Salinas Valley Groundwater Basin
Upper Valley Aquifer Subbasin
Water Year 2022 Annual Report
Submitted in Support of Groundwater Sustainability Plan Implementation

Salinas Valley Basin
Groundwater Sustainability Agency

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ABBREVIATIONS AND ACRONYMS

AF ....acre-feet
AF/yr. ....acre-feet per year
CCRWQCB.......Central Coast Regional Water Quality Control Board
COC(s) ....Constituent(s) of concern
DDW ....Division of Drinking Water
D-TAC ....Drought Operations Technical Advisory Committee
DWR ....California Department of Water Resources
DWSN..............Dry Winter Scenario Narrative
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.................milligrams per liter
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
SWIG ....Seawater Intrusion Working Group
SWRCB............State Water Resources Control Board
ug/L..................micrograms per liter
UMHOS/CM.....micromhos/centimeter
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) 2022, from October 1, 2021, to September 30, 2022.

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 the Sustainable Groundwater Management Act (SGMA).

In WY 2022, groundwater conditions remained similar to conditions in recent years, with slight changes in conditions related to specific sustainability indicators. WY 2022 is classified as a dry-normal year.

The groundwater data for WY 2022 are summarized below:

- Groundwater elevations decreased during this dry-normal water year, with a decline in elevations ranging from about 4 to 20 feet. Five Representative Monitoring Site (RMS) wells had groundwater elevations above their measurable objectives, 8 had elevations between their measurable objectives and minimum thresholds, and 2 had elevations below their minimum thresholds.
- Groundwater extractions for reporting year 2021 (November 1, 2020, through October 31, 2021) were approximately 122,300 acre-feet (AF). Groundwater extraction reporting lags by a year because it is not available until after the annual report submittal.
- There were 2 groundwater quality constituents of concern (COCs) that exceeded their minimum thresholds in WY 2022, none of them due to GSA groundwater management actions.
- No subsidence was detected in the Subbasin.
- All shallow wells used to monitor interconnected surface water (ISW) show groundwater elevations between the minimum threshold and measurable objective.

As a result, the Upper Valley Aquifer Subbasin had no undesirable results in WY 2022.

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

- **Upper Valley Subbasin Planning and Implementation:** SVBGSA worked with the Upper Valley Aquifer Subbasin Planning Committee to finish the Upper Valley Subbasin

GSP, submitted to DWR in January 2022. As the responsibilities of the subbasin planning committees finished with GSP submittal, SVBGSA set up subbasin implementation committees to lead subbasin-specific GSP implementation activities.

- **GSA policies, operations, and engagement:** SVBGSA continued to regularly engage interested parties through its Board of Directors and committees. It developed a 2-year and 5-year work plan and associated budget and continued to strengthen its relationship with partner agencies. SVBGSA conducted outreach to Underrepresented Communities. Finally, SVBGSA developed a well permit application review process to comply with Executive Order N-7-22.
- **Data and monitoring:** SVBGSA undertook several efforts to further increase data collection and monitoring, including identifying existing wells that could potentially fill monitoring network data gaps, engaging in discussions to expand the groundwater extraction monitoring program, and continuing support of USGS development of a groundwater-surface water model.
- **Project implementation activities:** SVBGSA developed a sustainability strategy for the Upper Valley Subbasin that outlines the GSP workstreams underway or planned to maintain sustainability, including the Upper Valley SMC Technical Advisory Committee and Multi-benefit Stream Channel Improvements. Management actions and projects are not needed at this time; however, 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. This report fulfills that requirement for the Salinas Valley – Upper Valley Aquifer Subbasin (Subbasin) for Water Year (WY) 2022.

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 is the second annual report for the Subbasin and includes monitoring data for WY 2022, which is from October 1, 2021, to September 30, 2022. 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 2022 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 Groundwater Sustainability Agency (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.

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 Annual Report Organization

This Annual Report corresponds to the requirements of GSP Regulations §356.2. It 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 Annual Report then addresses GSP implementation by reporting on actions taken to implement the GSP and progress toward interim milestones.

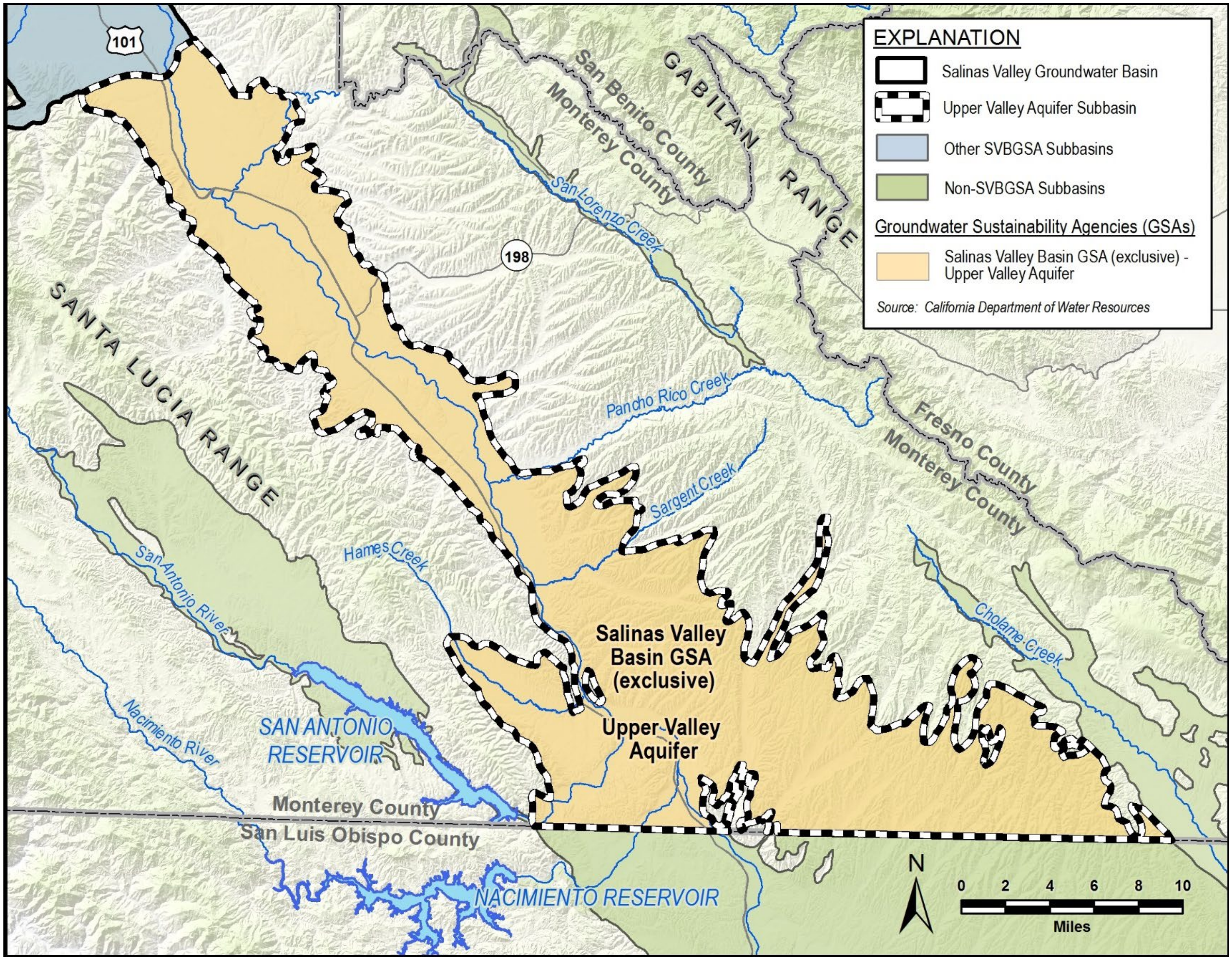

Figure 1. Upper Valley Aquifer Subbasin

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 the 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 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. The principal aquifer is also referred to as the Basin Fill Aquifer.

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, excess applied irrigation water, and 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 7.38 inches of rainfall in WY 2022. For comparison, the average rainfall from WY 1980 to WY 2022 at this gage is 11.87 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 2022 was a dry-normal year.

3 2022 DATA AND SUBBASIN CONDITIONS

This section details the Subbasin conditions and WY 2022 data. Where WY 2022 data are not available, it includes the most recent data available. SVBGSA stores monitoring data 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. Some growers also report surface water use to the State Water Resources Control Board (SWRCB). 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 oil 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.

Data from WY 2021 are reported in this Annual Report because WY 2022 GEMS data were not available in time to be incorporated in this report. The reporting period and submittal deadlines for GEMS data are defined by MCWRA Ordinance No. 3717 and 3718, and do not align with the GSP Annual Report deadline; therefore, groundwater extraction reported in Annual Reports will lag by 1 year until the Ordinances are updated. The GSP identifies GEMS expansion and enhancement as a priority to make groundwater extraction data more complete, accurate, and accessible. As noted in section 4.1.2, SVBGSA and MCWRA have begun conversations on this effort.

Table 1 presents groundwater extractions by water use sector, including the method of measurement and accuracy of measurement in the Upper Valley 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%. 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. Because the pumping total is for the Upper Valley Subbasin and not the MCWRA Upper Valley Subarea, the total differs from 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 (in AF/yr.)

Water Use Sector	Groundwater Extraction	Method of Measurement	Accuracy of Measurement
Urban (including industrial)	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.

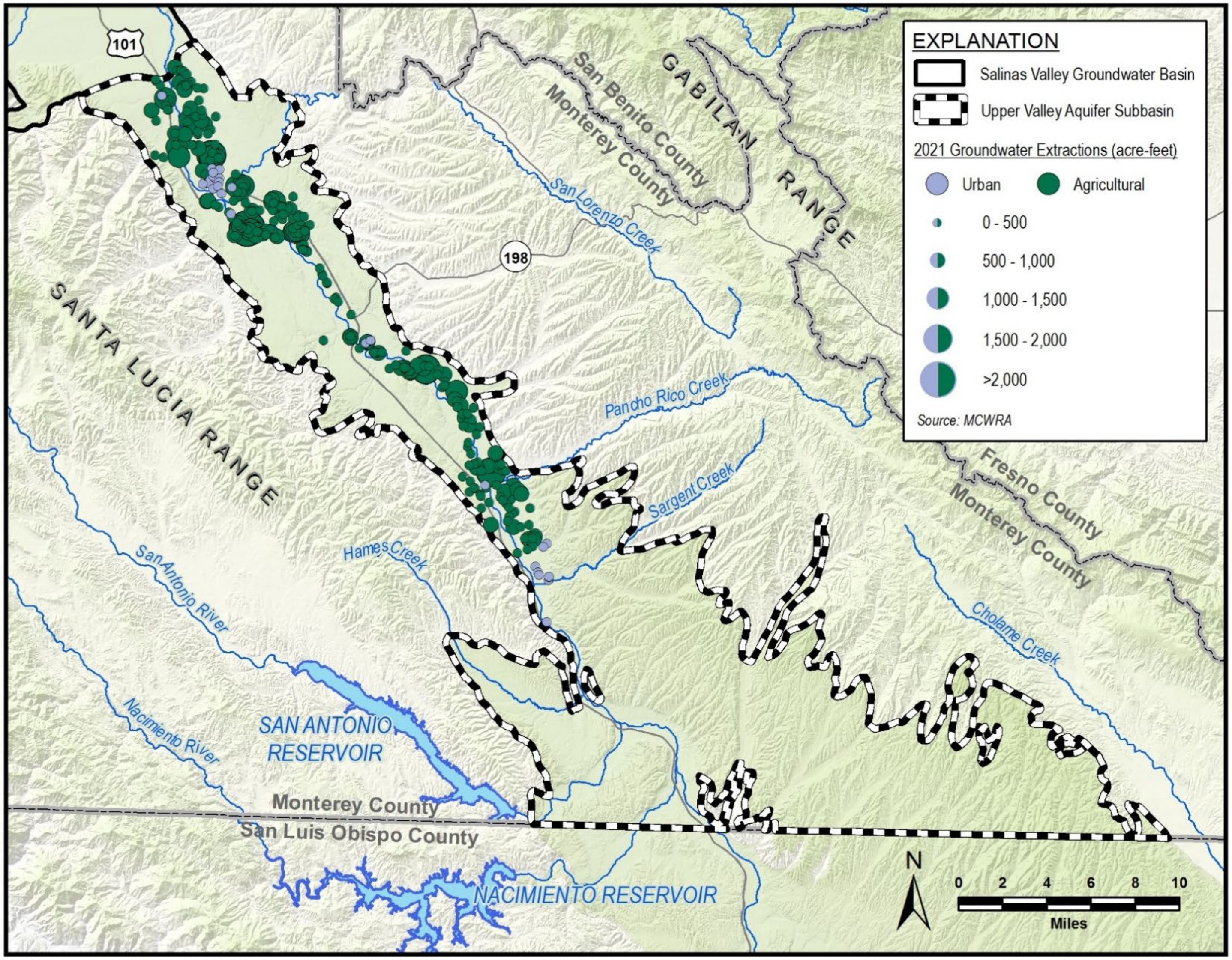

Figure 2. General Location and Volume of Groundwater Extractions

3.1.2 Surface Water Supply

Salinas River Watershed diversion data are obtained from the SWRCB Electronic Water Rights Information Management System (eWRIMS) website. These data include diversions from the Salinas River and its tributaries and are reported on an annual basis. Surface water diversions reported to eWRIMS were approximately 71,300 AF/yr. in WY 2021 and 53,200 AF/yr. in WY 2022. All surface water is used for irrigation.

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 and 1,400 AF/yr. in WY 2022.

3.1.4 Total Water Use

Total water use is the sum of groundwater extractions, surface water, and recycled water use and is summarized in Table 2. The total surface water use for the Subbasin includes all the eWRIMS reported diversions; 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 surface water. Total water use was 195,200 AF/yr. in WY 2021.

Many growers and residents have noted that some irrigation is reported both to SWRCB as Salinas River diversions and to MCWRA as groundwater pumping. Comparing surface water diversion data to groundwater pumping data is complicated because diversions and pumping are reported on different schedules. An initial analysis was undertaken by matching unique locations and monthly diversion amounts summed by the GEMS reporting year (November 1 to October 31) to reported annual pumping data. This initial analysis suggests that only a single AF of water was reported to both MCWRA and SWRCB. However, SVBGSA will continue to compare reported surface water use and groundwater extractions in the Subbasin to attempt to eliminate any double counting in the total water use.

Table 2. Total Water Use by Water Use Sector in WY 2021 (in AF/yr.)

Water Use Sector	Groundwater Extraction	Surface Water Use	Recycled Water	Method of Measurement	Accuracy of Measurement
Urban (including industrial)	3,000	0	1,600	Direct	Estimated to be +/- 5%
Agricultural	119,300	71,300	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	71,300	1,600		
TOTAL	**195,200**				

Note: Agricultural pumping is reported on the MCWRA reporting year basis whereas urban is reported in calendar-year basis. 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 (RMSs) and monitored by MCWRA. Since last year's annual report, a well (21S/09E-23G01) in the RMS network has been replaced because the well was removed from MCWRA's water level monitoring programs. Figure 3 shows the Subbasin's updated groundwater elevation representative monitoring network wells. The well selected as an RMS replacement (20S/08E-05R03) is highlighted with a pink star and the old RMS is marked with a red X on Figure 3. Although the new RMS is not near the old RMS, the new well produces better coverage of the Subbasin and the monitoring network still provides adequate coverage of the area in the Subbasin where most known groundwater use occurs.

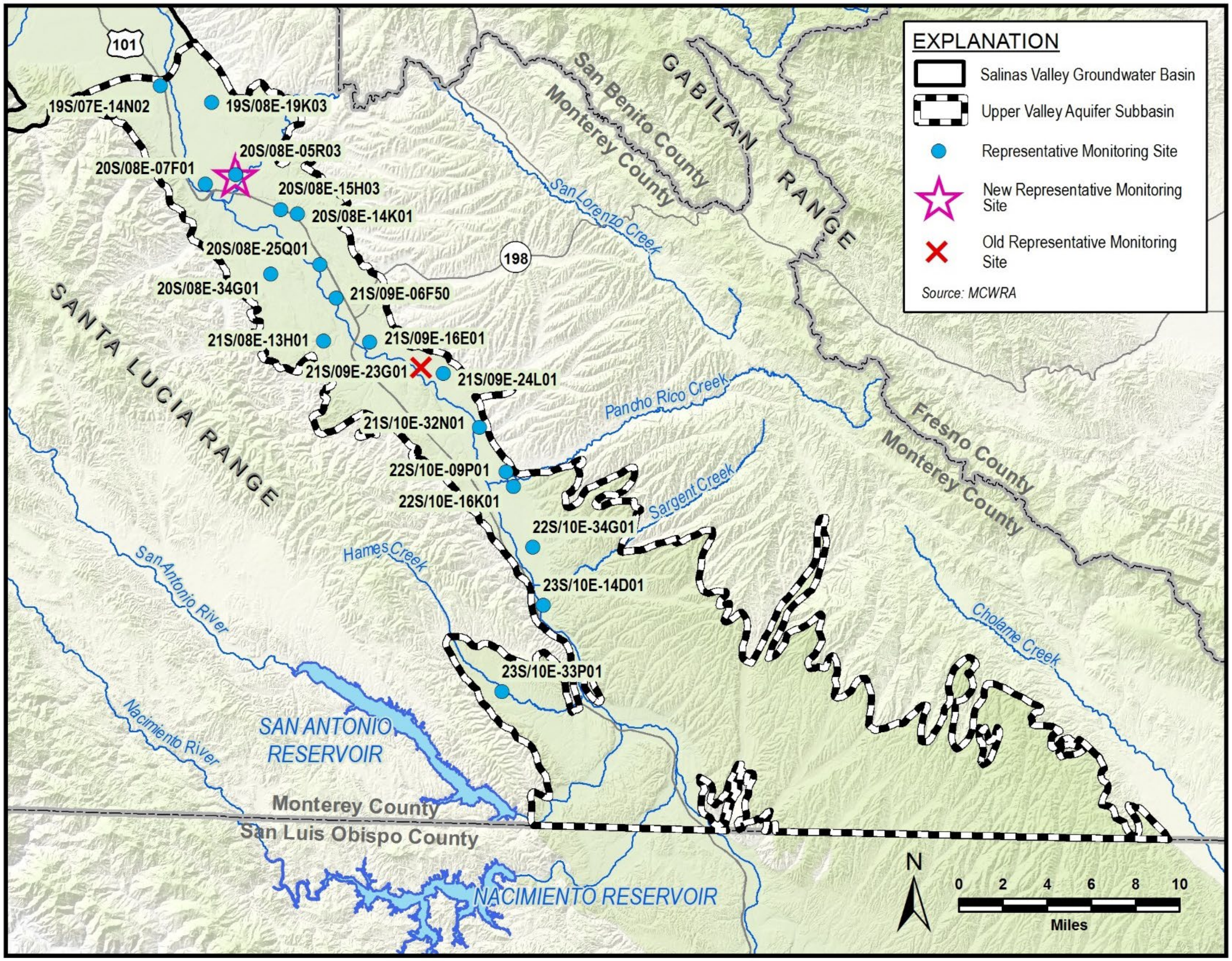

Figure 3. Locations of Representative Groundwater Elevation Monitoring Sites

Fall 2022 groundwater elevation data are presented in Table 3. In accordance with the GSP, this report uses groundwater elevations measured in the fall which are neutral groundwater conditions that are generally 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. 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. Figure 4 shows the approximate annual change in groundwater levels for the RMS wells. Wells that MCWRA did not sample during the fall event do not have a water level measurement for WY 2022. During GSP implementation, the SVBGSA is working to get biannual measurements for every RMS and to fill data gaps in the monitoring network with additional wells.

Table 3. Groundwater Elevation Data (in feet)

Monitoring Site	WY 2022 Groundwater Elevation
19S/07E-14N02	224.0
19S/08E-19K03	240.9
20S/08E-05R03	259.5
20S/08E-07F01	Not sampled
20S/08E-14K01	270.3
20S/08E-15H03	272.0
20S/08E-25Q01	315.6
20S/08E-34G01	358.6
21S/08E-13H01	374.9
21S/09E-06F50	323.8
21S/09E-16E01	340.1
21S/09E-24L01	366.7
21S/10E-32N01	385.0
22S/10E-09P01	403.4
22S/10E-16K01	407.9
22S/10E-34G01	428.1
23S/10E-14D01	Not sampled
23S/10E-33P01	Not sampled

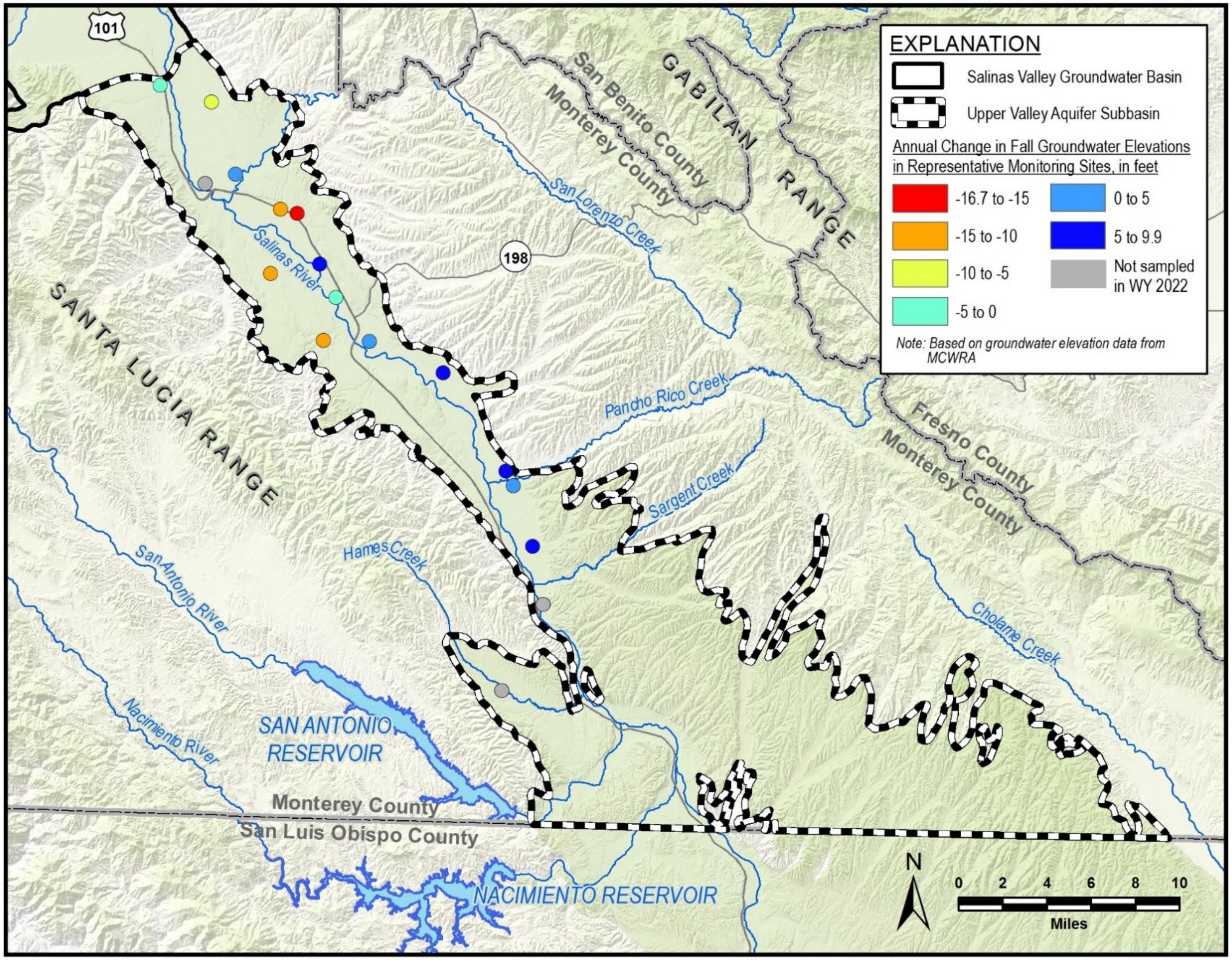

Figure 4. Annual Change in Fall Groundwater Elevations in Representative Monitoring Sites

3.2.1 Groundwater Elevation Contours

SVBGSA received fall 2022 groundwater elevation contour maps from MCWRA for the portion of the Upper Valley Subbasin that overlaps with the Upper Valley Subarea. SVBGSA developed new contour maps for August 2022. The August contours represent seasonal low conditions due to agricultural pumping, and the fall contours represent seasonal high conditions, even though they are neutral. 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 monitor 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 5. 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 5) 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 6 and Figure 7, 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.

