February 14, 2025

DRAFT REPORT

Santa Margarita Basin
Water Year 2024 Annual Report

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ACRONYMS & ABBREVIATIONS

1,2-DCE 1,2-dichloroethene
AF .... acre-feet
AF/yr .... acre-feet per year
amsl .... above mean sea level
Annual Report .... GSP Annual Report
ASR .... Aquifer Storage and Recovery
Basin .... Santa Margarita Groundwater Basin
Basin Model .... GSP Groundwater Basin Model
County .... County of Santa Cruz
DLR .... detection limit for reporting
DWR .... California Department of Water Resources
ft bgs .... feet below ground surface
GDE .... groundwater dependent ecosystems
GPY .... gallons per year
GSA .... Groundwater Sustainability Agency
GSP .... Groundwater Sustainability Plan
JPA .... Joint Powers Agreement
LID .... low impact development
mg/L .... milligrams per liter
MHA .... Mount Hermon Association
MO .... measurable objective
MT .... minimum threshold
MTBE .... methyl-tert-butyl ether
ND .... not detected at laboratory detection limit
PCE .... tetrachloroethene
RMPs .... representative monitoring point(s)
SCWD .... City of Santa Cruz Water Department
SLVWD .... San Lorenzo Valley Water District
SGMA .... Sustainable Groundwater Management Act
SMC .... sustainable management criteria
SMGWA .... Santa Margarita Groundwater Agency
SVWD .... Scotts Valley Water District
TCE .... trichloroethene
TDS .... total dissolved solids
µg/L .... micrograms per Liter
USGS .... United States Geological Survey
VOCs .... volatile organic compounds
WY .... Water Year

EXECUTIVE SUMMARY

Introduction

This fourth Annual Report since adoption of the Santa Margarita Groundwater Basin (Basin) Groundwater Sustainability Plan (GSP) covers the 2024 Water Year (WY2024), from October 1, 2023, through September 30, 2024. As shown on Figure ES-1, the Basin covers an area of 34.8 square miles (22,249 acres) in central Santa Cruz County. The Santa Margarita Groundwater Agency (SMGWA) is the sole groundwater sustainability agency (GSA) for the Basin. It was formed through a Joint Powers Agreement (JPA) between Scotts Valley Water District (SVWD), San Lorenzo Valley Water District (SLVWD), and the County of Santa Cruz (County). Figure ES-1 shows the jurisdictional extent of member agencies that comprise SMGWA in relation to the Basin boundary. The Department of Water Resources (DWR) approved the SMGWA GSP during WY2023 on April 27, 2023.

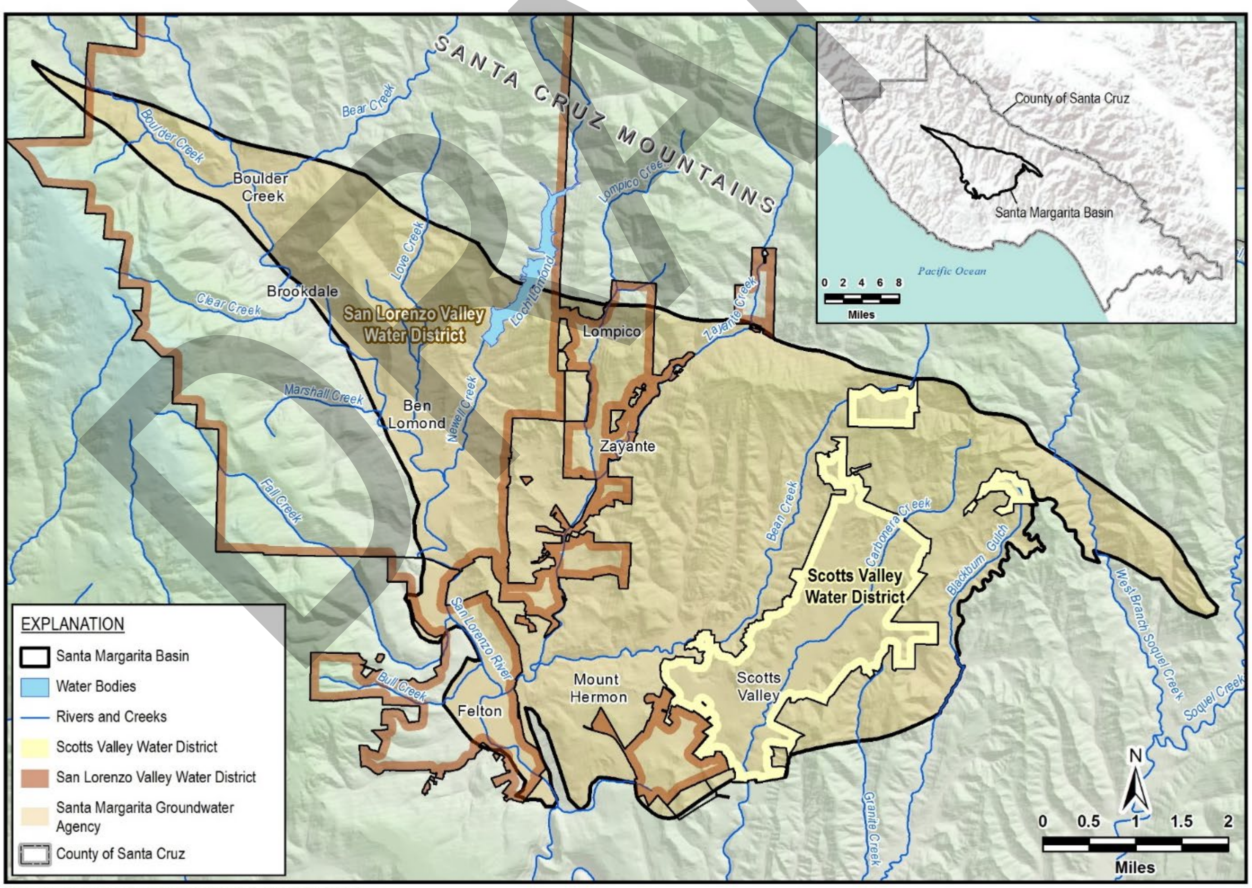

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Figure ES-1. Basin and Member Agency Jurisdictional Boundaries

Water Year Conditions and Water Use

WY2024 was a somewhat mixed water year with below average precipitation but above average surface water flow as measured on the San Lorenzo River at the Big Trees Gage. The combination of water use efficiency improvements, conjunctive use, and natural recharge resulted in stable groundwater levels and change in storage compared to the prior water year. Highlights related to WY2024 conditions and use are shown in Table ES-1 below.

Table ES-1. Summary of Long-term Average and WY2024 Hydrologic Conditions

Hydrologic Conditions Component	Long-term Average	WY2024
Precipitation at Boulder Creek	50.3 inches	44.1 inches
Precipitation at Scotts Valley	41.3 inches	32.7 inches
Surface Water Flow at Big Trees Gage	99,400 acre-feet/year	115,000 acre-feet
Groundwater Use	3,686 acre-feet/year	2,346 acre-feet
Surface Water Use	871 acre-feet/year	1,222 acre-feet
Change in Groundwater in Storage	-850 acre-feet/year	-260 acre-feet

The total volume of groundwater extracted in WY2024 was 2,346 acre-feet (AF), about 1% less than was extracted in WY2023, and, most significantly, the smallest volume extracted since reliable records began in WY1985. Most groundwater extraction in the Basin is for municipal supplies by SLVWD, SVWD, and Mount Hermon Association (MHA). In WY2024, about 81% of all groundwater was extracted by these water providers. SVWD extracted 1,043 AF (45%), SLVWD extracted 678 AF (29%), and MHA extracted 153 AF (7%). Remaining estimated groundwater use included: private domestic wells extracted 233 AF; (10%); non-domestic private wells extracted 122 AF (5%); small water systems extracted 86 AF (4%); and Quail Hollow Quarry extracted 32 AF (1%).

In WY2024, surface water was used to recharge groundwater through both in-lieu and direct methods. SLVWD shifted its operations to preferentially use surface water in lieu of groundwater. An estimated 304 AF of surface water was used for in-lieu recharge, based on shifts in water operations from long-term averages and intra-district transfers of surface water. SVWD and private developments captured stormwater and recharged groundwater at low-impact development (LID) sites in Scotts Valley. In WY2024, more than 28 AF of LID recharge was measured.

Progress Toward Implementing the GSP

The Basin GSP identified existing and planned projects that will result in long-term sustainability. Achievements in WY2024 on existing projects are summarized in Table ES-2 below.

Table ES-2. Summary of Existing Projects and Management Actions

Project	Description
SVWD Water Efficiency Rebates	Issued 10 rebates for turf replacement resulting in an estimated 0.87 acre-feet per year (AF/yr) (or 284,432 gallons per year (GPY)) savings, and additional 26 rebates for toilet and smart irrigation controller replacements saving an additional 0.10 AF/yr (31,807 GPY) for a total of 0.97 AF/yr (316,239 GPY)
SLVWD Water Efficiency Rebates	Issued 14 clothes washer rebates and 19 toilet rebates, resulting in an estimated savings of 0.73 AF/yr (238,900 GPY)
SVWD Low Impact Development (LID)	Captured and recharged 28.39 AF of stormwater at 3 LID facilities in Scotts Valley
SVWD Recycled Water	Distributed 149 AF of recycled water to non-potable water users in Scotts Valley
SLVWD Conjunctive Use	Used more surface water to reduce groundwater extraction in the SLVWD System resulting in an estimated 304 AF of in-lieu groundwater recharge

Progress was made in WY2024 on planned projects. SLVWD continued its efforts to expand conjunctive use operations within the district's boundaries, including preparation of an Environmental Impact Report that will be completed in WY2025 in support of a petition to modify place-of-use water rights. SLVWD is also assessing the feasibility of conveyance and water treatment upgrades necessary in order to use its 313 AF per year (AF/yr) allocation of surface water stored in Loch Lomond by the Santa Cruz Water Department (SCWD).

SVWD is working with SCWD on a drought response project that includes the design and construction of 2 critical pieces of infrastructure to improve drought resiliency for SVWD and SCWD: 1) a 12-inch-diameter, bi-directional, 1 million gallon per day intertie pipeline and pump station between the SCWD and SVWD distribution systems to facilitate transfers of water in droughts or other emergencies; and 2) a new extraction well in SVWD to replace aging wells to provide redundancy and increase extraction capacity to meet potential increased demand, and to strengthen SVWD's ability to supply water to neighboring agencies in drought conditions. While the initial phase of development is starting as an emergency supply project for both agencies, the 2 new infrastructure elements also create an opportunity to increase inter-district conjunctive use that relies on surface water sources from outside the Basin. In WY2024, design was completed and an agreement with a contractor was approved for the construction of the pipeline component. Construction of the pipeline, associated pump station, and the extraction well is expected to be completed by the end of 2025. SVWD and SCWD are also working on an Operational Agreement for the project.

During WY2024, progress was made by SMGWA toward filling GSP-identified data gaps in its monitoring network. Groundwater level transducers were installed in new monitoring wells, a dry season streamflow gage was added on Carbonera Creek, and a private domestic well was added to the monitoring network in an area of concentrated domestic groundwater users.

Sustainable Management Criteria Evaluation

No undesirable results occurred in the Basin in WY2024. Other than iron and manganese, which are naturally occurring at concentrations above regulatory standards and minimum thresholds (MTs), no MTs were exceeded for the Sustainable Management Criteria (SMC) relevant to the Basin.

1 INTRODUCTION

The Sustainable Groundwater Management Act (SGMA) of 2014 established a requirement and a framework for local agencies to sustainably manage their groundwater basins for current and future users of this vital resource. The Santa Margarita Groundwater Agency (SMGWA) formed in June 2017 to act as the local Groundwater Sustainability Agency (GSA) for the Santa Margarita Groundwater Basin (Basin). SGMA requires the submittal of a Groundwater Sustainability Plan (GSP) and an Annual Report to the California Department of Water Resources (DWR). The SMGWA Board of Directors unanimously adopted its GSP after a public hearing on November 17, 2021, and the GSP was submitted to DWR on January 3, 2022. DWR approved the SMGWA GSP on April 27, 2023. The SMGWA has until the end of January 2042 to achieve sustainable groundwater conditions as described in the GSP.

This is the fourth Annual Report prepared since adoption of the Basin GSP. It covers the 2024 Water Year (WY2024), from October 1, 2023, through September 30, 2024. Prior Annual Reports are available at the SMGWA website (https://www.smgwa.org/AnnualGSPReports) or at the DWR SGMA Portal (https://sgma.water.ca.gov/portal/).

1.1 Purpose of Annual Report

This Annual Report is intended to show progress toward achieving sustainable groundwater resources for those reliant on the Basin. It demonstrates to DWR, which is responsible for tracking GSP progress, that SMGWA is: 1) evaluating groundwater conditions annually; 2) implementing the GSP, including advancing projects and management actions and other plan components; and 3) comparing conditions to locally established sustainable management criteria (SMC).

1.2 Santa Margarita Groundwater Basin

The Basin is identified by DWR as the Santa Margarita Groundwater Basin (No. 3-027). As shown on Figure 1, the Basin covers an area of 34.8 square miles (22,249 acres) in central Santa Cruz County. The Basin is home to an estimated 29,000 residents, and includes the City of Scotts Valley, and the communities of Boulder Creek, Brookdale, Ben Lomond, Lompico, Zayante, Felton, and Mount Hermon. In WY2024, groundwater met about 63% of the Basin’s water supply needs.

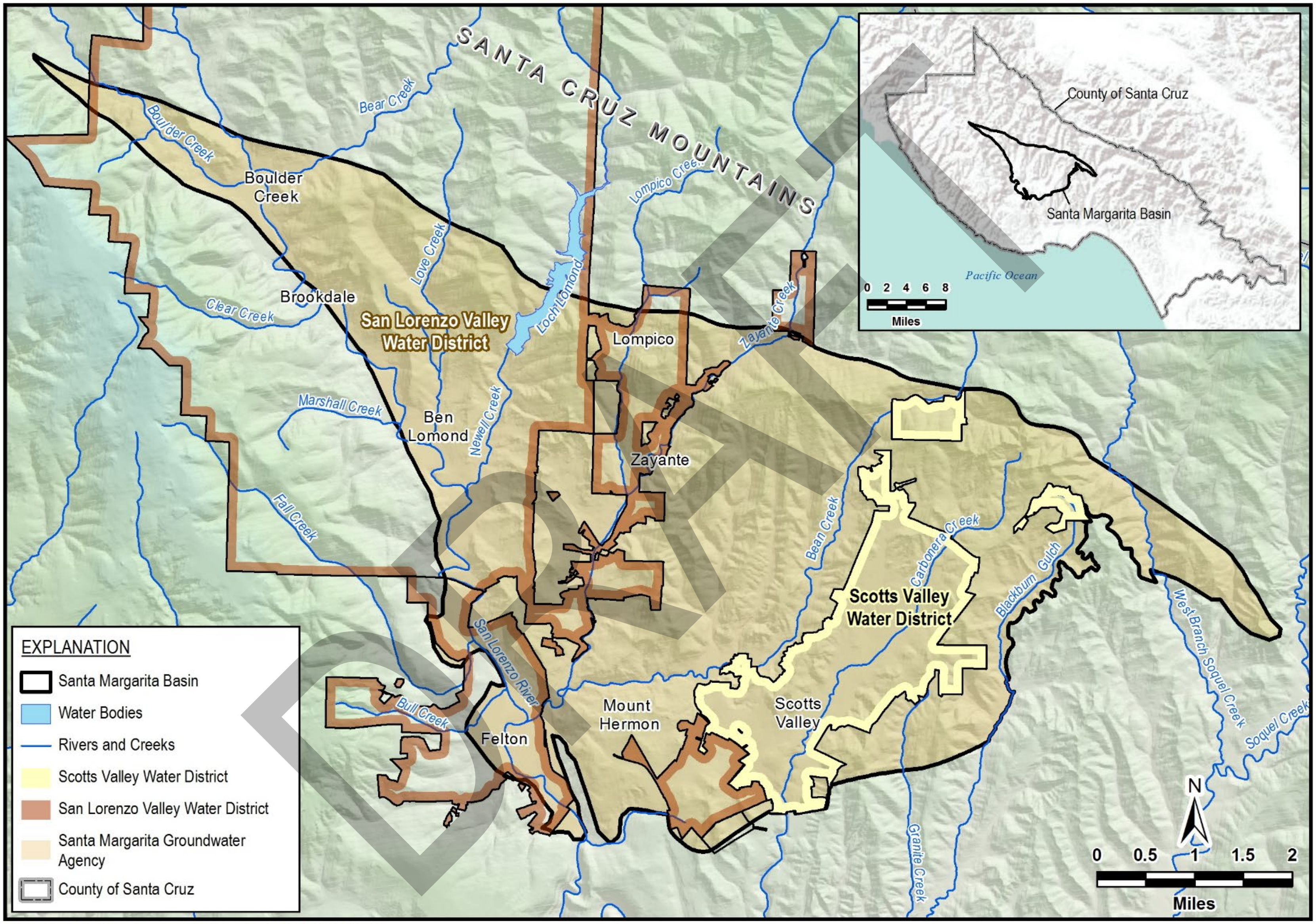

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Figure 1. Basin and Member Agency Jurisdictional Boundaries

The Basin is a geologically complex area that was formed by the same tectonic forces along the San Andreas fault zone that created uplift of the Santa Cruz Mountains and the rest of the California Coast Range. The Basin is bounded on the north by the Zayante trace of the active, strike-slip Zayante-Vergeles fault zone; on the east by a buried granitic high that separates the Basin from Santa Cruz Mid-County Basin; and on the west by the Ben Lomond fault (except where areas of alluvium lie west of the fault in an area previously designated as the Felton Basin). The southern boundary of the Basin with the West Santa Cruz Terrace Basin is located where sedimentary formations thin over a granitic high. A geologic map of the Basin is shown on Figure 2.

The Basin is filled with Tertiary-age sedimentary rocks. From oldest and deepest to youngest and shallowest, the main units are the Butano Sandstone, Lompico Sandstone, Monterey Formation, and Santa Margarita Sandstone. The 3 sandstone formations are the Basin's principal aquifers for water supply, as defined in the GSP. Although used for private domestic wells, the Monterey Formation is not a principal aquifer because it only supports small groundwater extraction volumes. Two younger formations cap the hilltops east of Zayante Creek: the impermeable Santa Cruz Mudstone and the overlying Purisima Formation, which is a major aquifer in the adjacent Santa Cruz Mid-County Basin but is of such limited extent in the Santa Margarita Basin that is used only for private domestic wells.

An example cross section on Figure 3 illustrates the subsurface geology along line D-D' on the geologic map shown on Figure 2. The cross section highlights the area in Mount Hermon and Scotts Valley where the Monterey Formation aquitard is absent between the Santa Margarita Sandstone and the underlying Lompico Sandstone. It shows how thin the Purisima Formation is in the Basin and how the Santa Margarita Sandstone is an unconfined aquifer, whereas the Lompico Sandstone and the Butano Sandstone are partially confined aquifers due to the presence of the overlying Monterey Formation.

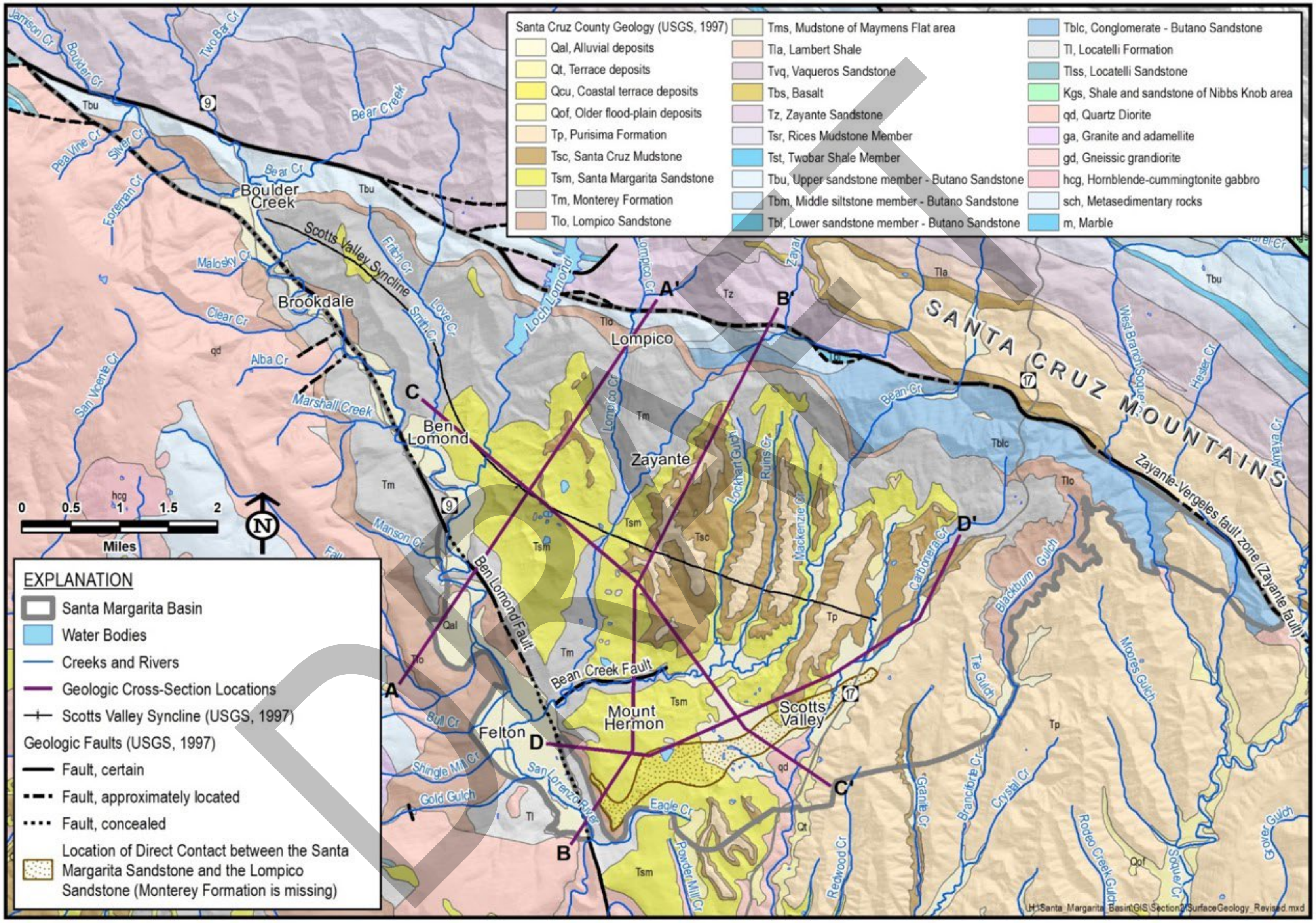

Figure 2. Surface Geology and Geologic Cross Section Locations

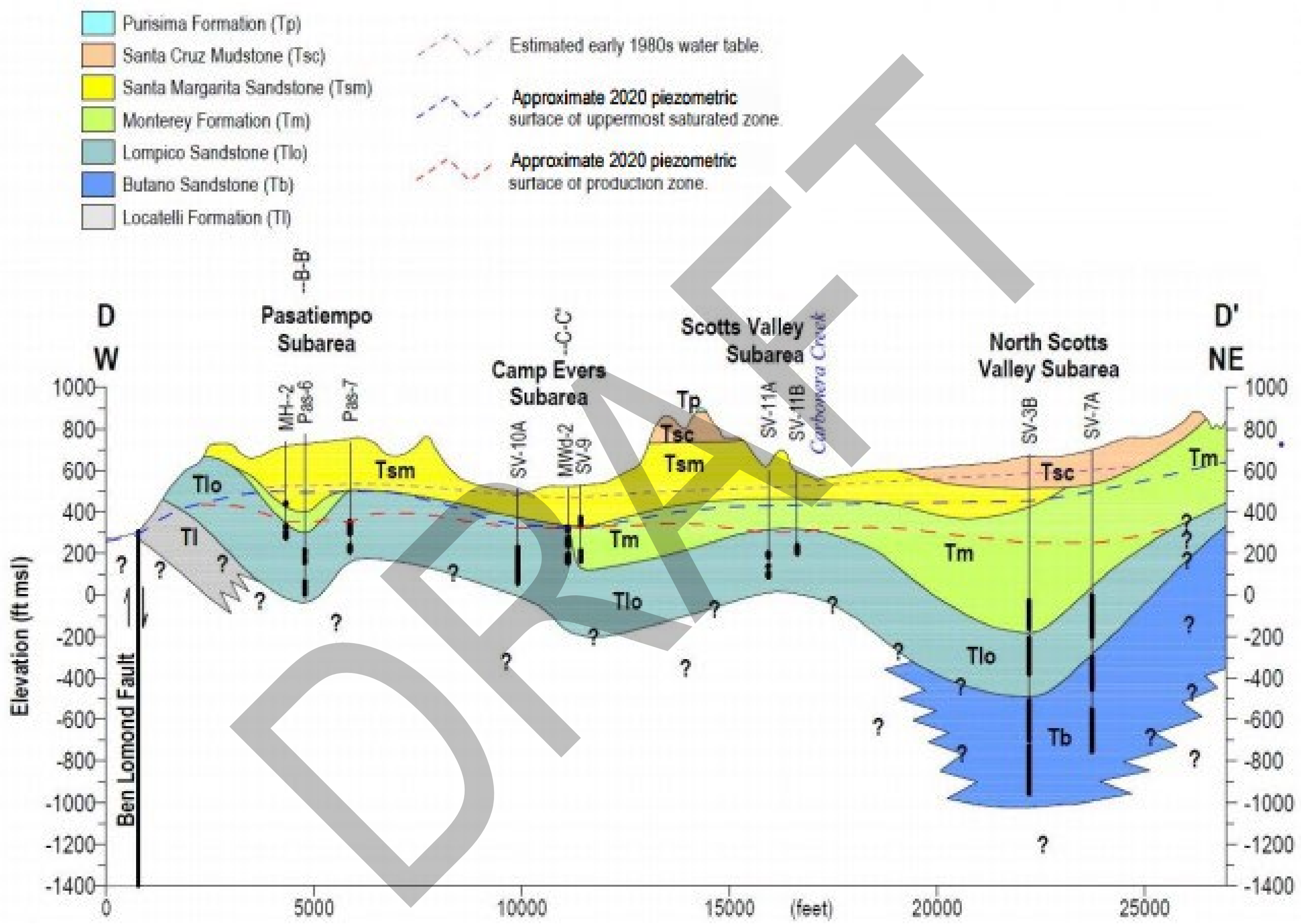

Figure 3. D-D' Geologic Cross Section

1.3 Santa Margarita Groundwater Agency

SMGWA, the sole GSA for the Basin, was formed through a Joint Powers Agreement (JPA) between Scotts Valley Water District (SVWD), San Lorenzo Valley Water District (SLVWD), and the County of Santa Cruz (County). Figure 1 shows the jurisdictional extent of member agencies that comprise the SMGWA in relation to the Basin boundary. SGMA and the JPA grant SMGWA the legal authority to prepare, adopt, and implement the GSP in the Basin.

SMGWA is governed by an 11-member Board of Directors comprising 2 representatives from each member agency as well as: 1 from the City of Scotts Valley, 1 from the City of Santa Cruz, 1 from Mount Hermon Association (MHA), and 2 private well owners. Each of the member agencies and other entities also have an alternate Board member.

1.4 Report Organization

The Annual Report includes required content resulting from GSP Regulations developed by DWR following the passage of SGMA. Organization of the report generally follows the GSP Regulations to help DWR review the Annual Report as required by SGMA, but there are deviations intended to make the report's flow more accessible to local users. The WY2024 Annual Report includes the following sections:

Executive Summary. This is a required section that summarizes the key information presented in the Annual Report.

Section 1. Introduction. This provides a brief background on the Annual Report and its purpose, the Basin, SMGWA, and the report organization.

Section 2. Water Year Conditions and Water Use. This section starts with a summary of the hydrologic conditions experienced in the Basin in WY2024, and is followed by a summary of the sources and uses of water in the Basin. Finally, Basin groundwater elevation and storage conditions are summarized.

Section 3. Progress Toward Implementing the GSP. This section describes progress on GSP projects and management actions, other GSP implementation activities, and actions taken toward addressing the DWR corrective actions identified in the GSP approval letter received by SMGWA on April 17, 2023.

Section 4. Sustainable Management Criteria Evaluation. This section compares WY2024 conditions at representative monitoring points to applicable sustainability indicators.

Appendices. These include long-term groundwater elevation hydrographs for representative monitoring points in relation to their measurable objectives and minimum thresholds, long-term hydrographs at other monitoring points in the Basin, and tables of water quality data and graphs of trends over time for constituents of concern.

2 WATER YEAR CONDITIONS AND WATER USE

The hydrologic conditions in WY2024 were slightly below average for precipitation, but slightly above average in terms of cumulative discharge as measured on the San Lorenzo River at the United States Geological Survey (USGS) Big Trees Gage. Despite the below average precipitation, groundwater use continued to decrease and many groundwater levels continued to increase. The Basin model estimated a slight net decrease of groundwater in storage of 260 AF, mainly because of below average precipitation recharge in the Santa Margarita aquifer, as deeper confined aquifer storage continues to increase due to lower annual extraction volumes.

2.1 Precipitation

Precipitation is the primary source of recharge in the Basin through both direct rainfall percolation and streamflow infiltration. Monitoring annual precipitation is a key component for understanding local water supply trends and groundwater conditions. Long-term precipitation records are available for 2 weather stations in the Basin: El Pueblo weather station in Scotts Valley and Boulder Creek weather station in Boulder Creek. Annual precipitation for the stations is shown on Figure 4.

WY2024 precipitation was slightly below average for the Basin. Total precipitation was 32.7 inches in Scotts Valley and 44.1 inches in Boulder Creek, which is about 88% and 79% of their respective long-term averages (Figure 4). Monthly precipitation relative to the most recent 30-year average (1994 through 2023) is shown on Figure 5. For WY2024, precipitation trends continue to show variable conditions with a below average start to the wet season in October through December and average to above average precipitation through the end of the wet season from January through May (Figure 5).

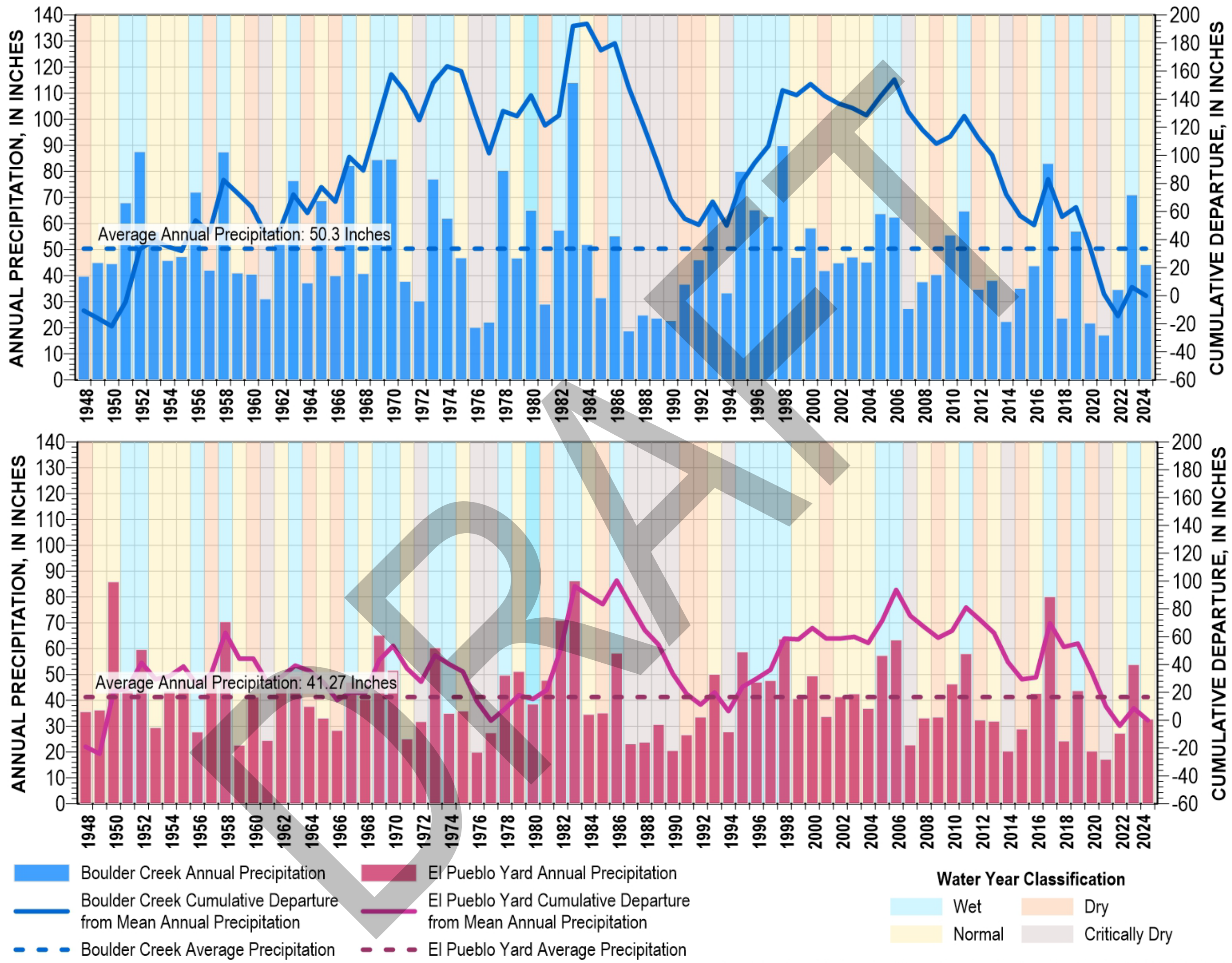

Figure 4. Annual Precipitation, Cumulative Departure from Average Annual Precipitation, and Water Year Type, WY1948-2024

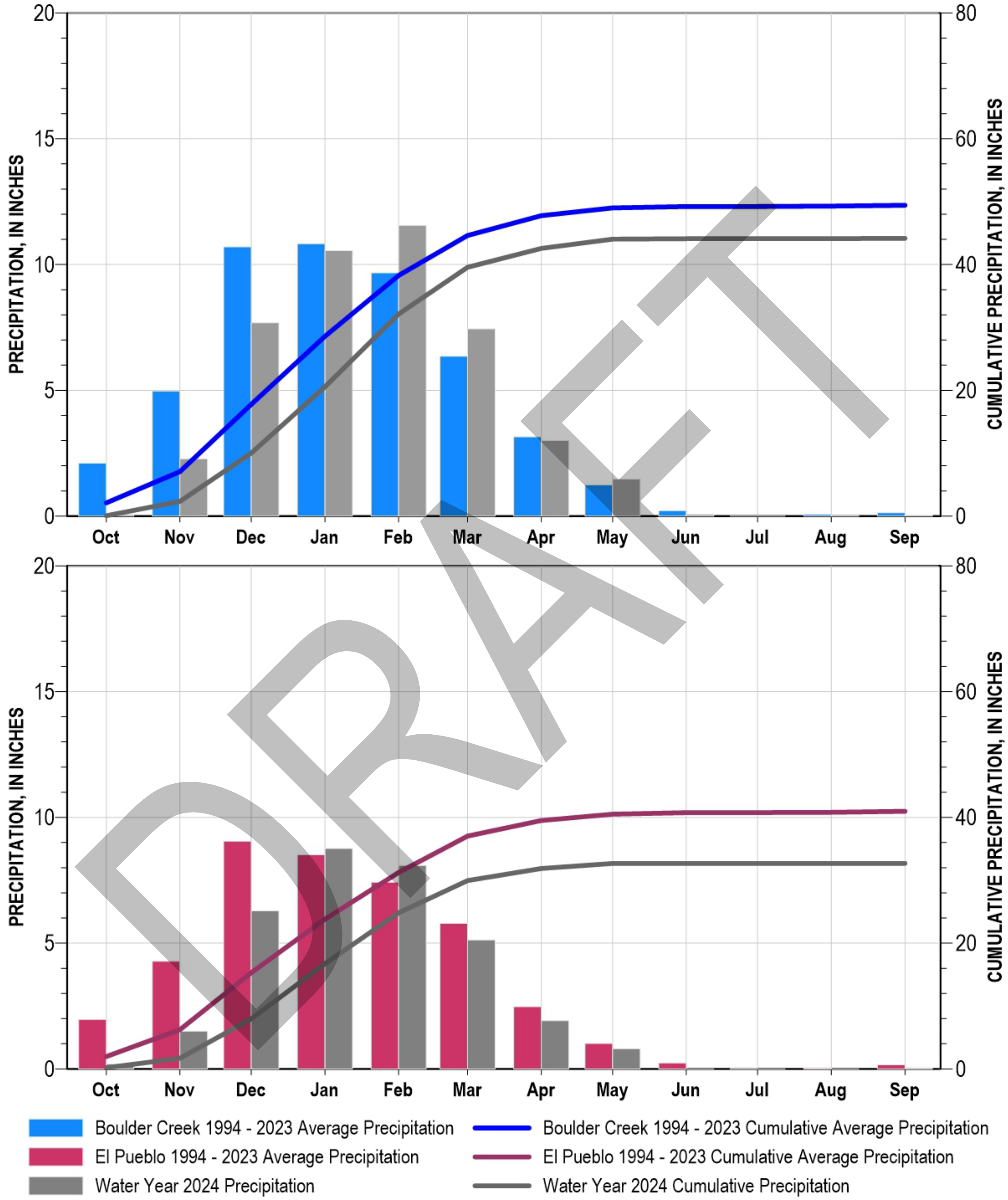

Figure 5. WY2024 Monthly and Annual Cumulative Precipitation versus 30-Year Average Precipitation

2.2 Surface Water Flow

The water-year type is determined for the Basin using the City of Santa Cruz water-year classification system. This classification system is based on the total cumulative discharge of the San Lorenzo River as measured just downstream of the confluence with Bean Creek at the USGS Big Trees Gage. Based on the cumulative streamflow, WY2024 is classified as a normal water year.

High late winter and early spring flows and a significant tailing period in the spring and summer led to above average monthly and cumulative streamflow in the San Lorenzo River for WY2024. Daily streamflow is shown on Figure 6 and monthly streamflow relative to long-term averages is shown on Figure 7. Streamflow at the Big Trees Gage peaked in February and then gradually decreased over the remainder of the water year. Cumulative WY2024 streamflow was 115,000 AF, which is about 115% of the 30-year cumulative average of 99,400 AF (Figure 7). The monthly streamflow was greater than average in every month except November, December, and January.

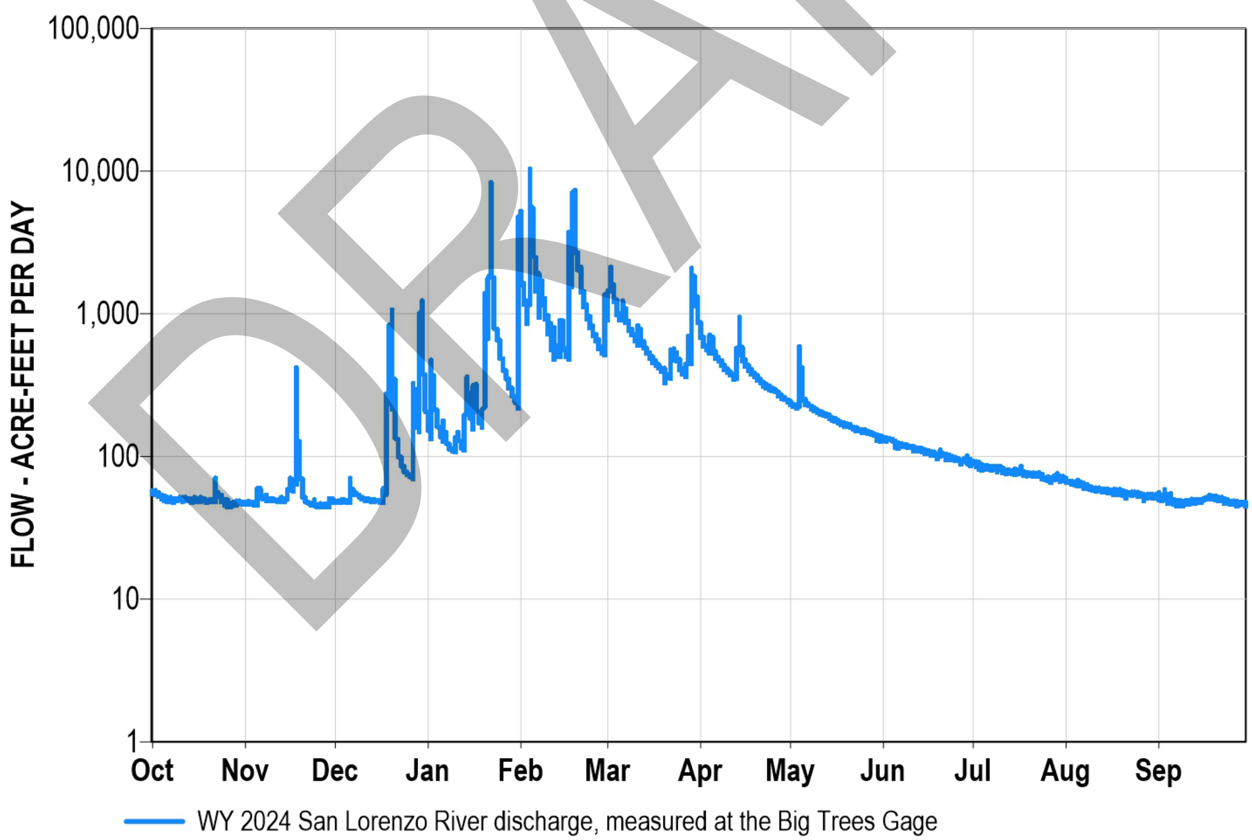

Figure 6. Streamflow at the USGS Big Trees Streamflow Gage, WY2024

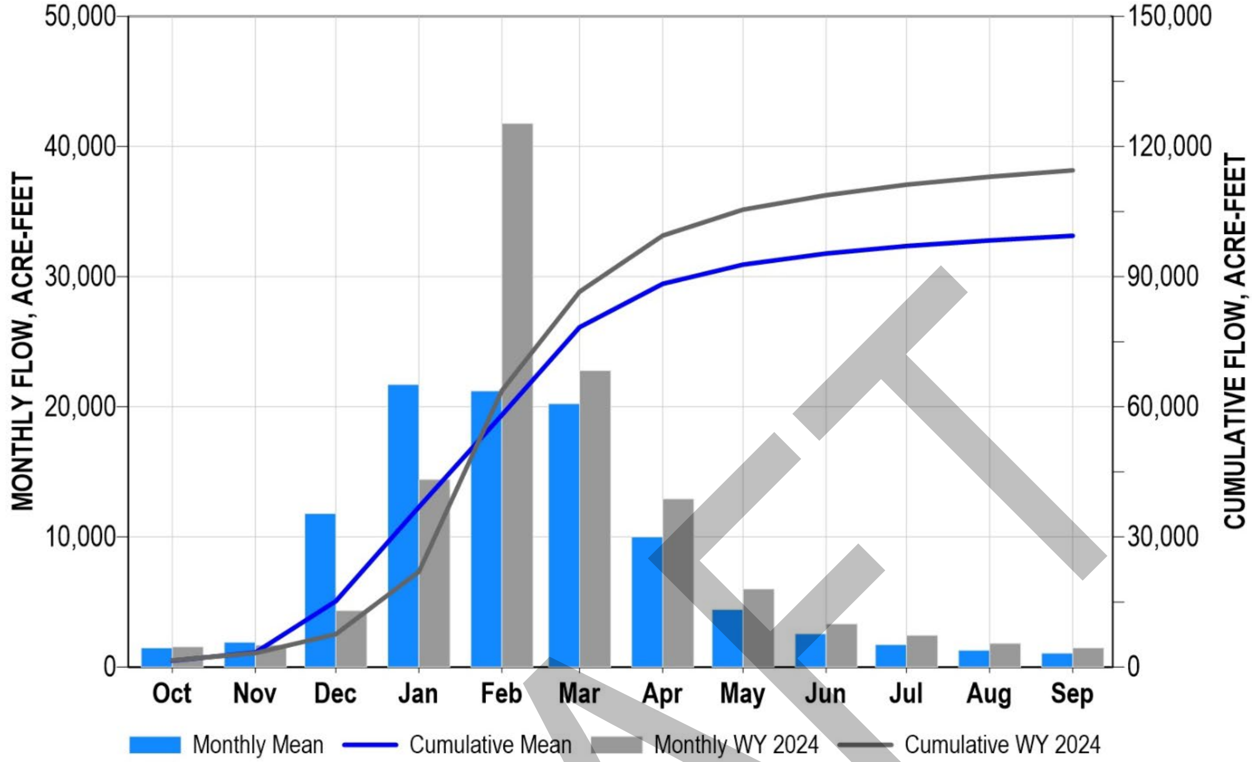

Figure 7. WY2024 and 30-year Mean Monthly and Cumulative Streamflow at the USGS Big Trees Gage

2.3 Groundwater Use

The total volume of groundwater extracted in WY2024 was 2,346 AF, about 15 AF less than was extracted in WY2023, and the lowest groundwater volume extracted since WY1985 when reliable record keeping began. Table 1 summarizes groundwater extraction for WY2024 by sector and by aquifer, and explains the measurement sources and relative accuracy. Figure 8 shows the locations of WY2024 groundwater extraction by aquifer and volume.

There are 3 principal aquifers and 2 additional non-principal aquifers that are used for groundwater supplies in the Basin. Most groundwater extraction is from the Lompico and Butano aquifers south of Bean Creek; north of Bean Creek, only the Santa Margarita aquifer is used as a significant groundwater supply. Of the total groundwater extracted in the Basin in WY2024, the Lompico aquifer supplied 54%, the Santa Margarita aquifer supplied 26%, and the Butano aquifer supplied 15%. The remaining 5% of groundwater was extracted primarily for rural domestic uses from the Monterey Formation and Purisima Formation, which are non-principal aquifers.

Most groundwater extraction in the Basin is for municipal supplies by SLVWD, SVWD, and MHA. In WY2024, about 81% of all groundwater was extracted by these water providers.

SLVWD extracted 678 AF (29%), SVWD extracted 1,043 AF (45%), and MHA extracted 153 AF (7%). About 64% of SLVWD extraction was from the Santa Margarita aquifer north of Bean Creek and about 36% was from the Lompico aquifer south of Bean Creek. All SVWD extraction is from the Lompico and Butano aquifers south of Bean Creek, with about 2/3 from the Lompico aquifer. All MHA extraction is from the Lompico aquifer.

Groundwater extraction for municipal use decreased in WY2024 relative to WY2023. In WY2024, SLVWD reduced its groundwater extraction by <1% compared to WY2023 after seeing a 7% reduction between WY2022 and WY2023 due to increased surface water use in that exceptionally wet year. Groundwater extraction totals have significantly declined the last 3 years in comparison to WY2021, a year in which groundwater use was greater than normal due to drought and the destruction of surface water diversion and conveyance infrastructure in the August 2020 CZU wildfire. The volume extracted in WY2024 was about 26% less than the average annual extraction for the 6-year period before the wildfire (from WY2014 to WY2019).

In WY2024, SVWD extracted the smallest volume of groundwater since accurate records began in 1985, reducing its extraction by about <1% compared to WY2023. This decrease is primarily due to resting of the Orchard supply well, which is screened in both the Lompico and Butano aquifers, in the wet season. This practice began during the exceptionally wet winter months of WY2023 resulting in a 17% decline in pumping from the Butano aquifer in WY2023 compared to WY2022 and by an additional 4% in WY2024 relative to WY2023.

MHA increased its groundwater extraction by about 4% in WY2024 compared to WY2023, a wet year. However, MHA extraction in WY2024 was about 10% less than the average for 1991 through 2023, the period for which metered data are available.

Small water systems accounted for about 4% of WY2024 groundwater extraction in the Basin. The remaining uses of groundwater in the Basin—private domestic use, landscaping, irrigation, pond filling and dust-control in quarries—are not metered, so the volumes of groundwater extracted can only be estimated. In WY2024, Quail Hollow Quarry pumping was revised from 25 to 32 AF, based on updated estimates of water use for dust control. Otherwise, the groundwater extractions for WY2024 were assumed to be the same as estimates made in the GSP for WY2018 for these smaller users, given that commercial and domestic activities have changed little in the Basin's sparsely populated areas. Relative to total groundwater use in WY2024, approximately 10% of groundwater extraction is for unmetered private domestic use, 5% is for landscaping, irrigation, and pond filling, and 1% is for dust mitigation at the Quail Hollow Quarry.

