MONTGOMERY
& ASSOCIATES
Water Resource Consultants

February 29, 2024

# Santa Margarita Basin
# Water Year 2023 Annual Report

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MONTGOMERY & ASSOCIATES

# 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
BBWC........................Big Basin Water Company
County........................County of Santa Cruz
DLR...........................detection limit for reporting
DWR ..........................California Department of Water Resources
EIR .............................Environmental Impact Report
ft bgs...........................feet below ground surface
FS ...............................Forest Springs
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
SGMI..........................Sustainable Groundwater Management Implementation
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
VOCs..........................volatile organic compounds
WY .............................Water Year

## EXECUTIVE SUMMARY

### Introduction

This third Annual Report since adoption of the Santa Margarita Groundwater Basin (Basin) Groundwater Sustainability Plan (GSP) covers the 2023 Water Year (WY2023), from October 1, 2022, through September 30, 2023. 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 the SMGWA in relation to the Basin boundary. The Department of Water Resources (DWR) approved the SMGWA GSP during WY2023 on April 27, 2023.

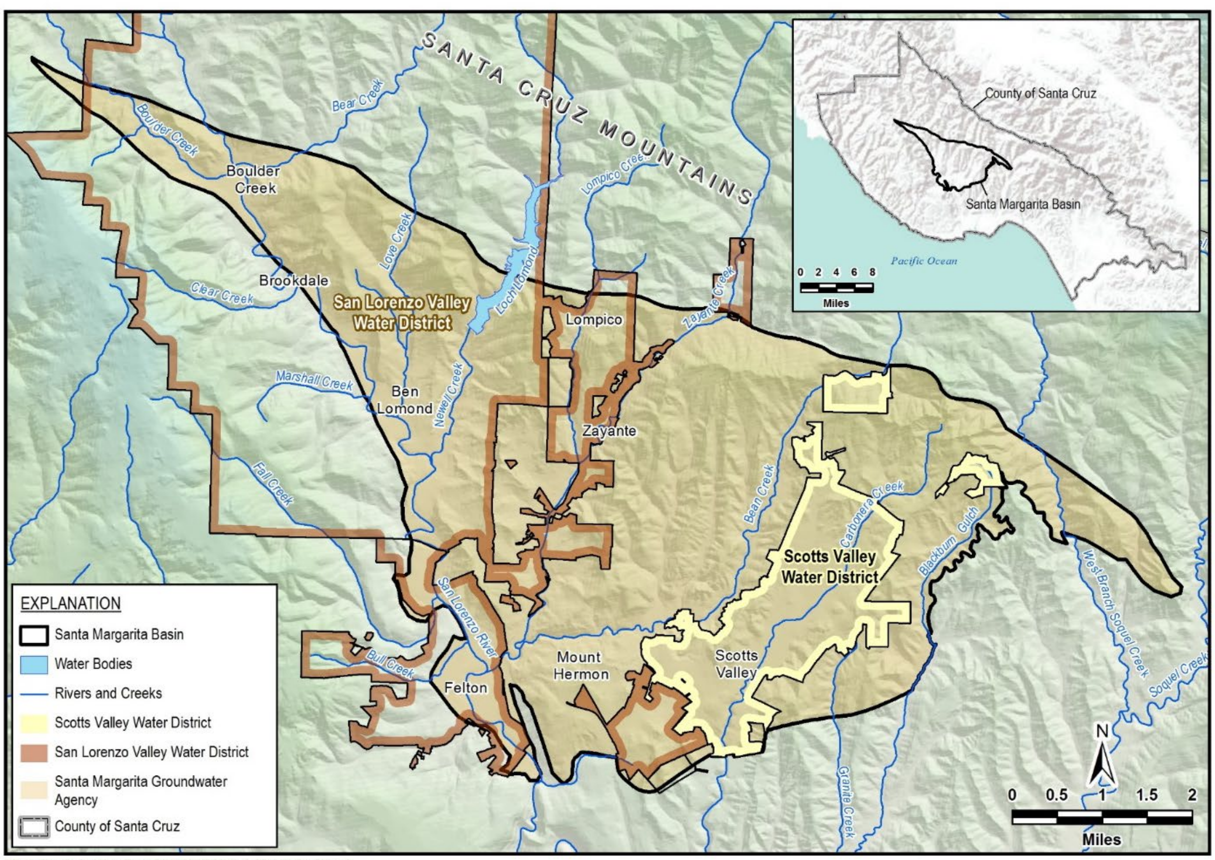


Figure ES-1. Basin and Member Agency Jurisdictional Boundaries

## Water Year Conditions and Water Use

WY2023 was substantially wetter than average, allowing for increased use of surface water and a reduction in groundwater extraction. The combination of modified water operations and natural recharge resulted in the largest annual model-calculated positive change of groundwater in storage since reliable record-keeping began in 1985. Highlights related to WY2023 conditions and use are shown in Table ES-1 below.

Table ES-1. Summary of Long-term Average and WY2023 Hydrologic Conditions

| Hydrologic Conditions Component | Long-term Average | WY2023 |
|---|---|---|
| **Precipitation at Boulder Creek** | 50.4 inches | 71.0 inches |
| **Precipitation at Scotts Valley** | 41.4 inches | 53.8 inches |
| **Groundwater Use** | 3,686 acre-feet/year | 2,361 acre-feet |
| **Surface Water Use** | 871 acre-feet/year | 1,202 acre-feet |
| **Change in Groundwater in Storage** | -870 acre-feet/year | +9,900 acre-feet |

The total volume of groundwater extracted in WY2023 was 2,361 acre-feet (AF), about 4% less than was extracted in WY2022, 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 WY2023, about 79% of all groundwater was extracted by these water providers. SVWD extracted 1,049 AF (44%), SLVWD extracted 683 AF (29%), and MHA extracted 147 AF (6%).

In WY2023, 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 351 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 WY2023, more than 37 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 WY2023 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 30 rebates for turf replacement resulting in an estimated 443,201 gallons per year (GPY) savings, and additional 16 rebates for toilet and smart irrigation controller replacements saving an additional 29,000 GPY for a total of 472,201 GPY |
| **SLVWD Water Efficiency Rebates** | Issued 27 clothes washer rebates, 17 toilet rebates, and 4 irrigation controller rebates resulting in an estimated savings of 272,675 GPY |
| **SLVWD Water Tank Improvements** | Replaced the leaking redwood Blue Ridge water storage tank with a new steel tank resulting in an estimated savings of 368,200 GPY |
| **SVWD Low Impact Development (LID)** | Captured and recharged 37.44 AF of stormwater at 3 LID facilities in Scotts Valley |
| **SVWD Recycled Water** | Distributed 138 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 North System resulting in an estimated 82 AF of in-lieu groundwater recharge |

Progress was made in WY2023 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 WY2024 in support of a petition to modify point-of-use water rights. SLVWD is also assessing the feasibility of conveyance and water treatment upgrades necessary in order to utilize its 313 AF 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 rely on surface water sources from outside the Basin. In WY2023, engineering design continued on the project, and SCWD prepared an Addendum to an existing Environmental Impact Report to cover the project. In WY2024, the project is expected to complete design and begin construction of the pipeline component. SVWD and SCWD are also working on an Operational Agreement for the project.

During WY2023, progress was made by SMGWA toward filling data gaps in the groundwater level monitoring network as identified in the GSP. Seven new monitoring wells were installed, and stream monitoring continued at 5 locations to better understand stream-aquifer interaction in the Basin.

## Sustainable Management Criteria Evaluation

No undesirable results occurred in the Basin in WY2023. Other than iron and manganese, which are naturally occurring at concentrations above regulatory standards and minimum thresholds, no minimum thresholds (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 third Annual Report prepared since adoption of the Basin GSP. It covers the 2023 Water Year (WY2023), from October 1, 2022, through September 30, 2023. Prior Annual Reports are available at the SMGWA website (https://www.smgwa.org/AnnualGSPReports) or at the DWR SMGA 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 WY2023, groundwater met about 63% of the Basin's water supply needs.

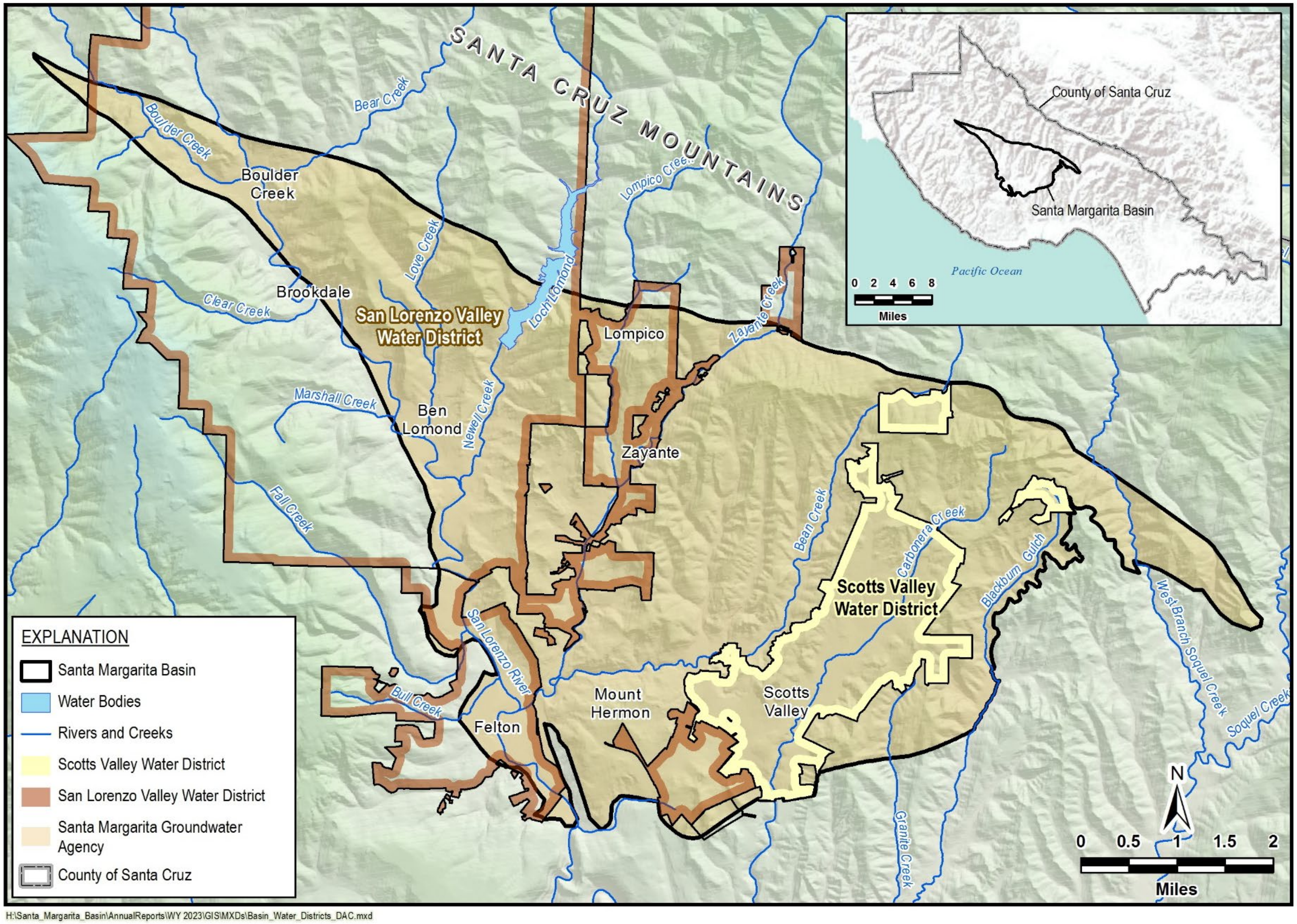


Figure 1. Basin and Member Agency Jurisdictional Boundaries

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. The main units, from oldest and deepest to youngest and shallowest, are the Butano Sandstone, Lompico Sandstone, Monterey Formation, and Santa Margarita Sandstone. The 3 sandstone formations form the Basin's principal aquifers. 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 3 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.

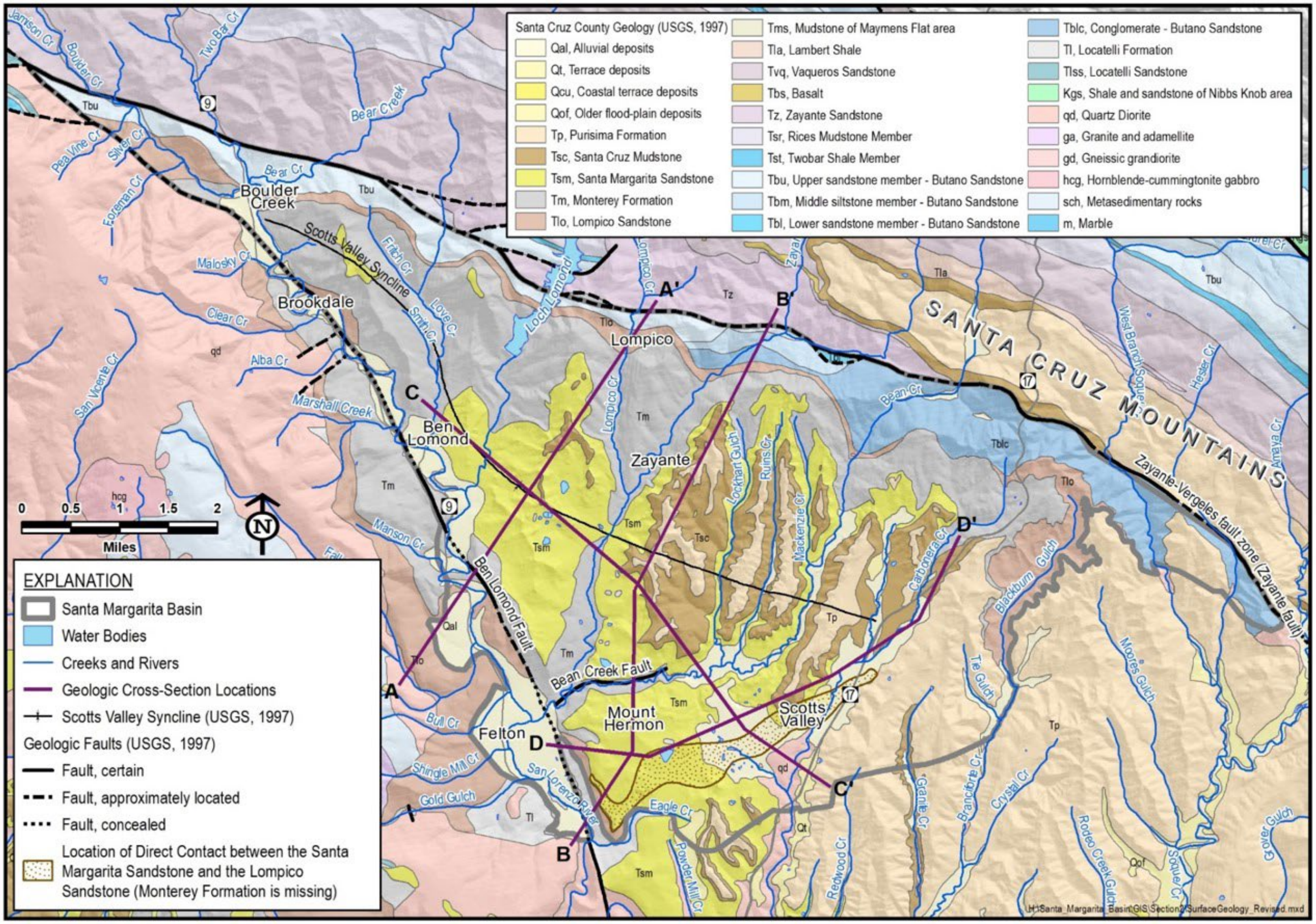


Figure 2. Surface Geology and Geologic Cross Section Locations

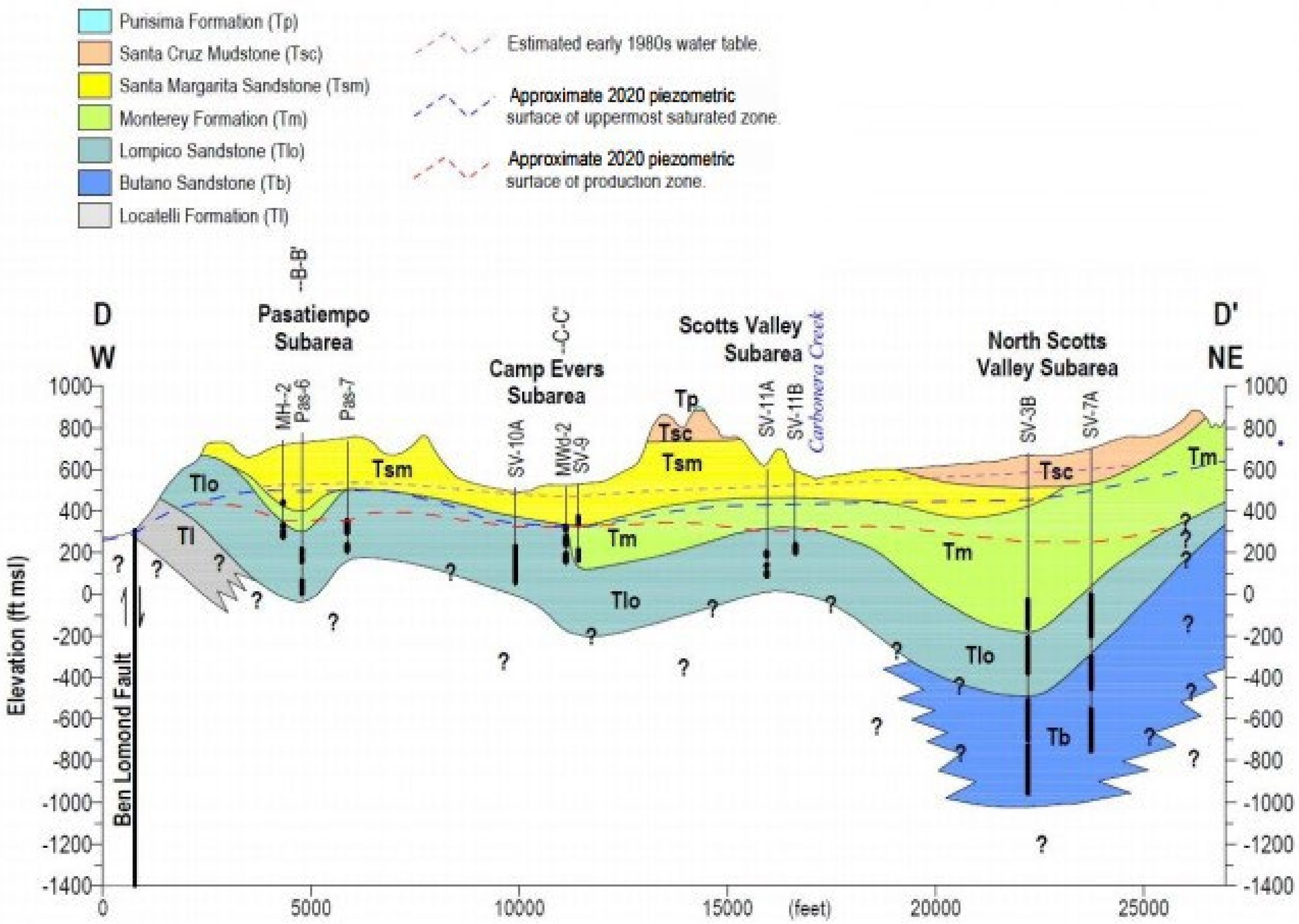


Figure 3. D-D' Geologic Cross Section

## 1.3 Santa Margarita Groundwater Agency

The SMGWA is the sole 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 1 shows the jurisdictional extent of member agencies that comprise the SMGWA in relation to the Basin boundary. The SGMA and JPA grant the SMGWA the legal authority to prepare, adopt, and implement the GSP in the Basin.

The SMGWA is governed by an 11-member Board of Directors comprised of 2 representatives from each member agency, 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. Sections of the WY2023 Annual Report are the following:

**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, the 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 WY2023, and is followed by a summary of the sources and uses of water in the Basin. Finally, Basin conditions—represented by groundwater elevation contour maps and estimated change in groundwater storage—resulting from the available sources and uses of water in WY2023 are provided.

**Section 3. Progress Toward Implementing the GSP.** This section describes progress on GSP projects and management actions, other GSP implementation activities, and any action 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 WY2023 conditions at representative monitoring points to applicable sustainability indicators in the

Basin. This section is presented last in the Annual Report because it represents the results by which DWR will judge whether SMGWA is making progress toward achieving the goal of long-term Basin sustainability by 2042.

**Appendices.** These include long-term 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, where necessary, for representative monitoring points in the Basin.

# 2 WATER YEAR CONDITIONS AND WATER USE

The hydrologic conditions in WY2023 were substantially wetter than average. When combined with effective operations by water suppliers, this resulted in significant improvements in Basin conditions. As described below, wet conditions allowed for the increased use of surface water with a reduction in groundwater production to pre-1985 volumes. The combination of modified water operations and natural recharge resulted in the single largest calculated positive change of groundwater in storage in the period of record dating back to 1985.

## 2.1 Precipitation

Precipitation is the primary source of recharge in the Basin through both direct rainfall percolation and streamflow infiltration through streambeds. 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: (1) El Pueblo weather station in Scotts Valley, and (2) Boulder Creek weather station in Boulder Creek. Annual precipitation for the 2 stations is shown on Figure 4.

WY2023 precipitation was well above average. Total precipitation was 53.8 inches in Scotts Valley and 71.0 inches in Boulder Creek, which is about 130% and 140% of their respective long-term averages (Figure 4). Monthly precipitation relative to the most recent 30-year average (1993 through 2022) is shown on Figure 5. Following a below-average start to WY2023, a large atmospheric river precipitation event spanning from the end of December to mid-January caused widespread local flooding. Following an average February, March 2023 was also substantially wetter than average. The well above-average rainfall in WY2023 marked a welcome departure from the prolonged dry period from WY2020 through WY2022.

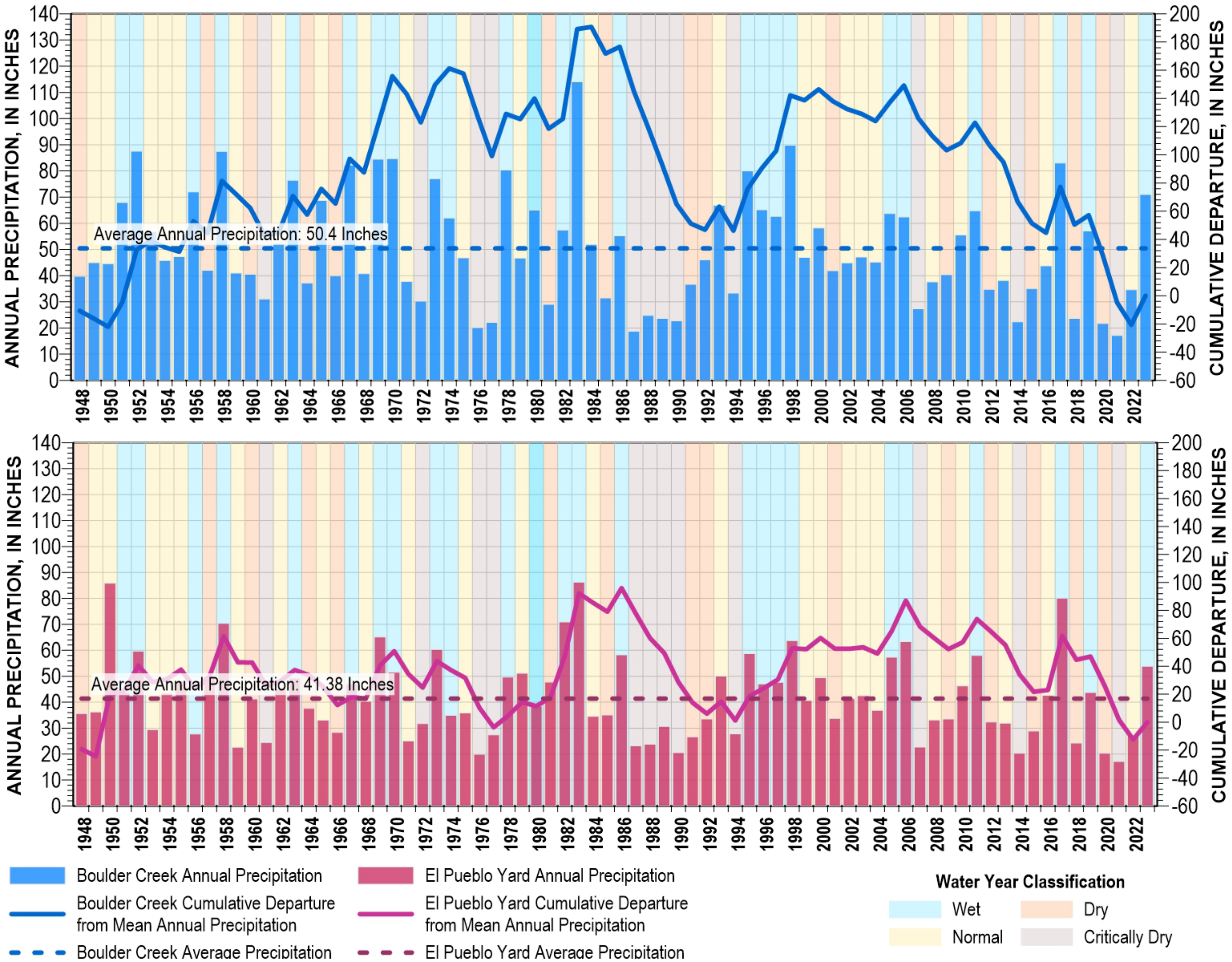


Figure 4. Annual Precipitation, Cumulative Departure from Average Annual Precipitation, and Water Year Type, WY1948-2023

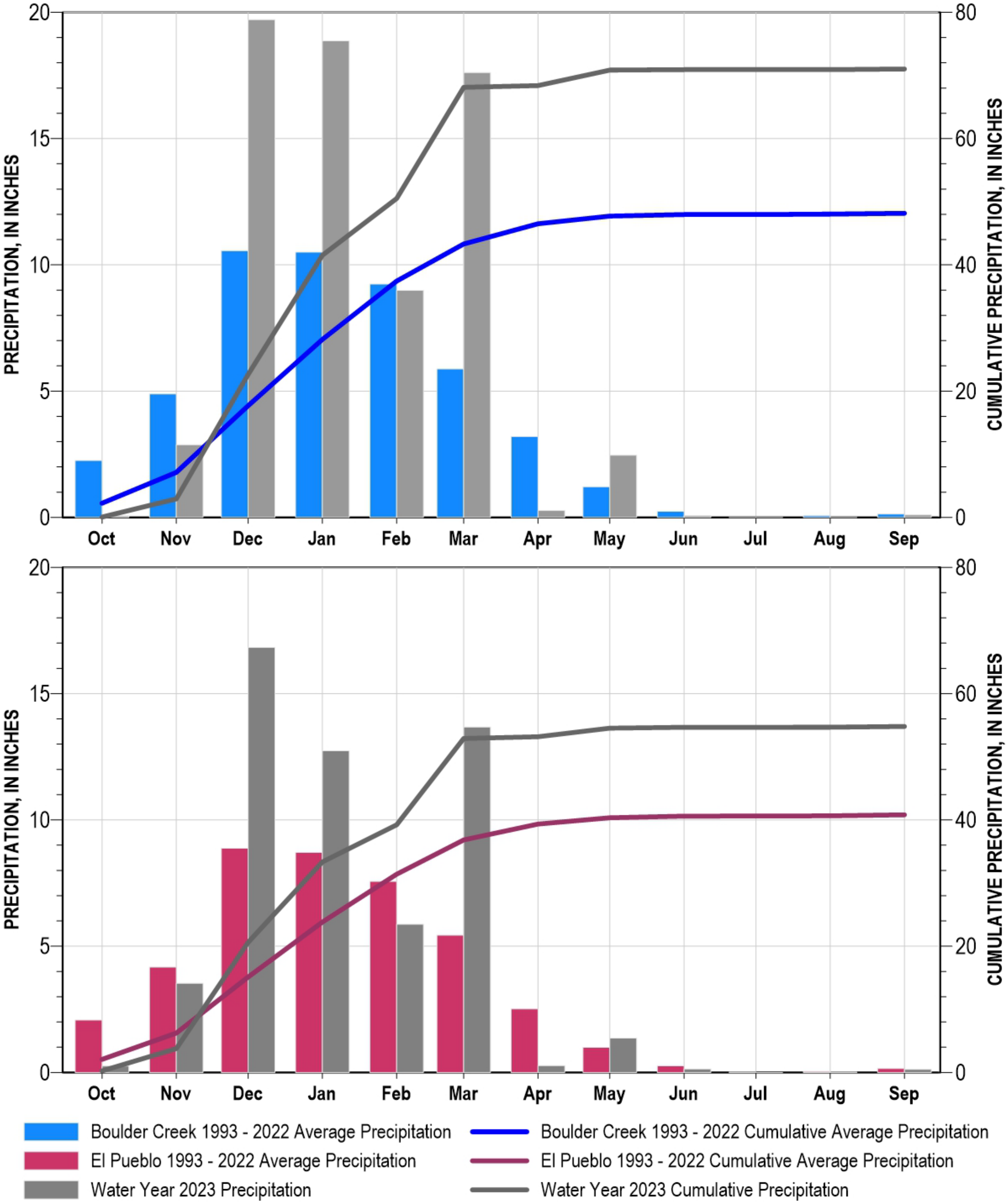


Figure 5. WY2023 Monthly and Annual Cumulative Precipitation versus 30-Year Average Precipitation

## 2.2 Surface Water Flow

The water-year type is determined for the Basin using the City of Santa Cruz water-year classification system, which is based on the total cumulative discharge of the San Lorenzo River as measured just downstream of the confluence with Bean Creek at the United States Geological Survey Big Trees Gage. Based on the cumulative streamflow, WY2023 is classified as a wet water year.

As illustrated on Figure 6 and Figure 7, high winter flows and a significant tailing period in the spring and summer led to much greater than average monthly and cumulative streamflow in the San Lorenzo River for WY2023. Streamflow at the Big Trees Gage peaked on January 8, 2023, following December and January storms and then subsided before a second peak on March 10, 2023 (Figure 6). After the March peak, streamflow gradually subsided over the remainder of the water year. Cumulative WY2023 streamflow was 241,000 AF, which is about 250% of the 30-year cumulative average (WY1993 to WY2022) of 94,000 AF (Figure 7). The monthly streamflow was greater than average in every month except October, November, and February.

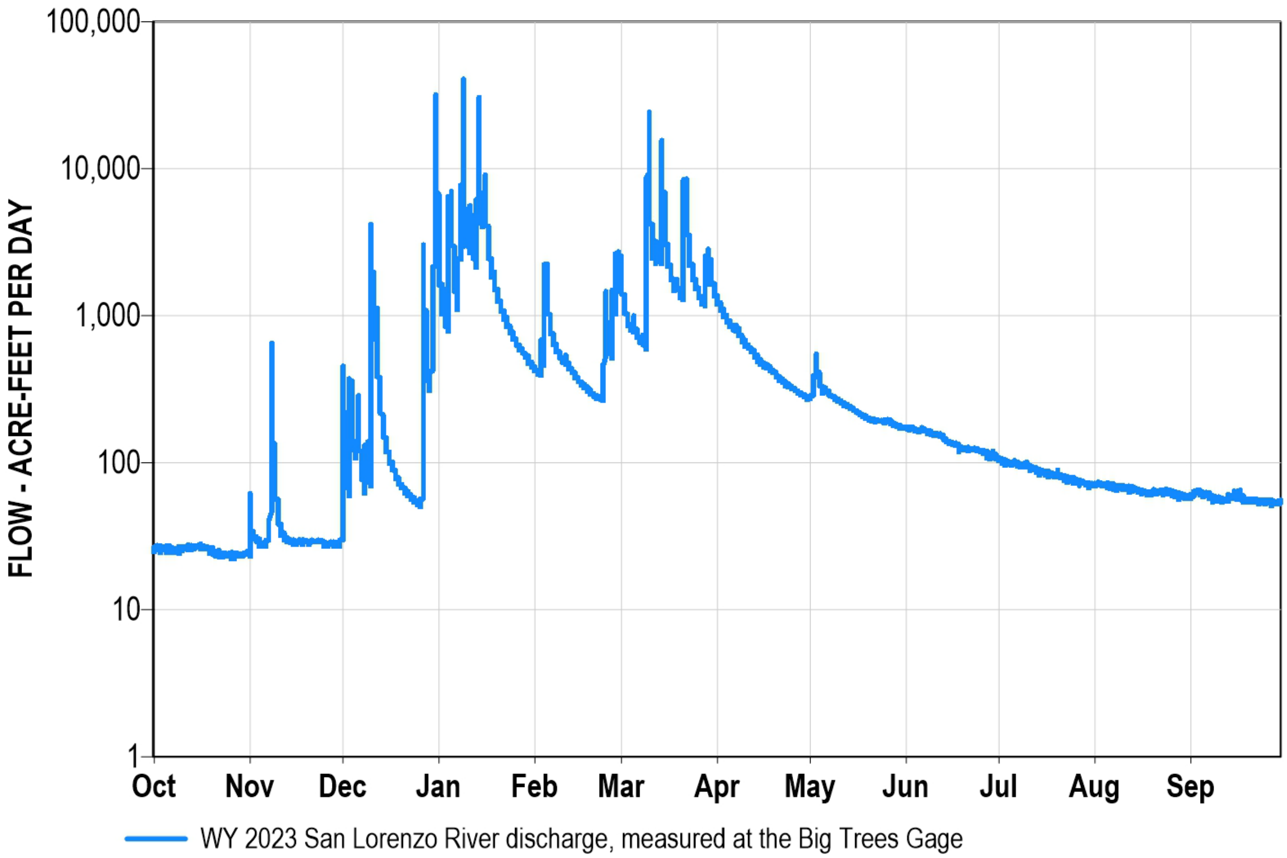


Figure 6. Streamflow at the USGS Big Trees Streamflow Gage, WY2023

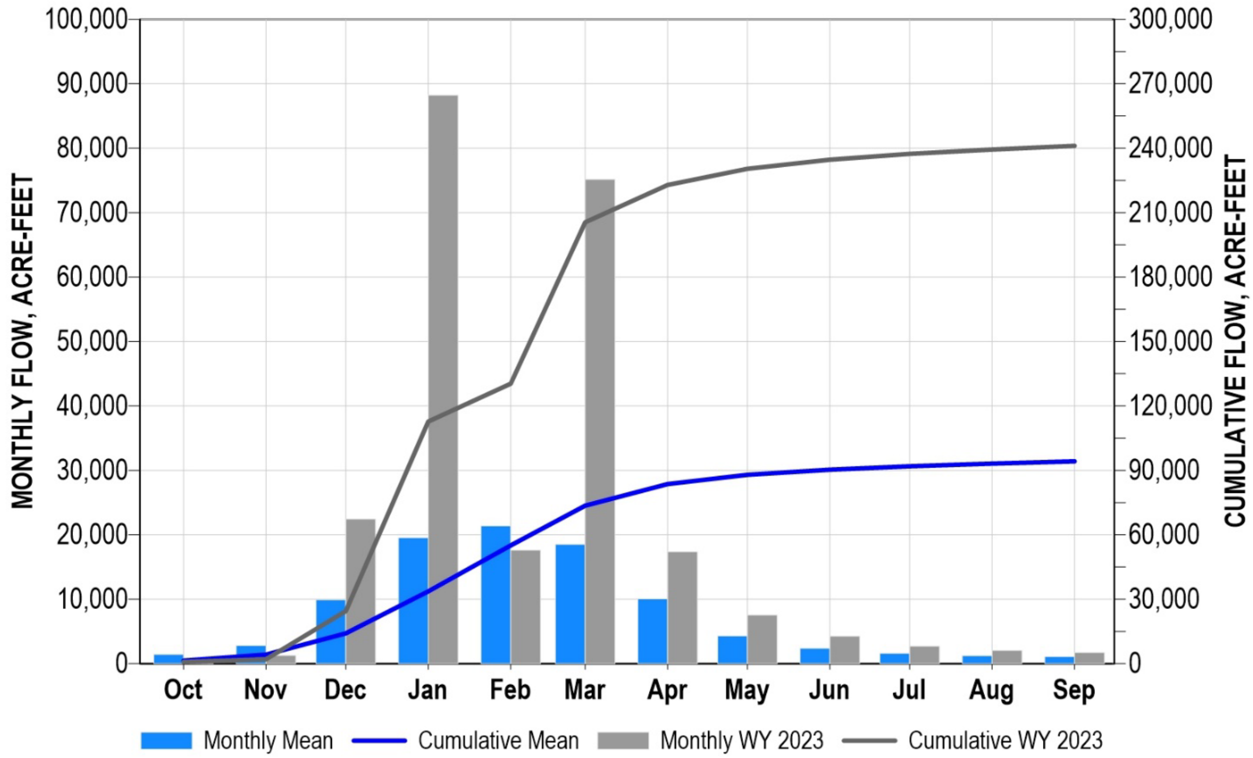


Figure 7. WY2023 and 30-year Mean Monthly and Cumulative Streamflow at the USGS Big Trees Gage

## 2.3 Groundwater Use

The total volume of groundwater extracted in WY2023 was 2,361 acre-feet (AF), about 4% less than was extracted in WY2022, *and the smallest groundwater volume extracted since WY1985 when reliable record keeping began*. This favorable result for the Basin is a result of a wet winter followed by cool spring and summer seasons reducing customer demand and allowing SLVWD to rest groundwater wells by using surface water supplies well into the summer.