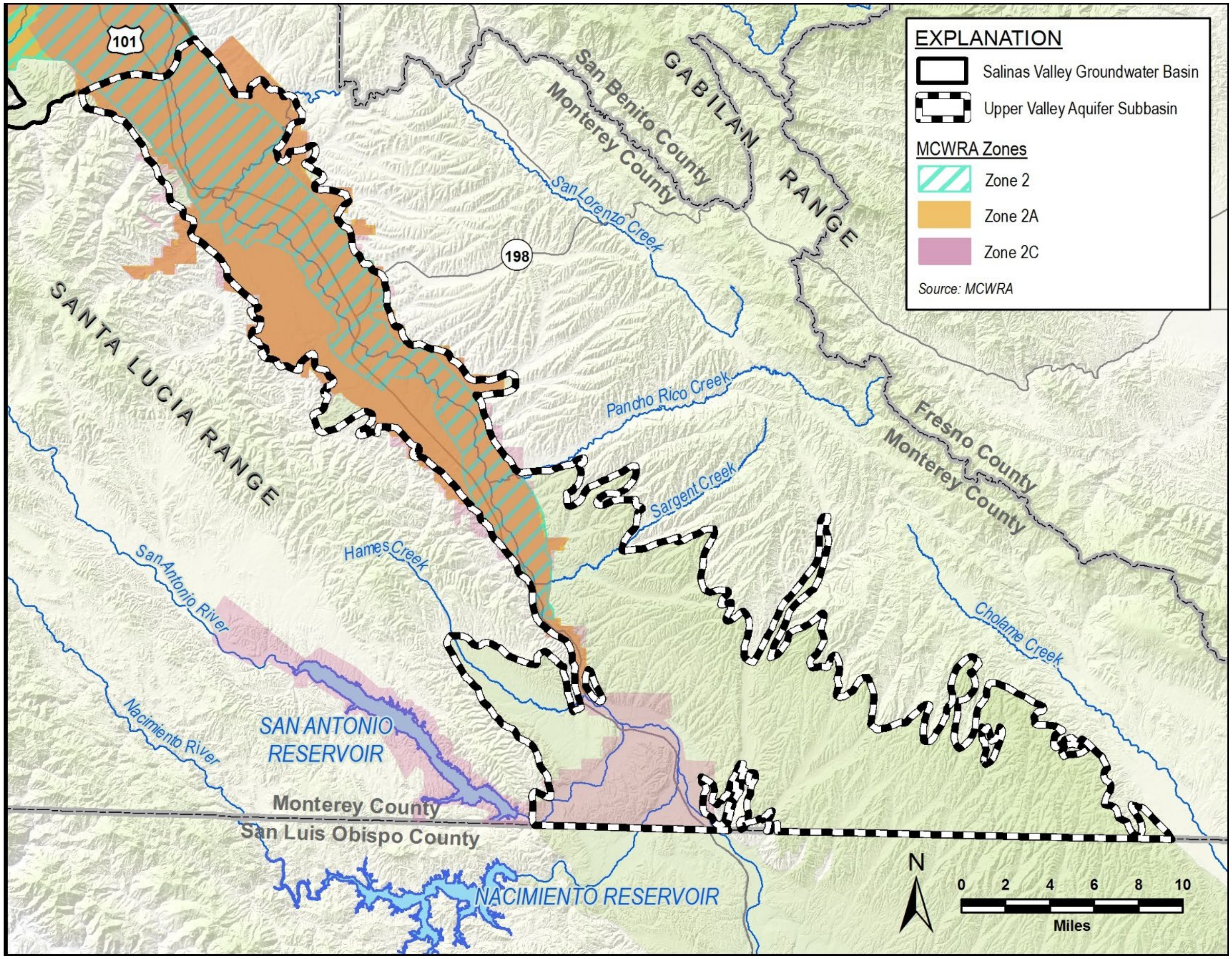

Figure 5. MCWRA Subarea Zones

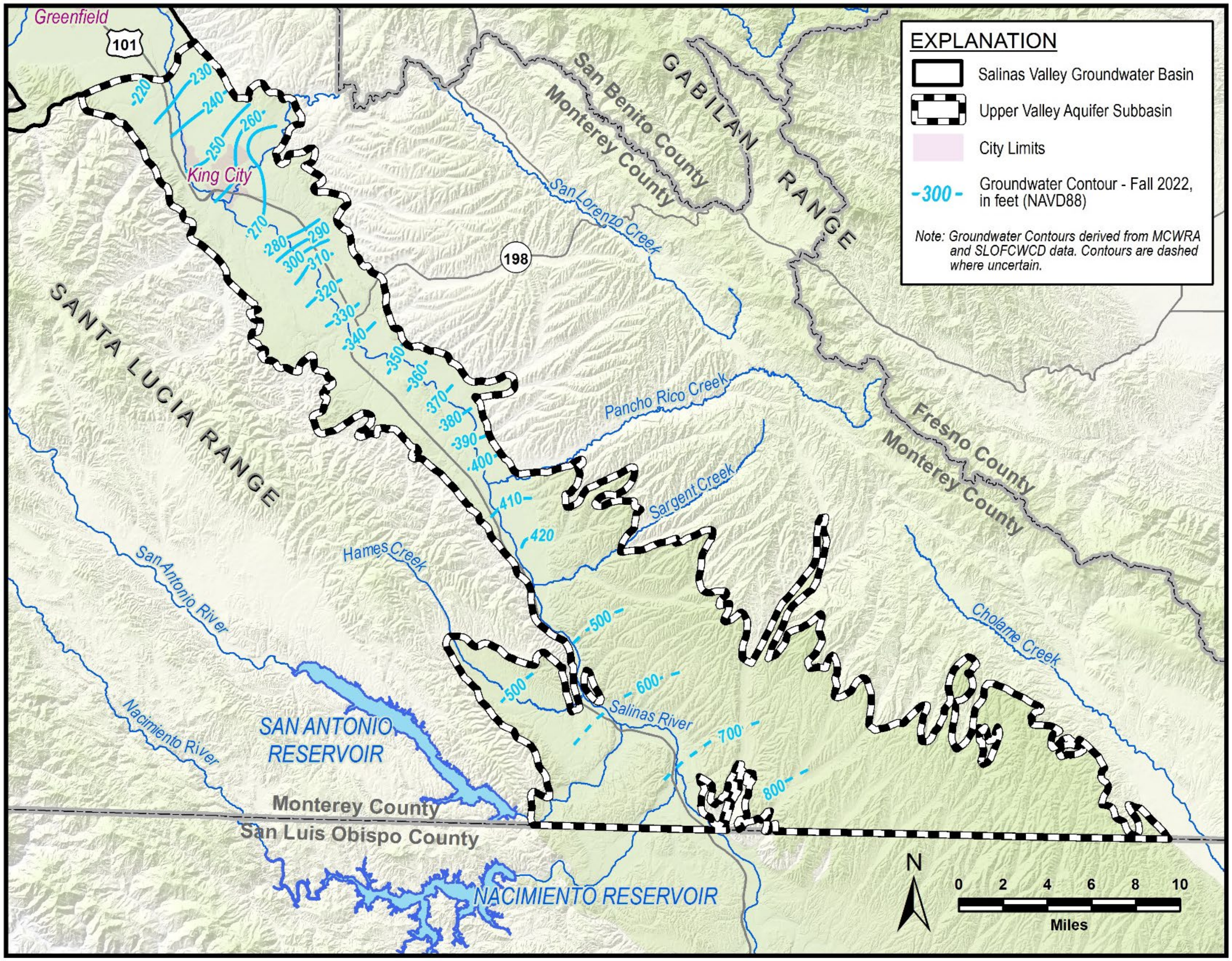

Figure 6. Seasonal High Groundwater Elevation Contour Map for the Upper Valley Aquifer Subbasin

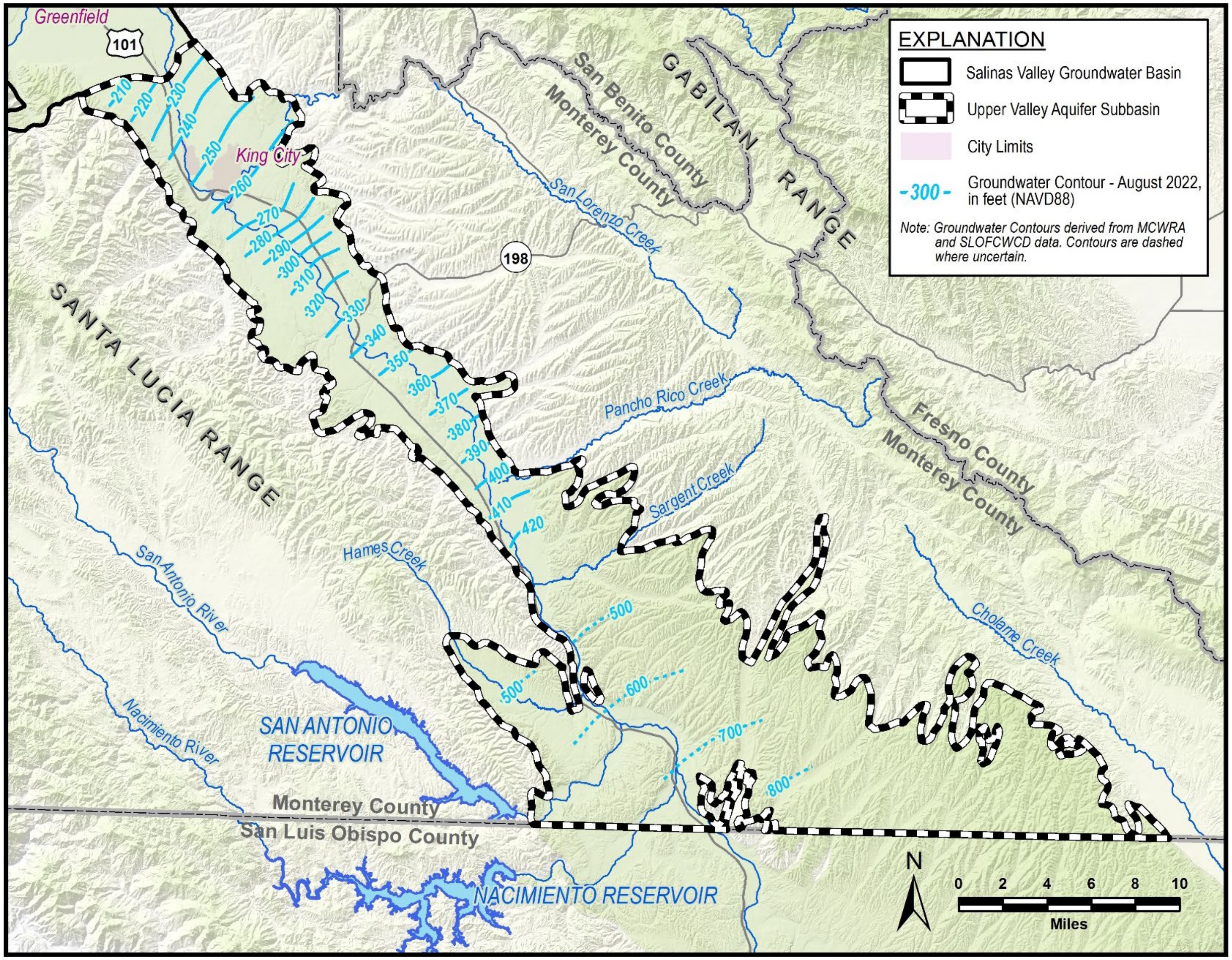

Figure 7. Seasonal Low Groundwater Elevation Contour Map for the Upper Valley Aquifer Subbasin

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 8. 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. Since WY 2021, groundwater elevations decreased in most wells by about 4 to 20 feet. Groundwater elevations in one of the wells (20S/08E-34G01) that is drilled deeper in the principal aquifer have been in decline for several years. Hydrographs for all RMSs are included in Appendix A.

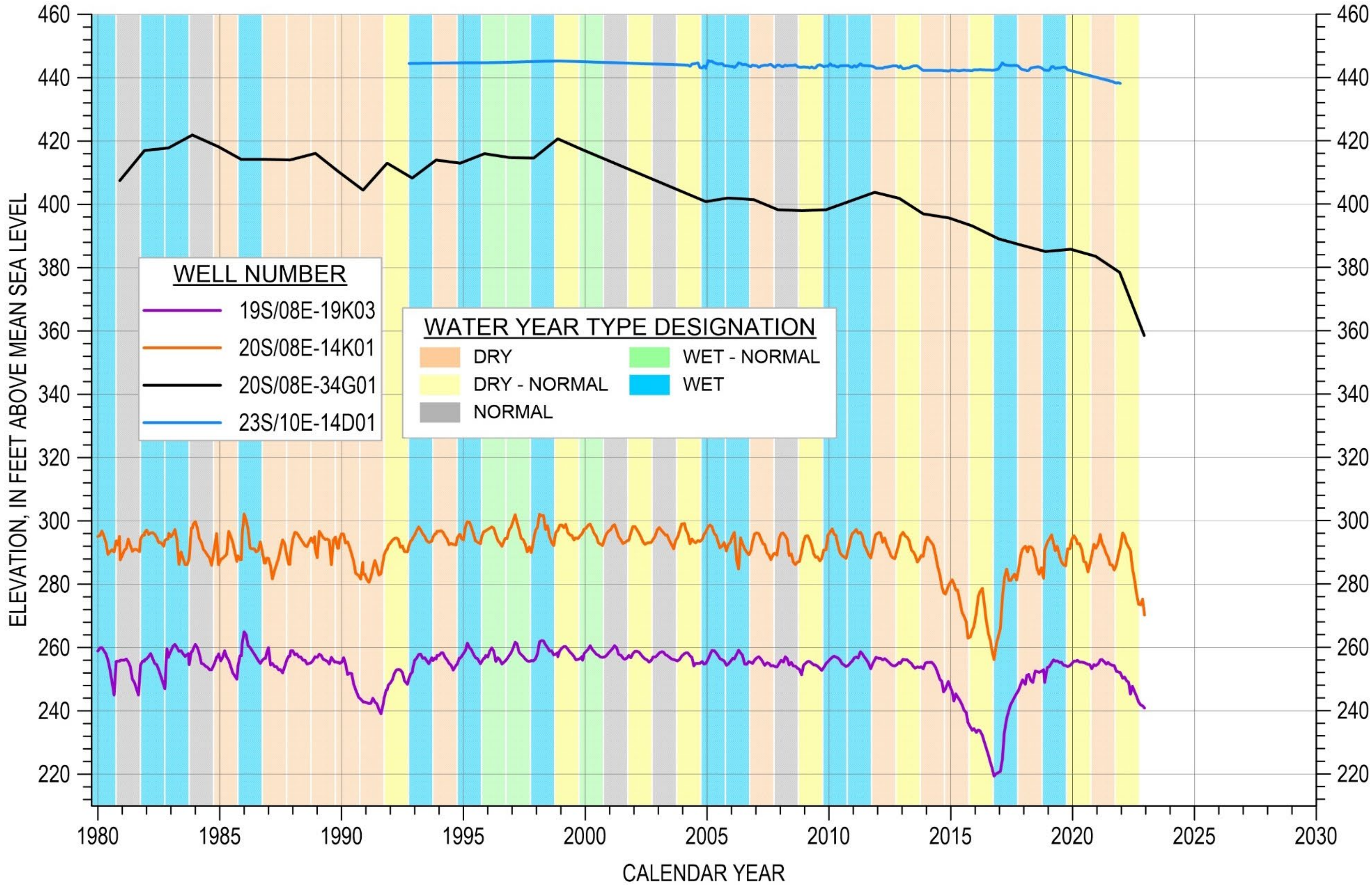

Figure 8. Groundwater Elevation Hydrographs for Selected Monitoring Wells

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 annual change in storage calculation is based on the groundwater elevation contours adapted by SVBGSA using MCWRA data for fall 2021 and fall 2022. 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 Subbasin from WY 2021 to WY 2022 was estimated by subtracting the fall 2021 groundwater elevations shown on Figure 9 from the fall 2022 groundwater elevations (Figure 6). This change was then multiplied by the storage coefficient for the Upper Valley Aquifer. Monterey County's State of the Basin Report approximates the storage coefficient to 0.10 for the Upper Valley Subarea (Brown and Caldwell, 2015). The estimated change in storage due to groundwater elevation changes, in acre-feet (AF) per acre, in the Upper Valley Subbasin is depicted on Figure 10. Since the groundwater elevation contours do not extend across the entire Subbasin (due to lack of data), storage change was not calculated in the areas that were not contoured, as indicated by the areas without color on Figure 10. There is little known pumping in non-contoured areas within the Subbasin, and therefore the actual change in storage may be higher or lower depending on average change in groundwater levels in the non-contoured area.

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 2021 to fall 2022 decreased by approximately 26,100 AF/yr. for the portion of the Upper Valley Subbasin that overlaps with MCWRA's Upper Valley Subarea (Figure 5). 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 Annual Change in Groundwater Storage

Component	Values
Area of contoured portion of Subbasin (acres)	56,600
Storage coefficient	0.10
Average change in groundwater elevations (feet)	-4.62
Total annual change in groundwater storage (AF/yr.)	**-26,100**

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

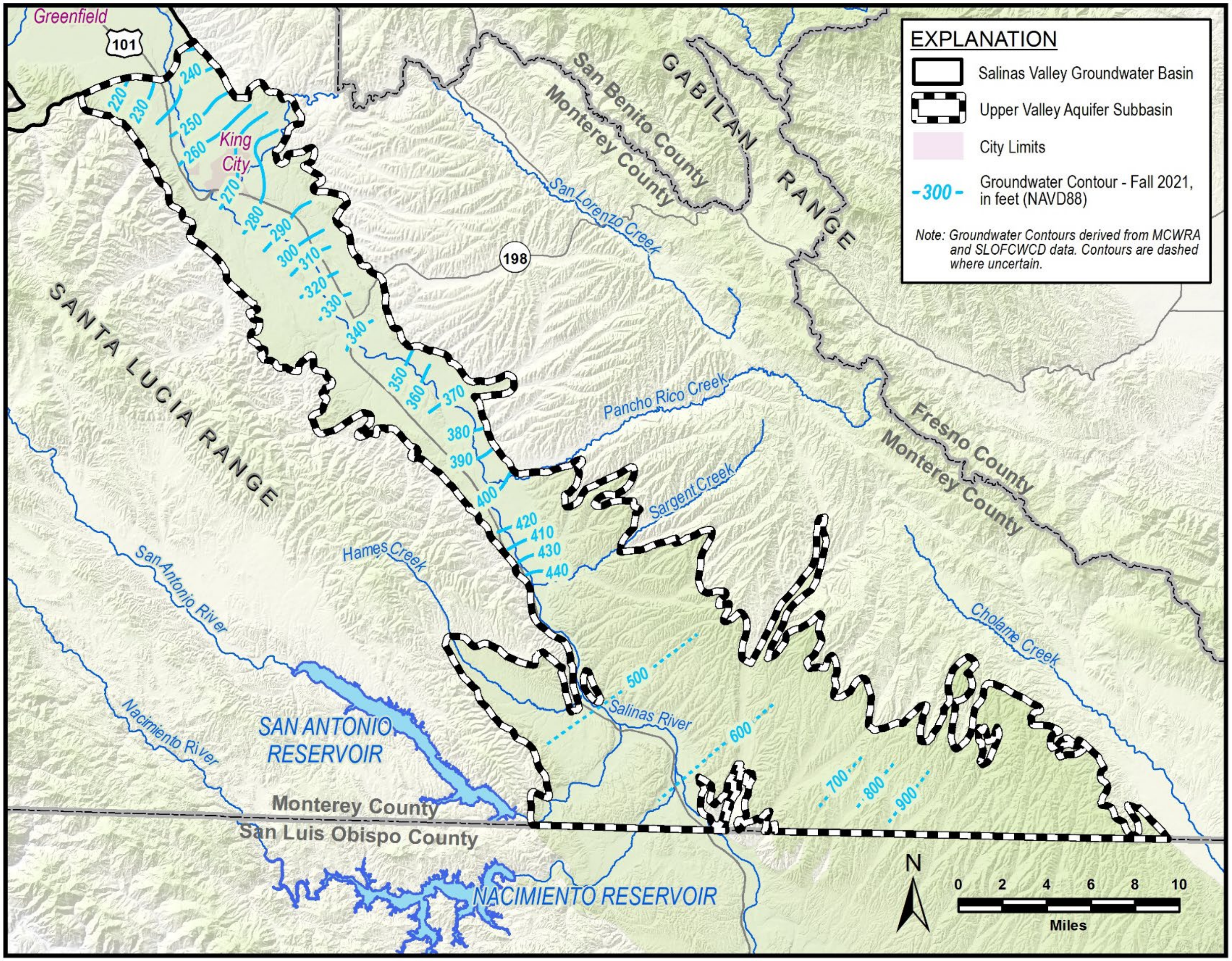

Figure 9. Fall 2021 Groundwater Elevation Contour Map

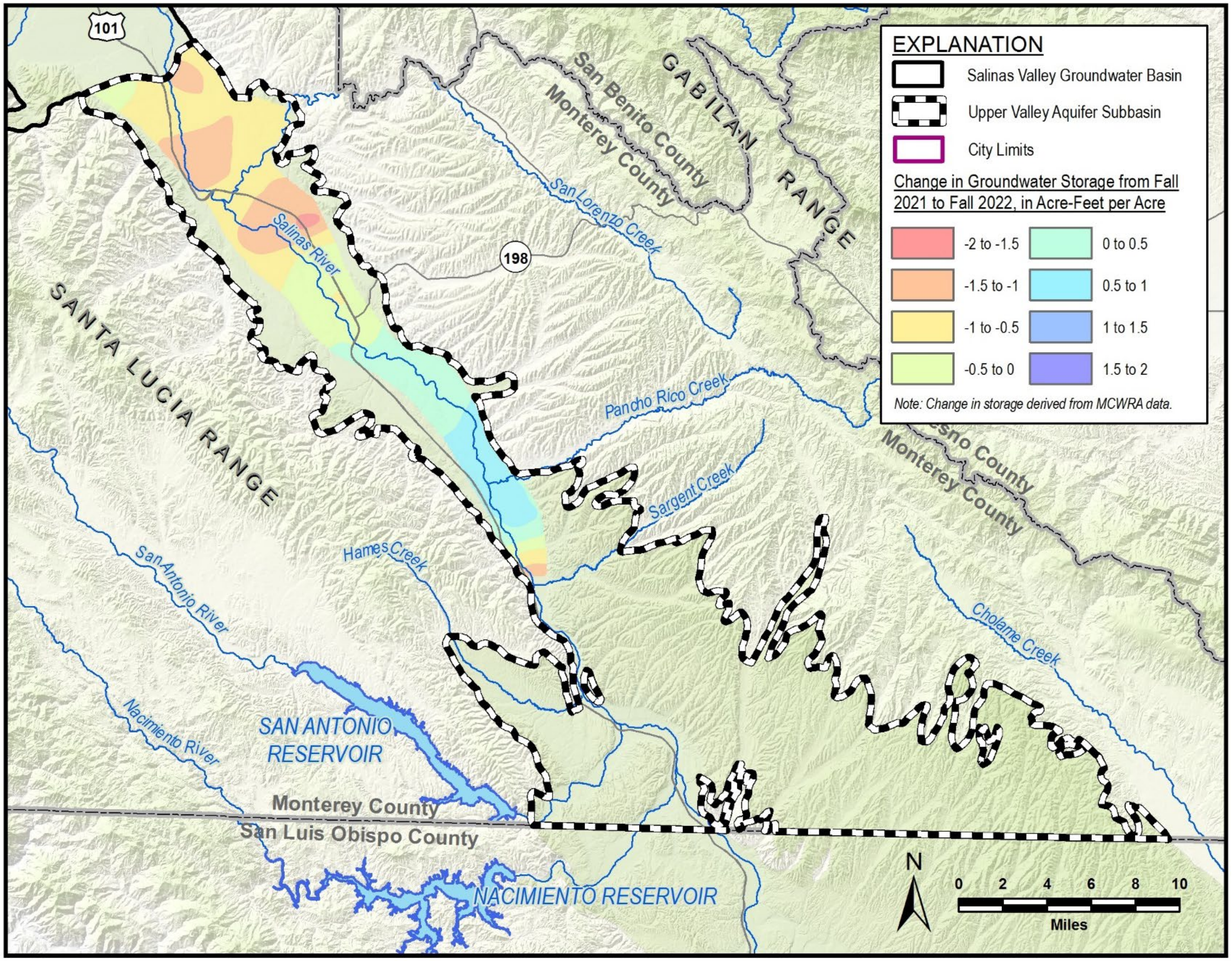

Figure 10. Estimated Annual Change in Groundwater Storage from WY 2021 and WY 2022

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 11. The annual and cumulative groundwater storage changes included on Figure 11 are based on average groundwater elevation changes for the area of the Subbasin that overlaps with MCWRA's Upper Valley Subarea (Figure 5). This figure includes groundwater extraction from 1995 to 2021 (the most current available data), 1995 to 2016 average historical extraction, and the 2070 projected extraction from Chapter 6 of the GSP. Pumping increased slightly 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, such that the 1995 change in storage value is based on change in storage from 1994. In WY 2022, groundwater storage decreased because groundwater elevations decreased, as shown by the orange and green lines.

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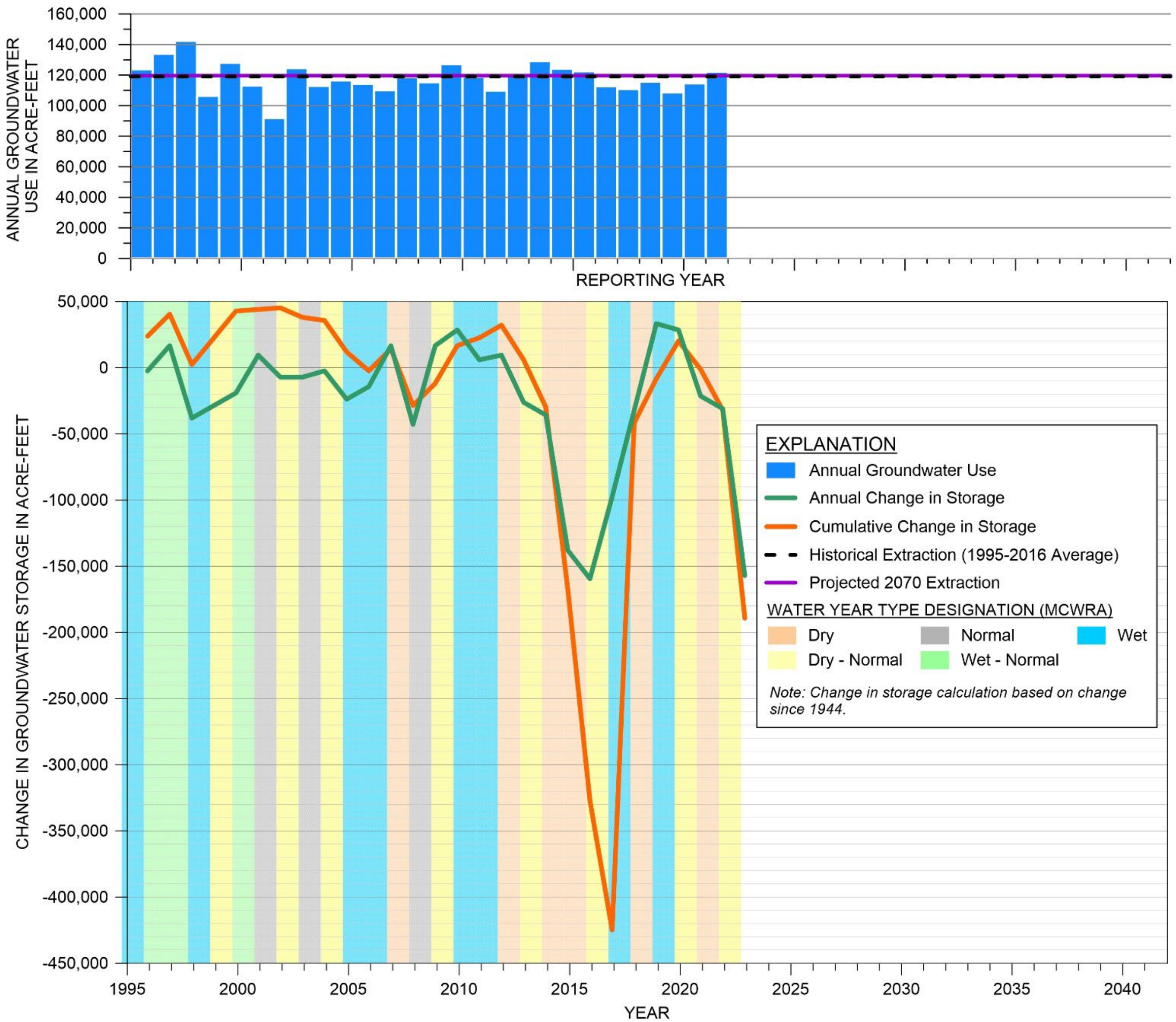


Figure 11. Groundwater Use and Annual and Cumulative Change in Groundwater Storage

3.4 Groundwater Quality

Degradation of groundwater quality is measured in 3 sets of wells: public water system supply wells, on-farm domestic wells, and irrigation wells. Data collected by SWRCB Division of Drinking Water (DDW) is used to evaluate groundwater quality in public water system supply wells. Under the Irrigated Lands Regulatory Program (ILRP), water quality degradation is monitored for on-farm domestic wells and irrigation wells. Water quality data for both programs can be found on SWRCB's GAMA Groundwater Information System. The constituents of concern (COCs) for 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 irrigation wells include those that may lead to reduced crop production and are outlined in the Basin Plan for Central Coast Regional Water Quality Control Board (CCRWQCB, 2019). As discussed in the GSP, each set of wells has its own COCs and only the last sample for each COC and each well are considered. Table 5 and Figure 12 shows the number of wells that were sampled in WY 2022 and that have concentrations above the regulatory standard for the COCs listed in the Upper Valley Subbasin GSP. The COCs that had wells with concentrations above the regulatory standard include boron, iron, nitrate, and total dissolved solids. While wells had concentrations above the regulatory standard for 4 COCs, those occurred in only 3 wells, and the well with multiple exceedances is noted on Figure 12.