Table 1. Groundwater Extraction in the Santa Margarita Basin, WY2024

Agency / Extraction Type	Principal Aquifer Extraction (acre-feet)			Non-Principal Aquifer Extraction (acre-feet)		Total (acre-feet)	Percentage of Total Extraction
	Santa Margarita	Lompico	Butano	Monterey	Purisima		
San Lorenzo Valley Water District[1]	431	247	0	0	0	**678**	**29%**
Scotts Valley Water District[1, 2]	0	724	319	0	0	**1,043**	**45%**
Mount Hermon Association[1]	0	153	0	0	0	**153**	**7%**
Private Domestic Wells[3]	62	28	26	87	31	**233**	**10%**
Non-Domestic Private Groundwater Users[4]	38	84	0	0	0	**122**	**5%**
Small Water Systems[5]	48	33	0	5	0	**86**	**4%**
Quail Hollow Quarry[6]	32	0	0	0	0	**32**	**1%**
Total by Aquifer (acre-feet)	**610**	**1,268**	**345**	**92**	**31**	**2,346**	**100%**
Aquifer Percentage of Total Extraction	**26%**	**54%**	**15%**	**4%**	**1%**	**100%**	

[1] Direct measurement by flow meter (most accurate).
[2] For SVWD extraction wells screened in both the Lompico and Butano aquifers. It is assumed that 40% of the water is extracted from the Lompico aquifer and 60% from the Butano aquifer.
[3] Estimated based annual water use factor per connection determined from metered Small Water Systems and applied to each residence outside of municipal water service areas (less accurate). The water use factor for WY2024 is 0.3 AF per connection. Number of private wells is assumed to be 777.
[4] Other private non-domestic uses include landscape irrigation and water for landscape ponds. Extraction is not metered so the volume is estimated (less accurate).
[5] Metered data are reported to County, but timing of reporting is too late for inclusion into the Annual Report. Therefore, only October through December 2023 are from WY2024, while January through September 2024 are from WY2023 (January through September 2023). While this reduces accuracy, the volumes from year to year generally do not vary significantly.
[6] Estimated by Graniterock in April 2024 based on estimated pumping rate and operational days per year at quarry (less accurate).

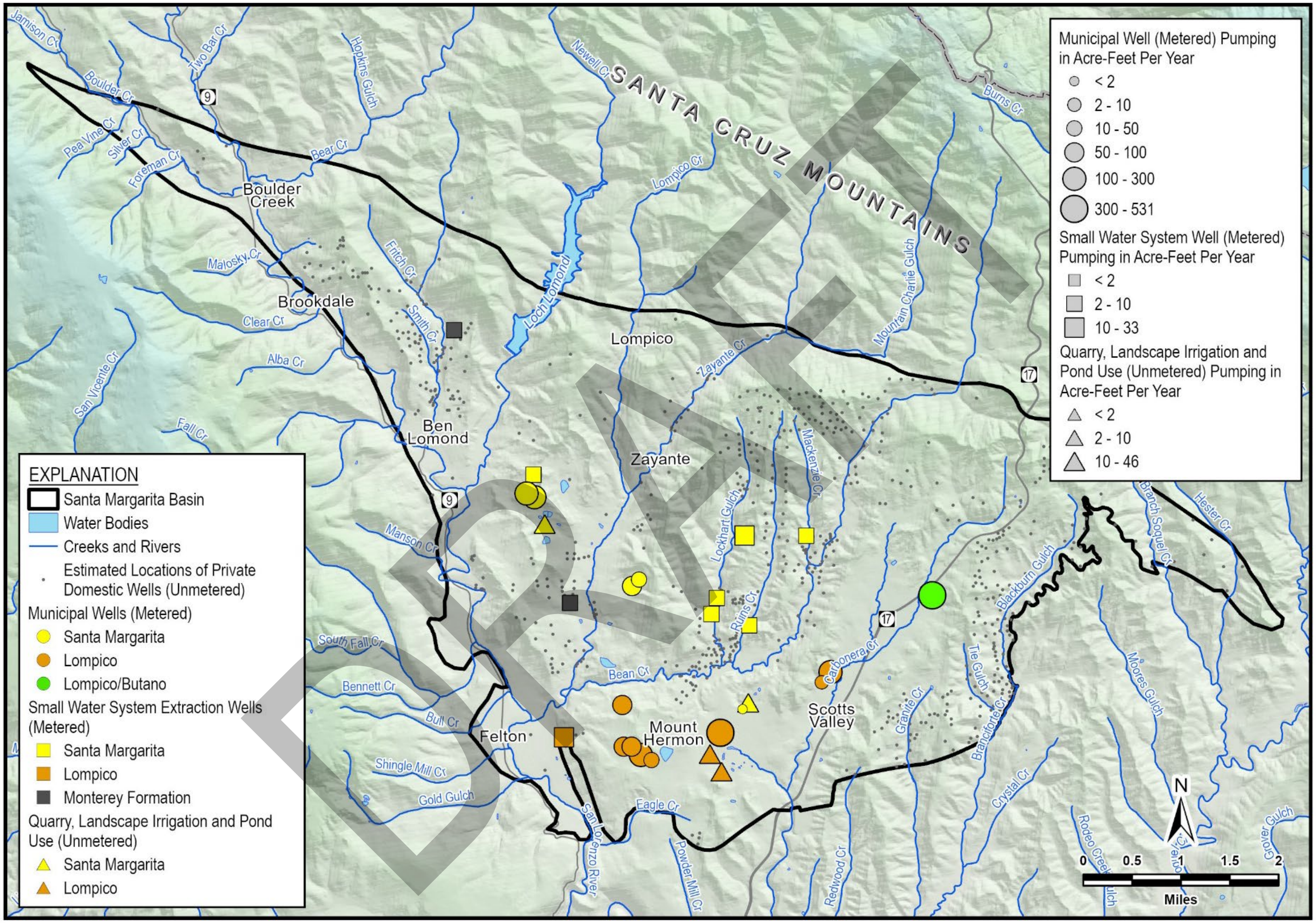

Figure 8. Groundwater Extraction Across the Santa Margarita Basin, WY2024

2.4 Surface Water Use

SLVWD is the primary surface water user in the Basin and adjacent watershed. In WY2024, SLVWD diverted a total of 1,222 AF of surface water from creeks that are tributaries to the San Lorenzo River. This is about 7% greater than the long-term average of 1,134 acre-feet per year (AF/yr) since WY2009 when SLVWD acquired the Felton System surface water sources (see Section 3.1.1.4 for additional description of the SLVWD systems). Greater than average surface water use in WY2024 is due to increased implementation of conjunctive use practices and the provision of water to 3 entities that incurred damage from the 2020 CZU wildfire. In WY2024, SLVWD transferred 11 AF within the Basin to Forest Springs and exported 22 AF outside the Basin to Big Basin Water Company (20 AF) and Bracken Brae (2 AF). Other small water systems with surface water rights in the Basin use about 7 AF/yr.

Under its water rights, SCWD diverts water from the San Lorenzo River at the southern end of the Basin in Felton during the wet season of non-drought years for use in their service area, which is outside the Basin. This water is pumped upstream to Loch Lomond Reservoir for later use in the dry season and, more substantially, in dry years. SCWD diverted 0.12 AF at the Felton diversion in February 2024 as a test to ensure the station still operated as intended because it has not been used in recent years.

SCWD regularly diverts water from the San Lorenzo River about 5 miles downstream of the Basin. In WY2024, SCWD diverted 4,850 AF from the San Lorenzo River downstream of the Basin. While this water is neither diverted nor used within the Basin, it is included in this report because SCWD is an active participant in the SMGWA and Basin GSP implementation due to the presence of critical infrastructure for their surface water supplies within the Basin and the important relationship between successful Basin management and downstream flow in the San Lorenzo River. SCWD is also active in planning for some of the projects described in Section 3.1.3.

2.4.1 Surface Water Used for In-lieu Groundwater Recharge

SLVWD has implemented conjunctive use in its North System for decades. In the North System, SLVWD optimizes the use of surface water and groundwater by utilizing stream flows for water supply while they are high and relying more on groundwater during the dry season. Conjunctive use in the North System reduces groundwater pumping in the Santa Margarita aquifer at the Quail Hollow and Olympia wellfields. On average, the North System uses surface water for 55% of its water supply and groundwater for 45%, reflecting long-term conjunctive use operations.

In WY2024, SLVWD shifted its operations to preferentially use surface water in lieu of groundwater. An estimate of the amount of North System surface water used for in-lieu groundwater recharge is obtained by comparing water usage to long-term averages. This was done by applying the long-term average ratio of surface water to groundwater (55% surface water, 45% groundwater) to the WY2024 total water use in the North System of 1,069 AF, which results in an expected use of 588 AF of surface water and 481 AF of groundwater. Actual surface water diversion in the North System in WY2024 was 638 AF (60% of total) and groundwater extracted was 431 AF (40% of total). While there are other factors that are difficult to account for (e.g., differences in total demand from year to year, the SLVWD System has not been fully repaired from the August 2020 CZU wildfire, etc.), the 50 AF increase from the average expected surface use in WY2024 represents a conservative estimate of surface water from the North System used for in-lieu recharge.

A more direct measure of in-lieu recharge can be obtained from data on intra-district water transfers. Use of the emergency intertie between the Felton System and the San Lorenzo Valley System since the 2020 CZU wildfire has demonstrated the value of conjunctive use practices and has benefited the Basin through in-lieu recharge. In WY2024, SLVWD transferred 254 AF of surface water from the Felton System into the San Lorenzo Valley System. This represents in-lieu recharge of the Basin because it offsets extraction of groundwater that would have otherwise been used due to surface-water infrastructure not being fully repaired from the 2020 CZU wildfire damage.

2.4.2 Surface Water Used for Direct Groundwater Recharge

SVWD and other private developments capture stormwater and recharge groundwater at low-impact development (LID) sites in Scotts Valley. Table 2 shows the total volume of known managed aquifer recharge using LID at SVWD-managed sites since they were constructed in 2018. In WY2024, more than 28 AF of LID recharge was measured.

Table 2. LID Infiltration, WY2018-2024

Water Year	Volume Infiltrated (acre-feet)			
	Transit Center	Woodside HOA	Scotts Valley Library	Total
2018	1.75	17.30	3.39	**22.44**
2019	3.08	31.17*	6.11*	**40.38***
2020	1.50*	14.97*	2.94*	**19.42***
2021	1.40	13.86	1.41	**16.67**
2022	1.75	13.87	1.41*	**17.03***
2023	2.39	28.79	6.26	**37.44**
2024	2.16	21.95	4.28	**28.39**

*Volumes estimated using available data

2.5 Water Use

2.5.1 Total Water Use

Total water use in WY2024 was 3,725 AF. The main sources of this water are municipal and private groundwater wells within the Basin and surface water diversions from the San Lorenzo River watershed west of the Basin by SLVWD. Small amounts are sourced from private surface diversions within the Basin and recycled water. SVWD utilizes recycled water for non-potable irrigation and dust control, as discussed in more detail in Section 3.1.1.3. Table 3 summarizes WY2024 total water use by user, use, and water source type; the methods and accuracy of the estimates are included in the footnotes to the table. The table also shows surface water diverted by SCWD from the San Lorenzo River downstream of the Basin.

Figure 9 illustrates total water use by water source for all users from WY1985 to WY2024. Total water used in WY2024 increased by about 23 AF from WY2023, or <1%. Total water use in WY2024 was 36% less than peak Basin water use of 5,815 AF in WY2001.

Table 3. Total Water Use by Source, WY2024

Water Supplier	Groundwater Use	Surface Water Use	Recycled Water Use	Exported Water	Total WY2024 Water Use
	(acre-feet)				
San Lorenzo Valley Water District[1,2]	678	1,222	0	22	1,900
Scotts Valley Water District[1]	1,043	0	149	0	1,192
Mount Hermon Association[1]	153	0	0	0	153
Private Domestic Wells[3]	233	0	0	0	233
Other Non-Domestic Private Groundwater Users[4]	122	0	0	0	122
Small Water Systems[5]	86	7	0	0	93
Quail Hollow Quarry[6]	32	0	0	0	32
TOTAL	**2,347**	**1,229**	**149**	**22**	**3,725**
Water Diverted and Used Primarily Downstream and Outside the Santa Margarita Basin and Adjacent Areas					
City of Santa Cruz[1]	0	0.12[7] 4,850[8]	0	0	4,850
Total	**2,347**	**6,079**	**149**	**22**	**8,575**

[1] Direct measurement by flow meter (most accurate).
[2] SLVWD total includes a transfer of 11 AF to Forest Springs, a small water system inside the Basin, and exports of 19.6 AF to Big Basin Water Company and 2.5 AF to Bracken Brae Mutual, small water systems just outside the basin. Exports are not added to total water use to avoid double counting.
[3] See note in Table 1. Volume is estimated using population and water use data.
[4] Other private non-domestic uses include landscape irrigation and water for landscape ponds. Extraction is not metered so the volume is estimated (less accurate).
[5] See note in Table 1. Volume is partially estimated using prior water year data.
[6] Estimated based on historical usage (less accurate).
[7] City of Santa Cruz's San Lorenzo River diversion from Felton to Loch Lomond tested in February 2024. This diversion is in the Basin but is only used in wet years.
[8] City of Santa Cruz's San Lorenzo River diversion at Tait Street (5 miles downstream of the Basin) to the City treatment plant. Water is primarily sourced from within the Santa Margarita Basin and the surrounding San Lorenzo River Watershed but is used outside of the Santa Margarita Basin.

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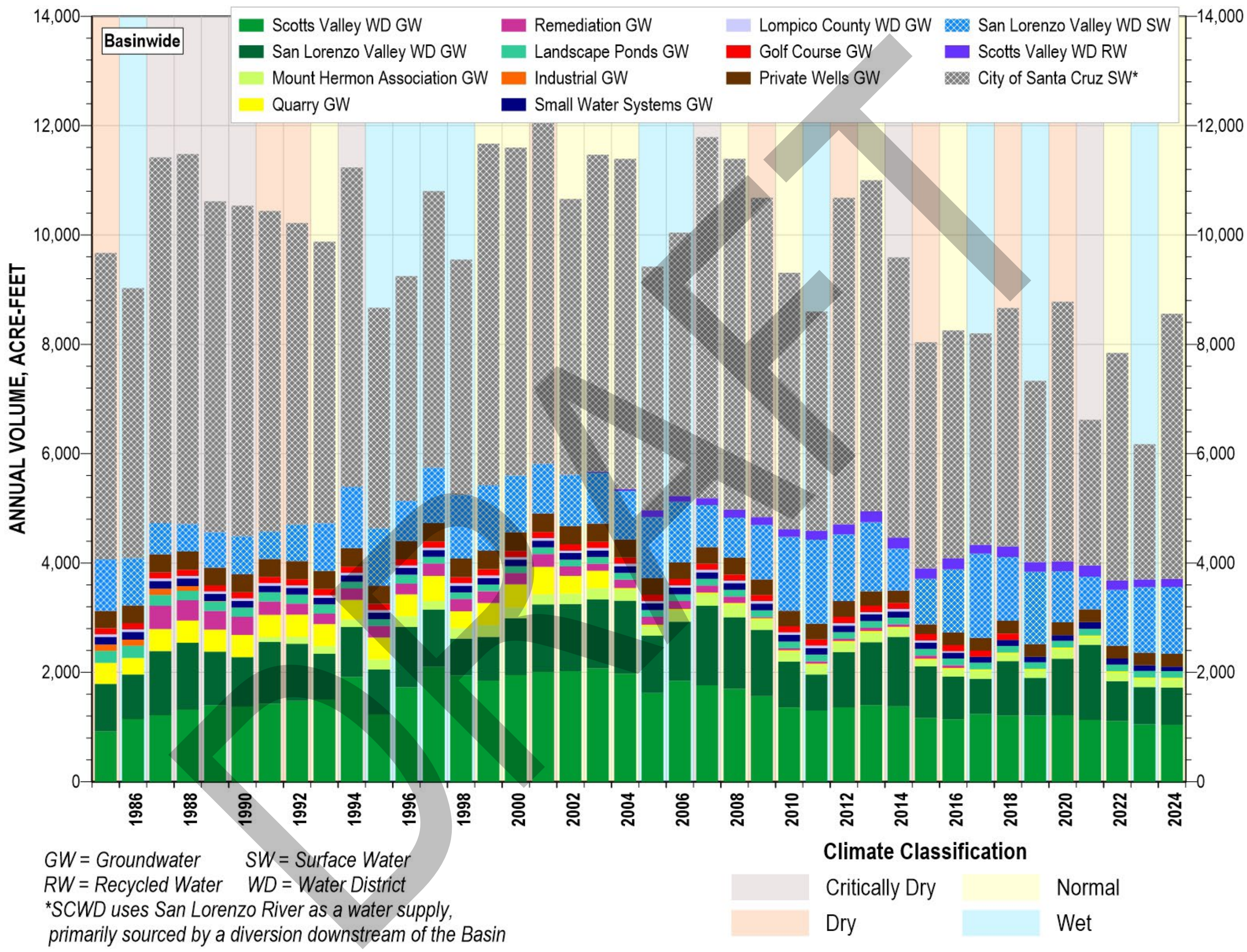

Figure 9. Total Basin Water Use, WY1985-2024

SCWD is the largest user of water resources originating from the Basin and its surrounding watershed, however that water is used outside the Basin. In WY2024, SCWD diverted 4,850 AF from the San Lorenzo River at the Tait Street diversion about 5 miles downstream from the Basin to serve its customers. Since this water is not diverted or used in the Basin, it is tracked separately from Basin water use in Table 3, but shown for reference on Figure 9.

Total water use by the 2 major water providers in the Basin, SLVWD and SVWD, has been decreasing consistently since the early 2000s (Figure 9), largely due to residents' strong conservation efforts and State regulations regarding water use efficiency in construction, as well as water efficiency measures undertaken by the water districts.

Most of the reduction in water use in the Basin since the early 2000s is driven by changes in groundwater extraction by SVWD. This is well-illustrated on Figure 10, which shows the volumes of water used north and south of Bean Creek by user and source. Most of the increase in water use in the Basin from 1985, when accurate records begin, until the early 2000s was a result of increasing extractions of groundwater by SVWD south of Bean Creek as the City of Scotts Valley grew and developed. Despite continued population growth, Scotts Valley water use has declined significantly from amounts used in the early 2000s. As a result, the volume of water used in WY2024 south (and east) of Bean Creek was similar to water used north of Bean Creek. This is consistent with the observation that groundwater elevations in SVWD wells in the South Scotts Valley area appear to be on a recovery trajectory since WY2015 (see Section 2.6.3).

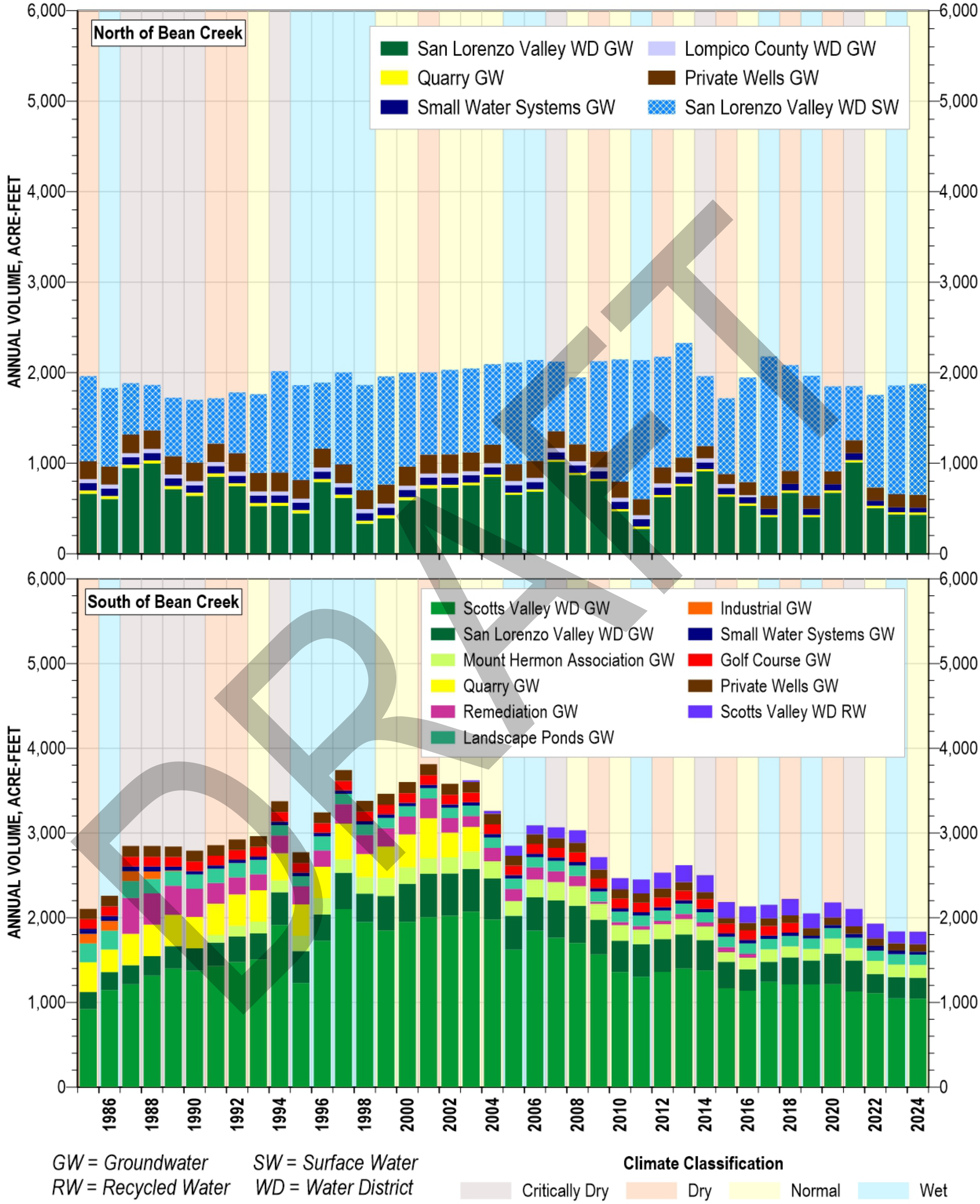

Figure 10. Total Water Use by Source and Location within the Basin, WY1985-2024

2.6 Groundwater Elevations

Groundwater elevations in the Basin are monitored using a network of 40 total extraction and monitoring wells installed by SLVWD, SVWD, MHA, and, most recently, SMGWA. Many of the wells have been used for decades to evaluate short-term, seasonal, and long-term groundwater trends for groundwater management purposes; 7 are new monitoring wells installed by SMGWA between May and September 2023. Of the 40 monitoring wells, 14 serve as representative monitoring points (RMP[s]) for evaluating groundwater level sustainable management criteria (SMC).

Groundwater levels are hand measured in monitoring wells using electric sounders at least semi-annually. SVWD and SMGWA wells have pressure transducers that measure and record groundwater level data at least daily. Groundwater level measurements collected from actively pumping extraction wells or monitoring wells in close proximity are noted and later removed from the datasets used to generate hydrographs and groundwater elevation contour maps.

Groundwater elevations are used to generate seasonal groundwater elevation contour maps for each principal aquifer (Figure 11 through Figure 16). For the Annual Report, groundwater elevation contours are shown only for areas where groundwater elevation data are available. Seasonal differences in groundwater elevations are illustrated with measured minimum groundwater elevations from March to May 2024 on the Spring contour maps and minimum groundwater elevations in September 2024 on the Fall contour maps.

Hydrographs are used to evaluate long-term trends in groundwater elevation. All available non-pumping groundwater elevation data collected in each well through WY2024 are plotted against a background that indicates water-year type to demonstrate the relationship between precipitation and groundwater elevations. Minimum thresholds (MT) and measurable objectives (MO) are included on the hydrographs for groundwater level RMPs.

Hydrographs are compiled in the appendices, grouped by RMPs and non-RMPs as follows:

- Appendix A: Chronic Lowering of Groundwater Level RMP Well Hydrographs
- Appendix B: Depletion of Interconnected Surface Water RMP Well Hydrographs
- Appendix C: GSP Non-RMP Monitoring Network Well Hydrographs

Locations of all groundwater elevation monitoring wells are shown in Appendix A, Page A-1.

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2.6.1 Santa Margarita Aquifer

The Santa Margarita Sandstone is the most permeable formation in the Basin, and it is exposed widely at the surface in the southern and central portions of the Basin. As a result, the mostly unconfined Santa Margarita aquifer recharges quickly in response to rainfall, but its groundwater levels drop when rainfall is limited. The Santa Margarita aquifer supplies about 26% of the total groundwater extracted from the Basin for municipal, domestic, landscape, and sand quarry uses. It is the aquifer that is most important for supporting groundwater-dependent ecosystems (GDE), springs, and baseflow to creeks.

Seasonal patterns in groundwater levels in the Santa Margarita aquifer are different north and south of Bean Creek. In areas north of Bean Creak (Quail Hollow and Olympia/Mission Springs areas), the Santa Margarita aquifer exhibits greater seasonal fluctuations in groundwater level than in other areas (or, for that matter, in other aquifers) in the Basin due to pumping at SLVWD wells in the Quail Hollow and Olympia/Mission Springs areas. Groundwater levels in this area remained stable in WY2024 after increasing in WY2023 (Appendix A, pages A-4, A-6, and Appendix C, pages C-7 through C-10). Groundwater levels are stable because SLVWD extracted similar amounts of groundwater from these wellfields as WY2023. New monitoring well SMGWA-6, installed downgradient of the Quail Hollow wellfield, will be used to evaluate potential groundwater and surface water interconnection at Newell Creek (Appendix C, page C-15) and SMGWA-5, installed upgradient of the Quail Hollow wellfield, will help evaluate potential stream interconnection with Zayante Creek in an area used for private extraction (Appendix C, page C-14).

South of Bean Creek (Mount Hermon/South Scotts Valley and North Scotts Valley areas), the Santa Margarita aquifer is partially dewatered. Dewatering occurred in the South Scotts Valley area due to overpumping in the 1990s, and groundwater elevations have not recovered. Even though the Santa Margarita aquifer is no longer used for municipal supply it has not recovered because, in this area, the Santa Margarita aquifer directly overlies the overdrafted Lompico aquifer with lowered groundwater levels (Figure 2 and Figure 3). In contrast, in the MHA and SLVWD Pasatiempo wellfields and in North Scotts Valley, the Santa Margarita aquifer was never used extensively as a water source, so hydrographs for SLVWD's Pasatiempo MW-2 (Appendix A, page A-5) and SVWD TW-18 (Appendix A, page A-7) illustrate the long-term stable groundwater levels in these areas, with slight fluctuations depending on precipitation. New monitoring south of Bean Creek monitoring wells SMGWA-2, -3, and -4 will be used to monitor groundwater levels in areas used for private extraction and having potential interconnection with streams (Appendix C, pages C-11 through C-13)

Groundwater elevation contour maps for the Santa Margarita aquifer are shown on Figure 11 and Figure 12 for WY2024 Spring and Fall, respectively. Groundwater elevation contours in the

Santa Margarita aquifer generally mimic topography. Groundwater flows toward areas where groundwater discharges naturally to springs and streams along Bean Creek and Zayante Creek. Locally, groundwater in the aquifer flows toward pumping depressions around extraction wells in the Quail Hollow and Olympia/Mission Springs areas.

Groundwater levels are stable or increasing in WY2024 after abundant rainfall in WY2023 replenished the aquifer following a 3-year dry period. Use of surface water in the winter and spring in lieu of pumping from the SLVWD Olympia wellfield likely contributed to a notable spring WY2023 to spring WY2024 (seasonal high) increase in groundwater levels of about 13 feet. The Olympia wellfield continues to have the largest groundwater level fluctuation annually and seasonally in the Santa Margarita aquifer. The maximum 6-foot decline in groundwater levels between spring WY2024 and fall WY2024, observed at SLVWD Olympia #3, is typical of the fluctuation between wet and dry seasons in this area of the unconfined aquifer. Seasonal fluctuations of a smaller magnitude are observed in other areas of the Santa Margarita aquifer.

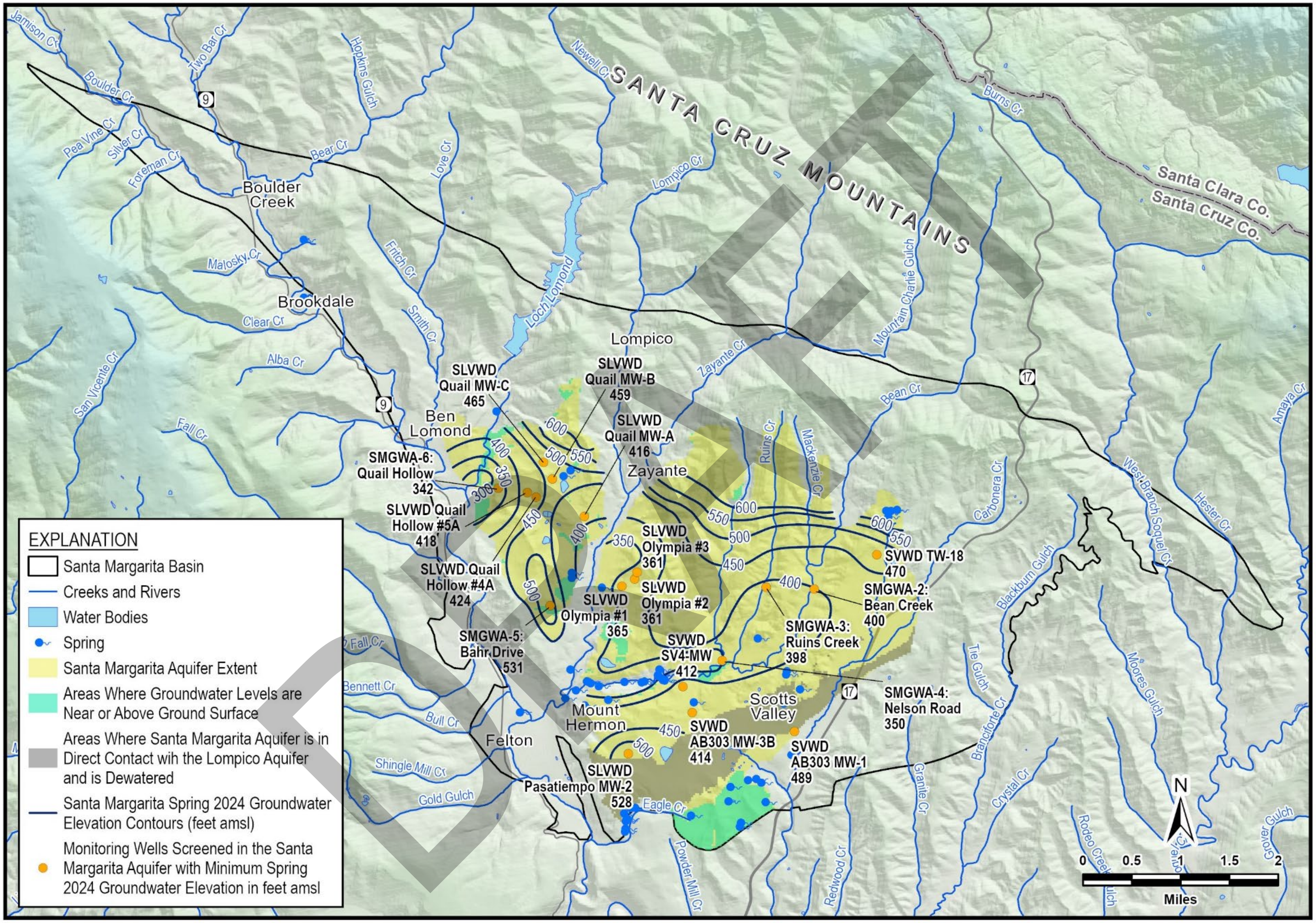

Figure 11. Santa Margarita Aquifer Groundwater Elevations and Contours, Spring 2024

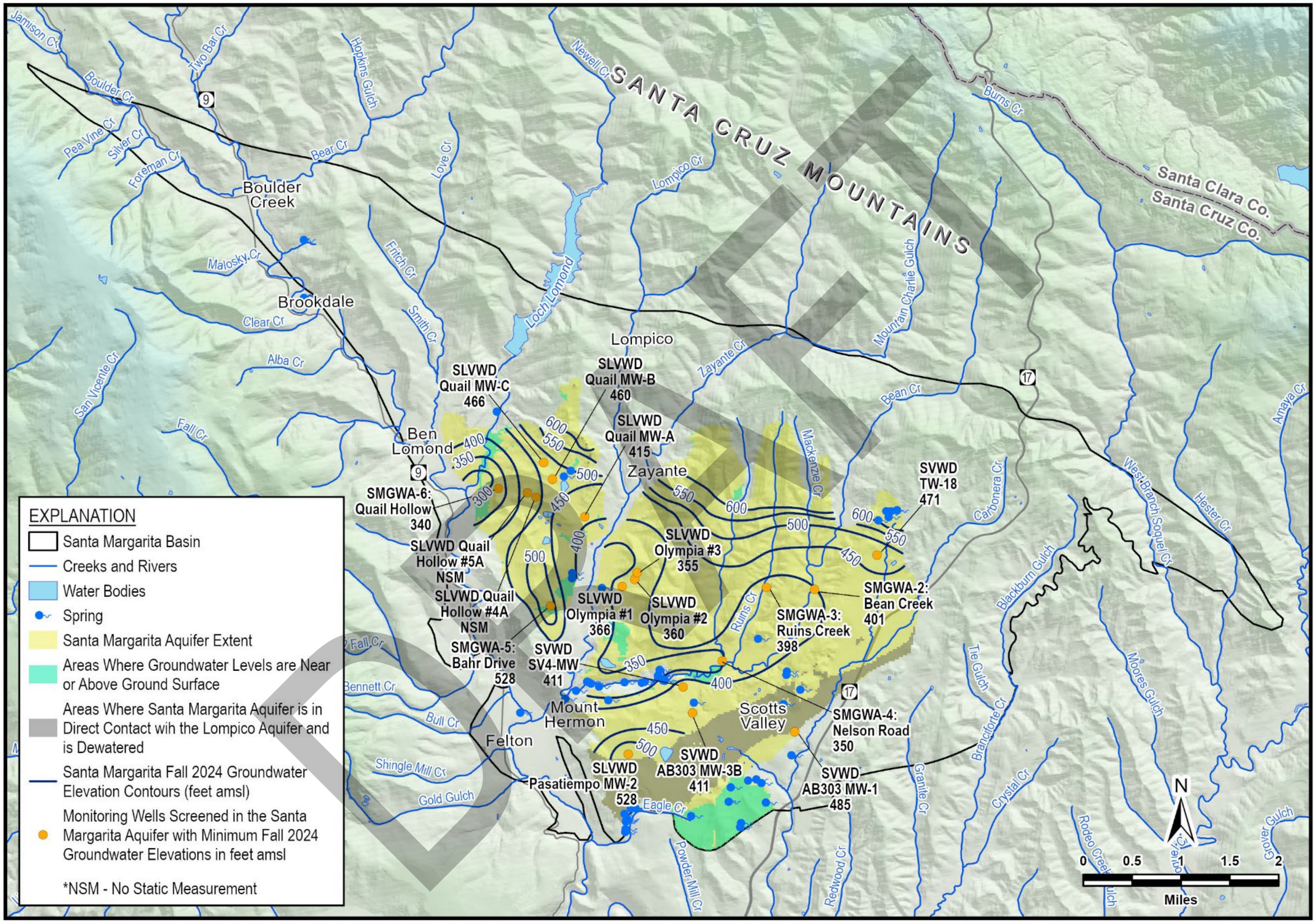

Figure 12. Santa Margarita Aquifer Groundwater Elevations and Contours, Fall 2024

2.6.2 Monterey Formation

The Monterey Formation is not considered a principal aquifer, even though it is used by some Basin residents who have low demands or no alternative water source. Only about 4% of groundwater extracted in the Basin is from the Monterey Formation. This fine-grained, relatively impermeable formation is present across much of the Basin and forms an important aquitard that separates the Santa Margarita and Lompico aquifers. Where the Monterey Formation is absent, the Santa Margarita aquifer may be dewatered due to percolation into the overdrafted Lompico aquifer directly below (Figure 2 and Figure 3). A Monterey Formation groundwater elevation contour map is not presented because it is not a principal aquifer in the Basin and there is very limited monitoring of it.

SVWD Well #9, an inactive extraction well, is the only long-term monitoring well in the Monterey Formation. By the early 1990s, the groundwater elevation in the well had fallen 200 feet from pre-1980 levels due to the combination of less-than-average precipitation and increased groundwater extraction in the overlying Santa Margarita aquifer and underlying Lompico aquifer. Groundwater extraction in the area decreased during the 1990s, and, as a result, groundwater elevations in the Monterey Formation have risen by about 54 feet since 1998. Nevertheless, the groundwater elevation in SVWD Well #9 is still approximately 135 feet below the 1980 elevation (Appendix A, page A-9) because recharge is inhibited by the low permeability of the formation. SVWD Well #9's groundwater elevation rose 4 feet in in WY2024.

In WY2023, SMGWA installed 2 new monitoring wells in areas where domestic well users rely exclusively on extractions of water from the Monterey Formation. These additions to the monitoring network fill data gaps in areas with no historical groundwater monitoring and will be used to collect data needed to evaluate potential interconnection with streams. SMGWA-7 lies toward the northwest limits of the Basin, close to Love Creek, whereas SMGWA-8 is located near the center of the Basin in the Randall Morgan Sandhills Preserve, adjacent to Bean Creek. SMGWA-7 is an artesian well with a groundwater elevation above the land surface. SMGWA-8 groundwater elevation fluctuated seasonally by 3 feet in WY2024 (Appendix C, page C-17).

2.6.3 Lompico Aquifer

The Lompico Sandstone is found throughout most of the Basin, but outcrops only along the Basin margins and in a few locations along the San Lorenzo River. The semi-confined Lompico aquifer is the primary aquifer tapped by SVWD, SLVWD, and MHA supply wells in the area south and east of Bean Creek, and accounts for approximately 54% of total groundwater extracted in the Basin (see Section 2.3). The Lompico aquifer is also an important source of baseflow to the San Lorenzo River in the few areas where it outcrops in or near the river. There is little extraction from the Lompico aquifer north of Bean Creek because it is much deeper there than south of Bean Creek; for the same reason there are no historical or current Lompico aquifer groundwater level monitoring wells north of Bean Creek.

Historical overpumping of the Lompico aquifer near Mount Hermon, Pasatiempo, and South Scotts Valley in the 1980s and 1990s caused groundwater levels to decline up to 200 feet (see SVWD Well #10's hydrograph in Appendix A, page A-13). This lowering trend was reversed starting in the early 2000s; by 2005, groundwater levels in the Lompico aquifer stabilized, and since 2015 have risen in the South Scotts Valley area (see SLVWD Pasatiempo #7's hydrograph in Appendix C, page C-25).

Groundwater elevations in the Lompico aquifer fluctuate little seasonally, with most wells having less than 5 feet of groundwater level decline between spring and fall, except for those close to active extraction wells. Groundwater elevation contour maps for the Lompico aquifer are shown on Figure 13 and Figure 14 for WY2024 spring and fall, respectively.

The highest groundwater elevations in the Lompico aquifer occur at the northern boundary of the Basin, where the Lompico Sandstone is exposed at the surface in a narrow strip parallel to the Zayante-Vergeles fault. This is the only area where the Lompico aquifer is recharged directly by percolation of precipitation or streamflow; elsewhere it is largely covered by younger geologic units that prevent direct recharge. The Lompico Sandstone is also exposed in small areas along the San Lorenzo River near Felton and further upstream near the communities of Ben Lomond and Boulder Creek. These areas are located downgradient, so the Lompico aquifer is a source of groundwater discharge that contributes to San Lorenzo River baseflow.

Groundwater flow in the southern portion of the Lompico aquifer is primarily controlled by municipal extraction in the South Scotts Valley area by SVWD and in the Mount Hermon/Pasatiempo area by SLVWD and MHA. Extraction in these areas has formed localized depressions in groundwater levels.

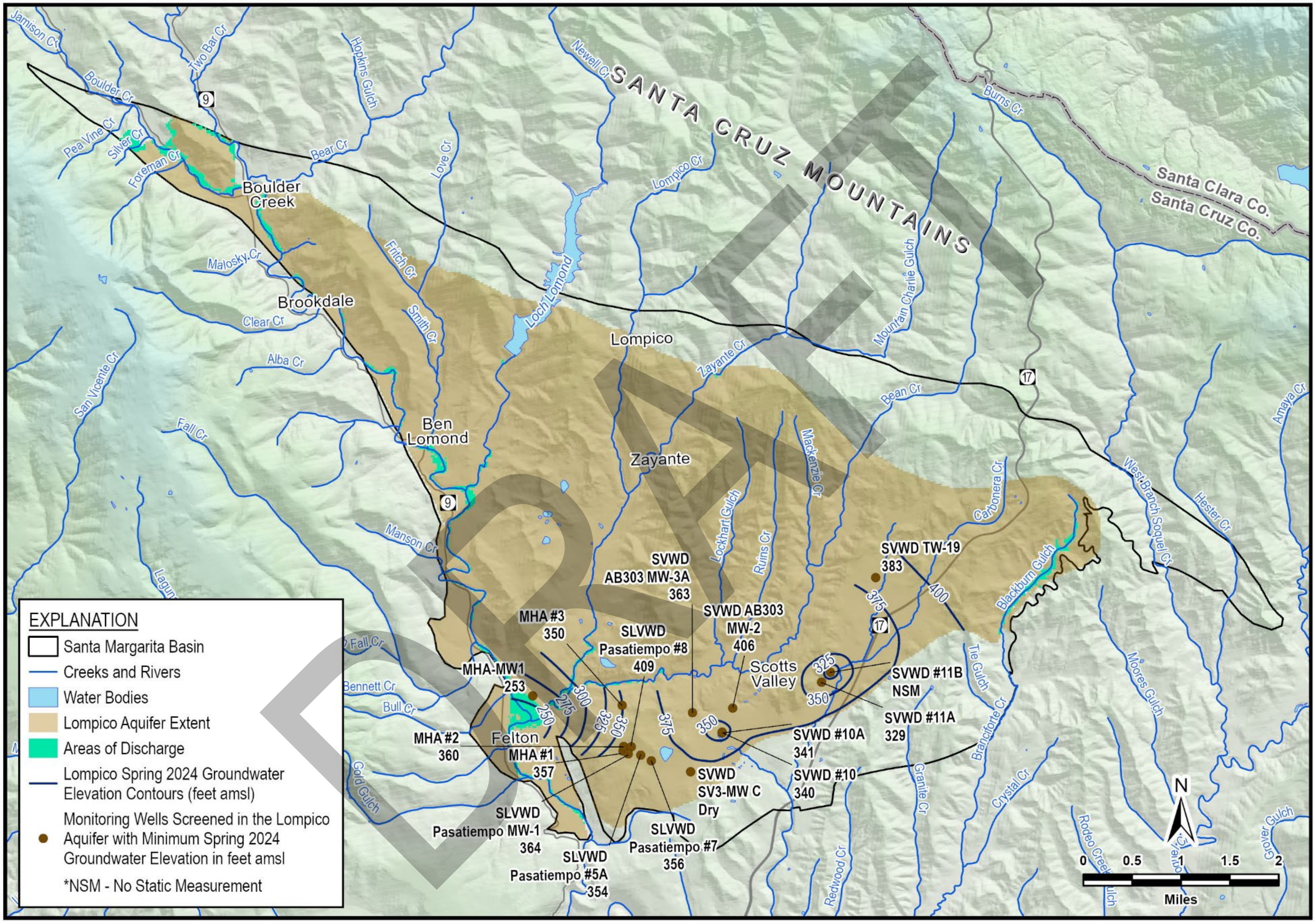

Figure 13. Lompico Aquifer Groundwater Elevations and Contours, Spring 2024

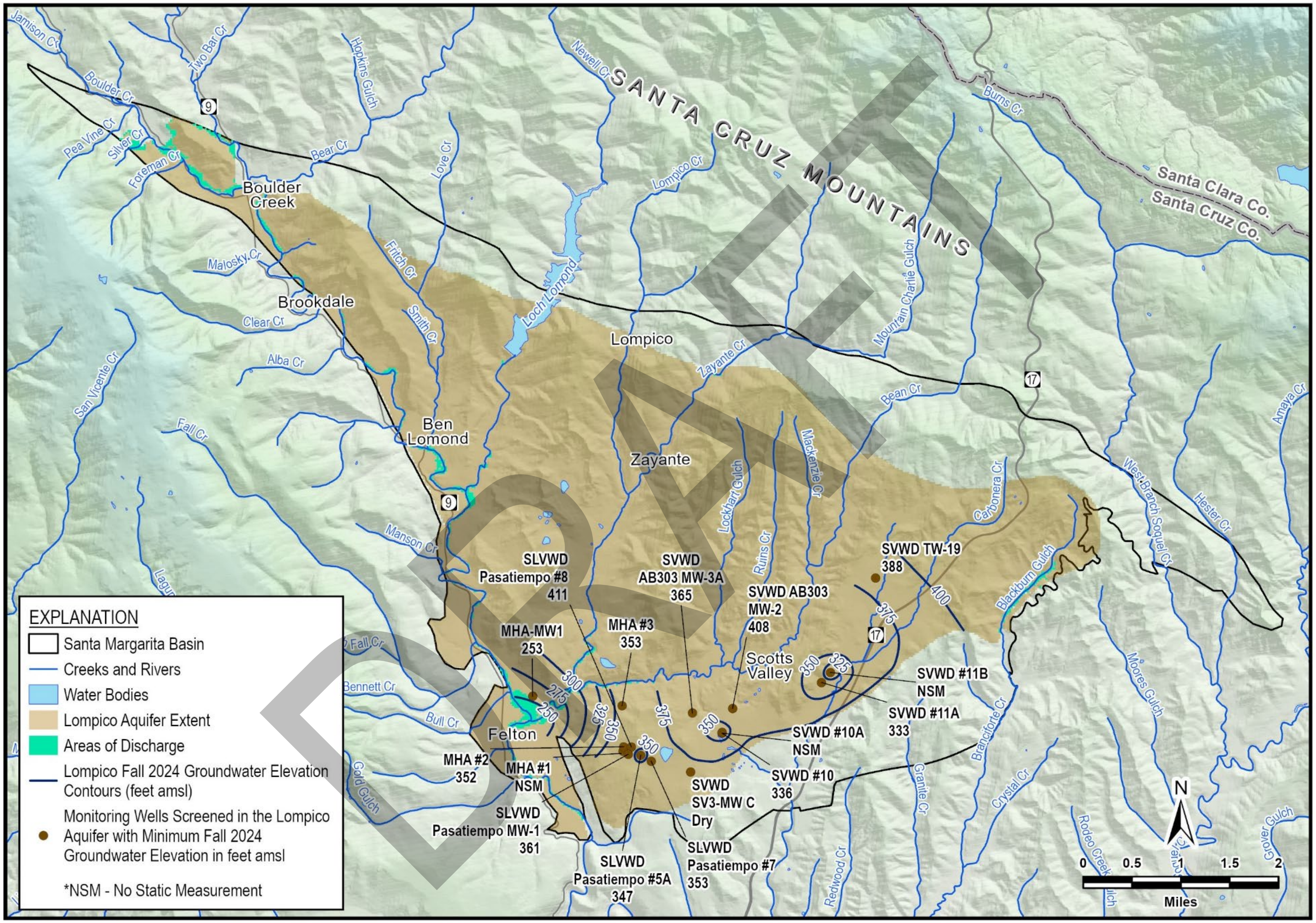

Figure 14. Lompico Aquifer Groundwater Elevations and Contours, Fall 2024

2.6.4 Butano Aquifer

The stratigraphically oldest of the 3 principal aquifers, the Butano Sandstone is also the deepest, except where it outcrops in the northern limb of the Scotts Valley syncline along the northern Basin boundary. SVWD has 2 deep supply wells in the northeast portion of its service area that extract groundwater from both the Lompico and Butano aquifers. The Butano aquifer accounts for about 15% of groundwater extracted from the Basin (see Section 2.3).

Due to its great depth, there are currently only 2 dedicated monitoring wells solely in the Butano aquifer: SVWD Canham and SVWD Stonewood. Originally drilled as exploratory wells in search of additional water resources north of the SVWD service area, neither well encountered sizable groundwater resources so they were converted to monitoring wells. The SVWD Stonewood well is located where the Butano aquifer outcrops near the Basin's northern boundary; the Canham well lies further south (Figure 15). Groundwater elevations over time in the dedicated Butano aquifer monitoring wells are stable (Appendix A, pages A-17 and A-18).