Table 1 summarizes groundwater extraction for WY2023 by sector and by aquifer, and explains the measurement sources and relative accuracy. Figure 8 shows the locations of WY2023 groundwater extraction sites, the aquifers used, and the volumes of groundwater extracted.

There are 3 principal aquifers and 2 additional sedimentary formations 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 has significant extraction. In WY2023, of the total groundwater extracted the Lompico aquifer supplied an estimated 54%, the Santa Margarita aquifer supplied 26%, and the Butano aquifer supplied approximately 15%. The remaining 5% of groundwater was extracted from non-principal aquifers, the Monterey Formation and Purisima Formation, primarily for rural domestic uses.

Most groundwater extraction in the Basin is for municipal supplies by SLVWD, SVWD, and MHA. In WY2023, about 79% of all groundwater was extracted by these water providers. SLVWD extracted 683 AF (29%), SVWD extracted 1,049 AF (44%), and MHA extracted 147 AF (6%). About 62% of SLVWD extraction was from the Santa Margarita aquifer north of Bean Creek and about 38% 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 WY2023 relative to WY2022. In WY2023, SLVWD reduced its groundwater extraction by about 7% compared to WY2022 by increasing surface water use. Groundwater extraction totals have significantly declined the last 2 years in comparison to WY2021, a year in which groundwater use was anomalously high due to the destruction of surface water diversion and conveyance infrastructure in the August 2020 CZU wildfire. The volume extracted in WY2023 was about 23% less than the average annual extraction for the 6-year period before the wildfire (from WY2014 to WY2019).

The volume of groundwater extracted by SLVWD would have been even smaller but for the need to use groundwater during the atmospheric river events of the winter of 2022-23 while surface supplies were unusable due to turbidity and damage to conveyance infrastructure. Were it not for the 46 AF transferred from the San Lorenzo Valley System to the Felton System during WY2023 for this purpose, customers in the Felton System would have experienced shortages of water. Had there not been this $5 million in winter damage to surface water infrastructure, groundwater use would hve been less than the near-record-low recorded for WY2023. Being able to use groundwater briefly when surface supplies are temporarily compromised by winter conditions is an example of the benefit of conjunctive use in providing reliability and continuity of supply, just as was observed immediately after the destruction caused by the CZU wildfire in 2020.

In WY2023, SVWD extracted the smallest volume of groundwater since accurate records began in 1985, reducing its extraction by about 5% compared to WY2022. Most of this reduction resulted from the SVWD resting the Orchard supply well, which is screened in both the Lompico and Butano aquifers, during the extraordinarily wet months of December 2022 and January 2023. As a result, SVWD's pumping from the Butano aquifer dropped by about 17% in WY2023 compared to WY2022.

MHA also reduced its groundwater extraction by about 5% compared to WY2022. MHA extraction in WY2023 was about 13.5% less than the average for 1991 through 2022, which is the period for which metered data are available.

Small water systems accounted for about 4% of WY2023 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. The groundwater extractions for WY2023 were assumed to be the same as estimates made in the GSP for WY2018, given that commercial and domestic activities have changed little in this sparsely populated area of the Basin. These are likely to be over-estimates of true use in WY2023 given that demand is less in a wet and cool year. As estimate for WY2018 in the GSP, unmetered extraction of groundwater for private domestic use constitutes about 10% of groundwater use in the Basin; use for landscaping, irrigation, and pond filling is 5%, and dust-mitigation in quarries is 1%.

Table 1. Groundwater Extraction in the Santa Margarita Basin, WY2023

| 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] | 433 | 250 | 0 | 0 | 0 | **683** | **29%** |
| Scotts Valley Water District[1, 2] | 0 | 718 | 330 | 0 | 0 | **1,049** | **44%** |
| Mount Hermon Association[1] | 0 | 147 | 0 | 0 | 0 | **147** | **6%** |
| 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] | 54 | 42 | 0 | 5 | 0 | **101** | **4%** |
| Quail Hollow Quarry[6] | 25 | 0 | 0 | 0 | 0 | **25** | **1%** |
| **Total by Aquifer (AF)** | **612** | **1,269** | **356** | **92** | **31** | **2,361** | **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 WY2023 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 2022 are from WY2023, while January through September 2023 are from WY2022 (January through September 2022). While this reduces accuracy, the volumes from year to year generally do not vary significantly.
[6] Estimated based on historical usage (less accurate).

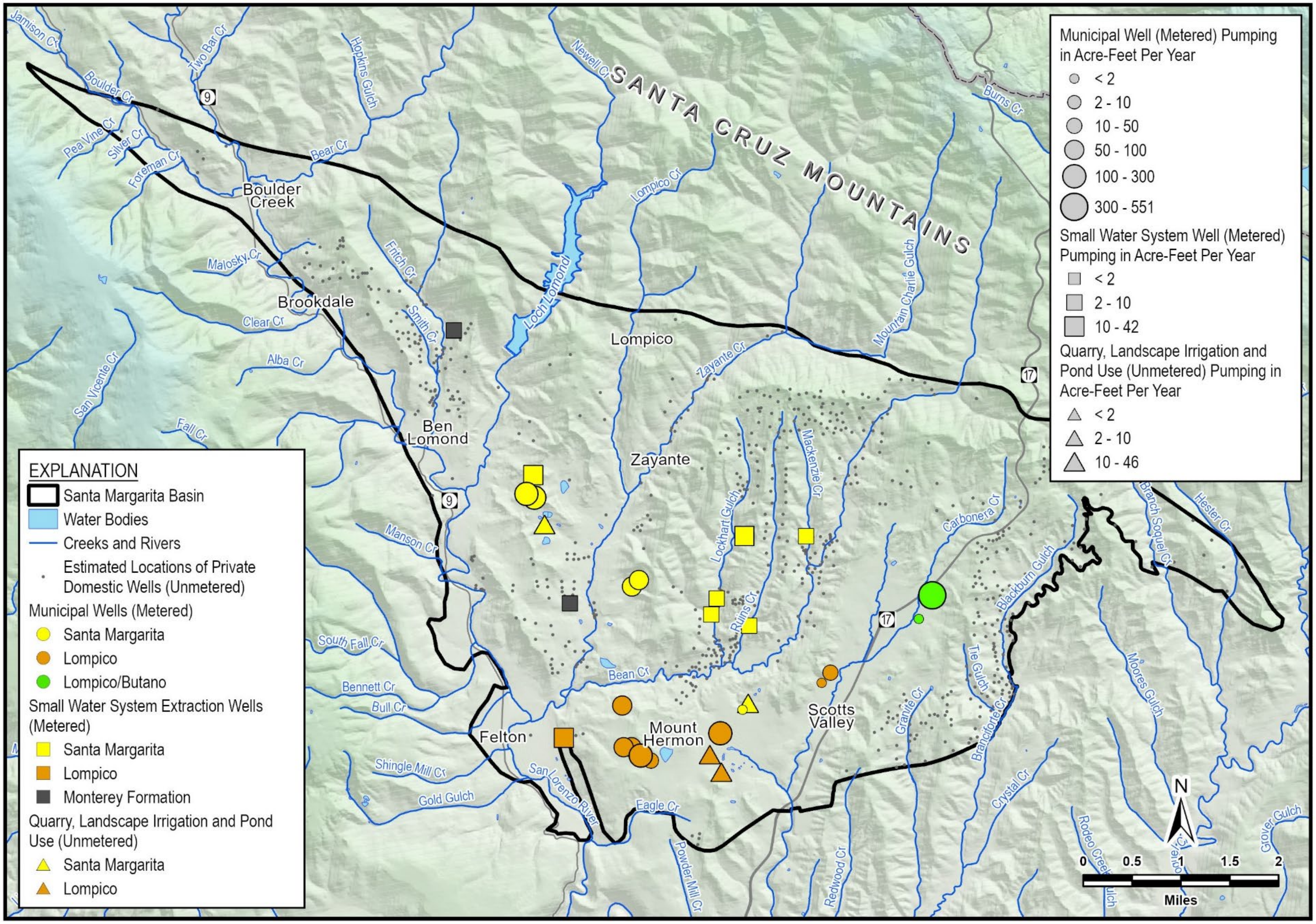


Figure 8. Groundwater Extraction Across the Santa Margarita Basin, WY2023

## 2.4 Surface Water Use

SLVWD is the primary surface water user in the Basin and adjacent watershed. In WY2023 SLVWD diverted a total of 1,202 AF of surface water from creeks that are tributaries to the San Lorenzo River. This is about 6% greater than the long-term average of 1,128 acre-feet per year (AF/yr) since WY2009 when SLVWD acquired the Felton system with its surface water sources (see Section 3.1.1.4 for additional description of the SLVWD systems). The increased use of surface water in the very wet WY2023 is a consequence of increased implementation of conjunctive use practices, as well as the export of 11 AF of water on an emergency basis to 2 water entities severely damaged by the 2020 CZU wildfire (Big Basin Water Company and Forest Springs association). In addition, SLVWD experienced an unusually large amount of water loss in WY2023 due to the major breaks in pipelines caused by flooding and landslides that could not be quickly repaired under the dangerous conditions of atmospheric river events in December 2022 and January 2023. Other small water systems with surface water rights use about 2 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. The SCWD Felton Diversion was not used in WY2023.

SCWD regularly diverts water from the San Lorenzo River about 5 miles downstream of the Basin where it meets roughly 2/3 of the water supply for its customers. In WY2023, SCWD diverted a total of 2,473 AF from the San Lorenzo River downstream of the Basin. While this water is neither diverted nor used within the Basin, it is included here 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. The North System has an average of 55% of its water supply from surface water and 45% from groundwater, reflecting long-term conjunctive use operations.

In WY2023, 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 can be 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 WY2023 total water use in the North System of 1,146 AF, which results in an expected use of 630 AF of surface water and 516 AF of groundwater. Actual surface water diversion in the North System in WY2023 was 713 AF (62% of total) and groundwater extracted was 433 AF (38% 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 82 AF increase from the average expected surface use in WY2023 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 WY2023, 269 AF of surface water from the Felton System was transferred to the San Lorenzo Valley System. This represents in-lieu recharge of the Basin because it offsets use of groundwater by the South System, which is otherwise entirely dependent on the Pasatiempo wellfield, by a transfer of 20 AF, and it augmented by 249 AF the availability of surface water in the North System, which allowed resting of the Olympia and Quail Hollow wellfields until July. Otherwise, groundwater would have had to have been used more because the surface-water infrastructure in the North System has not been 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 WY2023, more than 37 AF of LID recharge was measured.

Table 2. LID Infiltration, WY2018-2023

| 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** |

*Volumes estimated using available data

**Transducer malfunction resulted in no data collection at Library LID between October and February 2022. The recorded value was 0.55 AF. The estimated 1.41 AF above is the same for 2021. This is a reasonable adjusted estimate because the other stations had similar values from 2021 and 2022.

## 2.5 Water Use

### 2.5.1 Total Water Use

Total water use in WY2023 was 3,702 AF. This includes water sourced and used within the Santa Margarita Groundwater Basin, water sourced within the Basin's watershed and used within the Basin, and water sourced within the Basin and used in areas outside the Basin's boundary but within the Basin's watershed that are served by SLVWD. 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 and downstream by SCWD. 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 WY2023 total water use by user, use, and water source type; the methods and accuracy of the estimates are discussed in the footnotes to the table.

Figure 9 illustrates total water use by water source for all users for the period WY1985 to WY2023. Total water used in WY2023 decreased by about 17 AF from WY2022. This decrease would have likely been more significant without the large water losses experienced by SLVWD due to leaks caused by damage incurred during the winter storms of 2022-23 and by transfers of water on an emergency basis to Big Basin Water Company (discussed below). Even so, total water use in WY2023 was 36% less than peak Basin water use of 5,815 AF in WY2001.

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Table 3. Total Water Use by Source, WY2023

| Water Supplier | Groundwater Use | Surface Water Use | Recycled Water Use | Exported Water | Total WY2023 Water Use |
|---|---|---|---|---|---|
| | acre-feet | | | | |
| San Lorenzo Valley Water District[1] | 683 | 1,202 | 0 | 4 | 1,885 |
| Scotts Valley Water District[1] | 1,049 | 0 | 138 | 0 | 1,187 |
| Mount Hermon Association[1] | 147 | 0 | 0 | 0 | 147 |
| Private Domestic Wells[2] | 233 | 0 | 0 | 0 | 233 |
| Other Non-Domestic Private Groundwater Users[3] | 122 | 0 | 0 | 0 | 122 |
| Small Water Systems[4] | 101 | 2 | 0 | 0 | 103 |
| Quail Hollow Quarry[5] | 25 | 0 | 0 | 0 | 25 |
| **TOTAL** | **2,361** | **1,204** | **138** | **4** | **3,702** |
| **Water Diverted and Used Primarily Downstream and Outside the Santa Margarita Basin and Adjacent Areas** | | | | | |
| City of Santa Cruz[1] | 0 | 0[6]<br>2,473[7] | 0 | 0 | 2,473 |
| **Total** | **2,361** | **3,677** | **138** | **4** | **6,176** |

[1] Direct measurement by flow meter (most accurate).

[2] See note in Table 1. Volume is estimated using population and water use data.

[3] Other private non-domestic uses include landscape irrigation and water for landscape ponds. Extraction is not metered so the volume is estimated (less accurate).

[4] See note in Table 1. Volume is partially estimated using prior water year data.

[5] Estimated based on historical usage (less accurate).

[6] City of Santa Cruz's San Lorenzo River diversion from Felton to Loch Lomond - inactive in WY2023. This diversion is in the Basin but is only used in wet years.

[7] 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 but is used outside of the Santa Margarita Basin.

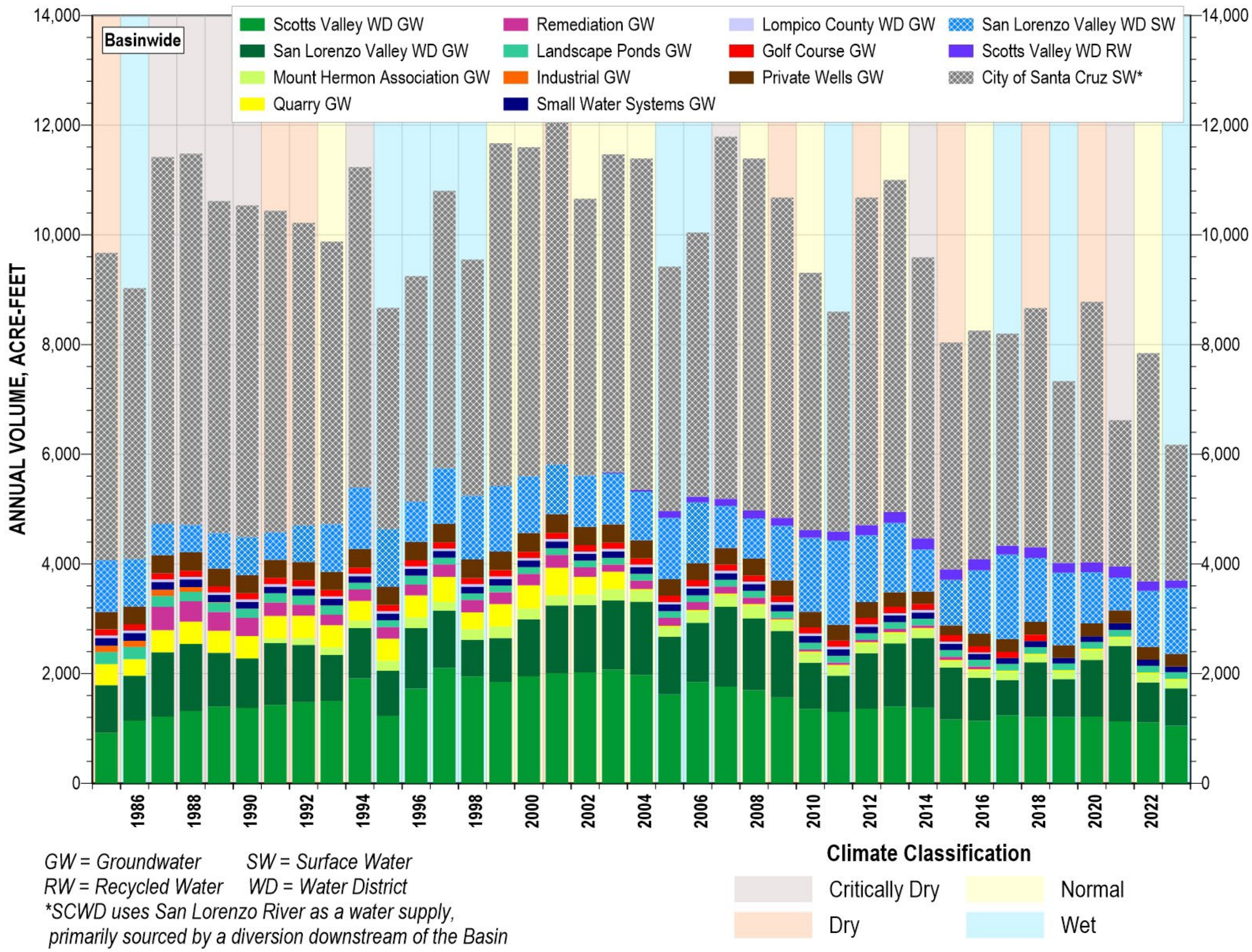


Figure 9. Total Basin Water Use, WY1985-2023

SCWD is the largest user of water resources originating from the Basin and its surrounding watershed. In WY2023, SCWD diverted 2,473 AF from the San Lorenzo River about 5 miles downstream from the Basin to serve its customers in the City of Santa Cruz. 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 use of water 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, in WY2023, the volume of water used 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).

Other information that is relevant to the current and future reporting of total water use in the basin include interdistrict transfers and water system consolidations. These are described further below.

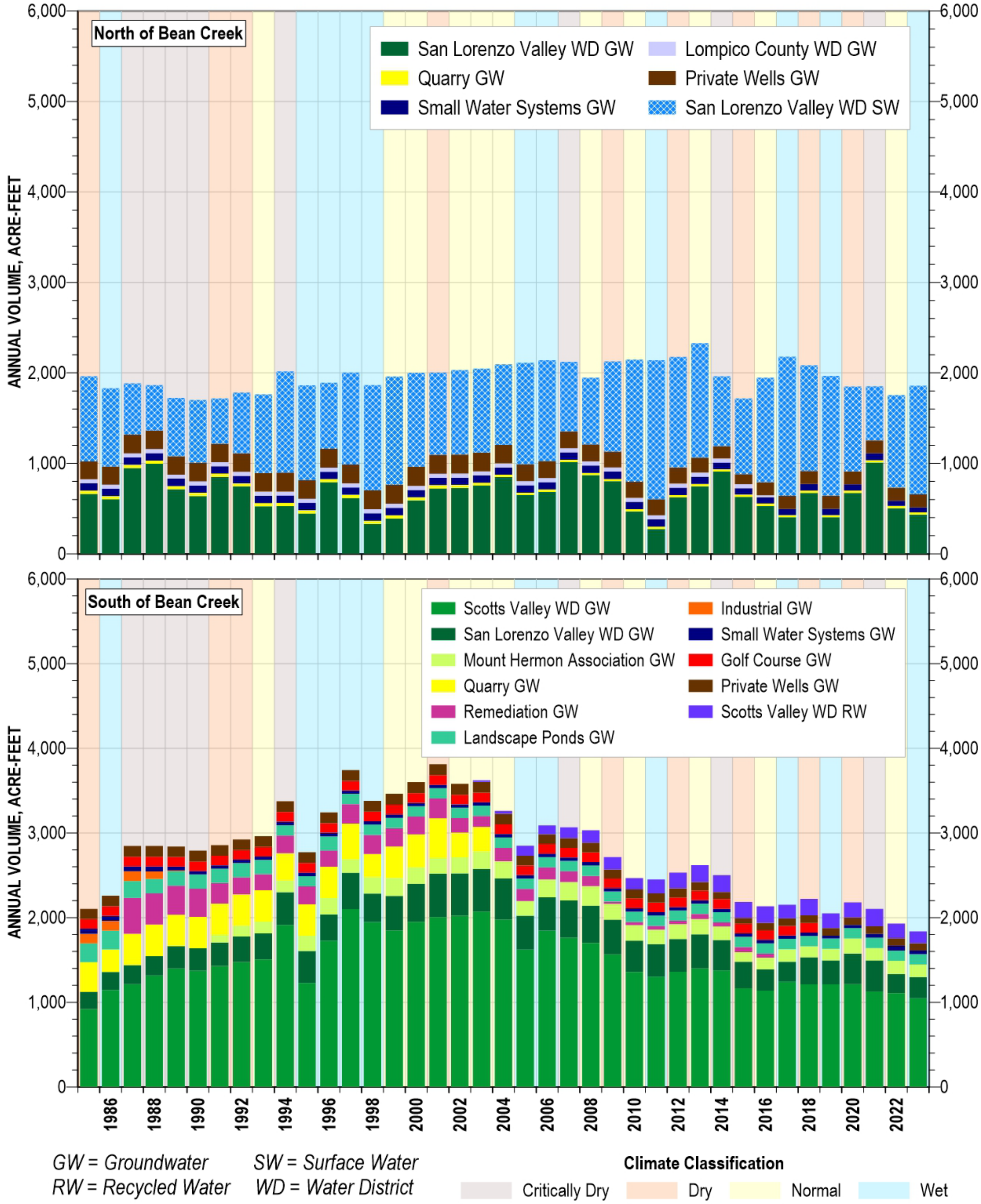


Figure 10. Total Water Use by Source and Location Within the Basin, WY1985-2023

## 2.5.2 Changes in Basin Water Use

### 2.5.2.1 Interdistrict Transfers of Water

In previous annual reports, a small volume of imported water, 38 AF, was recorded. This represented water transferred into the Basin by Big Basin Water Company (BBWC) to serve the Forest Springs Mutual (FS) small water system near Boulder Creek. BBWC is a private water company serving 540 connections northwest of the Basin. Its water is sourced outside the Basin but within the Basin's watershed. Both BBWC and FS were severely damaged in the 2020 CZU wildfire. There was no import of water from BBWC in WY2023; instead, SLVWD provided 8 AF to Forest Springs via an emergency intertie.

SLVWD has been providing water to BBWC on an emergency basis since the 2020 CZU wildfire. Initially this aid consisted of free filling stations for individual customers, but as the condition of the BBWC system further degraded, this changed to the sale of trucked water and, in July 1, 2023 an emergency intertie was constructed between SLVWD and the BBWC system. The intertie is currently capable of transporting about 60 gallons per minute (95 AF/yr). An estimated 3.5 AF (about 40% of which would have been groundwater sourced in the Basin) was transferred from SLVWD to BBWC in WY2023, representing a small export of water from the Basin (Table 3). The intertie is currently in near-constant use, so it is anticipated that the volume exported in WY2024 will be considerably greater than in WY2023.

The transfer of a total of 11 AF of water to BBWC and the FS system represented less than 1% of the use of water by SLVWD in WY2023.

Emergency interties are available to transfer water between SLVWD and SVWD, and between SLVWD and MHA, but there were no intertie transfers between the water districts in WY2023.

### 2.5.2.2 Water System Consolidations

During WY2023, SLVWD continued the process of consolidating with 2 small water systems that serve a total of 152 connections in 2 unincorporated communities that lie within the district's sphere of interest, the aforementioned FS system and the nearby Bracken Brae Mutual (Bracken Brae) system. These small water systems historically received water from BBWC, but in the aftermath of the 2020 CZU wildfire, they independently contacted SLVWD seeking consolidation. In 2022, DWR awarded SLVWD with a Small Community Drought Relief Program grant of $3.2 million for partial funding of the project. Environmental and engineering studies in support of consolidation began in WY2023. Construction is expected to commence on the first stage of the consolidation in WY2024, beginning with construction of an emergency intertie between Bracken Brae and SLVWD to stabilize their water supply.

The preferred solution of the County and State Water Resources Control Board to long-standing deficiencies of the BBWC system that were exacerbated by damage sustained in the 2020 CZU wildfire is consolidation with SLVWD. During WY2023 SLVWD continued a process begun in 2021 to explore the possibility of consolidation. In February 2023 SLVWD suspended these efforts because discussions with the state, county and BBWC had not identified the funding necessary to run the system and to make the necessary infrastructure improvements. In October 2023 BBWC was put in receivership. As of this writing, in addition to providing BBWC water via the emergency intertie, SLVWD also provides staff at cost to do emergency repairs of the system.

## 2.6 Groundwater Elevations

Groundwater elevations in the Basin are monitored using a network of 43 wells comprised of 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 43 monitoring wells, 14 have been selected 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 active 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 April and May 2023 on the Spring contour maps and minimum groundwater elevations in September 2023 on the Fall contour maps. The data from newly installed SMGWA monitoring wells added to the Fall 2023 contour map for the Santa Margarita aquifer improved the accuracy of groundwater elevation contouring.

Hydrographs are used to evaluate long-term trends in groundwater elevation. All available non-pumping groundwater elevation data collected in each well through WY2023 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: Pages A-2 through A-17: Chronic Lowering of Groundwater Level RMP Well Hydrographs
- Appendix B: Pages B-1 and B-2: Depletion of Interconnected Surface Water RMP Well Hydrographs
- Appendix C: Pages C-1 through C-22: GSP Non-RMP Monitoring Network Well Hydrographs

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

### 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 increased in WY2023 compared to WY2022 (Appendix A, pages A-3, A-5, and Appendix C, pages C-5 through C-8). Increased groundwater levels occurred because it was a wet year that allowed SLVWD to use more surface water and pump about 14% less groundwater from the Santa Margarita aquifer than in WY2022, and there was more groundwater recharge than usual from streamflow and precipitation to the unconfined portions of the aquifer.

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 over-pumping in the 1990s, and groundwater elevations have not recovered even though the Santa Margarita aquifer is no longer used for municipal supply because in this area the Santa Margarita aquifer directly overlies the over-drafted 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-4) and

SVWD TW-18 (Appendix A, page A-6) illustrate the long-term stable groundwater levels in these areas, with slight fluctuations depending on precipitation.

Groundwater elevation contour maps for the Santa Margarita aquifer are shown on Figure 11 and Figure 12 for WY2023 Spring and Fall, respectively. The maximum 7-foot decline in groundwater levels between Spring and Fall is typical of the fluctuation between wet and dry seasons in this unconfined aquifer, but was superimposed on an overall increasing trend in groundwater levels compared to WY2022, due to abundant rainfall that replenished the aquifer following a 3-year dry period. Furthermore, reduced extraction from the aquifer, particularly the 38% decrease in pumping from the SLVWD Olympia wellfield in WY2022 to WY2023, led to a notable rise of up to 25 feet in groundwater elevations.

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 (Figure 11 and Figure 12).

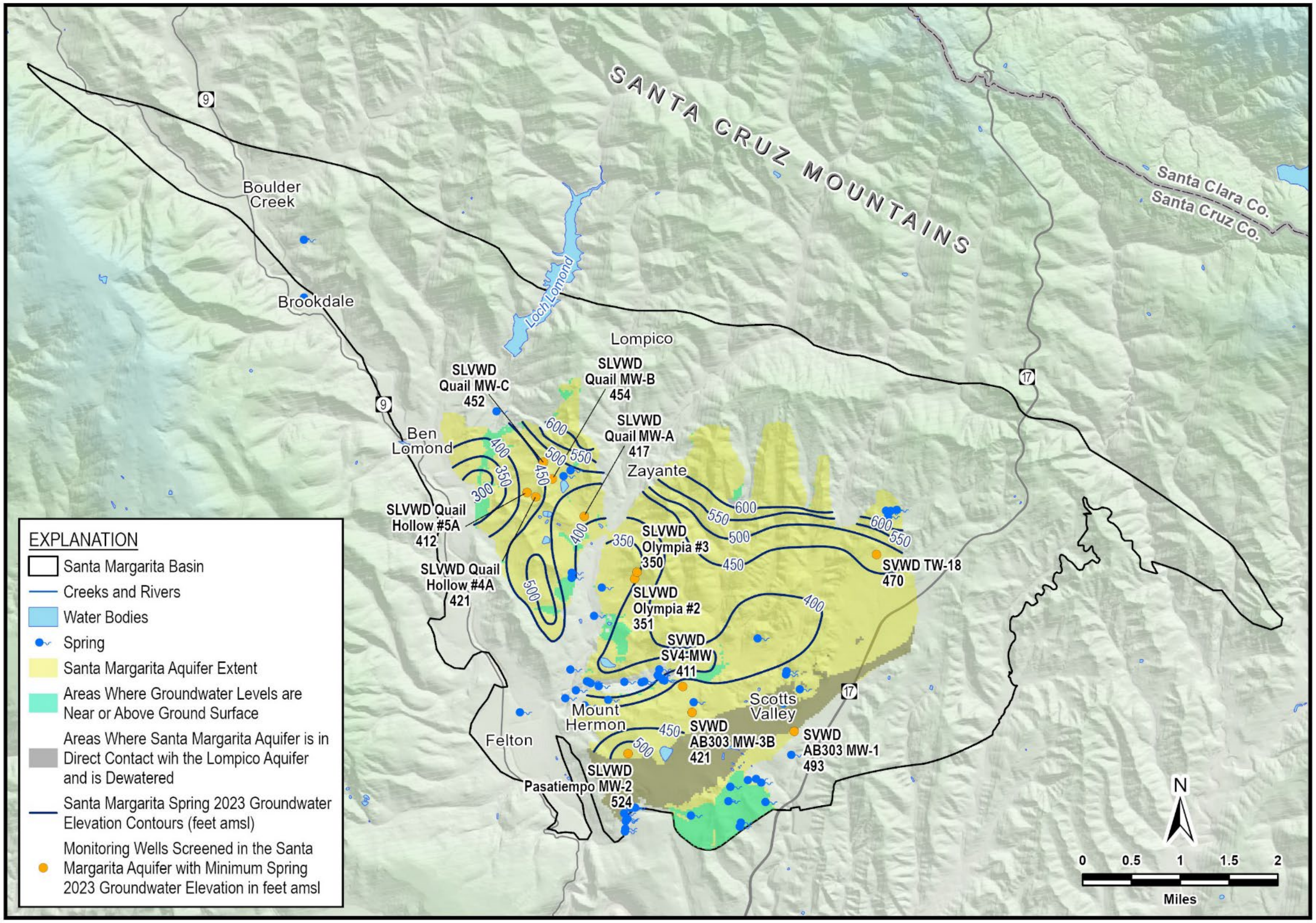


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Figure 11. Santa Margarita Aquifer Groundwater Elevations and Contours, Spring 2023

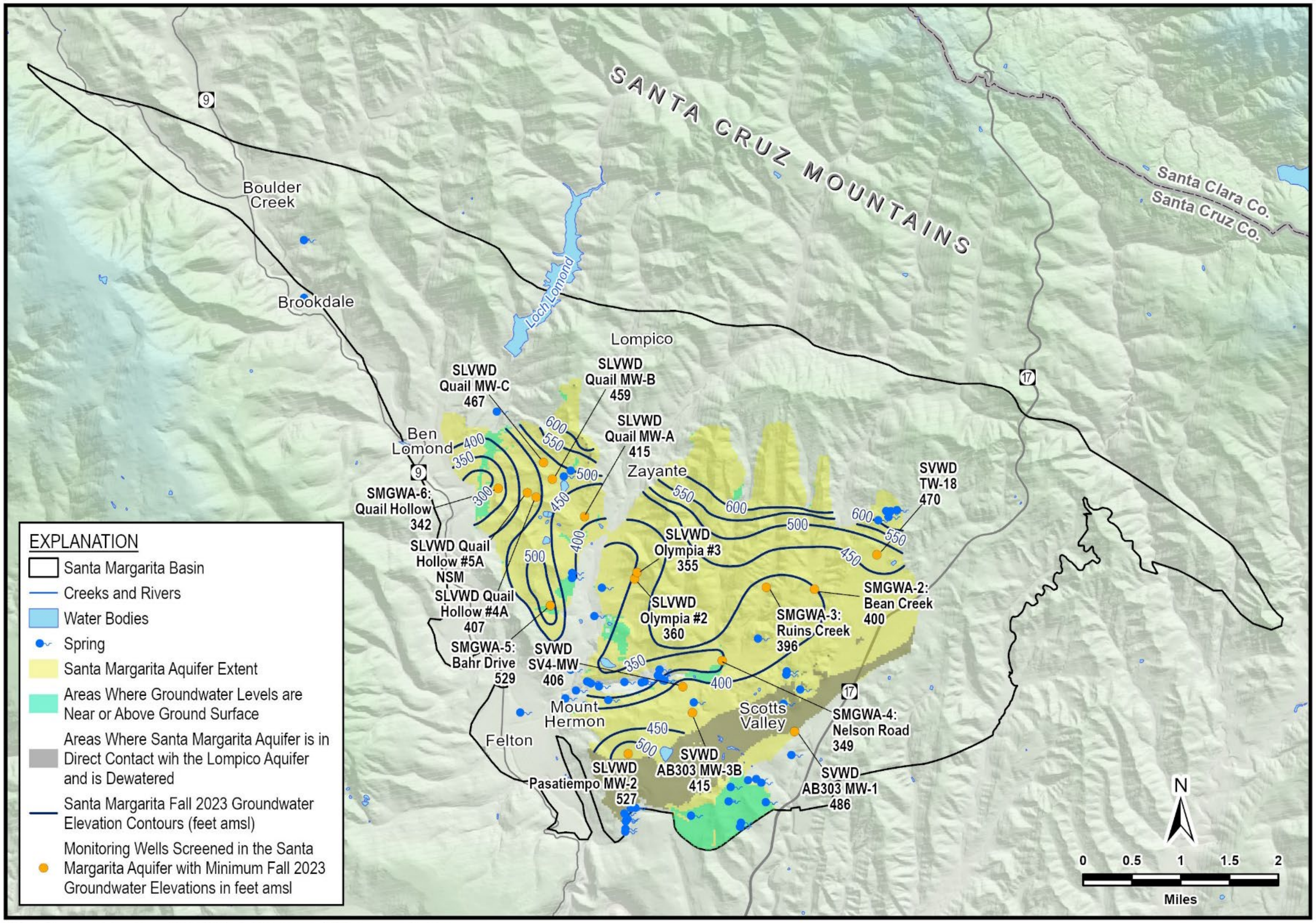


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Figure 12. Santa Margarita Aquifer Groundwater Elevations and Contours, Fall 2023

### 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 overdrafted Lompico aquifer with lowered groundwater levels directly below (Figure 2 and Figure 3).