Table 5. WY 2022 Groundwater Quality Data

Constituents of Concern (COC)	Regulatory Standard	Standard Units	Number of Wells Sampled for COC in WY 2022	Number of Wells Sampled in WY 2022 with COC Concentrations Above the Regulatory Standard
DDW Wells				
1,2,3-Trichloropropane (1,2,3 TCP)	0.005	ug/L	4	0
Benzo(a)pyrene	0.2	mg/L	0	0
Boron	1	mg/L	2	2
Cadmium	5	ug/L	1	0
Dinoseb	7	ug/L	1	0
Hexachlorobenzene	1	ug/L	0	0
Iron	300	ug/L	2	1
Lindane	0.2	ug/L	0	0
Manganese	50	ug/L	0	0
Nitrate (as nitrogen)	10	mg/L	10	0
Specific Conductance	1600	UMHOS/CM	3	0
Sulfate	500	mg/L	2	0
Total Dissolved Solids	1000	mg/L	3	0
Vinyl Chloride	0.5	ug/L	1	0
ILRP On-Farm Domestic Wells				
Chloride	250	mg/L	1	0
Nitrate (as nitrogen)	10	mg/L	1	1
Nitrate + Nitrite (sum as nitrogen)	10	mg/L	0	0
Specific Conductance	1600	UMHOS/CM	1	0
Sulfate	500	mg/L	1	0
Total Dissolved Solids	500	mg/L	1	1
ILRP Irrigation Wells				
Chloride	350	mg/L	0	0

mg/L- milligram/Liter
ug/L - micrograms/Liter
UMHOS/CM - micromhos/centimeter

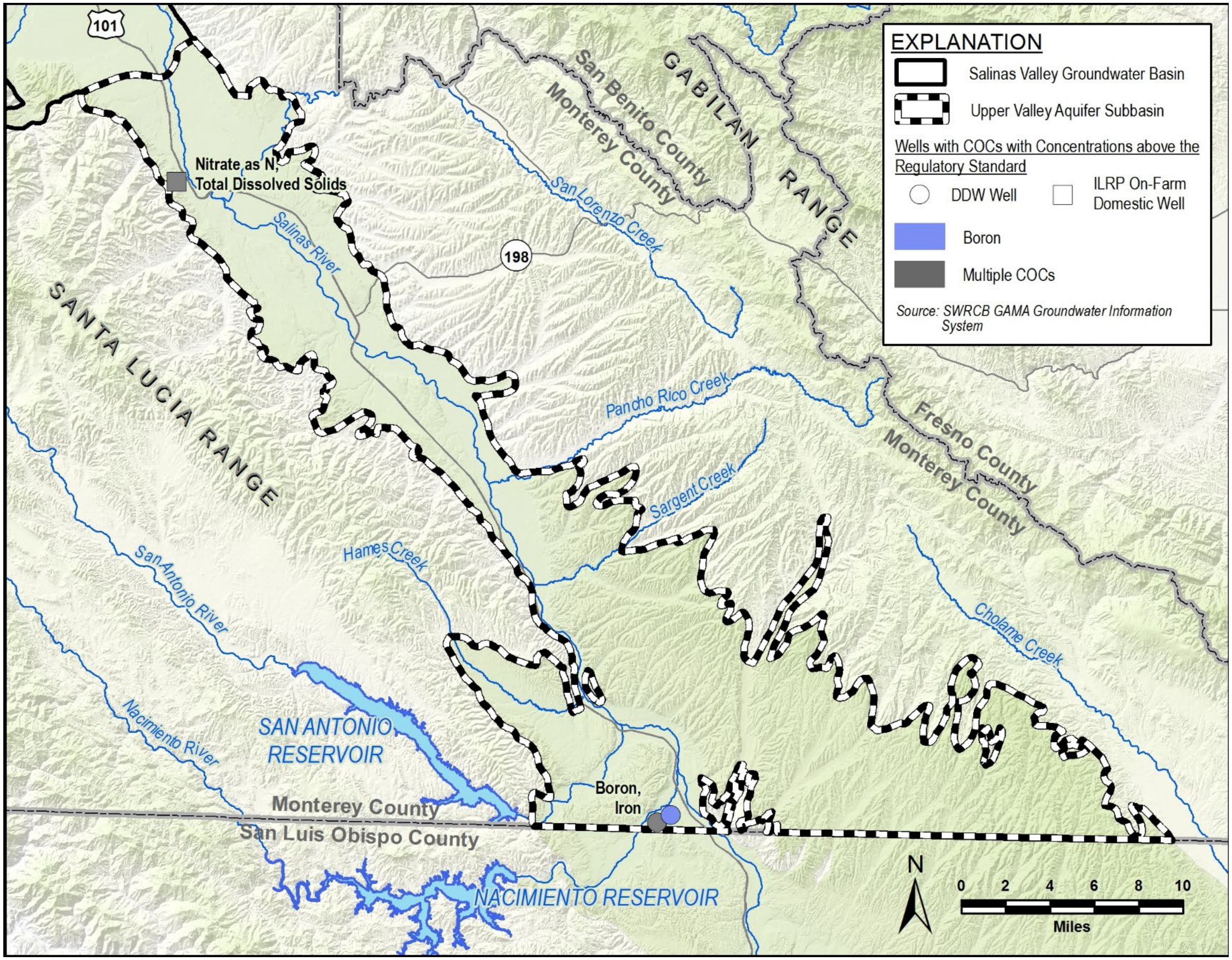


Figure 12. Wells with COC Concentrations Above the Regulatory Standard Sampled in WY 2022

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, 2022). Figure 13 shows the annual subsidence for the Upper Valley Subbasin from October 2021 to October 2022. Data continue to show negligible subsidence. All land movement was within the estimated error of measurement of +/- 0.1 foot.

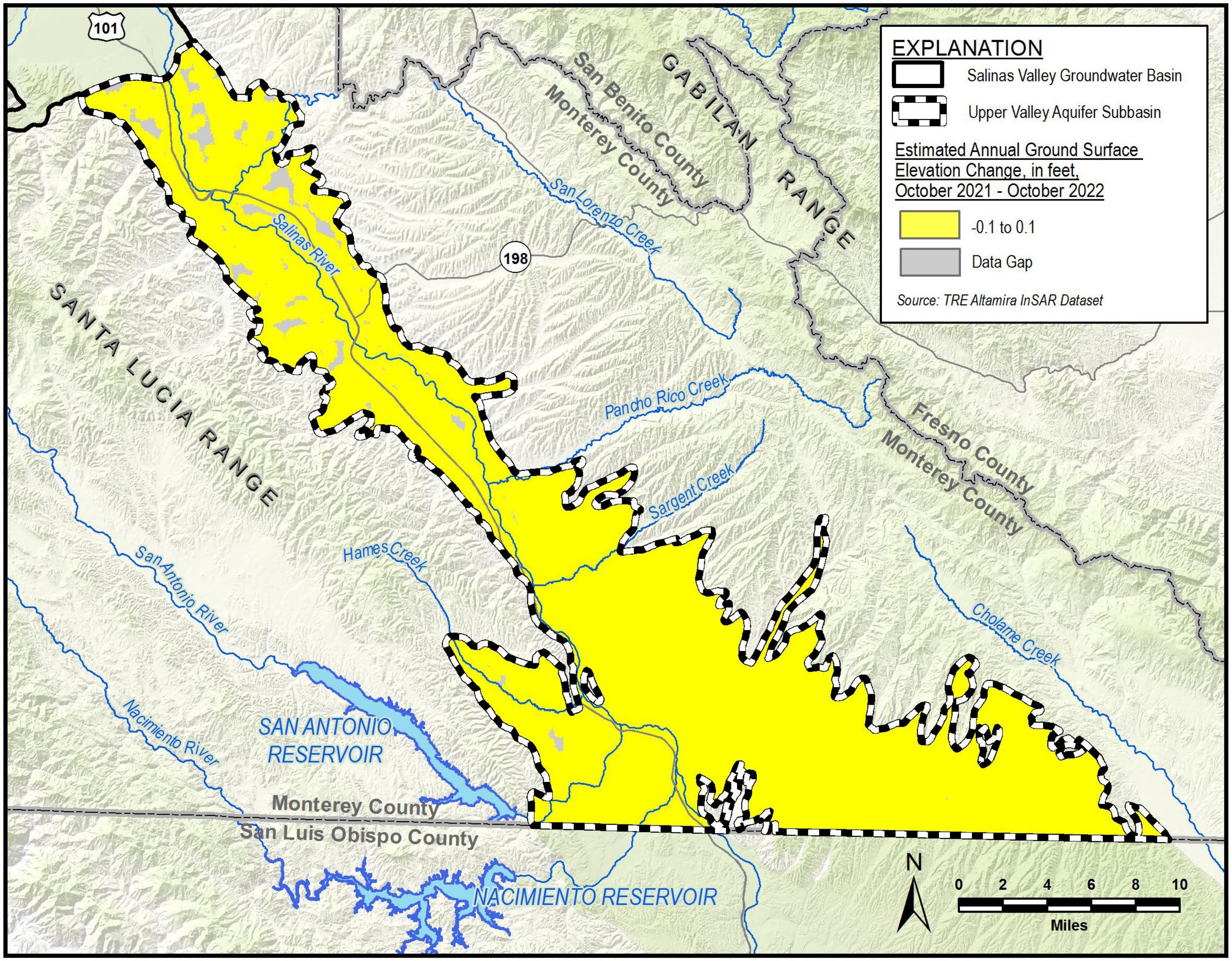


Figure 13. Annual Subsidence

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. ISW is monitored using shallow groundwater elevations near locations of ISW as a proxy for depletion of ISW. Seepage from a stream to the underlying aquifer is proportional to the difference between water elevation in the stream and groundwater elevations at locations away from the stream. Assuming the elevation in the stream is relatively stable, changes in interconnectivity between the stream and the underlying aquifer are determined by changes in groundwater levels in the aquifer. The proxy relationship is established in Section 8.10.2.1.1 of the GSP.

The ISW monitoring network consists of 4 shallow wells, which are all RMS wells. These wells will be supplemented with a new shallow well that will be installed along the Salinas River near Hames Valley. Table 6 lists the 2021 and 2022 shallow groundwater elevations and the annual change in shallow groundwater elevations for the ISW monitoring wells in the Subbasin. Shallow groundwater elevations decreased in 2 of the monitoring wells, indicating further depletion of ISW during WY 2022 at locations of ISW described in the GSP. Wells that MCWRA did not sample during the fall event do not have a water level measurement for WY 2022. Figure 14 shows the locations of the ISW RMS wells. SVBGSA is working to get biannual measurements for every RMS and to fill data gaps in the monitoring network with additional wells.

Table 6. Shallow Groundwater Elevation Data (in feet)

Monitoring Well	WY 2021 Groundwater Elevation	WY 2022 Groundwater Elevation Data	Annual Change
19S/07E-14H01	245.9	227.0	-18.9
20S/08E-07F01	260.4	Not sampled	-
21S/09E-16E01	344.7	340.1	-4.6
23S/10E-14D01	438.2	Not sampled	-

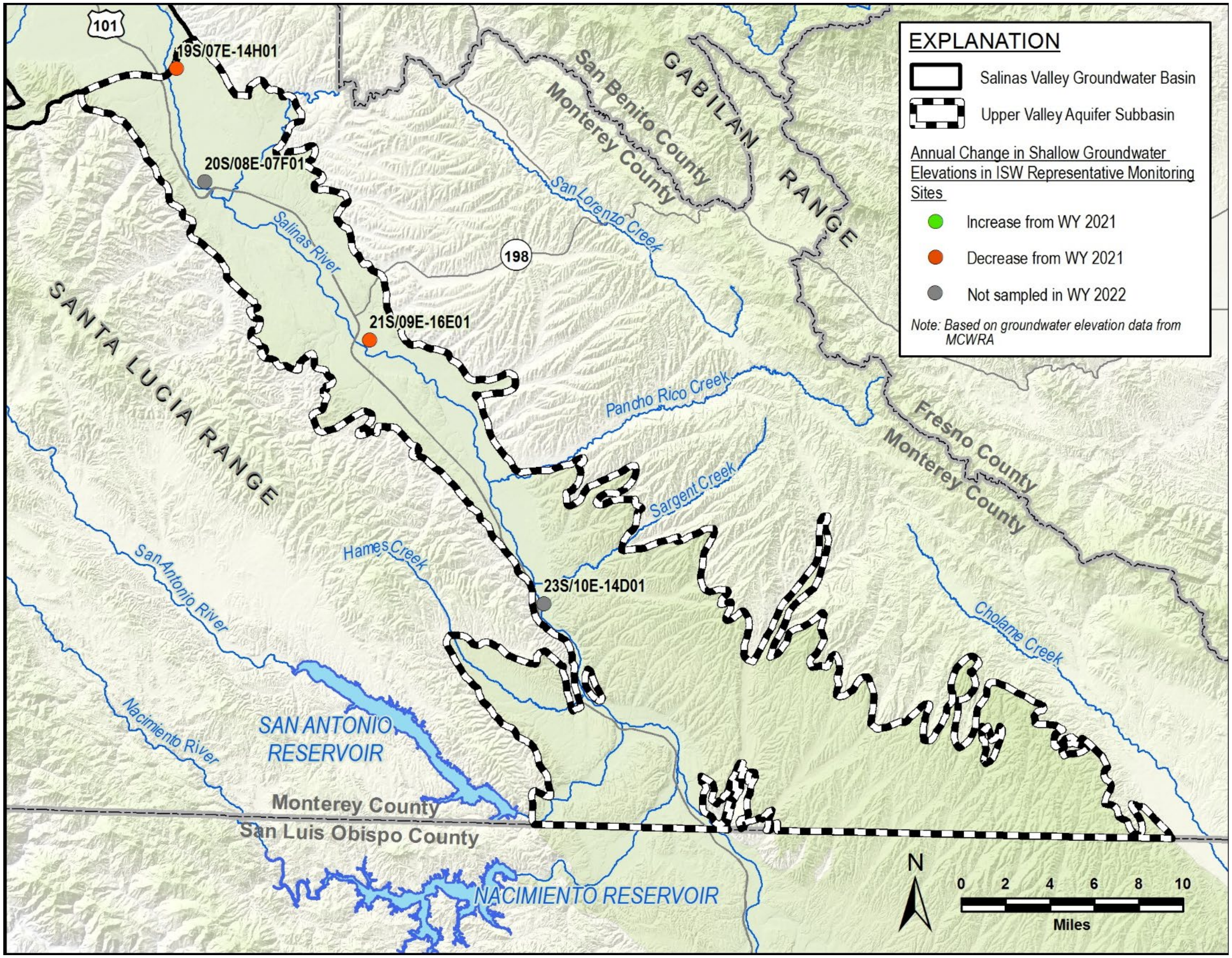


Figure 14. Change in Shallow Groundwater Elevations in ISW Representative Monitoring Sites

4 ANNUAL PROGRESS TOWARD IMPLEMENTATION OF THE GSP

4.1 WY 2022 Groundwater Management Activities

This section details groundwater management activities that have occurred in WY 2022. These include activities of SVBGSA and MCWRA that promote groundwater sustainability and are important for reaching the GSP sustainability goal. This section begins with an overview of SVBGSA's sustainability strategy for the Upper Valley Subbasin, which builds on and further details the Road Map included in the GSP.

In WY 2022, SVBGSA and MCWRA undertook 4 main categories of activities to begin GSP implementation and further groundwater sustainability goals: GSA policies, operations, and engagement; data and monitoring; planning; and sustainability strategy and activities.

4.1.1 GSA Policies, Operations, and Engagement

SVBGSA focused much of its effort during WY 2022 on developing GSA policies, standardizing GSA operations, and strengthening engagement to provide a strong base for GSP implementation.

Subbasin-level: 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 and submit it to DWR in January 2022. SVBGSA held 2 meetings of the Upper Valley Aquifer Subbasin Planning Committee during WY 2022 prior to submitting the GSP. As the responsibilities of the subbasin planning committees finished with GSP submittal, SVBGSA set up subbasin implementation committees to lead subbasin-specific GSP implementation activities. The Upper Valley Aquifer Subbasin Implementation Committee was formed with 4 subbasin committee members. SVBGSA held 3 meetings of the Upper Valley Aquifer Subbasin Implementation Committee during WY 2022 to begin implementation of the GSP.

Agency-level: During WY 2022, SVBGSA streamlined its committee structure. The SVBGSA Board of Directors transitioned the responsibilities of the Seawater Intrusion Working Group (SWIG) and Integrated Implementation Committee to the existing Advisory Committee, and the responsibilities of the SWIG Technical Advisory Committee to a new, broader Groundwater Technical Advisory Committee. SVBGSA continued its engagement across all Salinas Valley subbasins through its Board of Directors and Advisory Committee, holding 12 Board meetings and 9 Advisory Committee meetings over the course of WY 2022.

SVBGSA Work Plan, Budget, and Operating Fee: SVBGSA developed a 2-year and 5-year work plan and associated budget, which set the basis for the annual operating fee. The Board of

Directors passed a portion of the fee increase. During the budget discussions, the Board directed staff to determine whether the regulatory fee needed to be applied for some projects and management actions at a specific subbasin level. As a result of the partial funding, some workstreams moved forward while others remained unfunded, slowing implementation of certain activities.

Well Permitting: Governor Gavin Newsom released Executive Order N-7-22 on March 28, 2022. The Executive Order creates a role for GSAs in the groundwater well permitting process during droughts. Specifically, a well permitting agency shall not "approve a permit for a new groundwater well or for alteration of an existing well in a basin subject to the Sustainable Groundwater Management Act and classified as medium- or high-priority without first obtaining written verification from a Groundwater Sustainability Agency managing the basin or area of the basin where the well in proposed to be located that groundwater extraction by the proposed well would not be inconsistent with any sustainable groundwater management program established in any applicable Groundwater Sustainability Plan adopted by the Groundwater Sustainability Agency and would not decrease the likelihood of achieving a sustainability goal for the basin covered by such a plan." In addition, a proposed well cannot cause subsidence that would adversely impact or damage nearby infrastructure. SVBGSA worked with County agencies involved in well permitting, interested parties, and its Board of Directors to develop a process to comply with the Executive Order.

Coordination with Partner Agencies: SVBGSA and MCWRA 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 finalized the Memorandum of Understanding that outlines the roles of the 2 agencies and how they 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:

- Monterey County Health Department on data and the existing well permitting and water quality monitoring programs
- CCRWQCB to discuss the Water Quality Coordination Group
- Integrated Regional Water Management Plan, including coordinating with CCWG on watershed coordinator grant

Outreach: Underrepresented Communities are an important stakeholder for the SVBGSA to develop meaningful and long-term relationships with regard to groundwater sustainability. Outreach to Underrepresented Communities included 2 different methods of communication for making workshop materials more accessible. For the first in-person workshop since GSP implementation, SVBGSA offered Spanish interpretation services for attendees both in person and online. In addition, SVBGSA informational workshops are archived on a YouTube channel which is easily accessible to interested parties. A workshop on demand management was also translated and presented in Spanish with the video archived for accessible viewing.

SVBGSA worked very closely with the Watershed Coordinator for the Lower Salinas/Gabilan watershed. SVBGSA intends to learn from and apply lessons learned and outreach tools from the Lower Salinas/Gabilan watershed to the rest of the Salinas Basin. The Watershed Coordinator is collaborating with the League of United Latin American Citizens and developing materials to reach residents to increase their general understanding of water resources. A "Water 101" will help residents build a foundation for better voicing their needs regarding particular projects and management actions. In addition, the Watershed Coordinator is working with the North Monterey County School District in hopes of scheduling future groundwater related educational programs, co-funded by the SVBGSA.

4.1.2 Data and Monitoring

SVBGSA also undertook several efforts to further increase data collection and monitoring. During WY 2022:

- SVBGSA reviewed MCWRA and DWR databases to identify any potential existing wells that could fill data gaps, and reviewed the data gaps with interested parties.
- 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 continued to support the USGS through the Cooperative Agreement for the development of the Salinas Valley Integrated Hydrologic Model.

4.1.3 Planning

SVBGSA began WY 2022 with finalizing the Upper Valley Subbasin GSP, working together with the 7 members of the Upper Valley Planning Committee. Final stages included responding to and addressing comments on the draft GSP, reviewing changes with the Upper Valley Planning Committee, and presenting to the SVBGSA Board of Directors for final approval. SVBGSA submitted the GSP in January 2022.

After submittal of the 2022 GSPs, SVBGSA developed an Integrated Implementation Plan to tie the SVBGSA GSPs together. It described how the Salinas Valley's groundwater system functions holistically, outlined a Valley-wide water budget, and provided an integrated understanding of current groundwater conditions and SGMA sustainability goals.

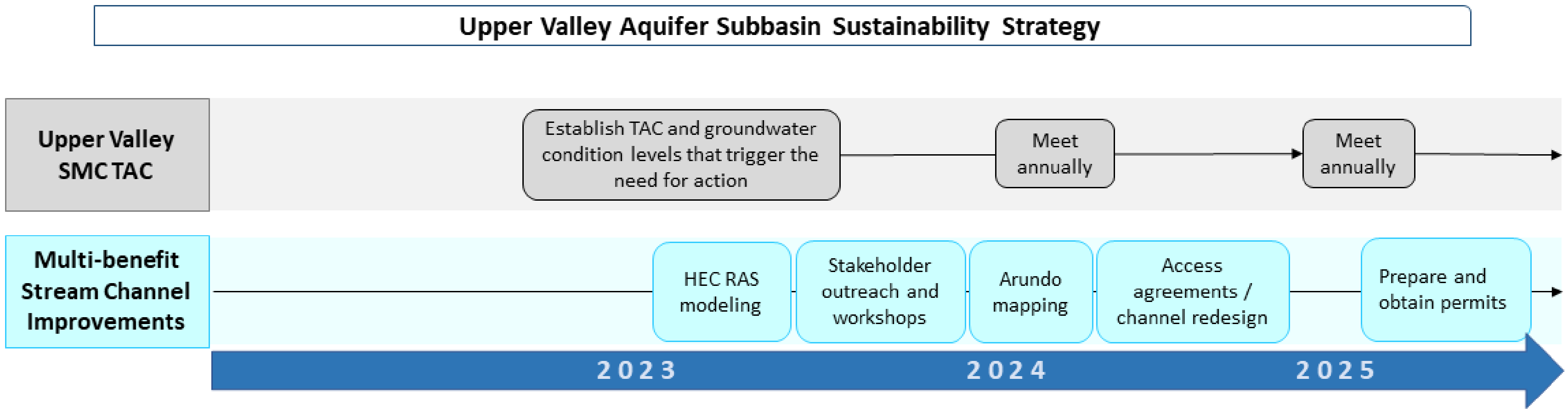
4.1.4 Sustainability Strategy and Activities

The Upper Valley GSP included a high-level Road Map for Refining and Implementing Management Actions and Projects. The Road Map organizes management actions and projects identified in Chapter 9 of the GSP into a general priority order for implementation. These include implementation actions that contribute to groundwater management and GSP implementation but do not directly help the Subbasin maintain sustainability. Activities in the implementation strategy build on GSA policies, operations, and engagement; data and monitoring; and planning activities.

The management actions and projects identified in the GSP are sufficient for maintaining sustainability in the Upper Valley Subbasin over the 50-year planning horizon. They will be integrated with projects for the other Salinas Valley subbasins as appropriate during GSP implementation. The management actions and projects described in this GSP have been identified as beneficial for the Upper Valley Subbasin. The impacts of management actions and projects on other subbasins will be analyzed and taken into consideration as part of the project selection process. Prior to implementation, they will be evaluated in the context of this Subbasin and the entire Valley.

Management actions and projects are not needed to maintain sustainability at this time; however, SVBGSA and MCWRA are moving forward with some actions that will positively impact groundwater conditions. In particular, MCWRA continues to convene the Drought Technical Advisory Committee when triggered, and SVBGSA held Agency-wide discussions on agricultural BMPs.

Figure 15 builds on the general Road Map in the GSP to show SVBGSA's sustainability strategy for the Upper Valley Subbasin. SVBGSA plans to support the Resource Conservation District's efforts, in partnership with the RMU association, on the Multi-benefit Stream Channel Improvements Project, which has broad support and potential groundwater benefit. In WY 2023, SVBGSA also plans to move forward with implementation actions and establish the SMC TAC. Since the Upper Valley Subbasin is currently not experiencing undesirable results, SVBGSA will establish the SMC TAC to review conditions annually and recommend to the Upper Valley Subbasin Implementation Committee whether additional management actions and projects are needed to maintain sustainability.