There have historically been 3 SVWD wells in the northeastern portion of the SVWD service area that are screened in both the Lompico and Butano aquifers: the extraction wells SVWD Orchard and SVWD #3B and monitoring well SVWD #15. SVWD #3B was destroyed in February 2024, prior to drilling its replacement (Sucinto Well) in the same area. Due to extraction from the Lompico/Butano supply wells, these 3 wells show more seasonal fluctuations in groundwater levels than the dedicated Butano wells located upgradient from the municipal supply wells (Appendix A, page A-16 and Appendix C, page C-31). Long-term groundwater elevations in the Lompico/Butano wells have been relatively stable since the early 2000s, as is the case for many of the wells screened exclusively in the Lompico aquifer.

Groundwater elevation contour maps for the Butano Aquifer for WY2024 spring and fall are shown on Figure 15 and Figure 16, respectively. Due to continuous pumping at SVWD Orchard well for much of WY2024, static groundwater level measurements in spring and fall were not obtained. Groundwater flow in the Butano aquifer is generally north to south, mimicking the topography from the aquifer's higher elevation recharge area at the Basin's northern boundary toward the lower elevations of Scotts Valley.

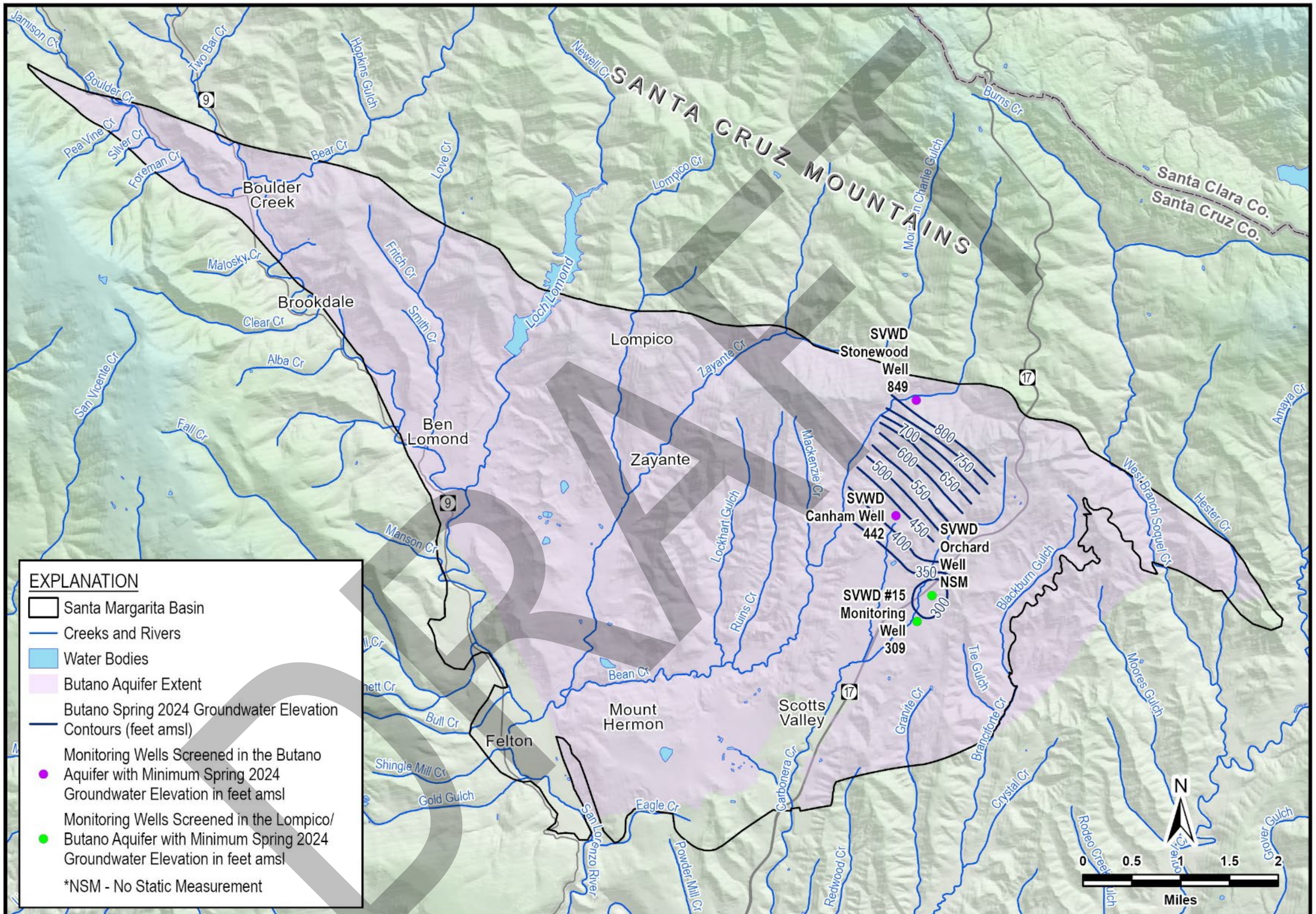

Figure 15. Butano Aquifer Groundwater Elevations and Contours, Spring 2024

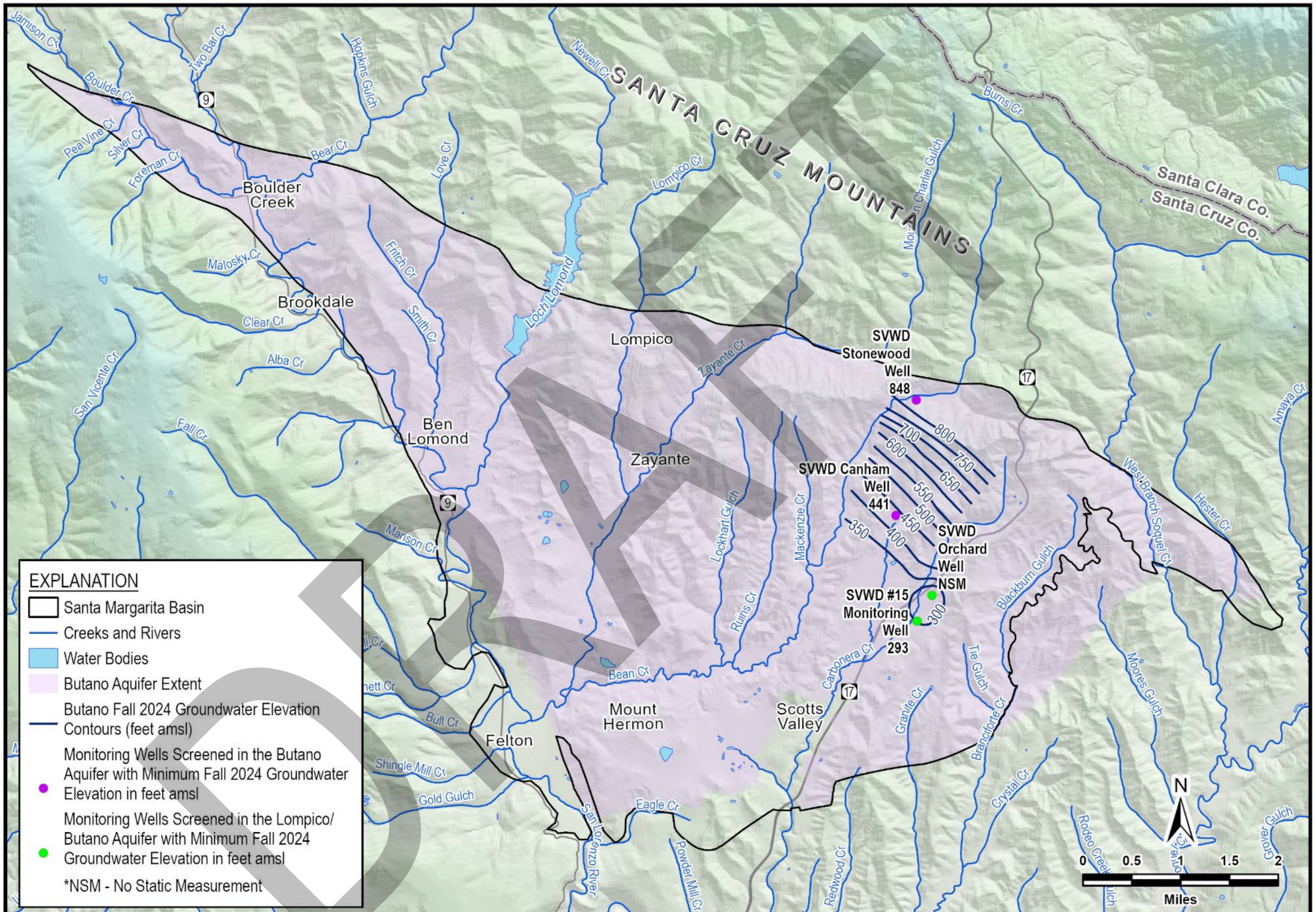

Figure 16. Butano Aquifer Groundwater Elevations and Contours, Fall 2024

2.7 Change in Groundwater in Storage

The change of groundwater in storage is estimated annually using the Basin Model. The Basin Model was updated with WY2024 climate and groundwater extraction data and improved by updating to the most recent numerical code. The WY2024 updates and improvements included the following:

- Monthly precipitation and temperature data from the Parameter-elevation Regressions on Independent Slopes Model[1] (PRISM) were used to update precipitation, evapotranspiration, recharge, runoff, and streamflow
- Extraction volumes provided by SLVWD, SVWD, and MHA
- Extraction volumes by small water systems as reported to the County
- Updated the numerical code to the most recent version of MODFLOW 6 (from 6.1 to 6.5)

Basin Model parameters assumed to have remained constant at the 2018 baseline levels estimated in the GSP are septic system return flows and groundwater extractions for private domestic use, quarries, and irrigation. Parameters such as surface water and groundwater interactions, stream stage, and groundwater elevations are simulated by the Basin Model.

2.7.1 WY2024 Change in Groundwater in Storage for the Santa Margarita Basin

Groundwater in storage was generally stable in all aquifers and formations in WY2024. The model calculated a net decrease of 260 AF of groundwater storage in the Basin. Figure 17 shows the annual and cumulative change of groundwater in storage and groundwater extraction from WY1985 through WY2024.

The calculated groundwater storage was close to being in balance in WY2024, with groundwater inflow essentially being equal to consumptive use and outflow. Very little change in storage occurred in WY2024 for several reasons, including: 1) normal climate following a cycle of high variability well below and above average water years; 2) the lowest total groundwater extraction for the Basin from 1985, the period of record; 3) continued water use efficiency; and 4) implementation of conjunctive use practices by SLVWD. Figure 17 shows that groundwater in storage is estimated to have decreased since 1985 by about 34,000 AF or an average of 850 AF/yr over 40 years. However, since peak Basin water use in 2001, the decline in groundwater in storage has slowed to an average of less than 300 AF/yr, with a cumulative decrease in storage in the past 23 years of only 6,820 AF. This improvement occurred despite the known statewide precipitation deficit over the past 2 decades, indicating progress toward reaching sustainability in the Basin.

[1] https://prism.oregonstate.edu/

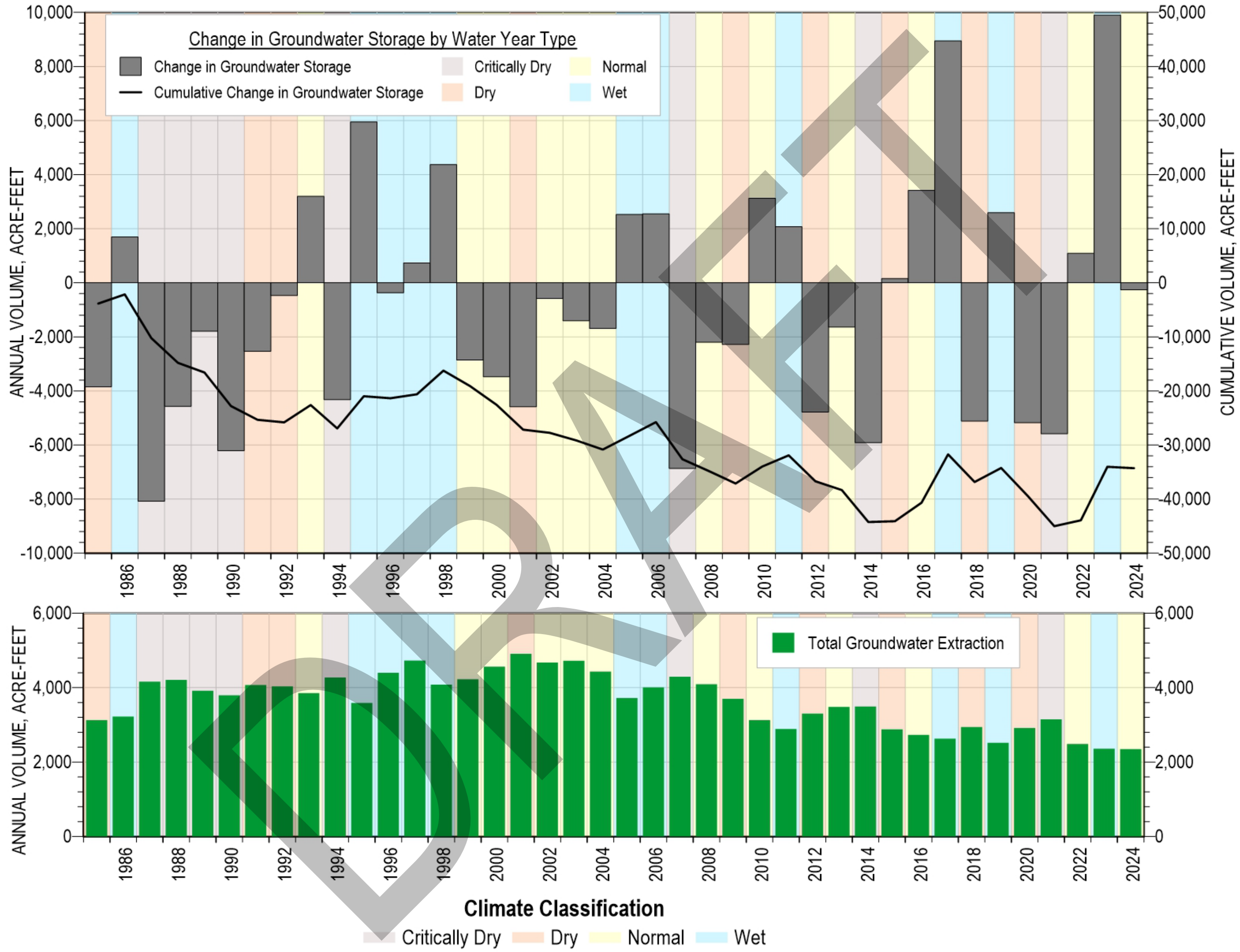

Figure 17. Annual Change in Groundwater in Storage for the Santa Margarita Basin, WY1985-2024

2.7.2 WY2024 Change in Groundwater in Storage for the Three Principal Aquifers and the Monterey Formation

The volume of groundwater stored in the unconfined and highly conductive Santa Margarita aquifer is strongly correlated with precipitation. Groundwater levels and groundwater storage in this aquifer decrease during dry years but rise quickly during wet years. The low permeability of the Monterey Formation prevents rapid changes due to climate, despite significant surface exposure. The Lompico and Butano aquifers are semi-confined and thus annual changes in storage are less pronounced and are more associated with groundwater extraction than precipitation. Direct recharge from precipitation occurs in all aquifers where they are exposed at the ground surface (Figure 2), particularly near streams.

Net groundwater in storage decreased 260 AF in WY2024. There was overall balance in all aquifers, particularly compared to change of storage values in recent years that often sum to thousands of AF (Figure 17). The Santa Margarita aquifer experienced a decrease of 450 AF; this aquifer is the most influenced by precipitation in the Basin, and WY2024 precipitation was slightly below average. Another factor likely influencing the Santa Margarita aquifer change in storage could be that the aquifer continued to discharge to creeks following the very high recharge that occurred in WY2023. This is supported by the observed above average surface water flow as noted in Section 2.2 of this report. The mostly non-productive Monterey Formation storage increased by 90 AF. The deeper Lompico and Butano aquifers also remained relatively balanced as total pumping volumes were similar to last year. The Lompico aquifer storage increased 160 AF, while the Butano decreased by 60 AF. The calculated changes in storage volumes for the 3 principal aquifers plus the Monterey Formation are summarized in Table 4.

Table 4. WY2024 Modeled Change in Groundwater in Storage by Aquifer/Formation

Change in Storage (AF)	Santa Margarita	Monterey	Lompico	Butano	TOTAL
WY2024	-450	90	160	-60	-260

Maps of modeled changes in groundwater in storage between fall WY2023 and fall WY2024 show where changes in storage occurred in the Basin. Maps are shown for the Santa Margarita aquifer (Figure 18), Monterey Formation (Figure 19), Lompico aquifer (Figure 20), and Butano aquifer (Figure 21). The change in storage values of acre-feet per acre shown on the maps are the change in storage per model cell divided by the cell size (110 feet x 110 feet converted to acres). The maps show the relative differences in change in storage across the Basin for WY2024 using the following color coding:

- Green – Between 1 and 2 AF/acre increase in storage
- Yellow – Between 0 and 1 AF/acre increase in storage
- Orange – Between 0 and 0.1 AF/acre decrease in storage
- Red – Between 0.1 and 4.3 AF/acre decrease in storage

In viewing these maps it is important to keep in mind that they are products of calculations using the Basin Model, not measured values. The accuracy of the contour maps depends on the number of data points and the degree to which the Basin Model is calibrated for a particular aquifer. Given that there are few monitoring wells in the Monterey Formation and the Butano aquifer, the model is not well-calibrated for these aquifers. There are more monitoring locations in the Lompico and Santa Margarita aquifers, but there are still large areas of the Basin where there are no wells to calibrate the Lompico and Santa Margarita aquifers in the model. In addition, results for all aquifers are dependent on model inputs, such that small, calculated differences should be regarded with some skepticism in the absence of sensitivity analyses that test how the results of model simulations change if small changes in input parameters (such as hydraulic conductivity) are implemented. Nonetheless, models have value in providing calculated values over broad areas where direct measurements of groundwater levels are not available. Their best use is spatially tracking relative (not absolute) changes in groundwater in storage from year to year as an indicator of whether the Basin is on track to sustainability.

The Santa Margarita aquifer had a net decrease in groundwater in storage in WY2024 (Figure 18). When viewed spatially, the fringes of the aquifer lost storage volume (orange and red colors) and the center of the aquifer gained storage volume (yellow and green colors). Groundwater in storage increased around SLVWD Quail Hollow but decreased around the Olympia wellfield. Scattered areas where the aquifer is used by small water systems, quarry, and private domestic users mostly show modest increases in storage.

The Monterey Formation has low permeability; therefore, changes in storage are smaller on an annual basis than the overlying Santa Margarita aquifer. The Monterey Formation groundwater in storage increased slightly overall in WY2024. When viewed spatially (Figure 19), the areas where groundwater levels increased (yellow colors) were overlain by the areas where groundwater in storage also increased in the Santa Margarita aquifer. The areas where groundwater in storage decreased (orange and red colors) are either overlain by areas where the Santa Margarita aquifer storage decreased or are in areas around the perimeter of the Basin where the Monterey Formation is exposed at the surface.

The mostly confined Lompico and Butano aquifers are less subject to storage changes in response to climate than the Santa Margarita aquifer and Monterey Formation due to their limited exposure at the surface, which restricts direct recharge. Instead, annual fluctuations in groundwater in storage are influenced mainly by groundwater extraction. The areas where Basin Model simulations typically show the most change in storage between water years is where these units are exposed in narrow strips along the northern and western boundary of the Basin.

Most of the Lompico and Butano aquifers demonstrate slight increase in storage in WY2024 (yellow colors on Figure 20 and on Figure 21). Storage increased in areas used for municipal supply in the Lompico aquifer around SLVWD's Pasatiempo wellfield, SVWD's Well #10A in southern Scotts Valley and in both Lompico and Butano aquifers in SVWD's Orchard well in northern Scotts Valley. Decreases in storage (orange and red colors) were most significant around the fringes of the Basin where the aquifer is exposed at the land surface, which is consistent with the below average precipitation observed in WY2024. These aquifers are also used as sources for private domestic pumping in the northern part of the Basin where storage decrease is noted in WY2024.

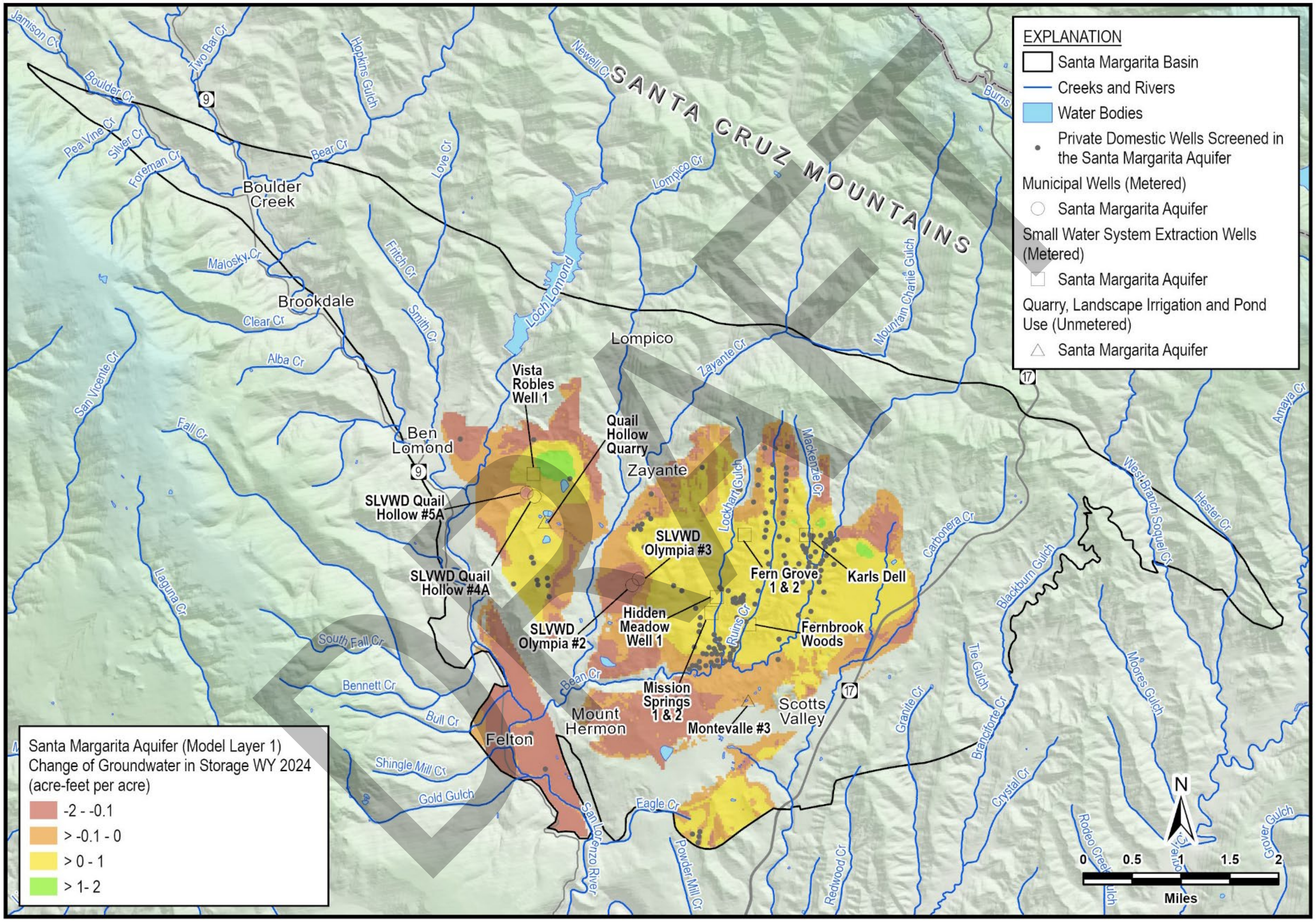

Figure 18. Change of Groundwater in Storage in Santa Margarita Aquifer, WY2024

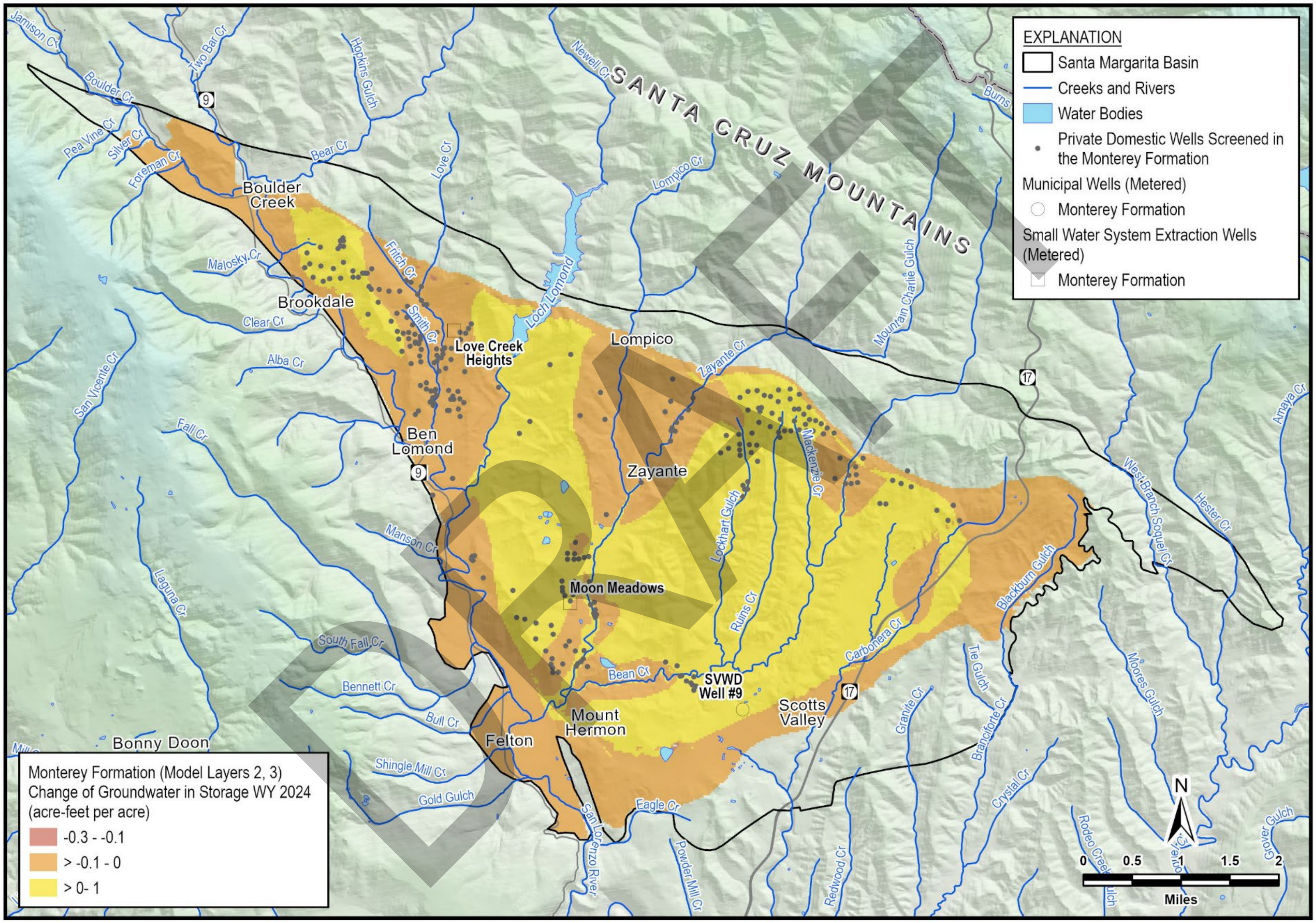

Figure 19. Change of Groundwater in Storage in Monterey Formation, WY2024

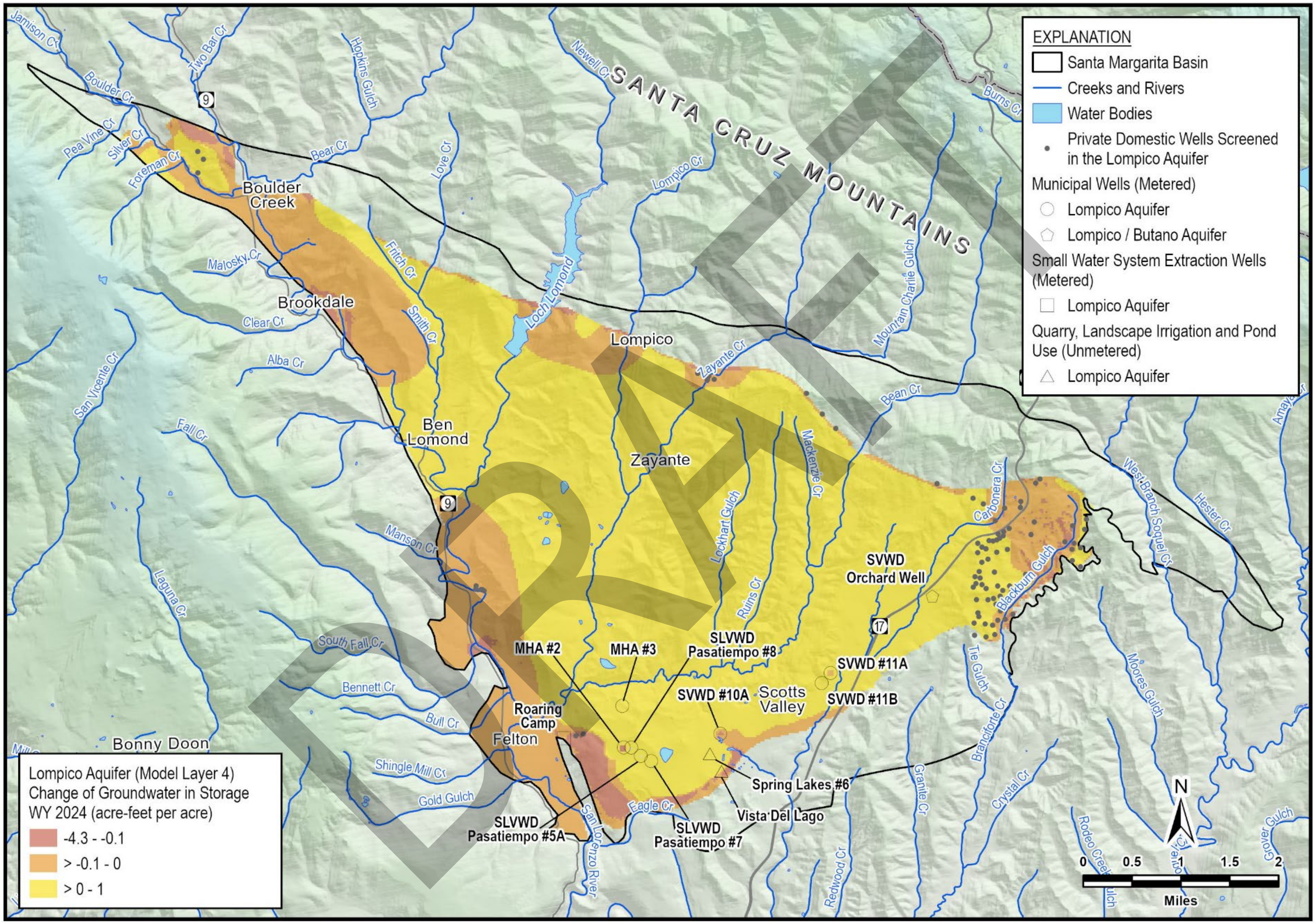

Figure 20. Change of Groundwater in Storage in Lompico Aquifer, WY2024

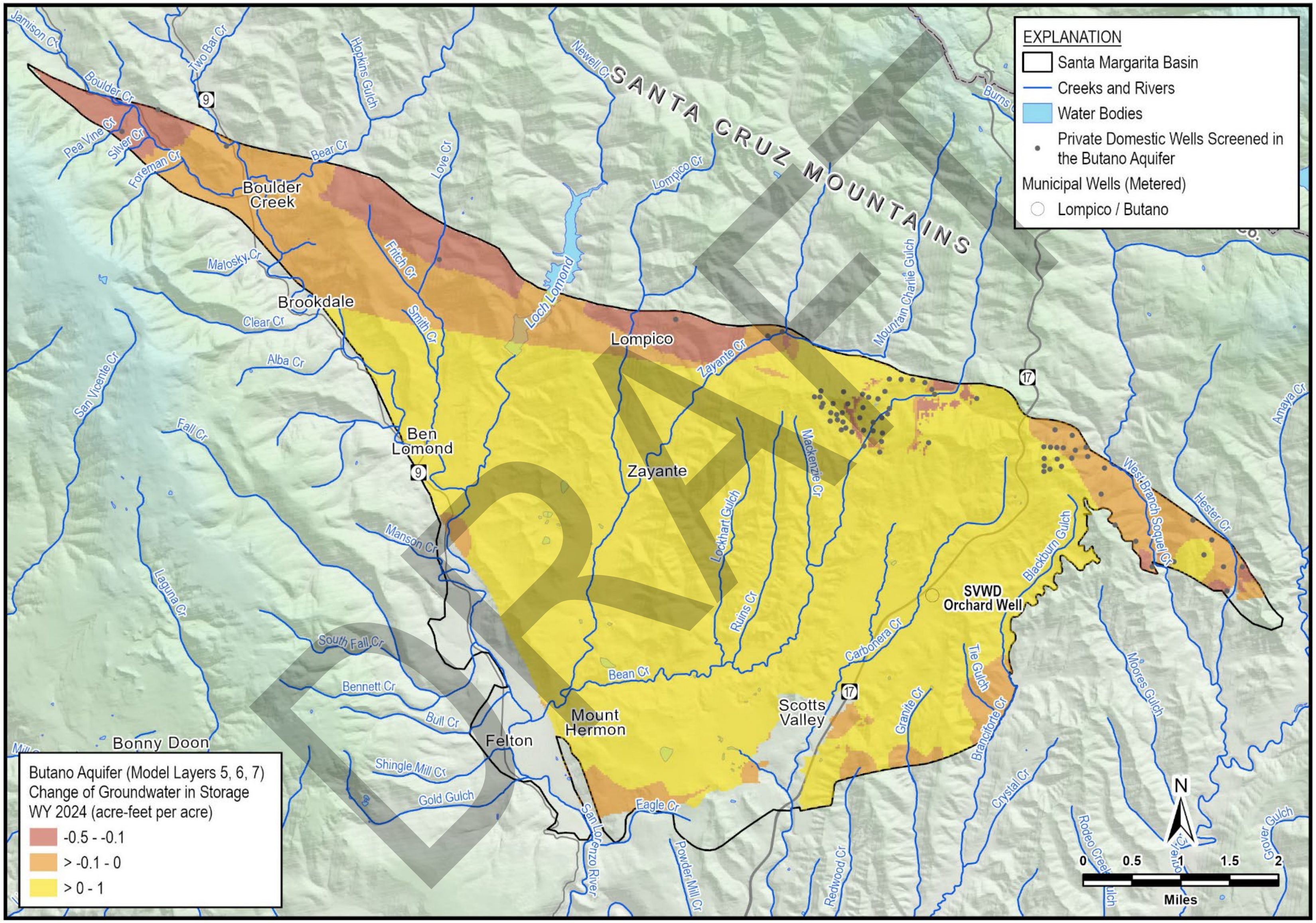

Figure 21. Change of Groundwater in Storage in Butano Aquifer, WY2024

3 PROGRESS TOWARD IMPLEMENTING THE GSP

This section provides an update on the progress made in WY2024 on GSP implementation activities. The following sections summarize: (1) progress on projects and management actions as the primary activities for long-term sustainability in the Basin; (2) other GSP implementation activities; and (3) the status of addressing corrective actions from the DWR GSP approval determination.

3.1 Projects and Management Actions Overview

The Basin GSP identified 3 groups of projects and management actions based on the following classifications:

- Group 1 – projects and management actions that were being implemented prior to adoption of the GSP
- Group 2 – projects and management actions that have not been implemented yet, but are the most likely options to be pursued during GSP implementation. Group 2 is further classified into 3 tiers based on:
  - Projects that rely on existing water sources from within the Basin (Tier 1)
  - Projects that rely on existing sources from outside the Basin (Tier 2)
  - Projects that rely on purified wastewater (Tier 3)
- Group 3 – additional conceptual projects and management actions that may be evaluated in the future if Group 1 and 2 projects are not feasible or do not achieve sustainability.

Implementation of Group 1 and Group 2, Tier 1 projects are expected to result in meeting Basin SMC based on modeled simulations during GSP development. Group 3 will be evaluated as necessary and discussed in future annual reports or the 5-year GSP periodic evaluation, but they are not discussed further in this WY2024 Annual Report. The status of Group 1 and Group 2 projects and management actions are described further below.

3.1.1 Existing Projects and Management Actions (Group 1)

This section summarizes the existing projects and management actions already being implemented in the Basin.

3.1.1.1 Water Use Efficiency

While Water Use Efficiency is characterized as a Group 1 and a Group 2, Tier 1 project in the Basin GSP, its discussion is combined into a single update for the Annual Report. SLVWD and SVWD continued to implement water efficiency programs focused on outreach, education, customer rebates, and water system improvements.

Both SLVWD and SVWD maintain an active social media outreach campaign for customers by posting seasonally appropriate water efficiency tips on a nearly weekly basis on Facebook, Instagram, and Nextdoor. SLVWD also uses the X (twitter.com) platform. Both agencies also provide an opportunity for customers to better educate themselves about their water use. SVWD provides the WaterSmart platform and SLVWD offers the Eye on Water platform for customers to get detailed information about their water use; SVWD has 3,011 current customers signed up and SLVWD has 845 customers signed up.

SLVWD and SVWD continued to offer rebates to encourage customer improvements to increase water use efficiency. In WY2024, SLVWD issued 14 clothes washer rebates and 19 toilet rebates, resulting in an estimated savings of 0.73 AF/yr [or 238,900 gallons per year (GPY)]. SVWD issued 10 rebates for turf replacement resulting in an estimated 0.87 AF/yr (284,432 GPY) savings, and additional 26 rebates for toilet and smart irrigation controller replacements saving an additional 0.10 AF/yr (31,807 GPY) for a total of 0.97 AF/yr (316,239 GPY). The volume of savings will continue to accrue throughout WY2025.

While outreach, education, and rebate programs increase awareness and efficiency on the customer side, SLWVD and SVWD also focus on improving efficiency within their respective distribution systems through upgrades to metering infrastructure, reduction of non-revenue water, and evaluation of system pressure. New metering infrastructure allows for increased accuracy, leak detection, and improved customer accountability. In 2016, SLVWD began deploying a multi-year system-wide meter change-out program which has upgraded 45% of meters through WY2024. SLVWD received a grant in 2024 to upgrade an additional 440 of its meters in 2025. In WY2025 and WY2026, SLVWD is planning to replace the following storage tanks that will result in reducing water system losses and protect the system from outages due to potential fires:

- Redwood Park Tank: Two 10,000-gallon redwood tanks with a 120,000-gallon fire-resistant steel tank
- Highland Tank: One 60,000-gallon redwood tank with a 120,000-gallon fire-resistant steel tank
- Felton Heights Tank: One 10,000-gallon redwood tank with a 120,000-gallon fire-resistant steel tank

- South Tanks (4): Four 10,000-gallon temporary polyethylene tanks with a 120,000-gallon fire-resistant steel tank

3.1.1.2 SVWD Low Impact Development (LID) Projects

SVWD monitors 3 LID facilities that were constructed prior to the passage of SGMA. Stormwater captured in WY2023 at the 3 LID facilities measured 28.39 AF. In WY2024, the facilities are expected to continue operations. While the amount of recharge in W2025 will be related to the amount and timing of precipitation encountered, it is reasonable to estimate about 26 AF of recharge, the average for WY2018 through WY2024, as shown in Table 2 in Section 2.5.

In addition to the existing LID facilities, SVWD received a 2022 Urban Community Drought Relief grant to expand the Transit Center LID project to contribute approximately 7 AF/yr of additional stormwater recharge to the Santa Margarita aquifer. In WY2023, the SVWD hired a contractor to update project design and environmental documentation. In WY2024, the project went out to bid and began construction. The project is expected to be operational in WY2025.

3.1.1.3 SVWD Recycled Water Program

The SVWD Recycled Water Program is a cooperative effort between SVWD and the City of Scotts Valley. Recycled water is produced at the City of Scotts Valley Tertiary Wastewater Treatment Plant, where it undergoes nitrate removal, ultra-violet disinfection, and chlorination. Recycled water is then distributed by SVWD to customers through a dedicated recycled water system. Recycled water is used mostly for landscape irrigation and to a lesser extent for dust control. SVWD continues to explore options to maximize the beneficial use of recycled water in the future.

Figure 22 shows recycled water use since it was made available to SVWD customers in 2002. SVWD distributed 149 AF of recycled water in WY2024, which was consistent with recycled water use in other normal years. In WY2025, the use of recycled water for non-potable uses will continue.

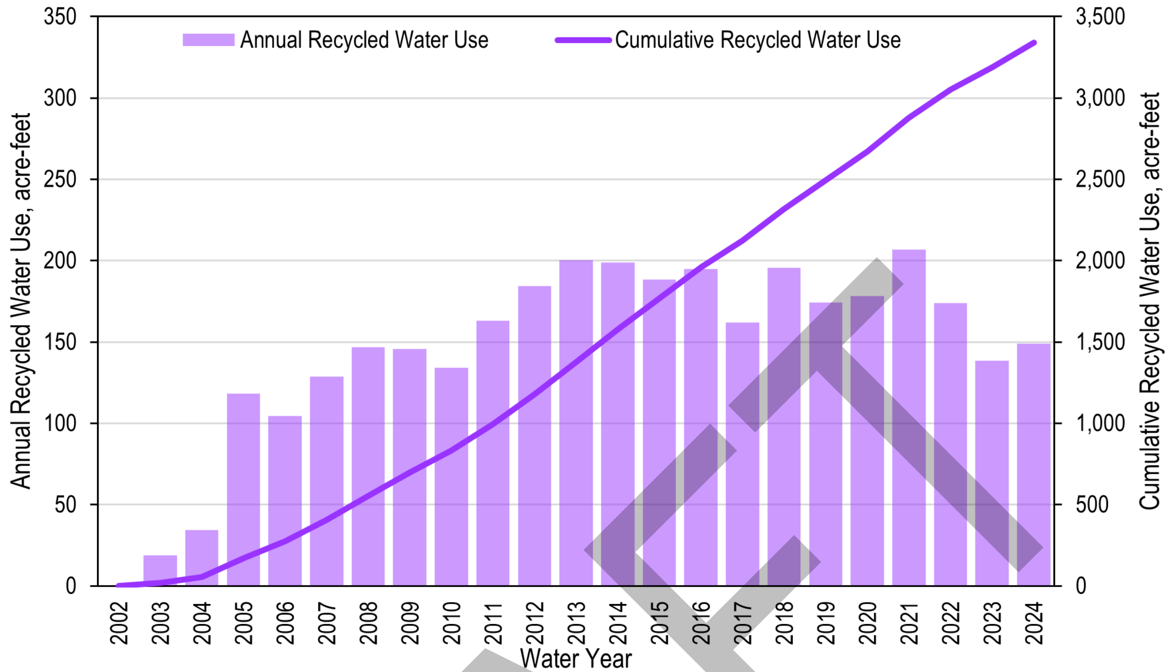

Figure 22. Recycled Water Use by SVWD Customers, WY2002-2024

3.1.1.4 SLVWD Conjunctive Use

The SLVWD owns, operates, and maintains 2 water systems that supply different water sources to distinct areas in the Basin: the San Lorenzo Valley System, made up of the connected North and South distribution systems, and the Felton System, which serves the community of Felton and surrounding areas in the southern portion of the Basin (Figure 23). The North System uses surface water and groundwater from the Quail Hollow and Olympia wellfields conjunctively, the South System uses groundwater extracted from wells in the Pasatiempo area, and the Felton System only uses surface water. The Felton System is connected to the San Lorenzo Valley System by an intertie that is only for emergency use. The intertie has been in use intermittently since 2020 due to the emergency conditions created by the extensive damage to the North System surface water infrastructure in the CZU wildfire.

A successful conjunctive use program has been implemented by SLVWD in their North System for decades. In the North System, the SLVWD optimizes the use of surface water and groundwater by utilizing stream flows while they are high and groundwater when stream flows are low. The conjunctive use of these sources has met annual water demands since 1984, without a substantial decline in groundwater levels. On average, the North System obtains 55% of its water supply from stream diversions and 45% from groundwater extraction. As normal conditions occurred in WY2024, SLVWD once again implemented its ongoing conjunctive use program in the North System, and emergency conjunctive use of the

Felton System instituted after the 2020 CZU fire. For the period, SLVWD used 60% surface water and 40% groundwater in the North System. As discussed in Section 2.4.1, this represents a conservative estimated benefit of conjunctive use in WY2024 of 50 AF of in-lieu groundwater recharge in the North System. In WY2024, 254 AF of surface water was transferred from the Felton system to the San Lorenzo Valley system. This surface water displaced an equivalent volume of water that would otherwise have to have been extracted from wells in the SLVWD system.

In WY2025, SLVWD will continue with its conjunctive use operations. The SLVWD will complete the Environmental Impact Report in support of its water rights petition to change place-of-use of surface water in the Felton system so that it can be used system-wide on a routine basis. This effort has been reignited by the obvious gains to the Basin from conjunctive use of Felton surface water supplies. The expected benefit of these operations for WY2025 cannot be determined until the conclusion of the water year because hydrology will be a significant component of operational decisions.

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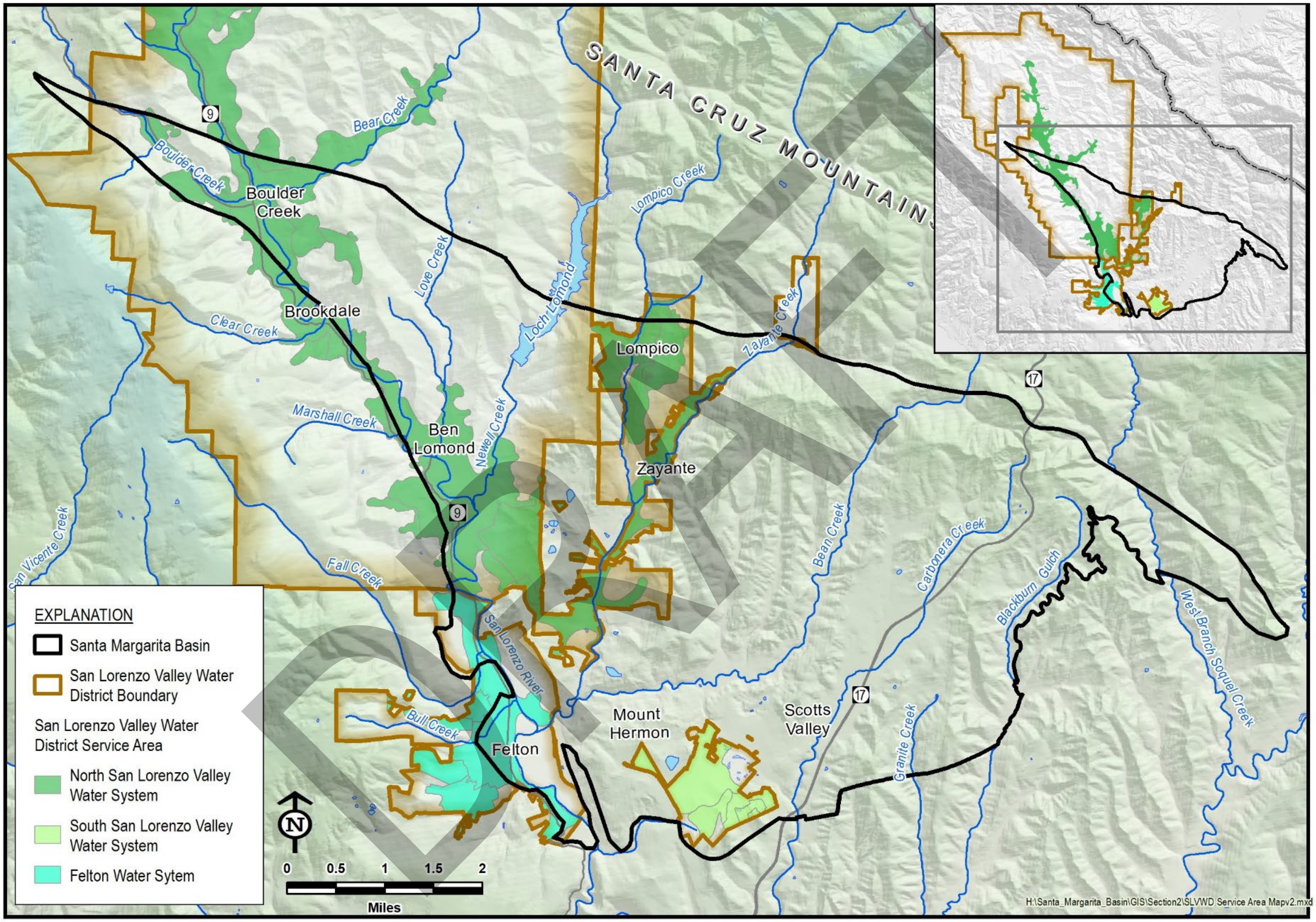

Figure 23. San Lorenzo Valley Water District Systems

3.1.2 Projects and Management Actions Using Existing Water Sources Within the Basin (Group 2, Tier 1)

Group 2, Tier 1 projects and management actions identified in the GSP focus on expansion of conjunctive use in the Basin using existing water sources within the Basin. The amount of surface water available for expanded conjunctive use is a function of factors such as annual precipitation, required minimum bypass flows for fish, the capacity of drinking water treatment facilities, and water rights restrictions on place-of-use.