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 in the Lompico aquifer below. Groundwater extraction in the area decreased during the 1990s, and, as a result, groundwater elevations in the Monterey Formation have risen by about 50 feet since 1998. Nevertheless, the groundwater elevation in SVWD Well #9 is still approximately 150 feet below the 1980 elevation (Appendix A, page A-8) because recharge is inhibited by the low permeability of the formation. In WY2023 the groundwater elevation fluctuated a few feet, similar to last year.

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 will fill data gaps in areas with no historical groundwater monitoring and address 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. A Monterey Formation groundwater elevation contour map is not presented because it is not a principal aquifer in the Basin.

### 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 over-pumping of the Lompico aquifer in the Mount Hermon/Pasatiempo/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-11). 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-16).

Groundwater elevation contour maps for the Lompico aquifer are shown on Figure 13 and Figure 14 for WY2023 Spring and Fall, respectively. 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.

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 small areas of exposure of the Lompico Formation along the San Lorenzo River, near Felton and further upstream near the communities of Ben Lomond and Boulder Creek, 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.

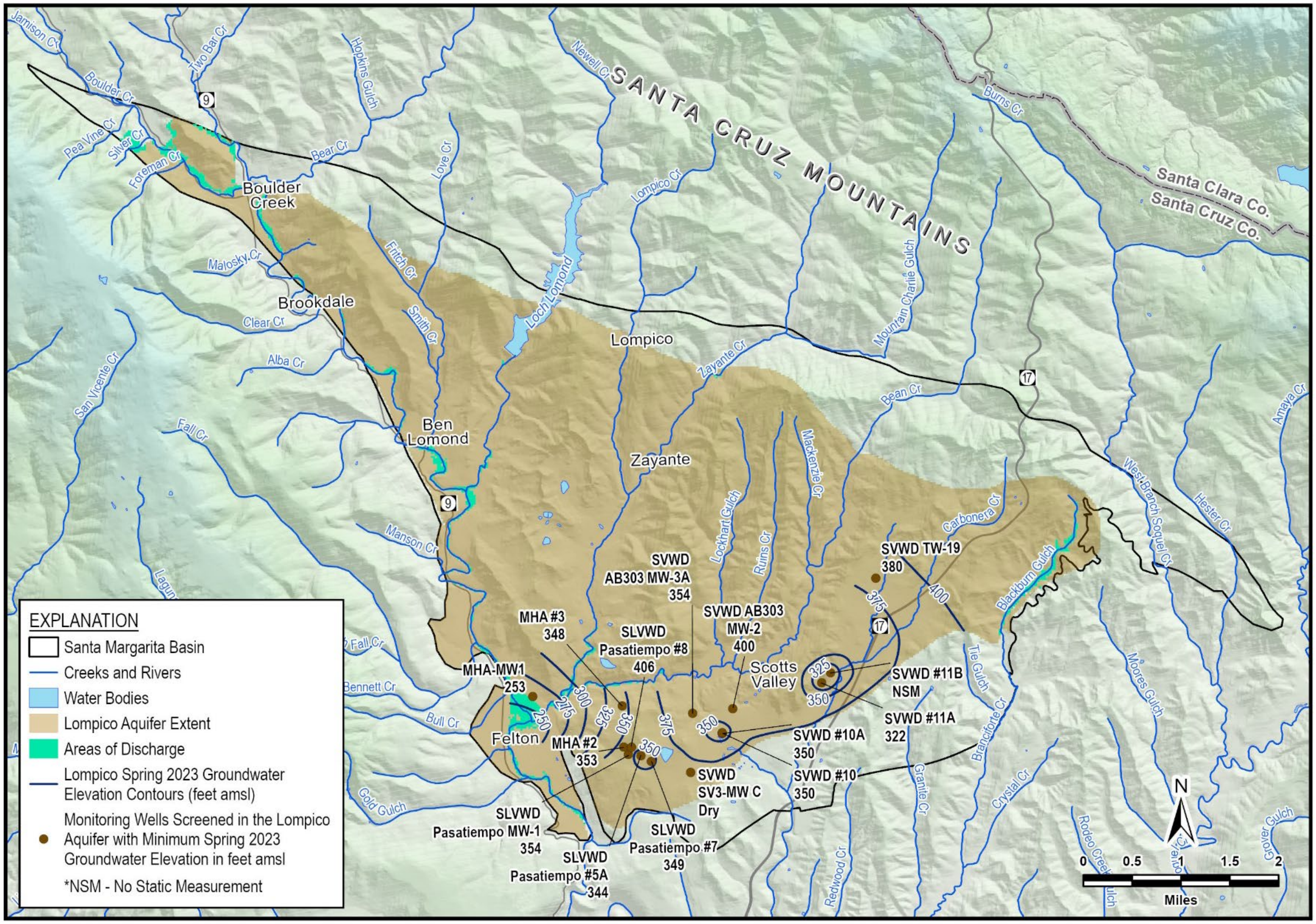


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Figure 13. Lompico Aquifer Groundwater Elevations and Contours, Spring 2023

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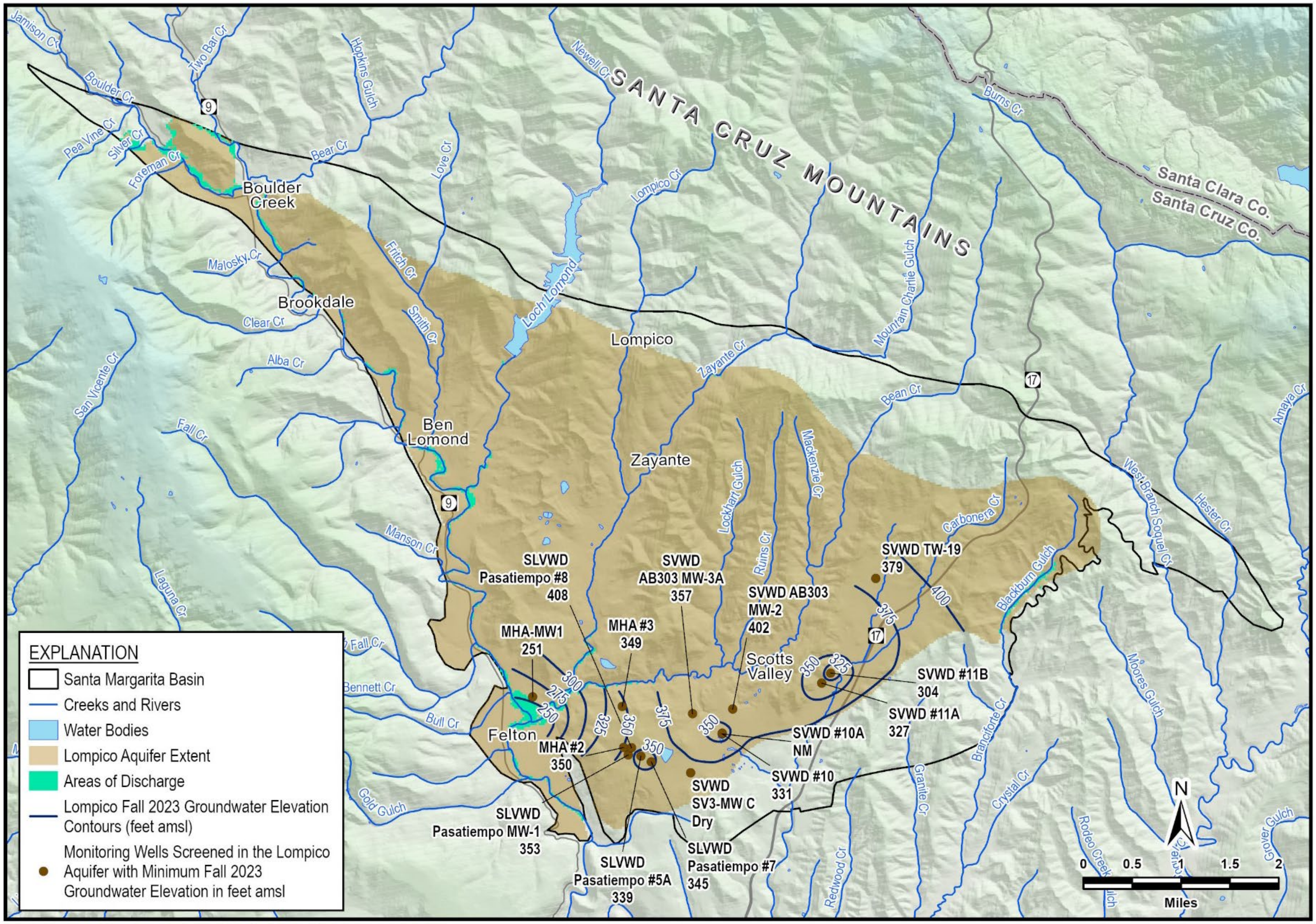

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Figure 14. Lompico Aquifer Groundwater Elevations and Contours, Fall 2023

### 2.6.4 Butano Aquifer

The stratigraphically oldest of the 3 main aquifers, the Butano Sandstone, is 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; hence, 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 9). Groundwater elevations over time in the dedicated Butano aquifer monitoring wells are stable (Appendix A, pages A-16 and A-17).

There are 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. Due to extraction from the wells, all show more seasonal fluctuations in groundwater levels than the dedicated Butano wells located upgradient from the municipal supply wells (Appendix A, page A-15 and Appendix C, pages C-21 and C-22). 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 WY2023 Spring and Fall are shown on Figure 15 and Figure 16, respectively. Due to almost continuous pumping at SVWD Orchard well, static groundwater level measurements for WY2023 Spring and Fall were not obtained. However, groundwater levels in nearby SVWD #3B and #15 monitoring wells were similar to WY2022. 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.

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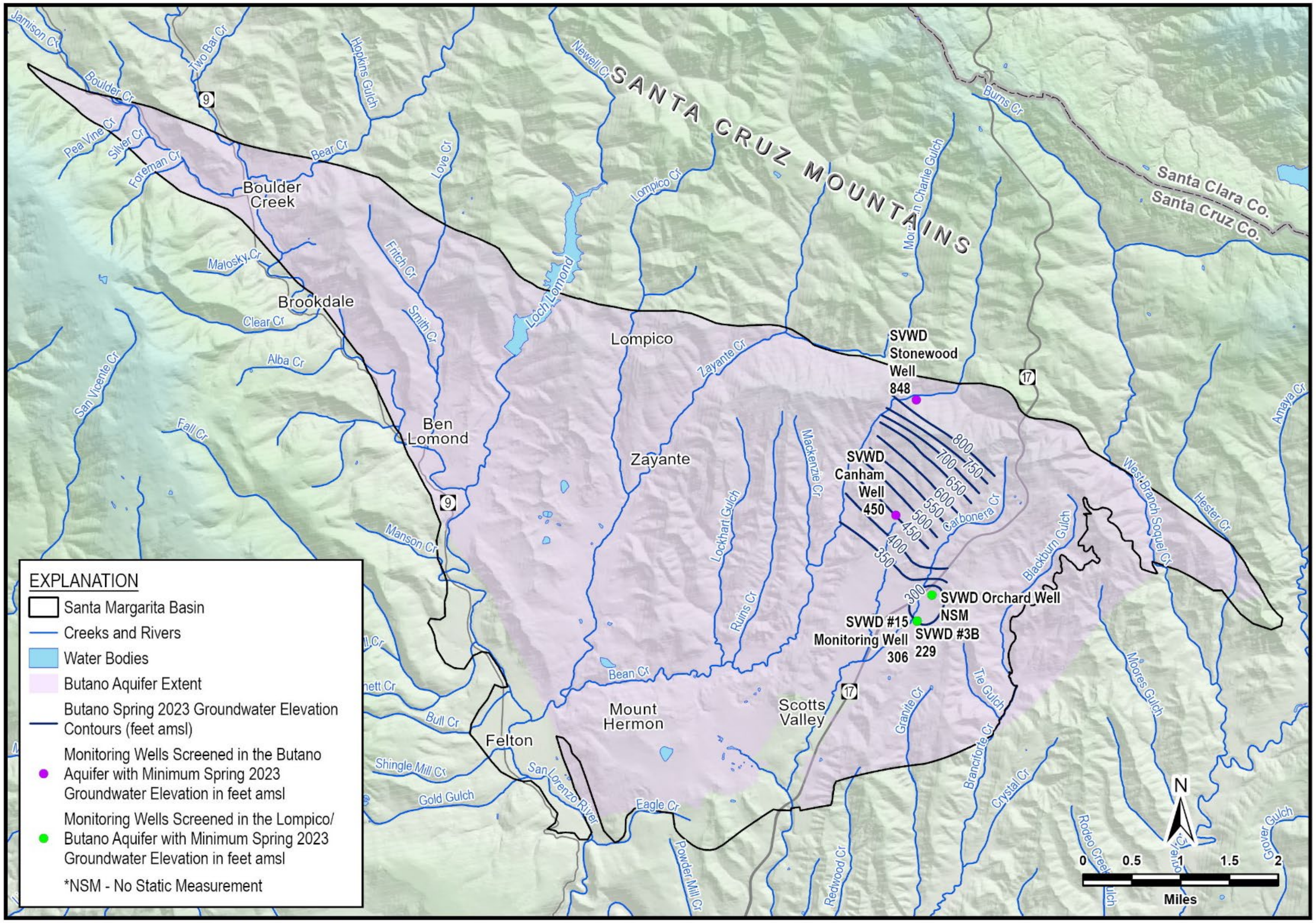

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Figure 15. Butano Aquifer Groundwater Elevations and Contours, Spring 2023

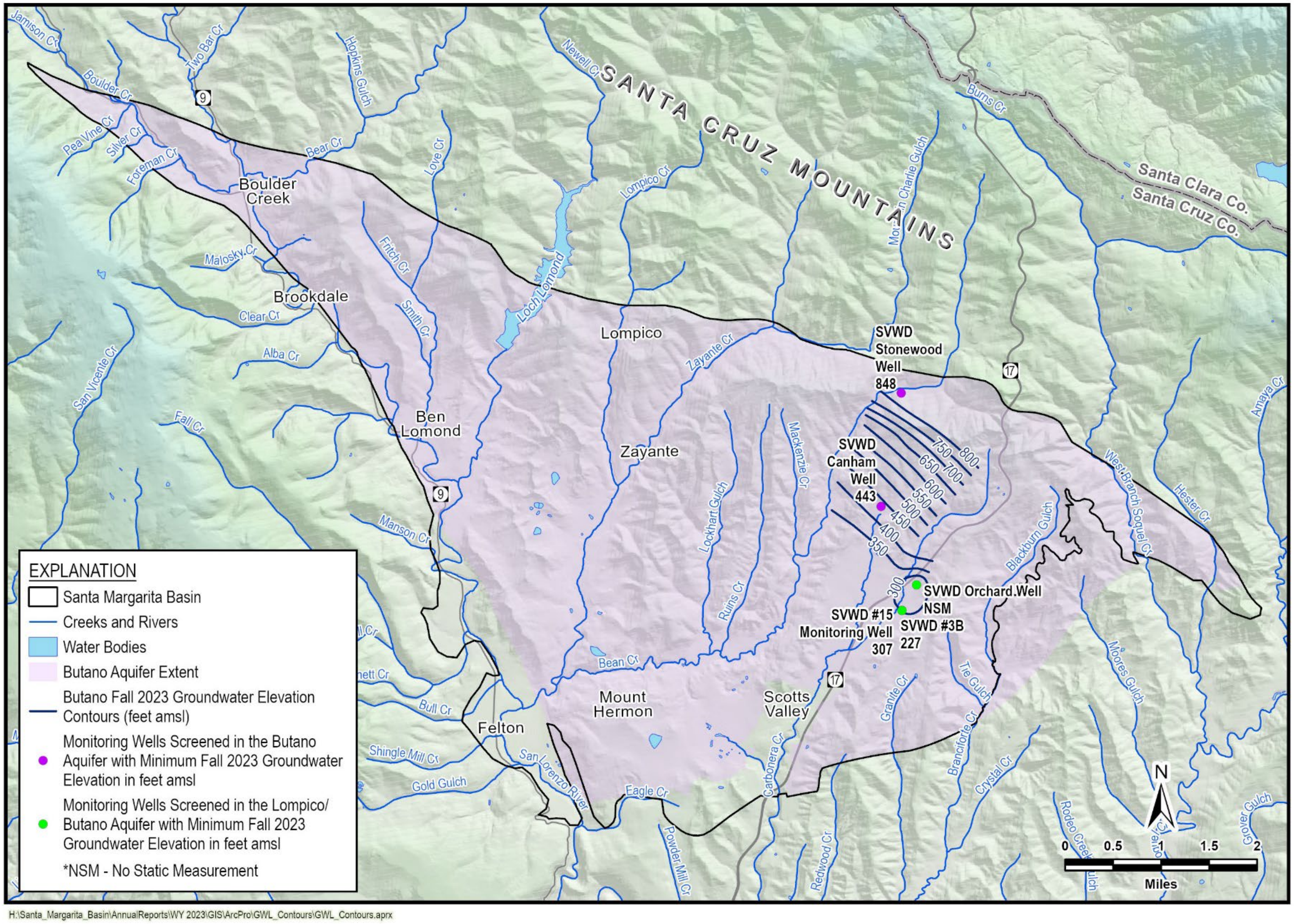


Figure 16. Butano Aquifer Groundwater Elevations and Contours, Fall 2023

## 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 WY2023 climate and groundwater extraction data, including the following:

- Monthly precipitation and temperature data from the Parameter-elevation Regressions on Independent Slopes Model[1] (known as "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

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 WY2023 Change in Groundwater in Storage for the Santa Margarita Basin

Wet conditions in WY2023 allowed groundwater in storage to increase in all aquifers and formations. The model calculated total increase in groundwater in storage in the Basin was close to 9,900 AF. Figure 17 shows the annual and cumulative change of groundwater in storage and groundwater extraction from WY1985 through WY2023.

The calculated increase in groundwater storage in WY2023 is greater than that of any year since 1985. This is due to a variety of factors, including: 1) the very wet conditions that returned following a 3-year dry period, which increased recharge and lowered demand; 2) the lowest total groundwater extraction for the Basin in the period of record from 1985; and 3) continued water use efficiency and 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 870 AF/yr over 39 years. However, since peak Basin water use in 2001, the decline in groundwater in storage has slowed to an average of 310 AF/yr, with a cumulative decrease in storage in the past 22 years of only 6,860 AF. This improvement occurred despite the known statewide precipitation deficit over the past 2 decades, indicating progress toward reaching sustainability.

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

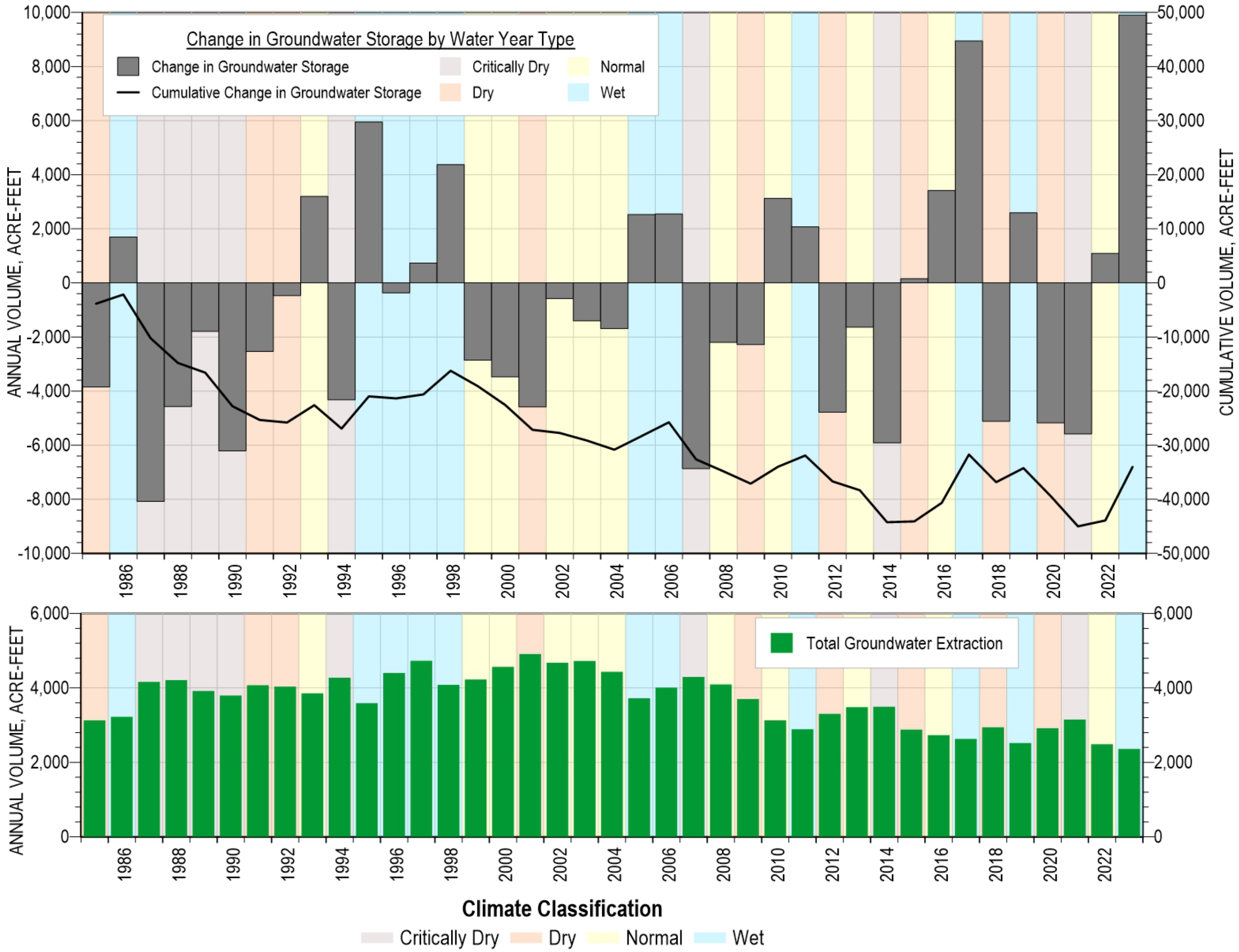


Figure 17. Annual Change in Groundwater in Storage for the Santa Margarita Basin, WY1985-2023

### 2.7.2 WY2023 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 when conditions are dry but rise quickly during wet years. The low permeability in the Monterey Formation prevents rapid recharge in response to a wet year. 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. However, direct recharge from precipitation occurs in all aquifers where they are exposed at the ground surface, particularly near streams.

The calculated changes in storage volumes for the 3 major aquifers plus the Monterey Formation are summarized in Table 4. About 46% of the basin-wide storage increase in WY2023 was in the Santa Margarita aquifer; 31% in the Butano aquifer; 12% in the Lompico aquifer; and 11% in the Monterey Formation.

Table 4. WY2023 Modeled Change in Groundwater in Storage by Aquifer/Formation

| Change in Storage (AF) | Santa Margarita | Monterey | Lompico | Butano | TOTAL |
|---|---|---|---|---|---|
| WY2023 | 4,600 | 1,100 | 1,200 | 3,000 | 9,900 |

Maps of modeled changes in groundwater in storage between Fall WY2022 and Fall WY2023 show where changes in storage occurred. 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 WY2023 using the following color coding:

- Blue – Between 3 and 5 AF/acre increase in storage
- Green – Between 1 and 3 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 0.3 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.

Nearly all areas in the Santa Margarita aquifer had a net increase in groundwater in storage in WY2023 (Figure 18). Groundwater in storage increased significantly around SLVWD Quail Hollow and Olympia wellfields (green and blue colors), as expected, as a result of expanded conjunctive use of surface water in the wet year, allowing resting of wells in SLVWD's North System. Scattered areas where the aquifer is used for private domestic supply also show modest increases in storage (yellow colors) presumably due to decreased demand during the wet year.

The Monterey Formation has low permeability and, therefore, changes in storage would be expected to be smaller on an annual basis than in the Santa Margarita aquifer. The Monterey Formation gained modest amounts of groundwater in storage in WY2023 (Figure 19) across the entire Basin.

The mostly confined Lompico and Butano aquifers are less subject to storage changes in response to a wet year 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 would be expected to be influenced more strongly by groundwater extraction. The only areas expected to see an increase in storage in the wet WY2023 would be where these units are exposed in narrow strips along the northern boundary of the Basin. This is also where they are used as sources by private domestic wells (Figure 20 and Figure 21).

Like the other aquifers, most of the Lompico aquifer had an increase in storage in WY2023 (yellow colors on Figure 20). The largest calculated increases in groundwater in storage (blue and green colors on Figure 20) occurred where the Lompico aquifer is used for municipal supply around SLVWD's Pasatiempo wellfield and SVWD's Well #10A in southern Scotts Valley. Increases in storage are confirmed by groundwater level increases in these areas

(Appendix C, Pages C-16 and C-18). There is very little change in storage north of the Pasatiempo wellfield, which is supported by nominal changes in groundwater levels measured in SLVWD's Pasatiempo #8 and MHA #2 (Appendix C, Pages C-12 and C-17) in WY2023 compared to WY2022.

Similar to the Lompico aquifer, the Butano aquifer had an overall calculated increase in groundwater in storage (yellow colors on Figure 21). The decrease in pumping of the Butano aquifer by SVWD as a result of resting the Orchard well during December 2022 and January 2023 did not cause storage to noticeably change near the well. An increase in storage (blue-green and green colors) occurred along Bean Creek at the north edge of the Basin (Figure 21) near where the Butano aquifer is exposed at the surface and is used for private wells, and is the combined result of greater direct recharge in this area and possibly a decrease in private domestic demand in a wet year with a cool spring and summer.

