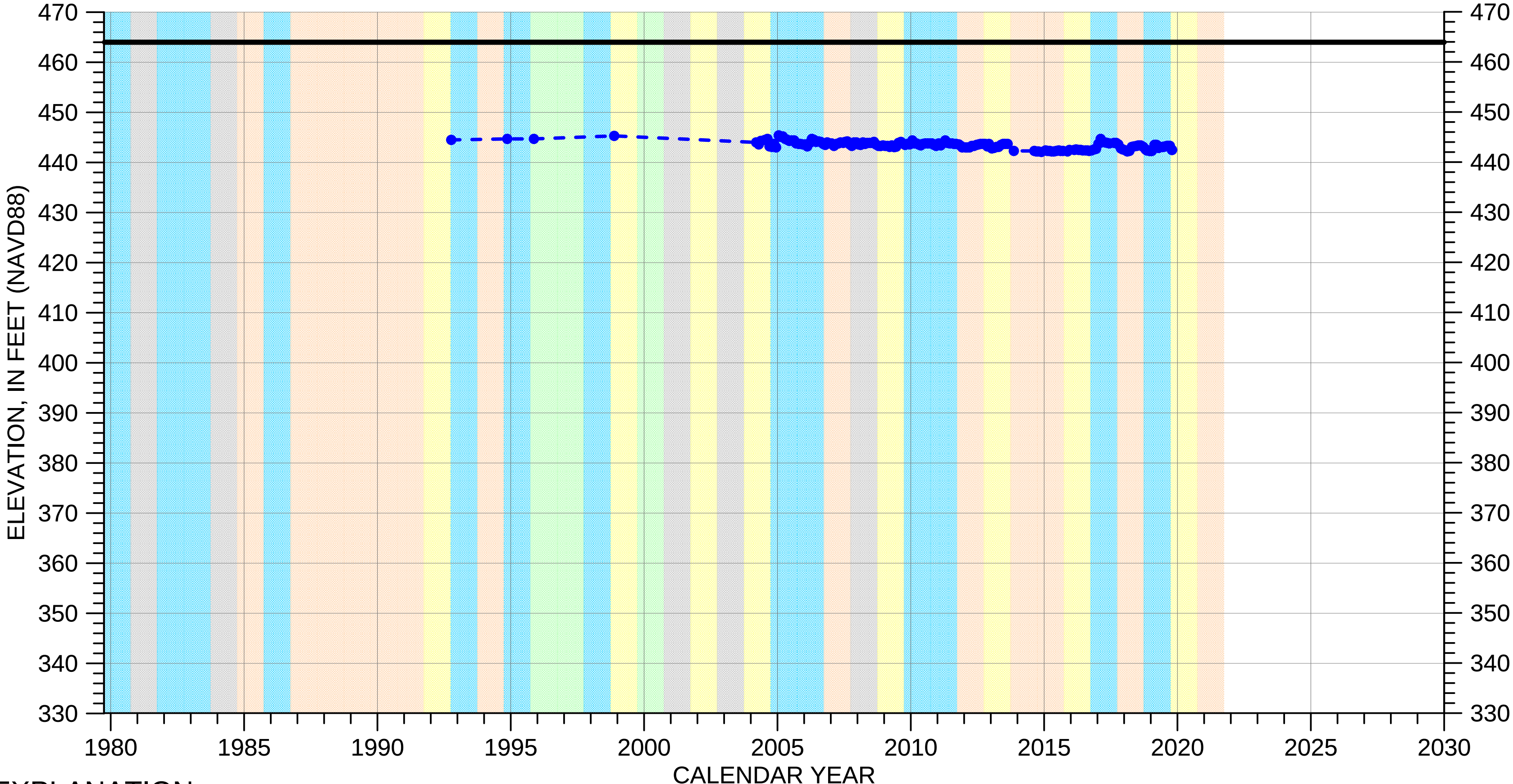
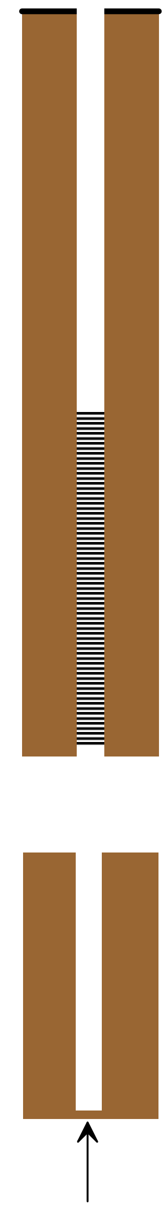
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 23S/10E-14D01

Upper Valley Aquifer Subbasin





Perforated from
392 to 332 feet msl

Well bottom
322 feet msl

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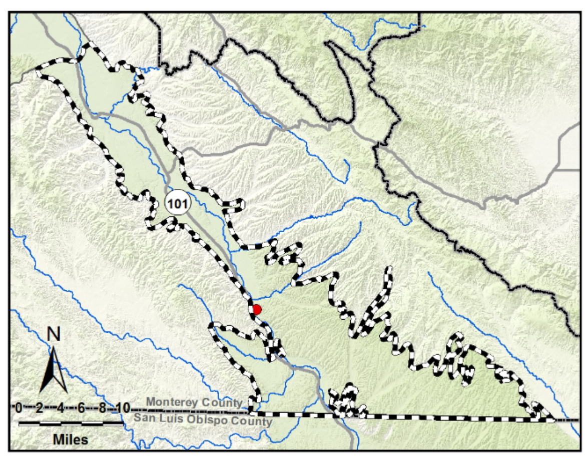
EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