Expanding SLVWD conjunctive use will involve 2 phases with different sources, conveyance infrastructure, and regulatory frameworks:

Phase 1 of Expanded Conjunctive Use: Surface water from existing diversion points in SLVWD's Felton and North Systems is available for expanded conjunctive use in the South System and can be conveyed with minimal modifications to existing infrastructure to other areas of the Basin where surface water is not currently used.

There is on average an estimated 227 AF/yr of additional surface water from SLVWD's North and Felton Systems available for expanded conjunctive use in the South System or other parts of the Basin. This estimated additional surface water amount would be refined with future analysis.

Phase 2 of Expanded Conjunctive Use: SLVWD's contractual allocation of 313 AF/yr of raw water from Loch Lomond reservoir is currently unused. This water could be available for conjunctive use in the Basin with improvements to water treatment and conveyance infrastructure, subject to completion of environmental compliance permitting and agreements with SCWD.

Expanded conjunctive use of water sources in the Basin requires modifications to SLVWD's water rights regarding place-of-use to allow SLVWD to use surface water from the Felton System throughout its service area, and to convey water to SVWD on a non-emergency basis. SLVWD submitted an Initial Study and Mitigated Negative Declaration in support of its water rights petition as part of the California Environmental Quality Act review in July 2021. In response to comments by SCWD, the State Water Resources Control Board, and the Department of Fish and Wildlife on the Mitigated Negative Declaration, SLVWD is currently undertaking an update to its engineering feasibility study. This study will focus on options for conjunctive use of its contracted 313 AF/yr allocation of Loch Lomond water, with projected completion of the report in Summer 2025. The report will include discussions with SCWD about purchasing an equivalent amount of treated water instead of treating raw Loch Lomond water. SLVWD and SCWD entered a formal agreement in 2021 to work collaboratively on reaching agreement on SLVWD's utilization of its Loch Lomond allocation and resolving water rights issues in the San Lorenzo River watershed.

3.1.3 Projects and Management Actions Using Surface Water Sources Outside the Basin (Group 2, Tier 2)

Group 2, Tier 2 projects rely on water sources from outside the Basin. While not specifically identified as needed to meet the Basin's SMC, they can help reduce uncertainty associated with unknown future climate conditions or can supplement Group 2, Tier 1 projects if they are not fully implemented as envisioned.

3.1.3.1 Water Transfer from Other Basins for Inter-District Conjunctive Use

Water transfer from sources outside of the Basin for inter-district conjunctive use is similar to the transfers described above, but they rely on importing of treated surface water during the wet season months to offset groundwater extraction demands. One current alternative in the planning stage is the use of treated surface water provided by SCWD from its San Lorenzo River and North Coast sources when additional surface water is available.

In WY2022, SVWD was awarded a 2021 Urban and Multibenefit Drought Relief grant for $9.5 million to implement a Regional Drought Resiliency Project. The project, anticipated to be completed by early 2026, includes the design and construction of 2 critical pieces of infrastructure to improve drought resiliency for SVWD and SCWD:

- A 12-inch-diameter, bi-directional, 1 million gallon per day intertie pipeline and pump station between the SCWD and SVWD distribution systems to facilitate transfers of water in droughts or other emergencies.
- A new extraction well in SVWD to replace aging wells, increase extraction capacity, strengthen SVWD's ability to provide redundancy and meet potential increased demand, and to supply water to neighboring agencies in drought conditions.

Together, the 2 new infrastructure elements create an opportunity to increase groundwater stored in the Basin for beneficial use. In WY2024, design was completed and an agreement with a contractor was approved for the construction of the pipeline component. Construction of the pipeline, associated pump station, and the extraction well is expected to be completed by the end of 2025. SVWD and SCWD are also working on an Operational Agreement for the project.

3.1.3.2 Aquifer Storage & Recovery Project in Scotts Valley Area of the Basin

A potential project identified in the Basin GSP would store treated surface water from SCWD's San Lorenzo River and North Coast sources as groundwater in the Basin for drought supply. Recharge of the surface water into the Basin would be achieved through the use of aquifer storage and recovery (ASR) wells in the area of Scotts Valley where groundwater levels in the Lompico aquifer have been lowered and there is the most storage capacity. The project is still in the conceptual phase and would need further study to determine its feasibility in the Basin. There were no additional studies on the use of ASR in the Basin in WY2024, and there are no current plans for study in WY2025. However, continued pilot ASR testing by SCWD in the neighboring Santa Cruz Mid-County Groundwater Basin could help inform the design of future ASR feasibility and pilot studies in the Basin.

3.1.4 Projects Using Purified Wastewater Sources (Group 2, Tier 3)

There are several potential project alternatives included in the GSP that would use purified wastewater to supplement water supplies in the Basin. SVWD and SCWD have both completed initial feasibility studies of projects involving injection and storage of purified wastewater prior to WY2022. No additional investigations were advanced on this topic in WY2024. During WY2025, SVWD will track progress on development of the Pure Water Soquel Project in the neighboring Santa Cruz Mid-County Groundwater Basin as a potential future source of purified wastewater.

3.2 Other GSP Implementation Activities

While most projects and management actions are being developed and implemented by member agencies and other agencies represented on the SMGWA Board, other GSP implementation activities are led by SMGWA. As described below, these include pursuing funding sources for GSP implementation, improvements to the monitoring network to address data gaps identified in the GSP, and continued stakeholder outreach and public participation.

3.2.1 GSP Implementation Funding Sources

In WY2025, SMGWA anticipates investigating potential mechanisms to generate local funds for SGMA compliance activities such as conducting the administrative functions of SMGWA, outreach, monitoring, and reporting. While implementation of projects and management actions are funded directly by the ratepayers of the members and participating agencies, the general costs of SGMA compliance remain a challenge for a small basin like the Santa Margarita. These costs are currently borne by agencies represented on the Board of Directors, with the 2 largest water districts operating in the Basin providing the majority of the funds. In

WY2025, representatives of the Basin intend to continue to educate state representatives of this undue burden and explore ways to reduce these expenses or increase funding from the grant sources.

3.2.2 Update on Improvement of Monitoring Network

SMGWA made progress in WY2024 toward filling monitoring data gaps identified in the Basin GSP. This section describes improvements to the GSP monitoring network made in WY2024 and planned activities for the near future.

3.2.2.1 Groundwater Level Monitoring Improvements

The Basin GSP identified 9 areas where groundwater is extracted, but no historical or current monitoring wells exist. To eliminate this monitoring data gap, the GSP recommended the following:

- Install wells in the Santa Margarita aquifer and Monterey Formation near communities with many private domestic wells but no groundwater level monitoring. Some of these well locations should also be used to assess interconnection between shallow groundwater and surface water and to evaluate whether groundwater extraction is causing depletion of surface water.
- Install 1 Butano aquifer monitoring well where SVWD extraction wells are screened across both the Lompico and Butano aquifers and no dedicated Butano monitoring well exists.

Sites for 9 new monitoring wells were selected in WY2021, shortly after the Basin GSP was submitted. In WY2022, SMGWA acquired site access, developed well installation technical specifications, prepared public bid documents, and coordinated well permits for 8 of the sites. A monitoring well location in the Monterey Formation in the northern portion of the Basin in the Weston Road area identified in the GSP could not be found due to a lack of County right of way locations. In WY2023, SMGWA installed 7 monitoring wells in the Santa Margarita aquifer and Monterey Formation.

During WY2024, SMGWA installed dataloggers in the 7 newly constructed monitoring wells. The installation of these shallow monitoring wells and their dataloggers was funded using remaining Proposition 68 grant funds from DWR and SMGWA contributions. The monitoring well locations are shown on Figure 24 (labeled as SMGWA-2 through SMGWA-8 on the map). In WY2024, the new well locations were added to the DWR SGMA Portal. Also in WY2024, the County of Santa Cruz identified a private domestic well owner in the Weston

Road area that will allow County staff to collect semi-annual groundwater level measurements to fill that data gap.

The planned deeper Butano aquifer monitoring well (SMGWA-1 on the map) will be installed on a different timeline. This well will be much more expensive than the other wells because it is substantially deeper. On September 26, 2023, SMGWA requested direct assistance from the DWR Technical Support Services program to install the Butano monitoring well. In WY2025, SMGWA will continue to check with DWR on the status of this direct assistance request.

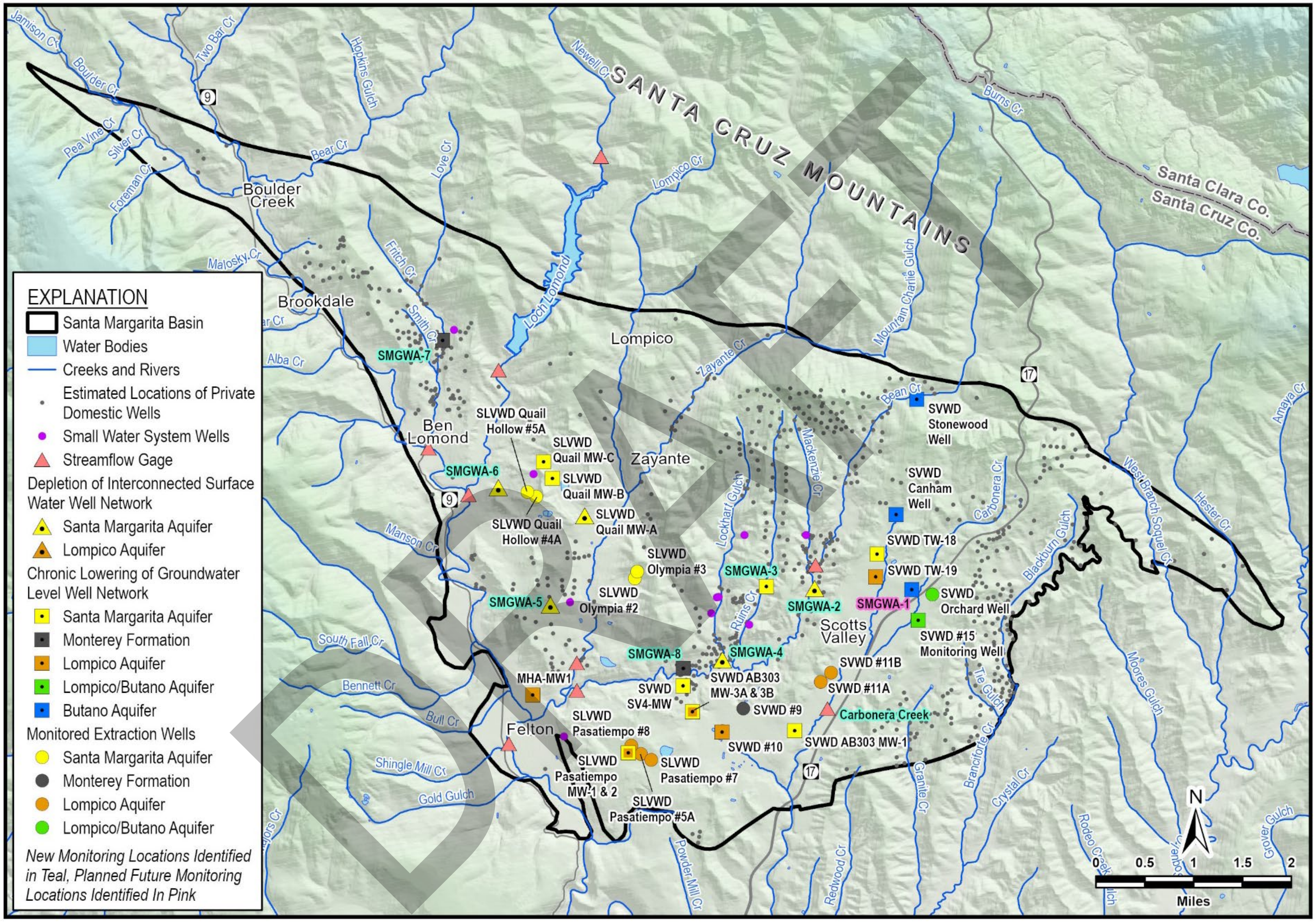

Figure 24. Monitoring Wells, Supply Wells, and Streamflow Gage Locations

3.2.2.2 Groundwater Extraction Monitoring Improvements

The Basin GSP identified a new well metering program requiring measurement and reporting of all non-*de minimis* groundwater extraction greater than 2 AF/yr. Current active non-municipal extractors using more than 2 AF/yr include the Quail Hollow Quarry, users that pump groundwater for large-scale irrigation or to fill landscape ponds, and small water systems with more than 5 connections. During GSP development only up to 4 potential unmetered non-*de minimis* users were identified. Small water systems with more than 5 connections have been metered since 2015. Development of a non-*de minimis* metering program was deferred in WY2024 due to other priorities, but SMGWA did participate in the Santa Cruz County well ordinance update effort that is proposing a well metering requirement on non-*de minimis* users. Additionally, SMGWA has tracked the development of a well registration, metering, and reporting policy by the Santa Cruz Mid-County Groundwater Agency. During WY2025, SMGWA anticipates considering if it is interested in adopting a similar policy.

3.2.2.3 Streamflow Monitoring Improvements

The Basin GSP identified 5 streamflow monitoring locations that would be monitored by SMGWA. Those stations were established in prior water years and monitored by SMGWA in WY2024. One streamflow monitoring data gap along Carbonera Creek was identified in the Basin GSP. In WY2024, SMGWA established a streamflow monitoring station along Carbonera Creek for monitoring during the dry season (May through October), as shown on Figure 24.

3.2.3 Stakeholder Outreach and Public Participation

During WY2024, SMGWA continued to conduct extensive stakeholder outreach and provide opportunities for public participation. Highlights of the activities include the following:

- Held public Board meetings on October 26, 2023; February 29, 2024; May 23, 2024; and August 22, 2024. All meetings were held beginning at 6:00 pm and were both in-person and on-line to maximize opportunities for public participation.
- Hosted an information table at the 22nd Annual Environmental Town Hall in Felton, organized by the San Lorenzo Valley Women's Club on October 28, 2023.
- Hosted an information table at the 9th Annual State of the San Lorenzo River Symposium held in Felton on April 13, 2024.
- Sent an electronic newsletter to 395 email subscribers highlighting basin conditions and activities on October 16, 2023; May 13, 2024; and August 8, 2024.
- Issued a press release in April 2024 on the improved groundwater level conditions. The release was posted on myscottsvalley.com.

- Created 116 social media posts on the SMGWA Facebook page (313 followers) and 114 social media posts to the SMGWA Instagram page (193 followers) related to groundwater topics.

3.3 GSP Recommended Corrective Actions

On April 27, 2023, DWR issued an approval determination for the Basin GSP. The approval included 4 recommended corrective actions. The recommended corrective actions, the GSA initial approach to addressing them, and a timeline for completion are shown in Table 5. In general, SMGWA believes that recommendations to modify SMC will require a GSP amendment. SMGWA further believes this amendment should be deferred until the required periodic evaluation due by January 31, 2027. In WY2025, SMGWA will request a meeting with DWR to further explore approaches and timing of addressing the recommended corrective actions.

Table 5. DWR Recommended Corrective Actions

DWR Recommended Corrective Action Number and Topic	DWR Recommended Corrective Action	GSA Initial Approach for Addressing Recommended Corrective Action	Timeline to Complete or Evaluate
1 – Evaluate impacts to domestic and GDEs in Monterey Formation	Evaluate beneficial use and users of the Monterey Formation and consider how changes in groundwater levels in the Monterey Formation may affect domestic well users and GDEs.	Review locations and extent of beneficial users relative to groundwater level minimum threshold and measurable objectives	Address with 2027 Periodic Evaluation
2 – Revise undesirable results definition for chronic lowering of groundwater levels	Revise the definition of undesirable results to remove the drought year condition or discuss how extractions and recharge will be 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 within the SMC for chronic lowering of groundwater levels.	Evaluate alternative undesirable result definitions as part of the periodic evaluation	Address with 2027 Periodic Evaluation
3 – Revise SMC for degraded groundwater quality	Revise SMC for degraded groundwater quality: • Revise the definition of undesirable results for degraded groundwater quality so that exceedances of minimum thresholds caused by groundwater extraction, whether the GSA has implemented pumping regulations or not, are considered in the assessment of undesirable results in the Basin. • Revise the sustainable management criteria for degraded water quality to include undesirable results for constituents of concern in the basin identified in the GSP.	Evaluate alternative undesirable result definitions as part of the periodic evaluation	Address with 2027 Periodic Evaluation
4 – Evaluate interconnected surface water sustainable management criteria	Address the following items by the first periodic evaluation: • Revise sustainable management criteria with the removal of the exemption for undesirable results in drought years. • Consider utilizing the interconnected surface water guidance as appropriate when issued by DWR to establish quantifiable minimum thresholds, measurable objectives, and management actions. • Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing. • Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping-induced surface-water depletion within the GSA's jurisdictional area.	Establish sustainable management criteria for applicable new wells installed in 2023 and consider utilizing upcoming DWR guidance to revise approach as part of the periodic evaluation	Partially addressed with 2023 well installations; remainder to be addressed with 2027 Periodic Evaluation

4 SUSTAINABLE MANAGEMENT CRITERIA EVALUATION

SGMA requires the use of SMC as a means of demonstrating that a groundwater basin is being sustainably managed. This section presents the SMC definitions developed for the Basin GSP followed by an assessment of the status of each of the 4 applicable sustainability indicators. The evaluation of SMC during WY2024 indicates that the Basin continues to make progress on its path toward long-term sustainability.

The SMC start with a locally defined sustainability goal, which for this Basin includes the following:

- Implement the SGMA, which requires the management and use of groundwater in the Basin in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.
- Provide a safe and reliable groundwater supply that meets the current and future needs of beneficial users.
- Support groundwater sustainability measures and projects that enhance a sustainable and reliable groundwater supply in the Basin, utilizing integrated water management principles by:
    - Safeguarding water supply availability for public health and welfare
    - Maintaining and enhancing groundwater availability for municipal, private, and industrial users and uses
    - Maintaining and enhancing groundwater contributions to streamflow, where beneficial users are dependent upon such contributions (fish, frogs, salamanders, dragonflies, etc.)
    - Maintaining and enhancing groundwater levels that support GDEs
    - Maintaining and enhancing groundwater quality for existing and future beneficial uses
- Provide for operational flexibility within the Basin by supporting a drought supply reserve that takes into account future climate change.
- Plan and implement projects and activities to achieve sustainability that are cost effective and do not place undue financial hardship on the SMGWA, its cooperating agencies, or basin stakeholders. A cost-benefit analysis, taking into consideration financial, social, environmental, and adverse consequences, may be conducted to evaluate whether a project or activity results in undue financial hardship.

To demonstrate that the sustainability goal is being met, SGMA requires a set of locally defined sustainability indicators to be used as metrics to determine if the Basin is experiencing undesirable results. The applicable Basin GSP sustainability indicators and definitions of undesirable results are shown in Table 6. Each sustainability indicator, and its status through WY2024, is discussed further below.

Table 6. Undesireable Result Definitions for Sustainability Indicators in the Basin

Sustainability Indicator	Undesirable Result Definition
Chronic lowering of groundwater levels	Groundwater elevation in any RMP falls below the minimum threshold in 2 or more consecutive non-drought years. If an RMP groundwater elevation below its minimum threshold is caused by emergency operational issues or extended droughts, it is not considered an undesirable result.
Reduction of groundwater in storage	Groundwater extraction volumes that exceed the reduction in groundwater storage minimum thresholds in 1 or multiple principal aquifers
Degraded water quality	Degraded groundwater quality minimum thresholds are exceeded at RMPs where: • Minimum thresholds have not been exceeded prior to SMGWA approved project(s) or management action(s) • An immediate resampling confirms the exceedance • The exceedance is caused by SMGWA approved project(s) or management action(s)
Depletion of interconnected surface water	Groundwater level in any RMP falls below the minimum threshold in 2 or more consecutive non-drought years. If an RMP groundwater level below its minimum threshold is caused by emergency operational issues or extended droughts, it is not considered an undesirable result.

4.1 Chronic Lowering of Groundwater Levels

Annual groundwater elevations are reviewed in this section to assess whether they remain within the target operational range between the MT and MO, and if they are on track to meet the 2027 interim milestone. There are 12 RMPs used to evaluate chronic lowering of groundwater levels relative to SMC. Table 7 shows the annual minimum groundwater elevation at each RMP since WY2020, relative to the RMP's MT, MO, and the 2027 interim milestone. Hydrographs in Appendix A show all historical data collected at RMPs relative to MTs and MOs.

Throughout WY2024, groundwater elevations at all 12 RMPs are above their respective MTs, which means undesirable results did not occur for chronic lowering of groundwater levels. Groundwater elevations are stable or increasing in most wells. The 2027 interim milestone is met for 8 RMPs (green and yellow colors in Table 7), 7 of which also meet MOs (green color in Table 7).

4.1.1 Santa Margarita Aquifer

There are 4 Santa Margarita aquifer RMPs:

- Quail Hollow area: SLVWD Quail MW-B
- Olympia and Mission Springs area: SLVWD Olympia #3
- Mount Hermon/Pasatiempo/South Scotts Valley area: SLVWD Pasatiempo MW-2
- North Scotts Valley: SVWD TW-18

In WY2024, groundwater elevations remained relatively stable compared to the prior water year, and are within the target operational range (Table 7):

- Two Santa Margarita aquifer RMPs are below 2027 interim milestone: SVWD TW-18 and SLVWD Quail MW-B
- Two Santa Margarita aquifer RMPs are above MOs: SLVWD Olympia #3 and SLVWD Pasatiempo MW-2

Groundwater elevations in parts of the Santa Margarita aquifer were relatively low in fall WY2022 after 3 consecutive dry years but have since rebounded with wetter conditions, including a very wet WY2023. By WY2024, groundwater elevations increased significantly and continued rising 5 feet in Quail MW-B, 4 feet in Pasatiempo MW-2, and 11 feet in Olympia #3 (Appendix A, pages A-4 through A-6). Groundwater elevations in the North Scotts Valley area, at SVWD TW-18, have been stable and close to or above the MO since 2000 (Appendix A, page A-7).

4.1.2 Monterey Formation

The only Monterey Formation RMP is SVWD Well #9 in the South Scotts Valley area. This well has a long-term increasing groundwater elevation trend (Appendix A, page A-9). In WY2024, groundwater elevations increased above the 2027 interim milestone and MO (Table 7).

4.1.3 Lompico Aquifer

There are 4 Lompico aquifer RMPs:

- Mount Hermon / Pasatiempo area: SLVWD Pasatiempo MW-1
- South Scotts Valley: SVWD Well #10
- Central Scotts Valley: SVWD Well #11A
- North Scotts Valley: SVWD TW-19

Groundwater elevations increased or remained stable in Lompico aquifer RMPs in WY2024 relative to the prior water year and are within the target operational range (Table 7). There are no MT exceedances in the Lompico aquifer RMPs. The aspirational 2027 interim milestone and MO values were chosen based on the modeled benefits of a hypothetical 540 AF/yr conjunctive use project that has yet to be defined and implemented. Even so, due to continued conservation and efficiency, 3 of the 4 RMPs already met their MOs in WY2024 (SVWD Well #10, SVWD Well #11A, and SVWD TW-19 as shown on Appendix A, pages A-12 through A-14). The only well that does not currently meet the MO, SLVWD Pasatiempo MW-1, met the 2027 interim milestone and has an increasing groundwater elevation trend (Appendix A, page A-11).

4.1.4 Lompico/Butano Aquifer

SVWD #15 monitoring well in the Northern Scotts Valley area is the only RMP screened in both the Lompico and Butano aquifers. This well is located near the Lompico/Butano SVWD Orchard supply well. Groundwater elevations in SVWD #15 monitoring well fluctuate seasonally, with spring levels frequently higher than the MO and fall levels below the 2027 interim milestone (Appendix A, page A-16). Since the groundwater level data collected by the transducer is influenced by pumping at nearby SVWD Orchard, only hand measurements collected when SVWD Orchard is not pumping are used to compare to the SMC. The minimum static groundwater elevation at SVWD #15 in WY2024 is within the target operational range at an elevation slightly below the 2027 interim milestone. Like Lompico aquifer wells, the chosen 2027 interim milestone and MO are aspirational, based on the modeled effects of a hypothetical 540 AF/yr conjunctive use project.

4.1.5 Butano Aquifer

There are 2 Butano aquifer RMPs, SVWD Stonewood and SVWD Canham, located in the Northern Scotts Valley area upgradient of the Orchard well. Both monitoring wells have stable long-term groundwater elevation trends (Appendix A, pages A-18 and A-19). In WY2024, groundwater elevations are within the target operational range (Table 7). SVWD Stonewood is above the 2027 interim milestone/MO. SVWD Canham is below the 2027 interim milestone. The Canham well 2027 interim milestone and MO are aspirational goals based on a hypothetical conjunctive use project that has yet to be implemented and are higher than any groundwater elevations measured in the well since monitoring began in 2011.

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Table 7. Groundwater Elevations Compared to Chronic Lowering of Groundwater Levels Sustainable Management Criteria, WY2020-2024

Aquifer	Well Name	Minimum Threshold	Interim Milestone #1 (2027)	Measurable Objective	WY2020*	WY2021*	WY2022	WY2023	WY2024
				Annual Minimum Groundwater Elevation (feet amsl)					
Water Year Type					Dry	Critically Dry	Normal	Wet	Normal
Santa Margarita	SLVWD Quail MW-B	449	472	472	462.4	455.8	451.8	451.0	458.4
	SLVWD Olympia #3	302	307	307	351.4	335.9	330.1	327.3	354.5
	SLVWD Pasatiempo MW-2	498	514	514	519.6	512.7	516.3	516.2	528.1
	SVWD TW-18	462	471	471	471.8	471.8	470.9	470.4	470.1
Monterey	SVWD #9	301	340	358	346.7	351.0	354.0	356.0	360.6
Lompico	SLVWD Pasatiempo MW-1	334	339	372	346.6	340.4	335.4	337.0	343.9
	SVWD #10	286	302	322	317.9	330.3	338.1	338.7	337.2
	SVWD #11A	288	299	317	310.4	308.0	312.6	320.2	324.7
	SVWD TW-19	314	357	376	373.1	370.4	370.0	378.4	378.1
Lompico/Butano	SVWD #15 Monitoring Well	291	310	333	302.8	307.1	307.9	306.5	307.2
Butano	SVWD Stonewood Well	836	844	844	848.3	845.0	845.8	847.6	847.7
	SVWD Canham Well	427	447	467	442.0	441.7	441.2	440.7	441.0

* Damage to SLVWD surface water intakes caused by the August 2020 CZU Wildfire caused groundwater extraction to increase and groundwater levels to decline in some areas of the Basin.
amsl – above mean sea level

Minimum threshold not met
Minimum threshold met but 2027 interim milestone and measurable objective not met
Minimum threshold and 2027 interim milestone met, but measurable objective not met
Measurable objective met

4.2 Reduction of Groundwater in Storage

The reduction of groundwater in storage SMC are annual groundwater extraction volumes for the principal aquifers and Monterey Formation. Groundwater sustainable yield estimates are developed using groundwater model projections. The MTs are related to groundwater extraction volumes predicted without implementation of additional projects or management actions, and the MOs are related to groundwater extraction volumes calculated assuming implementation of a hypothetical 540 AF/year conjunctive use project. The 2027 interim milestones are equal to the MT through 2027, and thereafter are equal to the MO through 2042. Table 8 lists WY2024 groundwater extraction in each aquifer relative to MTs and MOs.

WY2024 groundwater extraction is within the operational range between the MT and MO. The total extraction from each aquifer and formation is less than the MT, and only the MO in the Lompico aquifer is not met. Because the MO is based on implementation of projects that are still in the planning stages, not currently meeting the Lompico aquifer MO is expected. Given that no MTs were exceeded, undesirable results for reduction of groundwater in storage did not occur in WY2024.

Table 8. Groundwater Extractions Compared to Reduction in Groundwater in Storage Sustainable Management Criteria, WY2024

Aquifer	Groundwater Extraction, AF/year		
	Minimum Threshold*	**Measurable Objective**	**WY2024**
Santa Margarita	850	615	610
Monterey	140	130	92
Lompico**	1,290	1,000	1,268
Butano**	540	380	345
TOTAL	**2,820**	**2,125**	**2,315**

* The first interim milestone in 2027 is equal to the minimum threshold.
** Assumes that the SVWD extraction wells screened in both the Lompico and Butano aquifers pump 40% of their water from the Lompico aquifer and 60% from the Butano aquifer.

Minimum threshold not met
Minimum threshold and 2027 interim milestone met, but measurable objective not met
Measurable objective met

4.3 Degraded Water Quality

Groundwater in the Basin is generally of good quality and meets primary drinking water standards. However, both naturally occurring and anthropogenic groundwater quality constituents of concern are present in some aquifers in some areas. Iron and manganese are the only naturally occurring groundwater quality constituents in the Basin that routinely exceed drinking water standards; arsenic, total dissolved solids (TDS) and salinity occasionally approach or slightly exceed drinking water standards in a few wells. Anthropogenic groundwater quality constituents that are occasionally detected, though at concentrations less than drinking water standards, are nitrate from septic system leaching and organic point-source contaminants originating from several former industrial sites.

The MTs for degraded water quality are the California drinking water standards for each constituent, except for nitrate, which is set to half the maximum contaminant level (MCL) drinking water standard. The MOs are set to the average concentrations measured for each well between January 2010 and December 2019. This means that for some wells the MOs are at greater concentrations than the MTs for the naturally occurring constituents iron and manganese. The SMC for this sustainability indicator are met when concentrations are at or below the criteria.

All water quality RMP were sampled in WY2024 except for inactive RMP well SVWD Well #9 in the Monterey Formation and SVWD #3B, which was destroyed in WY2024. Going forward SVWD #3B is no longer an RMP well and will likely be replaced by SVWD Sucinto when that new supply well is integrated into SVWD's system. The MTs and WY2024 maximum concentrations for degraded water quality RMPs are summarized in Table 9. All water quality data collected from public supply wells in WY2024 for constituents with SMC are summarized in tabular format in Appendix D. Chemographs showing water quality data over time for constituents that have increasing trends are shown in Appendix E.

Consistent with past results, the only constituents found in WY2024 at concentrations higher than the MTs are iron and manganese. Iron and manganese are naturally elevated in the Lompico aquifer and in parts of the Santa Margarita aquifer, such as the Olympia wellfield (Table 9). Because the iron and manganese concentrations greater than the MTs are naturally occurring and are not being caused by groundwater use, they do not constitute undesirable results. SLVWD and SVWD routinely treat or blend raw groundwater to meet state drinking water standards for iron and manganese.

Table 10 lists the WY2024 maximum concentrations relative to MOs for iron and manganese in wells that exceed MTs. In WY2024, iron concentrations meet the MOs in all 5 wells. There are 4 wells that meet the MO for manganese and 1 well, SVWD #10A, that does not meet the MO.

Along with iron and manganese, the other constituents measured at concentrations that do not meet MOs in some wells in WY2024 are arsenic, TDS, chloride, nitrate, and chlorobenzene (Table 9). Given that the MOs are based on long-term average concentrations for each well, and for chlorobenzene, the laboratory reporting limit, it is expected that some wells will not meet the MOs by a small amount.

Arsenic is naturally occurring at or near the MCL and MT in some areas of the Basin. SVWD #11B is the only RMP well that regularly approaches the arsenic MCL and MT of 10 µg/L (Appendix E, page E-4). This well had a long-term increasing trend with 7 sporadic detections slightly above the MCL from WY1999 to WY2018, but has since had a decreasing trend. In all 3 RMPs in which arsenic was detected in WY2024 (SLVWD Quail Hollow #5A, SLVWD Pasatiempo #7, and SVWD #11B), the concentrations were close to or below the MOs. Samples collected from SLVWD Pasatiempo #8 in recent years are routinely around the MCL and MT for arsenic (Appendix E, page E-3). This well was installed in December 2018 and was not made an RMP during development of the GSP because there was insufficient water quality data to make informed decisions on SMC. SLVWD blends the water extracted from Pasatiempo #8 with water from sources with low arsenic concentrations to ensure that water supplied to customers meets water quality standards.

TDS and chloride concentrations are well below their respective MTs (Table 9), but do not meet the MO in 4 of 7 sampled wells. This reflects long-term trends in several wells in which TDS and chloride concentrations are slowly rising, such that MOs for more than half the RMPs are not met. Chemographs for wells with increasing salinity concentration trends are included in Appendix E. These include SLVWD Olympia #3 in the Santa Margarita aquifer and SLVWD Pasatiempo #7, SVWD #10A and SVWD Orchard well in the Lompico aquifer (Appendix E, pages E-6 through E-9 and E-13 through E-16).

Nitrate was detected in WY2024 only at SLVWD Quail Hollow #5A and Pasatiempo #7. Quail Hollow #5A is typically the only RMP with elevated nitrate between 1 and 3.5 milligrams per liter (mg/L). The WY2024 concentration (3.4 mg/L) is the second highest concentration measured since 2000 (Appendix E, page E-11). The nitrate concentration at Pasatiempo #7 in WY2024 (0.4 mg/L) is near the reporting limit and only slightly above the MO for this well.

Occasionally chlorobenzene is detected at trace concentrations near the reporting limit at SVWD #11A. The MO for chlorobenzene is the laboratory reporting limit so any detection indicates that the MO is not being met.

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Table 9. Groundwater Quality Compared to Sustainable Management Criteria, WY2024

Aquifer	Well Name	TDS	Chloride	Iron	Manganese	Arsenic	Nitrate as Nitrogen	Methyl-tert-butyl-ether	Chlorobenzene	Trichloroethylene	Tetrachloroethylene	1,2-Dichloroethylene
		Concentration milligrams per Liter (mg/L)										
Minimum Threshold		***1,000***	***250***	***0.3***	***0.05***	***0.01***	***5***	***0.013***	***0.07***	***0.005***	***0.005***	***0.07***
Santa Margarita	SLVWD Quail Hollow #5A	120	5.8	ND	ND	0.0026	3.4	ND	ND	ND	ND	ND
Santa Margarita	SLVWD Olympia #3	690	8.3	0.32	0.140	ND	ND	ND	ND	ND	ND	ND
Monterey	SVWD Well #9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Lompico	SLVWD Pasatiempo #7	140	7.6	0.36	0.060	0.0018	0.40	ND	ND	ND	ND	ND
Lompico	SVWD #10A	320	35	1.40	0.170	ND	ND	ND	ND	ND	ND	ND
Lompico	SVWD #11A	540	28	0.31	0.110	ND	ND	ND	0.0011	ND	ND	ND
Lompico	SVWD #11B	330	21	0.64	0.070	0.0085	ND	ND	ND	ND	ND	ND
Lompico / Butano	SVWD Orchard Well	510	58	ND	0.0027	ND	ND	ND	ND	ND	ND	ND

Minimum threshold not met

Minimum threshold met, but measurable objective not met (see Appendix D for MO)

Minimum threshold and measurable objective met, or analyte not detected (ND)

NS – not sampled because well was not actively pumped for water supply

Table 10. Groundwater Quality Compared to Iron and Manganese Measurable Objectives, WY2024

Aquifer	Well Name	Iron Concentration (mg/L)		Manganese Concentration (mg/L)	
		Measurable Objective	WY2024 Maximum	Measurable Objective	WY2024 Maximum
Santa Margarita	SLVWD Olympia #3	0.502	0.32	0.157	0.14
Lompico	SLVWD Pasatiempo #7	0.539	0.36	0.099	0.06
	SVWD #10A	1.51	1.40	0.099	0.17
	SVWD #11A	0.459	0.31	0.112	0.11
	SVWD #11B	0.826	0.64	0.077	0.070

Measurable objective not met
Measurable objective met

4.4 Depletion of Interconnected Surface Water

Depletion of interconnected surface water is assessed at 2 RMPs using groundwater elevations as a proxy. The approach for evaluating sustainability is the same as the approach described for the chronic lowering of groundwater levels indicator in Section 4.1. Table 11 compares 5 years of annual minimum groundwater elevations for depletion of interconnected surface water RMPs with MTs and MOs. Hydrographs for depletion of interconnected surface water RMPs are shown in Appendix B, pages B-3 and B-4. WY2024 groundwater elevations in both RMPs remained stable and higher than their respective MTs, which means undesirable results did not occur for depletion of interconnected surface water.

Table 11. Groundwater Elevations Compared to Depletion of Interconnected Surface Water Sustainable Management Criteria, WY2020-2024

Aquifer	Well Name	Minimum Groundwater Elevation (feet amsl)						
		Minimum Threshold	Measurable Objective*	WY2020	WY2021	WY2022	WY2023	WY2024
Water Year Type				Dry	Critically Dry	Normal	Wet	Normal
Santa Margarita	SLVWD Quail MW-A	413	416	414.4	413.3	413.1	413.3	414.5
	SVWD SV4-MW	381	387	401.6	404.1	405.7	408.7	404.2

* 2027 interim milestones are equal to the measurable objective

Minimum threshold not met
Minimum threshold met, but measurable objective not met
Measurable objective met

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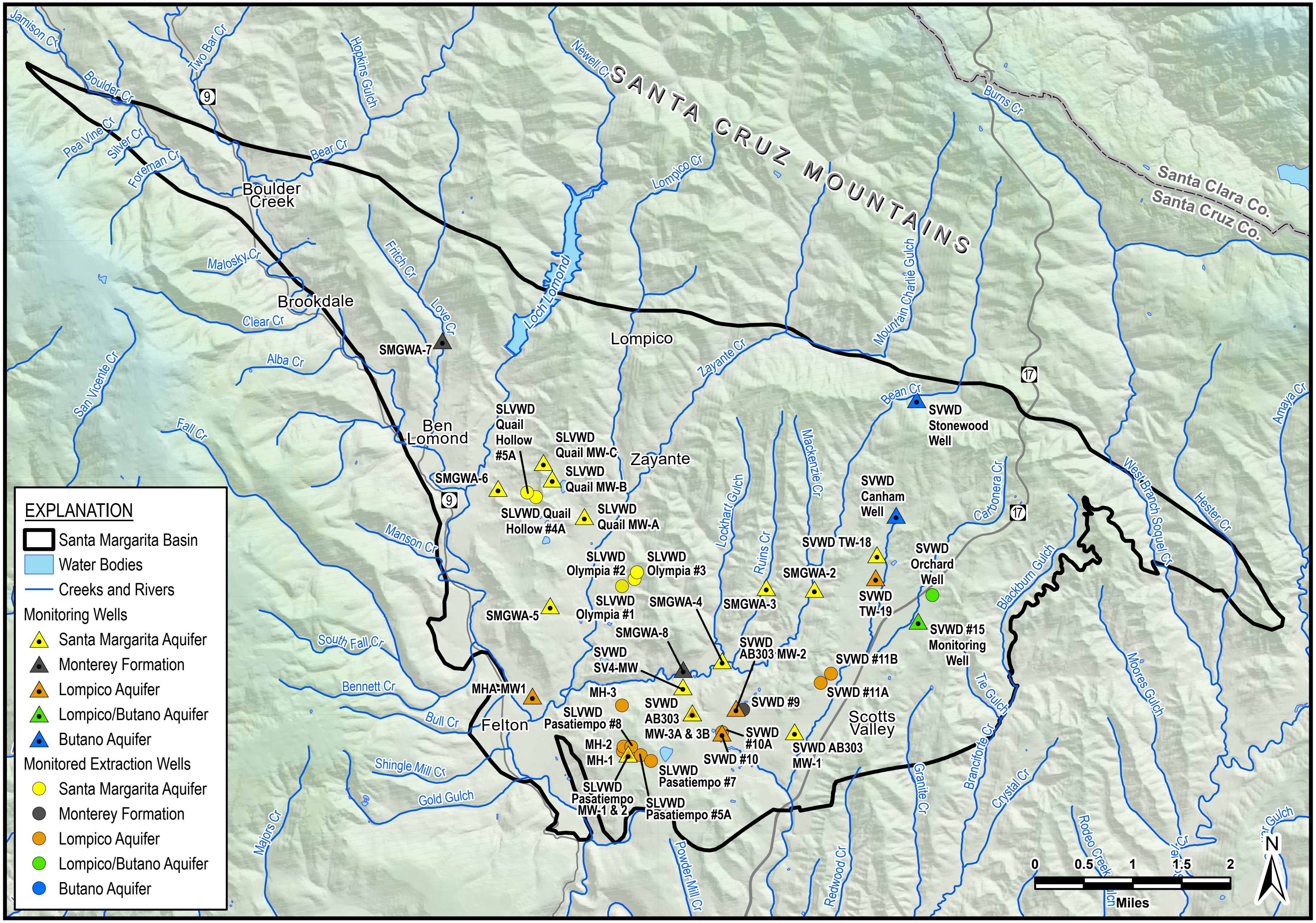
Appendix A

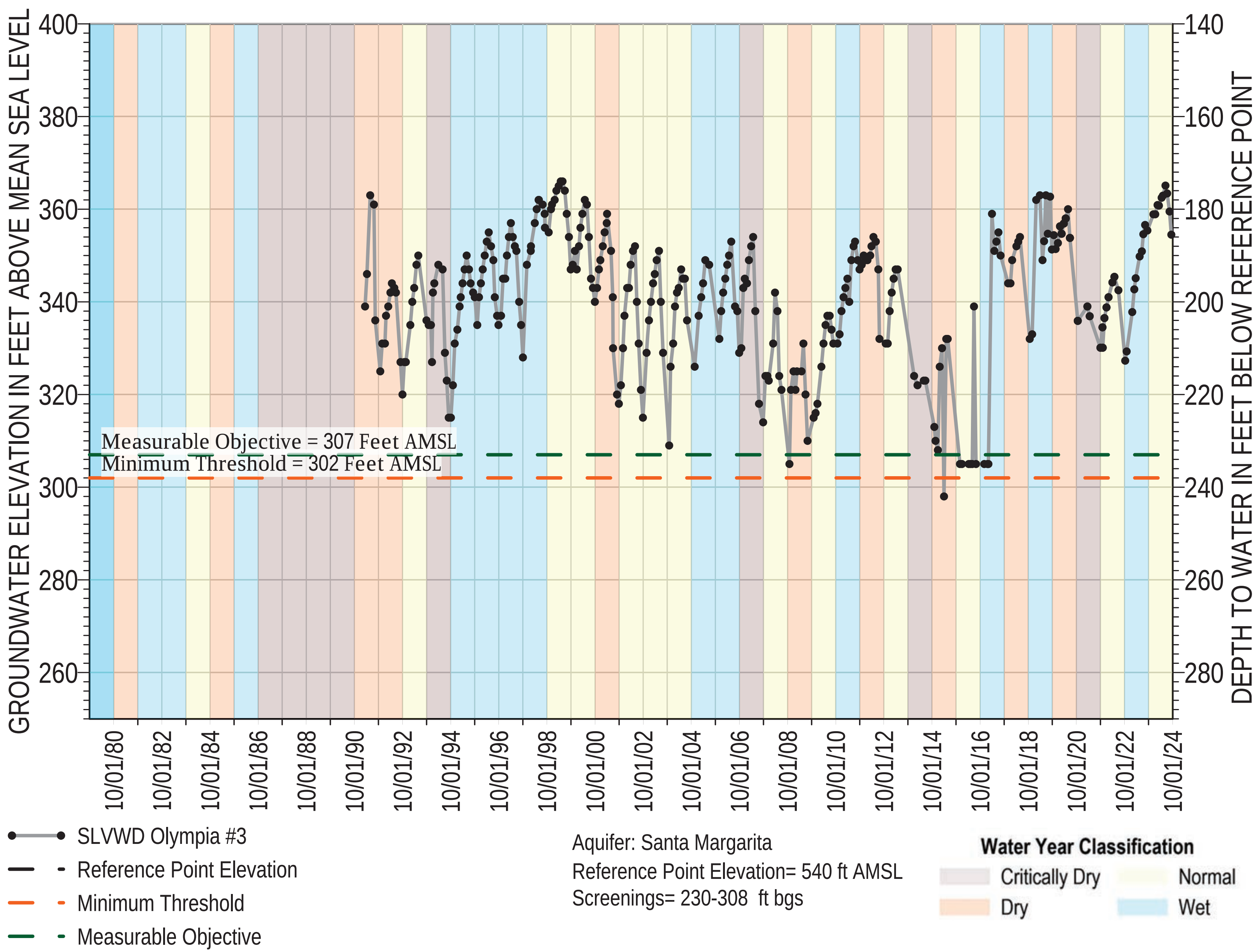
Chronic Lowering of Groundwater Levels Representative Monitoring Point Hydrographs with Sustainable Management Criteria

Well Locations and Screen Aquifer Shown on Figure A-1

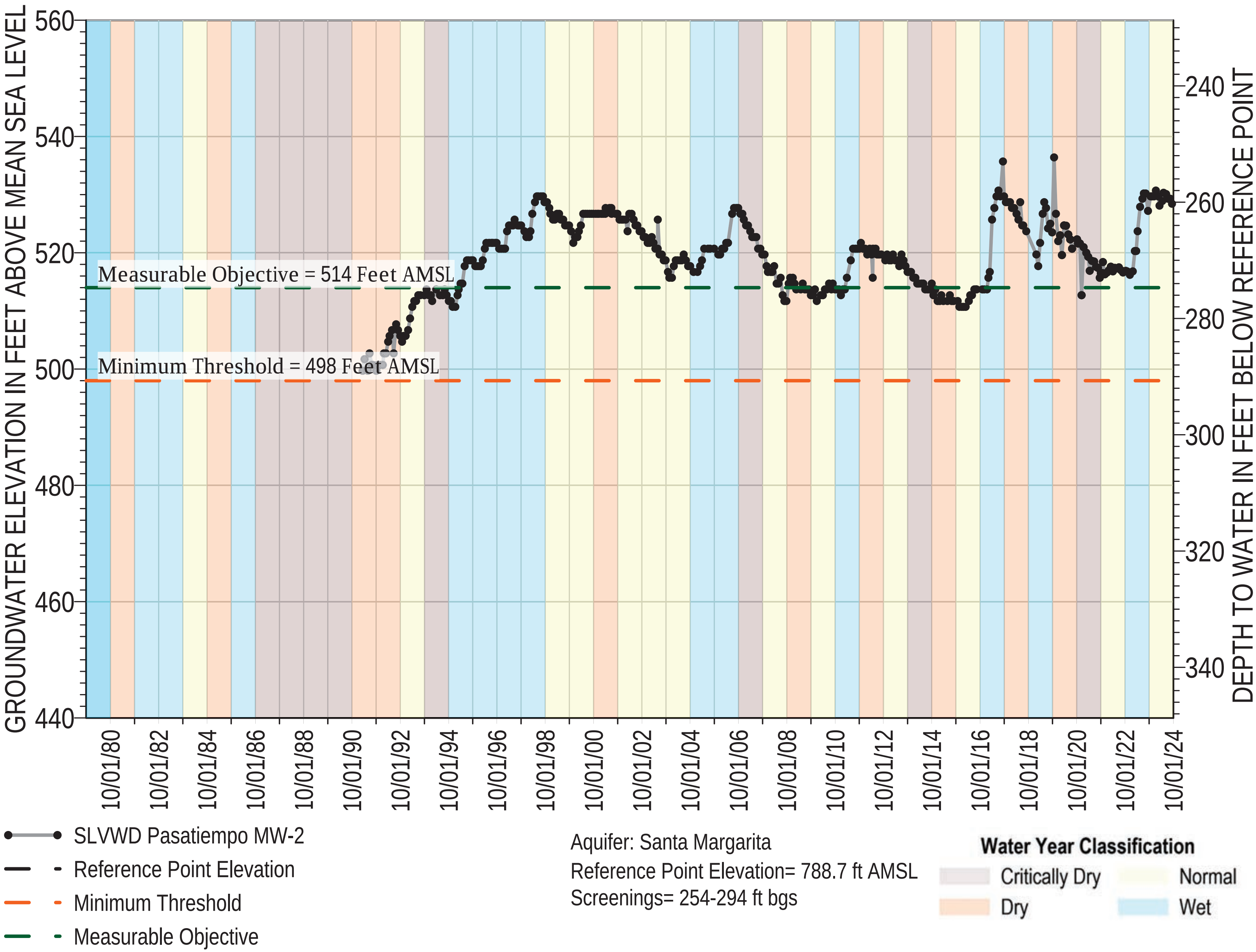
H:\Santa_Margarita_Basin\AnnualReports\WY 2024\GIS\ArcPro\Appendix_GWL_Map\Appendix_GWL_Map.aprx