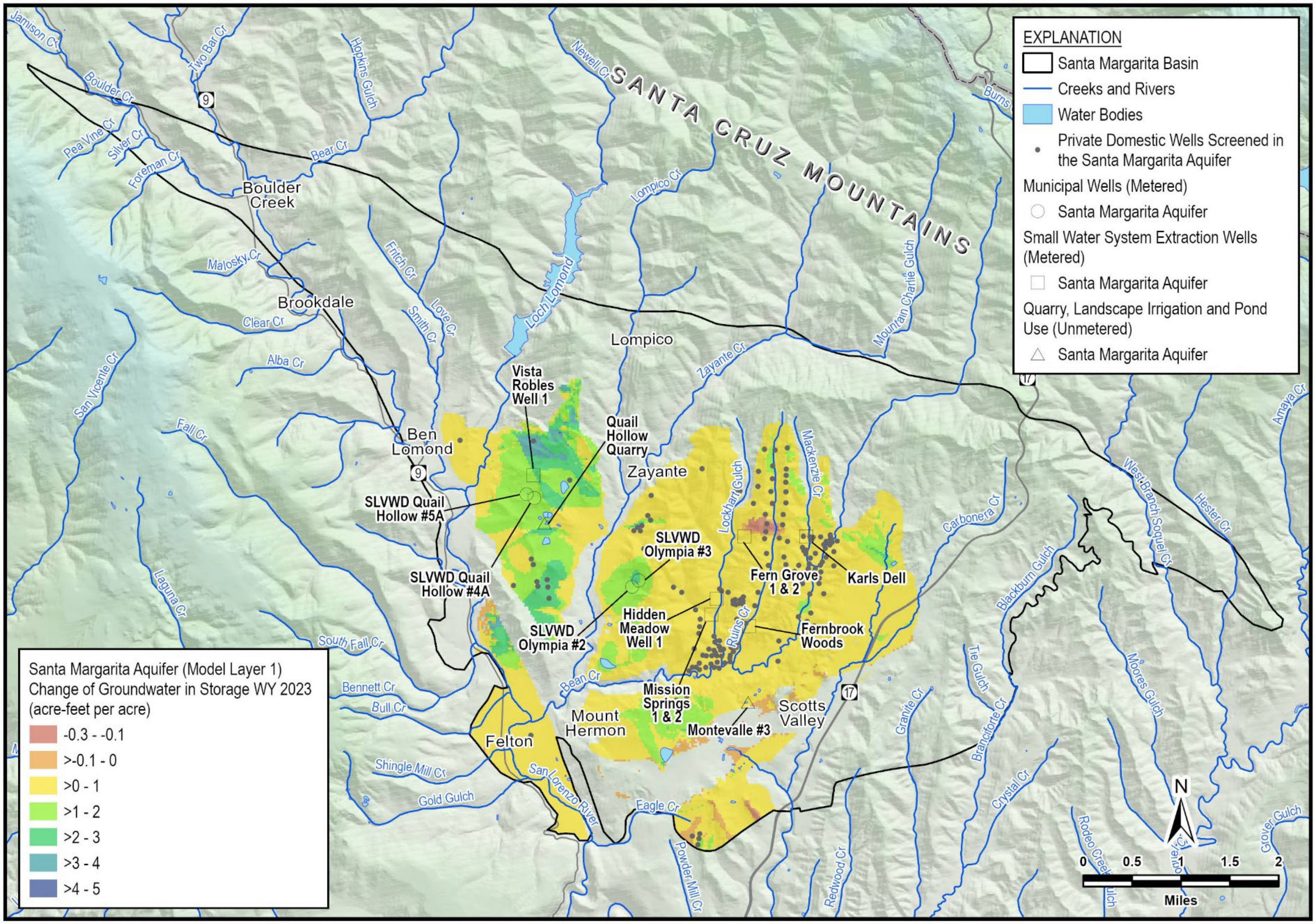


Figure 18. Change of Groundwater in Storage in Santa Margarita Aquifer, WY2023

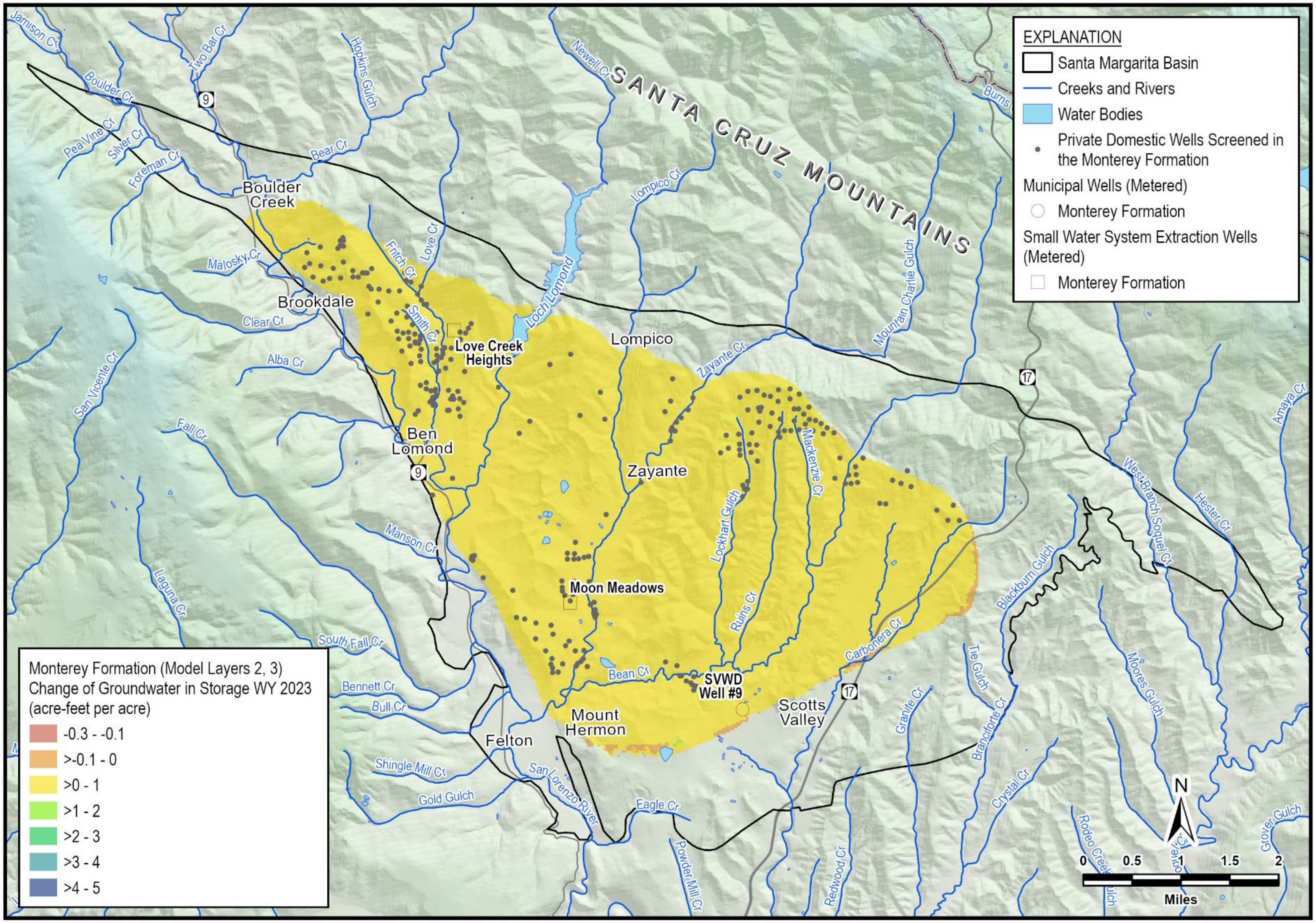


Figure 19. Change of Groundwater in Storage in Monterey Formation, WY2023

MONTGOMERY & ASSOCIATES

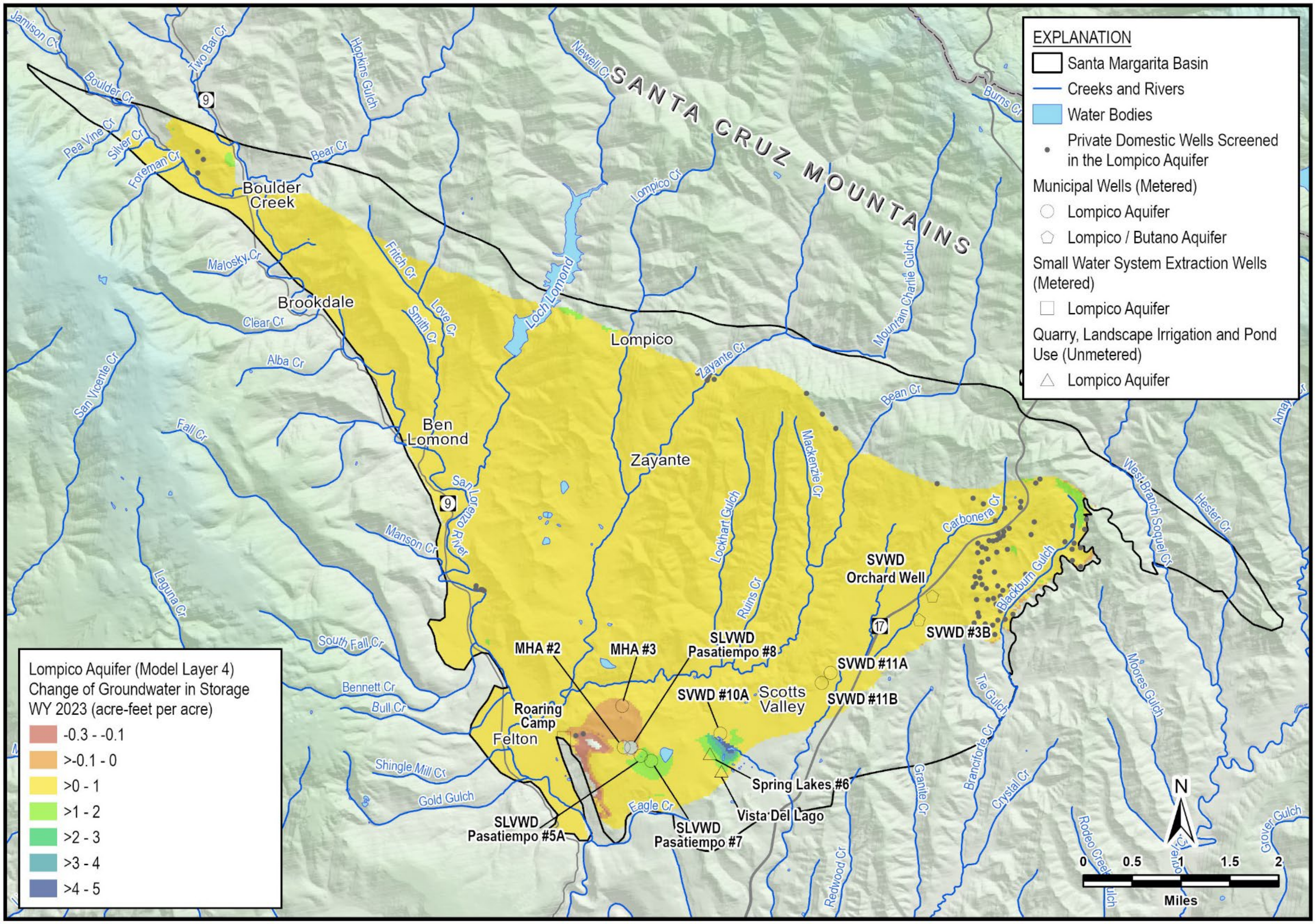


Figure 20. Change of Groundwater in Storage in Lompico Aquifer, WY2023

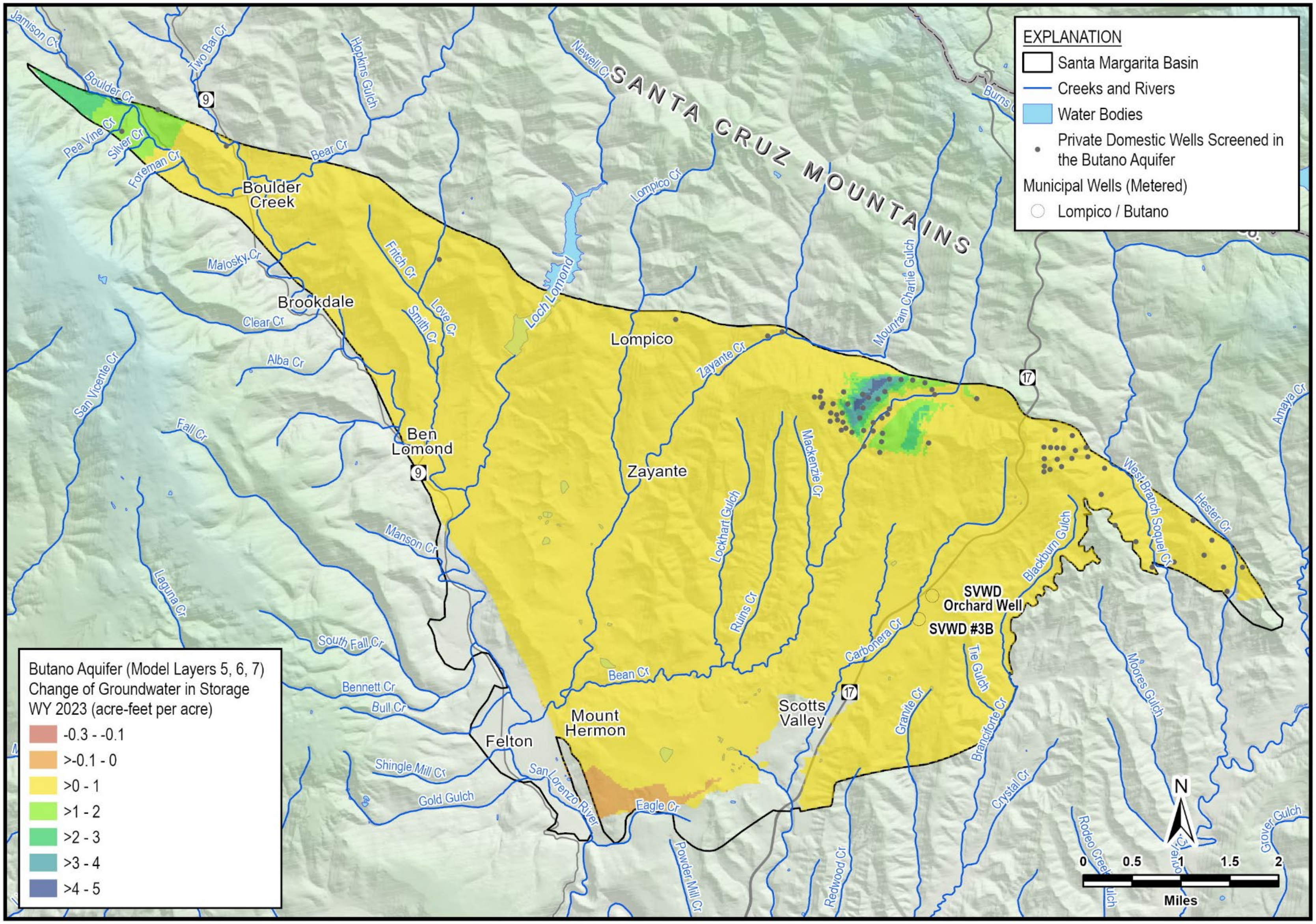


Figure 21. Change of Groundwater in Storage in Butano Aquifer, WY2023

# 3 PROGRESS TOWARD IMPLEMENTING THE GSP

This section provides an update on the progress made in WY2023 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 is expected to result in meeting Basin SMC based on modeling analysis 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 WY2023 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 in WY2023.

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 2,269 current customers signed up and SLVWD has 680 customers signed up.

SLVWD and SVWD continued to offer rebates to encourage customer improvements to increase water use efficiency. In WY2023, SLVWD issued 27 clothes washer rebates, 17 toilet rebates, and 4 irrigation controller rebates resulting in an estimated savings of 272,675 gallons per year (GPY). SVWD issued 30 rebates for turf replacement resulting in an estimated 443,201 GPY savings, and additional 16 rebates for toilet and smart irrigation controller replacements saving an additional 29,000 GPY for a total of 472,201 GPY. The volume of savings will continue to accrue throughout WY2024.

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 36% of meters through WY2023. SLVWD received a grant in 2022 to upgrade an additional 400 of its meters by March of 2024. SVWD has had advanced metering infrastructure in place since 2021. SVWD tested and calibrated all extraction meters in WY2023. Finally, SLVWD replaced the leaking redwood Blue Ridge water storage tank with a new steel tank in WY2023, which results in an estimated savings of 368,200 GPY. In WY2024, SLVWD is budgeting to replace the following:

- 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 37.44 AF. In WY2024, the facilities are expected to continue operations. While the amount of recharge in WY2024 will be related to the amount and timing of precipitation encountered, it is reasonable to estimate about 25 AF of recharge, the average for WY2018 through WY2023, 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 is expected to go out to bid and begin 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 138 AF of recycled water in WY2023. The reduced demand in WY2023 was consistent with wet conditions in the Basin and an overall reduction in SVWD customer demand from WY2022. In WY2024, the use of recycled water for non-potable uses will continue.

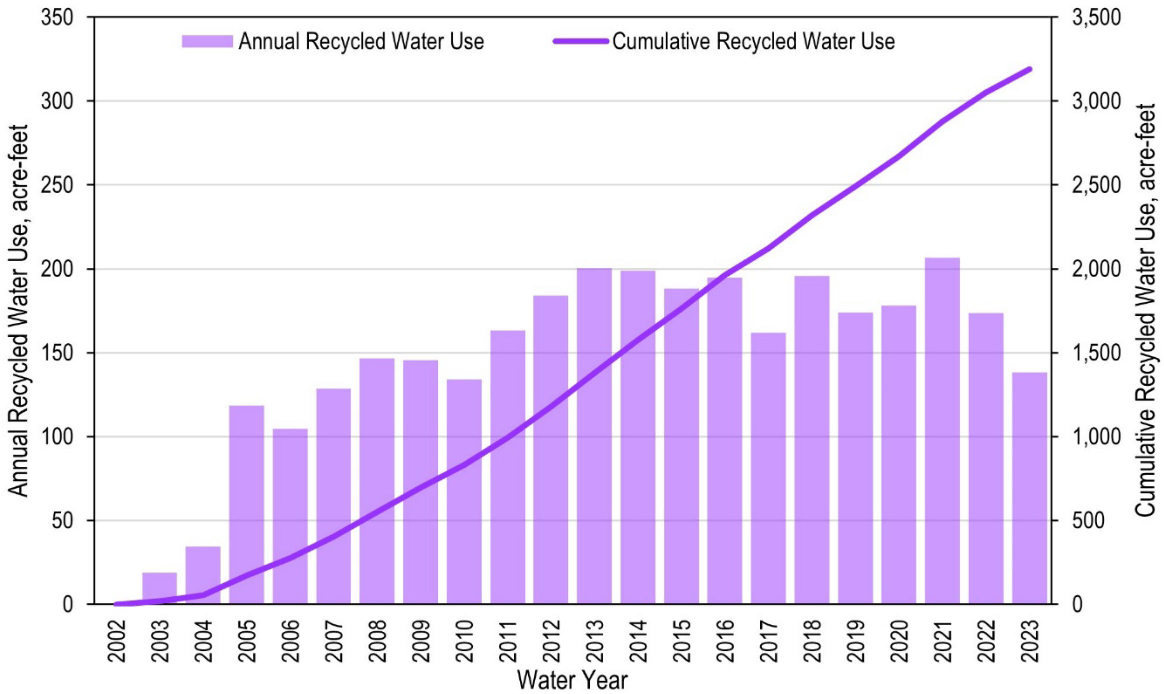


Figure 22. Recycled Water Use by SVWD Customers, WY2002-2023

#### 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 wet conditions prevailed in WY2023, 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 62% surface water and 38% groundwater in the North System. As discussed in Section 2.4.1, this represents a conservative estimated benefit of conjunctive use in WY2023 of 82 AF of in-lieu groundwater recharge in the North System. In WY2023, 351 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 North and South systems. Because of the very wet winter, a large storm in March (see Figure 6), and a relatively cool spring and summer, stream flows remained elevated well into the summer such that the SLVWD did not have to turn on its wells until July.

In WY2024, 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 point 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 re-ignited by the obvious gains to the Basin from conjunctive use of Felton surface water supplies. The expected benefit of these operations for WY2024 cannot be determined until the conclusion of the water year, because hydrology will be a significant component of operational decisions.

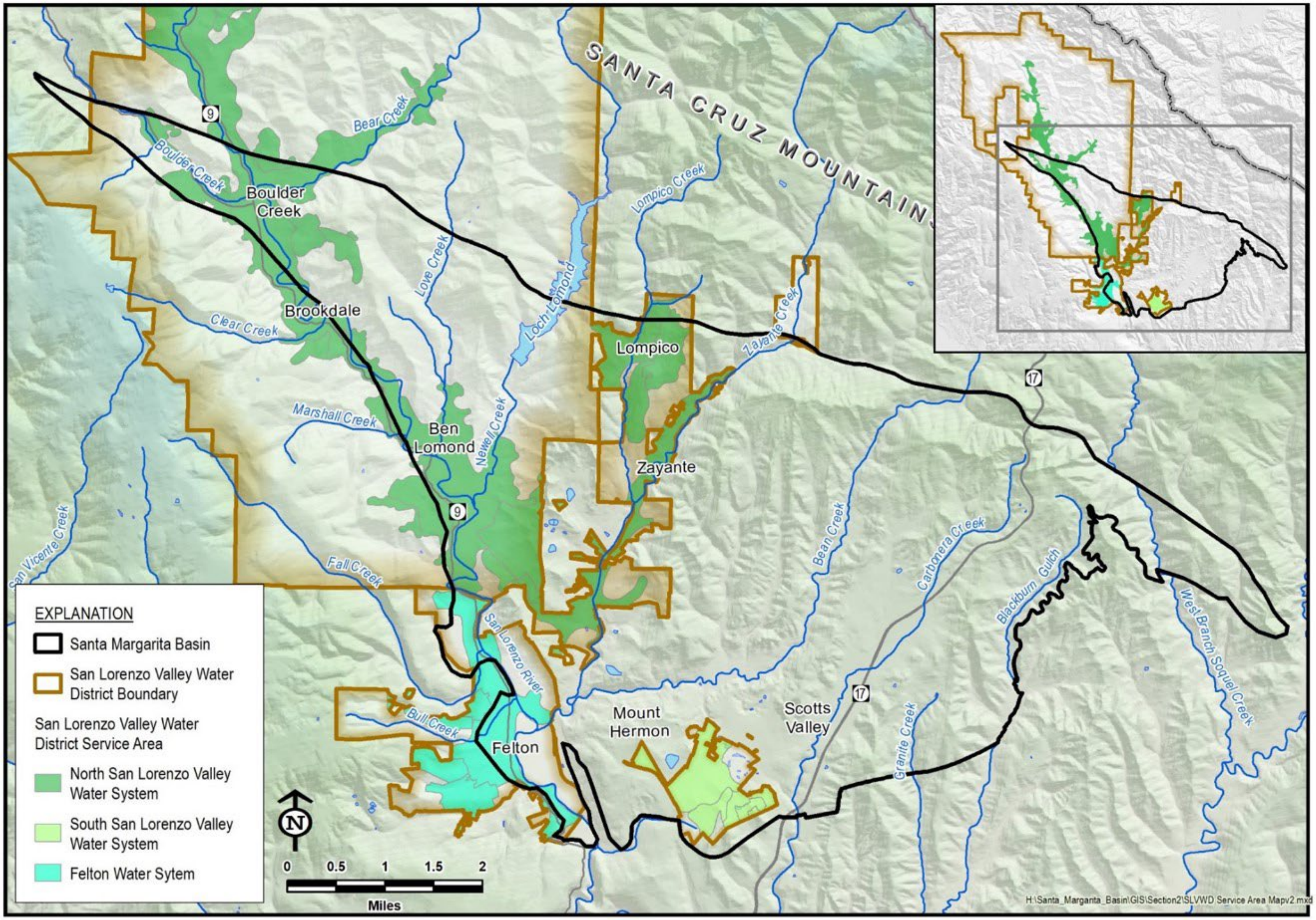

Figure 23. San Lorenzo Valley Water District Systems

### 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 excess surface water available for 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**: Excess 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 excess 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 excess 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 Environmental Impact Report of intra-District water transfers, which is anticipated to be completed by the end of 2024. Once modifications to intra-District water rights are secured, SLVWD will proceed with environmental studies and water rights petitions that address inter-District water transfers.

SLVWD plans to complete an updated engineering feasibility study and environmental impact report by the end of 2024 for conjunctive use of its contracted 313 AF/yr allocation of Loch Lomond water. In parallel, SLVWD will continue to pursue discussions with SCWD about purchasing an equivalent amount of treated water instead. 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 import 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 excess 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 WY2023, engineering design continued on the project and SCWD prepared an Addendum to an existing Environmental Impact Report to cover the project. In WY2024, the project is expected to complete design and begin construction of the pipeline component. 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 WY2023, and there are no current plans for study in WY2024. However, continued pilot ASR testing by SCWD in the neighboring Santa Cruz Mid-County Groundwater Basin in WY2023 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 WY2023. During WY2024, 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 potential data gaps identified in the GSP, and continued stakeholder outreach and public participation.

### 3.2.1 GSP Implementation Funding Sources

In WY2023, SMGWA submitted a Sustainable Groundwater Management Implementation (SGMI) Round 2 Grant application. The application requested funds to evaluate project and management actions, develop long-term SMGWA funding mechanisms, perform additional monitoring of streams and GDE, install a deep monitoring well in the Butano aquifer, provide private well owner assistance in the form of bulk water stations in the event of loss of water, and assist with GSP administration and reporting. Though the application scored well, it did not receive funding due to budget cuts to the DWR grant program.

In WY2024, 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 such as 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 WY2024, 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 significant progress in WY2023 toward filling the potential monitoring data gaps identified in the Basin GSP. Addressing these gaps was prioritized based on their importance to assessing SMC as well as the availability of funding. This section describes improvements to the GSP monitoring network made in WY2023 and planned activities for the near future.

#### 3.2.2.1 Groundwater Level Monitoring Improvements

The Basin GSP identified filling data gaps in dedicated monitoring wells as a high priority and recommended a unifying elevation survey of monitoring wells as a lower priority activity to be performed as funding becomes available.

##### 3.2.2.1.1 Groundwater Level Monitoring Well Installations

The Basin GSP identified 9 areas where groundwater is extracted, but no historical or current monitoring wells exist. To eliminate this monitoring 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.

During WY2023, SMGWA installed 7 monitoring wells in the Santa Margarita aquifer and Monterey Formation. The installation of these shallow monitoring wells was funded using remaining Proposition 68 grant funds from DWR and SMGWA contributions. The new monitoring well locations are shown on Figure 24 (labeled as SMGWA-2 through SMGWA-8 on the map). The new well locations will be added to the DWR SGMA Portal in WY2024.

The planned deeper Butano aquifer monitoring well (SMGWA-1 on the map) will be installed on a different timeline. This well will be constructed at a school where installation can only occur in the summer when school is out of session. This well is also much more expensive than the other wells because it is substantially deeper. SMGWA requested direct assistance from the DWR Technical Support Services program on September 26, 2023, to install the Butano monitoring well. In WY2024, SMGWA will continue to check with DWR on the status of this direct assistance request. Additionally, SMGWA will evaluate options to address the monitoring gap in the Weston Road area.

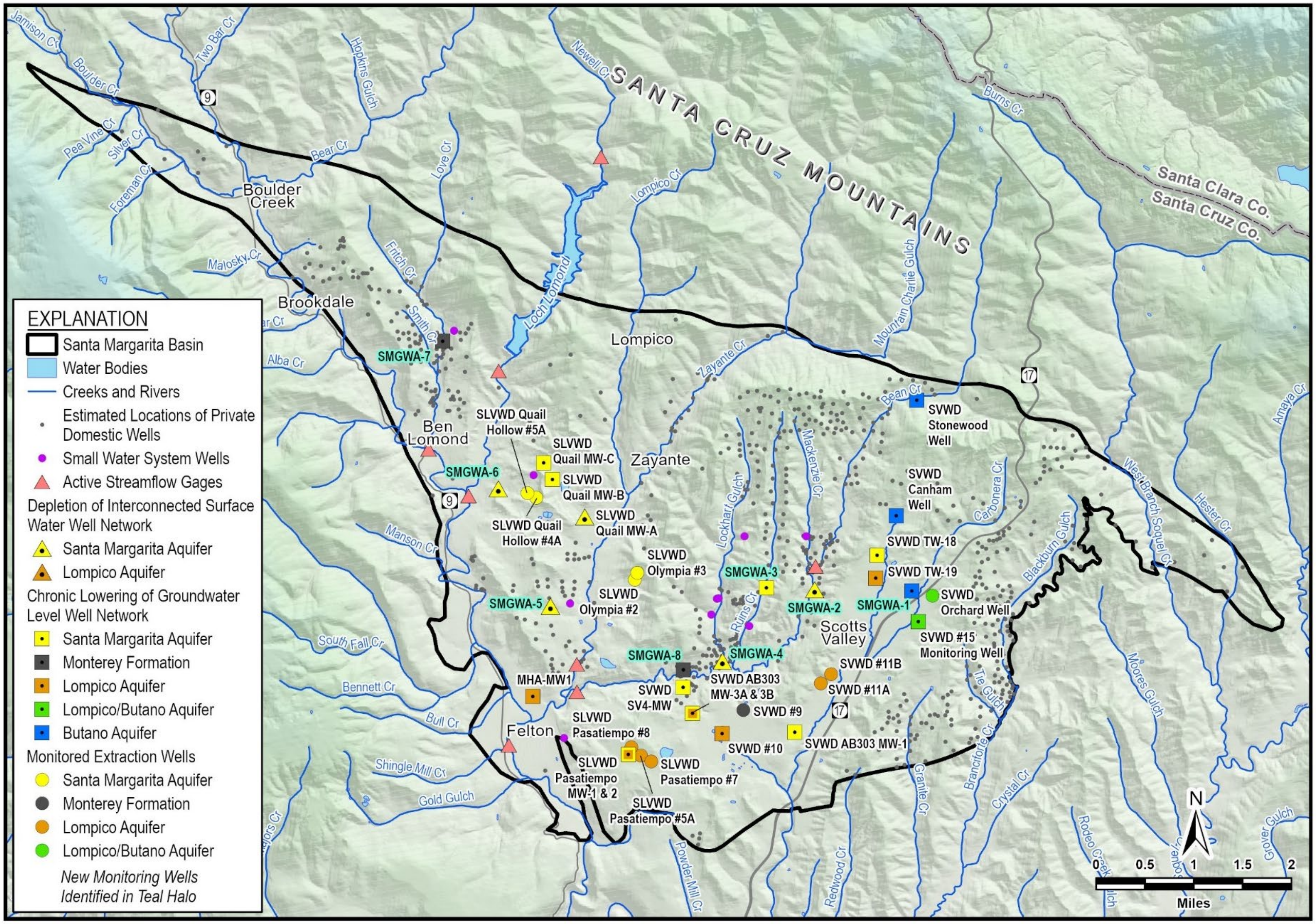


Figure 24. New Monitoring Wells, Existing Monitoring Locations, and Supply Wells

#### 3.2.2.1.2 Survey of Reference Point Elevations in Groundwater Level Monitoring Wells

Reference-point elevations in groundwater monitoring wells are used to convert depth-to-groundwater in wells to groundwater elevations that can be used to assess groundwater flow directions. Reference point elevations in Basin wells were compiled during GSP preparation from several agency datasets established over many years and measured using a variety of survey techniques or estimates. The GSP indicated that a comprehensive survey could improve understanding of groundwater flow in the Basin. Given the great topographic relief in the Basin, the improvement to modeling of groundwater flow directions provided by more accurate reference point elevations is relatively small. As such, an elevation survey is a lower-priority monitoring network improvement and will be considered by the SMGWA only as external funding allows. There was no planning of this activity in WY2023, and none is anticipated for WY2024.

### 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 WY2023, with construction of the monitoring well network described above being the priority activity. During WY2024, SMGWA anticipates work in identifying and reaching out to the applicable non-*de minimis* groundwater users and continuing with program design. Implementation of the program is currently anticipated in WY2025.

### 3.2.2.3 Groundwater Quality Monitoring Improvements

Groundwater quality sampling is conducted routinely in public extraction wells; therefore, there are no spatial data gaps in this network. However, the sampling frequency in some public extraction wells is suboptimal for GSP analysis purposes because some analytes are sampled only once every 3 years as required by the State Water Resources Control Board Division of Drinking Water. The Basin GSP identified increasing the frequency of groundwater quality sampling as an improvement to the monitoring to generate a more comprehensive and timelier dataset that can be used to evaluate potential degradation of groundwater quality. In WY2023, SLVWD sampled their groundwater quality RMP wells (Olympia #3, Quail Hollow #5A, and Pasatiempo #7), which reduced the sampling interval to 2 years.

#### 3.2.2.4 Streamflow Monitoring Improvements

The Basin GSP identified 5 streamflow monitoring locations that would be monitored by SMGWA. Those stations were monitored by SMGWA in WY2023. During WY2023, two of the stations were heavily damaged by flooding. In May 2023, those stations were reconstructed at nearby streambank locations that were not damaged during the flood events. Monitoring of the 5 locations will continue to WY2024.

One streamflow monitoring data gap along Carbonera Creek was identified in the GSP. As this creek is not as connected to groundwater as most other creeks in the Basin, this is a data gap with a low priority. No action will be taken on this in WY2024 due to funding priorities.

### 3.2.3 Stakeholder Outreach and Public Participation

During WY2023, SMGWA continued to conduct extensive stakeholder outreach and provide opportunities for public participation. Highlights of the activities include:

- Held public Board meetings on October 27, 2022, January 26, 2023, March 23, 2023, and May 25, 2023. All meetings were held beginning at 6:00 pm and were both in-person and on-line to maximize opportunities for public participation.
- Issued press releases in May 2023 on the DWR approval of the GSP and on the beginning of the monitoring well drilling project. The GSP approval item was posted by myscottsvalley.com. The drilling project item was posted by myscottsvalley.com and the Santa Cruz Mountain Bulletin.
- Sent direct mailings to 62 residents located in the vicinity monitoring well drilling sites to inform them of the project and posted weekly updates on drilling progress to smgwa.org.
- Created 133 social media posts on the SMGWA Facebook page (307 followers) and 126 social media posts to the SMGWA Instagram page (188 followers) related to groundwater topics.
- Partnered with California State Parks in posting information on Facebook and Instagram on interpretive events related to groundwater held on March 18, 2023, and April 29, 2023, at Henry Cowell Redwoods State Park.

## 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 corrective actions, the GSA initial approach to addressing them, and the timeline for completion are shown in Table 5. In general, SMGWA believes that recommendations to modify SMC would require a GSP amendment. SMGWA further believes this amendment should be deferred until the required periodic evaluation due by

January 31, 2027. In WY2024, 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 during periodic evaluation | Address with 2027 Periodic Evaluation |
| 3 – Revise SMC for degraded groundwater quality | Revise SMC for degraded groundwater quality:<br>• 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.<br>• 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 during periodic evaluation | Address with 2027 Periodic Evaluation |
| 4 – Evaluate interconnected surface water sustainable management criteria | Address the following items by the first periodic evaluation:<br>• Revise sustainable management criteria with the removal of the exemption for undesirable results in drought years.<br>• Consider utilizing the interconnected surface water guidance as appropriate when issued by DWR to establish quantifiable minimum thresholds, measurable objectives, and management actions.<br>• 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.<br>• 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 during 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 sustainable management criteria (SMC) as a means of demonstrating that a groundwater basin is being effectively 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 WY2023 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 GDE
    - 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 also 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 WY2023, 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:<br>• Minimum thresholds have not been exceeded prior to SMGWA approved project(s) or management action(s)<br>• An immediate resampling confirms the exceedance<br>• 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 WY2019, relative to the RMP's MT, MO, and the 2027 interim milestone. Hydrographs in Appendix A (pages A-3 through A-17) show all historical data collected at RMPs relative to MTs and MOs.

Throughout WY2023 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 7 RMPs (green and yellow colors in Table 7), 6 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 WY2023, 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. During WY2023 groundwater elevations increased 10 feet in Quail MW-B and Pasatiempo MW-2 and 30 feet in Olympia #3 (Appendix A, pages A-3 through A-5). 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-6).

### 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-8). In WY2023, groundwater elevations are within the target operational range, above the 2027 interim milestone and very close to the 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 generally increased in Lompico aquifer RMPs in WY2023 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 effects of a hypothetical 540 AF/yr conjunctive use project. Even so, 3 of the 4 RMPs met their MOs in WY2023 (SVWD Well#10, SVWD Well #11A, and SVWD TW-19).

### 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 2 Lompico/Butano SVWD water supply wells: SVWD #3B and SVWD Orchard. 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-15). The minimum groundwater elevation in WY2023 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 SVWD #3B and Orchard Lompico/Butano wellfield. Both wells have stable long-term groundwater elevation trends (Appendix A, pages A-16 and A-17). In WY2023, 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, and are higher than any groundwater elevations measured in the well since monitoring began in 2011.

Table 7. Groundwater Elevations Compared to Chronic Lowering of Groundwater Levels Sustainable Management Criteria, WY2019-2023

| Aquifer | Well Name | Annual Minimum Groundwater Elevation (feet amsl) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Minimum Threshold | Interim Milestone #1 (2027) | Measurable Objective | WY2019 | WY2020* | WY2021* | WY2022 | WY2023 |
| Water Year Type | | | | | Wet | Dry | Critically Dry | Normal | Wet |
| Santa Margarita | SLVWD Quail MW-B | 449 | 472 | 472 | 460.4 | 462.4 | 455.8 | 451.8 | 451.0 |
| | SLVWD Olympia #3 | 302 | 307 | 307 | 332.0 | 351.4 | 335.9 | 330.1 | 327.3 |
| | SLVWD Pasatiempo MW-2 | 498 | 514 | 514 | 517.7 | 519.6 | 512.7 | 516.3 | 516.2 |
| | SVWD TW-18 | 462 | 471 | 471 | 469.9 | 471.8 | 471.8 | 470.9 | 470.4 |
| Monterey | SVWD #9 | 301 | 340 | 358 | 342.1 | 346.7 | 351.0 | 354.0 | 356.0 |
| Lompico | SLVWD Pasatiempo MW-1 | 334 | 339 | 372 | 357.4 | 346.6 | 340.4 | 335.4 | 337.0 |
| | SVWD #10 | 286 | 302 | 322 | 308.8 | 317.9 | 330.3 | 338.1 | 338.7 |
| | SVWD #11A | 288 | 299 | 317 | 302.3 | 310.4 | 308.0 | 312.6 | 320.2 |
| | SVWD TW-19 | 314 | 357 | 376 | 361.6 | 373.1 | 370.4 | 370.0 | 378.4 |
| Lompico/Butano | SVWD #15 Monitoring Well | 291 | 310 | 333 | 298.1 | 302.8 | 307.1 | 307.9 | 306.5 |
| Butano | SVWD Stonewood Well | 836 | 844 | 844 | 849.1 | 848.3 | 845.0 | 845.8 | 847.6 |
| | SVWD Canham Well | 427 | 447 | 467 | 443.0 | 442.0 | 441.7 | 441.2 | 440.7 |

* 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 WY2023 groundwater extraction in each aquifer relative to MTs and MOs.

WY2023 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 WY2023.

Table 8. Groundwater Extractions Compared to Reduction in Groundwater in Storage Sustainable Management Criteria, WY2023

| Aquifer | Groundwater Extraction, AF/year | | |
|---|---|---|---|
| | Minimum Threshold* | Measurable Objective | WY2023 |
| Santa Margarita | 850 | 615 | 612 |
| Monterey | 140 | 130 | 92 |
| Lompico** | 1,290 | 1,000 | 1,269 |
| Butano** | 540 | 380 | 356 |
| **TOTAL** | **2,820** | **2,125** | **2,330** |

* 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, 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 systems and organic point-source contaminants 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 greater concentrations than the MTs for the naturally occurring constituents iron, manganese, arsenic, TDS and salinity. The SMC for this sustainability indicator are met when concentrations are at or below the criteria.

All water quality RMP were sampled in WY2023 except for 2 inactive RMP wells: SVWD Well #9 in the Monterey Formation and SVWD #3B screened over both the Lompico and Butano aquifers. The MTs and WY2023 maximum concentrations for degraded groundwater RMPs are summarized in Table 9. All WY2023 SMC-related water quality data for public supply wells in the Basin 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, in WY2023, the only constituents found 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 WY2023 maximum concentrations for iron and manganese in wells that exceed MTs relative to MOs. In WY2023, iron concentrations meet the MOs in 4 wells and do not meet the MO in 1 well. There are 2 wells that meet the MO for manganese and 3 wells that do not meet the MO.

Along with iron and manganese, the other constituents measured at concentrations that do not meet MOs in some wells in WY2023 are arsenic, TDS, chloride, and nitrate. Given that the MOs are based on long-term average concentrations for each well, 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-3). 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 WY2023 (SLVWD Quail Hollow #5A, SLVWD Pasatiempo #7, and SVWD #11B), the concentrations were very close to the MOs. Samples collected from SLVWD Pasatiempo #8 in recent years are routinely around the MCL and MT for arsenic (Appendix E, page E-2). 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.

Total dissolved solids (TDS) and chloride concentrations are well below their respective MTs (Table 9), but do not meet the MO in 6 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 most RMPs are not met. For those wells with trends, chemographs are included in Appendix E (SLVWD Olympia #3 in the Santa Margarita aquifer and SLVWD Pasatiempo #7, SLVWD Pasatiempo #8, SVWD #10A and SVWD Orchard well in the Lompico aquifer; Appendix E, pages E-5 through E-8 and E-12 through E-15).

Nitrate was detected in WY2023 only at SLVWD Quail Hollow #5A and Pasatiempo #7 (0.57 mg/L). The concentration of 2.5 mg/L at SLVWD Quail Hollow #5A is slightly higher than the MO of 2.13 mg/L, but well below the MT of 5 mg/L. The nitrate concentration fluctuates over time in this well, and although the concentrations have been increasing since WY2015, over a longer 20-year period there does not appear to be an overall increasing trend (Appendix E, page E-10).