Other Management Actions and Projects, if needed in the future:

- Fallowing, Fallow Bank, and Agricultural Land Retirement
- Reservoir Reoperation
- Managed Aquifer Recharge with Overland Flow

Figure 15. Upper Valley Sustainability Strategy

More specifically, an action undertaken in WY 2022 that contributed to groundwater sustainability includes:

Drought Technical Advisory Committee (D-TAC): MCWRA formed a Drought Operations Technical Advisory Committee (D-TAC) to provide, when drought triggers occur, technical input and advice regarding the operations of Nacimiento and San Antonio Reservoirs. During WY 2022, MCWRA convened the D-TAC to develop a proposed reservoir release schedule for the April to December period. The D-TAC also worked on formulating a Dry Winter Scenario Narrative (DWSN) for the January – March period following the release schedule period with the purpose of recommending release actions in the event of continuation of dry conditions in the following winter. The DWSN was finalized in April 2022. The DTAC will be activated in future years when 2 reservoir storage depletion triggers are met and winter inflow fails to replenish reservoir storage about either of those triggers.

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.

Significant and unreasonable conditions occur due to inadequate groundwater management and qualitatively describe groundwater conditions deemed insufficient by subbasin planning committees. Minimum thresholds are quantitative indicators of the Subbasin's locally defined significant and unreasonable conditions. An undesirable result is a combination of minimum threshold exceedances that shows a significant and unreasonable condition across the Subbasin as a whole. Measurable objectives are the goals that reflect the Subbasin's desired groundwater conditions for each sustainability indicator and provide operational flexibility above the minimum thresholds. The GSP and annual reports must demonstrate that groundwater management will not only avoid undesirable results, but can reach measurable objectives by 2042. DWR uses interim milestones every 5 years to review progress from current conditions to measurable objectives.

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 groundwater management. Average hydrogeologic conditions are the anticipated future groundwater conditions in the Subbasin, averaged over the planning horizon and accounting for anticipated climate change. 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. 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 16 show the anticipated average precipitation for 2030 and 2070, accounting for reasonable future climatic change (DWR, 2018). Measured annual precipitation from WY 2020 through 2022 are shown as blue dots and the dashed blue line shows the average measured precipitation since GSP implementation. This figure shows that precipitation in WY 2022 was slightly below the average hydrologic conditions for the Subbasin represented by the average precipitation after GSP implementation. Furthermore, average precipitation 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 2022 was classified as dry-normal, and therefore it is more likely that groundwater levels were low. Areas with current minimum threshold exceedances should be monitored and should demonstrate progress toward interim milestones measurable objectives as conditions approach expected average conditions.

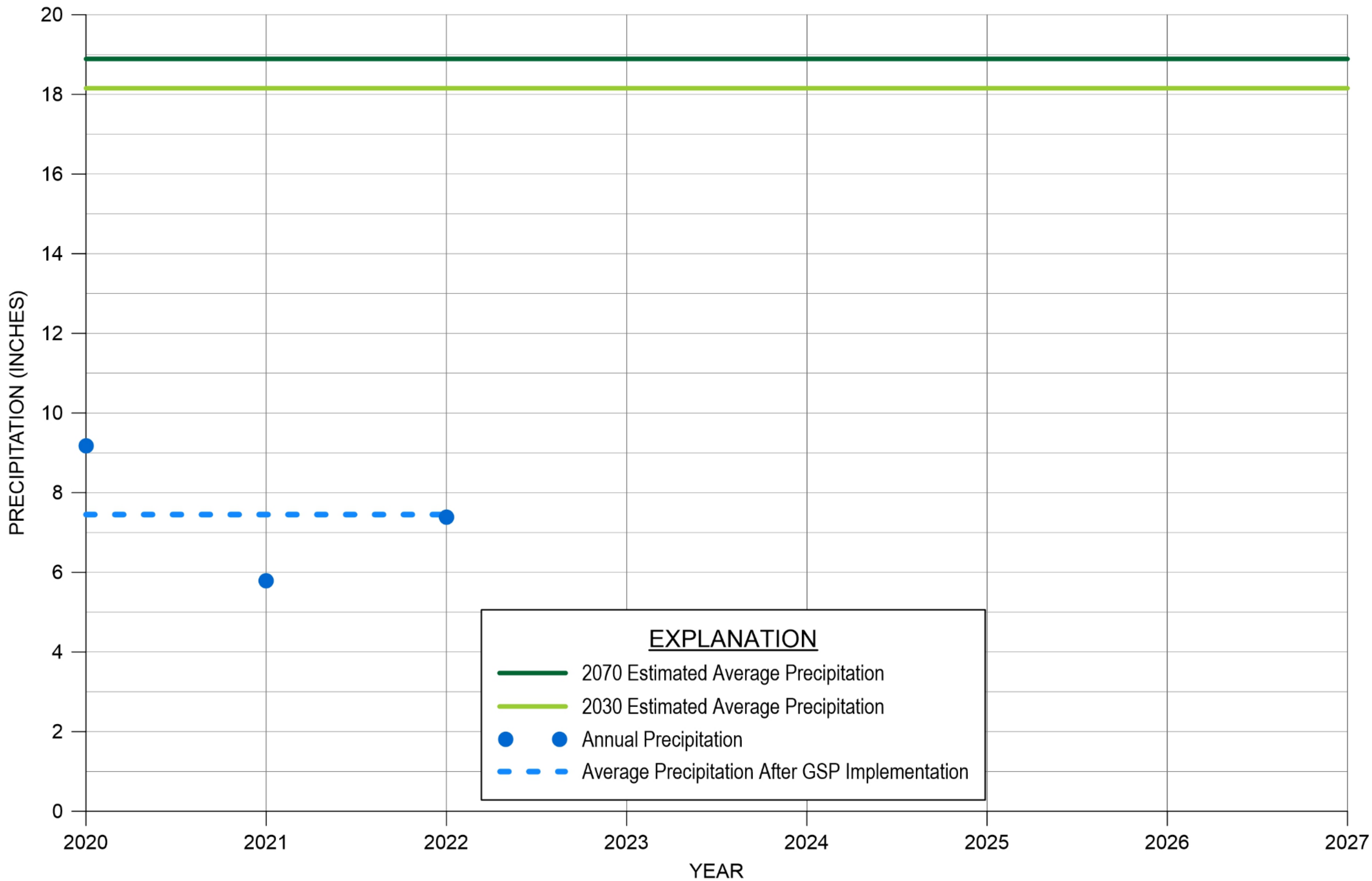


Figure 16. Comparison of Average Precipitation Since GSP Implementation and Estimated Future Average Precipitation

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 2012 and 2016 at each representative monitoring well. The minimum threshold values for each well within the groundwater elevation monitoring network are provided in Table 7. 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. Groundwater elevations are also compared against the groundwater level SMC on Figure 17. The red cells below show that 2 wells in the Subbasin exceeded their minimum threshold in WY 2022.

Table 7. Groundwater Elevation Data, Minimum Thresholds, and Measurable Objectives (in feet)

Below Minimum Threshold		Above Minimum Threshold		Above Measurable Objective
Monitoring Site	**Minimum Threshold**	**WY 2022 Groundwater Elevation**	**Interim Milestone at Year 2027**	**Measurable Objective (Goal to Reach at 2042)**
19S/07E-14N02	187.7	224.0	233.9	232.6
19S/08E-19K03	215.5	240.9	255.2	256.1
20S/08E-05R03	226.0	259.5	270.0	270.2
20S/08E-07F01	216.9	Not sampled	267.5	267.3
20S/08E-14K01	258.4	270.3	294.2	294.6
20S/08E-15H03	247.0	272.0	290.5	290.4
20S/08E-25Q01	309.7	315.6	314.8	316.7
20S/08E-34G01	384.1	358.6	390.3	403.8
21S/08E-13H01	387.9*	374.9	397.1	397.1*
21S/09E-06F50	322.9	323.8	331.8	332.7*
21S/09E-16E01	330.0	340.1	345.4	344.7
21S/09E-24L01	352.5	366.7	362.5	364.7
21S/10E-32N01	368.0	385.0	377.4	378.1
22S/10E-09P01	383.6	403.4	401.2	401.7
22S/10E-16K01	375.5	407.9	400.3	400.8
22S/10E-34G01	419.4	428.1	424.7	425.0
23S/10E-14D01	437.2	Not sampled	442.7	443.3
23S/10E-33P01	506.7	Not sampled	509.3	528.0

*Groundwater elevation was estimated.

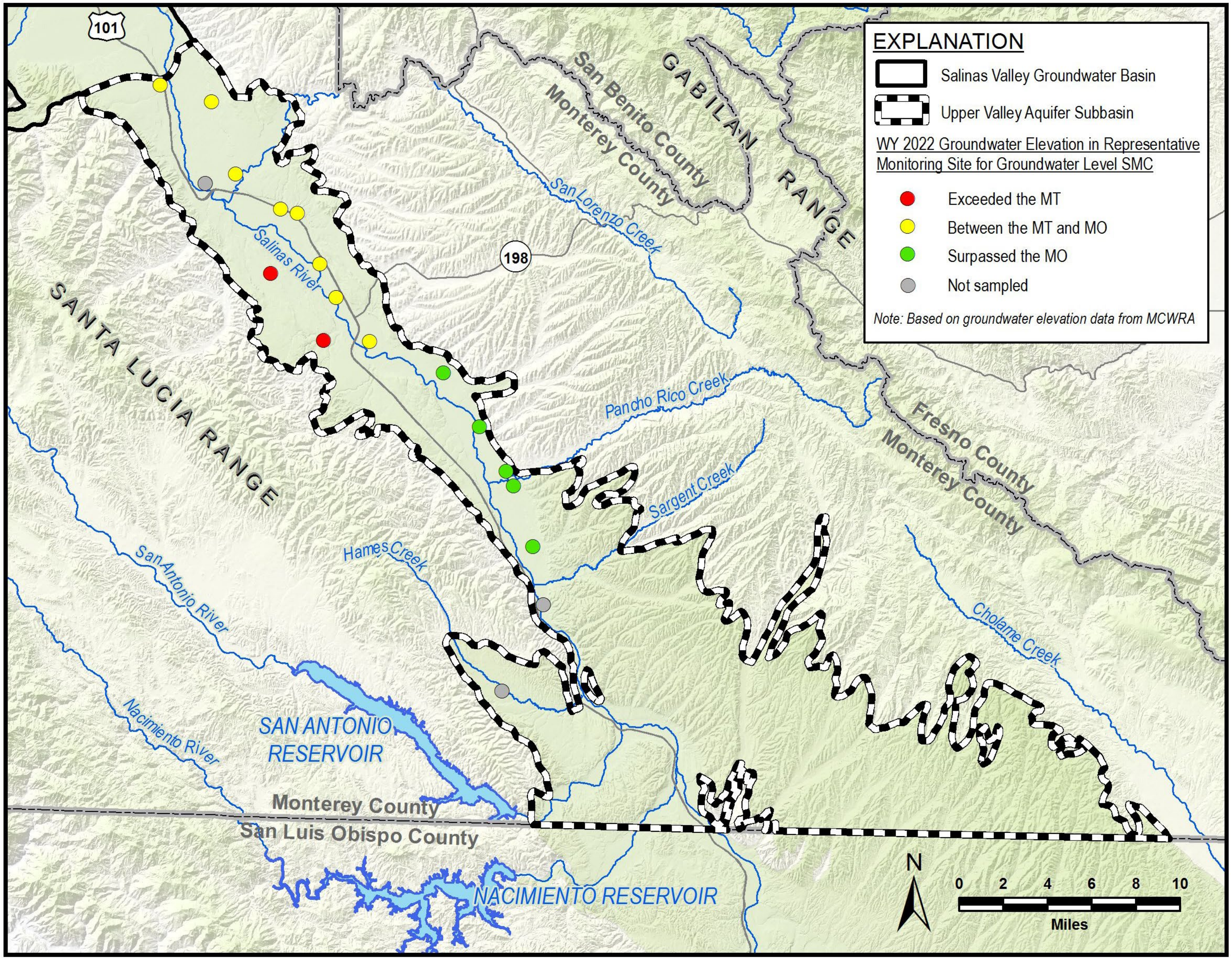


Figure 17. Groundwater Elevations Compared to the Minimum Thresholds and Measurable Objectives

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 7. Five RMS wells had groundwater elevations higher than their measurable objective in WY 2022 and are represented by the green cells in Table 7.

To show progress toward measurable objectives, DWR assesses interim milestones at 5-year intervals. The 2027 interim milestones for groundwater elevations are also shown in Table 9. The WY 2022 groundwater elevations in 6 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 7 shows that 11% of the RMS wells were below their minimum threshold but these exceedances do not lead to an undesirable result. Groundwater elevation minimum threshold exceedances, compared with the undesirable result, are shown on Figure 18. If a value is in the shaded red area, it would constitute an undesirable result. This graph will be updated annually with new data to demonstrate the current status of the sustainability indicator.

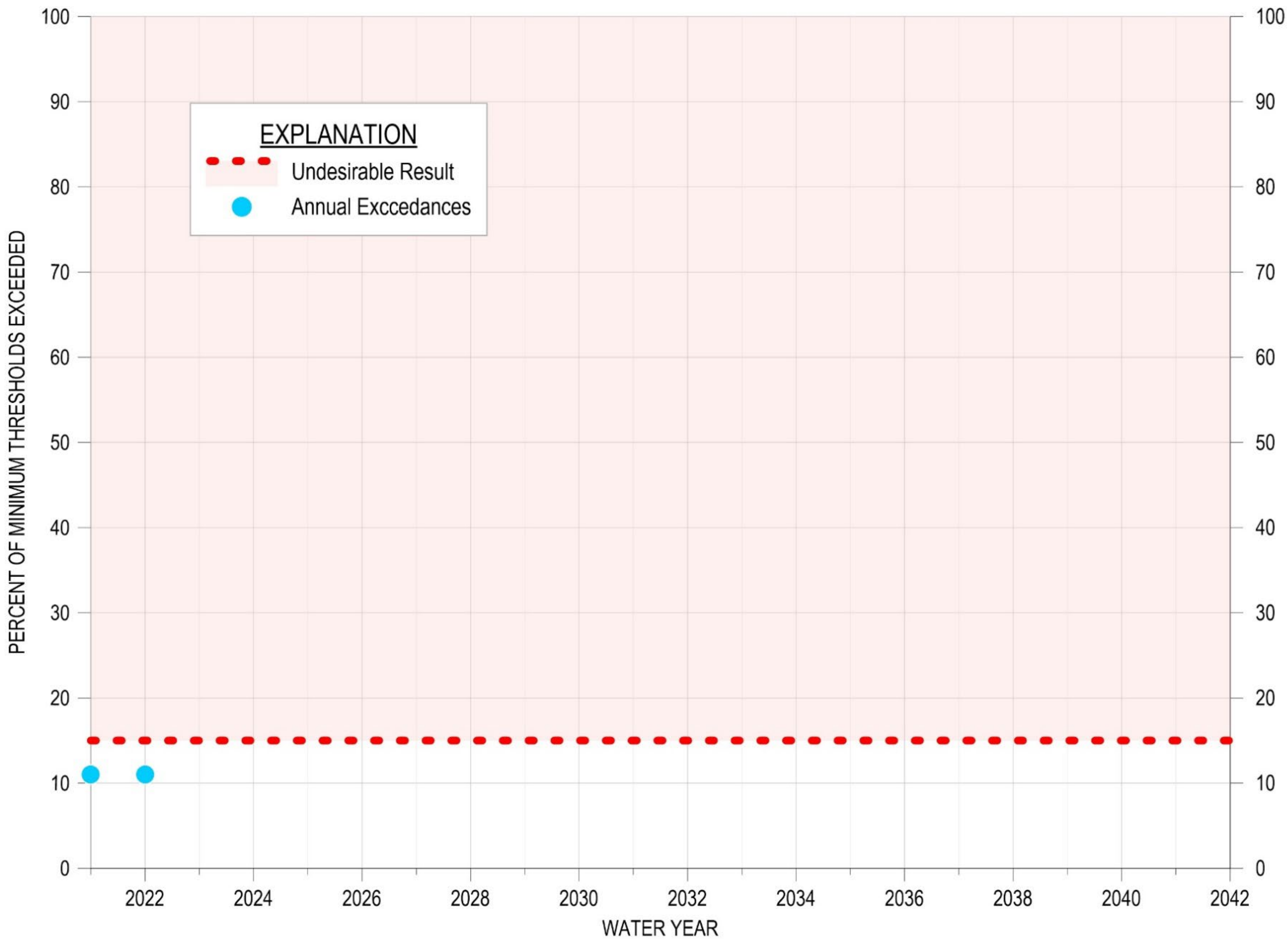


Figure 18. Groundwater Elevation and Storage Exceedances Compared to the Undesirable Result

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 WY 2022 groundwater storage SMC as measured by proxy using groundwater elevations do not cause as undesirable result as shown on Figure 18. If a value is in the shaded red area, it would constitute an undesirable result.

4.2.3 Degraded Groundwater Quality SMC

4.2.3.1 Minimum Thresholds

The degraded groundwater quality minimum thresholds were established for each COC based on the number of supply wells monitored that had higher concentrations than the regulatory standards for drinking water and irrigation water during the last sampling event. 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 COC for the wells within the groundwater quality monitoring network are provided in Table 8. Table 8 also shows the wells with concentrations higher than the regulatory standard in WY 2022 discussed in Section 3.4 and the running total of wells with concentrations higher than the regulatory standard, which are used to assess the SMC. Only the latest sample for each COC at each well is used for the running total. The minimum thresholds are set to no additional wells with concentrations higher than the regulatory standard for each constituent, as compared to the 2019 baseline. The SMC are based on the total number of wells in order to assess subbasin-wide conditions; so if a single well rises above a COC's regulatory standard and another falls below, there is no change in the number of wells with concentrations above the regulatory standard. These conditions were determined to be significant and unreasonable because COC concentrations above the regulatory standard may 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 may reduce grower's yields and profits.

As the GSP established a minimum threshold for each COC, there is an exceedance of the minimum threshold if there are more wells with concentrations above the regulatory standard than there were in 2019. In WY 2022, there were 2 COCs that exceeded their groundwater quality minimum thresholds. The last column in Table 8 includes the number of wells above the 2019 baseline that had higher concentrations than the regulatory standard. If a COC has more wells with concentrations above the regulatory standard than the minimum threshold, it is highlighted in orange to indicate an exceedance. The negative numbers in the last column indicate a drop in the total number of wells with concentrations above the regulatory limit, as compared to 2019 when the minimum threshold was established.

In November 2022, SWRCB provided DWR with its assessment of degradation of groundwater quality SMC for high and medium priority subbasins like the Upper Valley Subbasin. SWRCB reviewed the COCs listed in the GSP and suggested adding gross alpha radioactivity to the list of COCs for the Subbasin. Although this constituent has exceeded its regulatory standard in the past, no wells in the monitoring network had exceeded the regulatory standard in the latest sampling for wells. SVBGSA will continue to monitor this constituent and will add it as a COC for the Subbasin if it exceeds the regulatory standard in wells in the monitoring network.

Compared to WY 2021, an additional COC, total dissolved solids, exceeded its minimum threshold with one well with concentrations above the regulatory limit.

Table 8. Minimum Thresholds and Measureable Objectives for Degradation of Groundwater Quality

Constituents of Concern (COC)	Minimum Threshold/ Measurable Objective (Baseline number of wells with COC concentrations above the Regulatory Standard in 2019)	Number of Wells Sampled in WY 2022 with COC Concentrations Above the Regulatory Standard	Total Number of Wells with COC Concentrations Above the Regulatory Standard in Most Recent Sample	Number of Wells with COC Concentrations above Minimum Threshold (negative if fewer than MT)
DDW Wells				
1,2,3-Trichloropropane	4	0	4	0
Benzo(a)Pyrene	1	0	1	0
Boron	2	2	2	0
Cadmium	1	0	1	0
Dinoseb	1	0	1	0
Hexachlorobenzene	1	0	1	0
Iron	8	1	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	1	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	1	36	1
ILRP Irrigation 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 wells with COC concentrations above the regulatory standard and are set at the 2019 baseline to aim for no degradation. 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 8. Interim milestones are also set at the minimum threshold levels. Although there were 2 groundwater quality minimum threshold exceedances in

WY 2022, the groundwater quality data already meet the 2027 interim milestones because these exceedances are not a result of GSA groundwater management 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 8 shows 2 constituents exceeded their minimum threshold in WY 2022. Since SVBGSA has yet to implement any projects or management actions in the Subbasin, these exceedances are not due to GSA actions. Therefore, the groundwater quality exceedances do not cause an undesirable result. The groundwater quality minimum threshold exceedances, compared with the undesirable result, are shown on Figure 19. If a value is in the shaded red area due to GSA action, it would constitute an undesirable result. This graph is updated annually with new data to demonstrate the current status of the sustainability indicator.

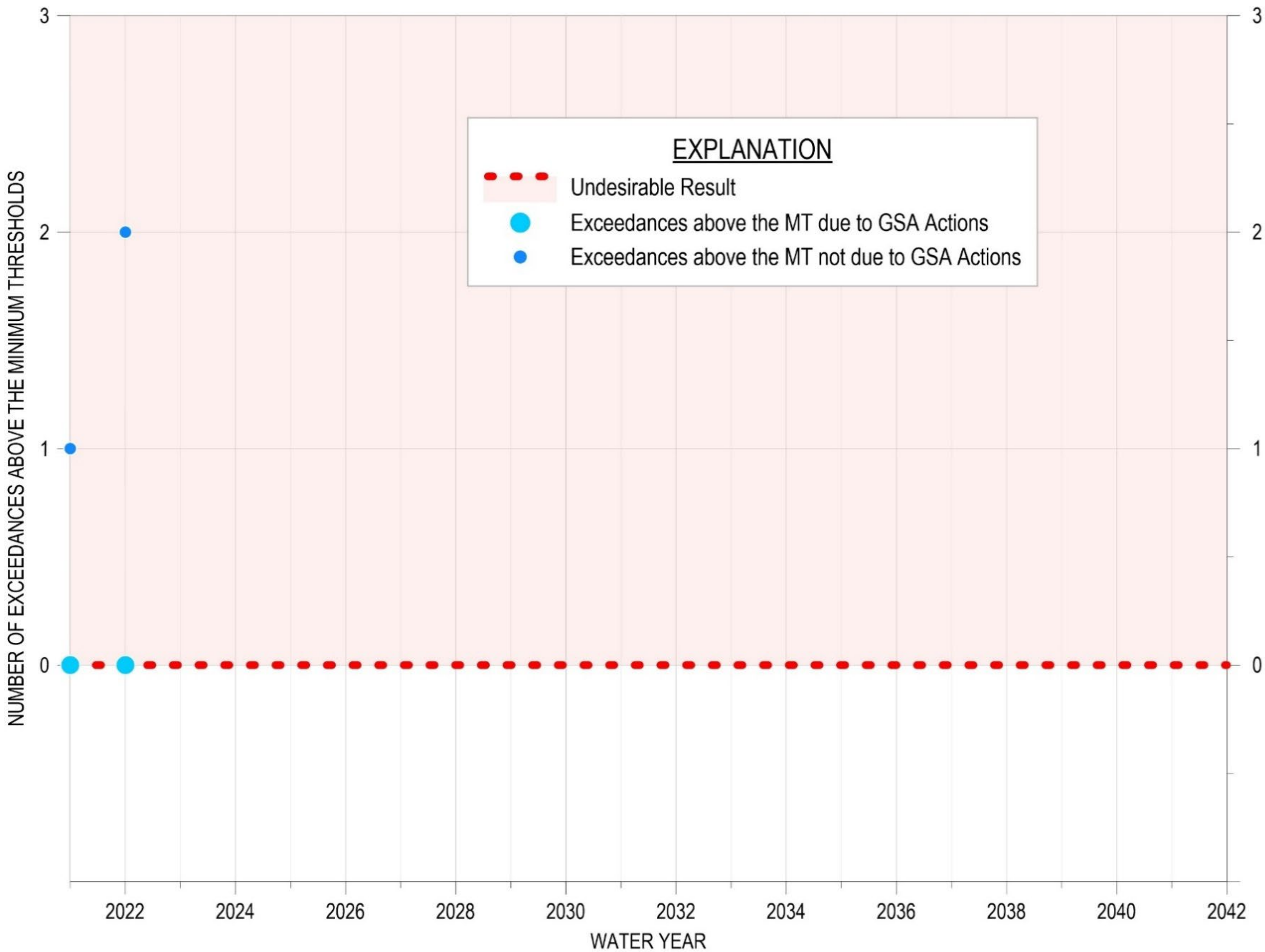


Figure 19. Groundwater Quality Minimum Threshold Exceedances Compared to the Undesirable Result

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 2021 to October 2022 demonstrated less than the minimum threshold of 0.1 foot/year, as shown on Figure 13.

4.2.4.2 Measurable Objectives and Interim Milestones

The measurable objectives for land 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 13 demonstrates that data from October 2021 to October 2022 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 land 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 2022 showed subsidence was below the minimum threshold of 0.1 foot per year. The latest land subsidence data, therefore, does not lead to an undesirable result. Maximum annual measured subsidence in the Subbasin, compared with the subsidence undesirable results, is shown on Figure 20. If a value is in the shaded red area, it would constitute an undesirable result. This graph is updated annually with new data to demonstrate the current status of the sustainability indicator.