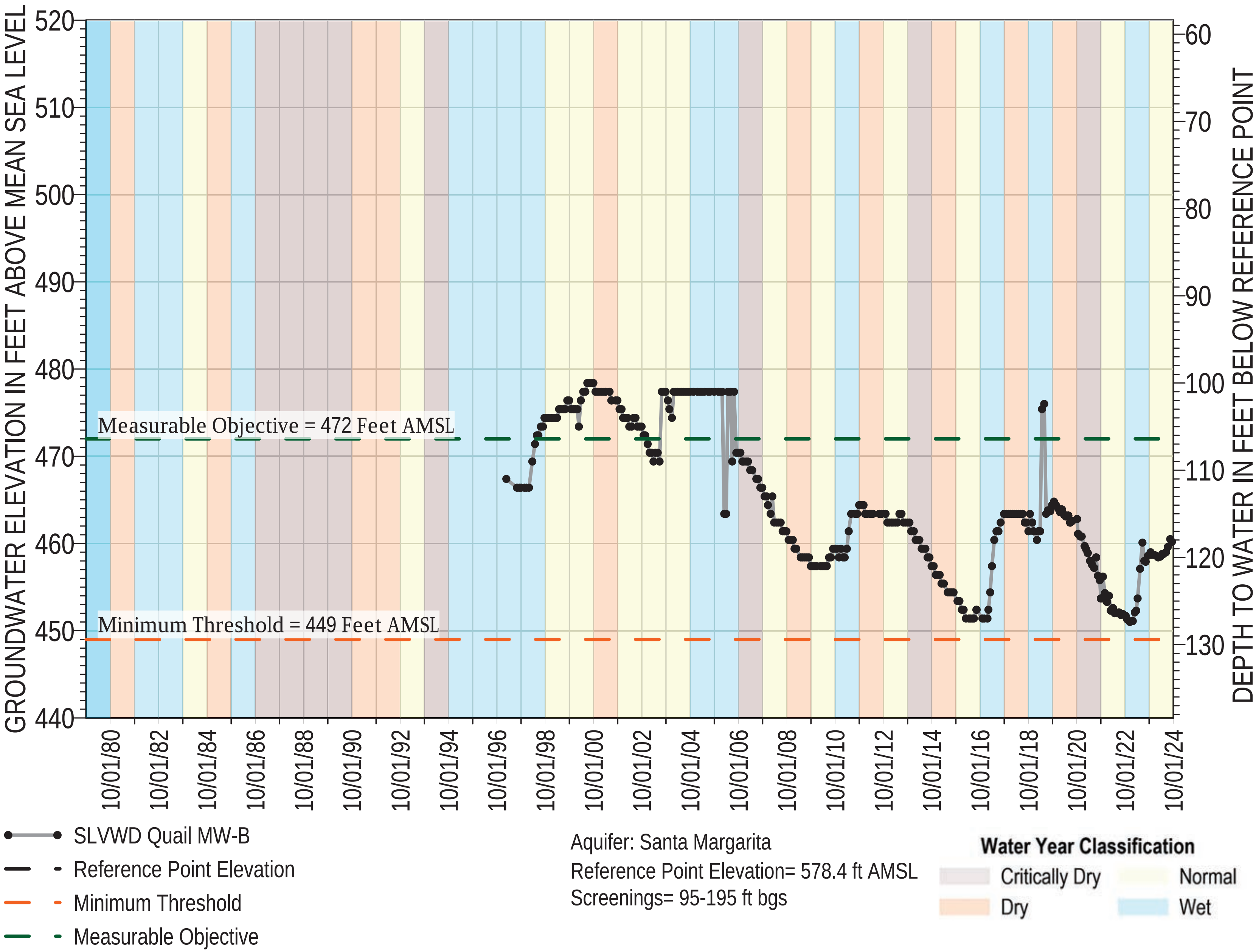
Santa Margarita Sandstone



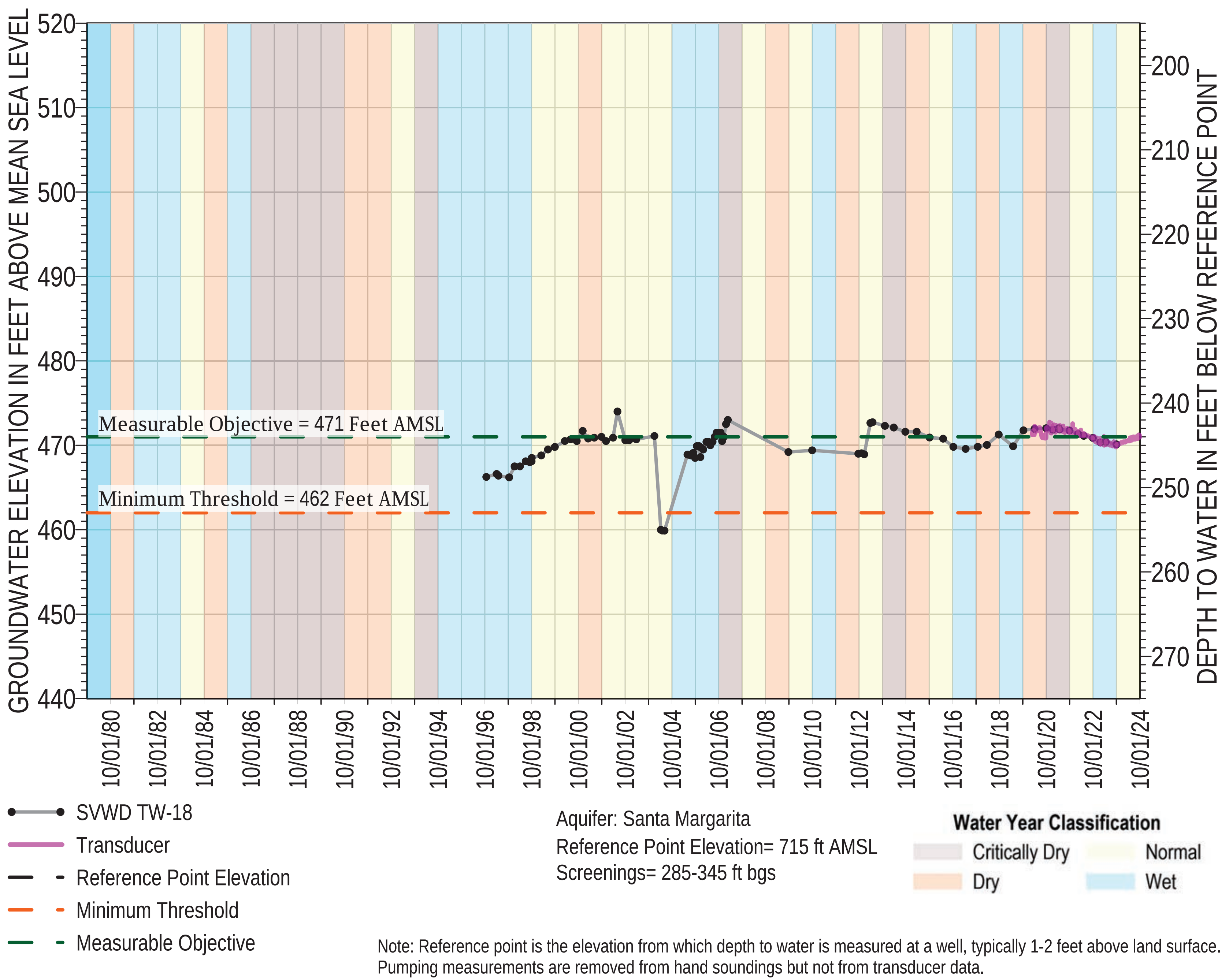
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
DEPTH TO WATER IN FEET BELOW REFERENCE POINT
520
510
500
490
480
470
460
450
440
200
210
220
230
240
250
260
270
Measurable Objective = 471 Feet AMSL
Minimum Threshold = 462 Feet AMSL
10/01/80
10/01/82
10/01/84
10/01/86
10/01/88
10/01/90
10/01/92
10/01/94
10/01/96
10/01/98
10/01/00
10/01/02
10/01/04
10/01/06
10/01/08
10/01/10
10/01/12
10/01/14
10/01/16
10/01/18
10/01/20
10/01/22
10/01/24
SVWD TW-18
Transducer
Reference Point Elevation
Minimum Threshold
Measurable Objective
Aquifer: Santa Margarita
Reference Point Elevation= 715 ft AMSL
Screenings= 285-345 ft bgs
Water Year Classification
Critically Dry
Normal
Dry
Wet
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.

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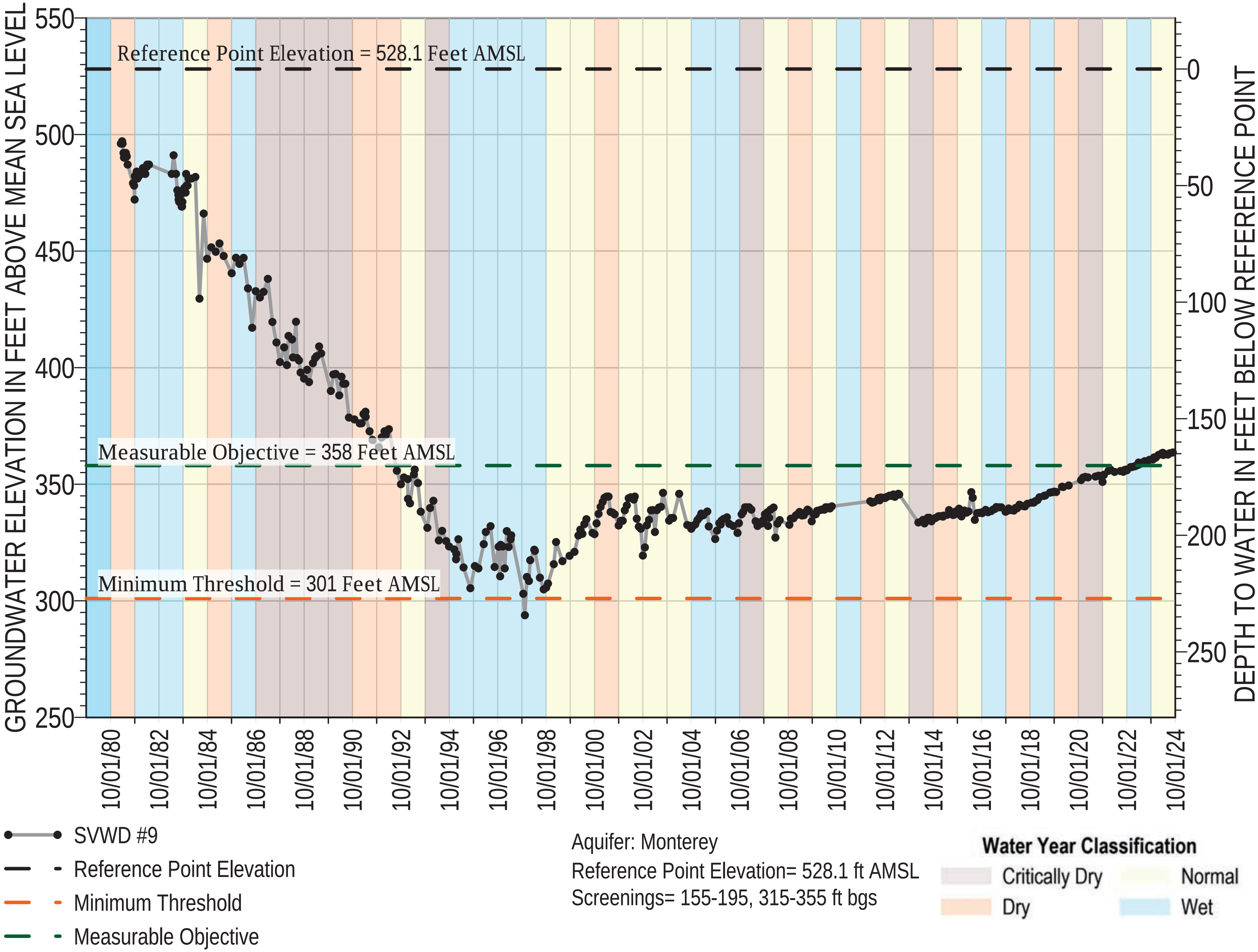
Monterey Formation



Aquifer: Monterey
Reference Point Elevation= 528.1 ft AMSL
Screenings= 155-195, 315-355 ft bgs

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.

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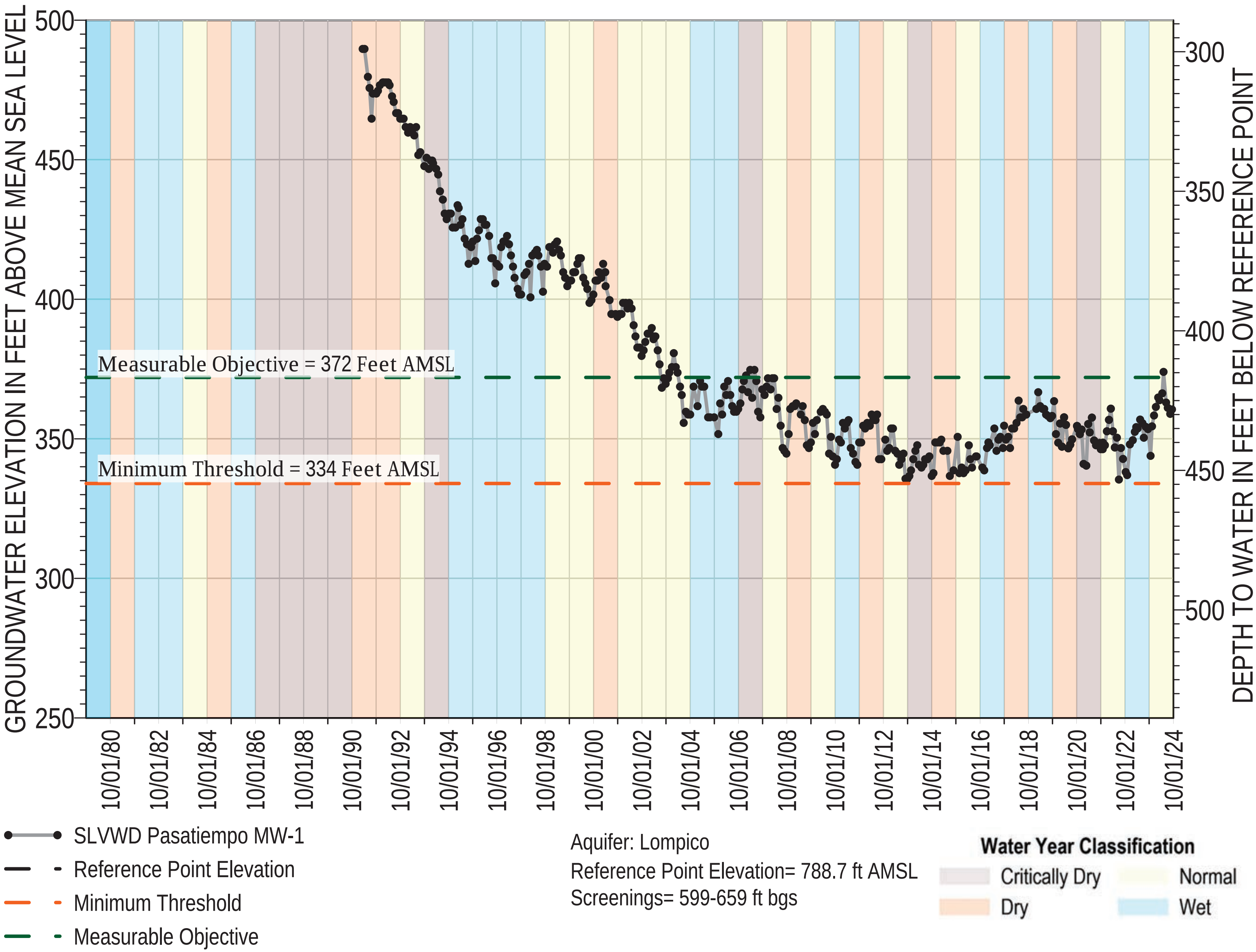
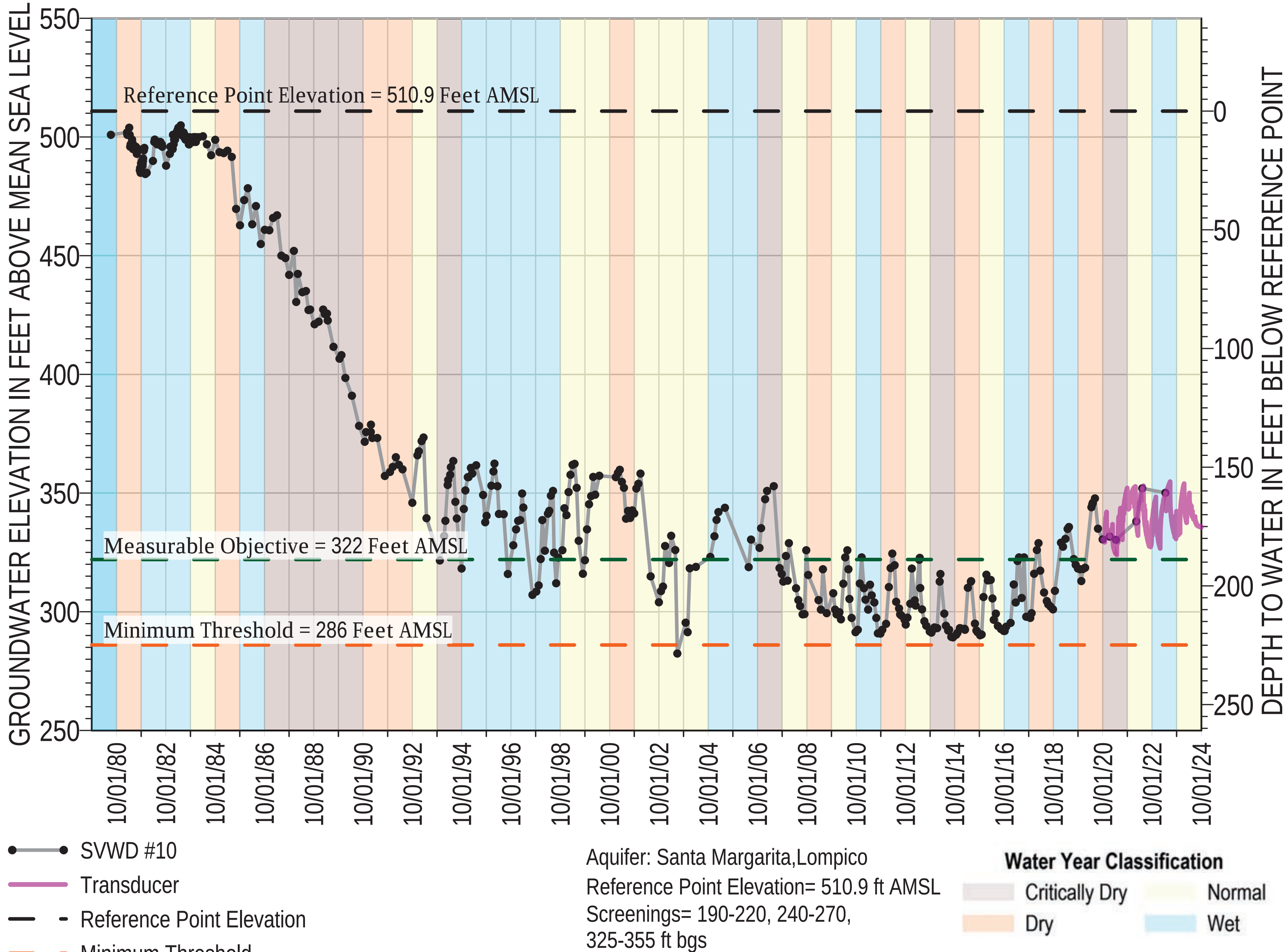
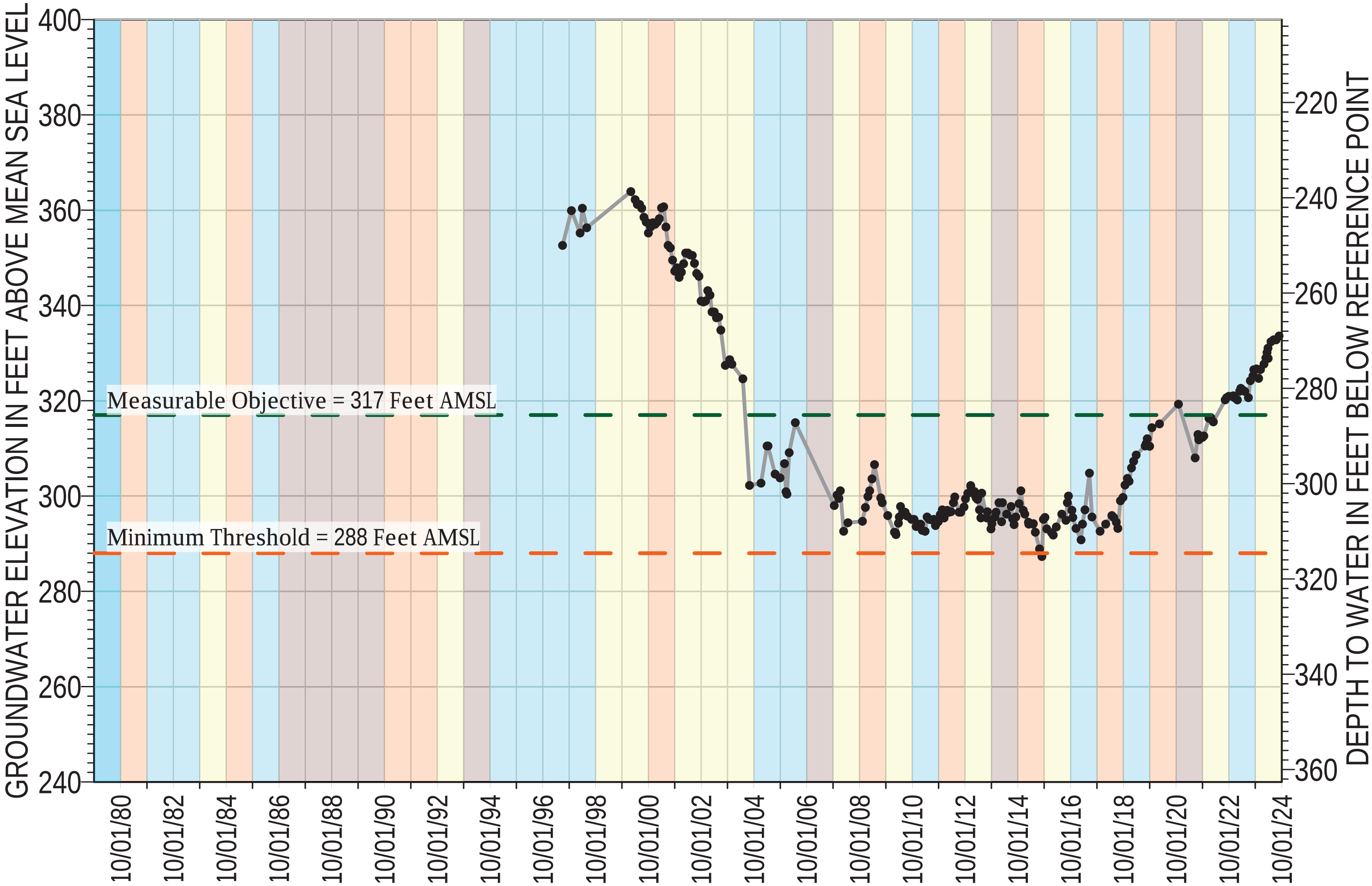
Lompico Sandstone



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.

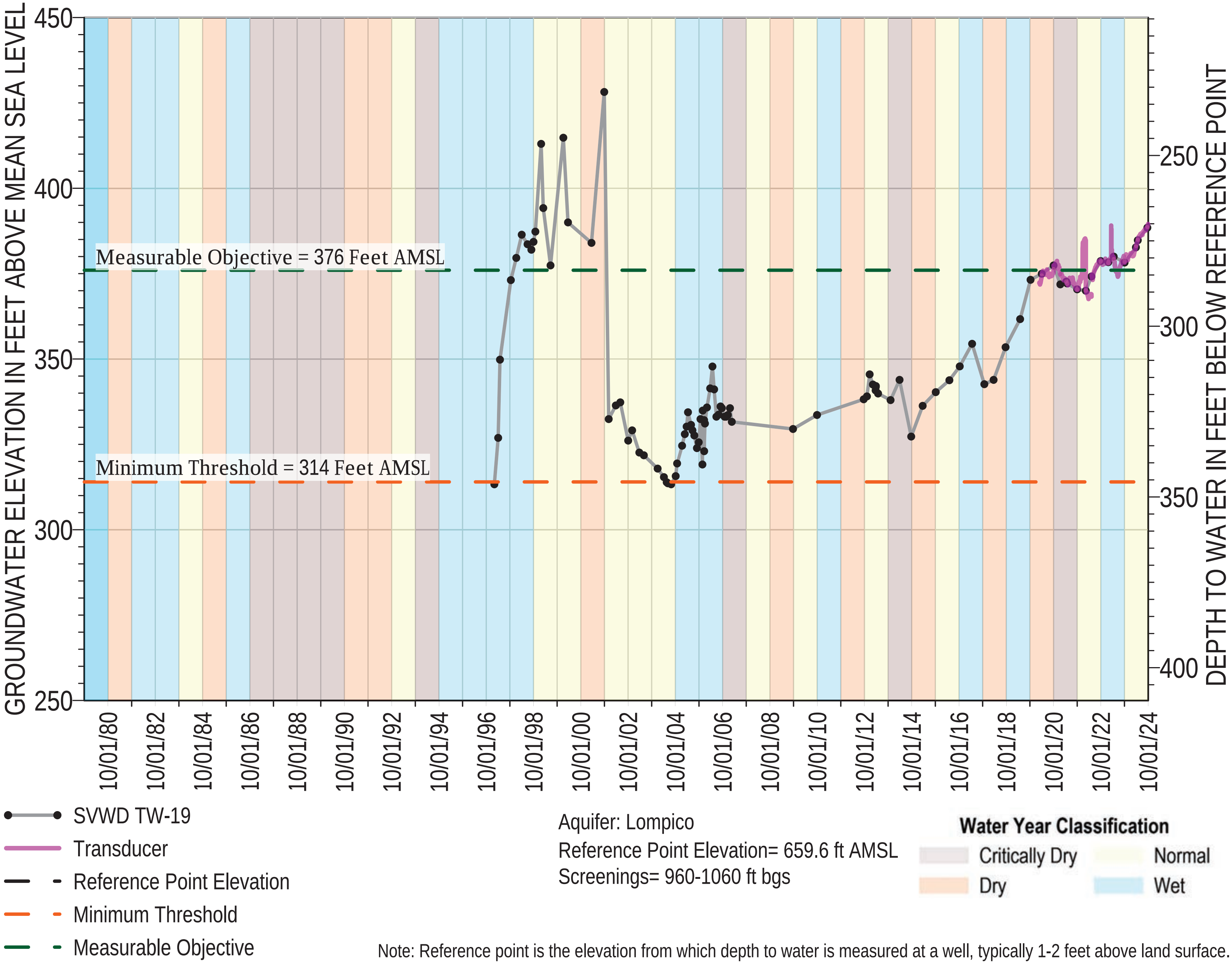


SVWD #11A
Reference Point Elevation
Minimum Threshold
Measurable Objective

Aquifer: Lompico
Reference Point Elevation= 602.6 ft AMSL
Screenings= 399-419, 459-469,
495-515 ft bgs

Water Year Classification
Critically Dry
Normal
Dry
Wet

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.

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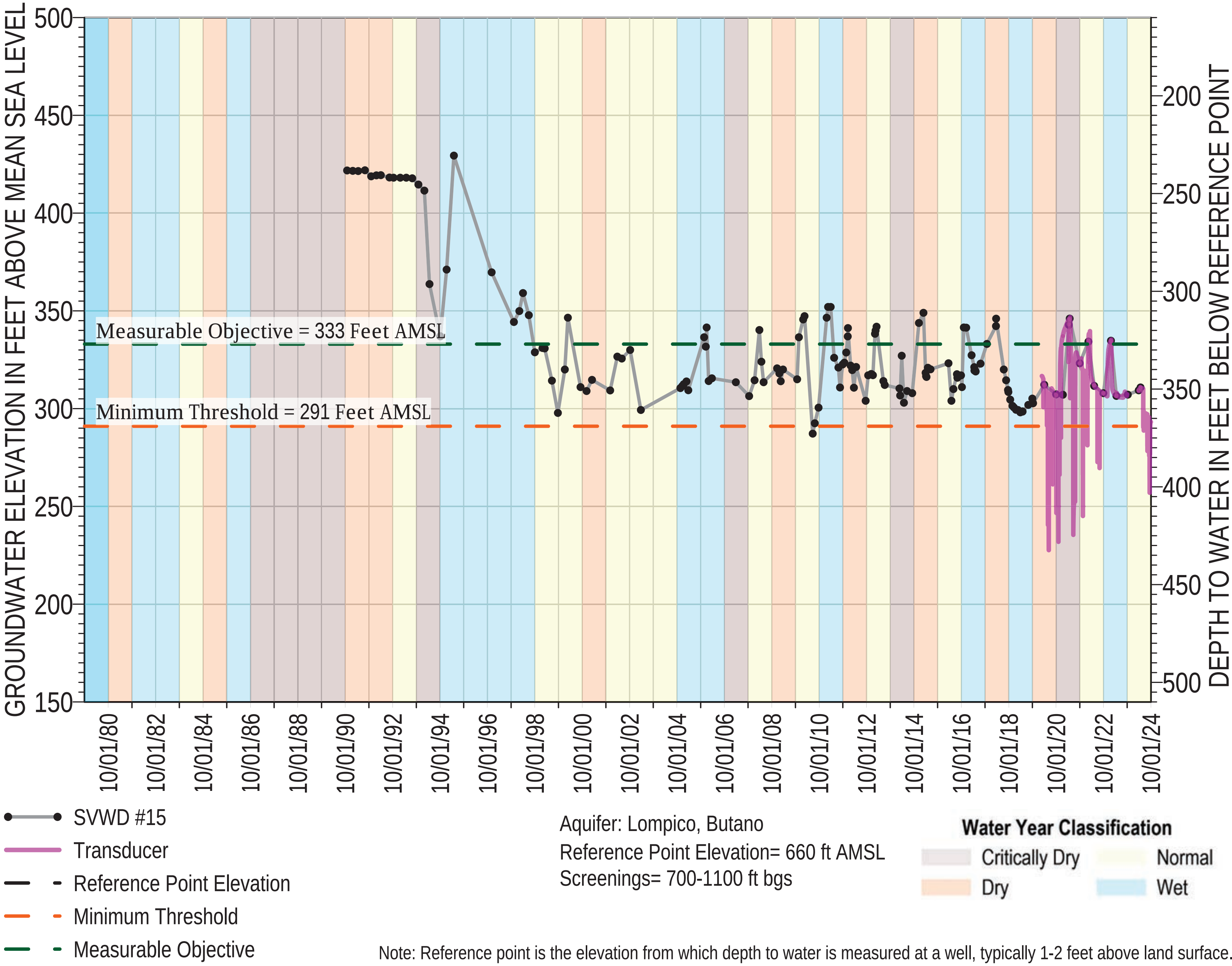
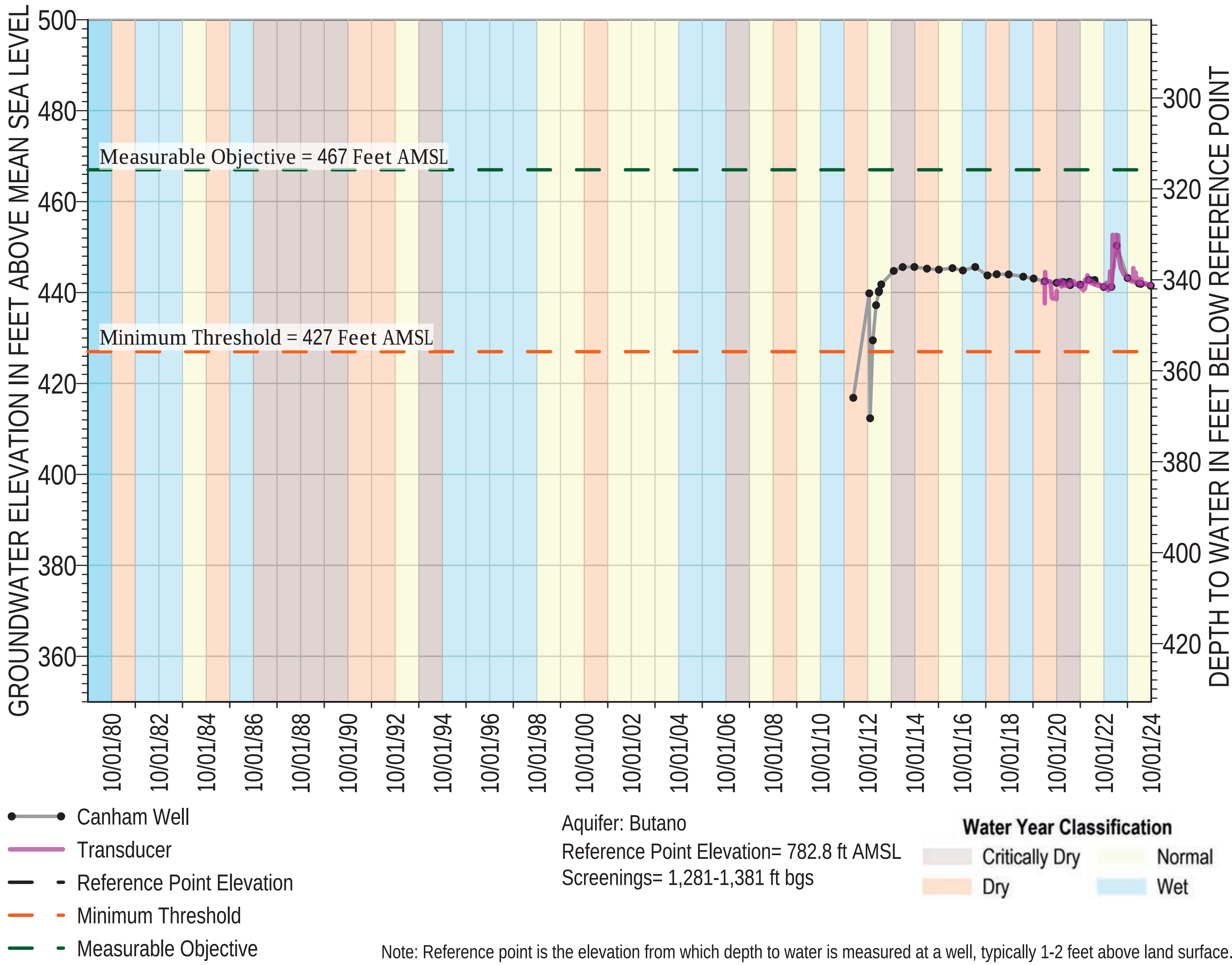
Lompico/Butano Sandstone

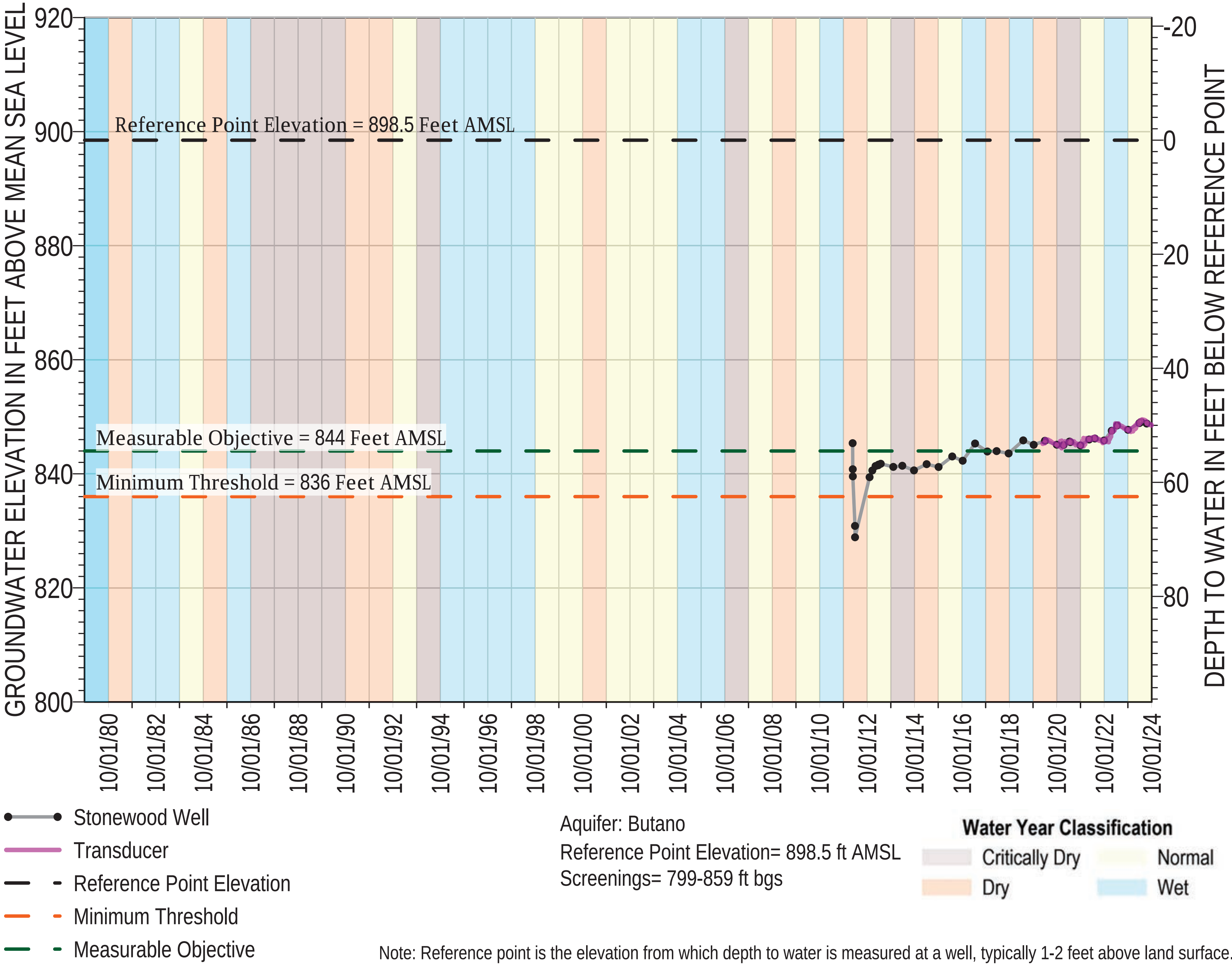


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.

Butano Sandstone



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.

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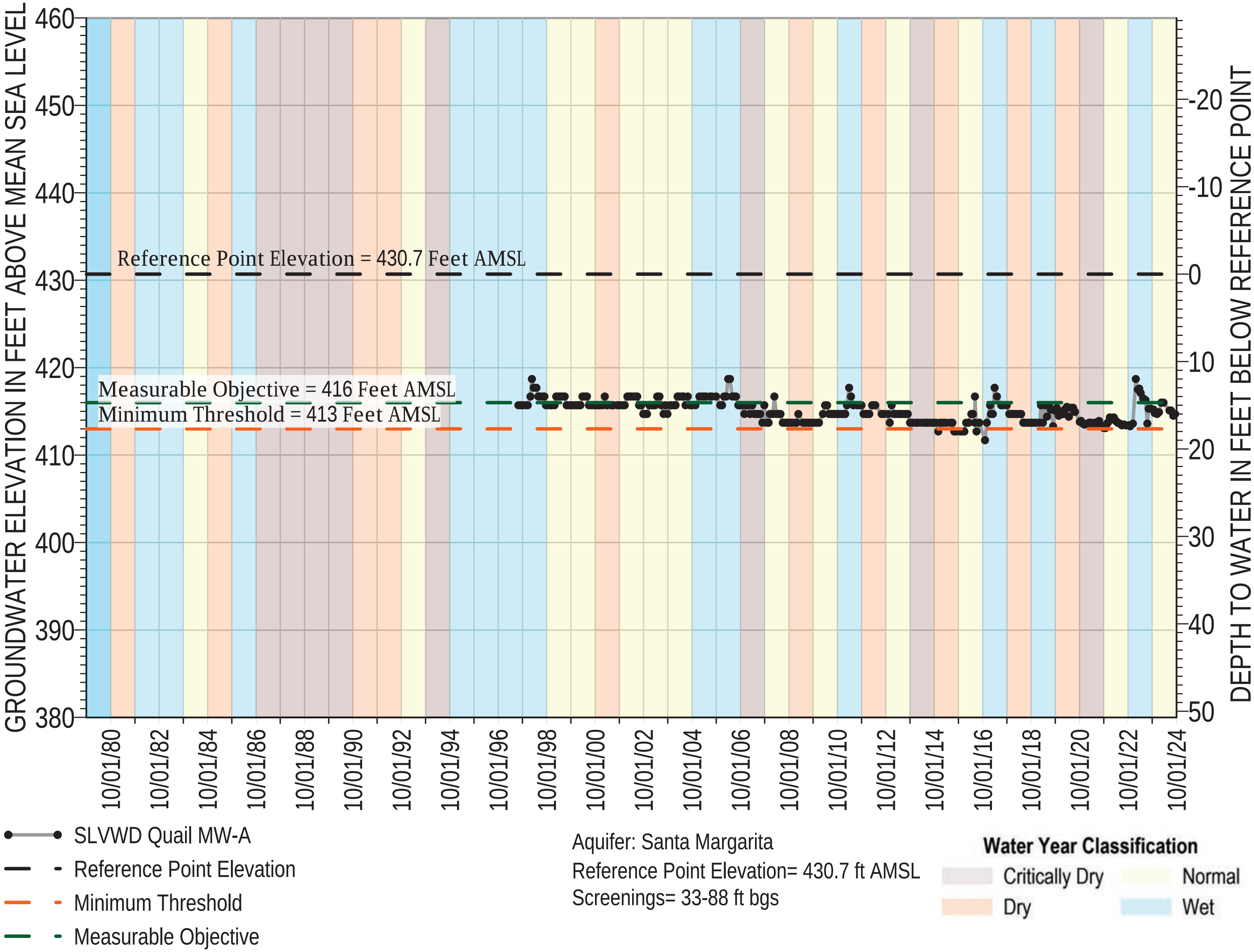
Appendix B

Depletion of Interconnected Surface Water Representative Monitoring Point Hydrographs with Sustainable Management Criteria



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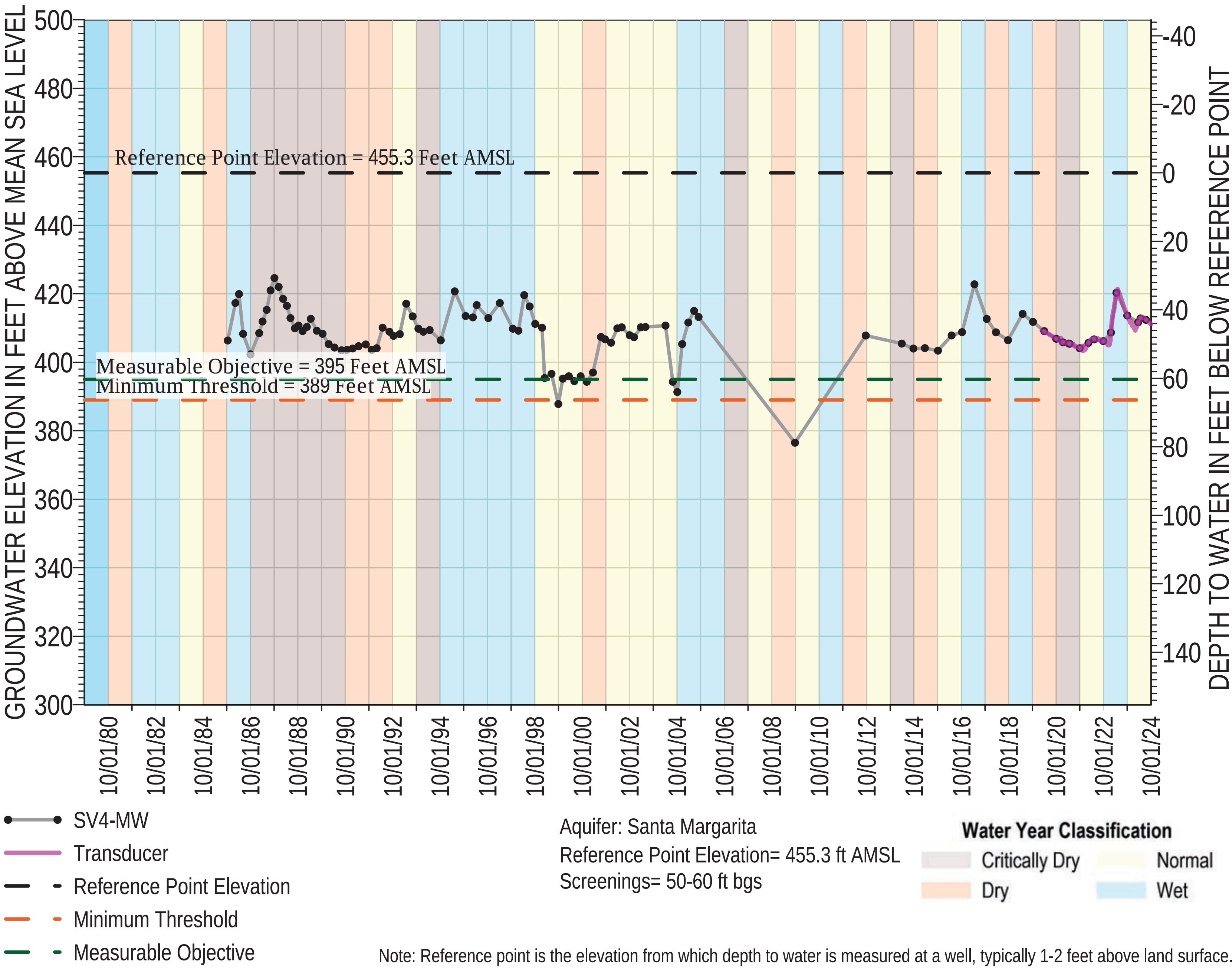

Aquifer: Santa Margarita
Reference Point Elevation= 455.3 ft AMSL
Screenings= 50-60 ft bgs

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.