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Table 9. Groundwater Quality Compared to Sustainable Management Criteria, WY2023

| 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 | 8.3 | ND | ND | 0.0027 | 2.5 | ND | ND | ND | ND | ND |
| Santa Margarita | SLVWD Olympia #3 | 730 | 7.5 | 0.74 | 0.160 | 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 | 180 | 9.1 | 0.33 | 0.970 | 0.0021 | 0.57 | ND | ND | ND | ND | ND |
| Lompico | SVWD #10A | 310 | 35 | 1.30 | 0.150 | ND | ND | ND | NA | ND | NA | ND |
| Lompico | SVWD #11A | 560 | 29 | 0.31 | 0.095 | ND | ND | ND | NA | ND | NA | ND |
| Lompico | SVWD #11B | 395 | 37 | 0.70 | 0.082 | 0.0081 | ND | ND | NA | ND | NA | ND |
| Lompico/ Butano | SVWD #3B | NS | NS | NS | NS | NS | NS | NS | NS | NS | NA | NS |
| Lompico/ Butano | SVWD Orchard Well | 520 | 58 | ND | ND | 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

NA – not analyzed

Table 10. Groundwater Quality Compared to Iron and Manganese Measurable Objectives, WY2023

| Aquifer | Well Name | Iron Concentration (mg/L) | | Manganese Concentration (mg/L) | |
|---|---|---|---|---|---|
| | | Measurable Objective | WY2023 Maximum | Measurable Objective | WY2023 Maximum |
| Santa Margarita | SLVWD Olympia #3 | 0.502 | 0.74 | 0.157 | 0.160 |
| Lompico | SLVWD Pasatiempo #7 | 0.539 | 0.33 | 0.099 | 0.097 |
| | SVWD #10A | 1.51 | 1.30 | 0.099 | 0.150 |
| | SVWD #11A | 0.459 | 0.31 | 0.112 | 0.095 |
| | SVWD #11B | 0.826 | 0.70 | 0.077 | 0.082 |
| Lompico/ Butano | SVWD #3B | 0.380 | Not Sampled | 0.042 | Not Sampled |

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-2 and B-3. WY2023 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, WY2019-2023

| Aquifer | Well Name | Minimum Groundwater Elevation (feet amsl) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Minimum Threshold | Measurable Objective* | WY2019 | WY2020 | WY2021 | WY2022 | WY2023 |
| Water Year Type | | | | Wet | Dry | Critically Dry | Normal | Wet |
| Santa Margarita | SLVWD Quail MW-A | 413 | 416 | 413.7 | 414.4 | 413.3 | 413.1 | 413.3 |
| | SVWD SV4-MW | 381 | 387 | 406.6 | 401.6 | 404.1 | 405.7 | 408.7 |

* 2027 interim milestones are equal to the measurable objective

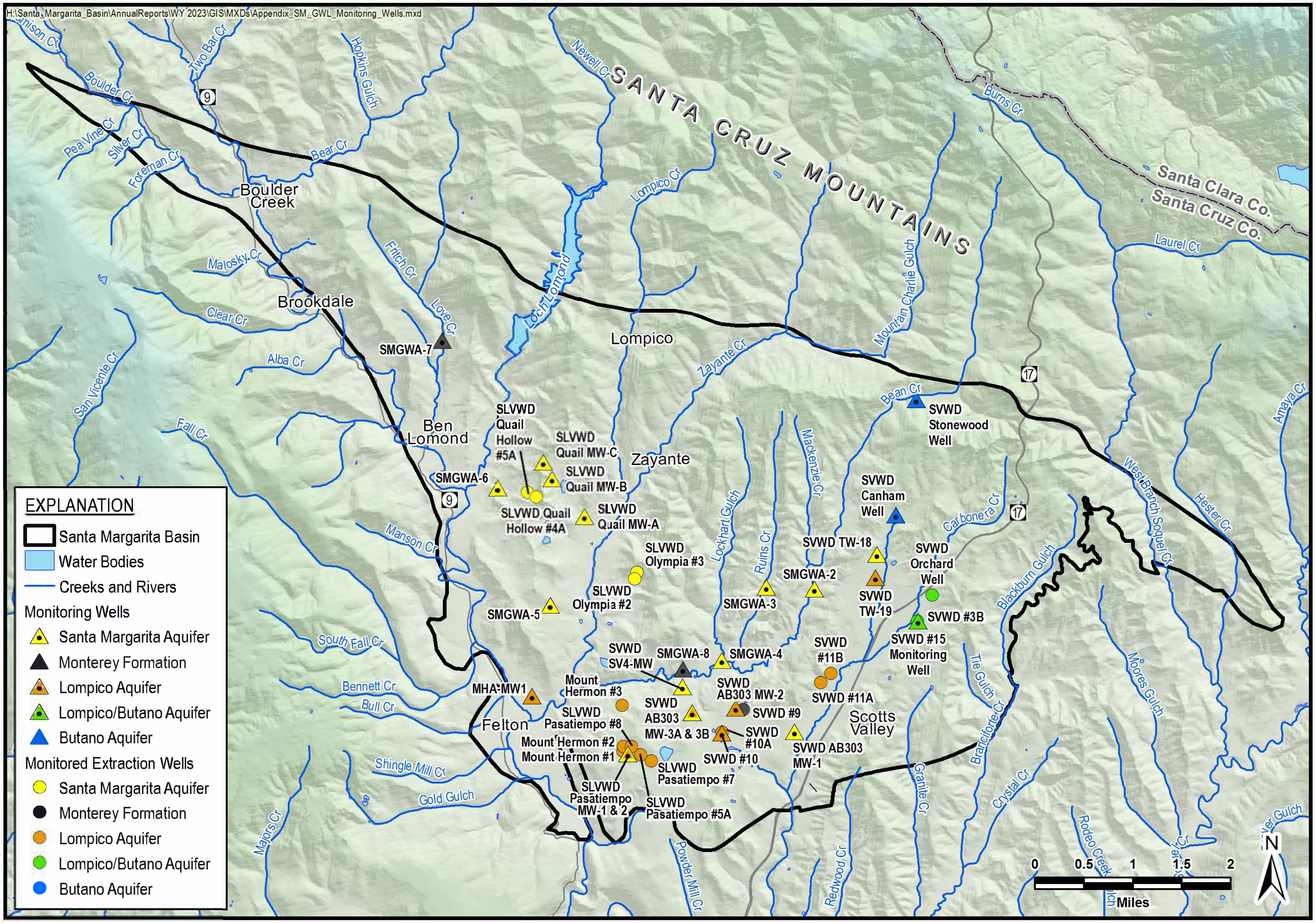
| |
|---|
| Minimum threshold not met |
| Minimum threshold met, but measurable objective not met |
| Measurable objective met |

# 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

Figure A-1. Groundwater Level Monitoring Network



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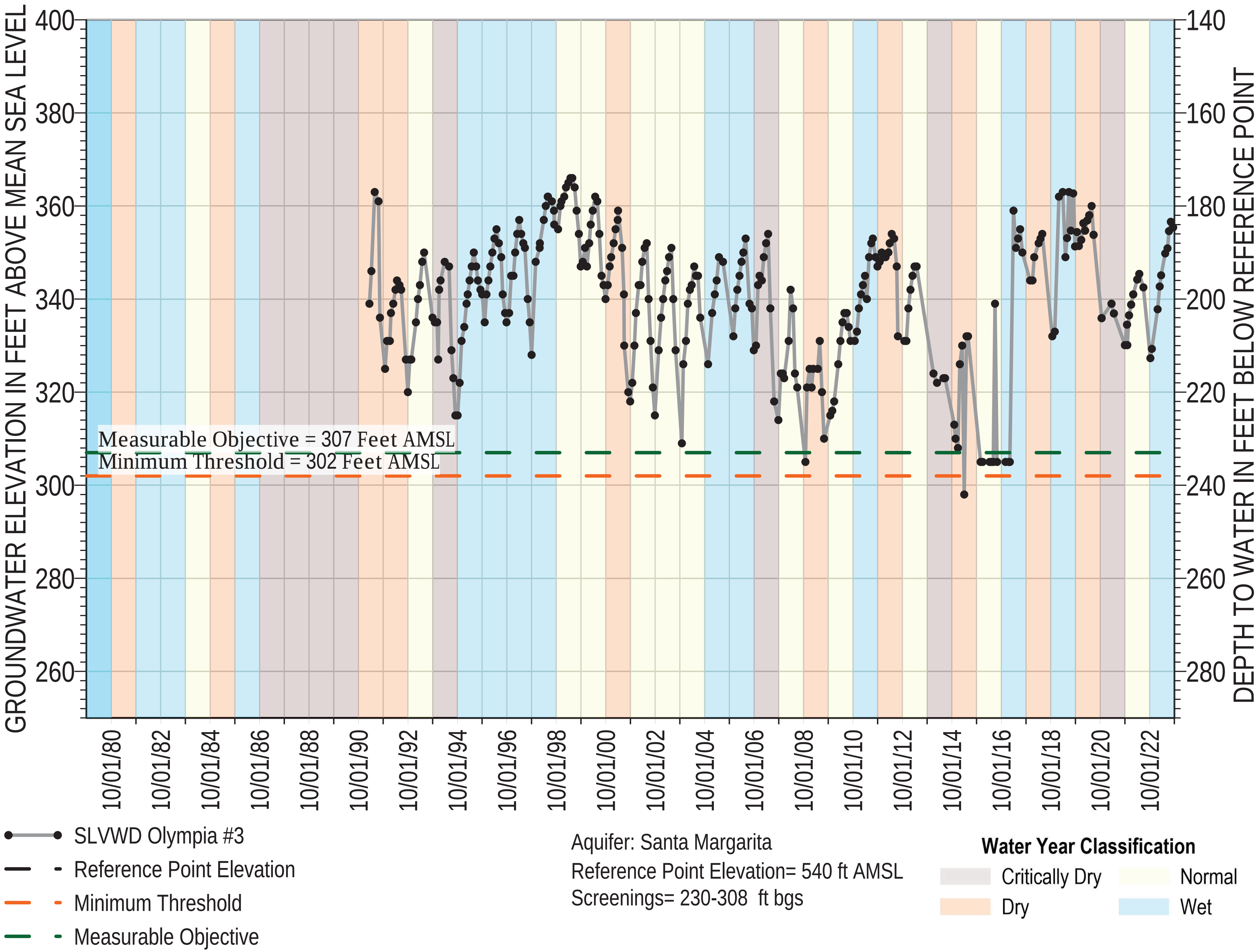
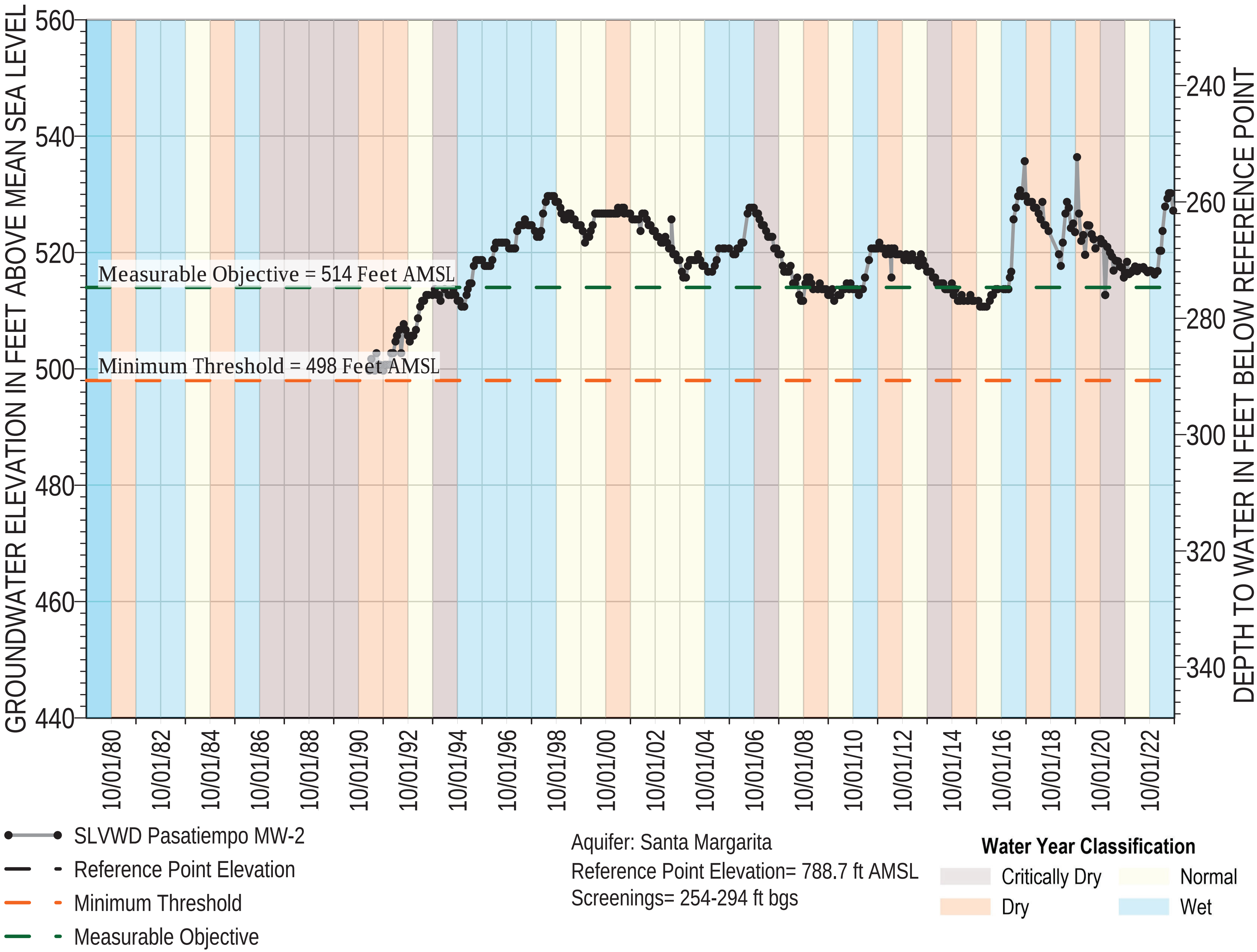
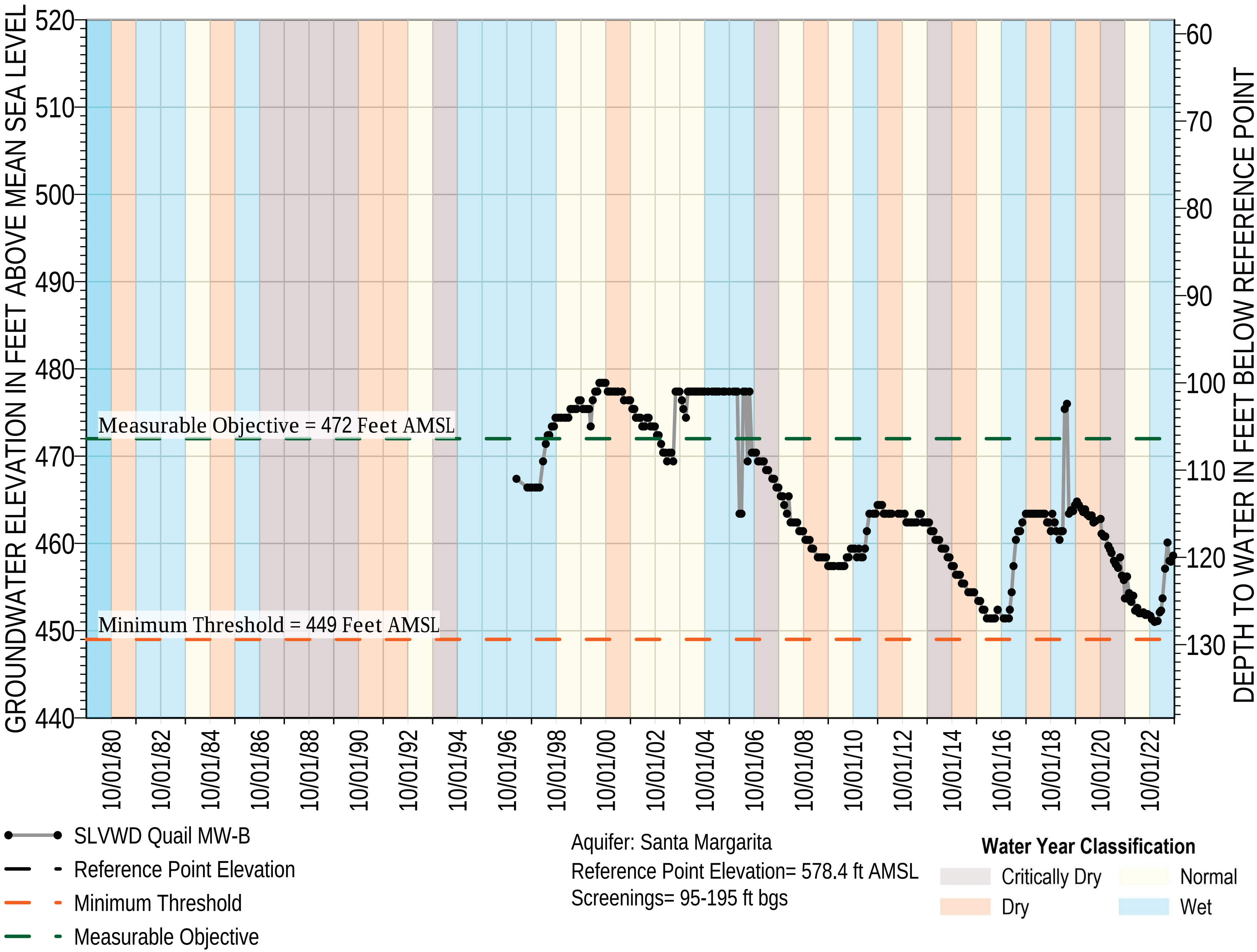
# Santa Margarita Sandstone



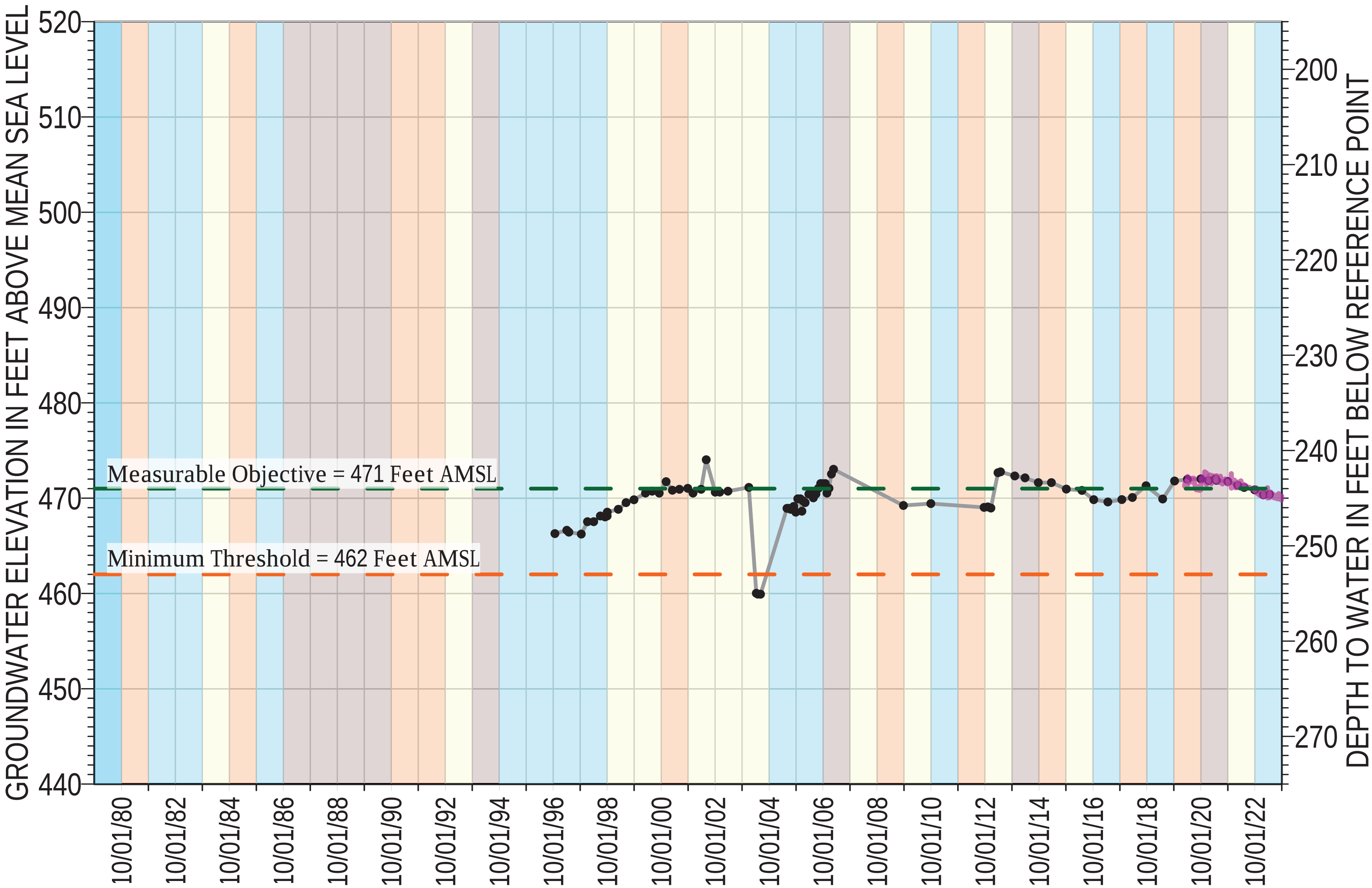

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.




Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.




Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.




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.

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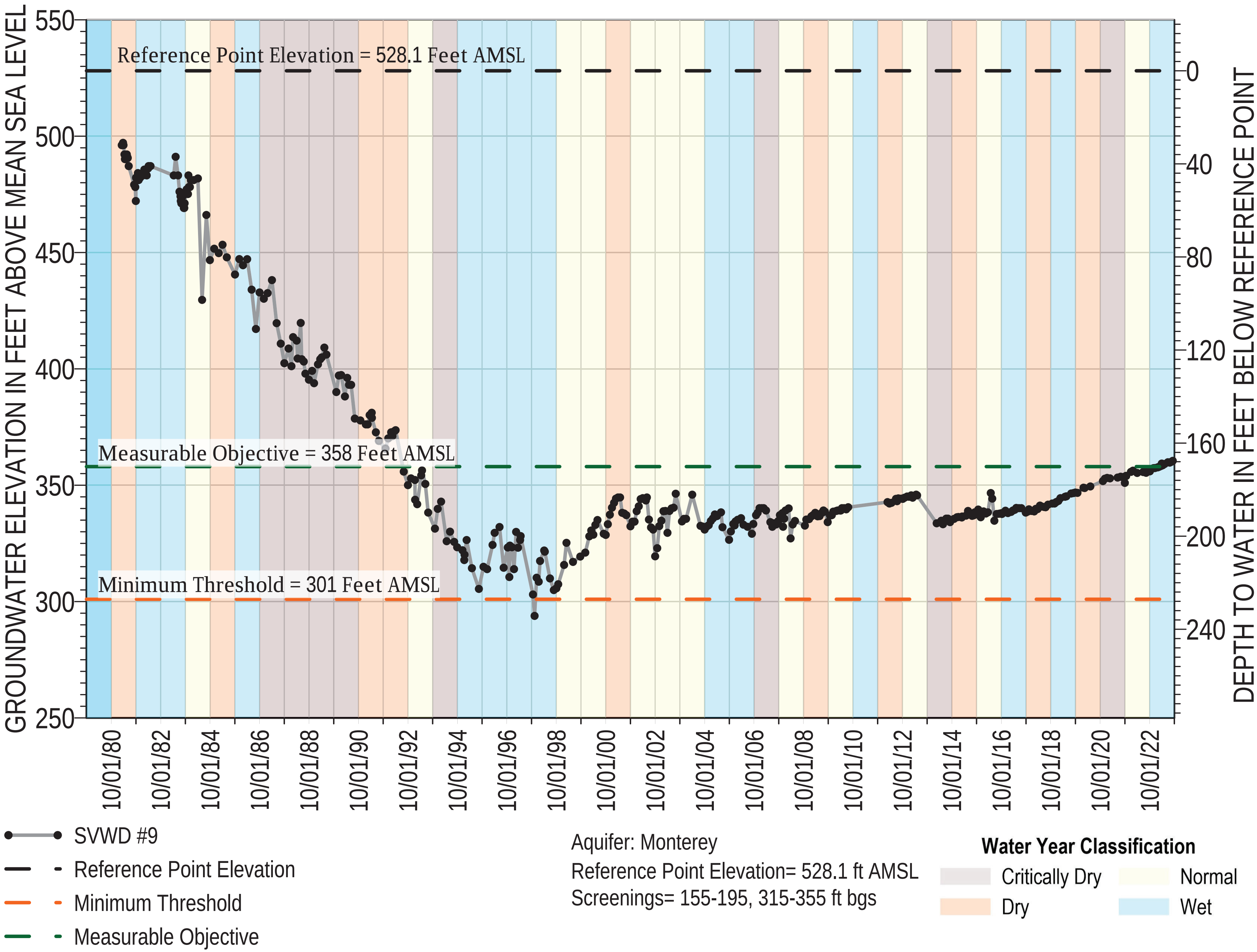
# Monterey Formation




Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

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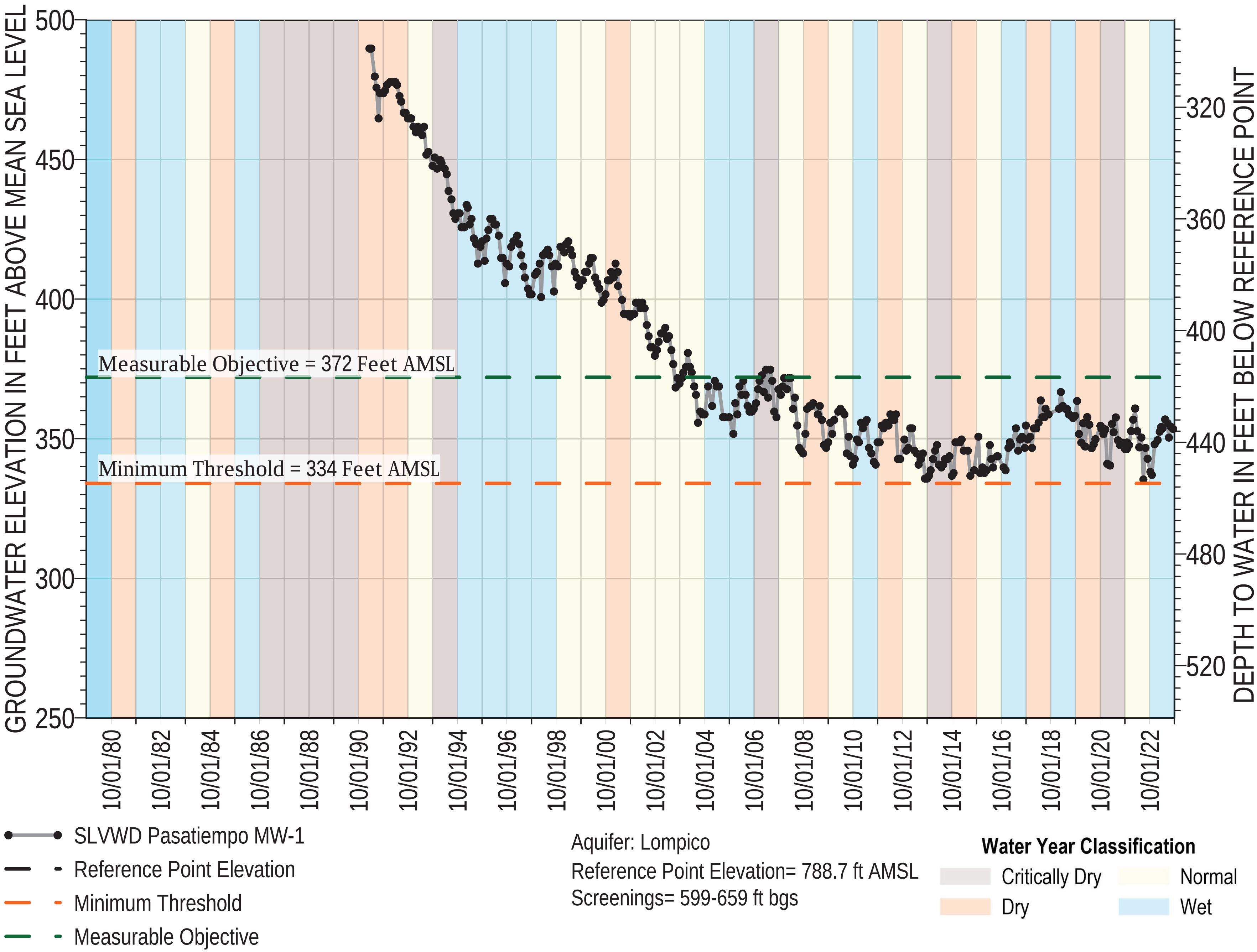
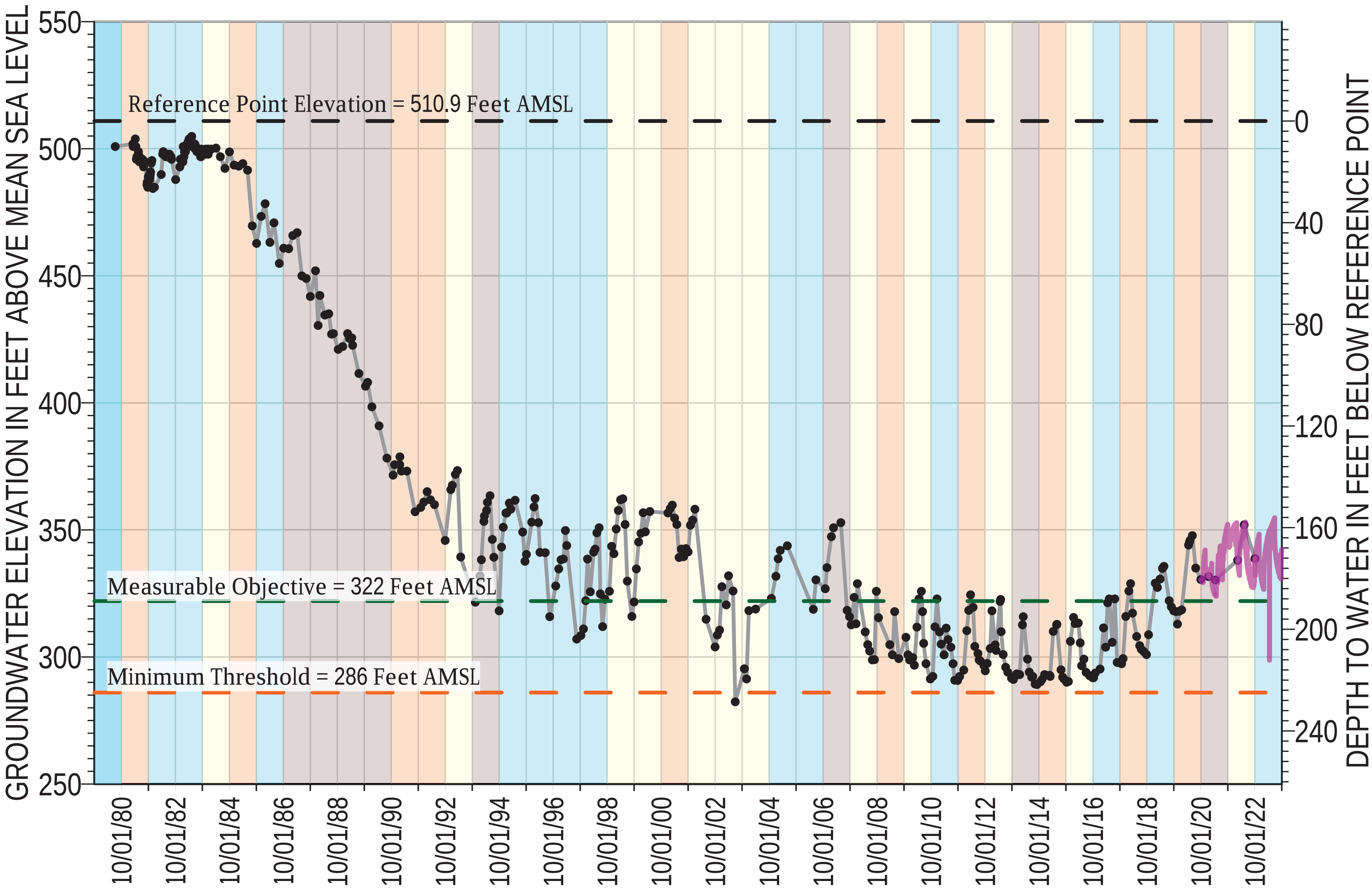
# Lompico Sandstone




Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.