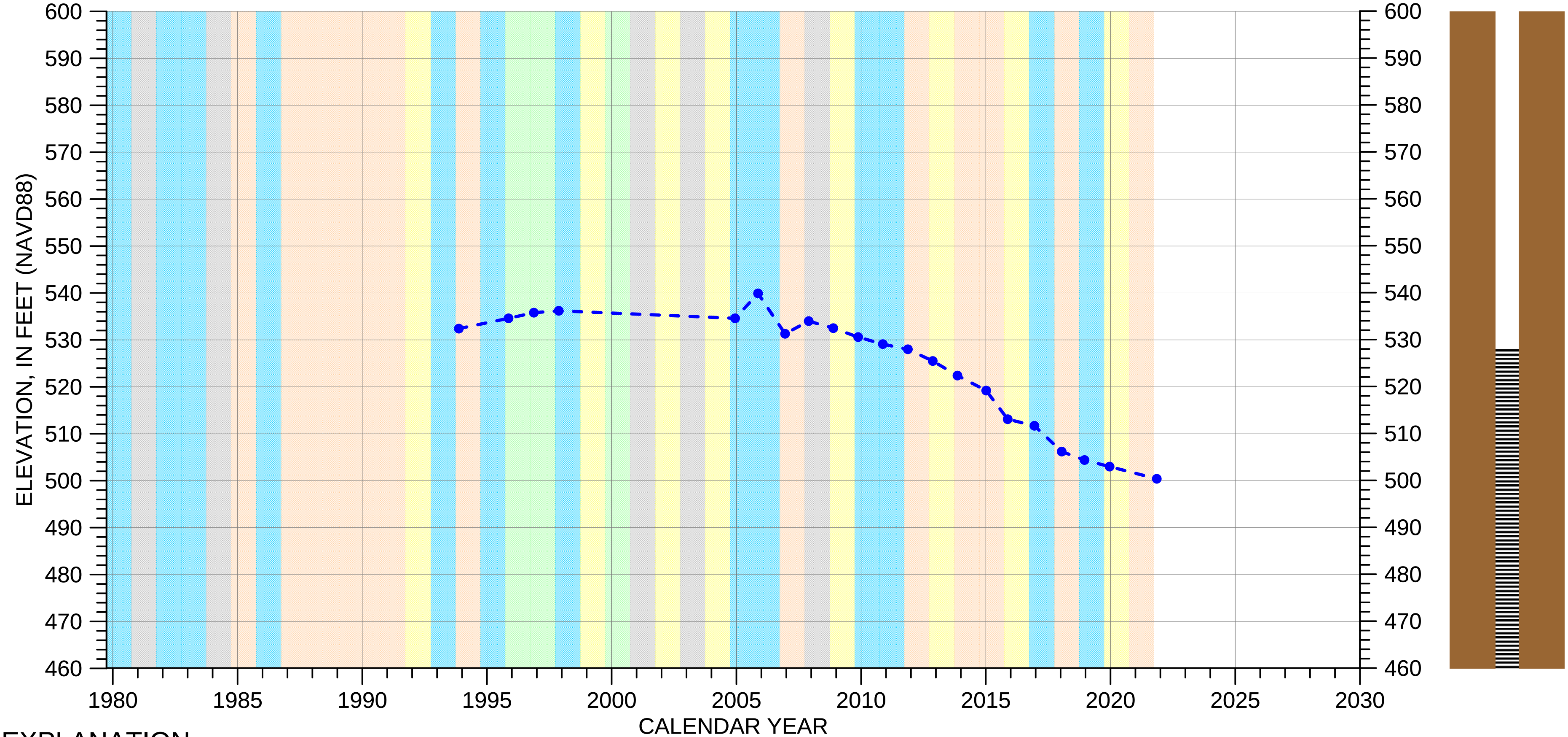
WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET



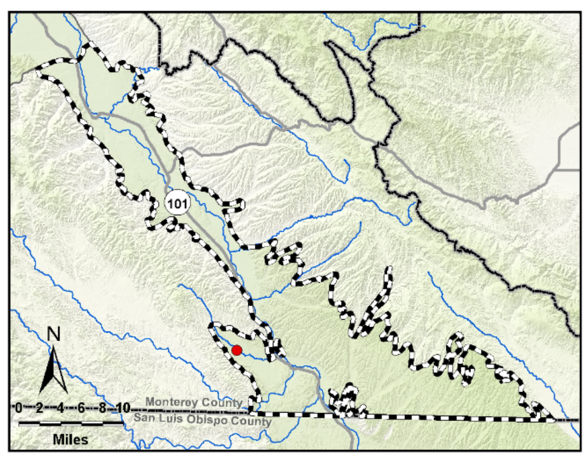
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 23S/10E-33P01

Upper Valley Aquifer Subbasin



EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface (748 FT MSL)



Multiple perforated intervals from 528 to 98 feet msl

Well bottom -33 feet msl

WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET

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