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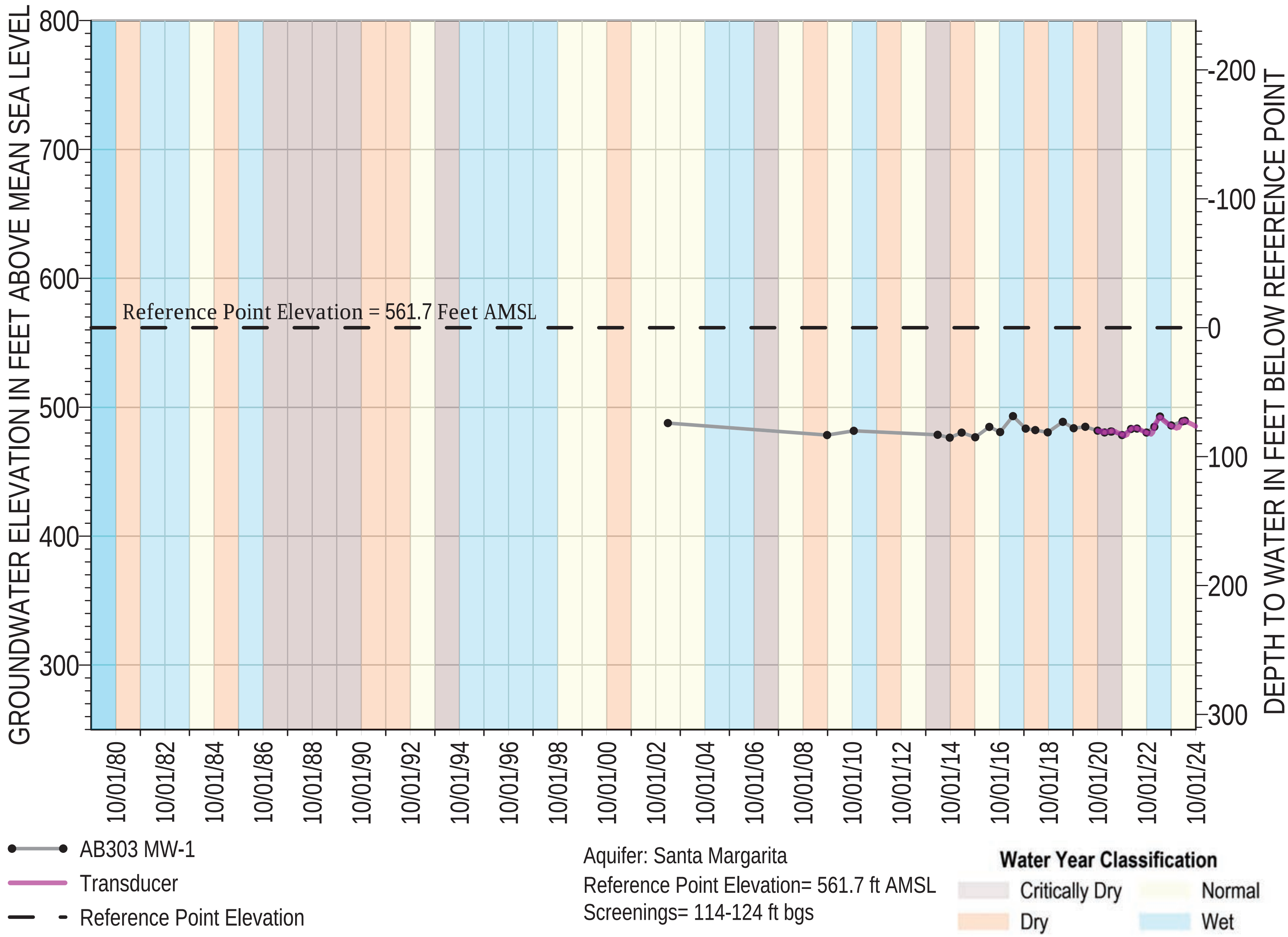
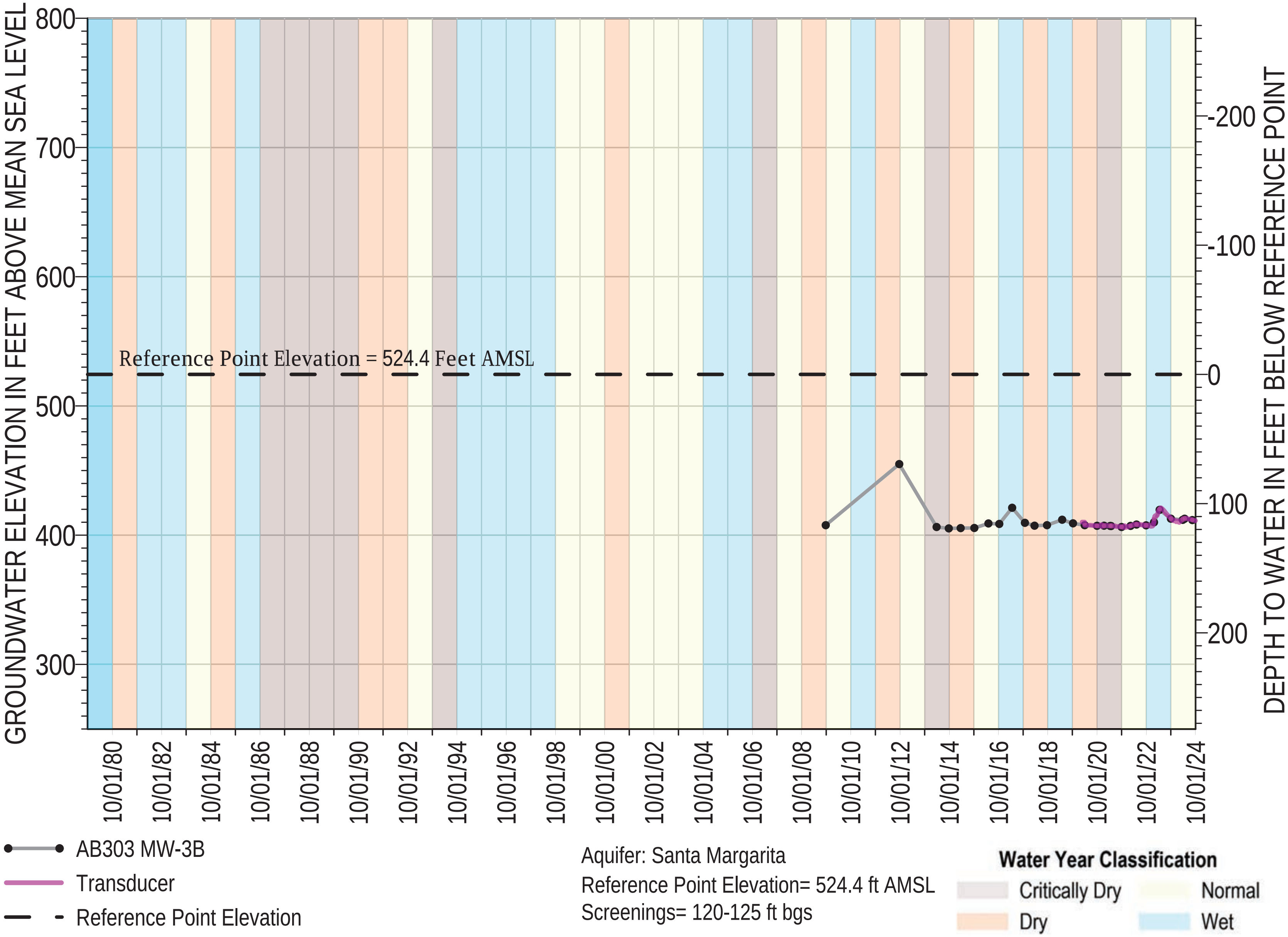
Appendix C

GSP Non-RMP Monitoring Network Hydrographs

Santa Margarita Sandstone

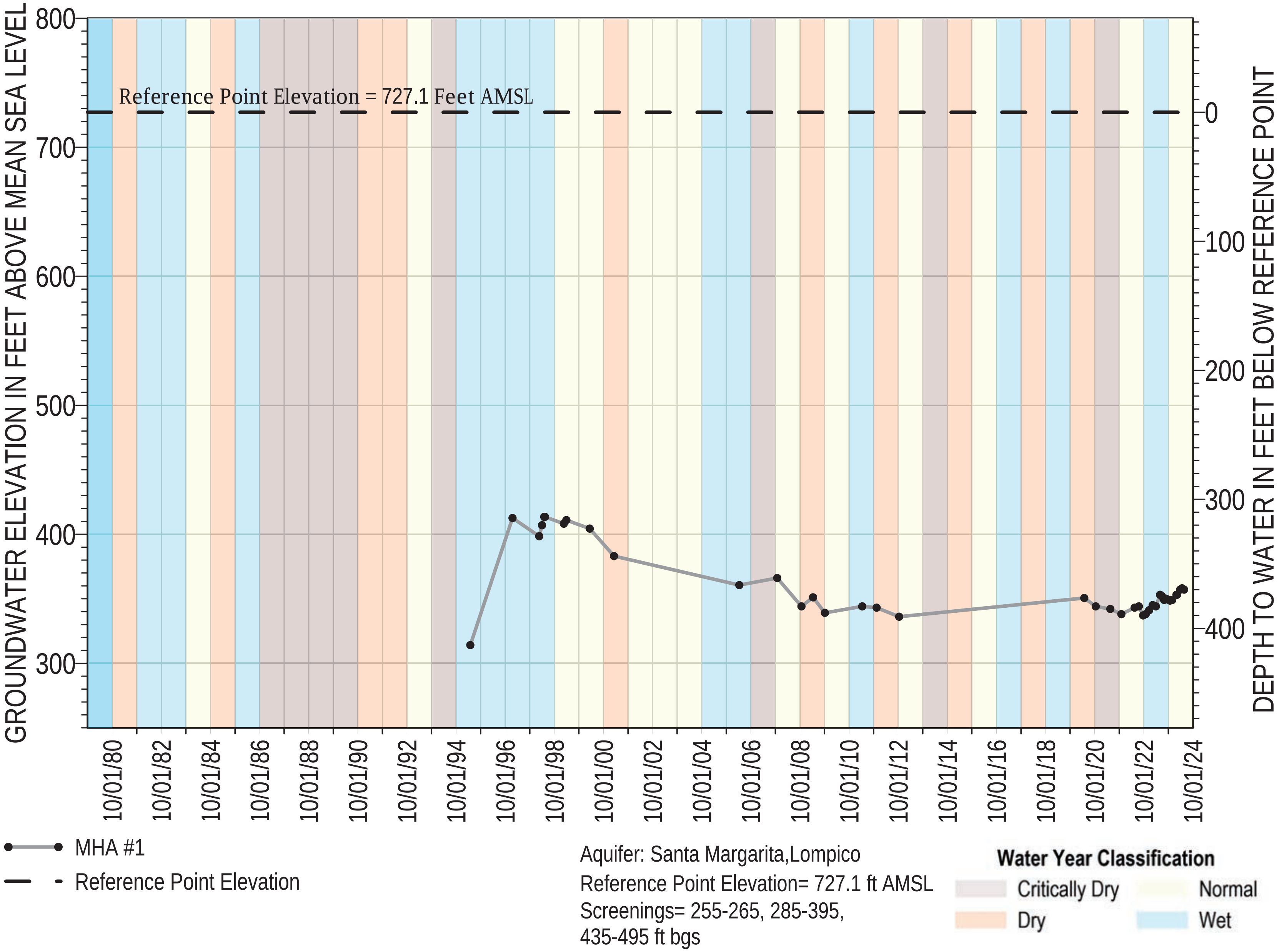


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



Aquifer: Santa Margarita
Reference Point Elevation= 524.4 ft AMSL
Screenings= 120-125 ft bgs

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



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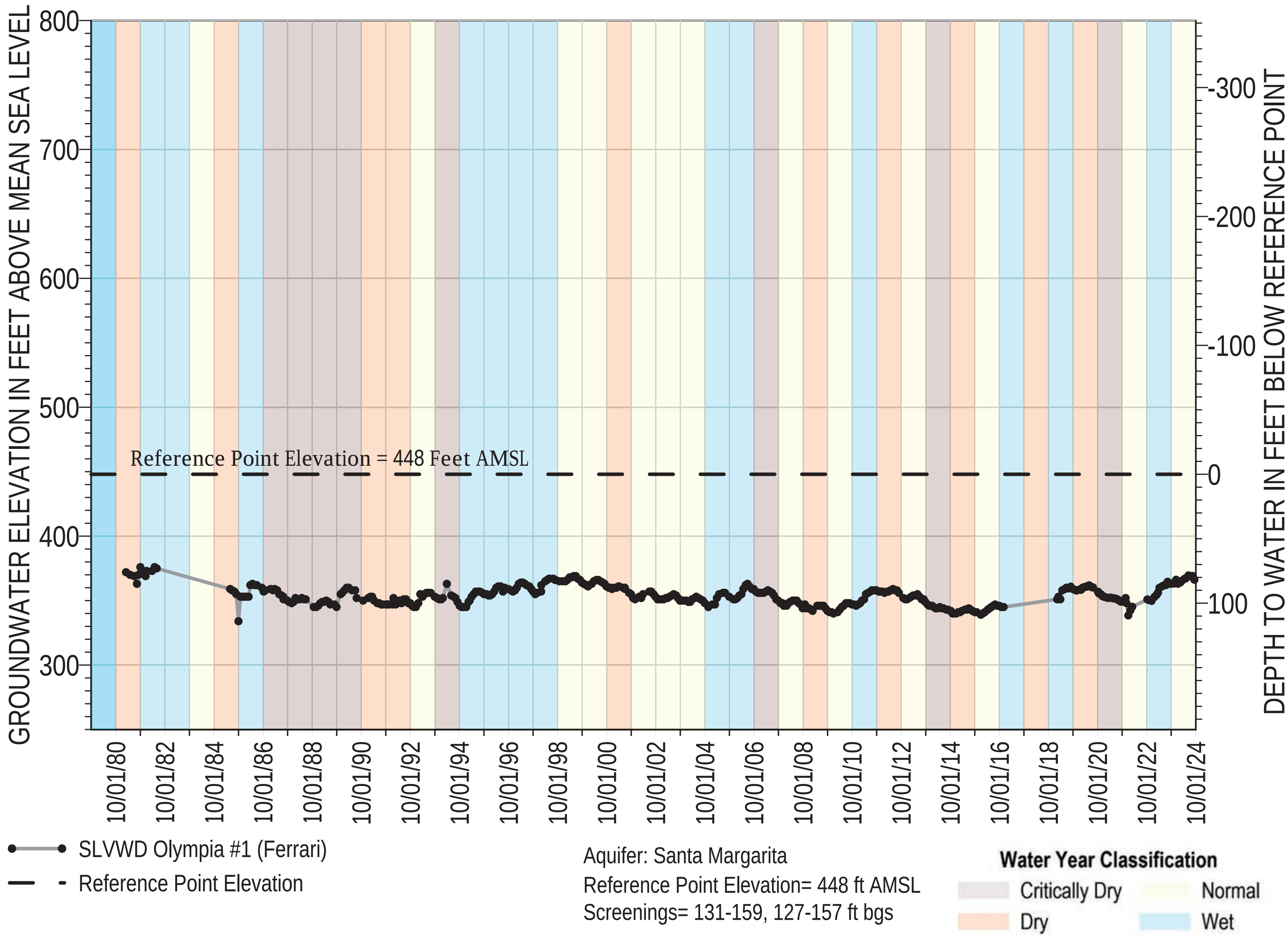
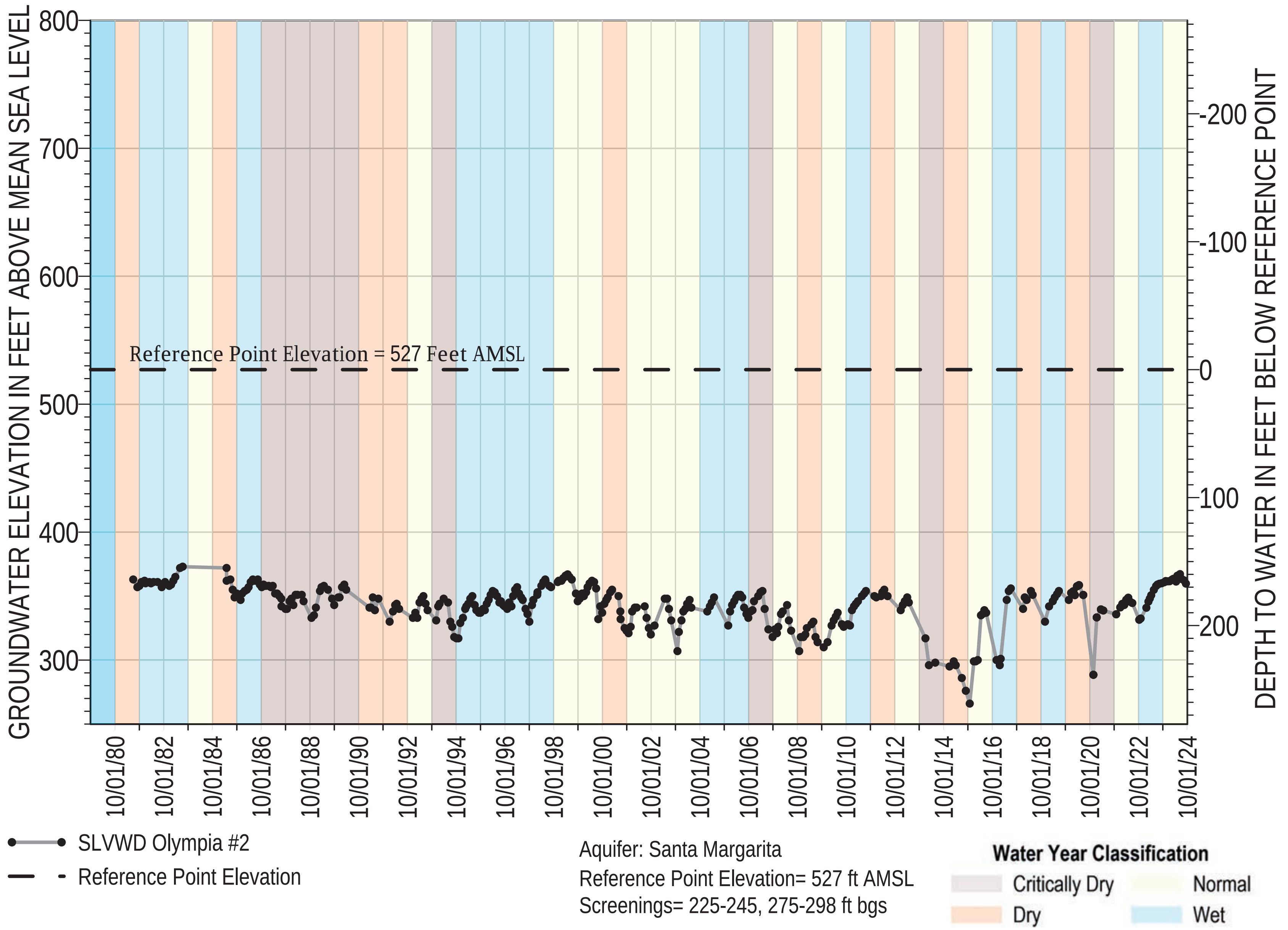
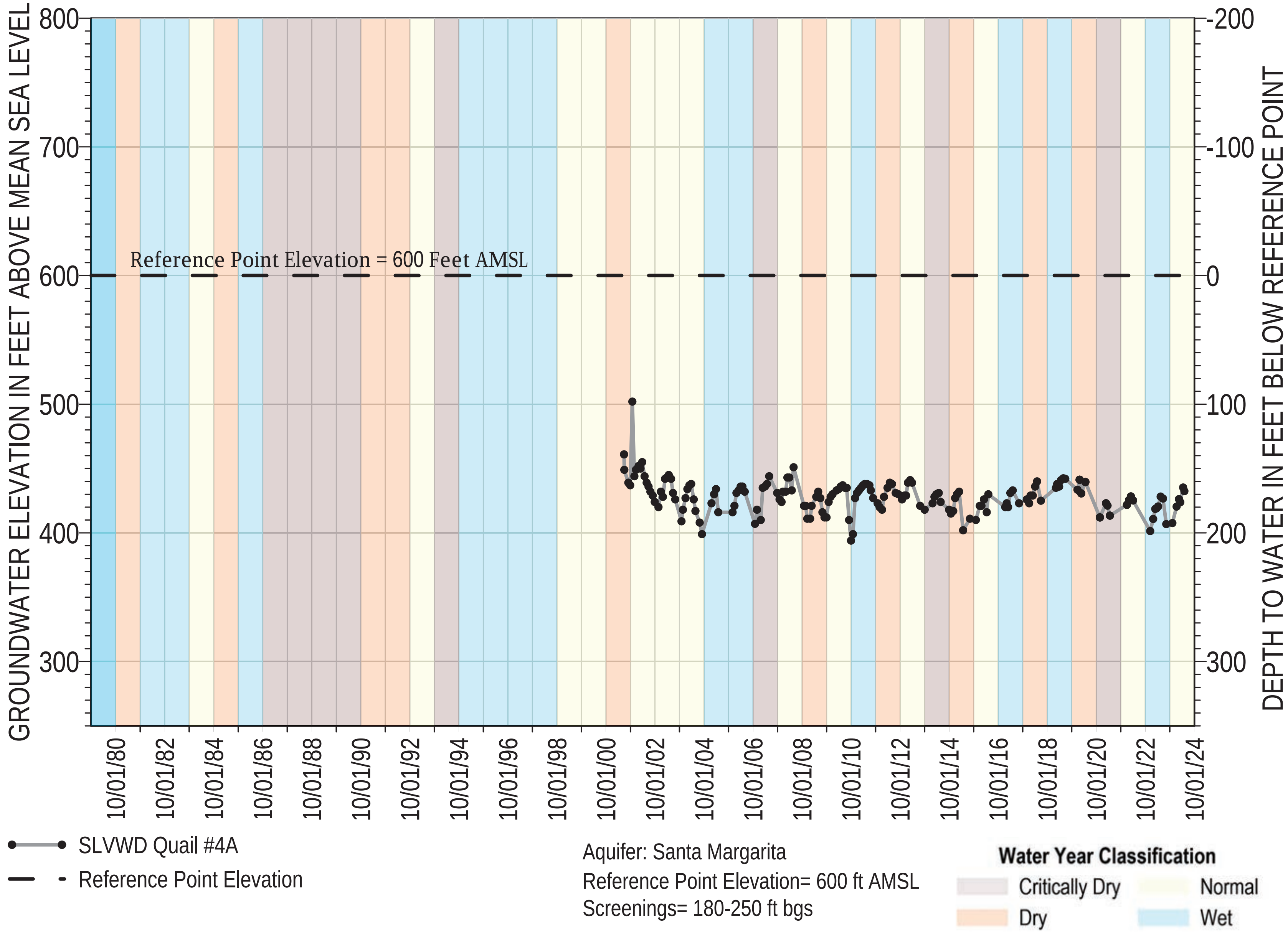
Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.

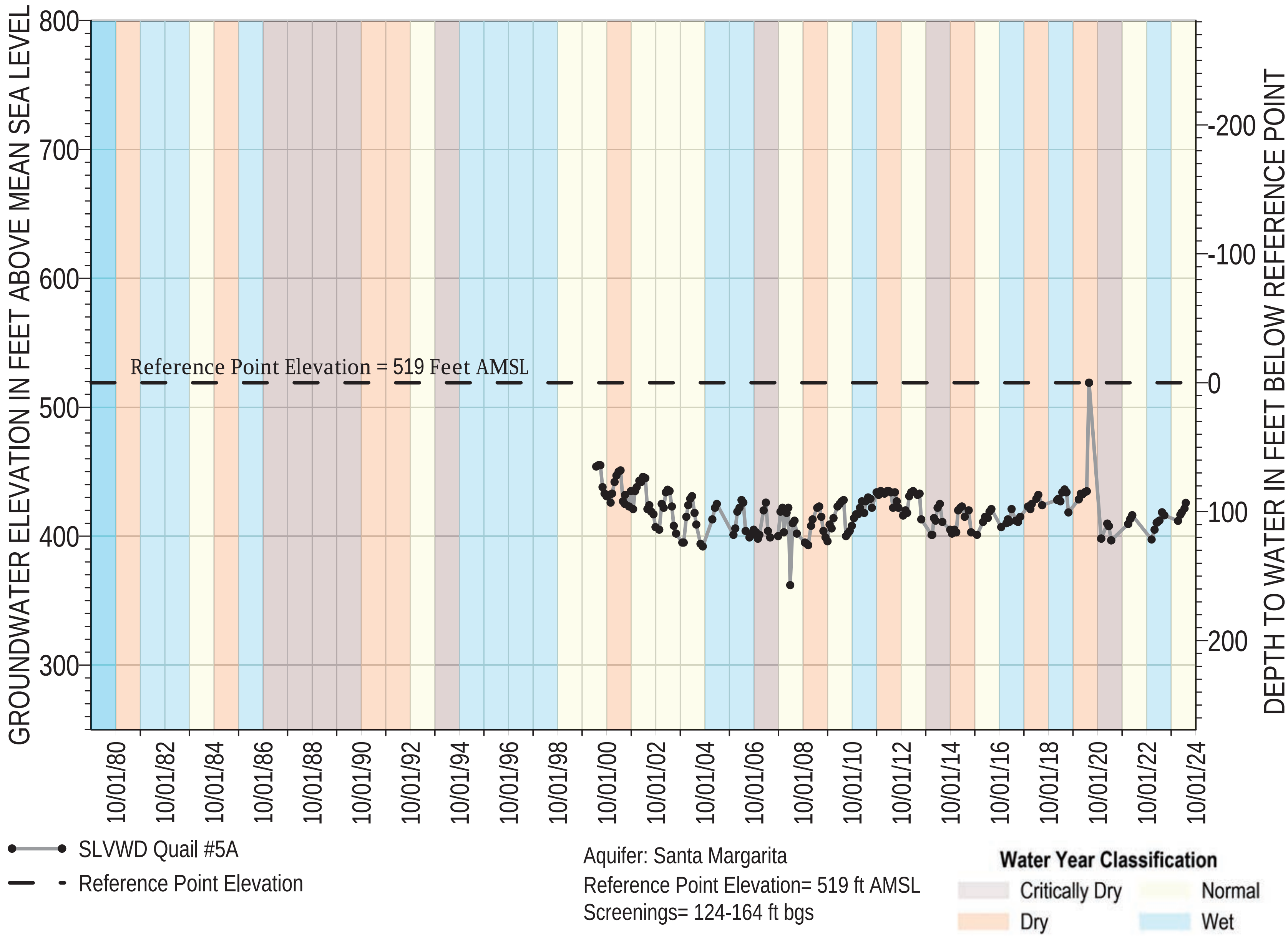


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.

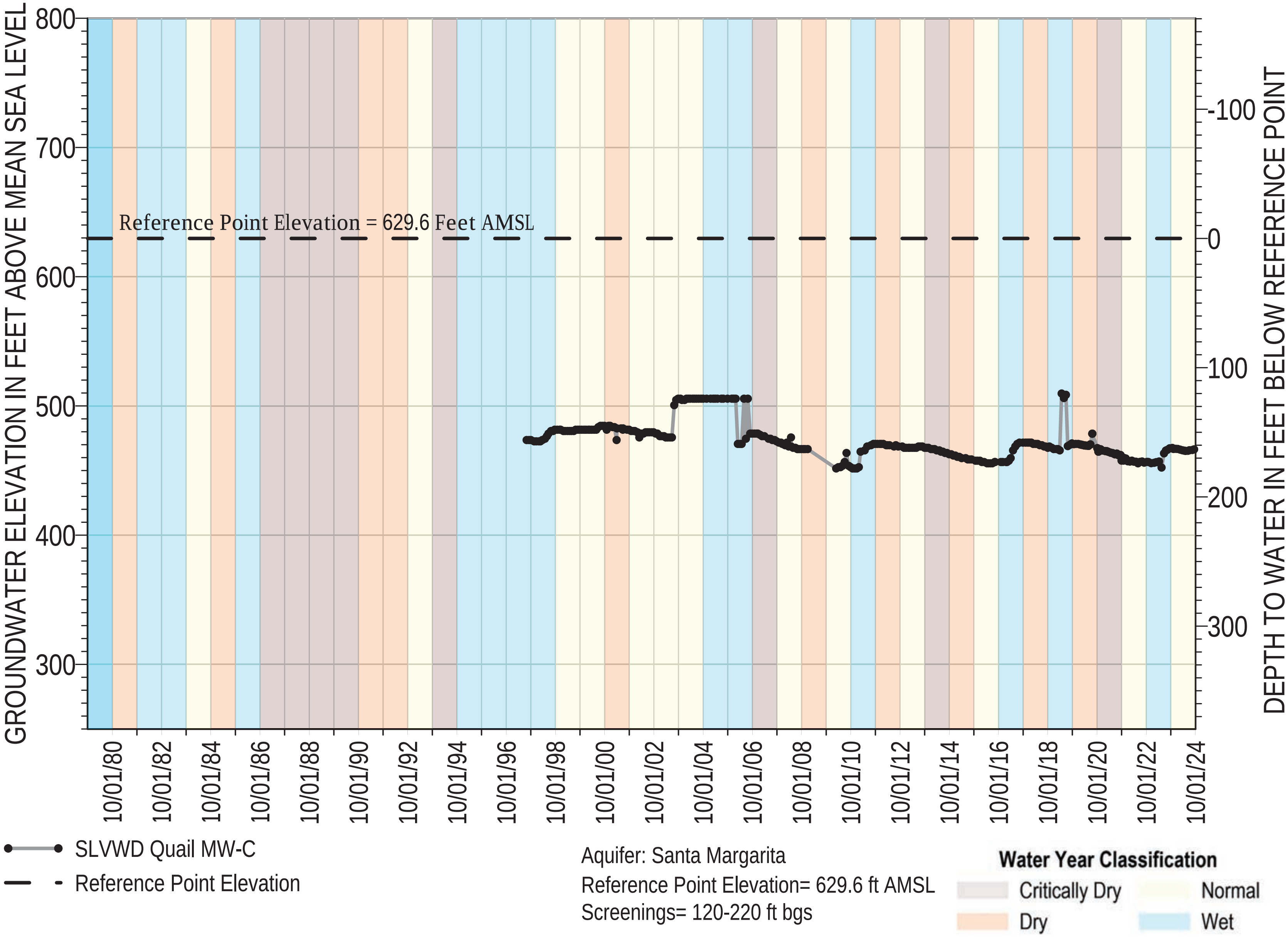


Aquifer: Santa Margarita
Reference Point Elevation= 600 ft AMSL
Screenings= 180-250 ft bgs

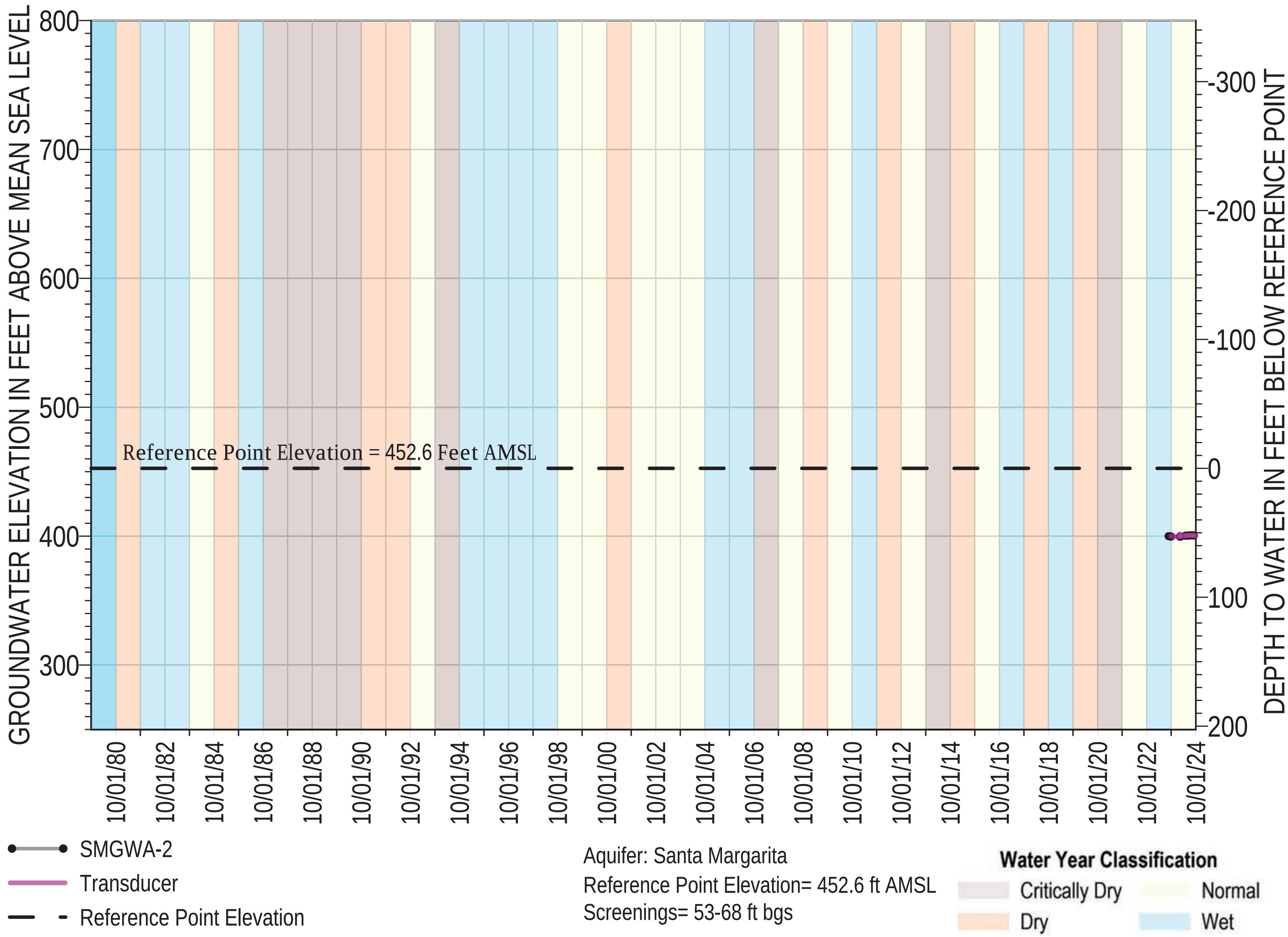
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.

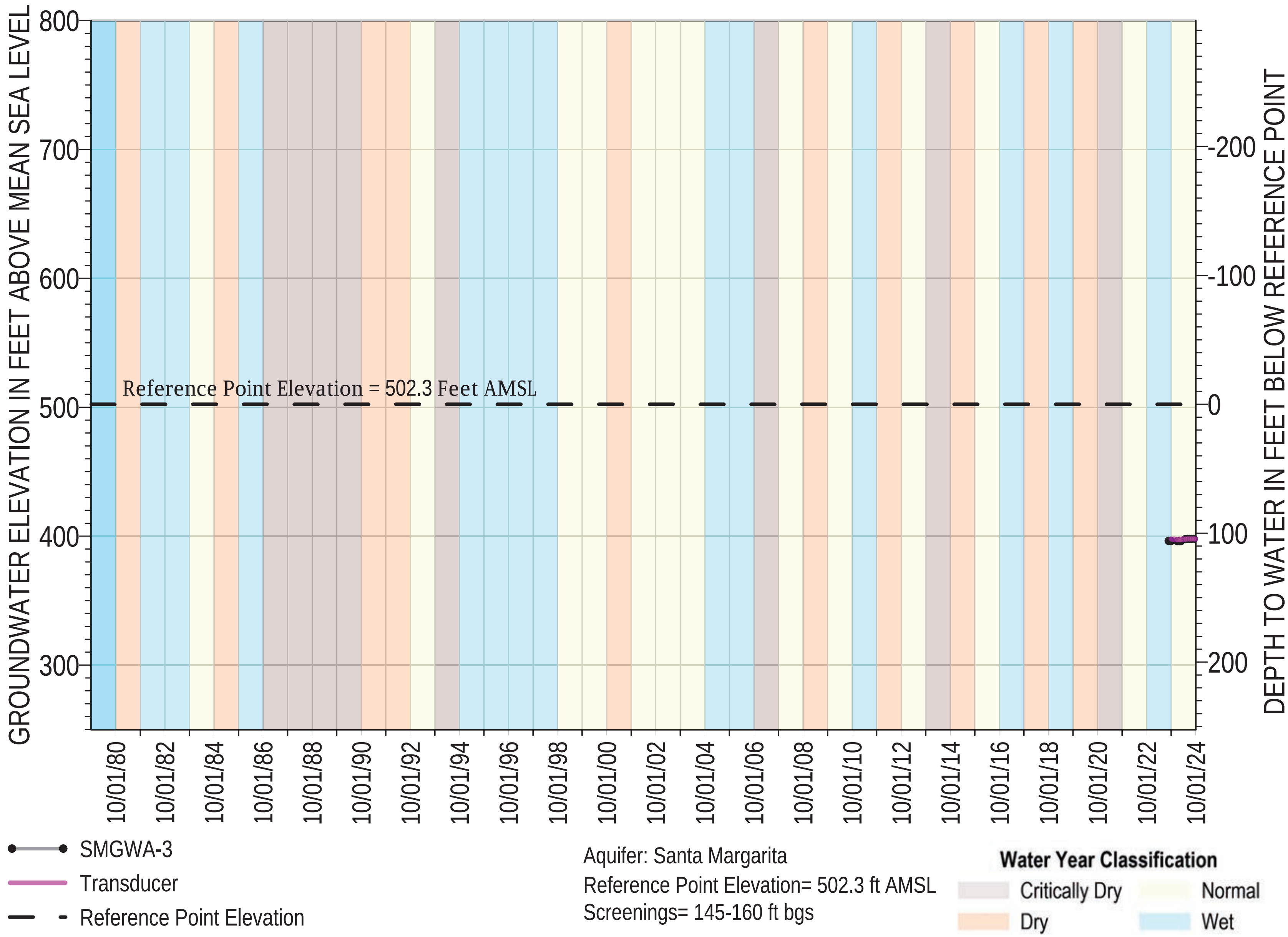


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.

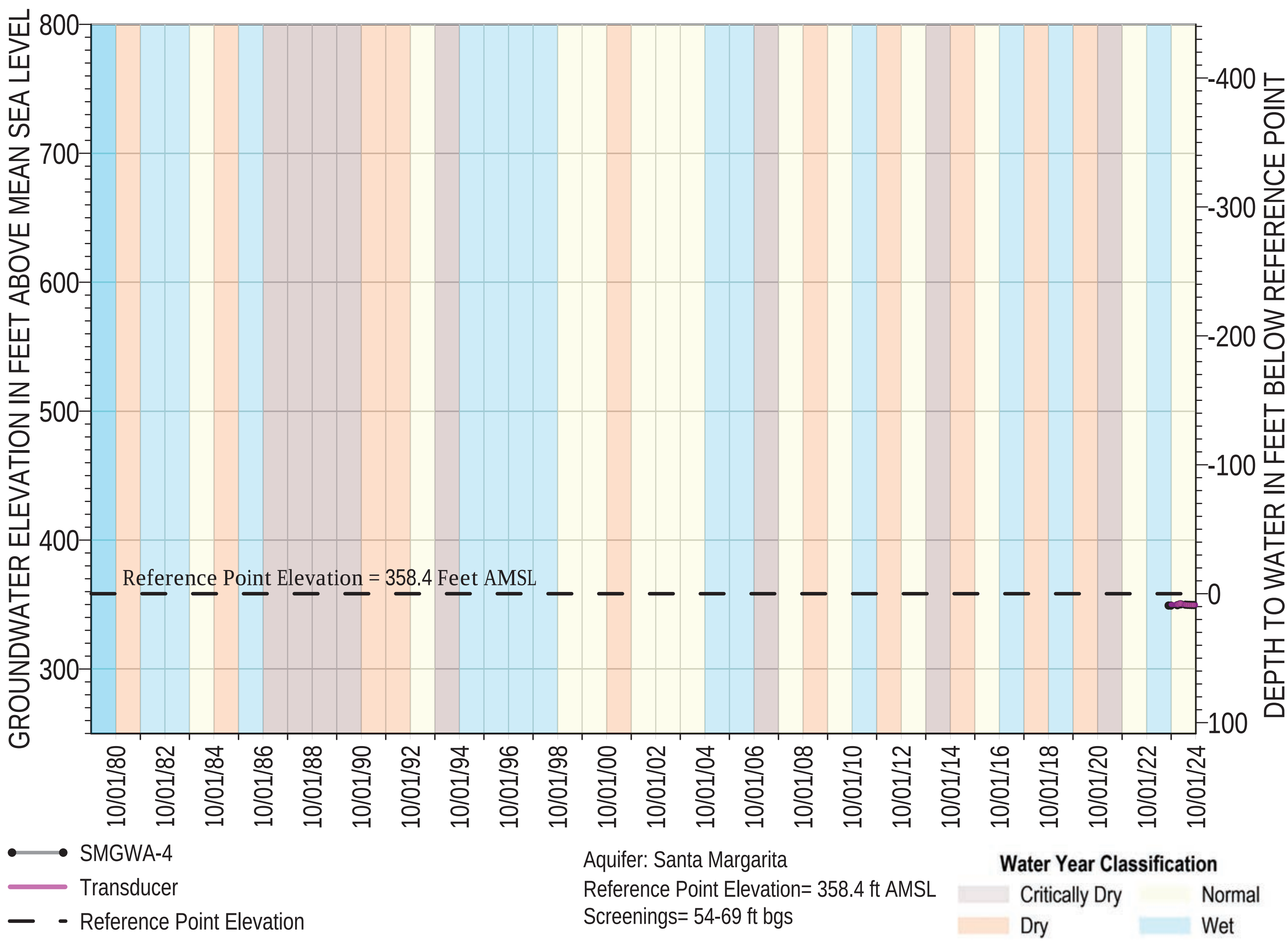


Aquifer: Santa Margarita
Reference Point Elevation= 452.6 ft AMSL
Screenings= 53-68 ft bgs

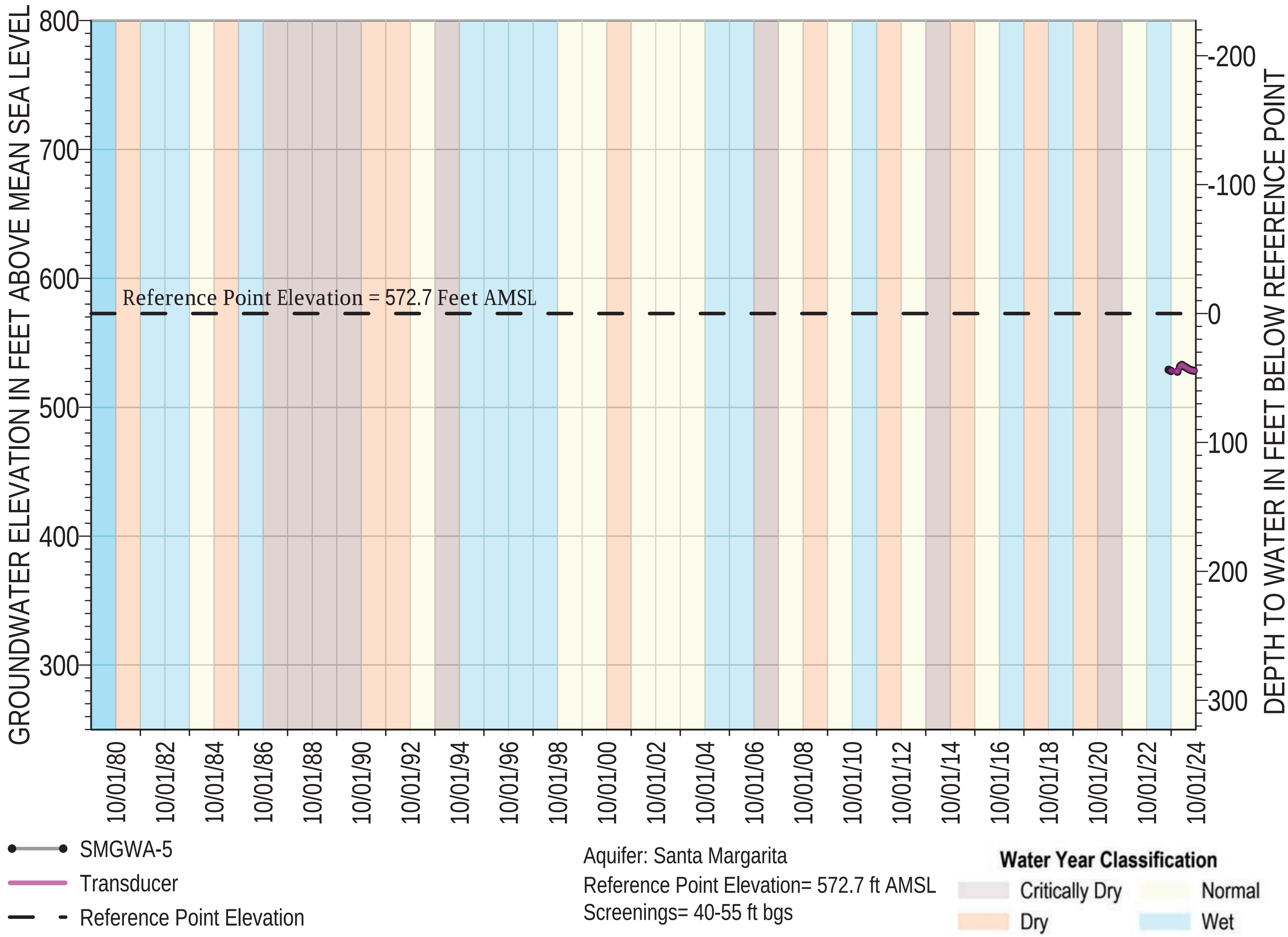
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



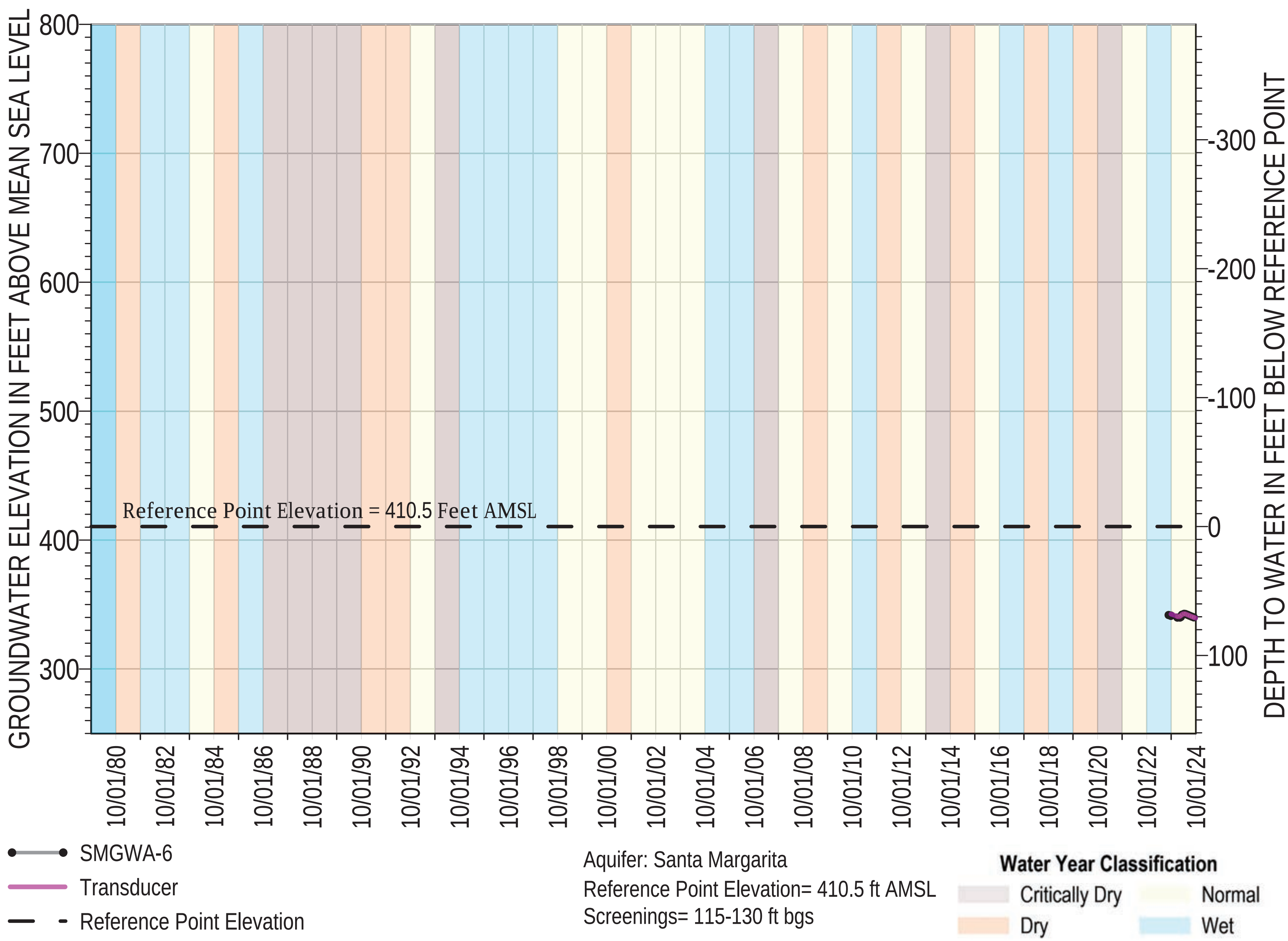
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.