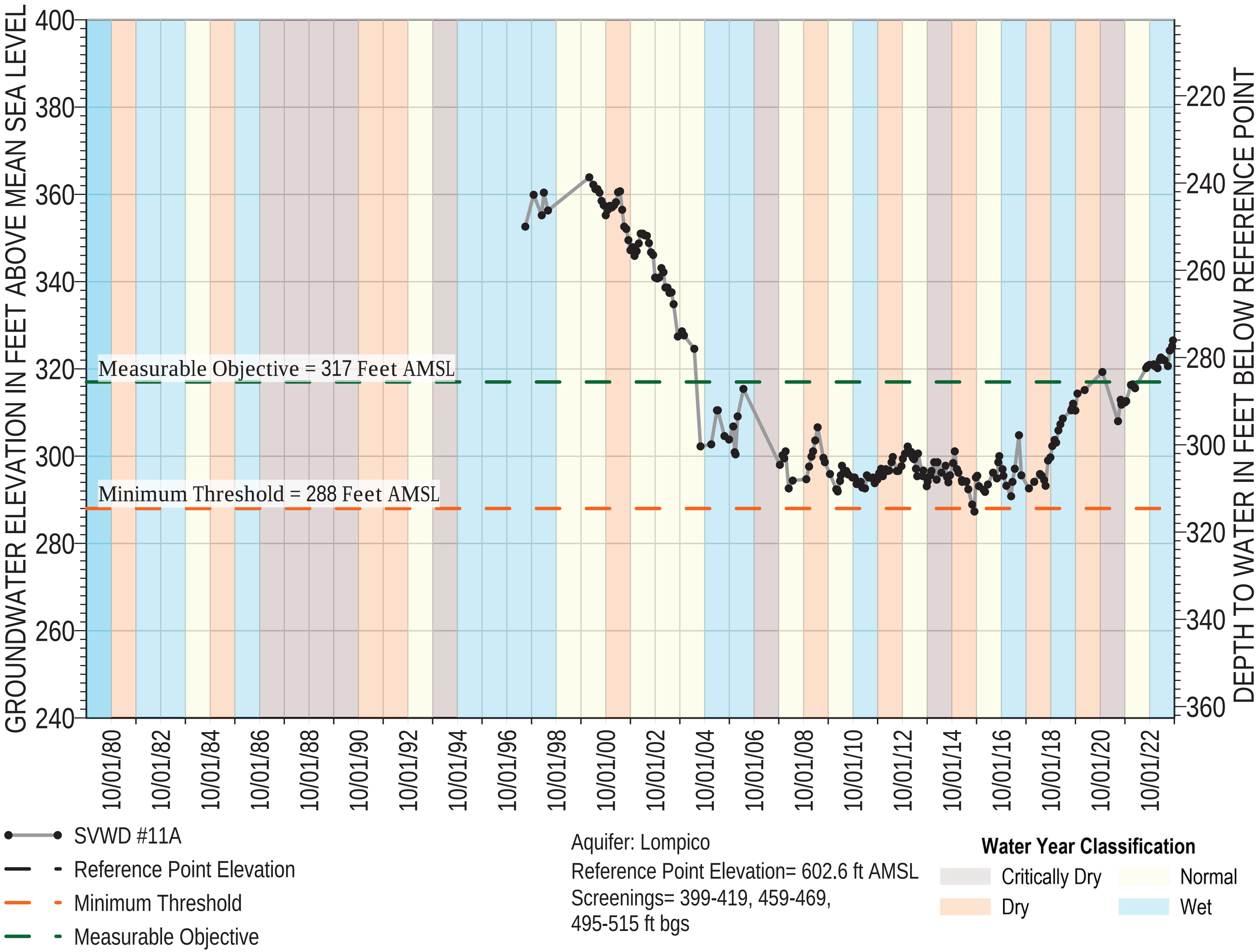

SVWD #10
Transducer
Reference Point Elevation
Minimum Threshold
Measurable Objective

Aquifer: Santa Margarita,Lompico
Reference Point Elevation= 510.9 ft AMSL
Screenings= 190-220, 240-270, 325-355 ft bgs

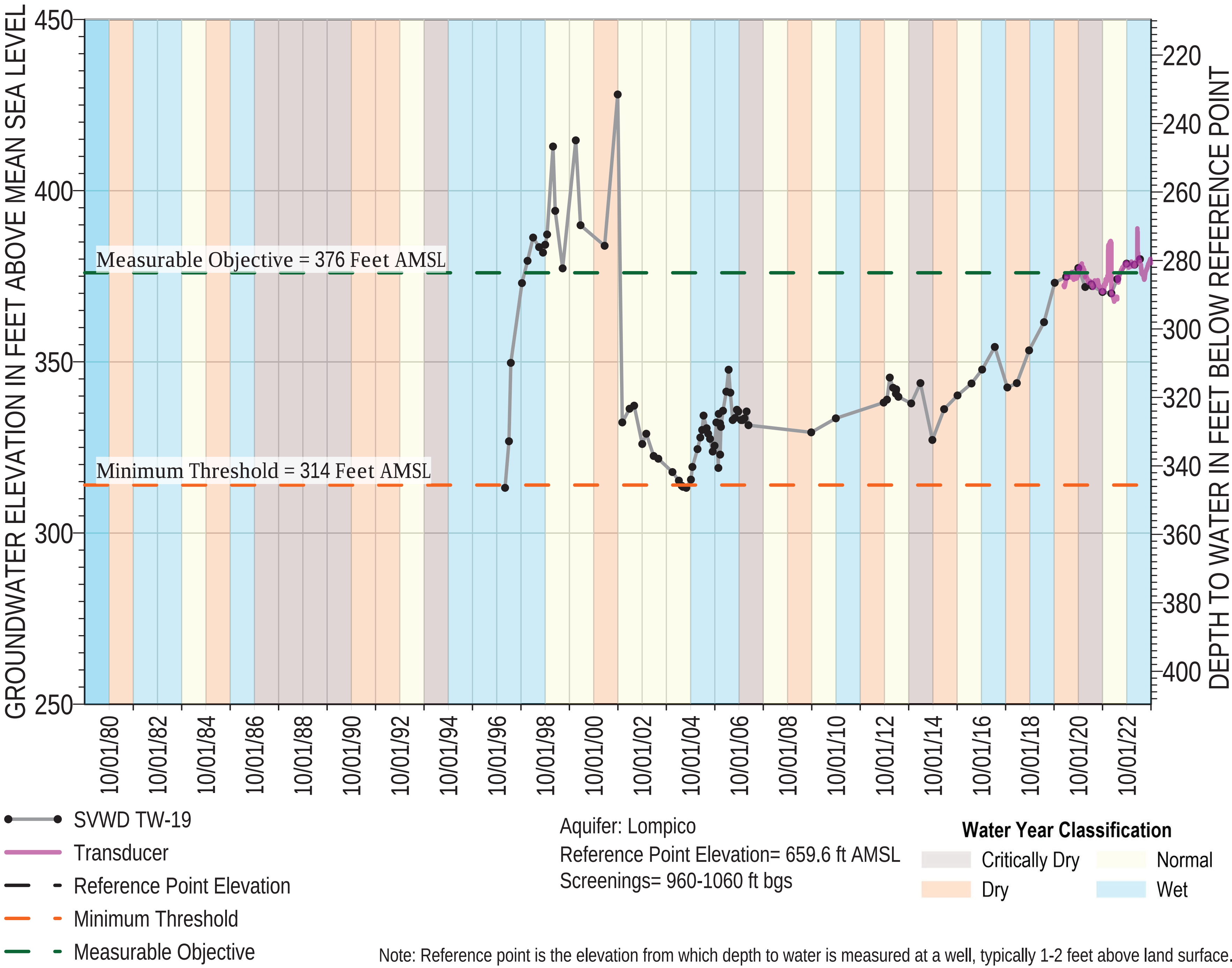
**Water Year Classification**

Critically Dry
Dry
Normal
Wet

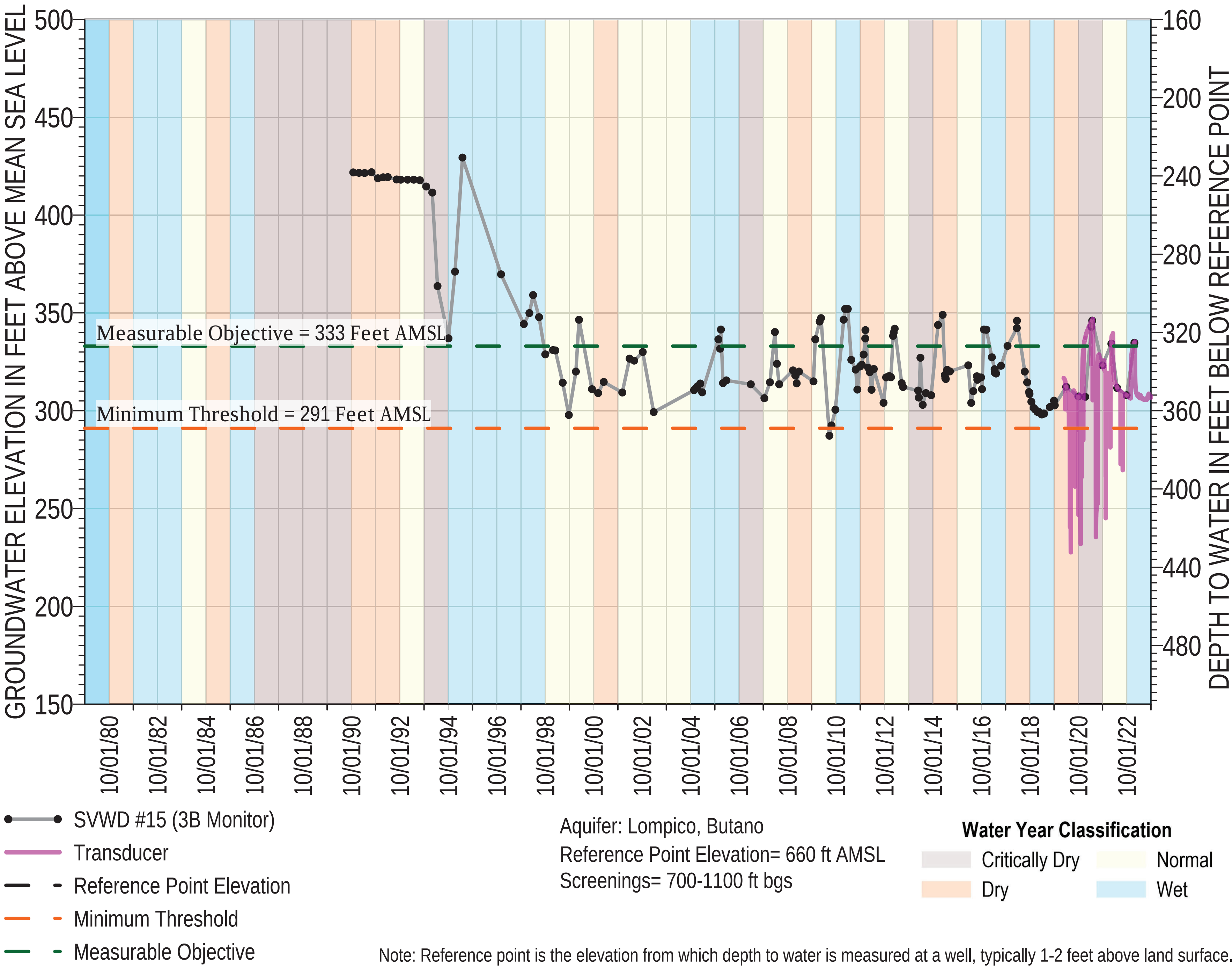
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.



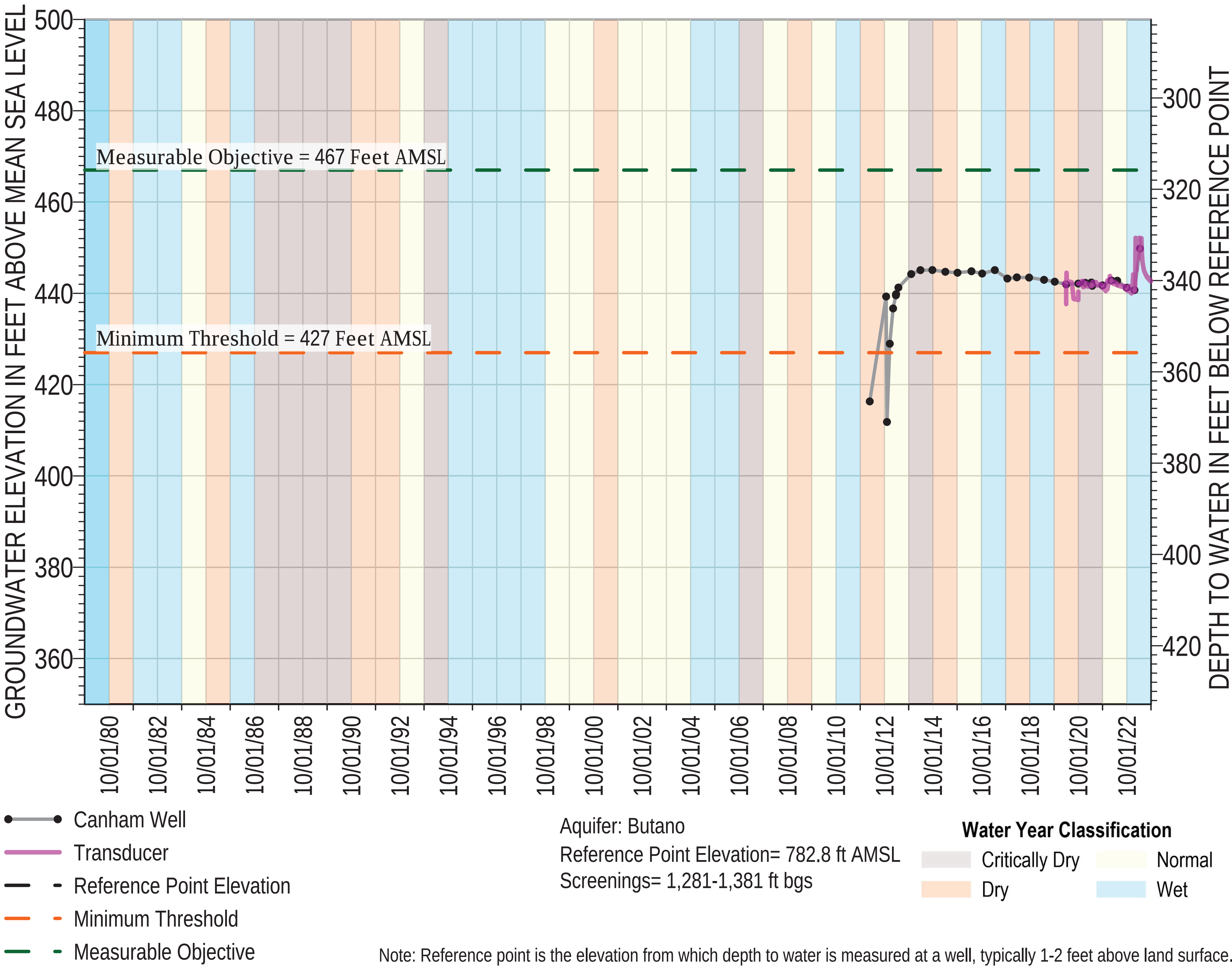

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.


GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
DEPTH TO WATER IN FEET BELOW REFERENCE POINT
450
400
350
300
250
220
240
260
280
300
320
340
360
380
400
Measurable Objective = 376 Feet AMSL
Minimum Threshold = 314 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
SVWD TW-19
Transducer
Reference Point Elevation
Minimum Threshold
Measurable Objective
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.

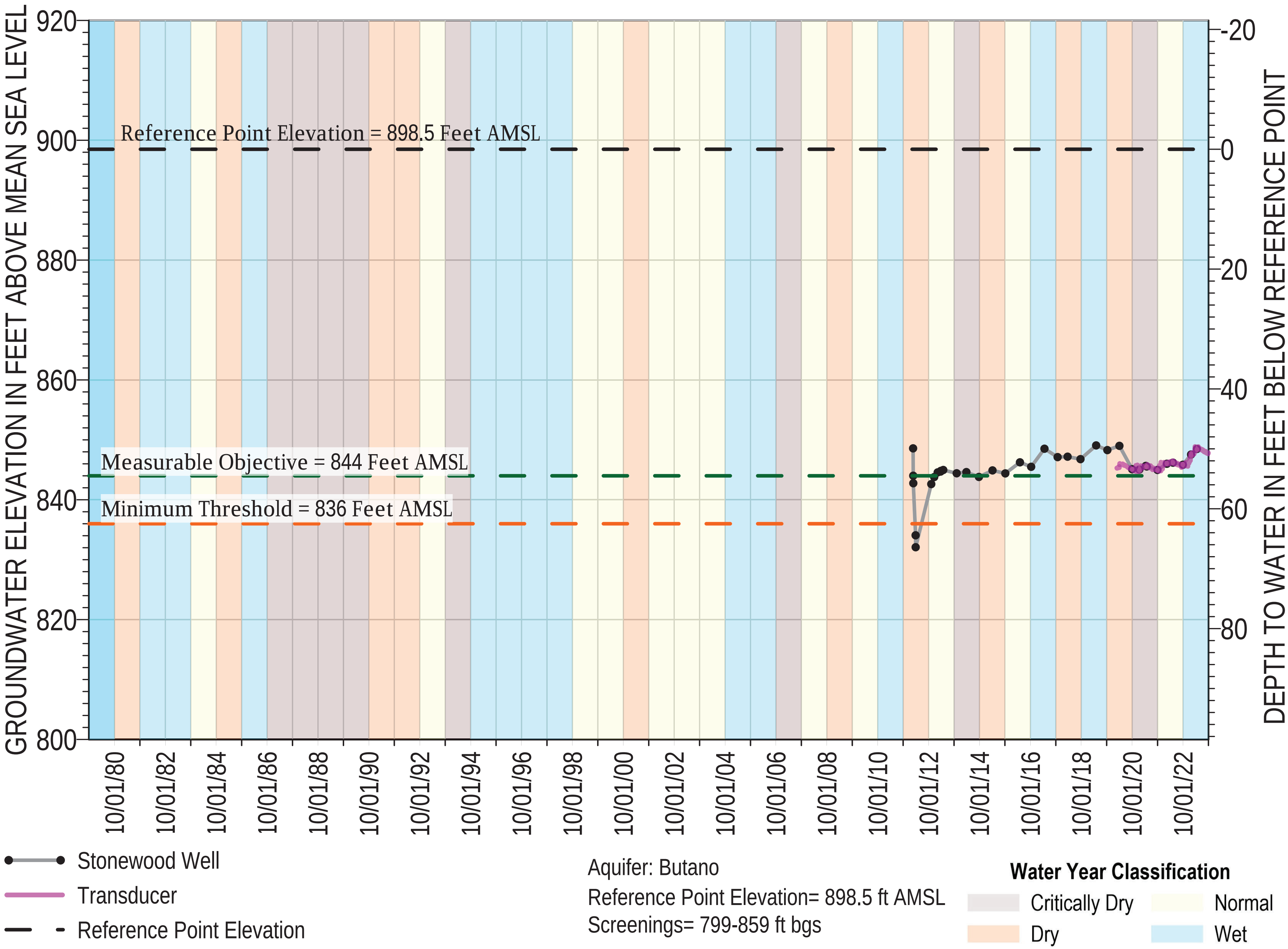
# Lompico/Butano Sandstone




Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.




Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

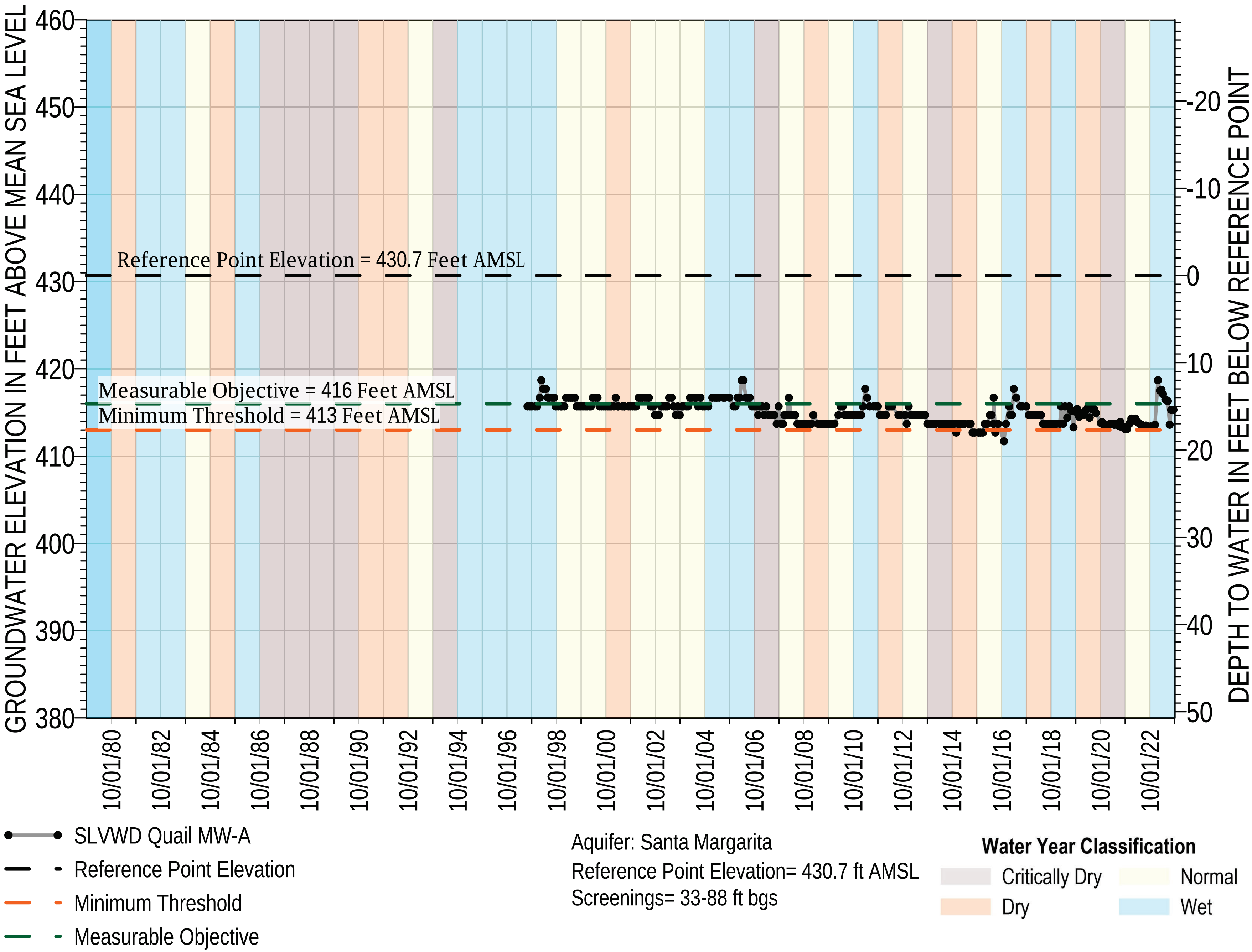



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

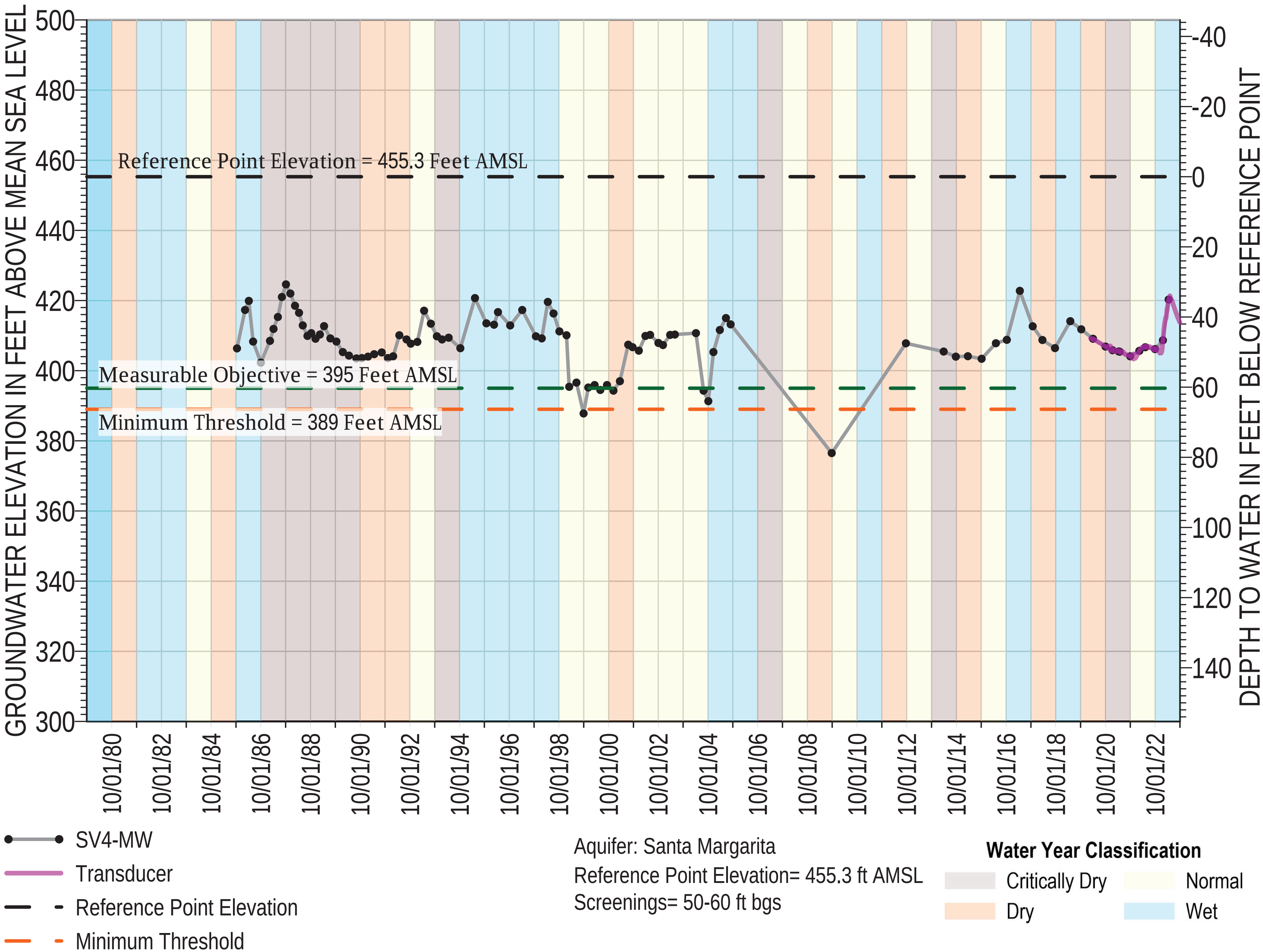
MONTGOMERY & ASSOCIATES

# Appendix B

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




Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

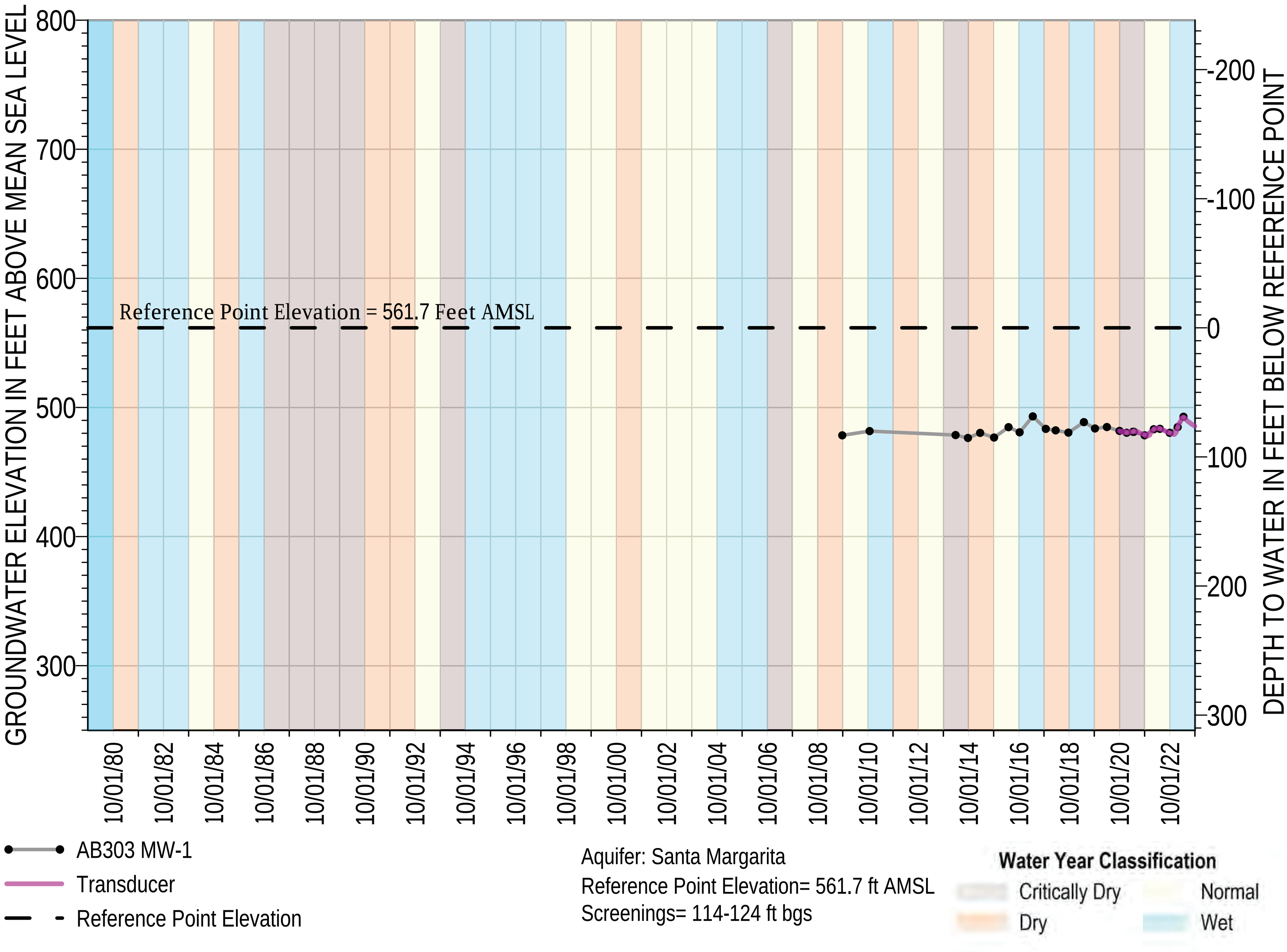



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

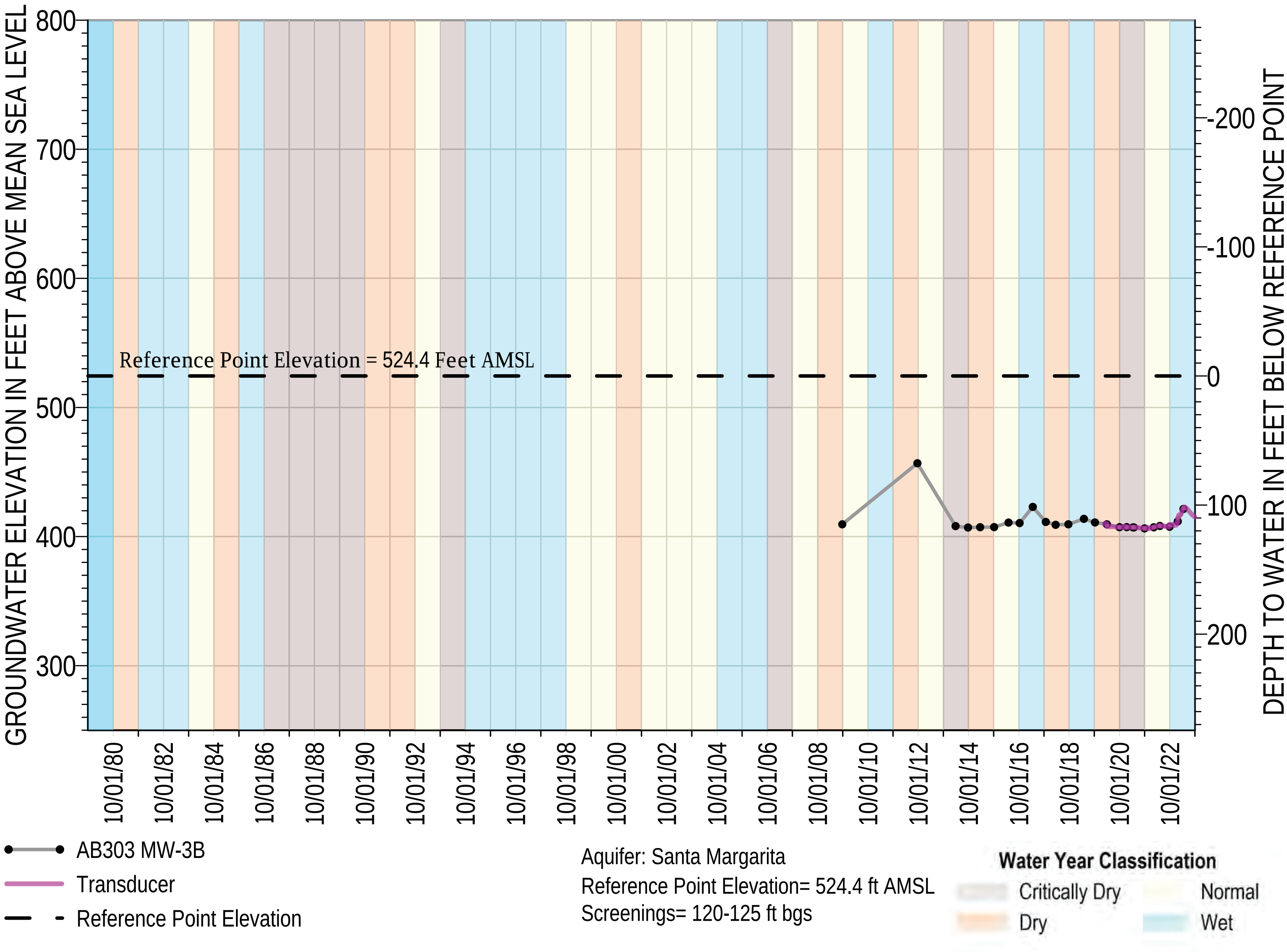
# Appendix C

# GSP Non-RMP Monitoring Network Hydrographs

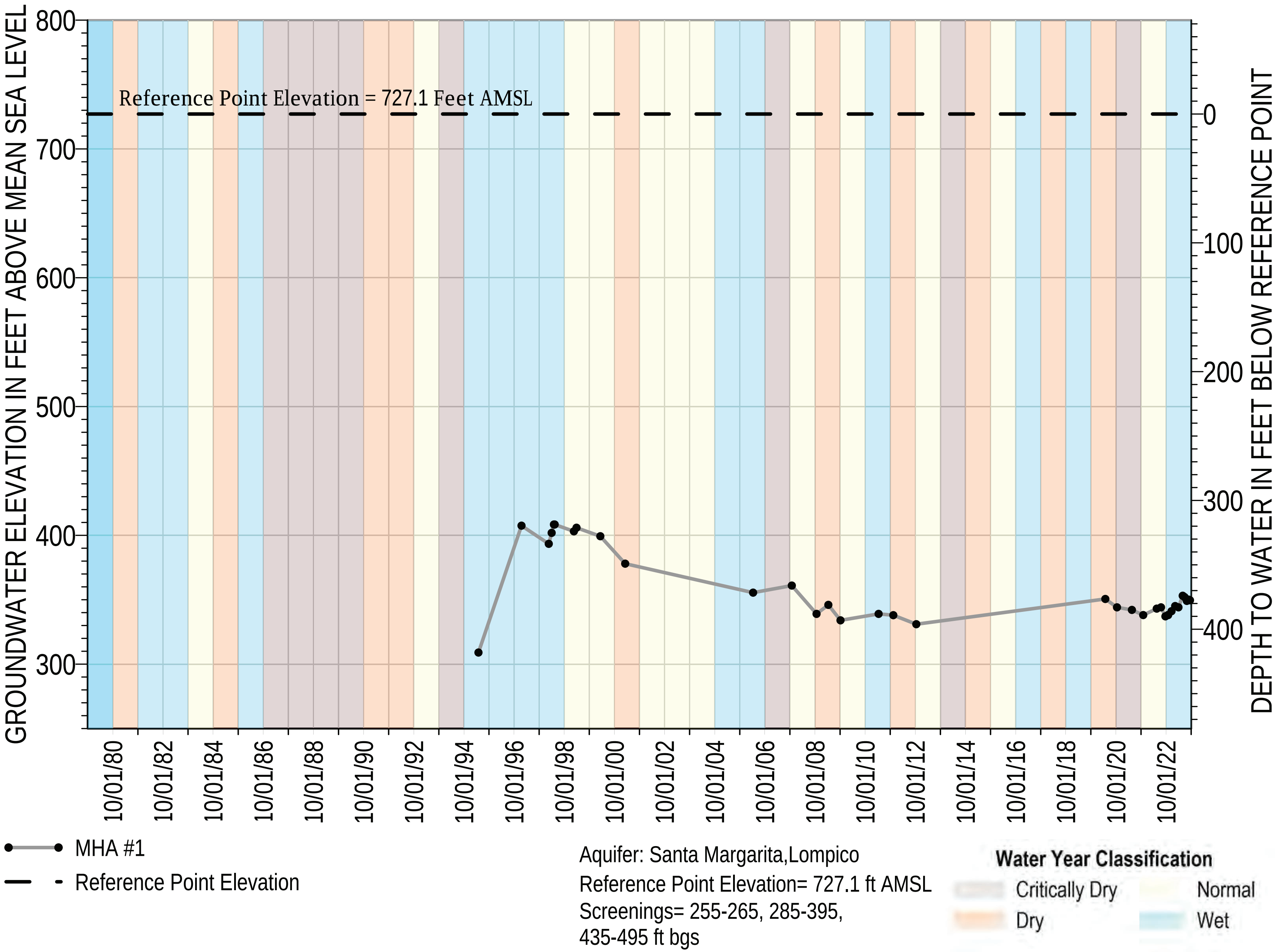
# Santa Margarita Sandstone




Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

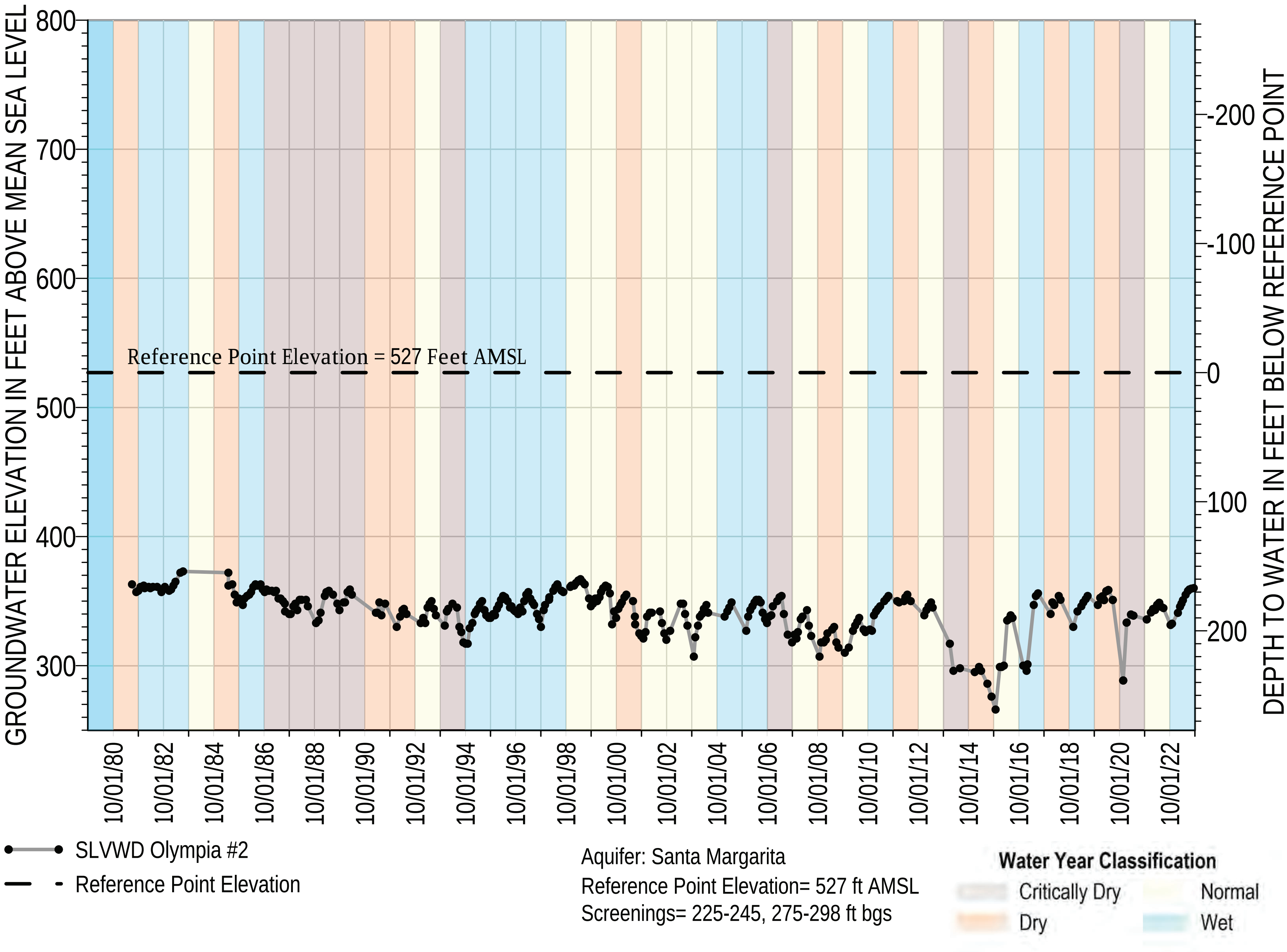



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

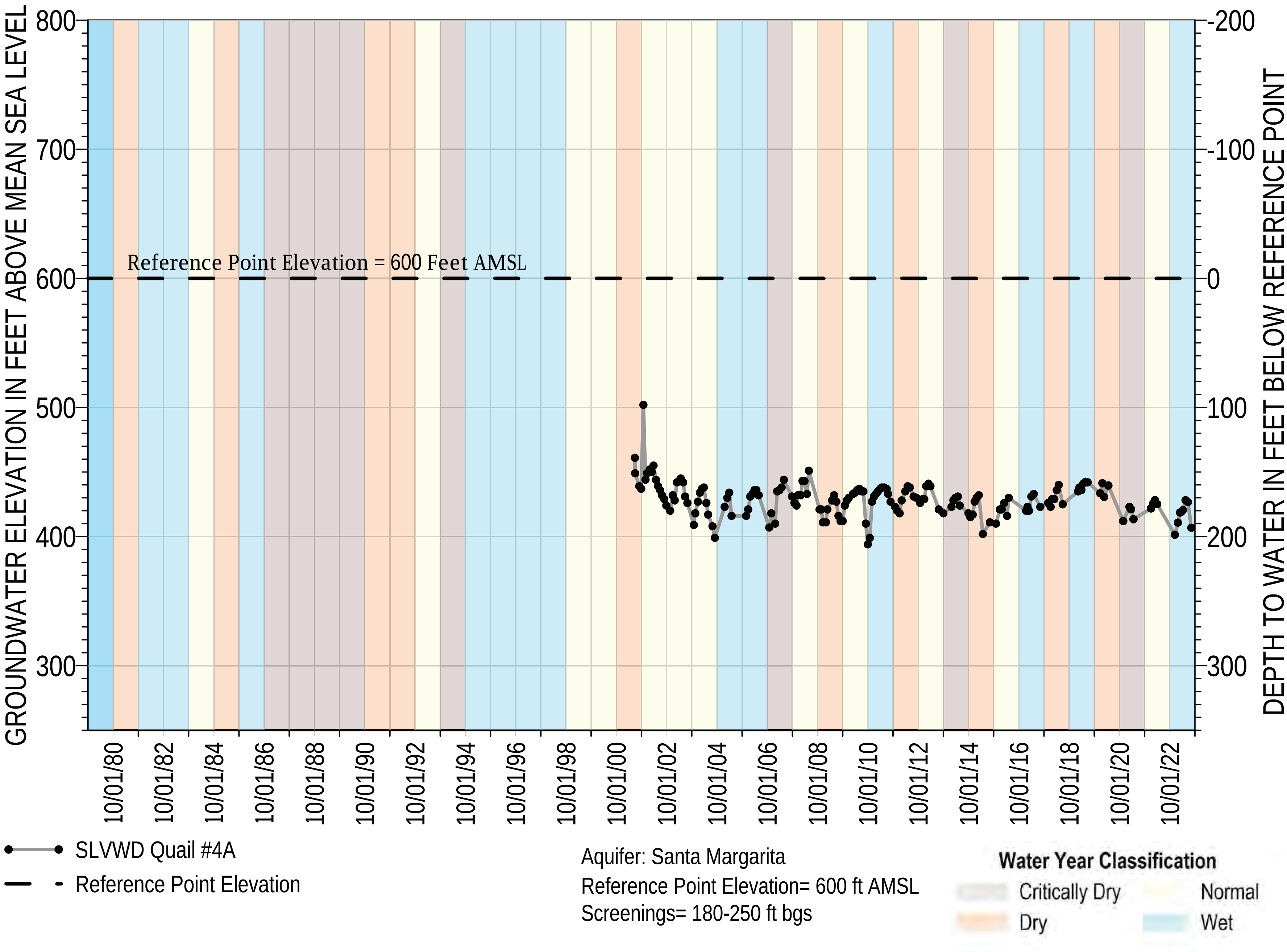



Aquifer: Santa Margarita,Lompico
Reference Point Elevation= 727.1 ft AMSL
Screenings= 255-265, 285-395,
435-495 ft bgs

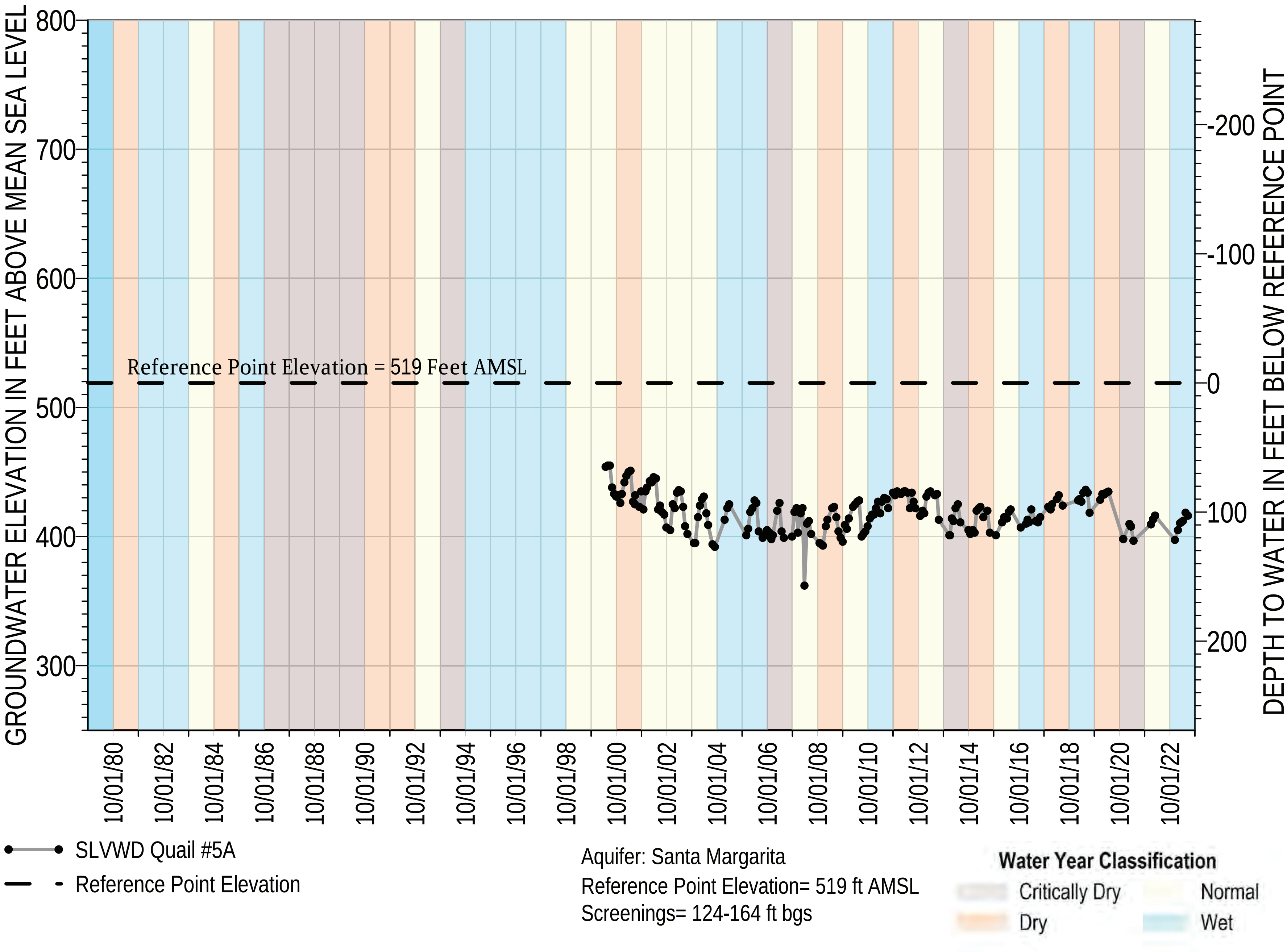
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.



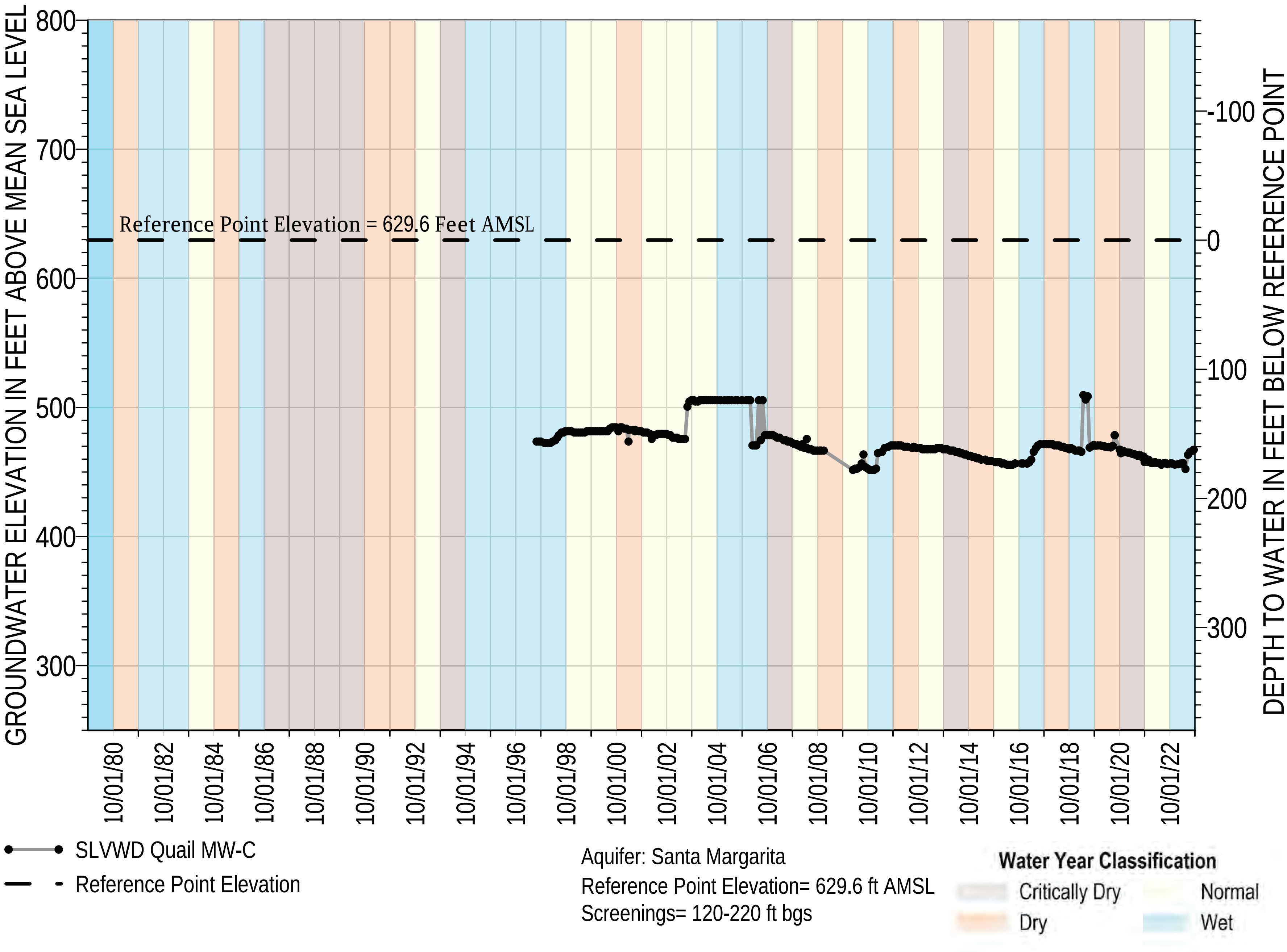

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.




Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

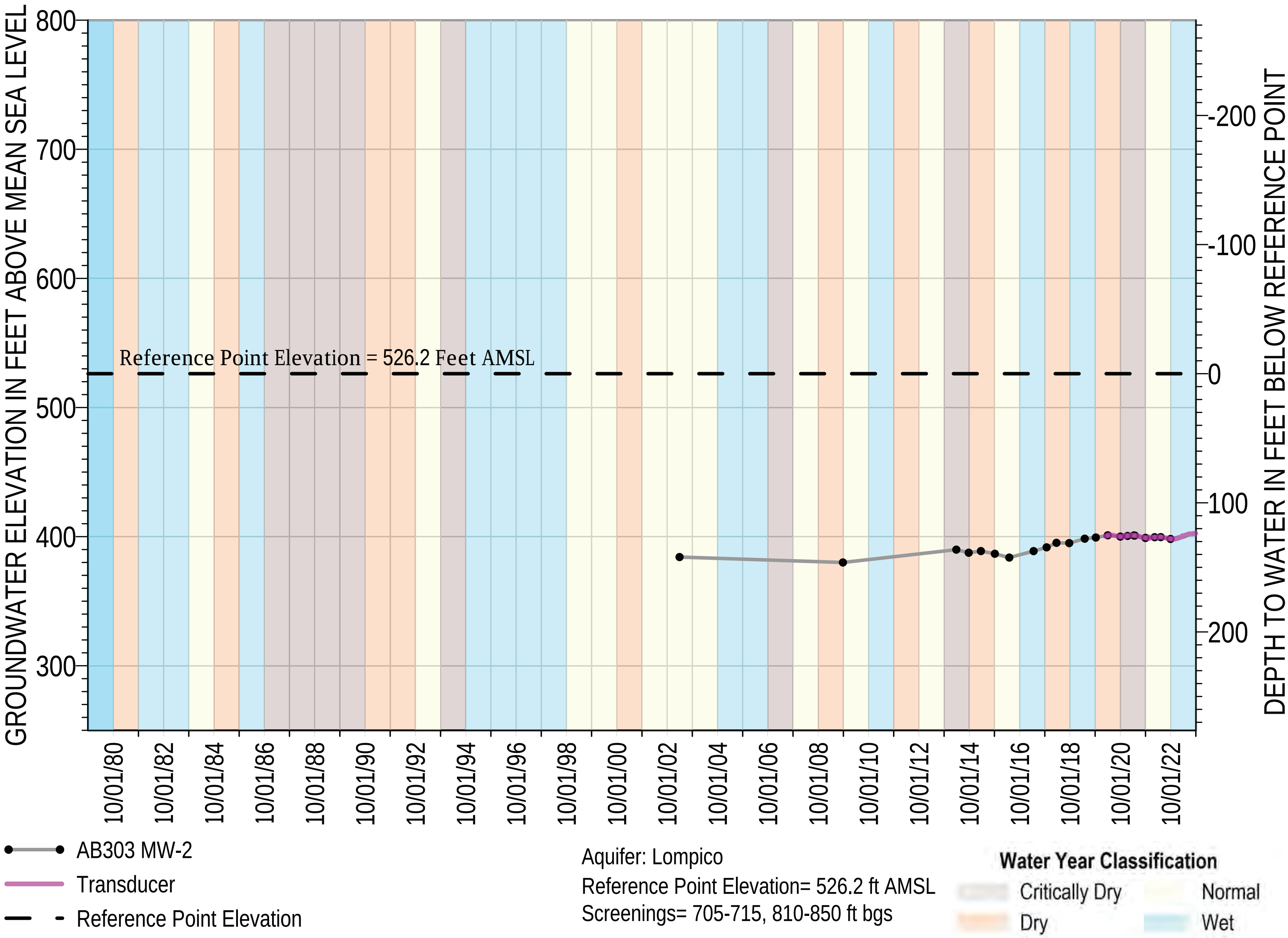



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.



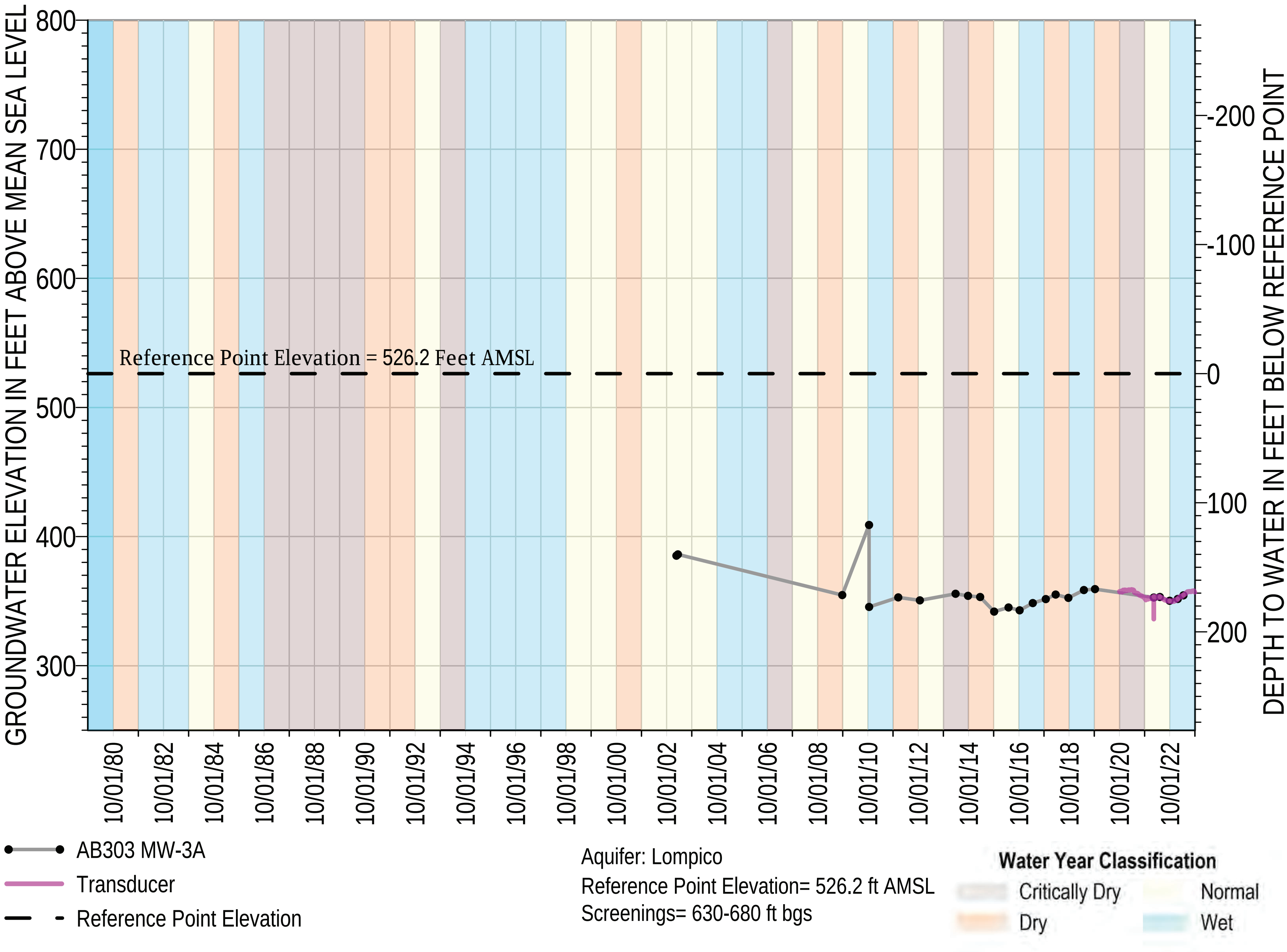

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

# Lompico Sandstone

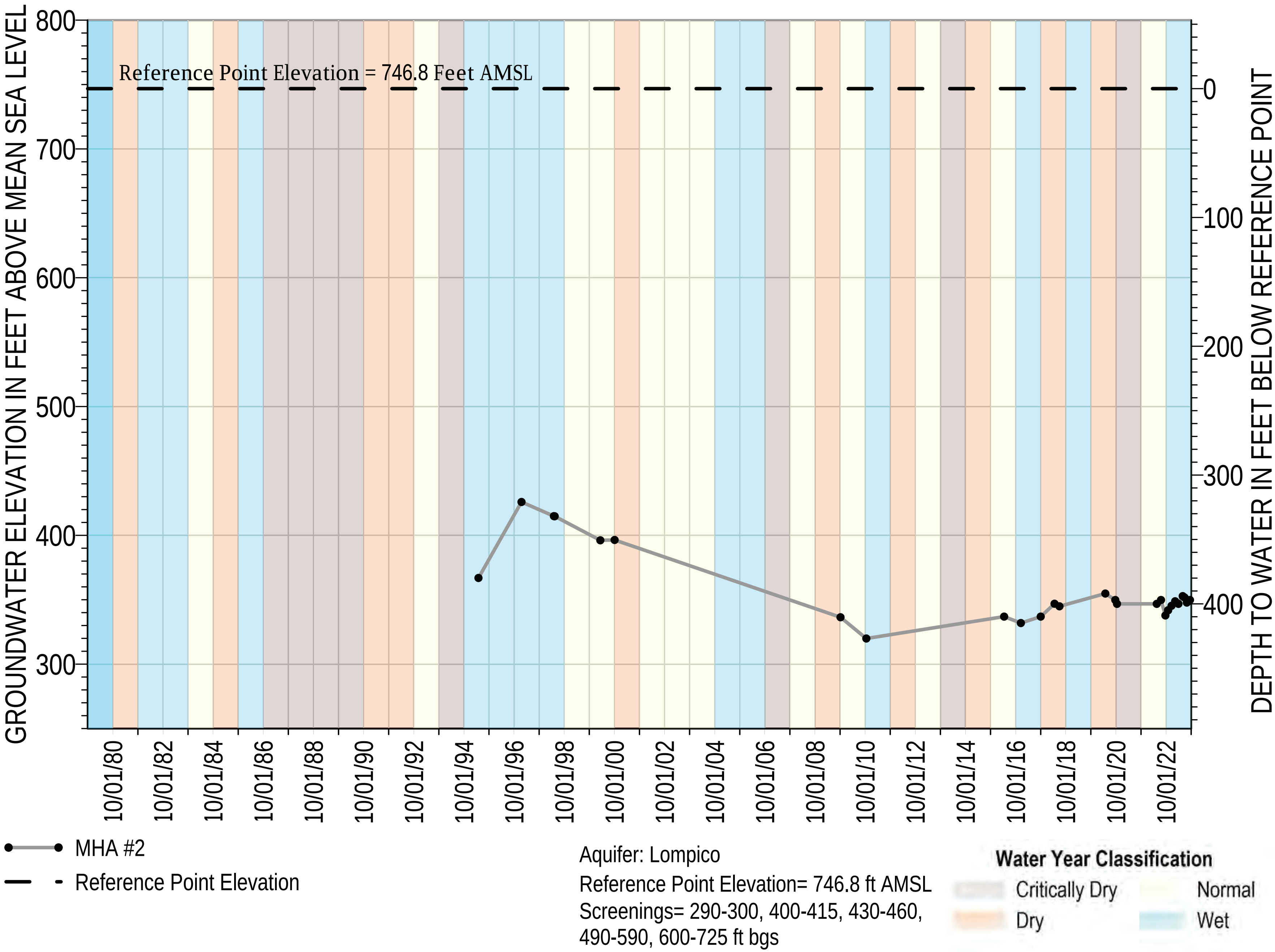



Aquifer: Lompico
Reference Point Elevation= 526.2 ft AMSL
Screenings= 705-715, 810-850 ft bgs

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

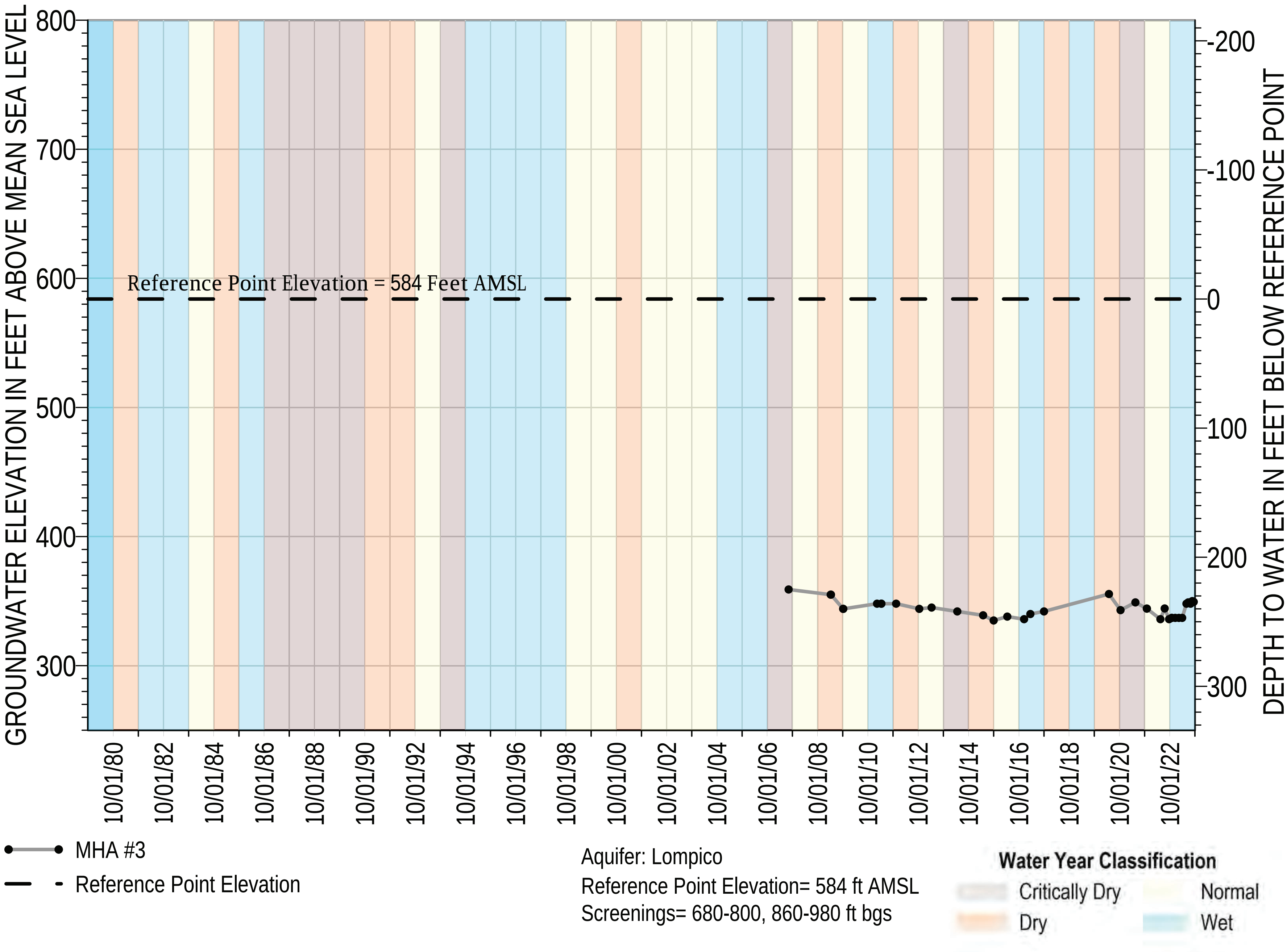



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

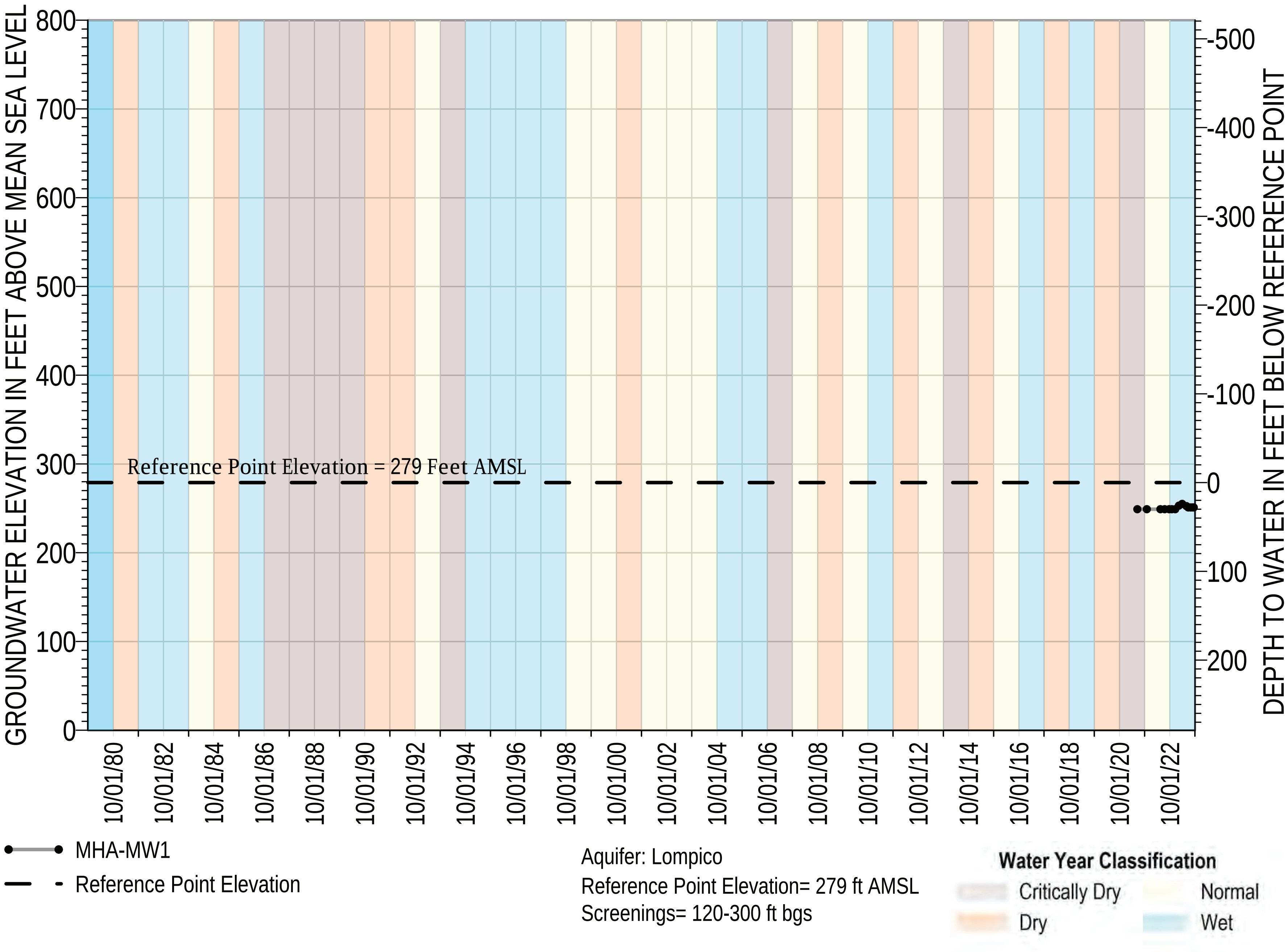



Aquifer: Lompico
Reference Point Elevation= 746.8 ft AMSL
Screenings= 290-300, 400-415, 430-460, 490-590, 600-725 ft bgs