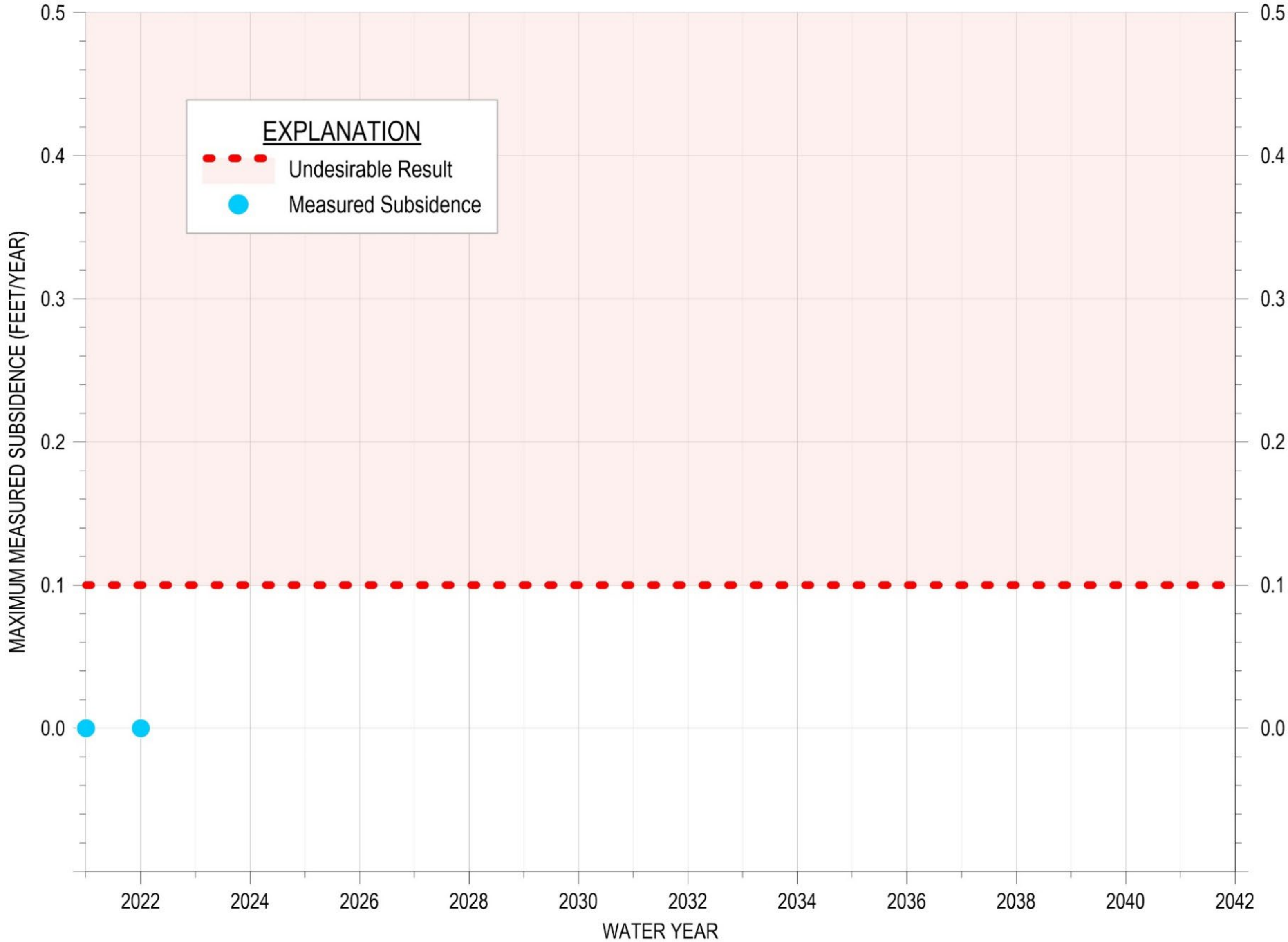


Figure 20. Maximum Measured Subsidence Compared to the Undesirable Result

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 9. 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 2022, none of the existing monitoring wells were below their minimum threshold. When the new monitoring well is drilled to fill the data gap, 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 9. 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 2022 Groundwater Elevation**	**Interim Milestone at Year 2027**	**Measurable Objective (Goal to Reach at 2042)**
19S/07E-14H01	213.7	227.0	249.4	250.0*
20S/08E-07F01**	216.9	-	266.3	267.3
21S/09E-16E01**	330.0	340.1	345.0	344.7
23S/10E-14D01**	437.2	-	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 9 and are set to 2011 shallow groundwater elevations. None of the wells surpassed their measurable objective in WY 2022.

Table 9 also lists the 2027 interim milestones. To show progress toward measurable objectives, DWR assesses interim milestones at 5-year intervals. In WY 2022, none of the RMSs had groundwater elevations 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.*

Streamflow depletion in the Subbasin is complicated by many factors, such as reservoir releases, recharge of the aquifer from streamflow, losses to vegetation, and ET. The ISW SMC applies to depletion of ISW from groundwater use. For SGMA compliance purposes, the default assumption is that any depletions of surface water beyond the level of depletion that occurred prior to 2016, as evidenced by reduction in groundwater levels, represent depletions that are significant and unreasonable. Any additional depletions of surface water flows caused by groundwater conditions in excess of conditions as they were in 2016 would likely be an undesirable result that must be addressed under SGMA. There is currently no biological opinion or habitat conservation plan that indicates additional protection is needed for species protected under the Endangered Species Act; however, if it is determined that additional protection is needed and streamflow loss is due not to surface water flows but to groundwater extraction, SVBGSA will adapt as necessary to adhere to environmental laws.

Table 9 shows that there are no exceedances of the ISW minimum thresholds; therefore, the WY 2022 shallow groundwater elevations do not cause an undesirable result. The ISW minimum threshold exceedances compared with the undesirable result are shown on Figure 21. If a value is in the shaded red area, it would constitute an undesirable result. This graph is updated annually with new data to demonstrate the current status of the sustainability indicator.

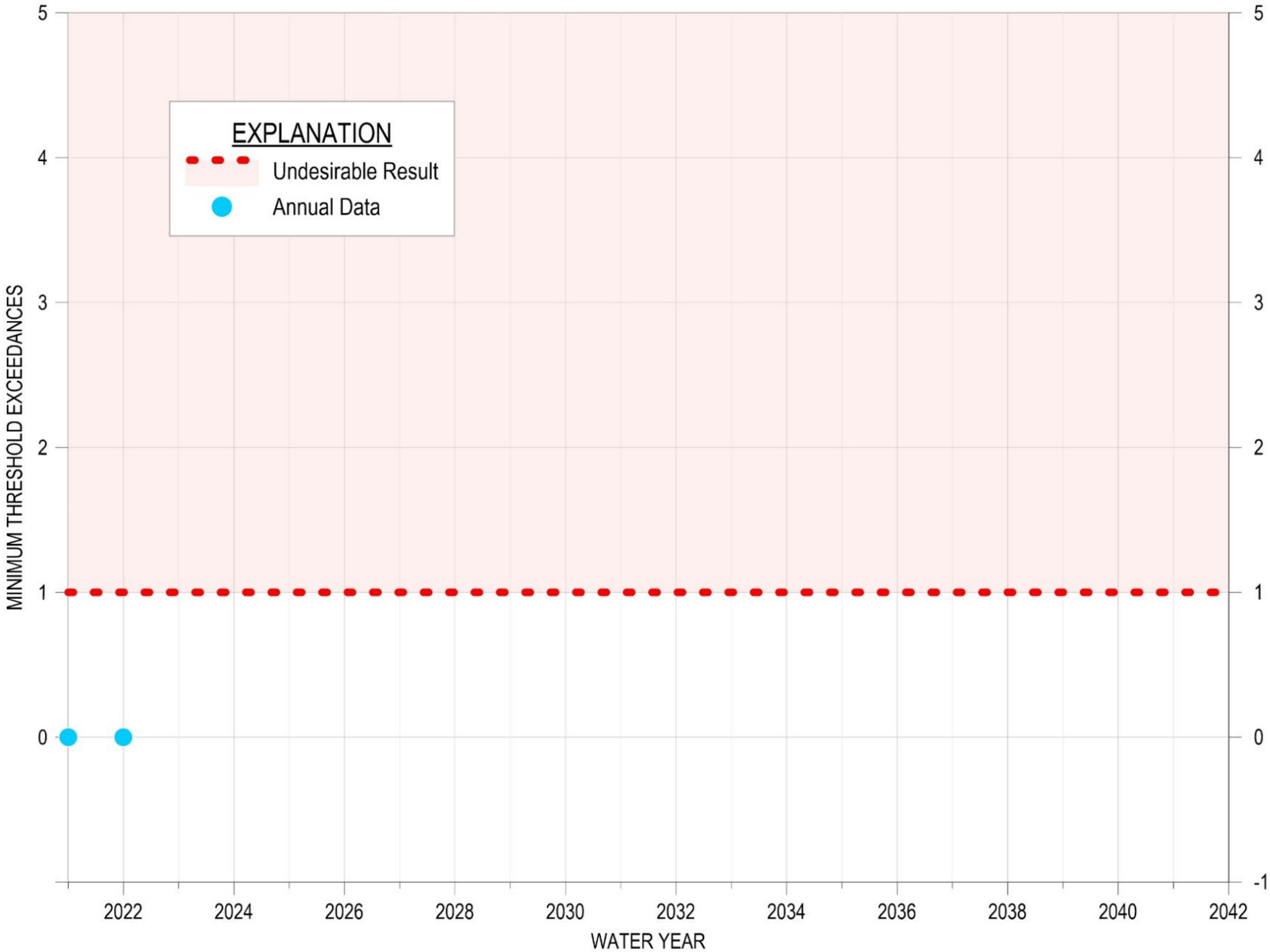


Figure 21. Shallow Groundwater Elevation Exceedances Compared to the Undesirable Result

5 CONCLUSION

This 2022 Annual Report updates data and information for the Upper Valley Subbasin GSP from WY 2021 to WY 2022 with the best available data. It covers GSP implementation activities up to September 30, 2022. 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 2022 was classified as dry-normal. Groundwater elevations decreased in WY 2022, with most wells showing elevations between their minimum thresholds and measurable objectives. Change in groundwater storage, as measured by groundwater elevation changes, decreased from WY 2021 to WY 2022. Groundwater quality data showed 2 exceedances of minimum thresholds, none of them due to GSA actions. Negligible subsidence was observed in the Subbasin in WY 2022. Finally, the existing shallow wells used to monitor depletion of ISW were all above their minimum thresholds and below their measurable objectives.

Since GSP submittal, the SVBGSA has continued to actively engage stakeholders and has started activities to implement the GSP. The SVBGSA continues to convene its subbasin committees, Advisory Committee, and Board of Directors. It has also begun to fill data gaps and start implementing management actions in the Upper Valley Subbasin GSP.

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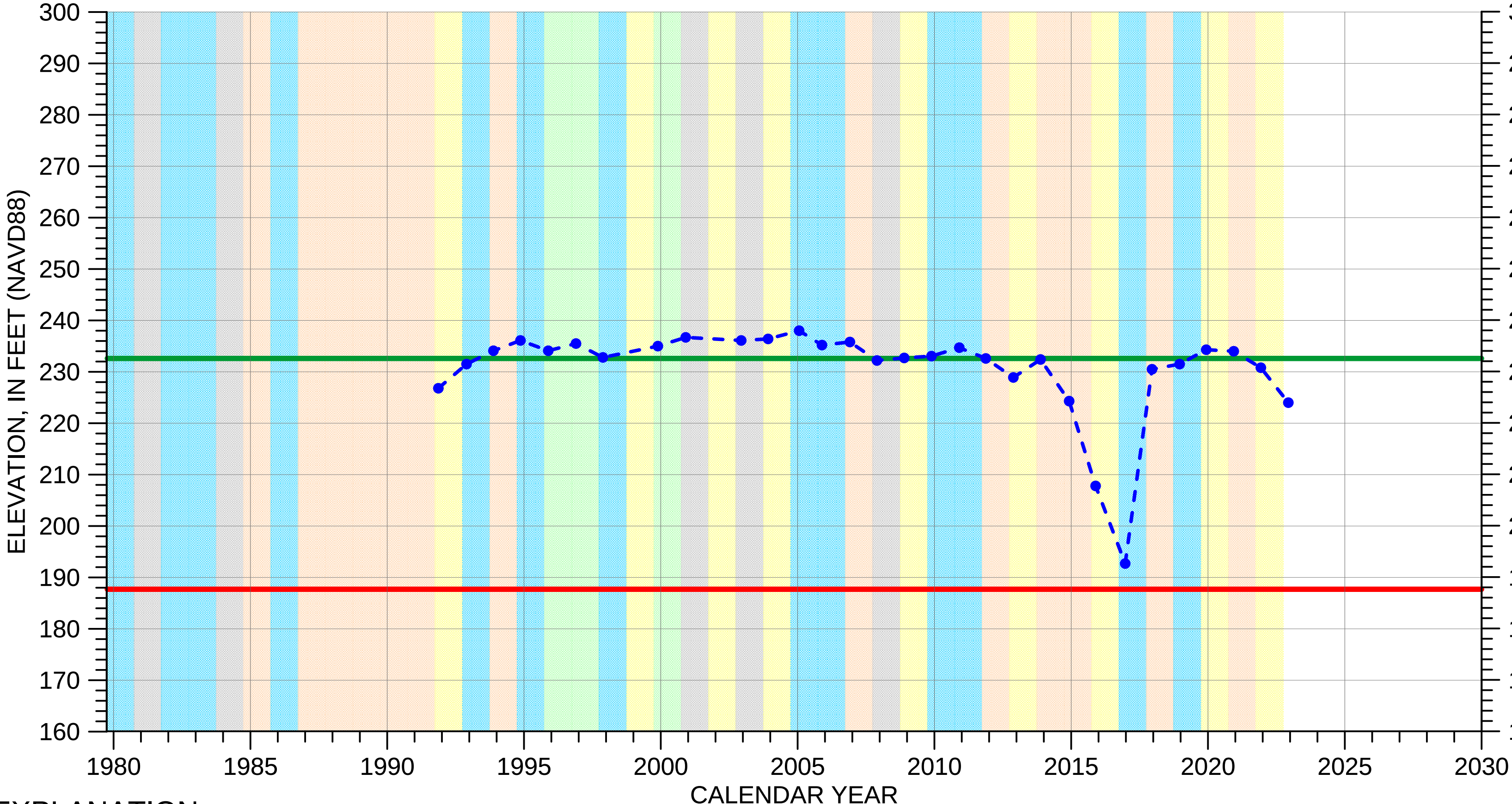
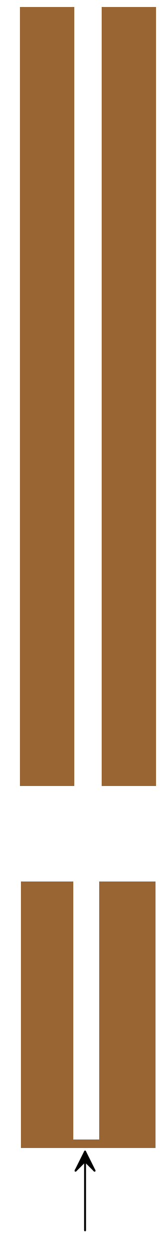
APPENDIX A. HYDROGRAPHS OF REPRESENTATIVE MONITORING SITE WELLS

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

Upper Valley Aquifer Subbasin





Perforated interval unknown

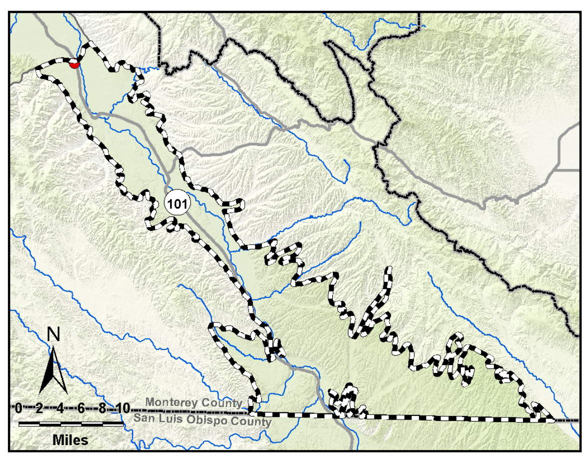
Well bottom
88 feet msl

EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface (316 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



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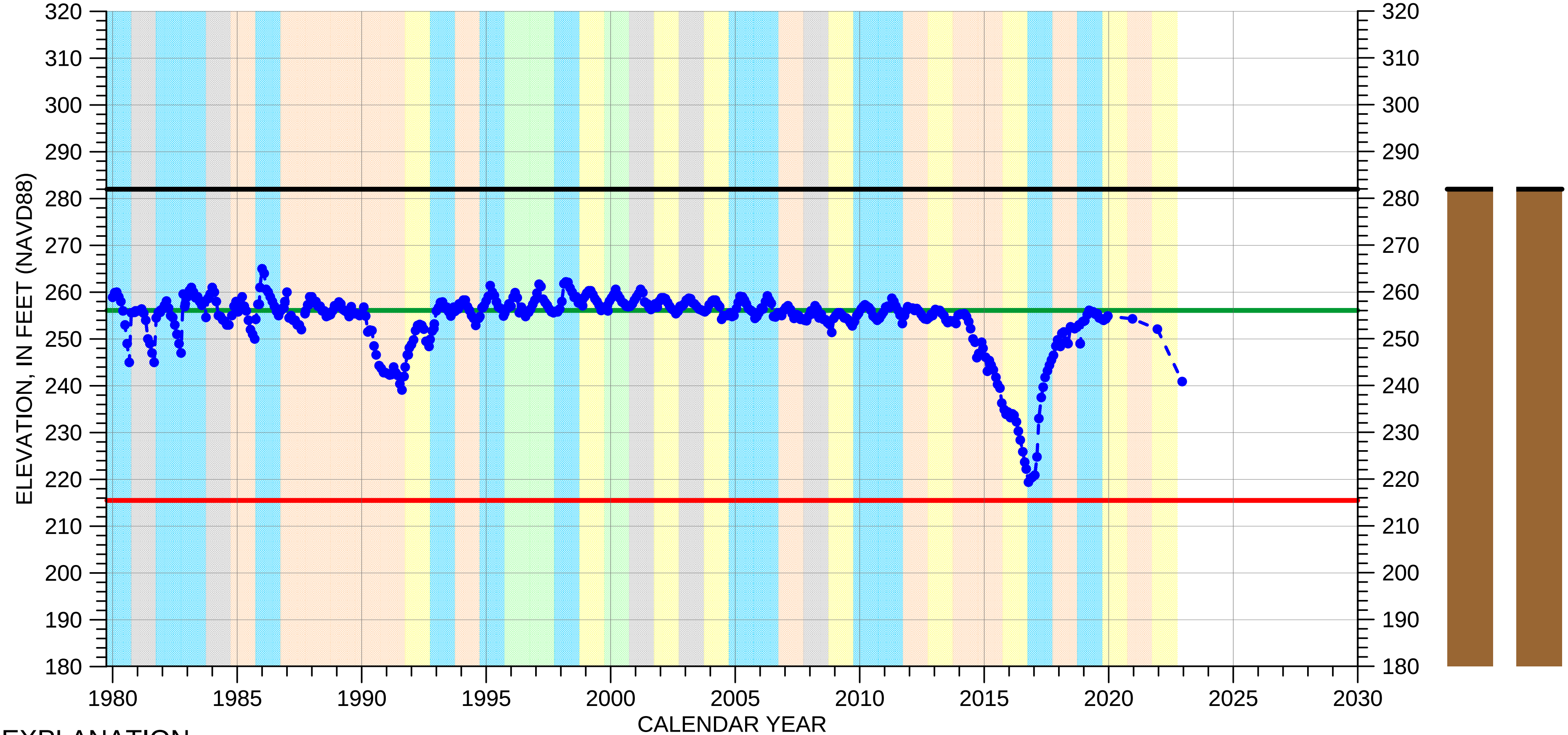
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 19S/08E-19K03

Upper Valley Aquifer Subbasin

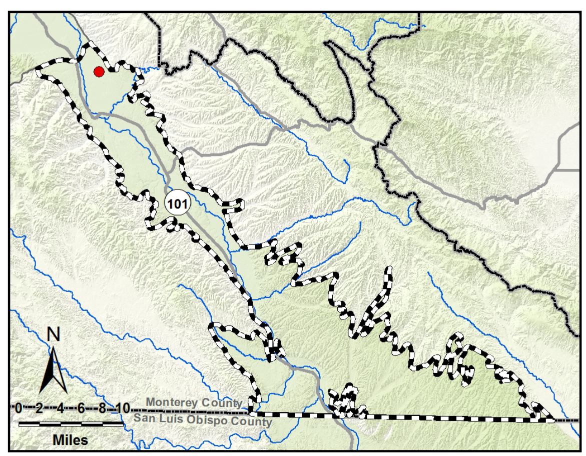


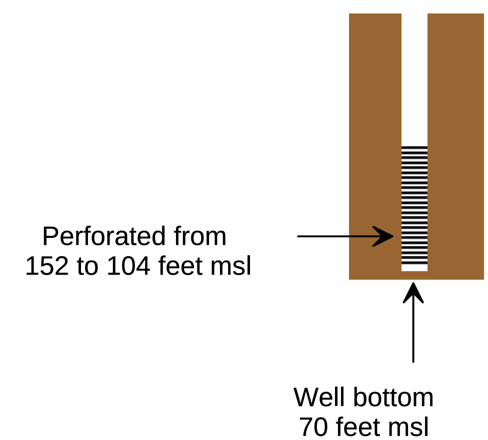
EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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





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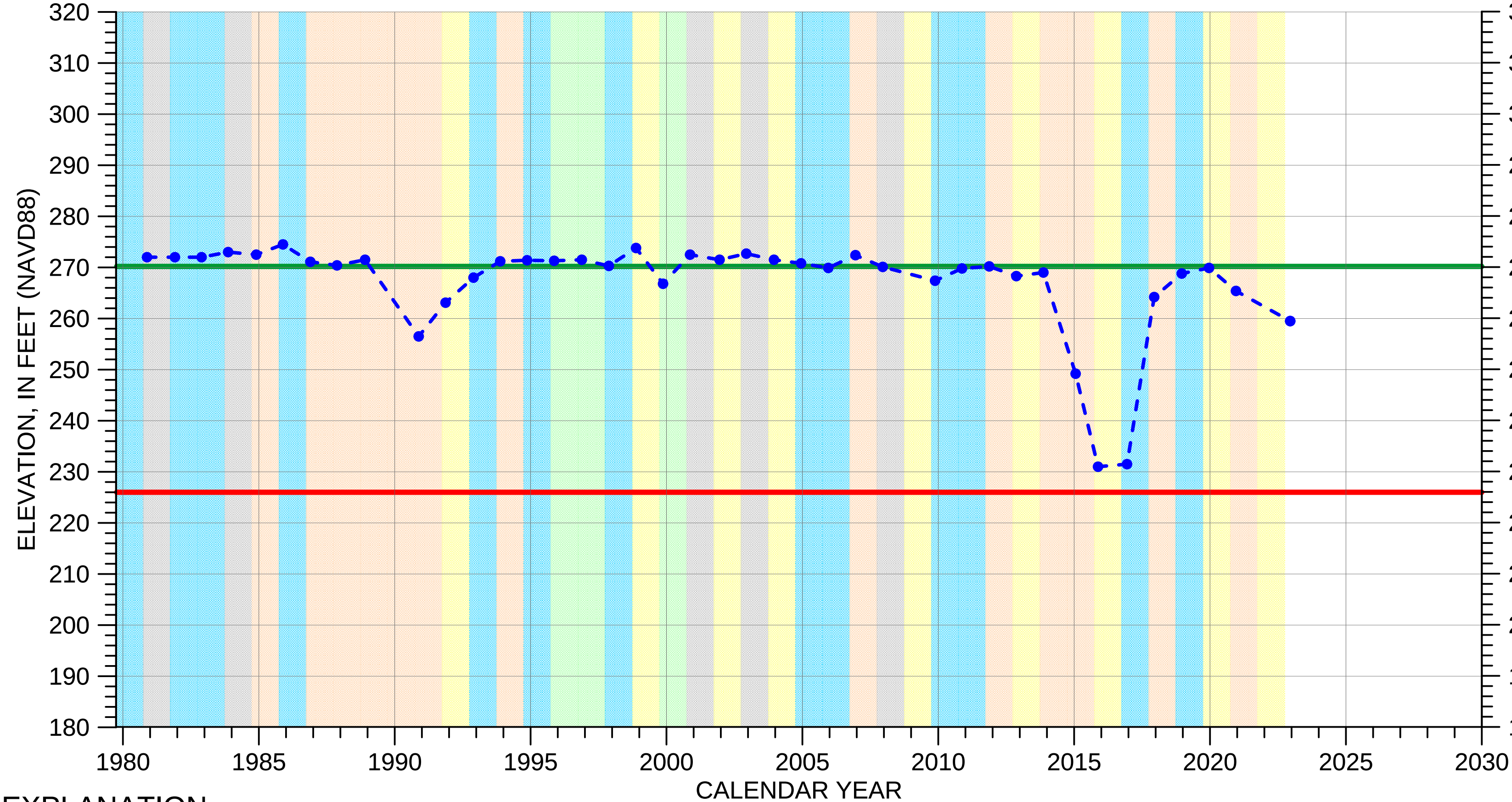
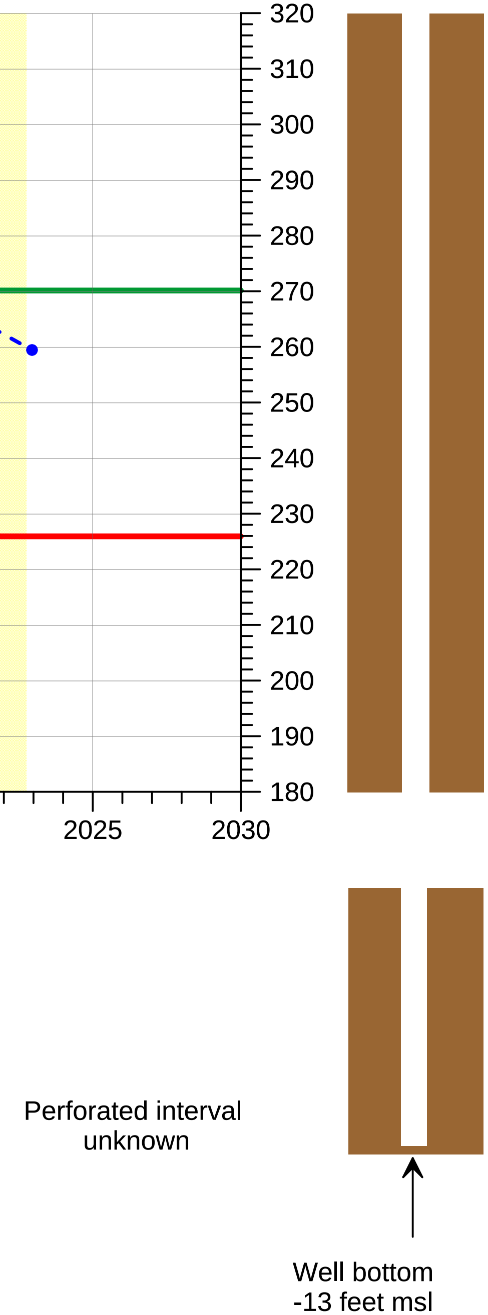
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 20S/08E-05R03