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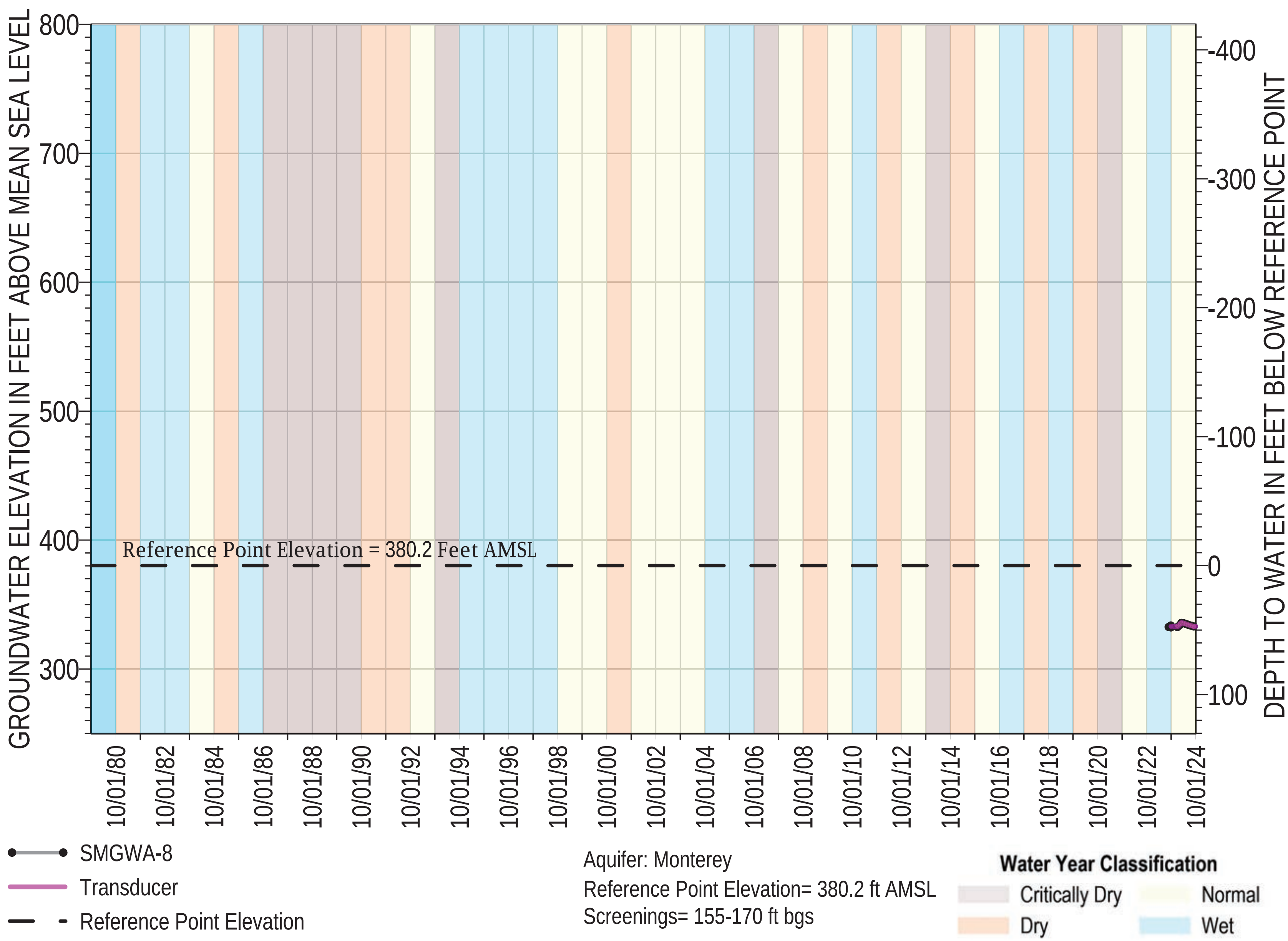
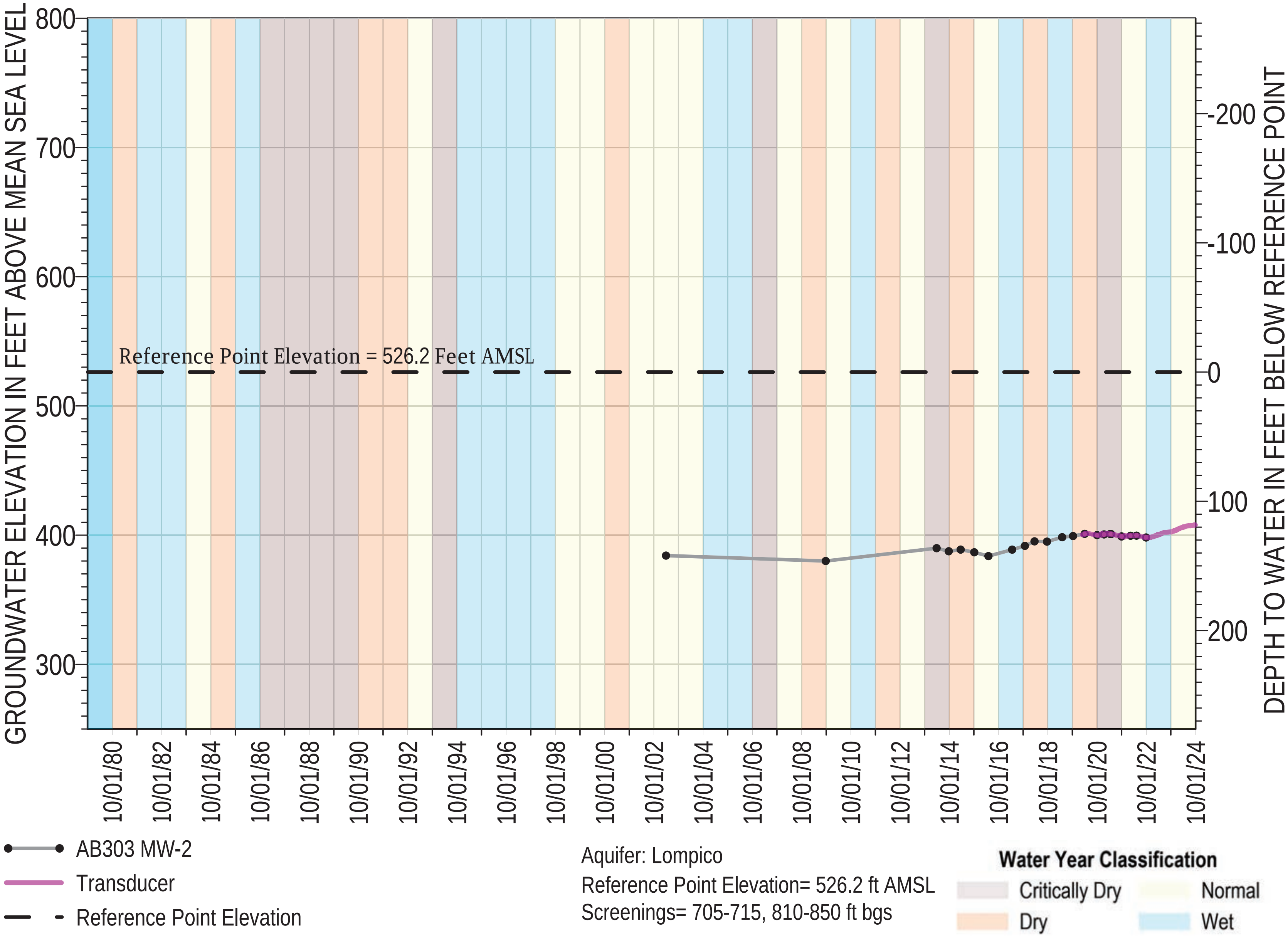
Appendix C

Monterey Formation

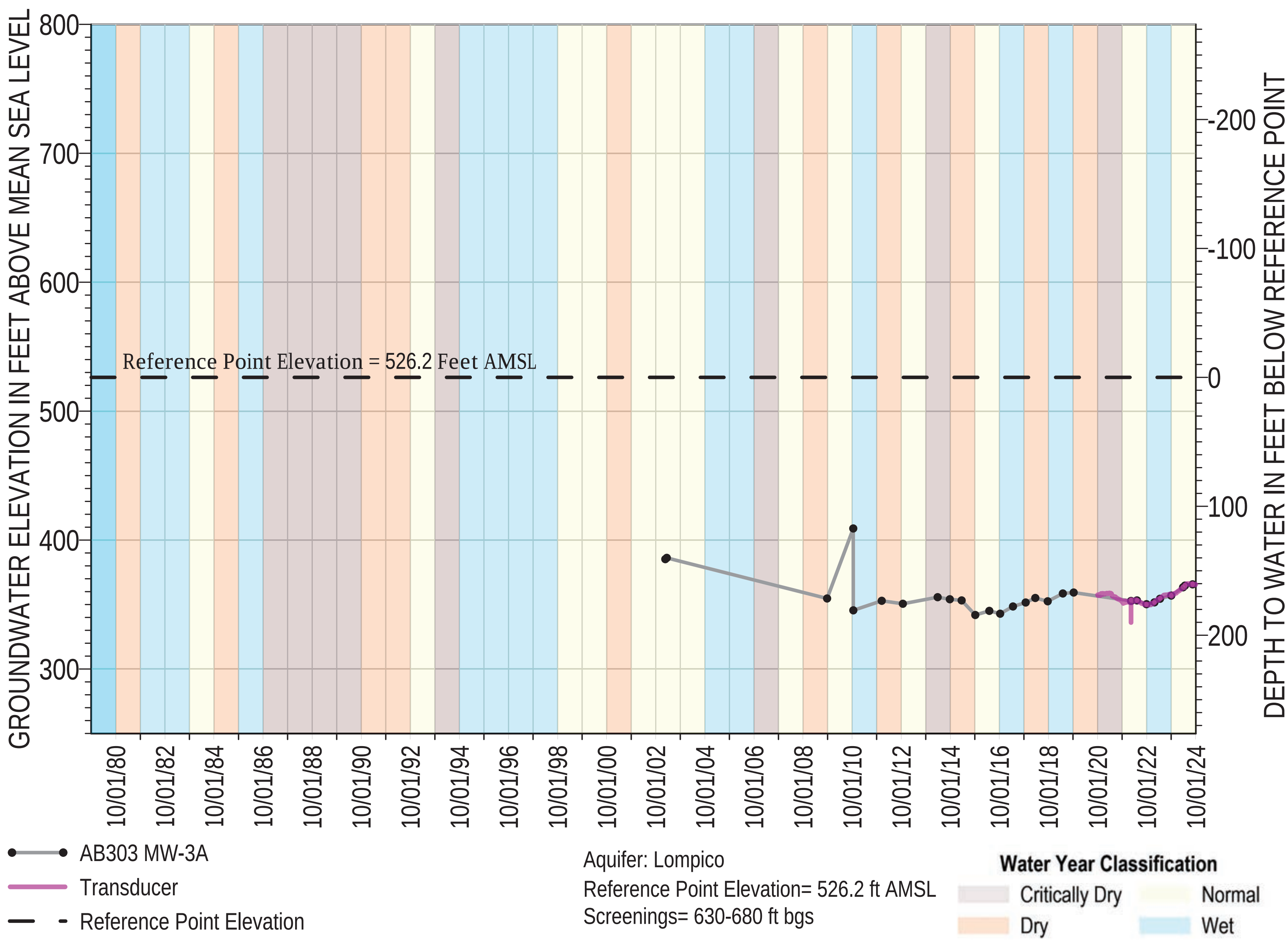


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.

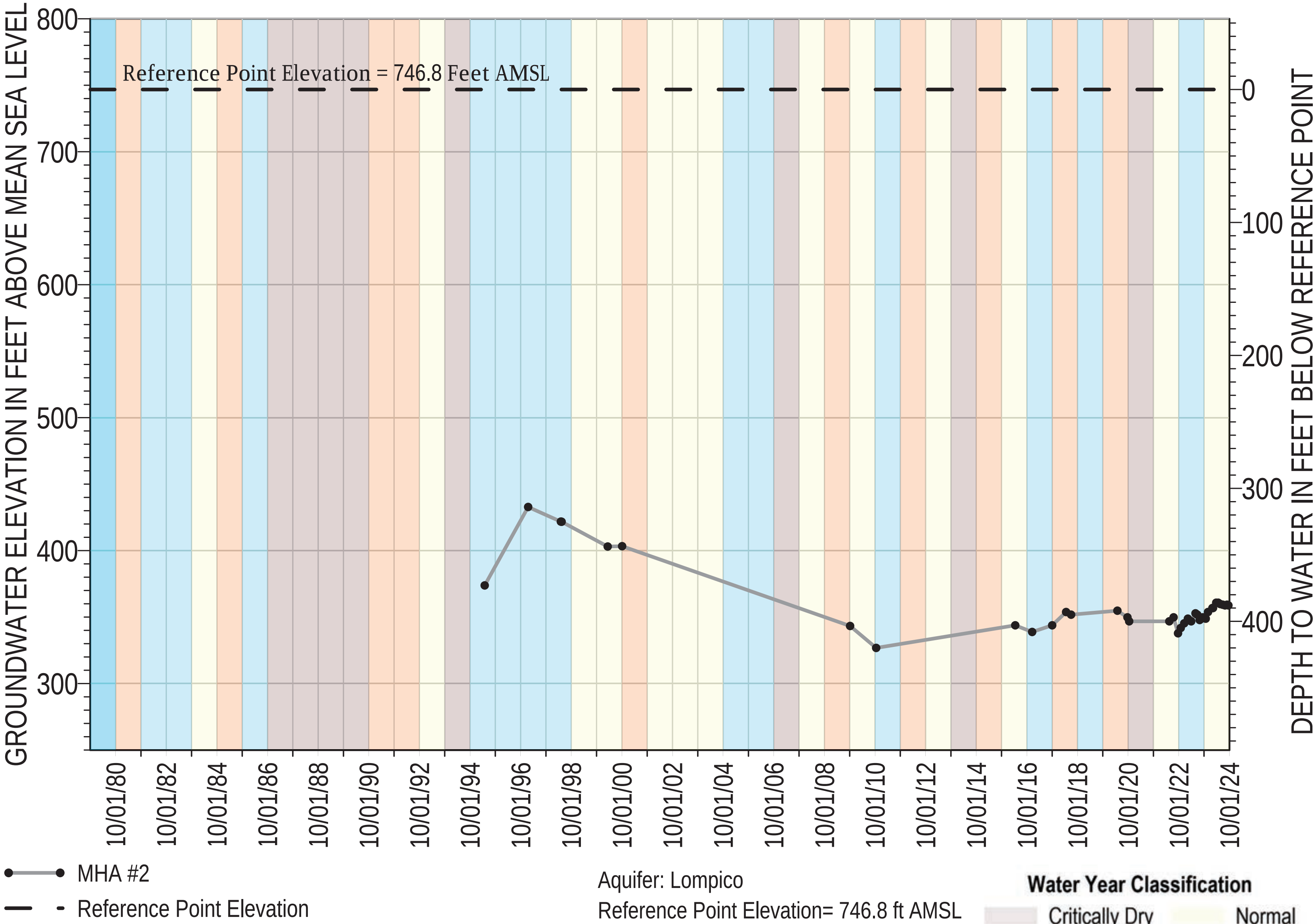
Lompico Sandstone



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.

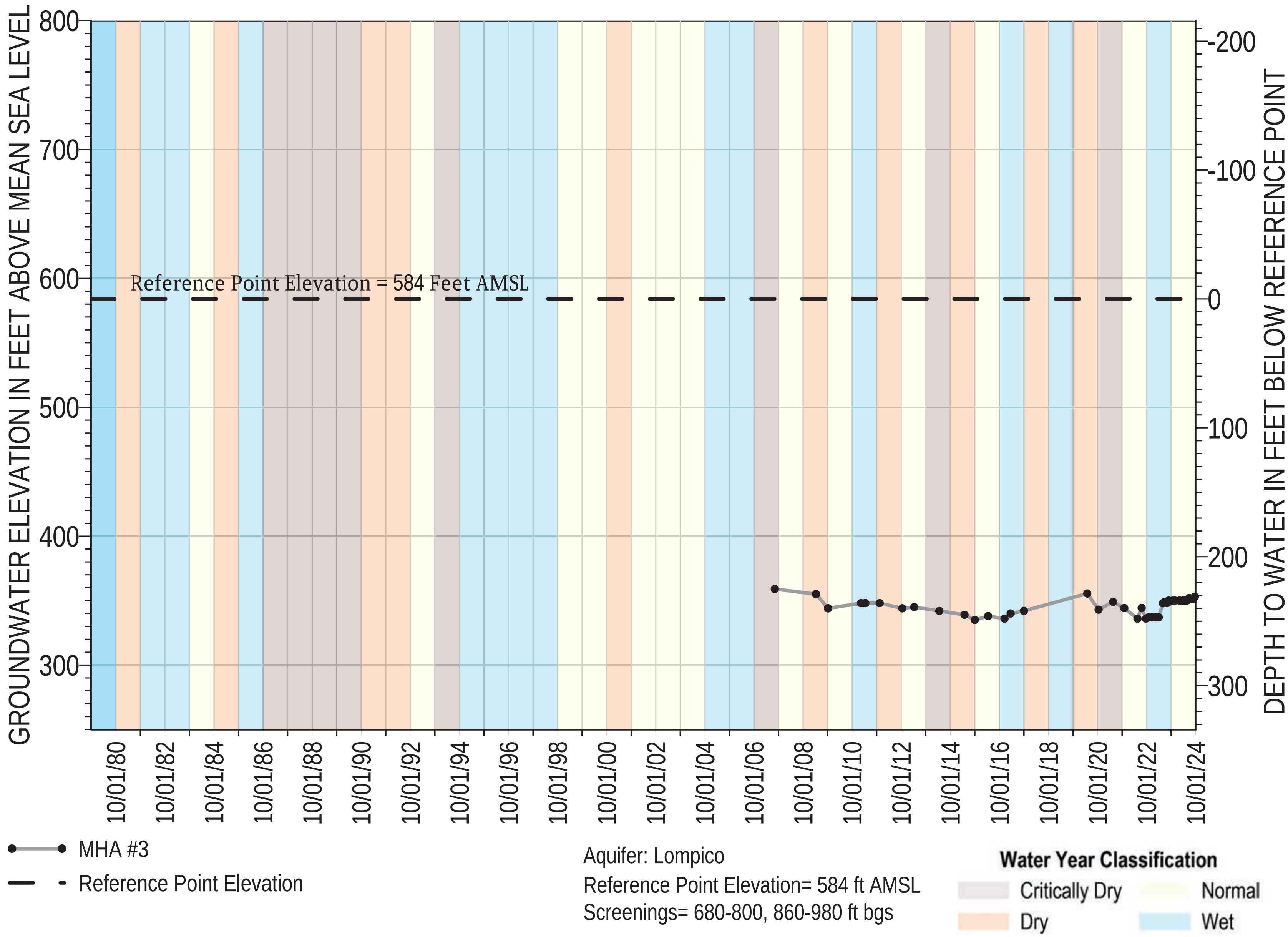


Aquifer: Lompico
Reference Point Elevation= 746.8 ft AMSL
Screenings= 290-300, 400-415, 430-460, 490-590, 600-725 ft bgs

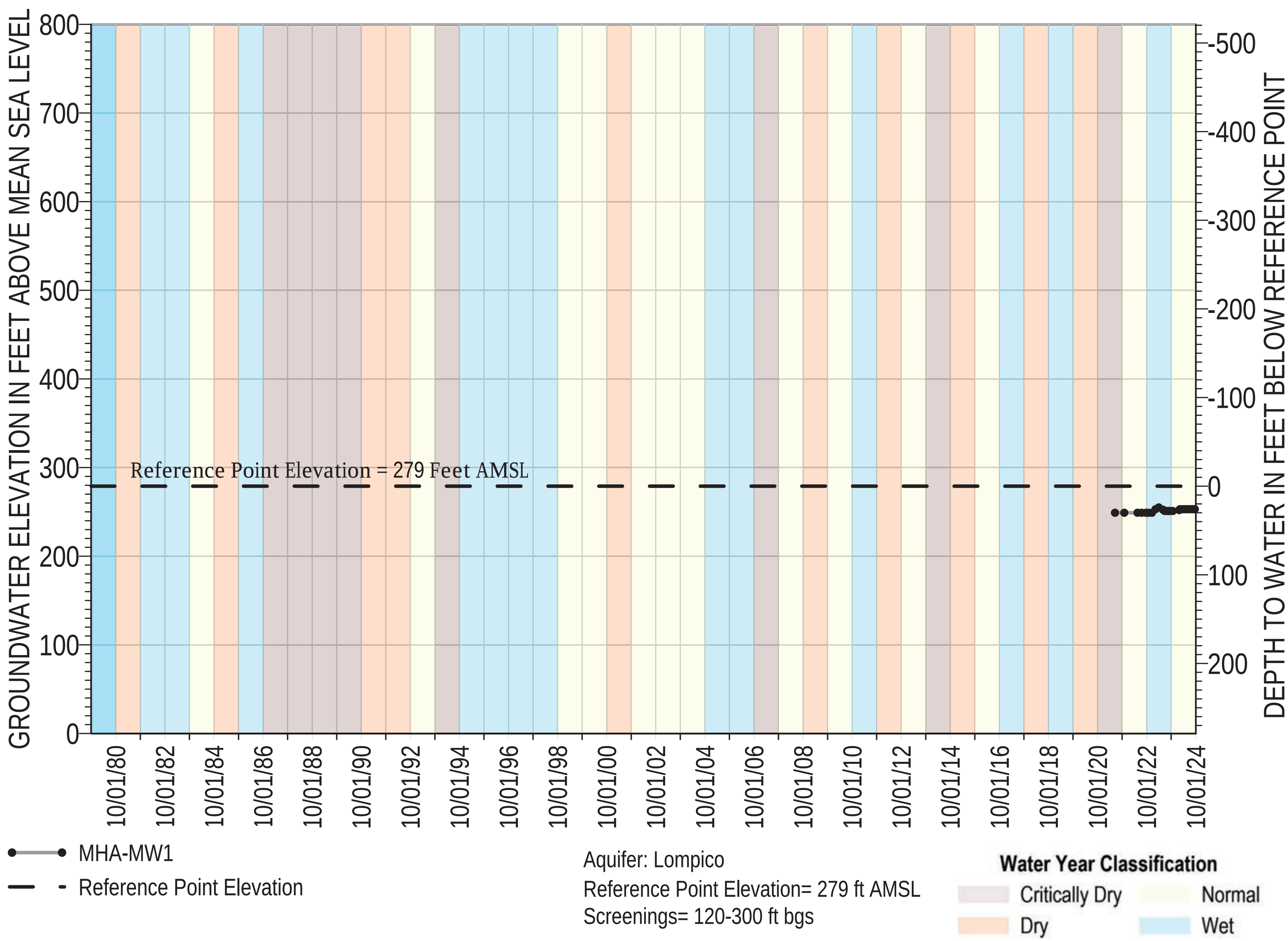
Water Year Classification

Critically Dry | Normal | Dry | Wet

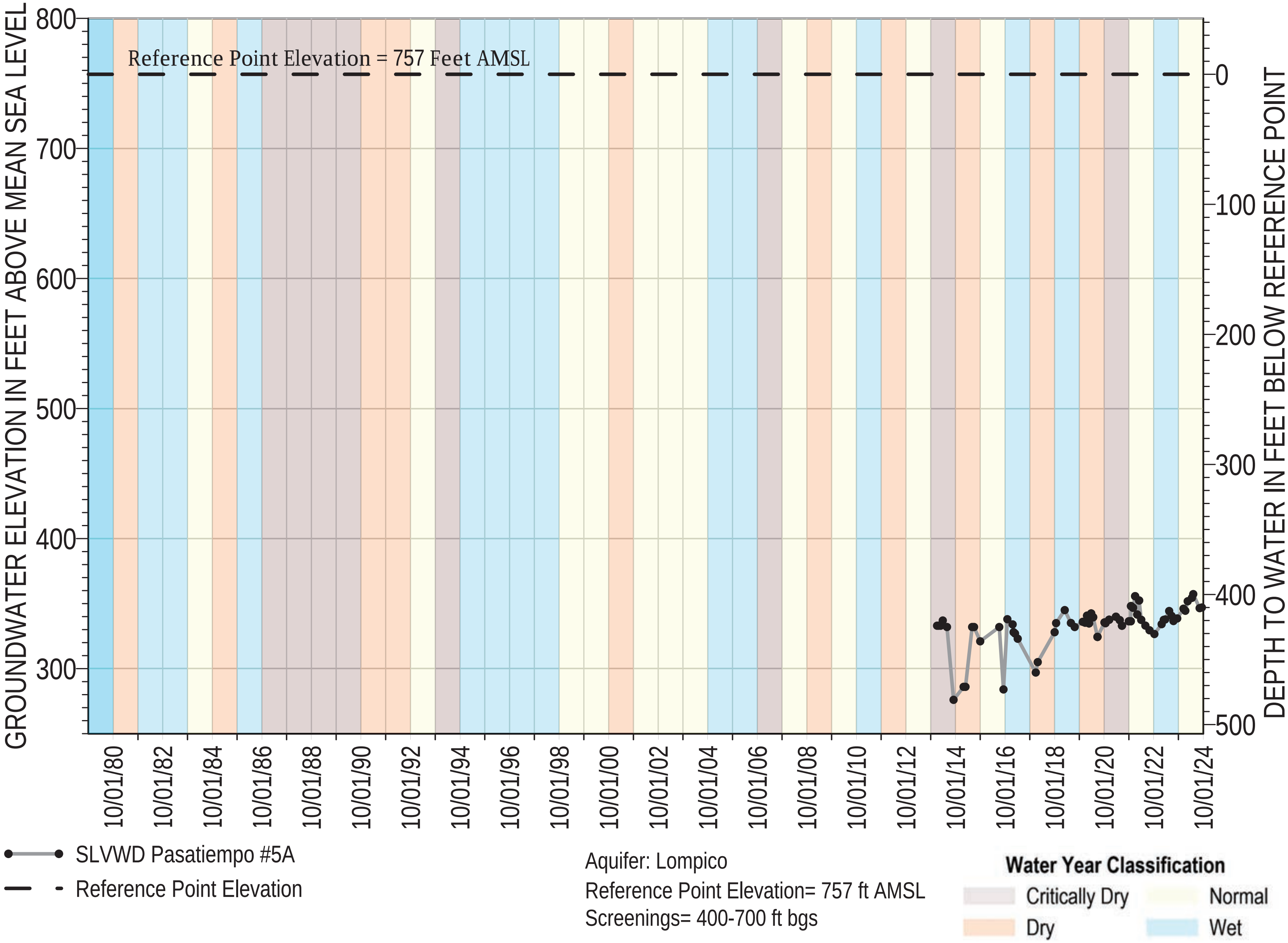
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



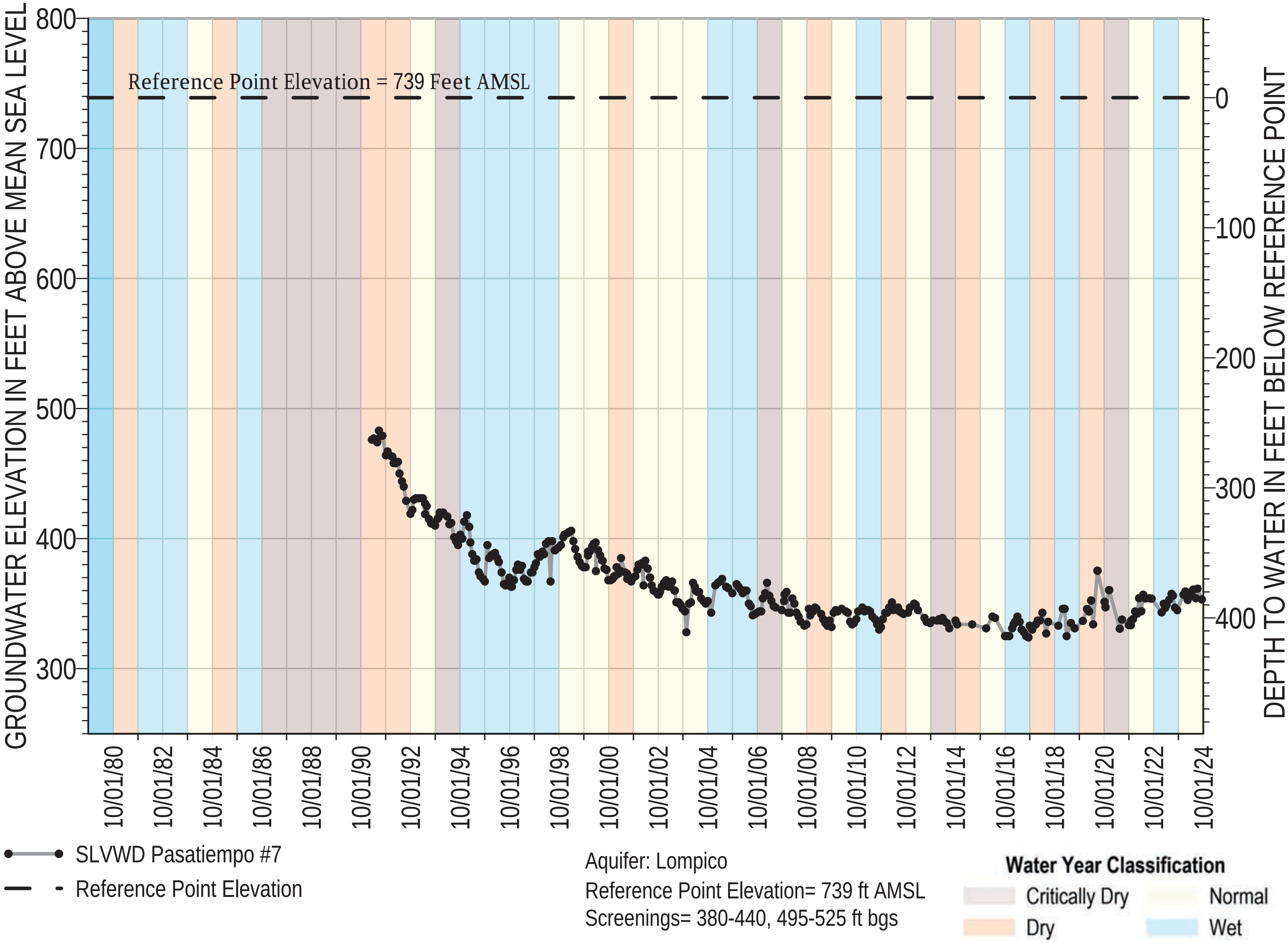
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



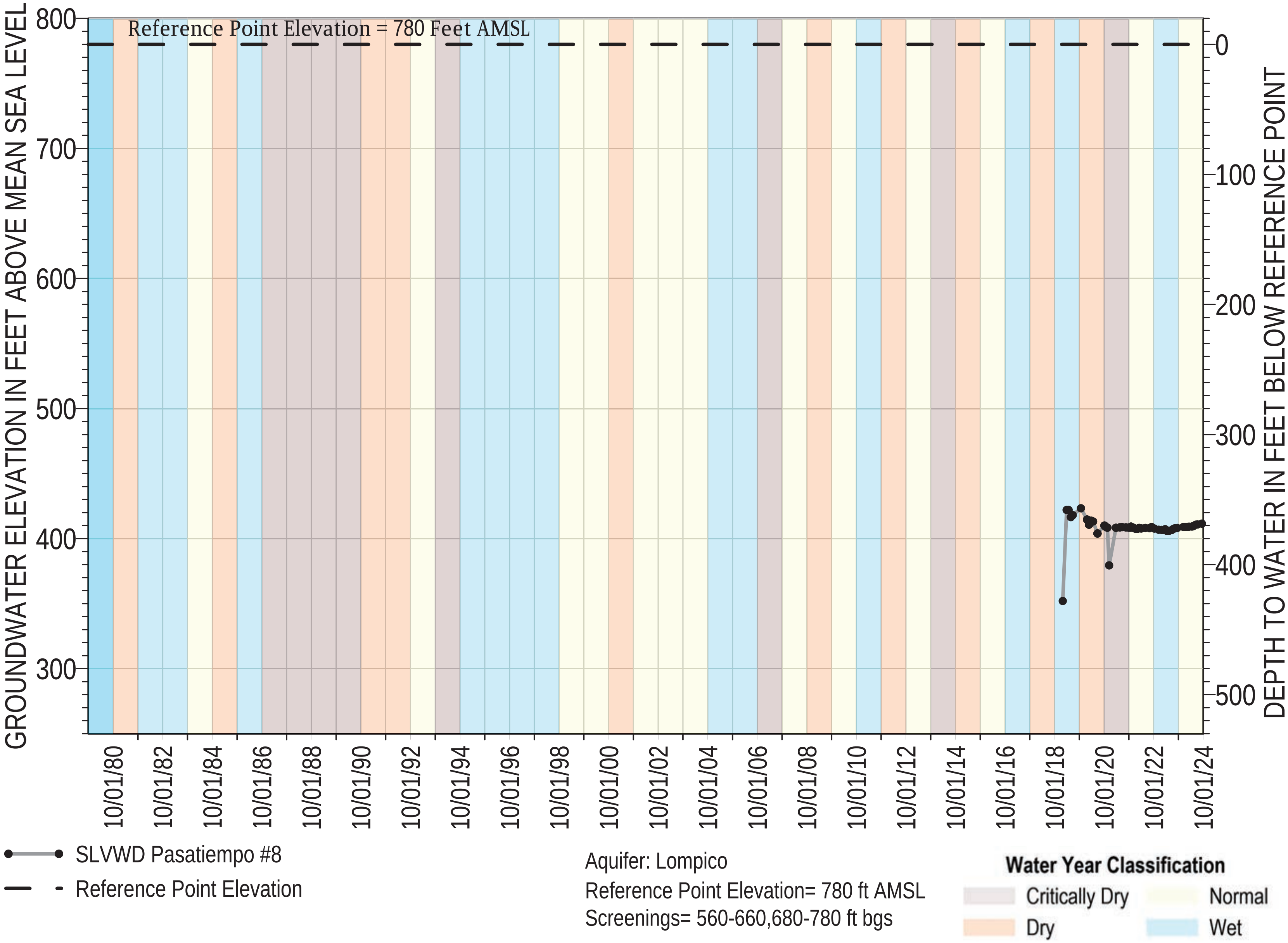
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



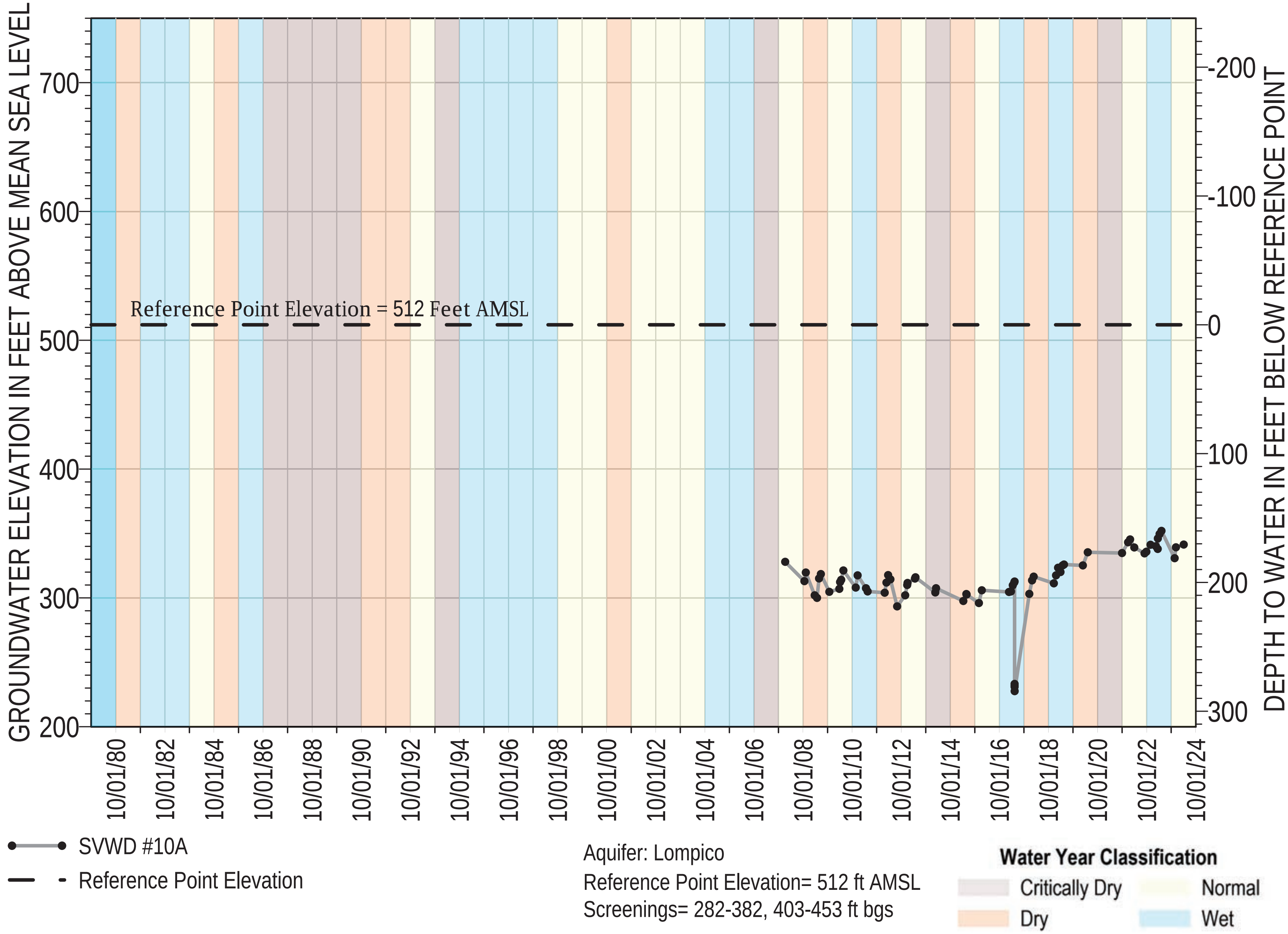
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



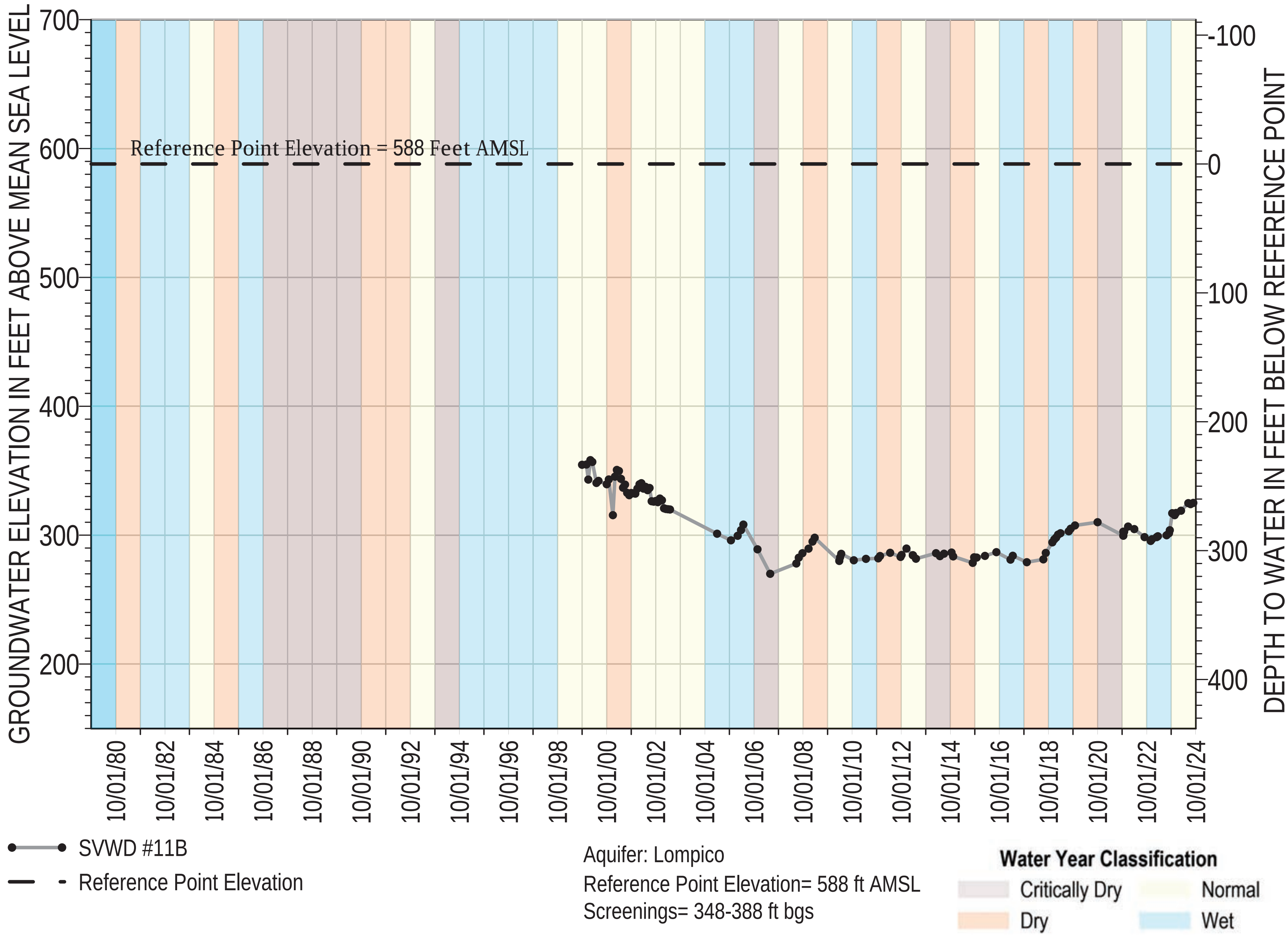
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



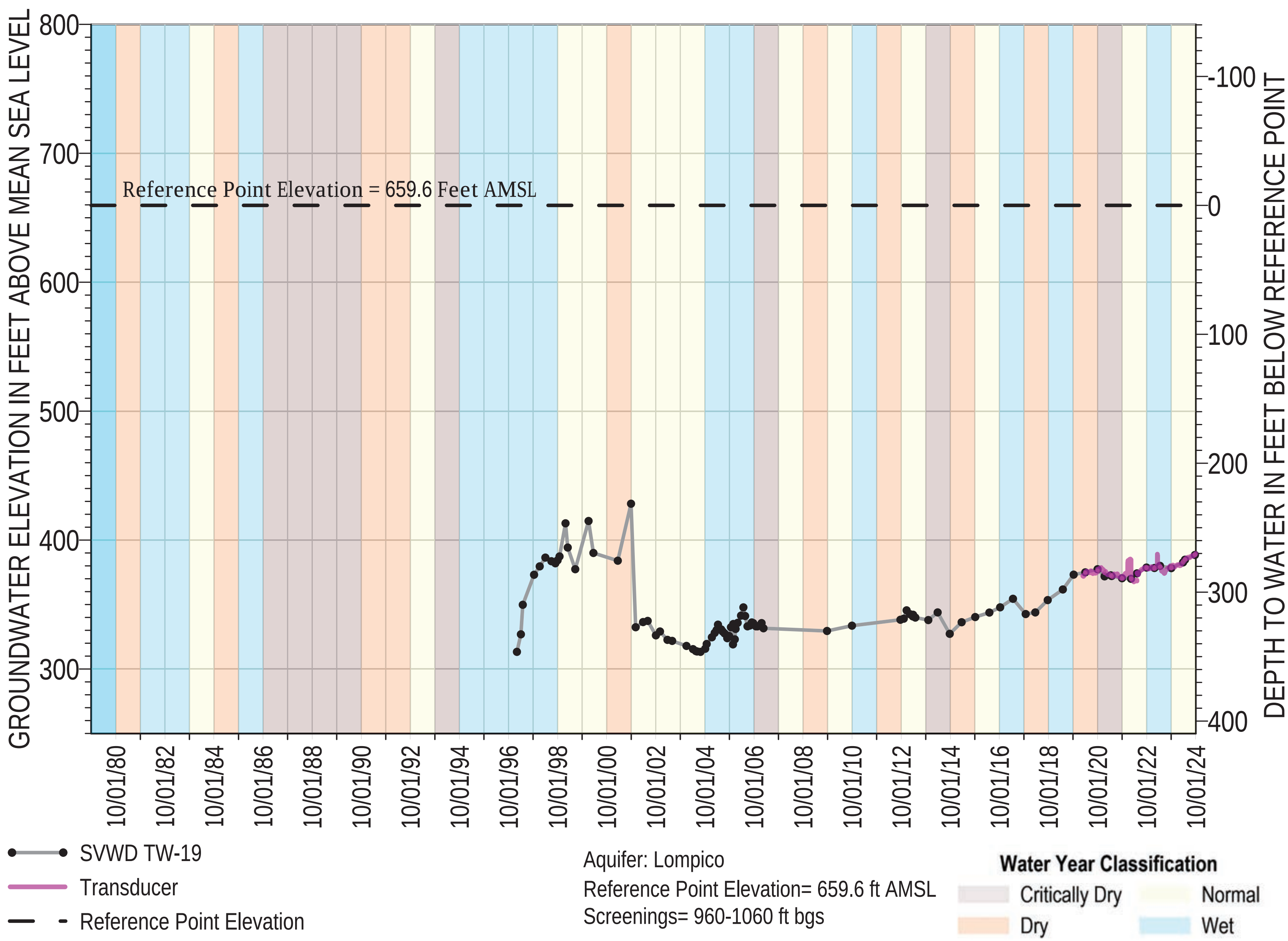
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



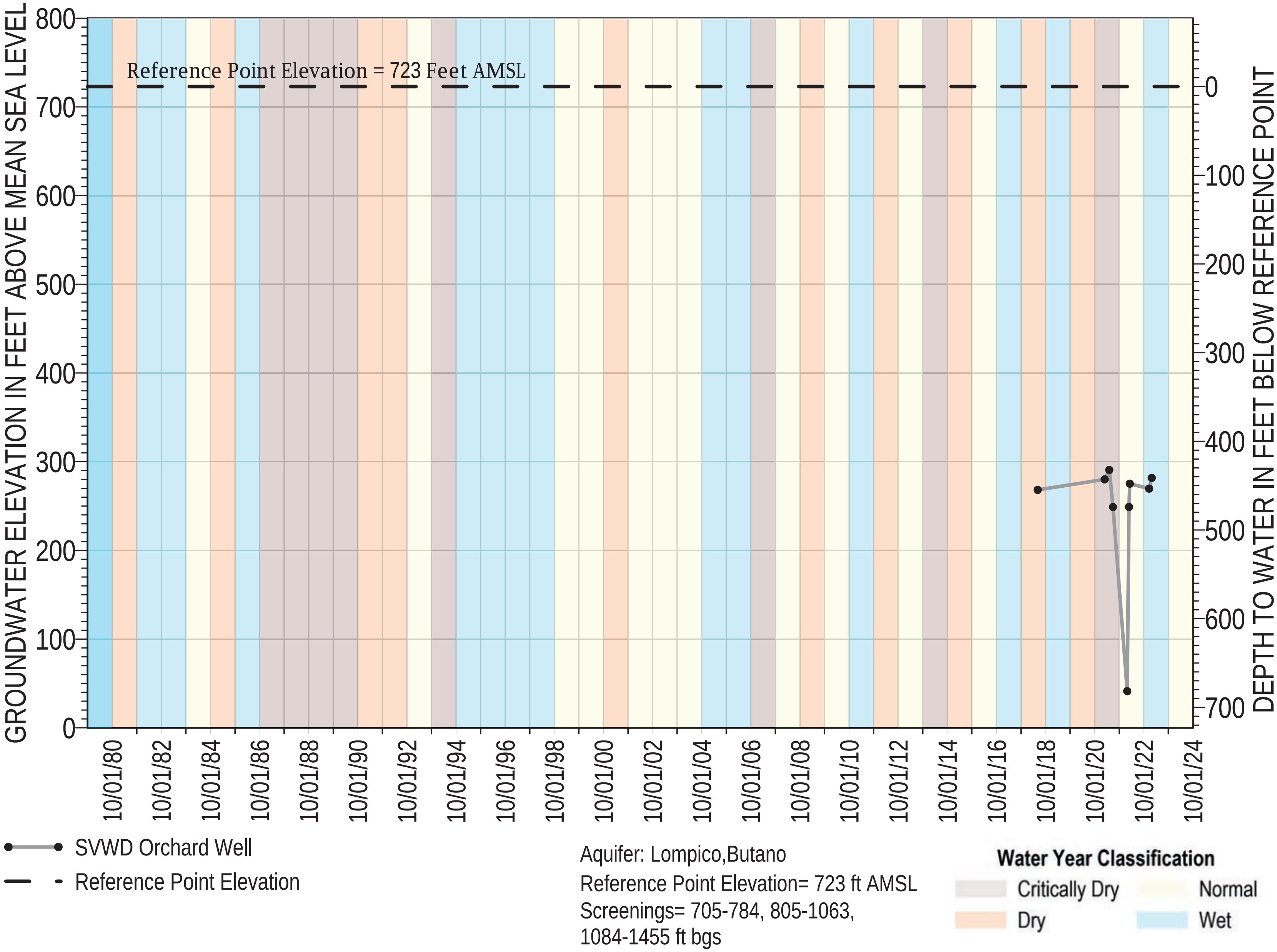
Aquifer: Lompico
Reference Point Elevation= 659.6 ft AMSL
Screenings= 960-1060 ft bgs

Water Year Classification

Critically Dry
Normal
Dry
Wet

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.

Lompico/Butano Sandstone



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.
Pumping measurements are removed from hand soundings but not from transducer data.

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Appendix D

Water Quality Data

Santa Margarita Basin Groundwater Quality Data for WY 2024

Constituent	1,2-DCE	Arsenic	Chloride	Chlorobenzene	Iron	Manganese	MTBE	Nitrate (as N)	PCE	TDS	TCE
MT	0.07	0.01	250	0.07	0.3	0.05	0.013	5	0.005	1,000	0.005
SVWD Orchard Well											
MO	0.0005	0.002	26.3	0.001	0.063	0.004	0.003	0.4	0.0005	450	0.0005
10/19/2023					ND	0.0026					
2/28/2024					ND	0.0027					
5/15/2024					ND	0.0027					
5/20/2024			43.0							490	
8/27/2024	ND	ND	58.0	ND	ND	0.0024	ND	ND	ND	510	ND
SLVWD Olympia #2											
MO	MO not defined because well is not an RMP										
11/21/2023					**0.330**	**0.160**					
2/14/2024					**0.470**	**0.150**					
4/8/2024	ND	ND	6.4	ND	0.280	**0.140**	ND	ND	ND	330	ND
5/15/2024					**0.500**	**0.140**					
8/7/2024					0.240	**0.160**					
SLVWD Olympia #3											
MO	0.0005	0.002	8.85	0.001	0.502	0.157	0.003	0.4	0.0005	573	0.0005
11/21/2023					0.190	**0.140**					
2/14/2024					0.300	**0.140**					
4/8/2024	ND	ND	8.3	ND	**0.310**	**0.130**	ND	ND	ND	690	ND
5/15/2024					**0.320**	**0.140**					
8/7/2024					0.120	**0.140**					
SLVWD Pasatiempo #5A											
MO	MO not defined because well is not an RMP										
10/4/2023		0.002			0.037	0.003					
11/2/2023		0.002			0.042	0.004					
1/9/2024		0.001			0.140	0.007					
2/13/2024		0.001			**0.320**	0.043					
3/6/2024		0.001			0.120	0.006					
4/8/2024	ND	0.001	6.7	ND	0.100	0.005	ND	0.13	ND	160	ND
4/9/2024		0.001			0.130	0.007					
5/8/2024		0.001			0.260	0.009					
6/5/2024		0.002			0.046	0.003					

MT - Minimum Threshold, MO - Measurable Objective, RMP - Representative Monitoring Point
ND - Not Detected above reporting limit, all values are in mg/L
Values above MT in bold

Santa Margarita Basin Groundwater Quality Data for WY 2024

Constituent	1,2-DCE	Arsenic	Chloride	Chlorobenzene	Iron	Manganese	MTBE	Nitrate (as N)	PCE	TDS	TCE
MT	0.07	0.01	250	0.07	0.3	0.05	0.013	5	0.005	1,000	0.005
SLVWD Pasatiempo #5A											
MO	MO not defined because well is not an RMP										
7/9/2024		0.001			0.042	0.004					
8/7/2024		0.002			0.035	0.003					
9/10/2024		0.002			0.160	0.004					
SLVWD Pasatiempo #7											
MO	0.0005	0.002	7.4	0.001	0.539	0.099	0.003	0.33	0.0005	143	0.0005
10/4/2023		0.0011			0.360	0.039					
11/2/2023		ND			0.130	0.045					
12/6/2023		0.0018			0.101	0.018					
1/9/2024		ND			0.150	0.034					
2/13/2024		ND			0.260	0.007					
3/6/2024		ND			0.130	0.037					
4/8/2024	ND	ND	7.6	ND	0.090	0.029	ND	0.4	ND	140	ND
4/9/2024		ND			0.250	0.036					
5/8/2024		0.001			0.310	0.060					
6/5/2024		ND			0.098	0.019					
7/9/2024		ND			0.110	0.027					
8/7/2024		ND			0.097	0.035					
9/10/2024		ND			0.130	0.032					
SLVWD Pasatiempo #8											
MO	MO not defined because well is not an RMP										
10/4/2023		0.010			0.170	0.019					
11/2/2023		0.009			0.170	0.023					
12/6/2023		0.010			0.170	0.022					
1/9/2024		0.008			0.250	0.023					
2/13/2024		0.007			0.330	0.023					
3/6/2024		0.008			0.260	0.024					
4/8/2024	ND	0.008	6.9	ND	0.180	0.022	ND	ND	ND	140	ND
4/9/2024		0.007			0.210	0.025					
5/8/2024		0.006			0.240	0.020					
6/5/2024		0.010			0.160	0.022					

MT - Minimum Threshold, MO - Measurable Objective, RMP - Representative Monitoring Point
ND - Not Detected above reporting limit, all values are in mg/L
Values above MT in bold

Santa Margarita Basin Groundwater Quality Data for WY 2024

Constituent	1,2-DCE	Arsenic	Chloride	Chlorobenzene	Iron	Manganese	MTBE	Nitrate (as N)	PCE	TDS	TCE
MT	0.07	0.01	250	0.07	0.3	0.05	0.013	5	0.005	1,000	0.005
SLVWD Pasatiempo #8											
MO	MO not defined because well is not an RMP										
7/9/2024		0.009			0.170	0.024					
8/7/2024		0.009			0.170	0.023					
9/10/2024		0.010			0.190	0.025					
SVWD #10A											
MO	0.0005	0.002	30.6	0.001	1.51	0.099	0.003	0.39	0.0005	290	0.0005
11/7/2023			35.0		1.400	0.170					
5/28/2024					0.760	0.110					
8/27/2024	ND	ND	32.0	ND	0.430	0.110	ND	ND	ND	320	ND
SLVWD Quail #5A											
MO	0.0005	0.002	8	0.001	0.02	0.003	0.003	2.13	0.0005	123	0.0005
4/8/2024	ND	0.003	5.8	ND	ND	ND	ND	3.4	ND	120	ND
SVWD #11A											
MO	0.0005	0.003	27.1	0.001	0.459	0.112	0.0	0.4	0.0005	525	0.0
11/7/2023					0.270	0.100					
2/28/2024		ND			0.250	0.100					
5/15/2024		ND			0.280	0.110					
8/14/2024	ND	ND	28.0	0.0011	0.310	0.100	ND	ND	ND	540	ND
SVWD #11B											
MO	0.0005	0.009	21.3	0.001	0.826	0.077	0.003	0.4	0.0005	367	0.0005
11/7/2023		0.008			0.640	0.070					
3/26/2024					ND	ND					
5/15/2024		0.009			0.290	0.059					
8/14/2024	ND	0.009	21.0	ND	0.610	0.063	ND	ND	ND	330	ND

MT - Minimum Threshold, MO - Measurable Objective, RMP - Representative Monitoring Point
ND - Not Detected above reporting limit, all values are in mg/L
Values above MT in bold

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Appendix E

Well Chemographs

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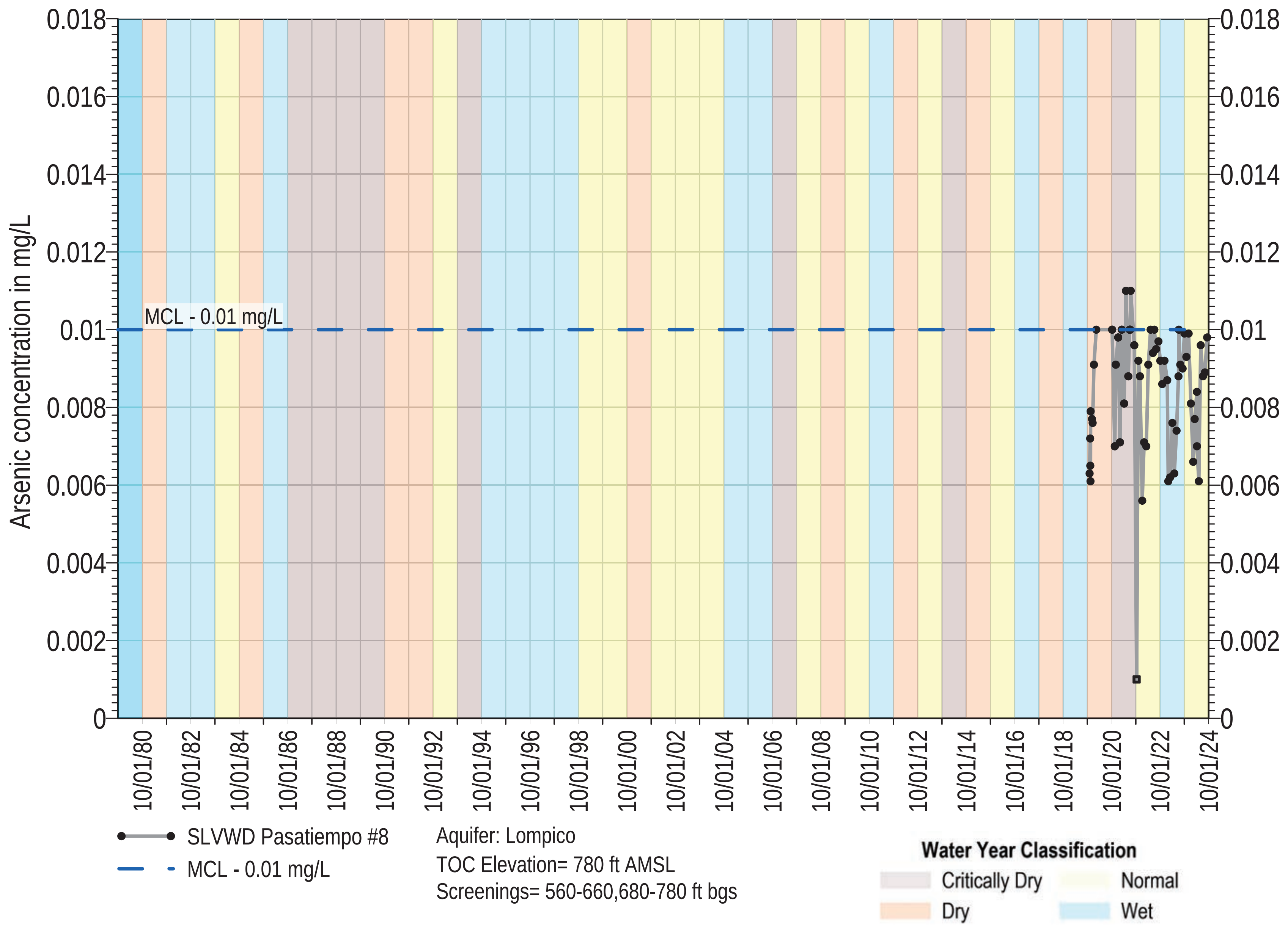
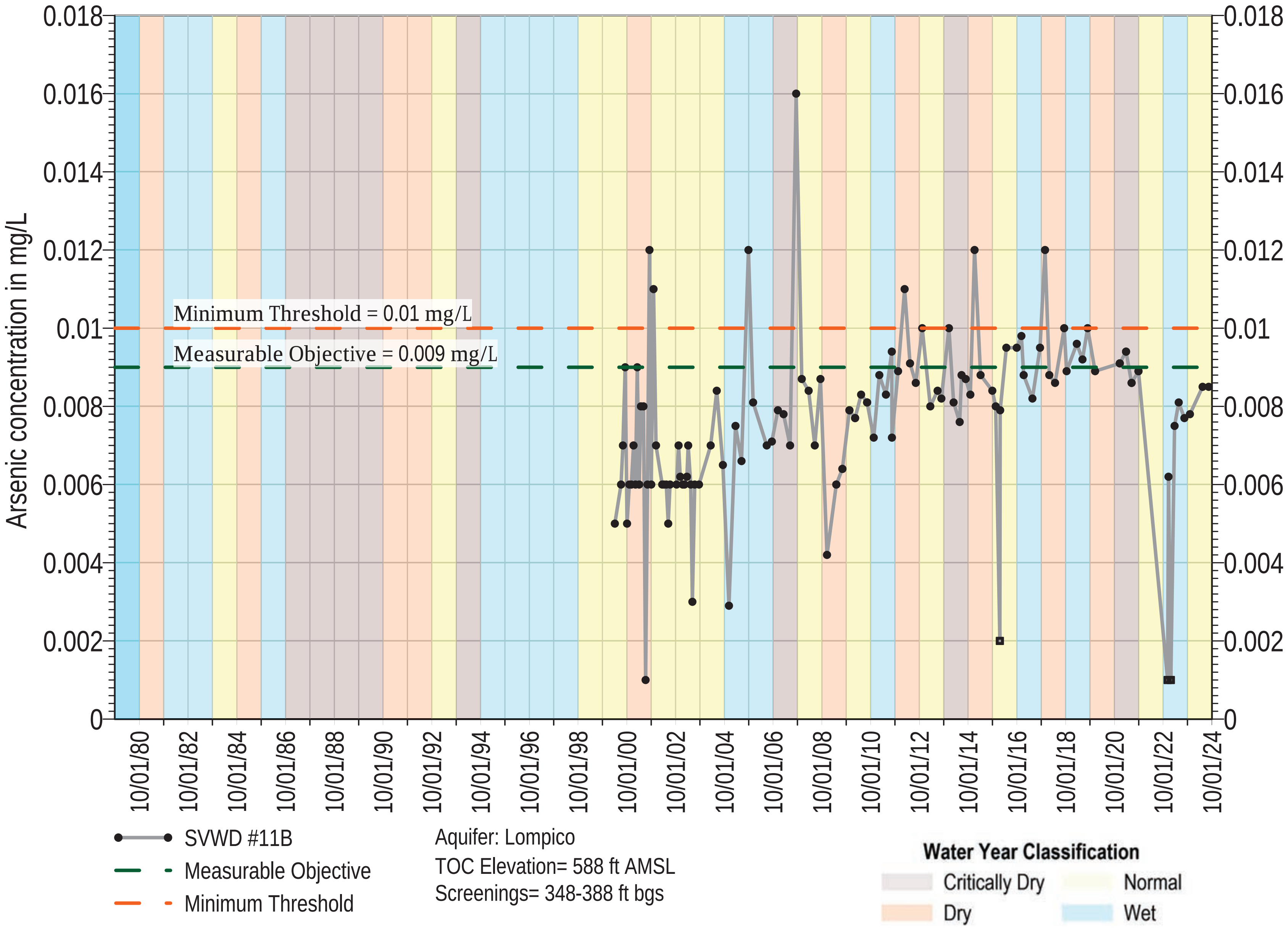
Arsenic



Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result



Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result

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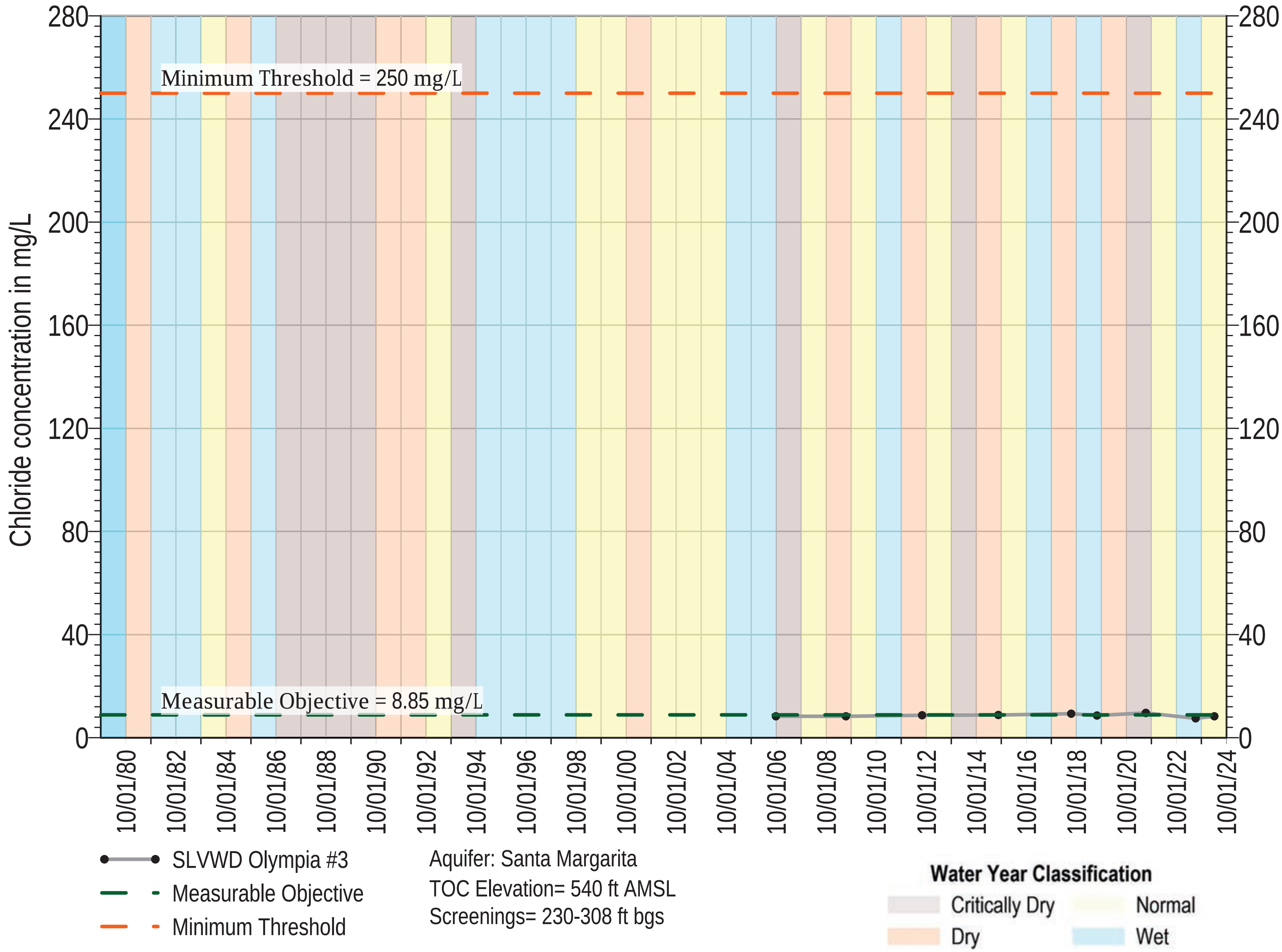
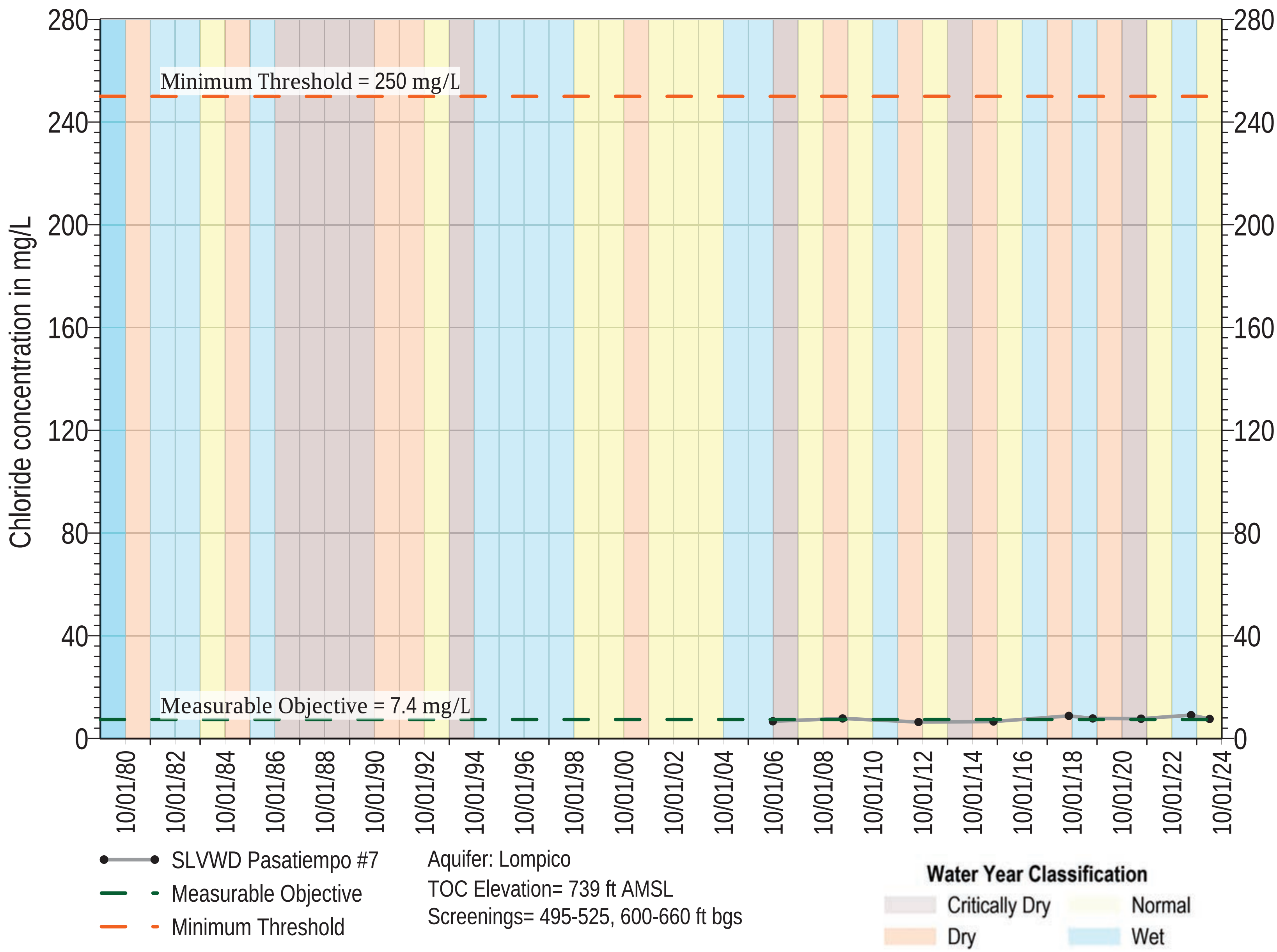
Chloride



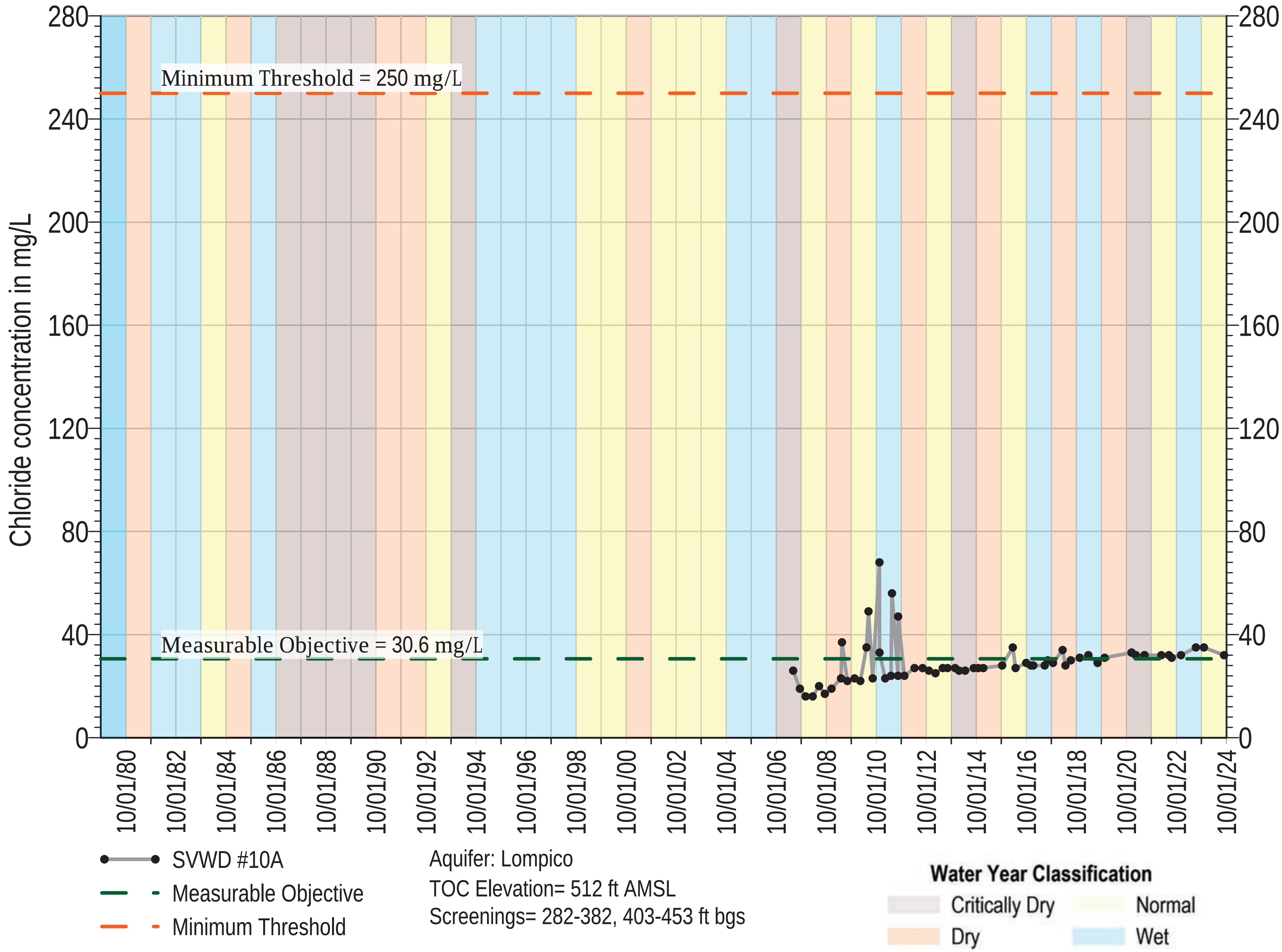
Square symbols indicate non-detects (ND)

ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)

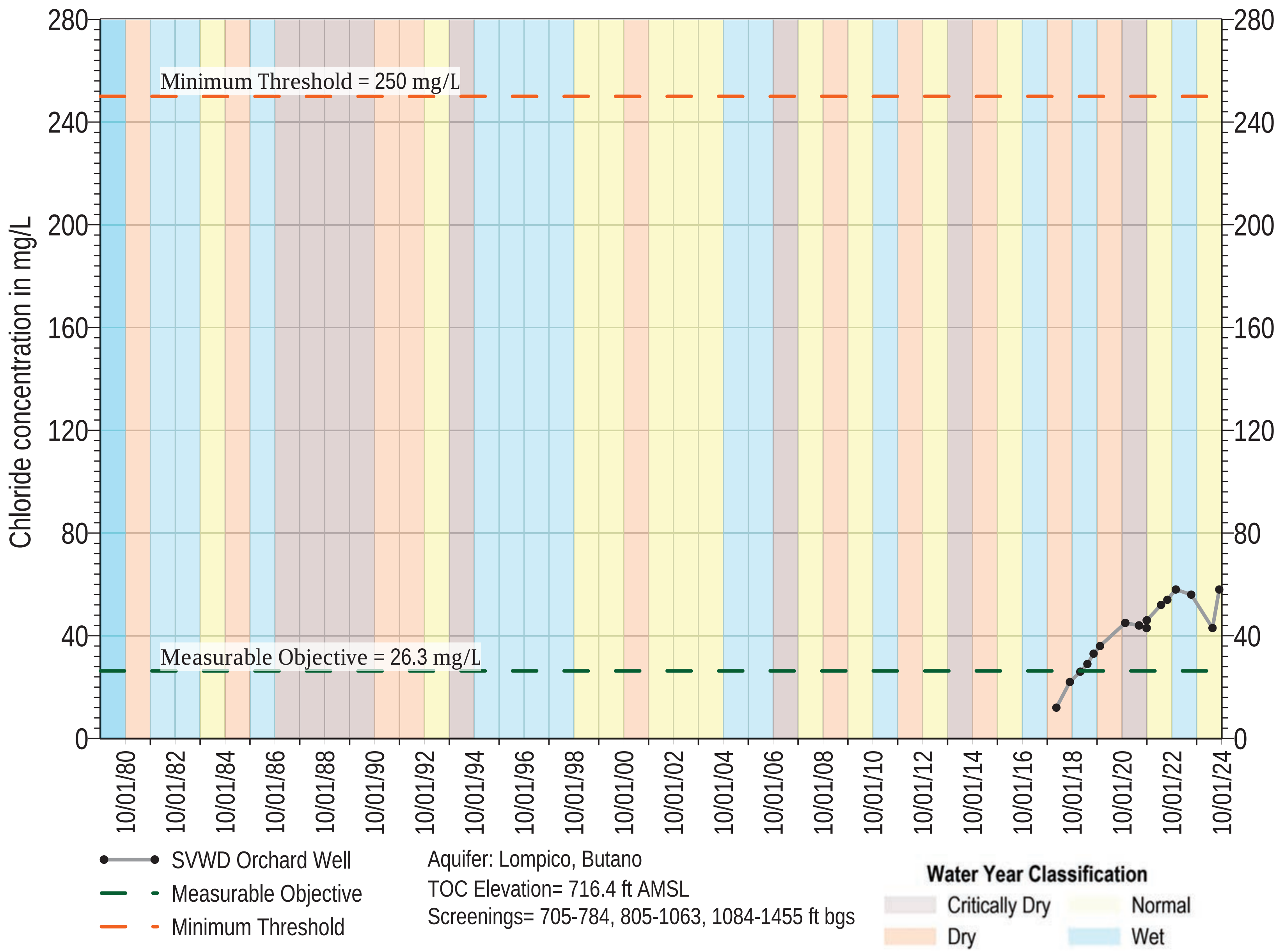
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result



Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result



Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result



Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result

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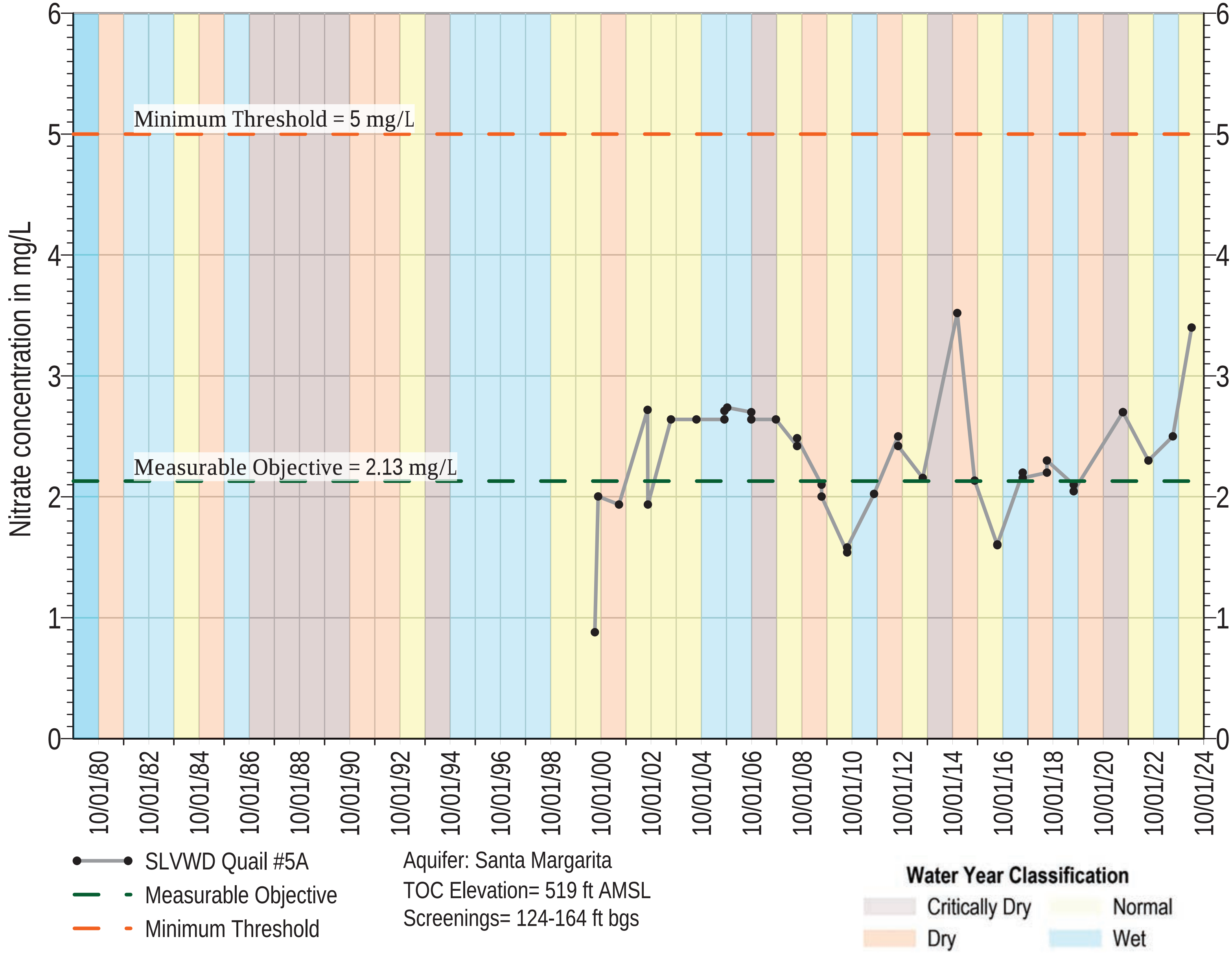
Nitrate



Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result

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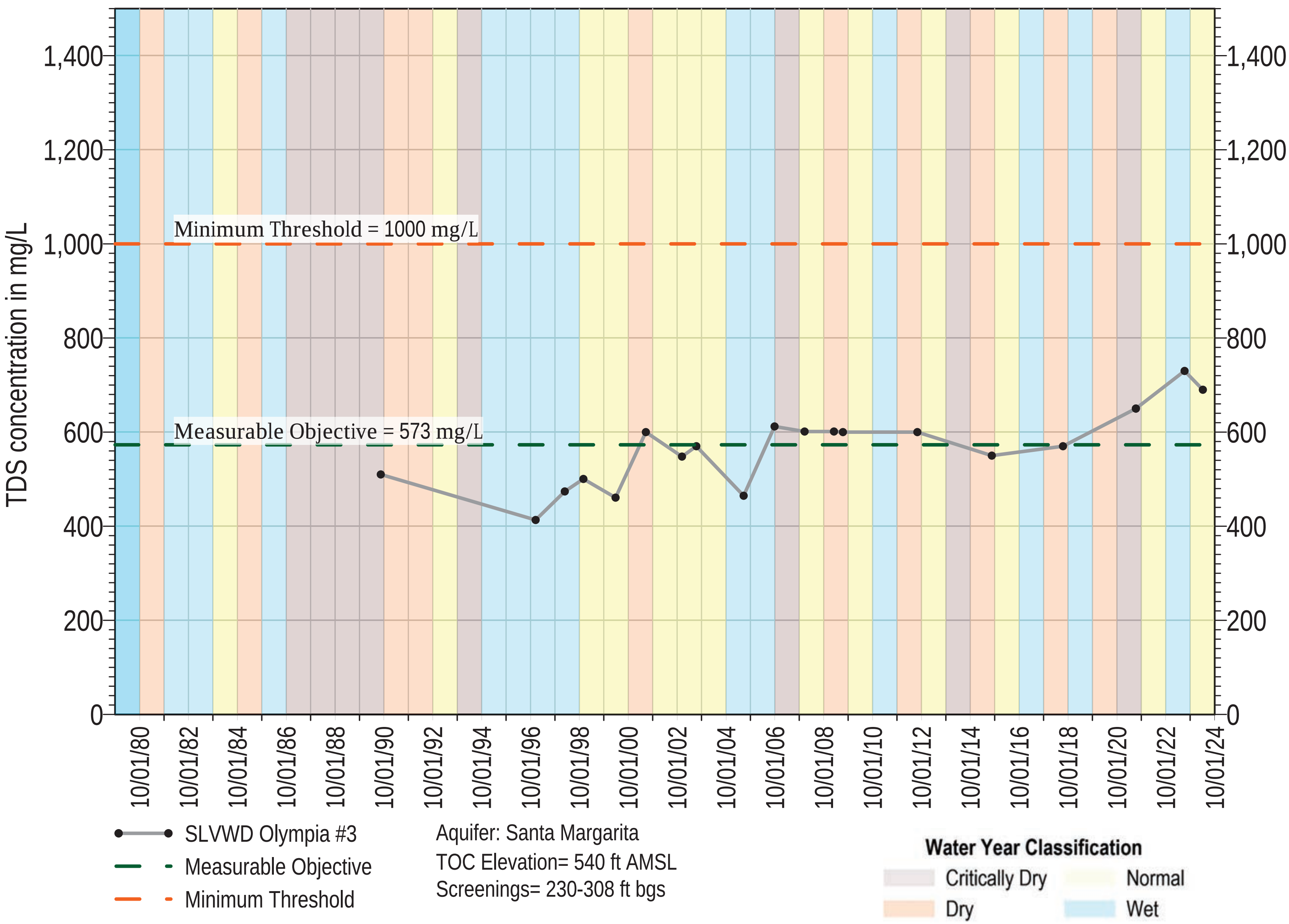
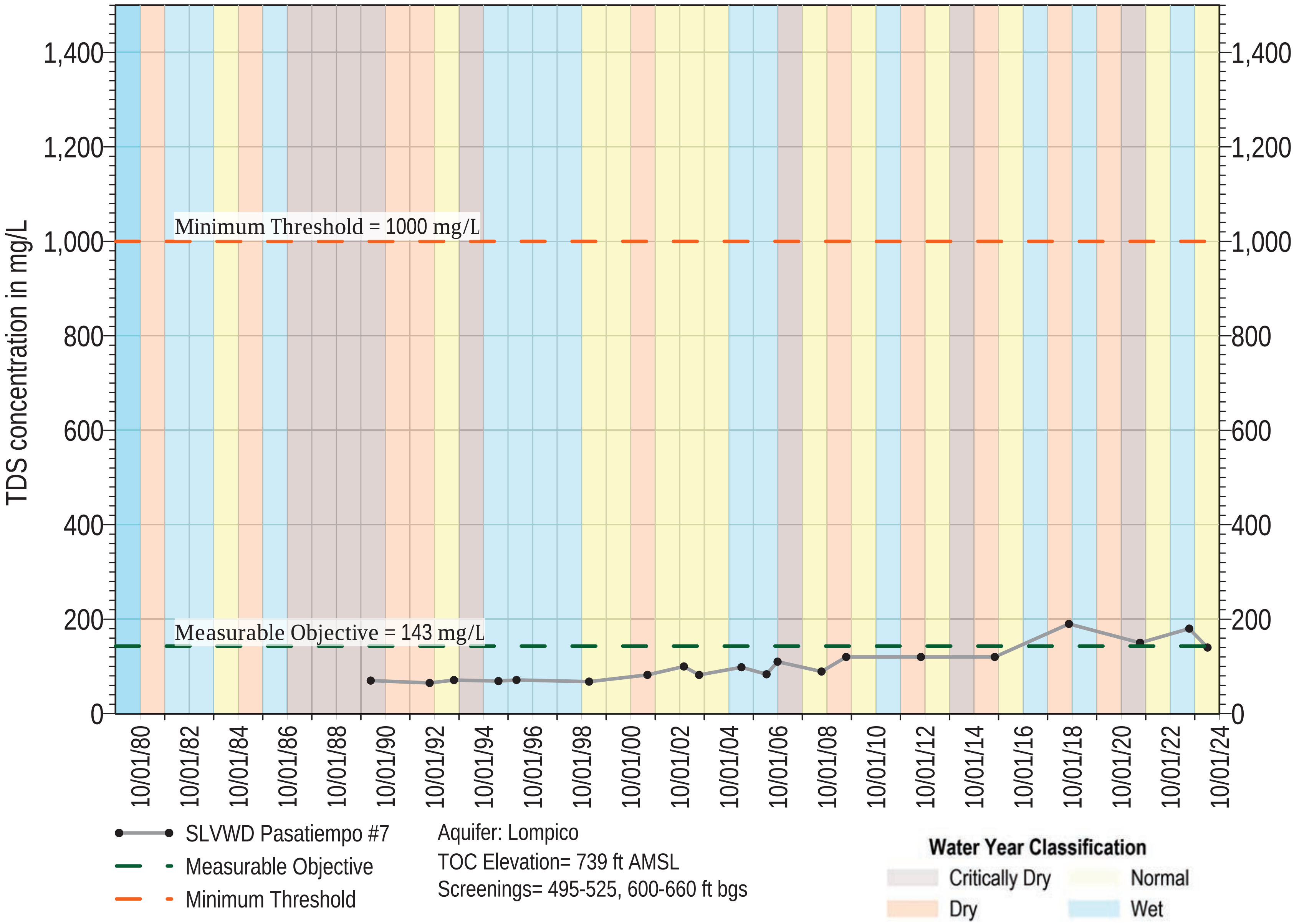
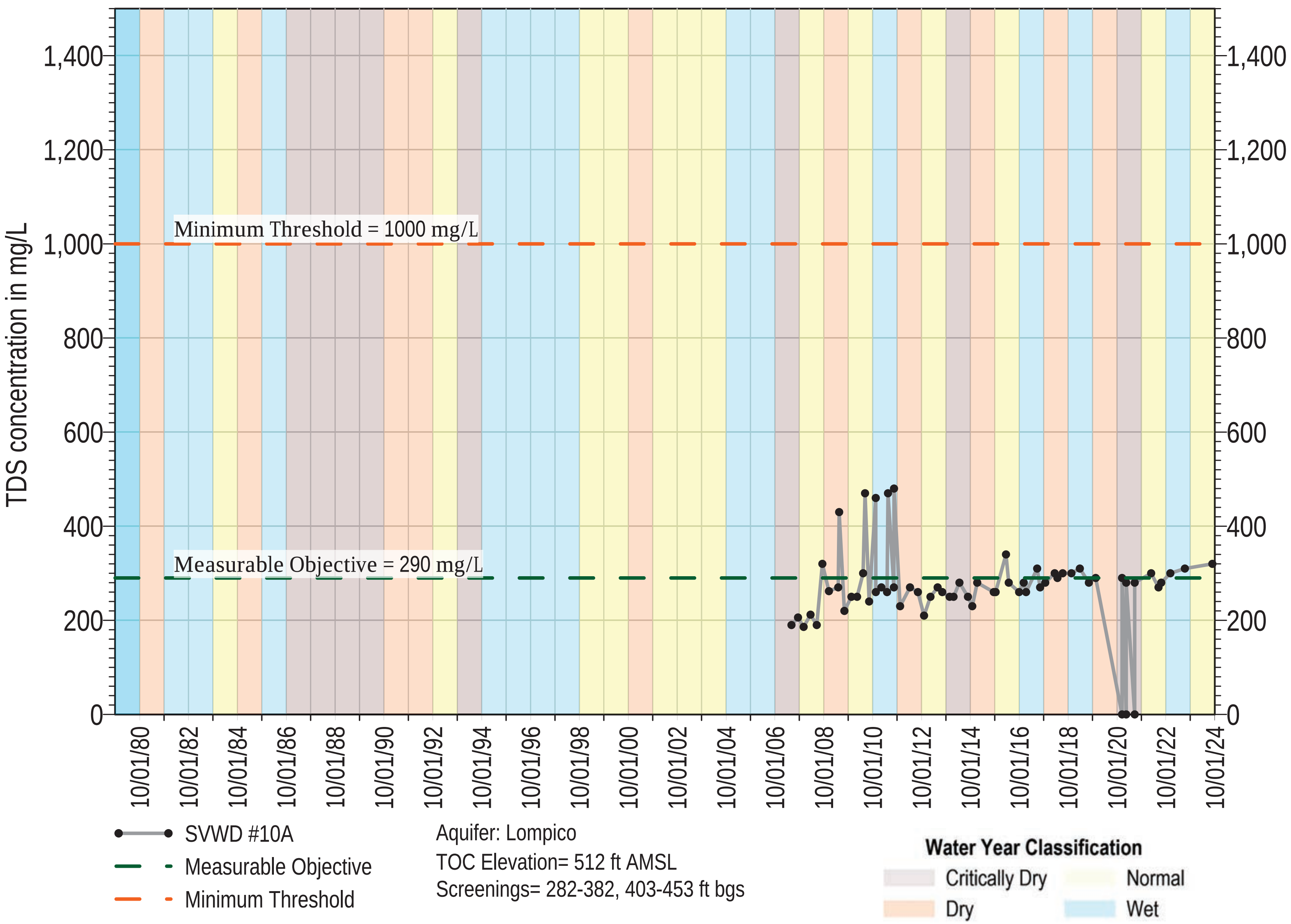
TDS



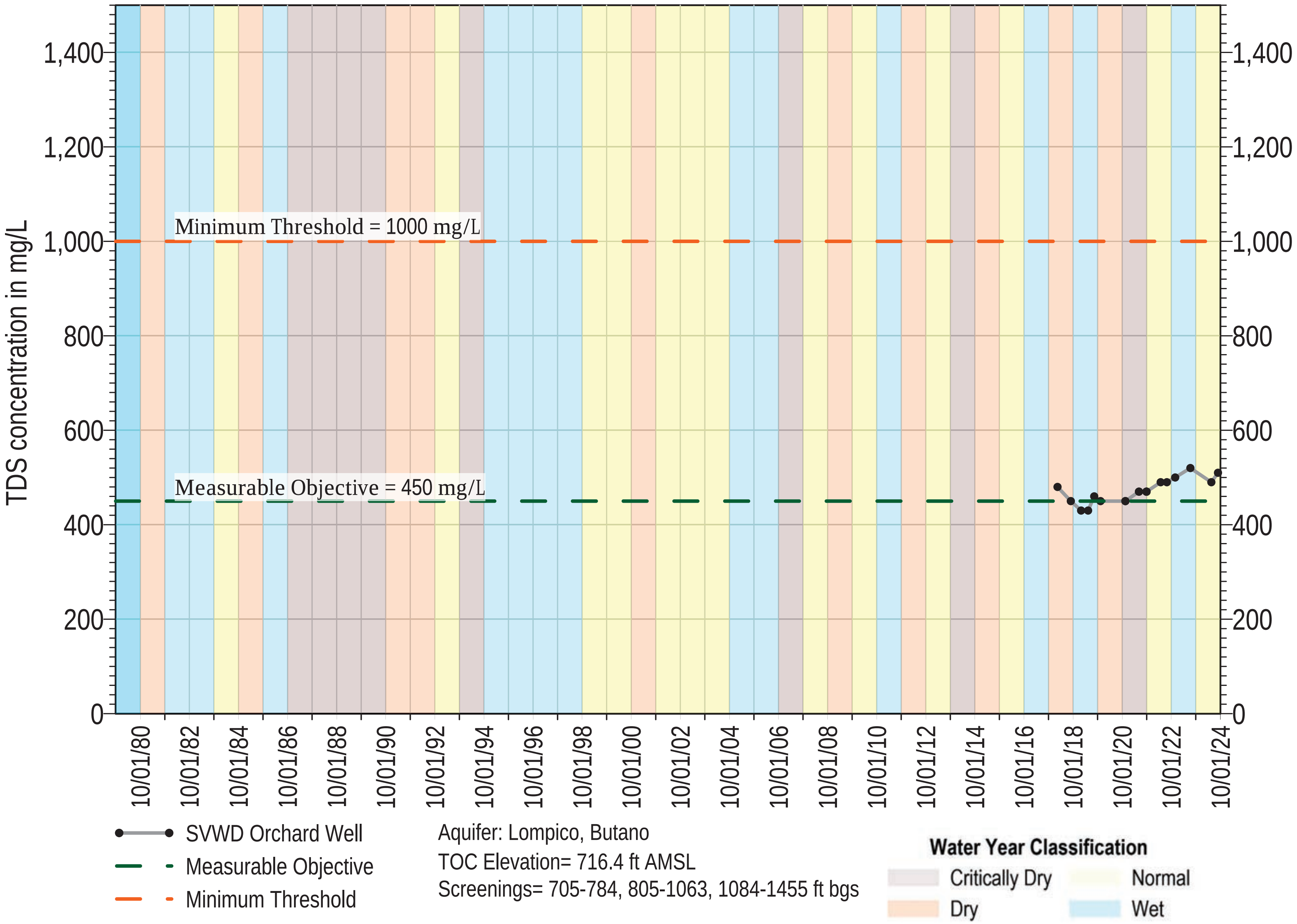
Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result



Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result



Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result



Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result