Upper Valley Aquifer Subbasin



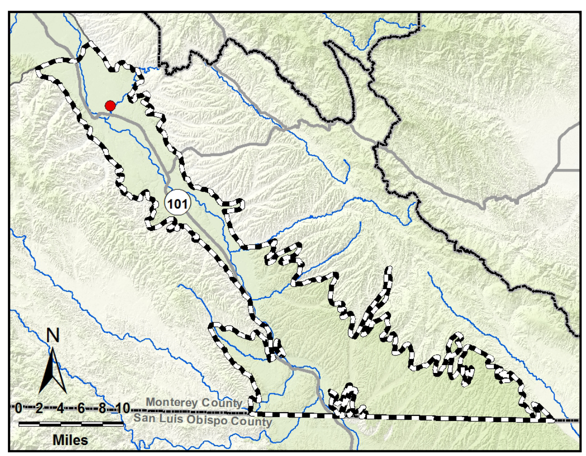


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface (337 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



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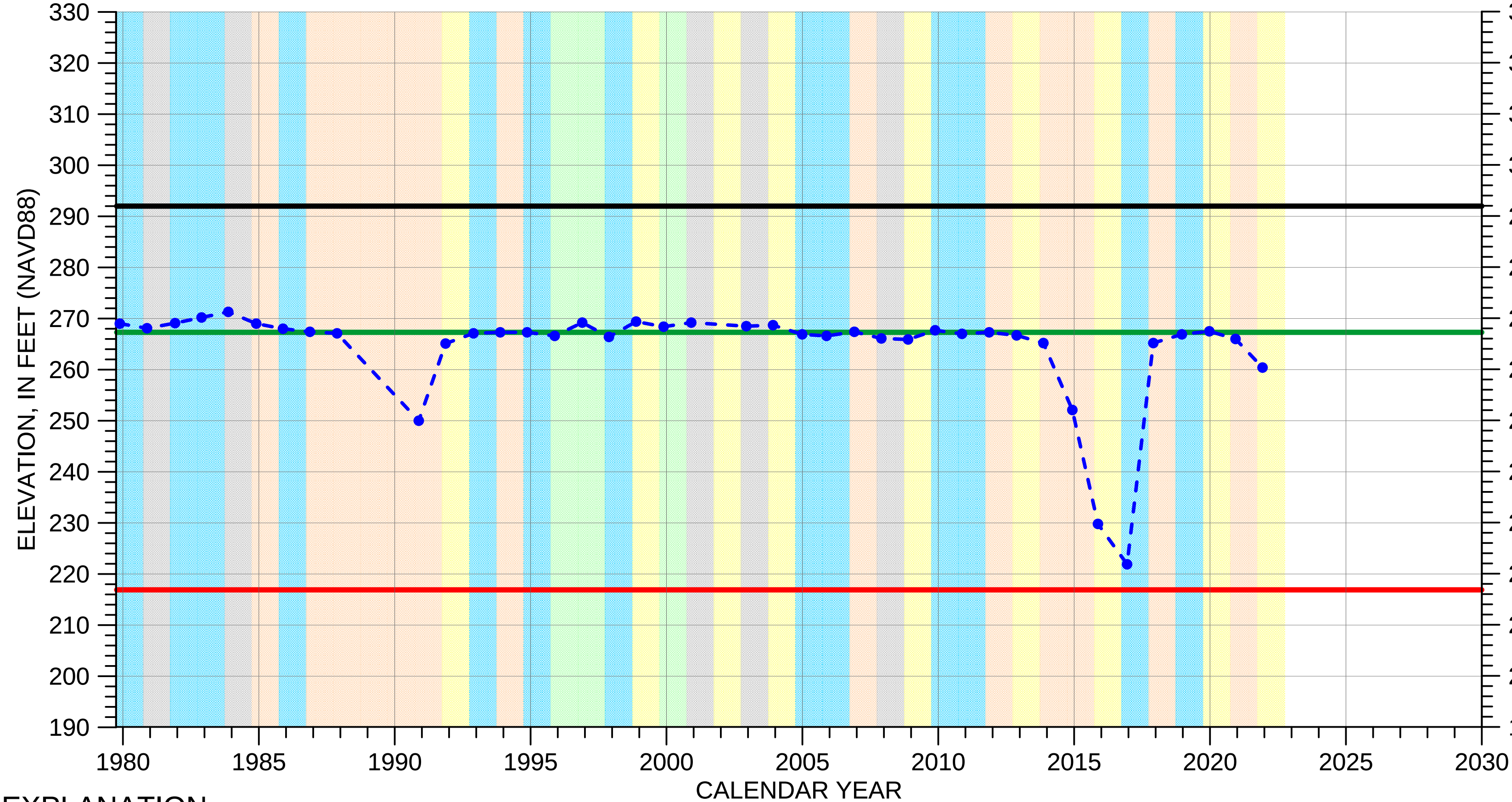
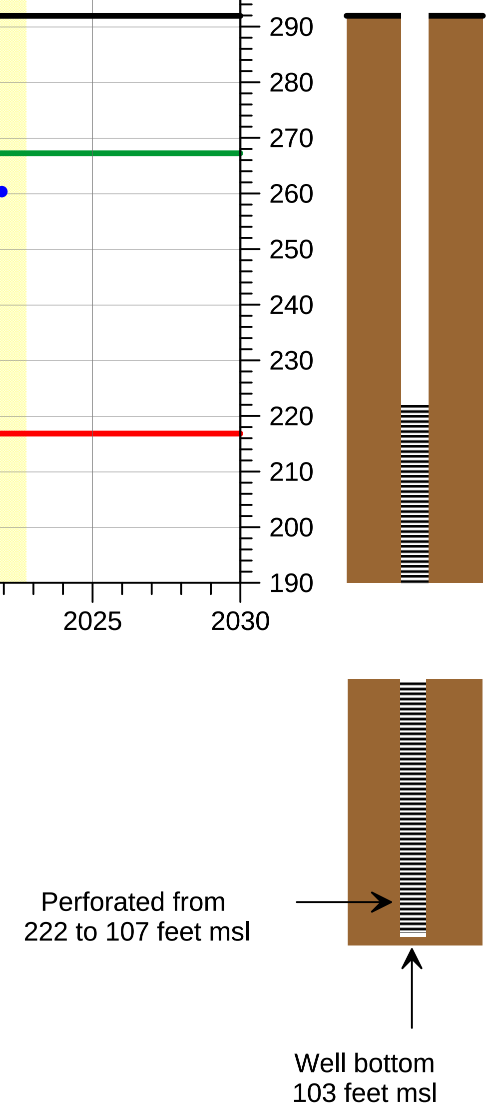
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 20S/08E-07F01

Upper Valley Aquifer Subbasin



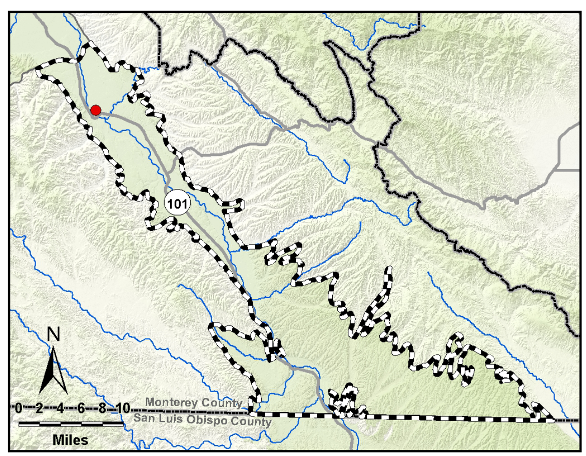


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



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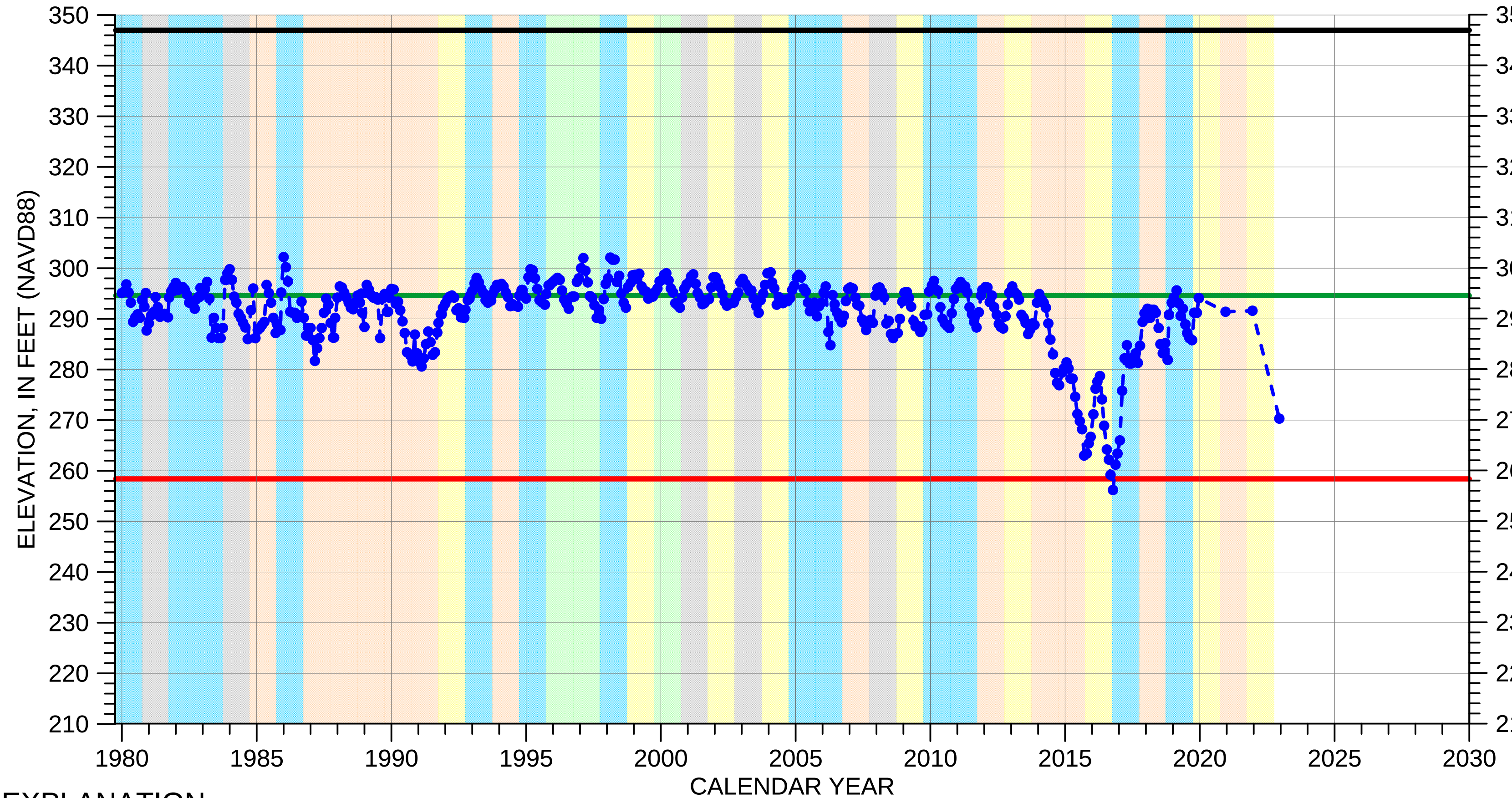
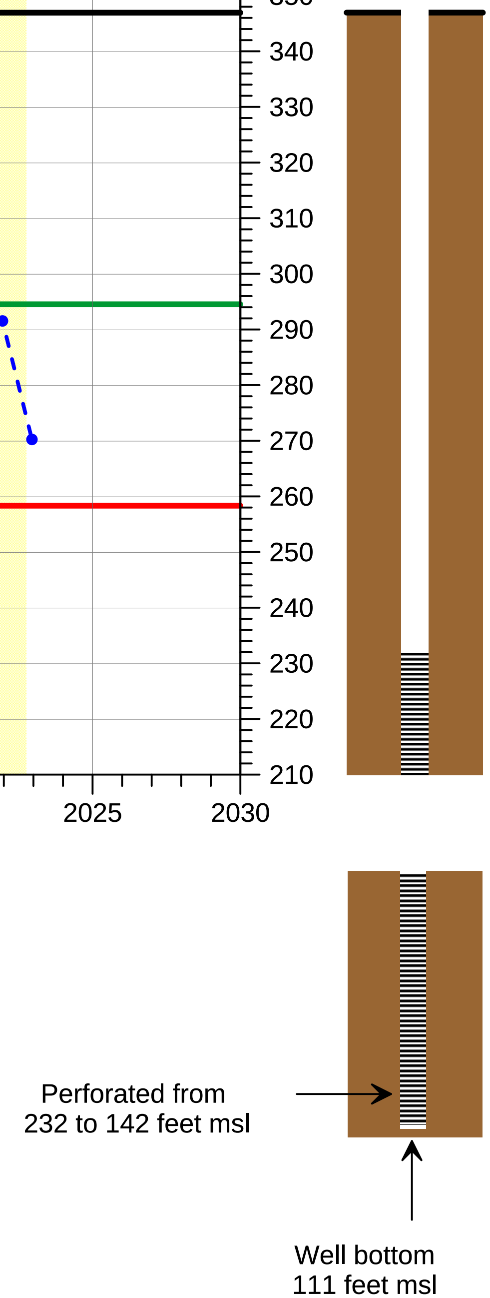
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 20S/08E-14K01

Upper Valley Aquifer Subbasin



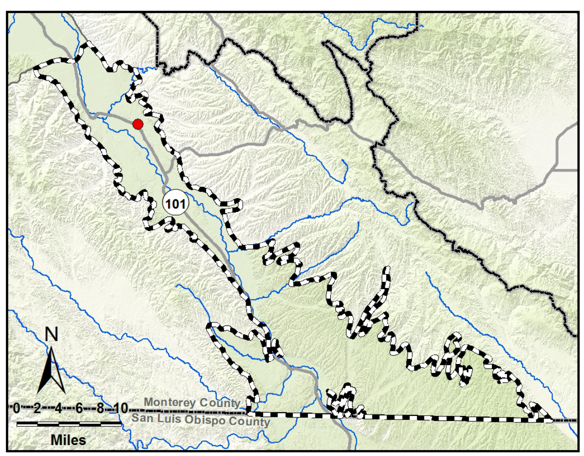


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



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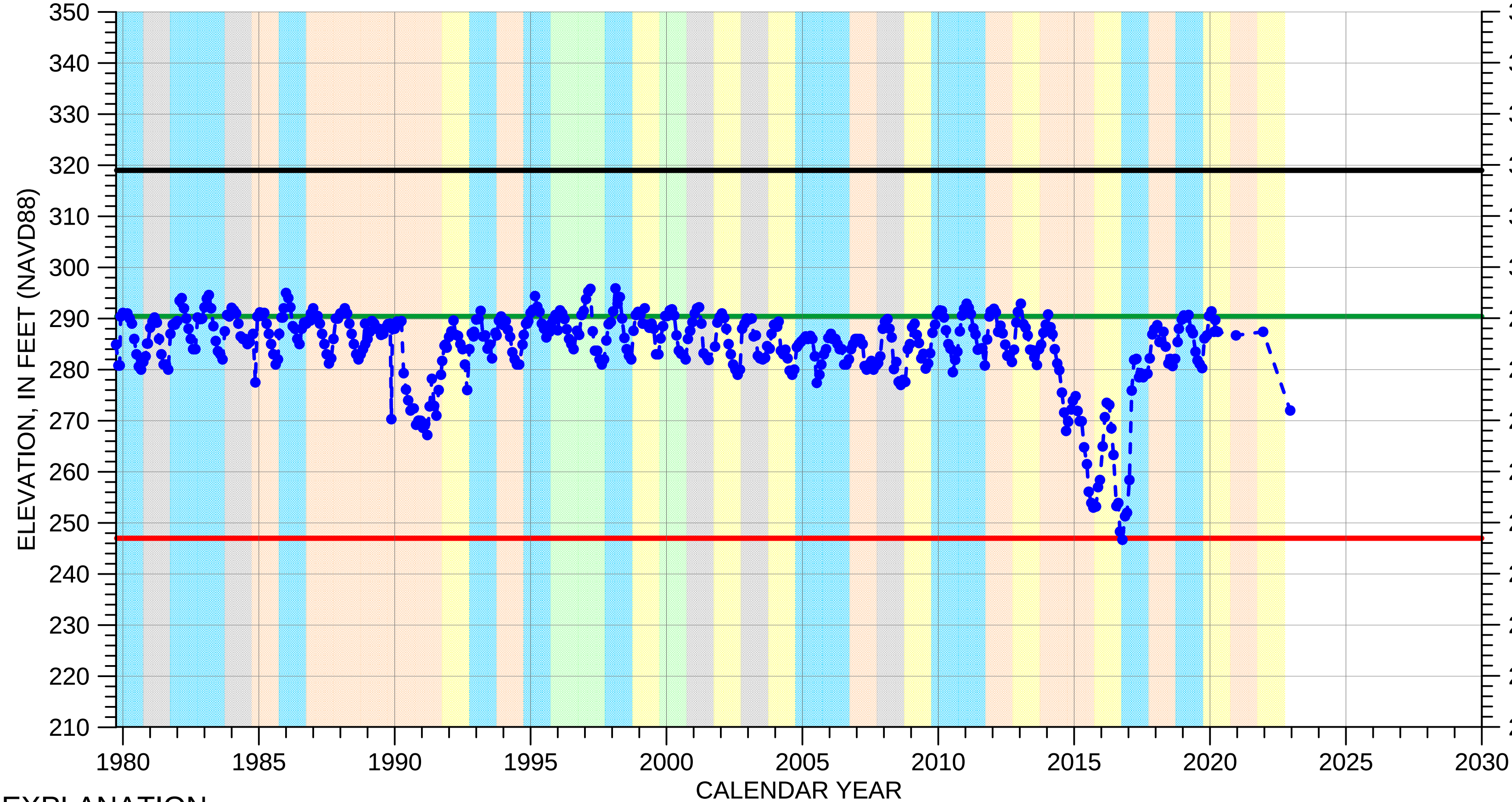
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 20S/08E-15H03

Upper Valley Aquifer Subbasin



Perforated from 239 to 157 feet msl

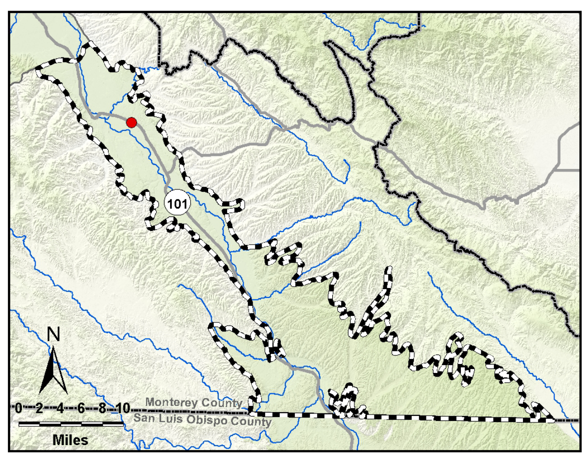
Well bottom 149 feet msl

EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



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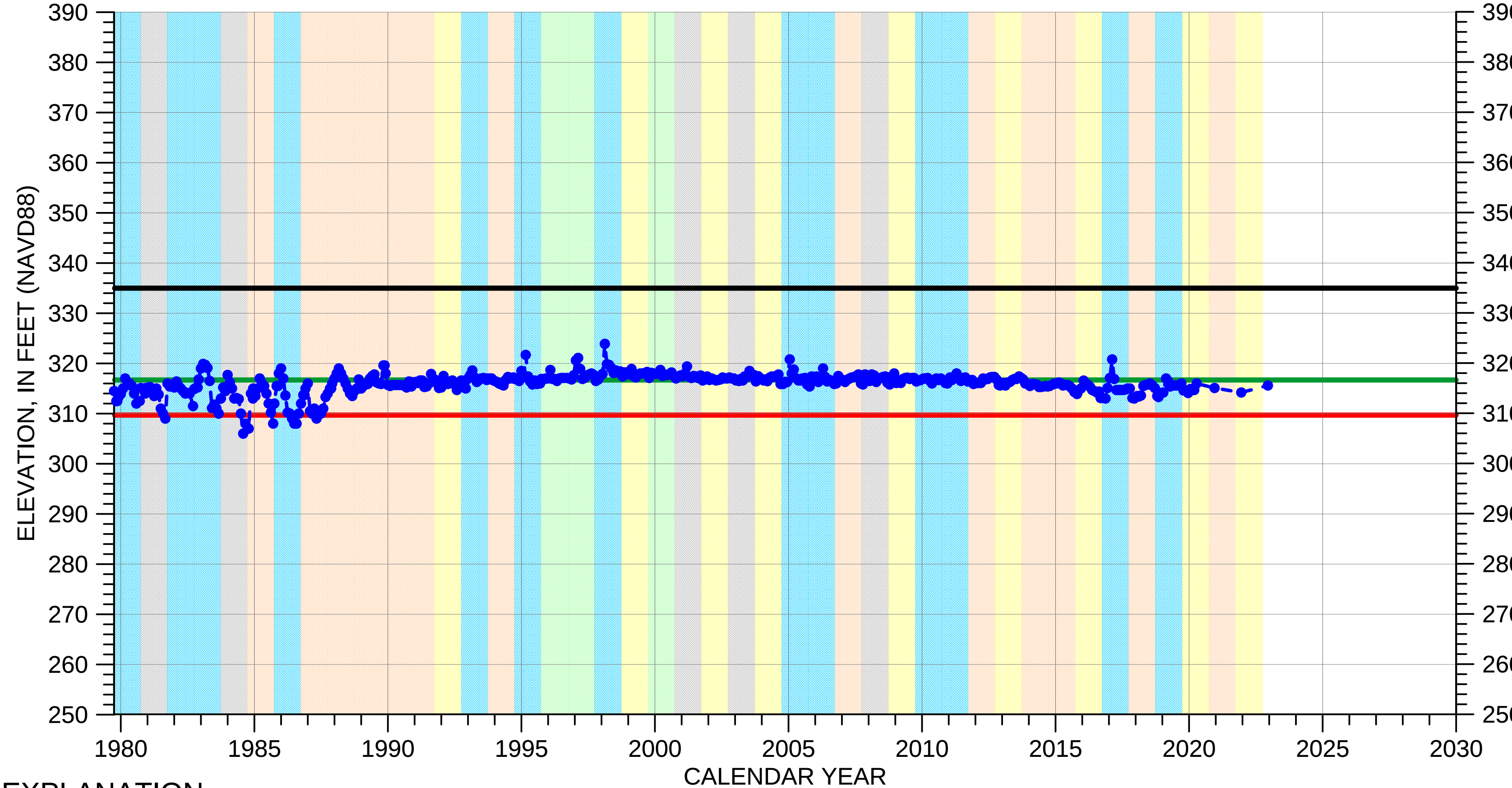
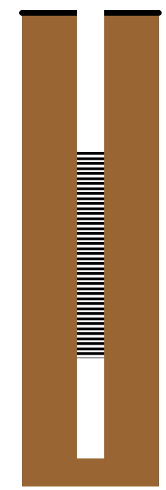
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 20S/08E-25Q01

Upper Valley Aquifer Subbasin



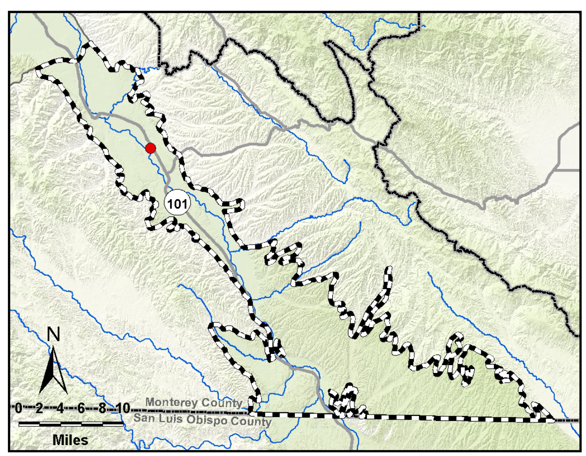


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



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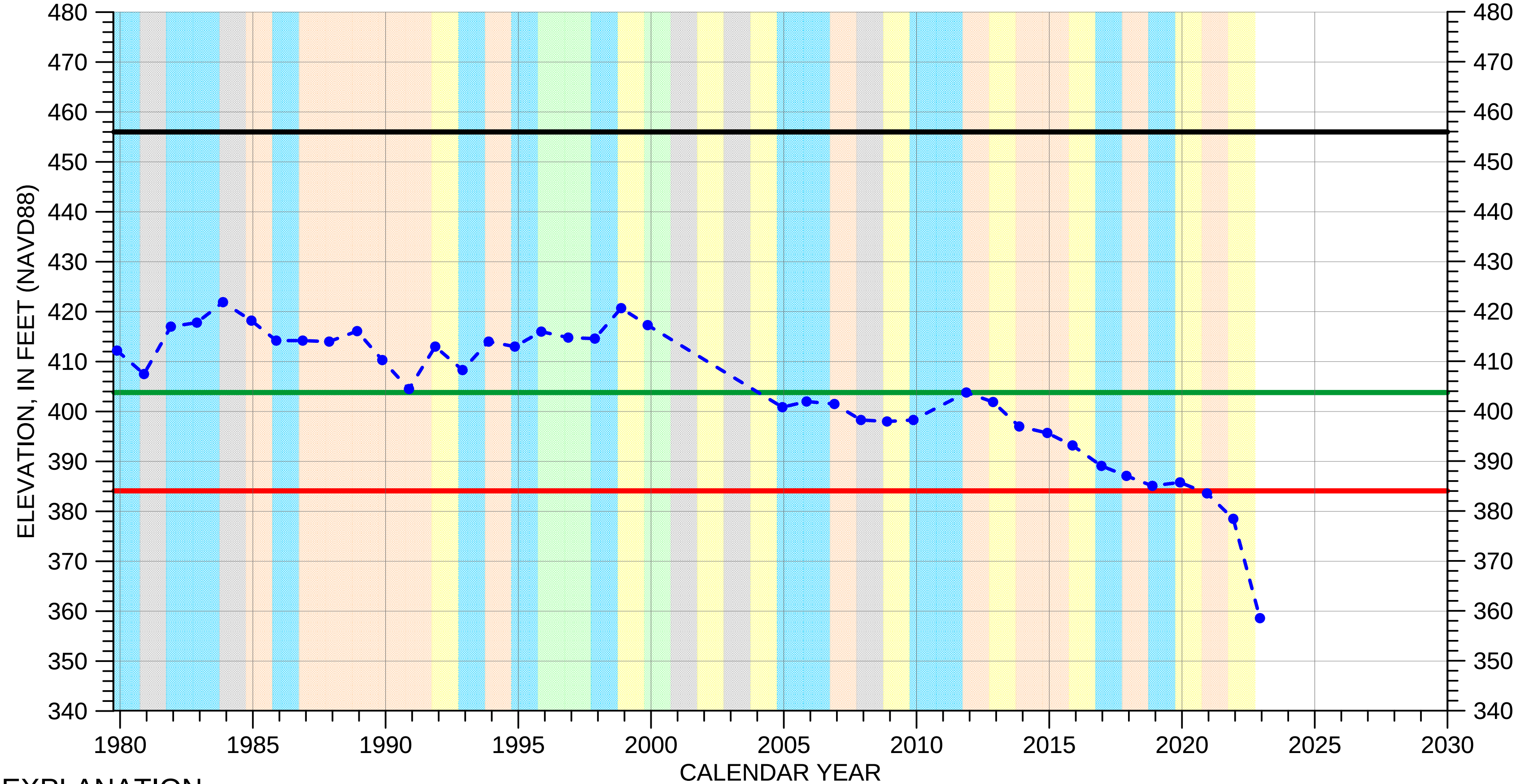
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 20S/08E-34G01

Upper Valley Aquifer Subbasin

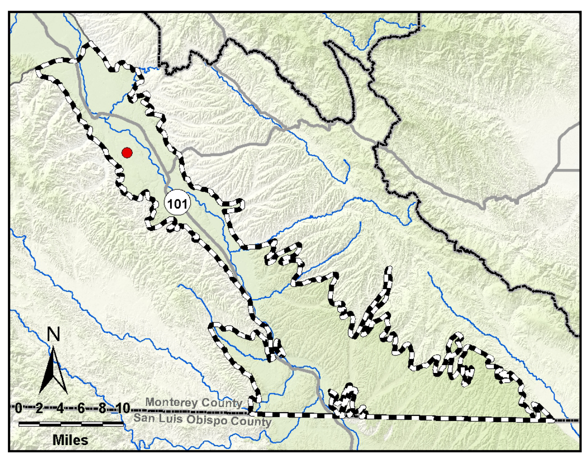


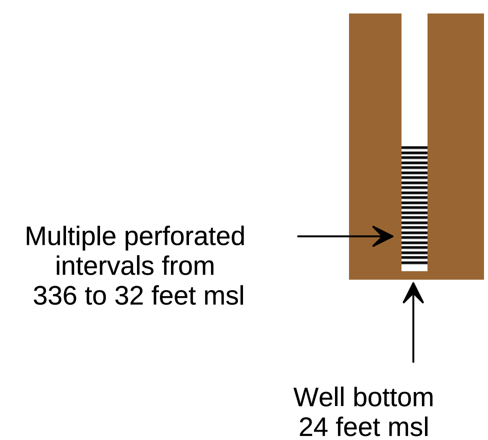
EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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





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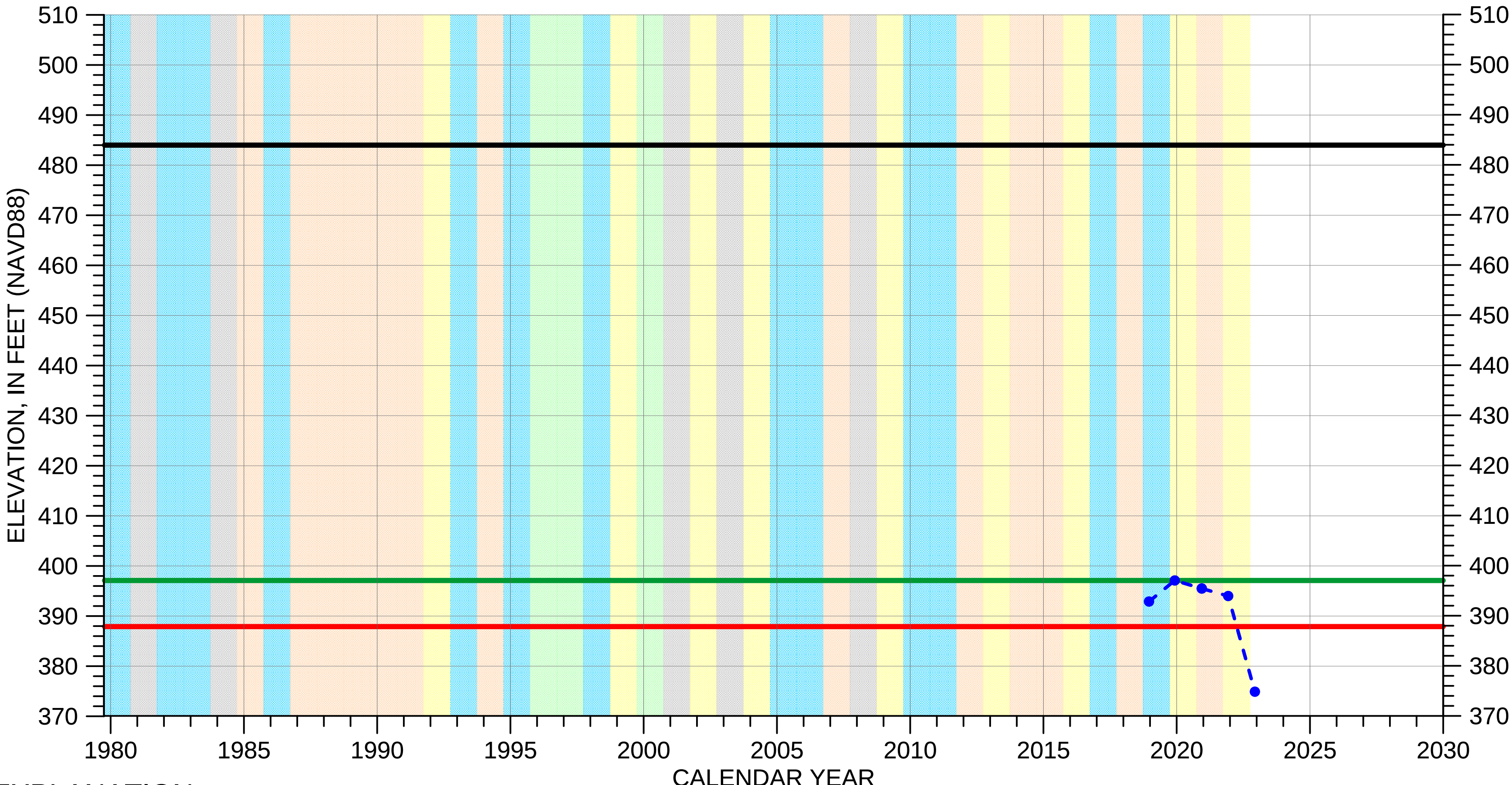
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 21S/08E-13H01

Upper Valley Aquifer Subbasin

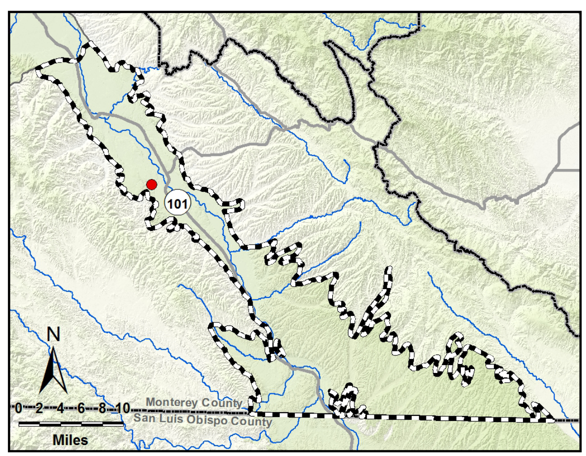


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



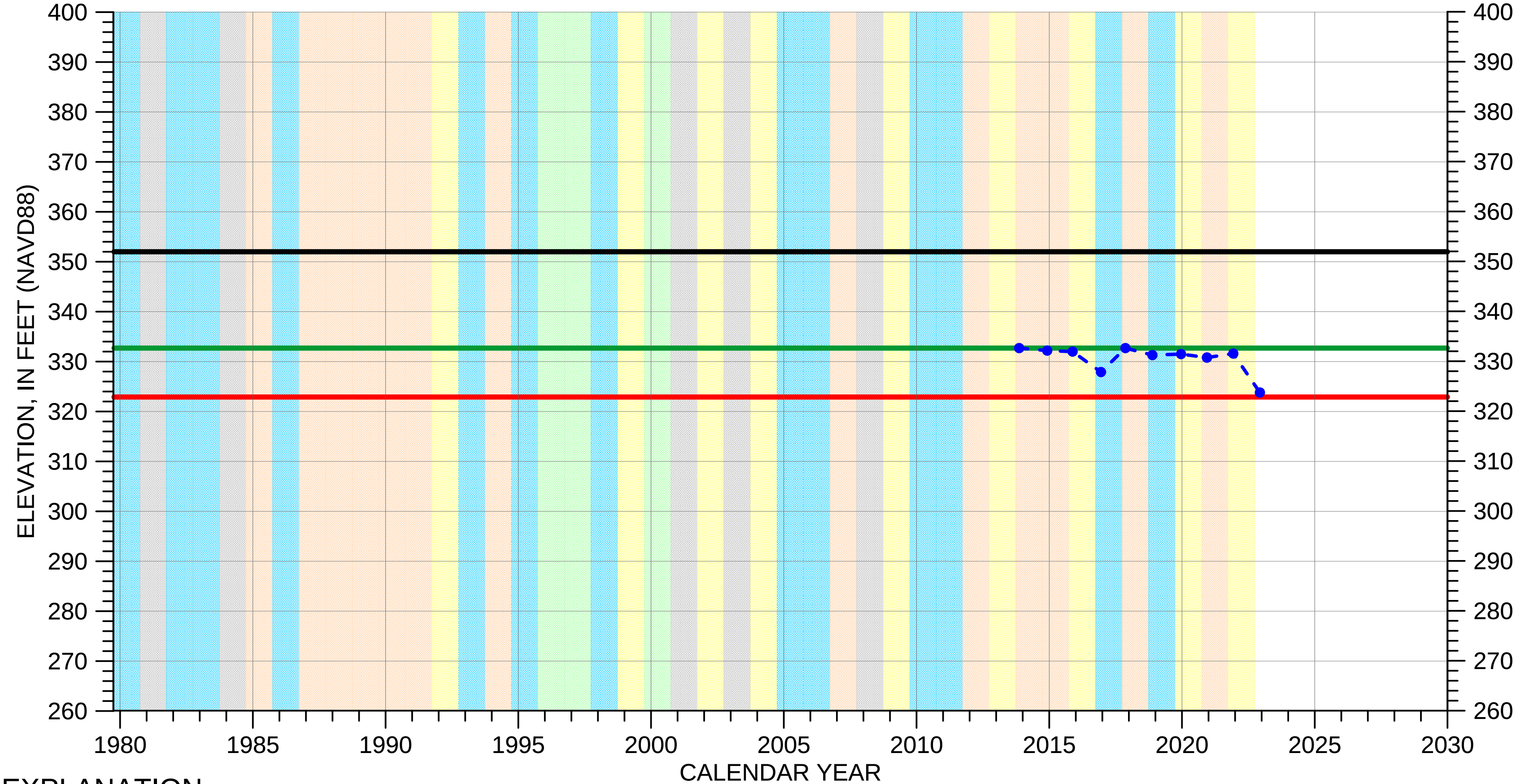
Perforated interval unknown

Well bottom elevation unknown

C:\Users\tpontifex\Documents\Salinas Valley Basin GSA\Hydrographs\GRFs_test\21S_08E-13H01.grf

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

Upper Valley Aquifer Subbasin



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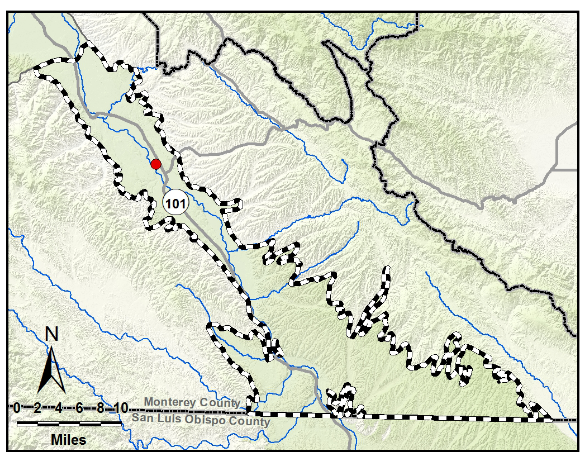
EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

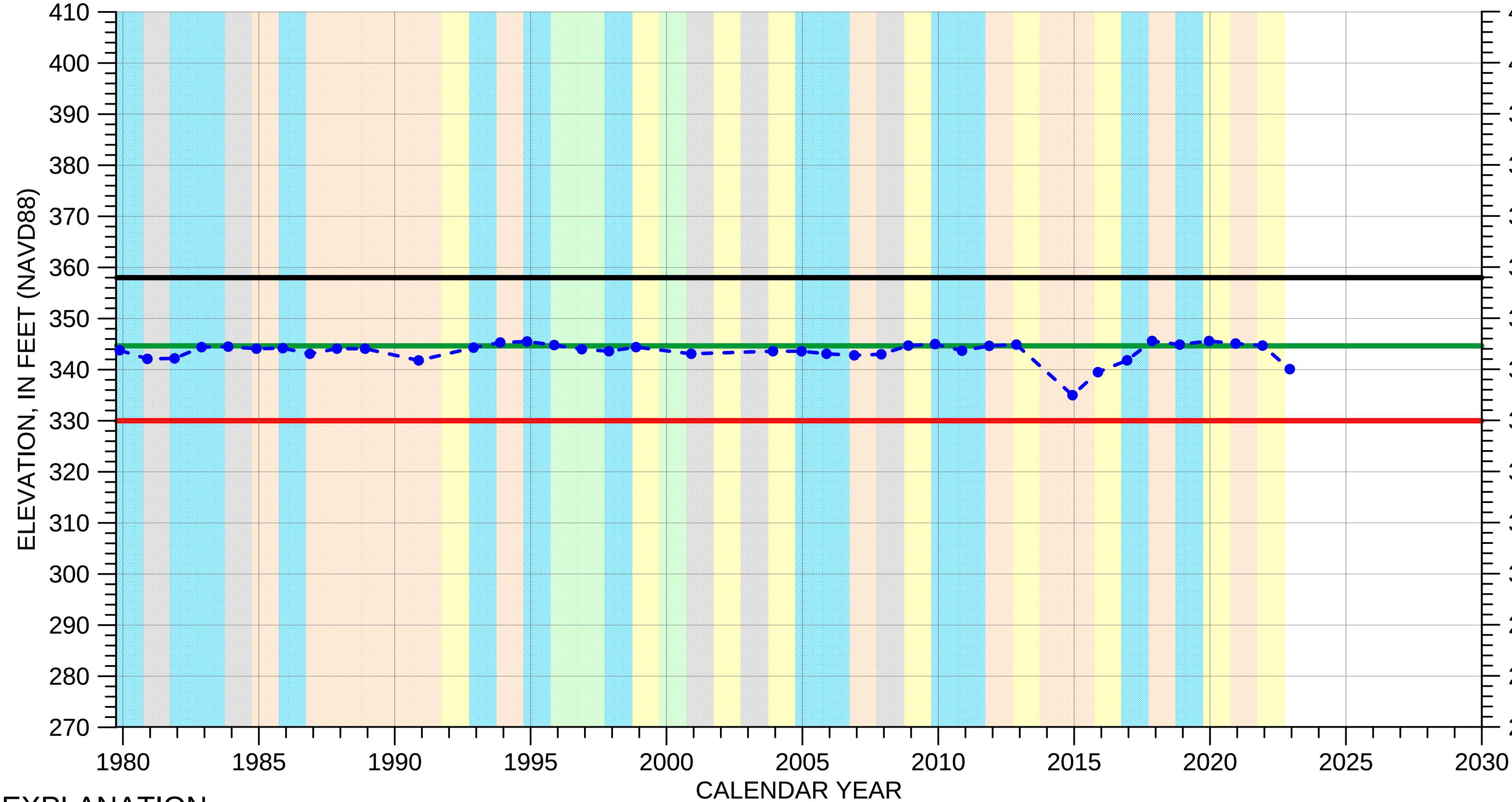
WATER YEAR TYPE DESIGNATION

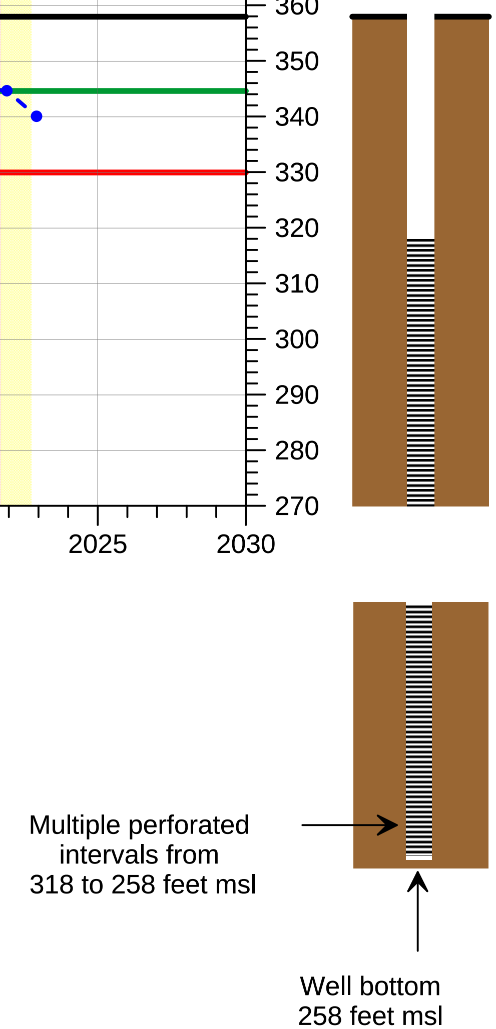
- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET



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

Upper Valley Aquifer Subbasin



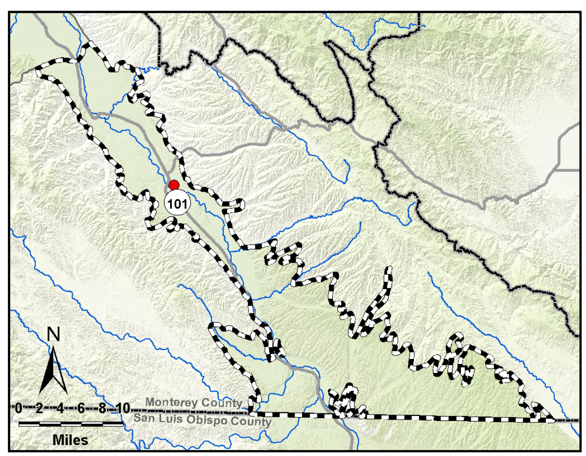


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



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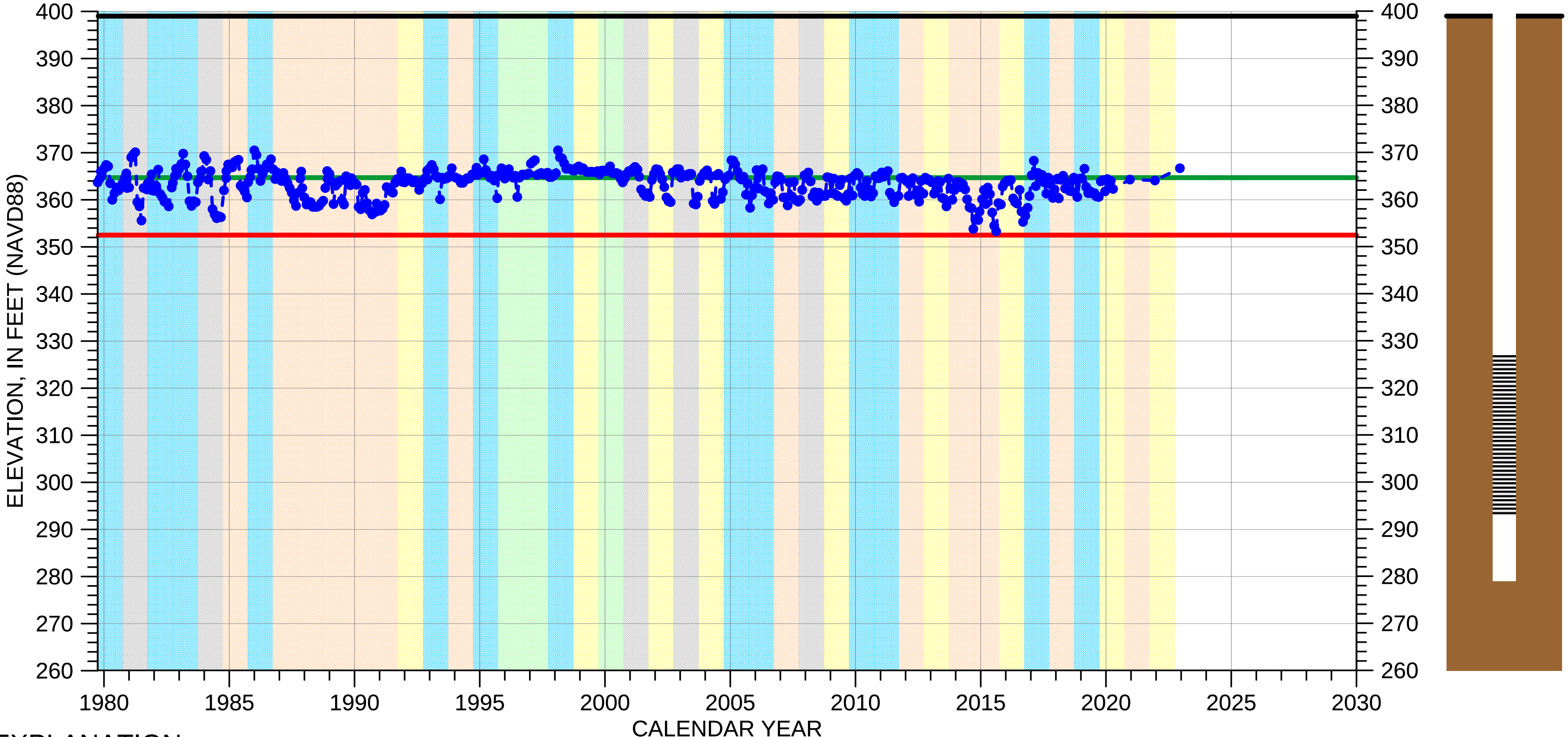
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 21S/09E-24L01

Upper Valley Aquifer Subbasin

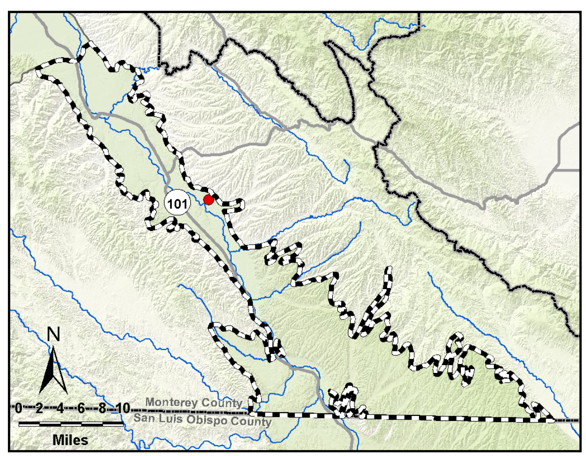


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

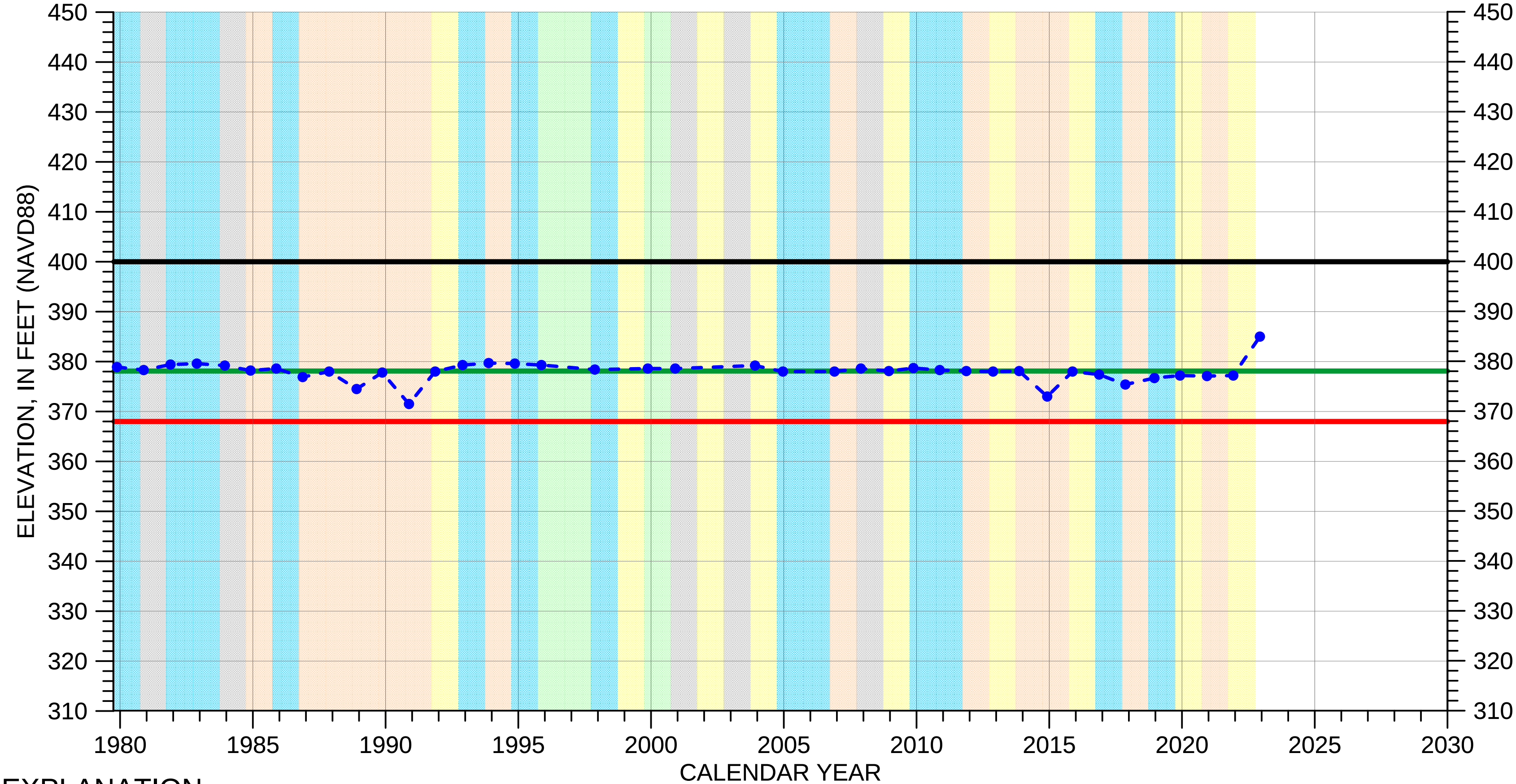
- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET



C:\Users\tpontifex\Documents\Salinas Valley Basin GSA\Hydrographs\GRFs_test\21S_09E-24L01.grf

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

Upper Valley Aquifer Subbasin

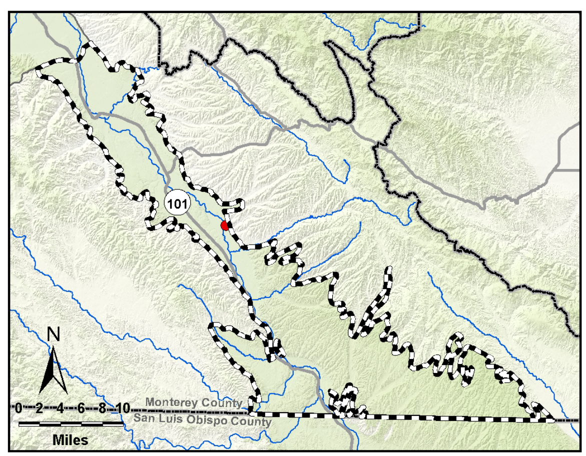


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



Perforated interval unknown

Well bottom elevation unknown

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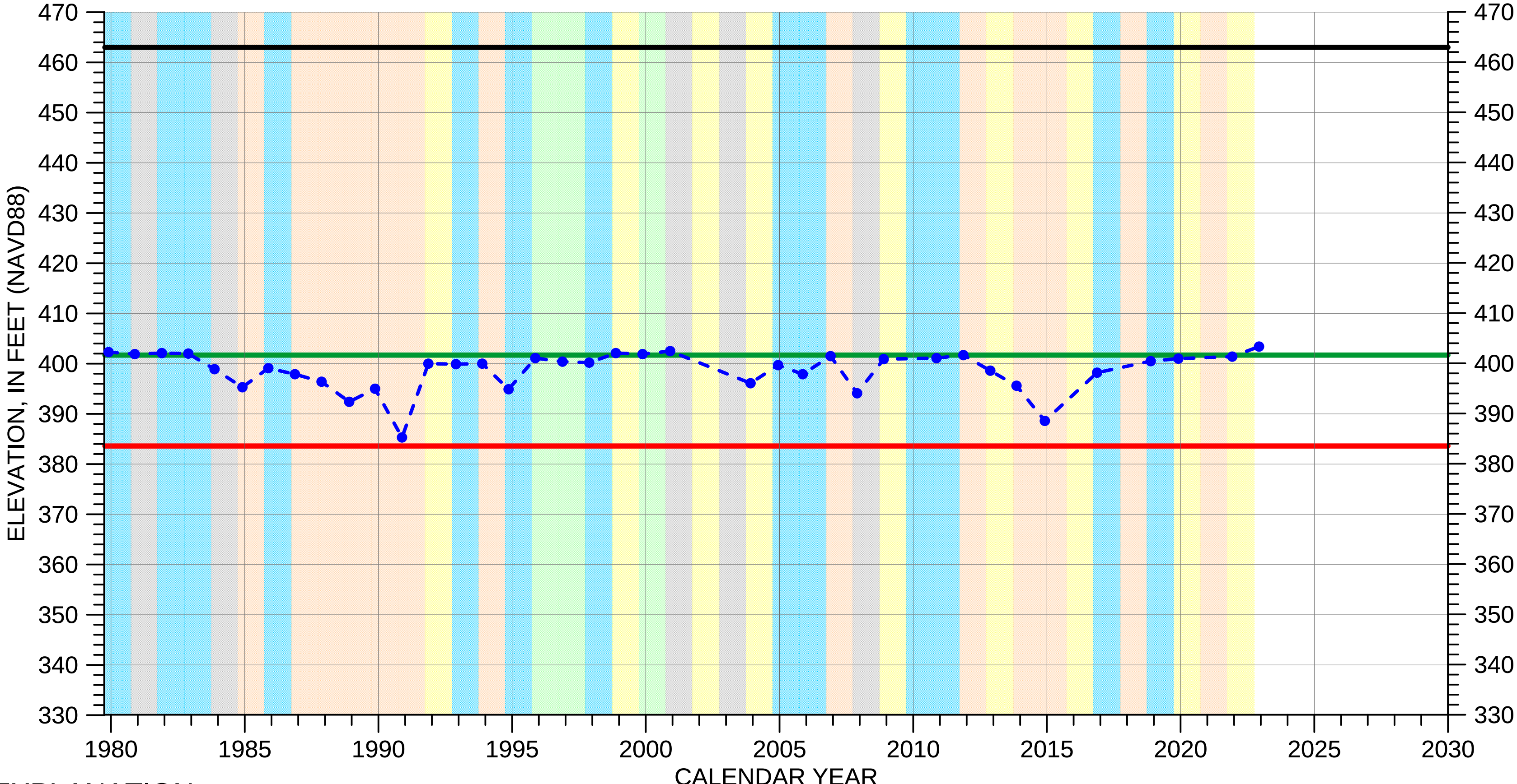
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 22S/10E-09P01

Upper Valley Aquifer Subbasin

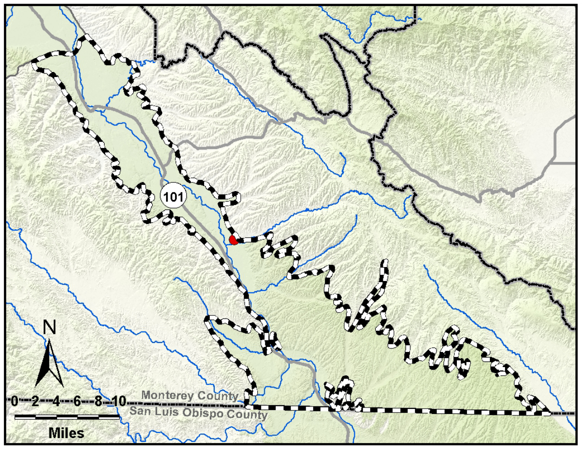


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



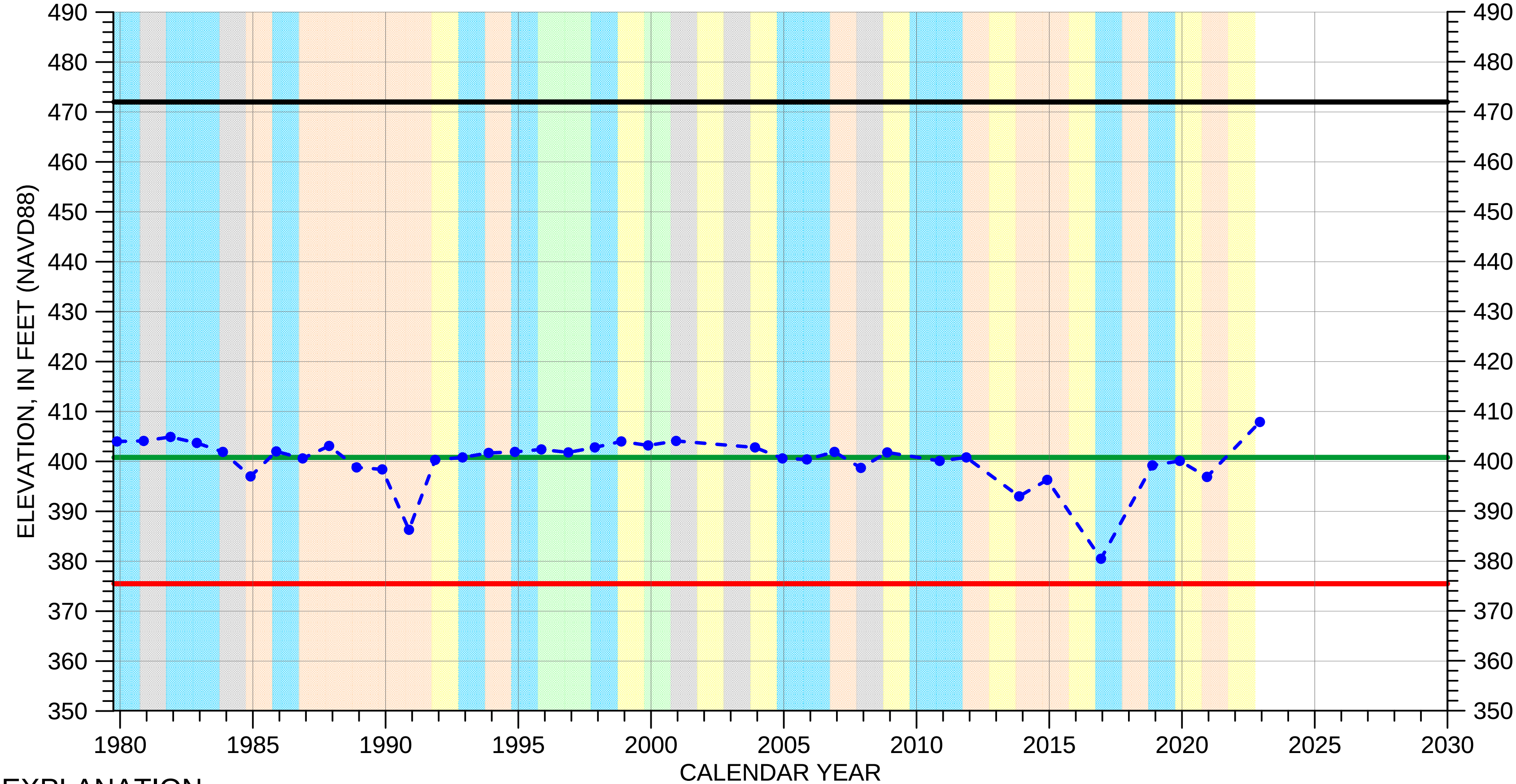
Perforated interval unknown

Well bottom elevation unknown

C:\Users\tpontifex\Documents\Salinas Valley Basin GSA\Hydrographs\GRFs_test\22S_10E-09P01.grf

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

Upper Valley Aquifer Subbasin

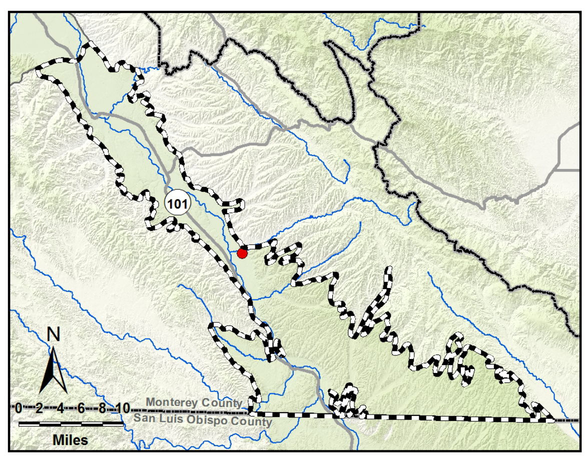


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



Perforated interval unknown

Well bottom elevation unknown

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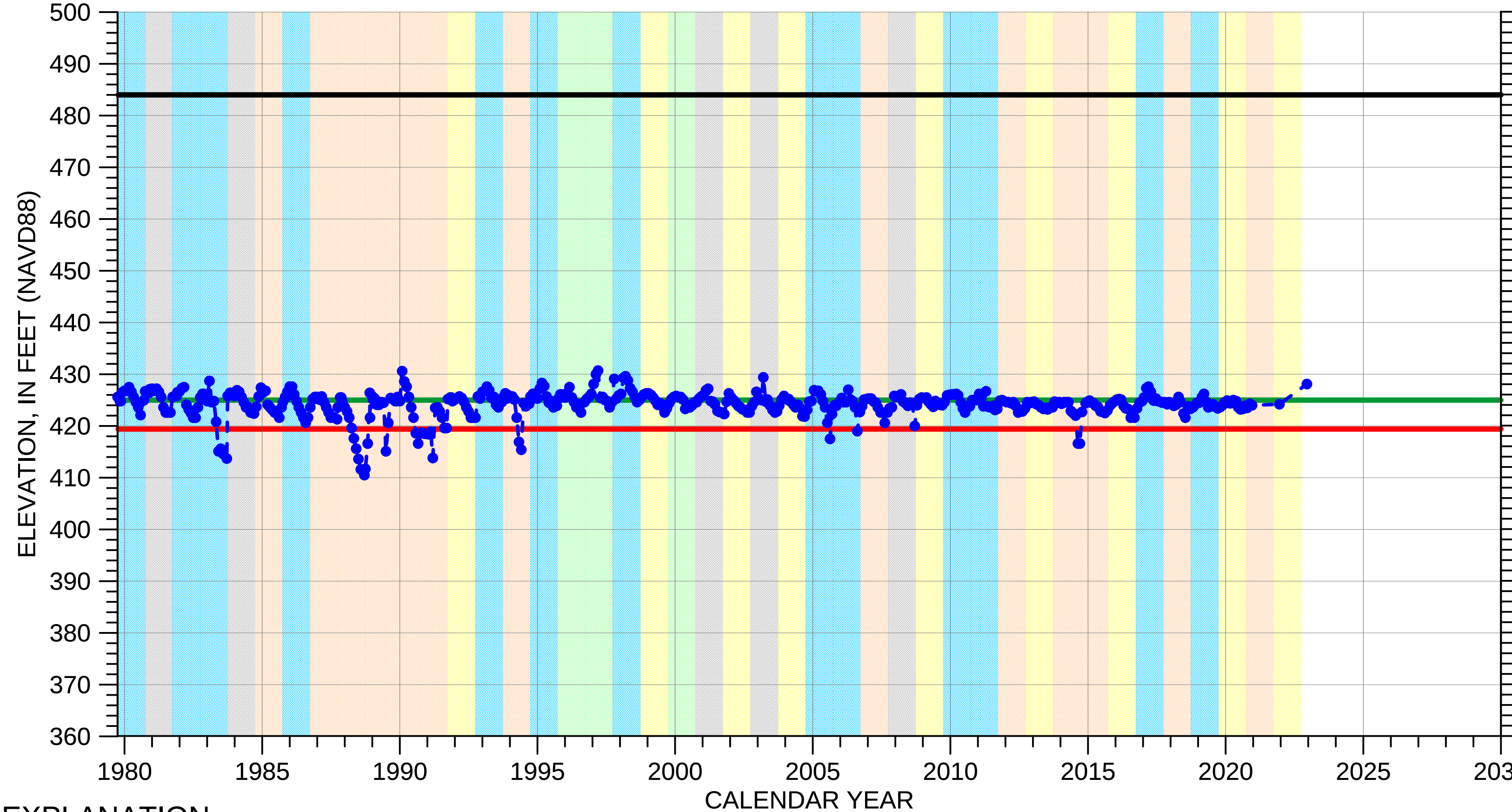
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 22S/10E-34G01

Upper Valley Aquifer Subbasin

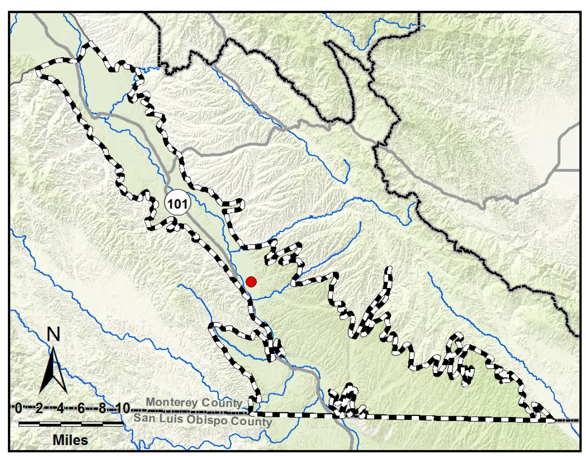


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



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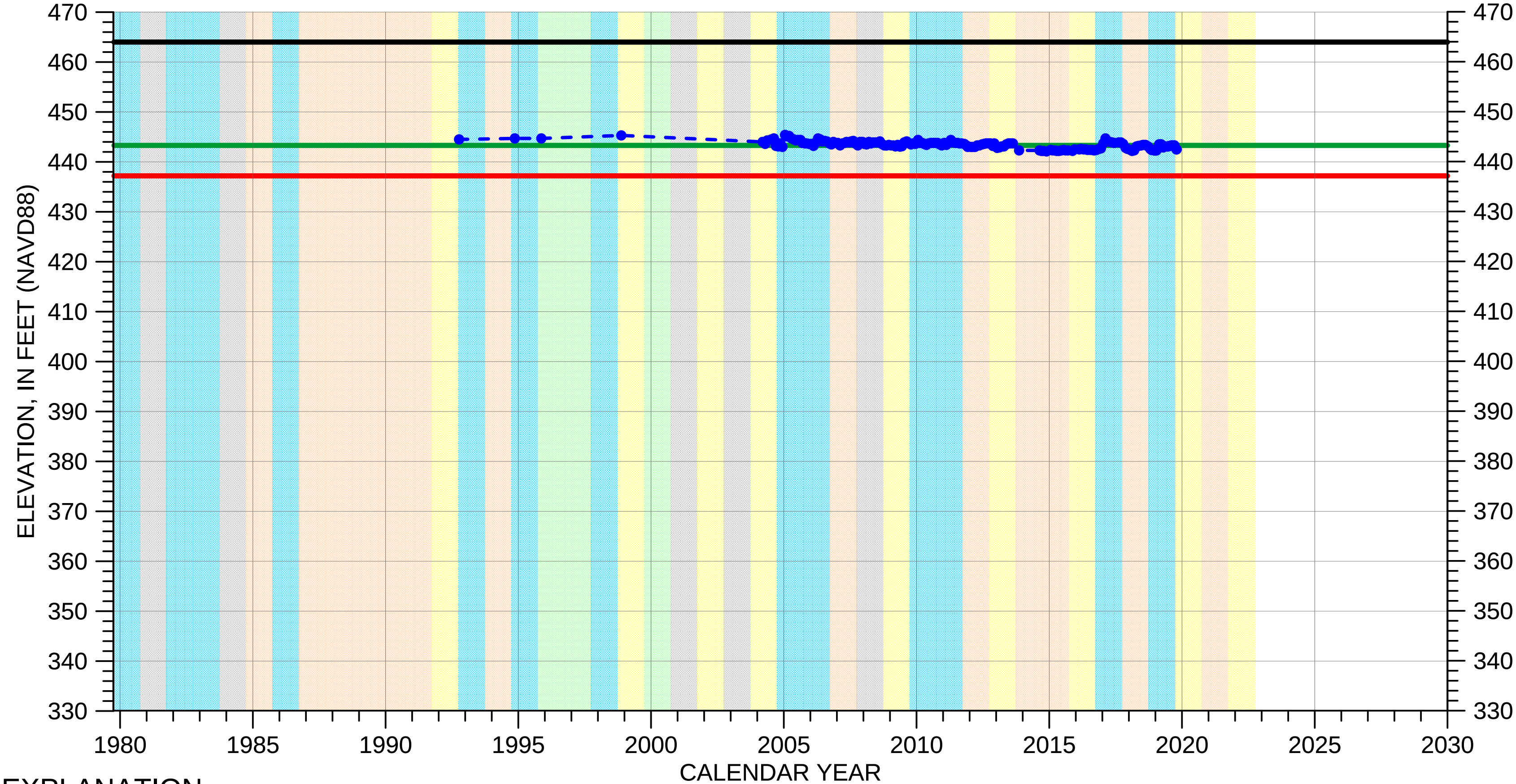
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 23S/10E-14D01

Upper Valley Aquifer Subbasin

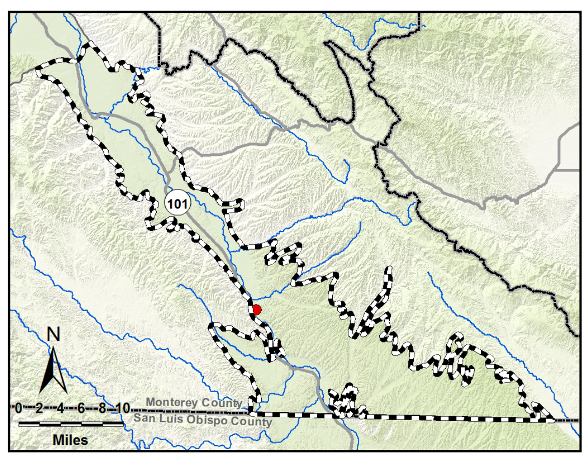


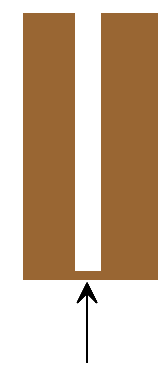
EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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





Perforated from
392 to 332 feet msl

Well bottom
322 feet msl

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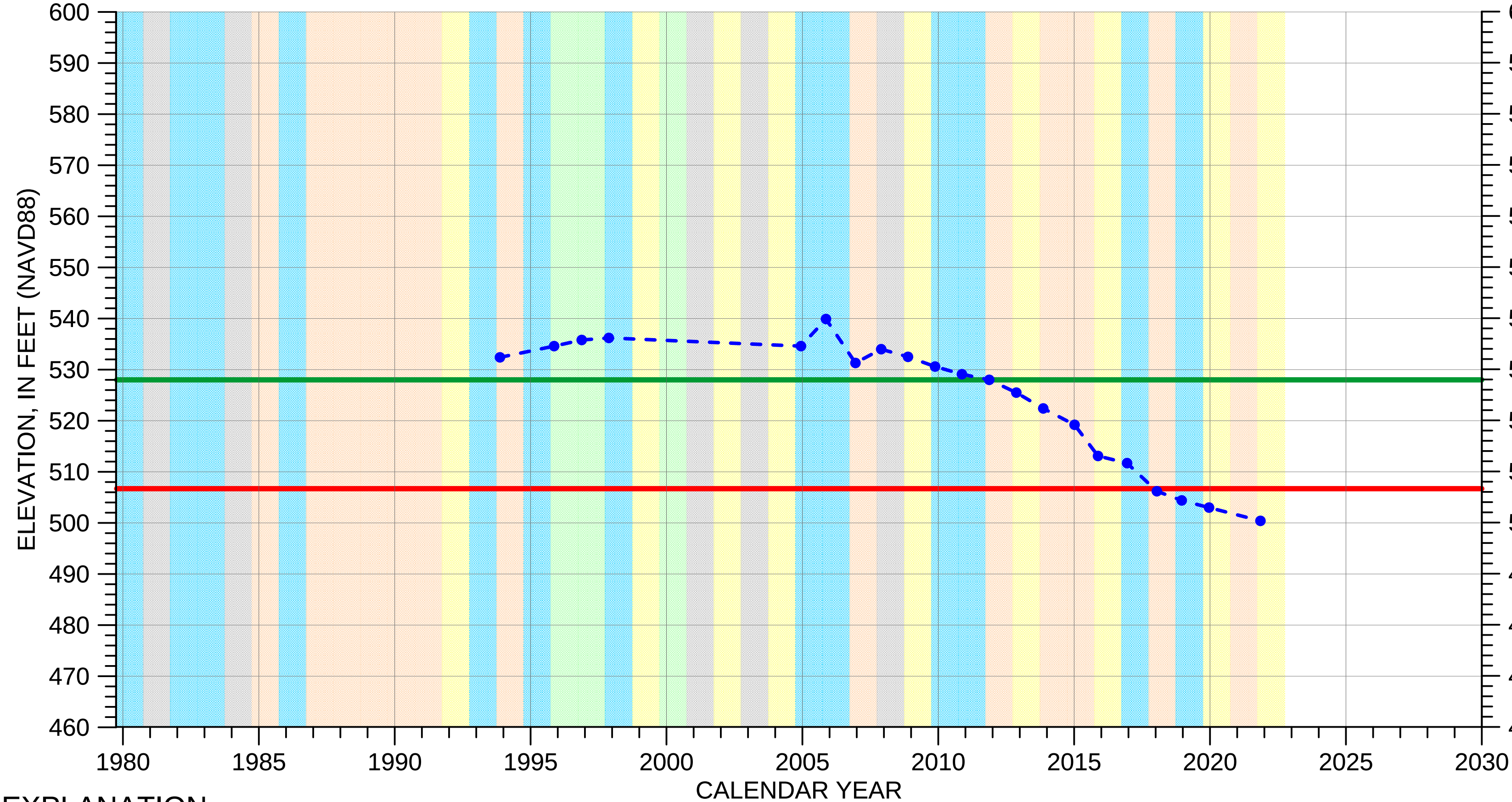
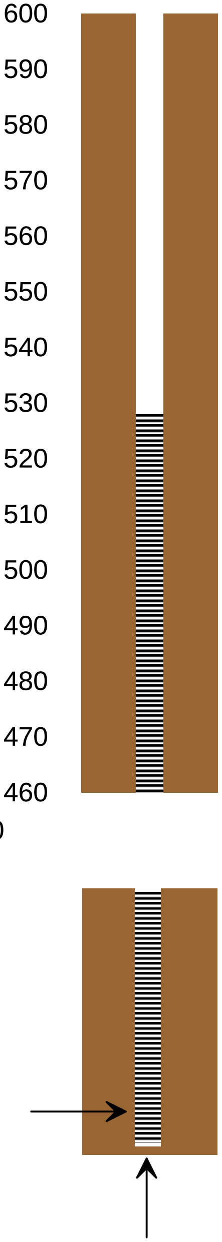
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 23S/10E-33P01 Upper Valley Aquifer Subbasin





Multiple perforated intervals from 528 to 98 feet msl

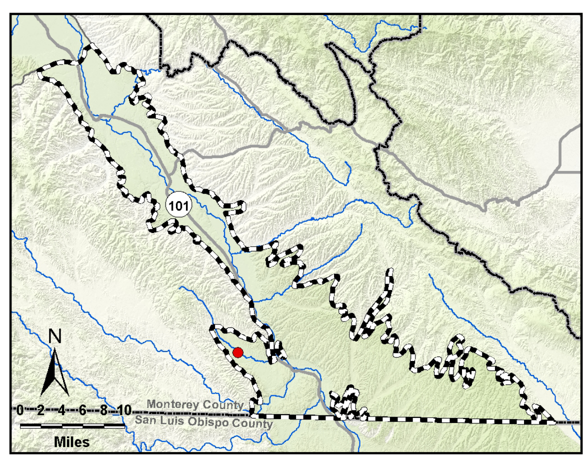
Well bottom -33 feet msl

EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface (748 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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



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