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

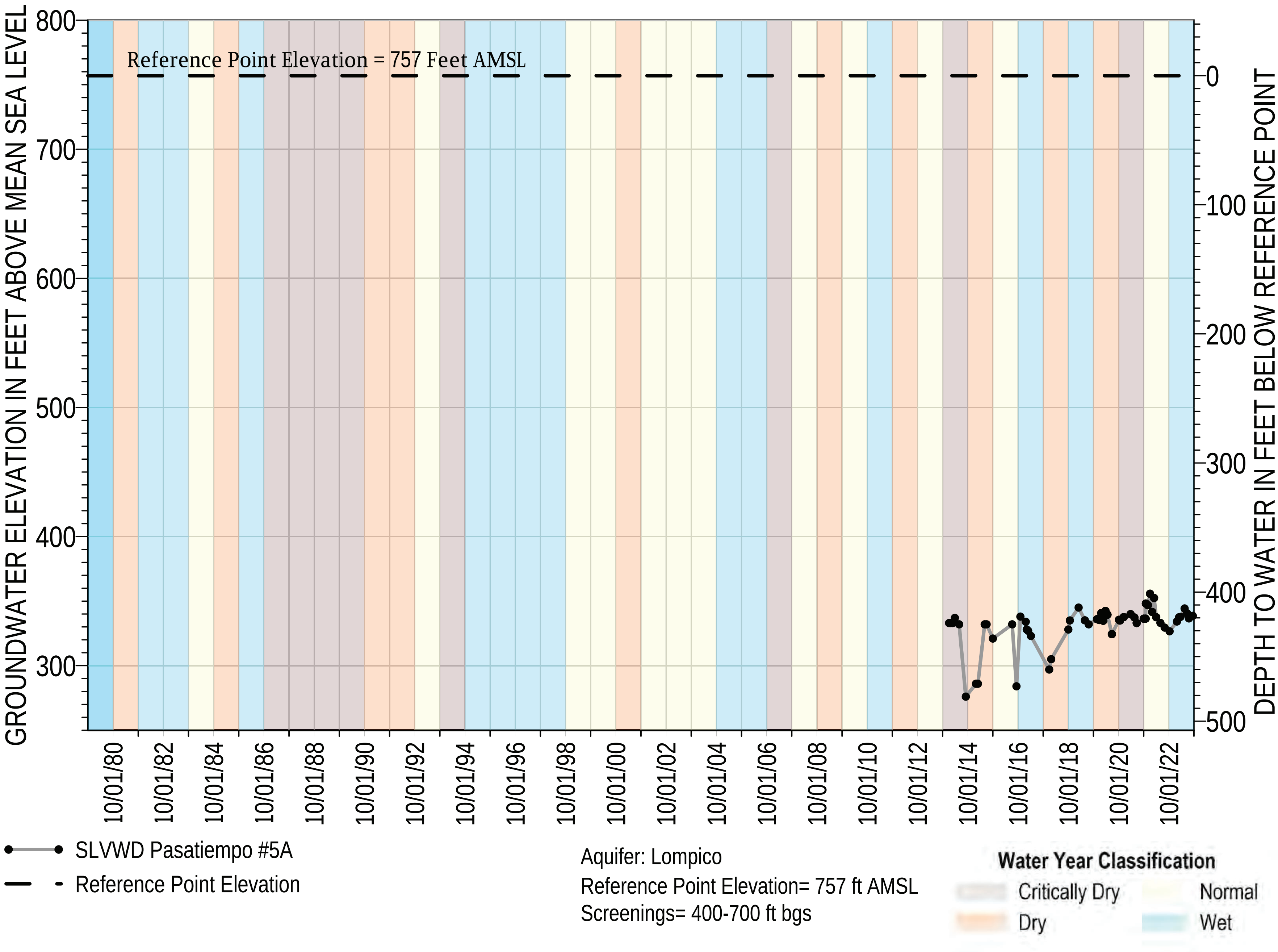



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

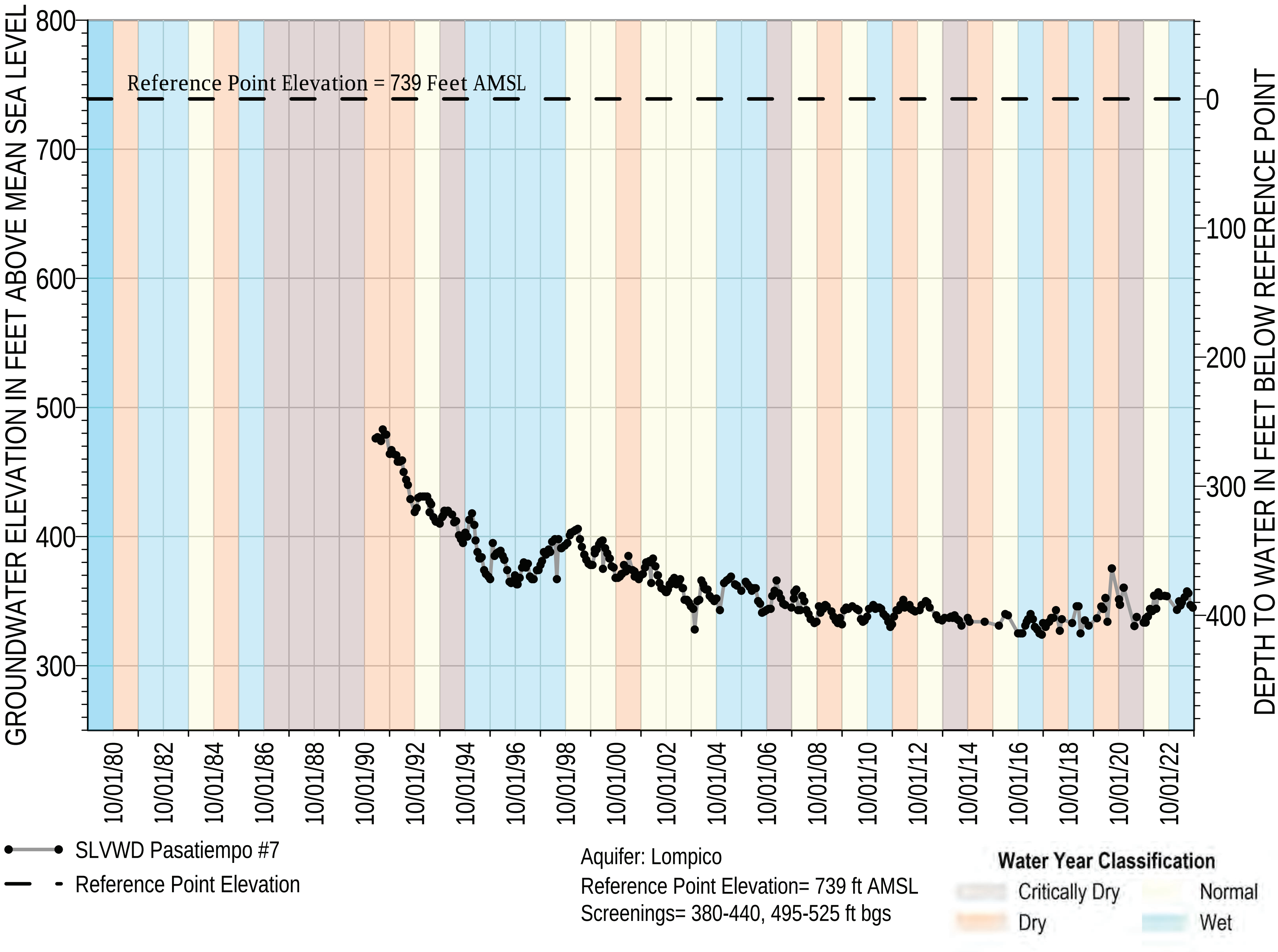



Aquifer: Lompico
Reference Point Elevation= 279 ft AMSL
Screenings= 120-300 ft bgs

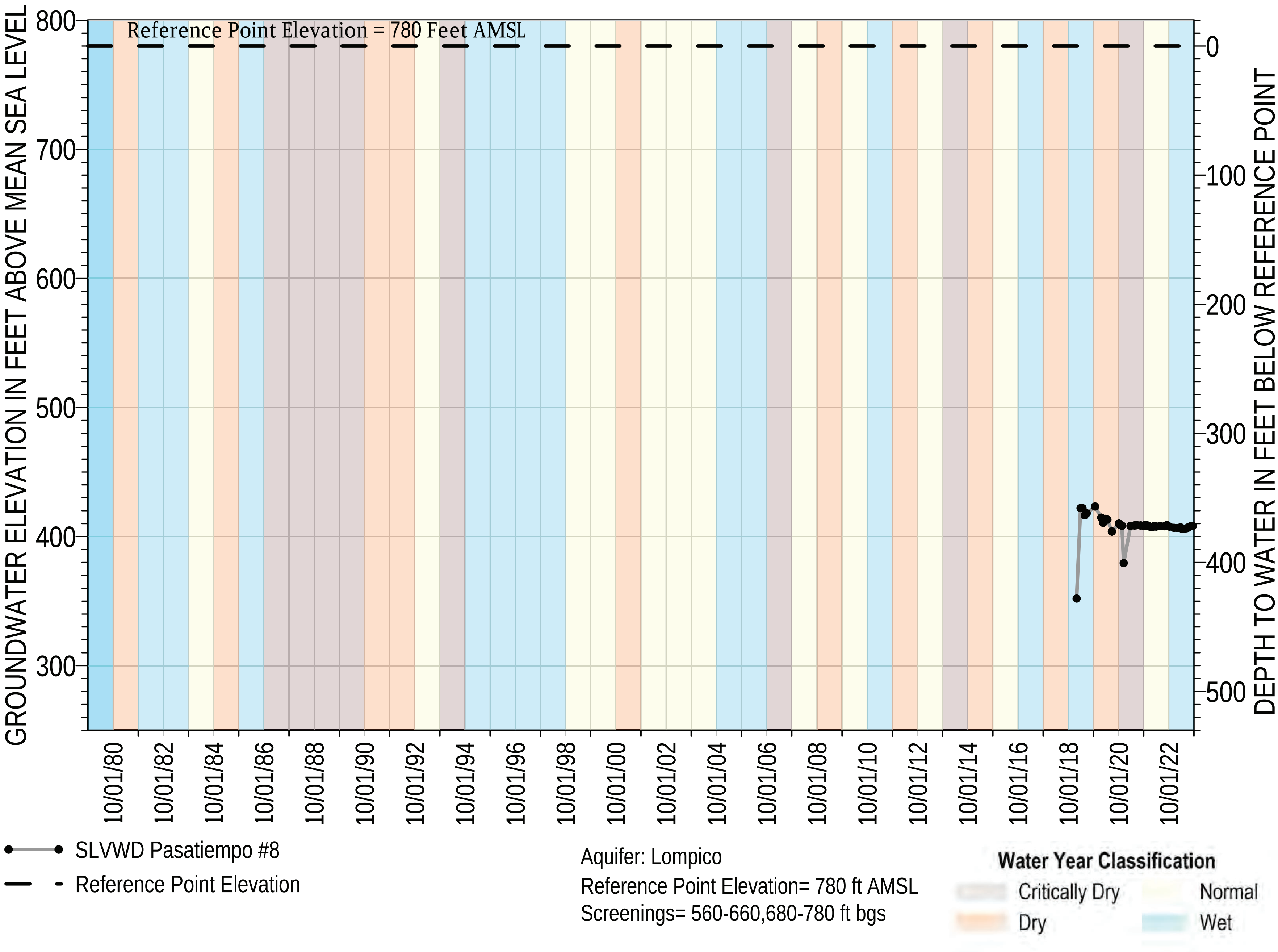
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.



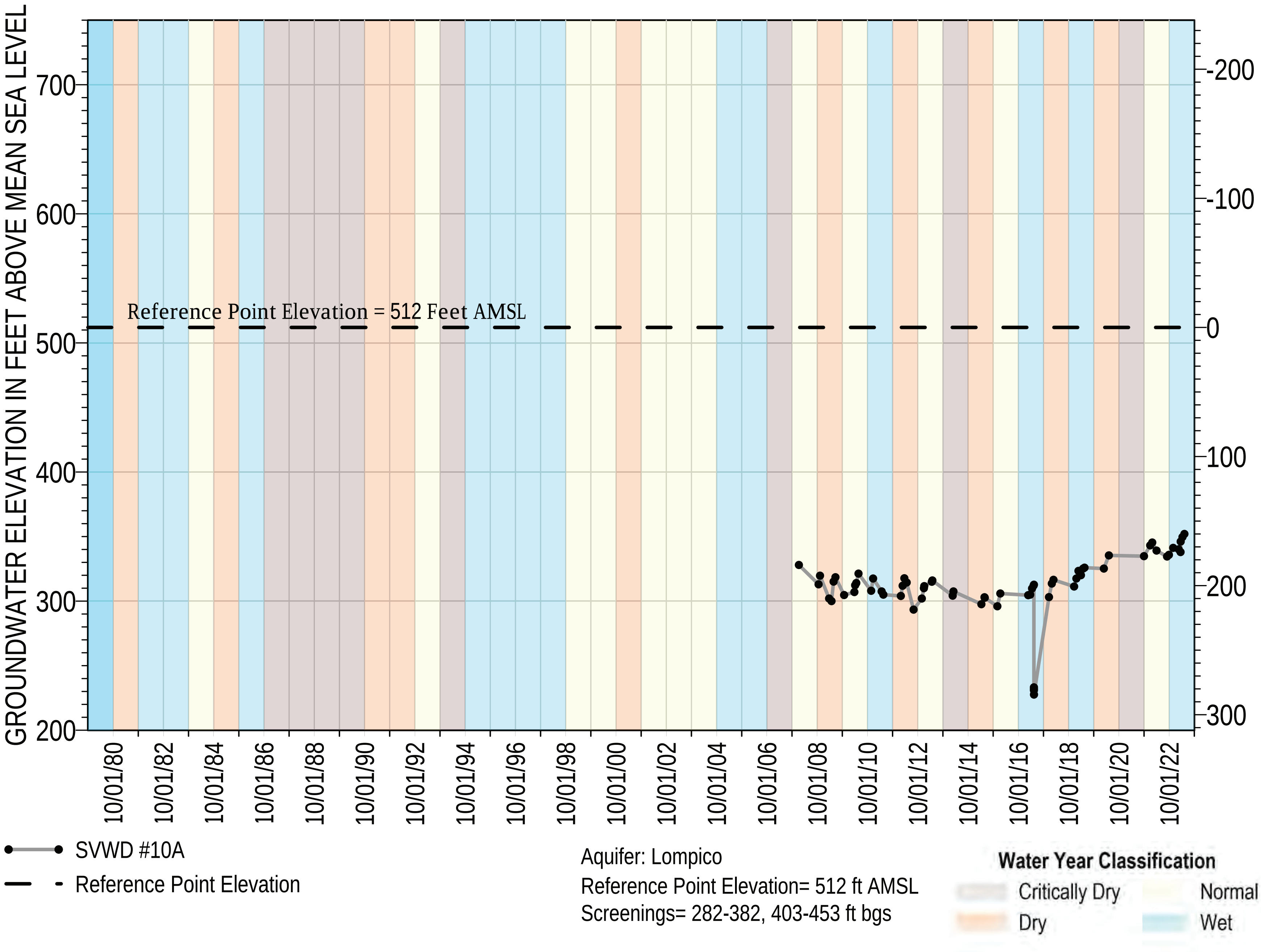

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.



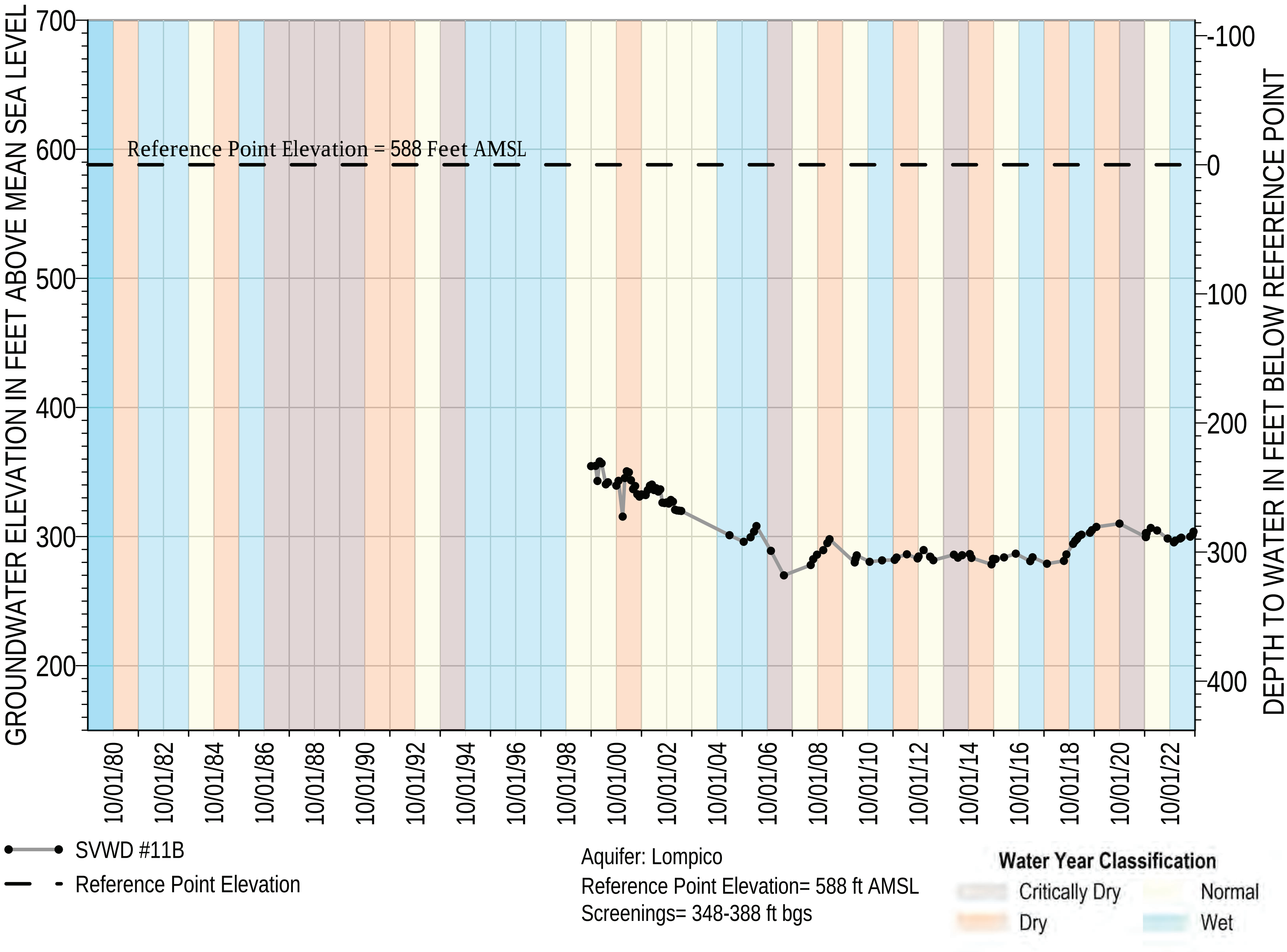

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.




Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

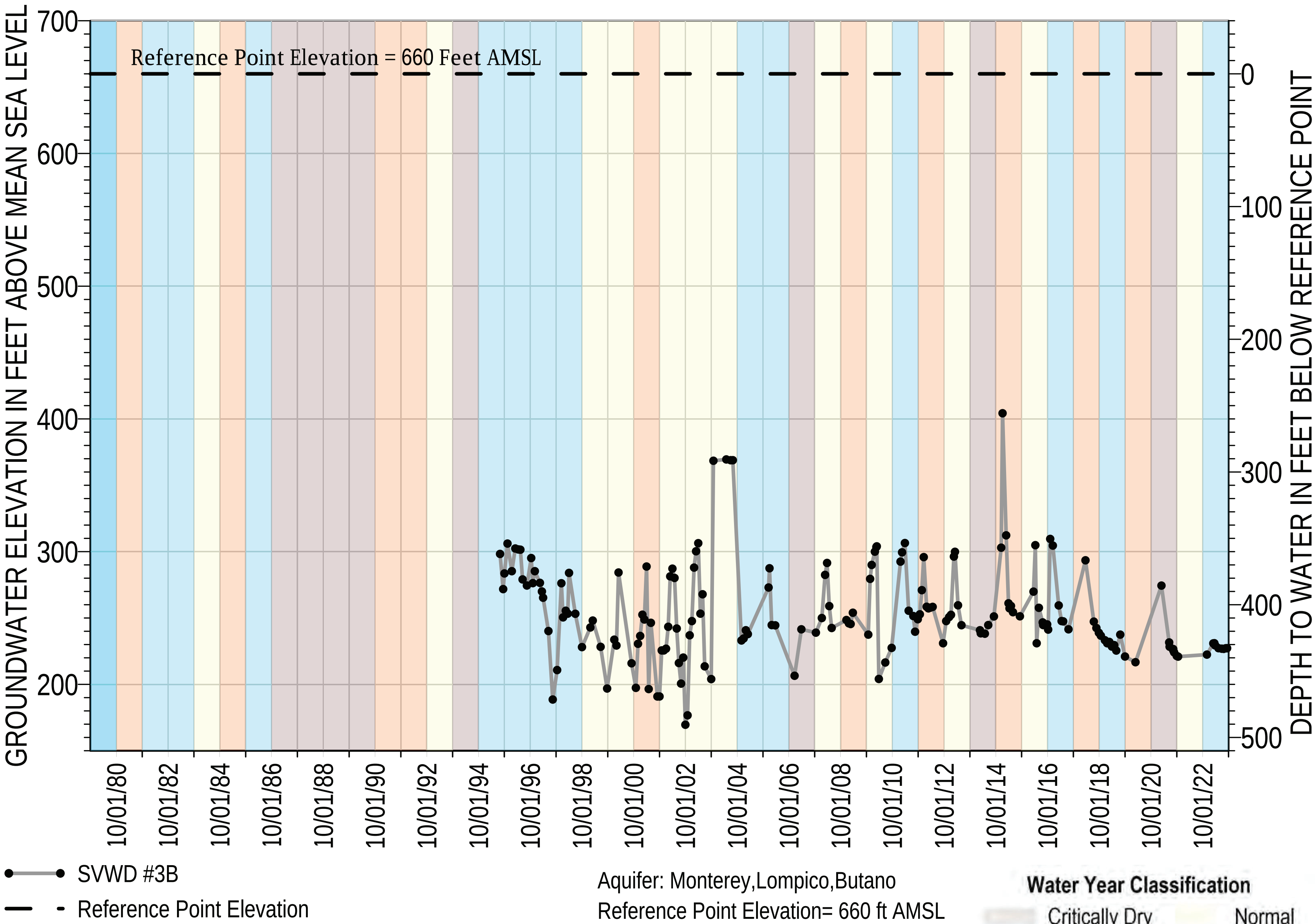



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.



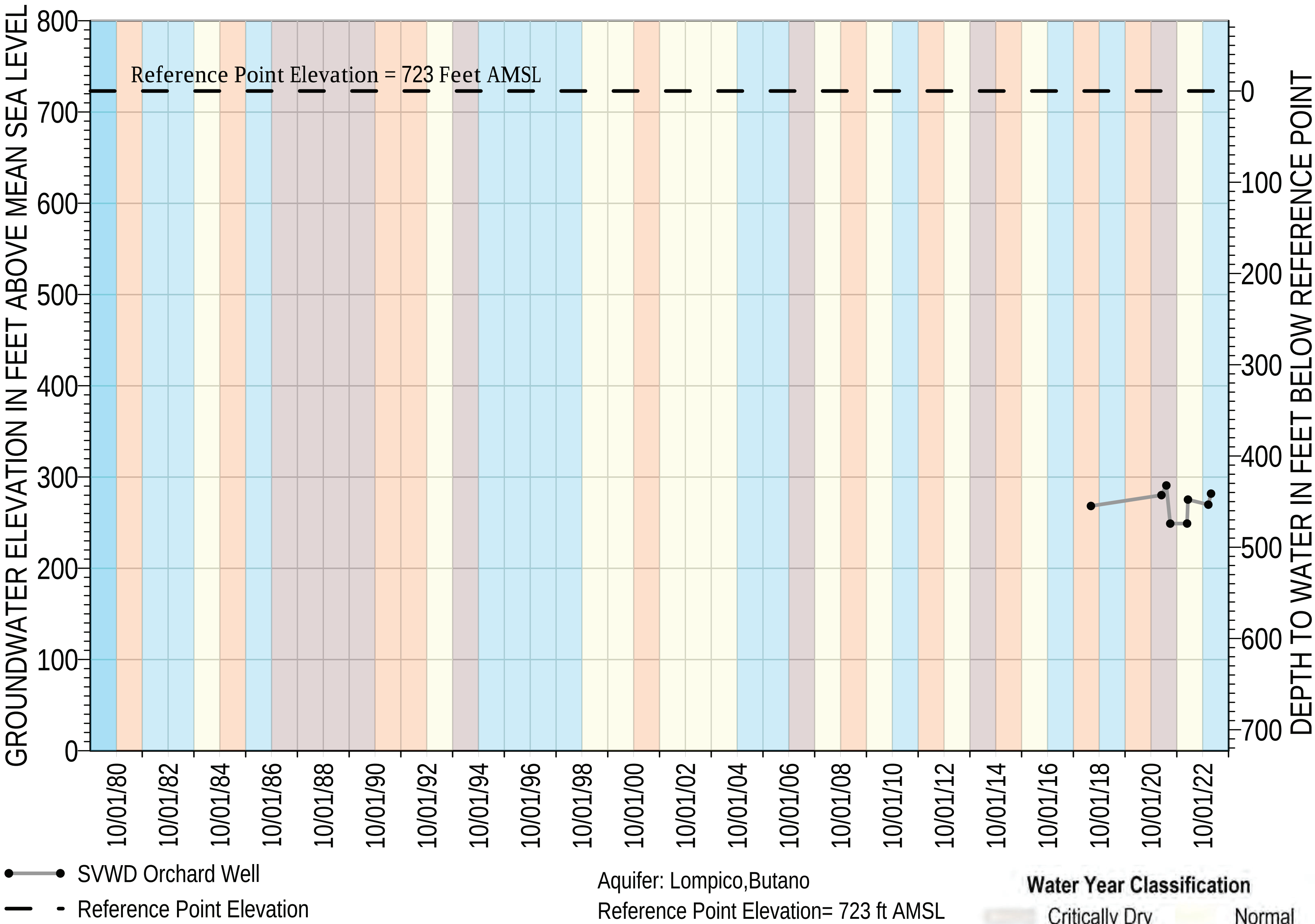

Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

## Lompico/Butano Sandstone




Aquifer: Monterey,Lompico,Butano
Reference Point Elevation= 660 ft AMSL
Screenings= 700-730, 880-1050, 1180-1370, 1400-1670 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.




Aquifer: Lompico,Butano
Reference Point Elevation= 723 ft AMSL
Screenings= 705-784, 805-1063, 1084-1455 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.

MONTGOMERY & ASSOCIATES
Water Resource Consultants

# Appendix D

# Water Quality Data

# Santa Margarita Basin Groundwater Quality Data for WY 2023

| 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** |
| 10/31/2022 | ND | ND | | | ND | 0.0026 | | | | | |
| 11/29/2022 | ND | ND | 58.0 | ND | ND | 0.0024 | ND | ND | ND | 500 | ND |
| 3/9/2023 | | | | | ND | ND | | | | | |
| 5/23/2023 | | | | | ND | 0.0025 | | | | | |
| 7/13/2023 | ND | ND | 56.0 | ND | ND | 0.0025 | ND | ND | ND | 520 | ND |
| **SLVWD Olympia #2** | | | | | | | | | | | |
| **MO** | **MO not defined because well is not an RMP** | | | | | | | | | | |
| 11/1/2022 | | | 6.0 | | 0.130 | **0.160** | | | | | |
| 2/8/2023 | | | | | 0.210 | **0.110** | | | | | |
| 5/16/2023 | | | | | 0.210 | **0.098** | | | | | |
| 8/16/2023 | | | | | 0.170 | **0.110** | | | | | |
| **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** |
| 11/1/2022 | | | | | 0.240 | **0.260** | | | | | |
| 2/8/2023 | | | | | **0.600** | **0.240** | | | | | |
| 5/16/2023 | | | | | **1.480** | **0.320** | | | | | |
| 7/10/2023 | ND | ND | 7.5 | ND | **0.450** | **0.140** | ND | ND | ND | 730 | ND |
| 8/16/2023 | | | | | **0.360** | **0.280** | | | | | |
| **SLVWD Pasatiempo #5A** | | | | | | | | | | | |
| **MO** | **MO not defined because well is not an RMP** | | | | | | | | | | |
| 11/3/2022 | | 0.002 | | | 0.029 | 0.004 | | | | | |
| 12/7/2022 | | 0.003 | | | 0.028 | 0.003 | | | | | |
| 2/2/2023 | | 0.001 | | | 0.073 | 0.004 | | | | | |
| 3/2/2023 | | 0.002 | | | **0.380** | 0.009 | | | | | |
| 4/5/2023 | | 0.003 | | | 0.038 | 0.005 | | | | | |
| 6/7/2023 | | 0.002 | | | 0.052 | 0.004 | | | | | |
| 7/11/2023 | ND | 0.002 | 8.0 | ND | 0.025 | 0.003 | ND | 0.095 | ND | 180 | ND |
| **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** |
| 10/5/2022 | | 0.002 | | | 0.075 | 0.027 | | | | | |

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 2023

| 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 #7** | | | | | | | | | | | |
| **MO** | **0.0005** | **0.002** | **7.4** | **0.001** | **0.539** | **0.099** | **0.003** | **0.33** | **0.0005** | **143** | **0.0005** |
| 11/3/2022 | | ND | | | 0.190 | 0.048 | | | | | |
| 12/7/2022 | | 0.001 | | | 0.170 | 0.045 | | | | | |
| 1/18/2023 | | 0.002 | | | 0.096 | 0.021 | | | | | |
| 2/2/2023 | | 0.001 | | | 0.190 | **0.056** | | | | | |
| 3/2/2023 | | ND | | | **0.330** | **0.097** | | | | | |
| 10/5/2022 | | 0.0019 | | | 0.075 | 0.027 | | | | | |
| 11/3/2022 | | ND | | | 0.190 | 0.048 | | | | | |
| 12/7/2022 | | 0.0011 | | | 0.170 | 0.045 | | | | | |
| 1/18/2023 | | 0.0019 | | | 0.096 | 0.021 | | | | | |
| 2/2/2023 | | 0.001 | | | 0.190 | **0.056** | | | | | |
| 3/2/2023 | | ND | | | **0.330** | **0.097** | | | | | |
| 4/5/2023 | | ND | | | 0.160 | 0.042 | | | | | |
| 5/4/2023 | | 0.0021 | | | **0.320** | 0.035 | | | | | |
| 6/7/2023 | | ND | | | 0.170 | 0.031 | | | | | |
| 7/6/2023 | | 0.0019 | | | 0.078 | 0.018 | | | | | |
| 7/11/2023 | ND | ND | 9.1 | ND | 0.150 | 0.038 | ND | 0.57 | ND | 180 | ND |
| 8/2/2023 | | 0.0019 | | | 0.098 | 0.022 | | | | | |
| 9/6/2023 | | ND | | | 0.140 | 0.039 | | | | | |
| **SLVWD Pasatiempo #8** | | | | | | | | | | | |
| **MO** | **MO not defined because well is not an RMP** | | | | | | | | | | |
| 10/5/2022 | | 0.009 | | | 0.150 | 0.021 | | | | | |
| 11/3/2022 | | 0.009 | | | 0.180 | 0.021 | | | | | |
| 12/7/2022 | | 0.009 | | | 0.180 | 0.021 | | | | | |
| 1/18/2023 | | 0.009 | | | 0.170 | 0.021 | | | | | |
| 2/2/2023 | | 0.006 | | | 0.280 | 0.016 | | | | | |
| 3/2/2023 | | 0.006 | | | **0.330** | 0.019 | | | | | |
| 4/5/2023 | | 0.008 | | | 0.240 | 0.021 | | | | | |
| 5/4/2023 | | 0.006 | | | **0.310** | 0.018 | | | | | |
| 6/7/2023 | | 0.007 | | | 0.190 | 0.020 | | | | | |
| 7/6/2023 | | 0.009 | | | 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 2023

| 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** | | | | | | | | | | |
| 7/11/2023 | ND | 0.010 | 7.3 | ND | 0.170 | 0.023 | ND | ND | ND | 140 | ND |
| 8/2/2023 | | 0.009 | | | 0.200 | 0.021 | | | | | |
| 9/6/2023 | | 0.009 | | | 0.180 | 0.023 | | | | | |
| **SVWD #10A** | | | | | | | | | | | |
| **MO** | **0.0005** | **0.002** | **30.6** | **0.001** | **1.51** | **0.099** | **0.003** | **0.39** | **0.0005** | **290** | **0.0005** |
| 12/8/2022 | | ND | 32.0 | | **0.700** | **0.091** | | ND | | 300 | |
| 6/29/2023 | | | | | **1.300** | **0.150** | | | | | |
| 7/13/2023 | ND | ND | 35.0 | | 0.001 | **0.098** | ND | ND | | 310 | 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** |
| 7/10/2023 | ND | 0.003 | 8.3 | ND | ND | ND | ND | 2.5 | 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** |
| 4/5/2023 | | ND | | | **0.310** | **0.095** | | | | | |
| 8/16/2023 | ND | ND | 30.0 | | 0.240 | **0.095** | ND | ND | | 560 | 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** |
| 12/8/2022 | ND | ND | 37.0 | | ND | ND | | ND | | 310 | |
| 12/21/2022 | ND | 0.006 | 26.0 | | 0.280 | ND | ND | ND | | 395 | ND |
| 1/25/2023 | ND | ND | 35.0 | | ND | ND | ND | ND | | 310 | ND |
| 2/8/2023 | | | | | | | | ND | | | |
| 3/22/2023 | | 0.008 | | | **0.610** | **0.082** | | | | | |
| 5/23/2023 | | 0.008 | | | **0.700** | **0.071** | | | | | |
| 6/29/2023 | | | | | 0.017 | ND | | | | | |
| 8/16/2023 | ND | 0.008 | 25.0 | | **0.630** | **0.067** | ND | ND | | 370 | ND |

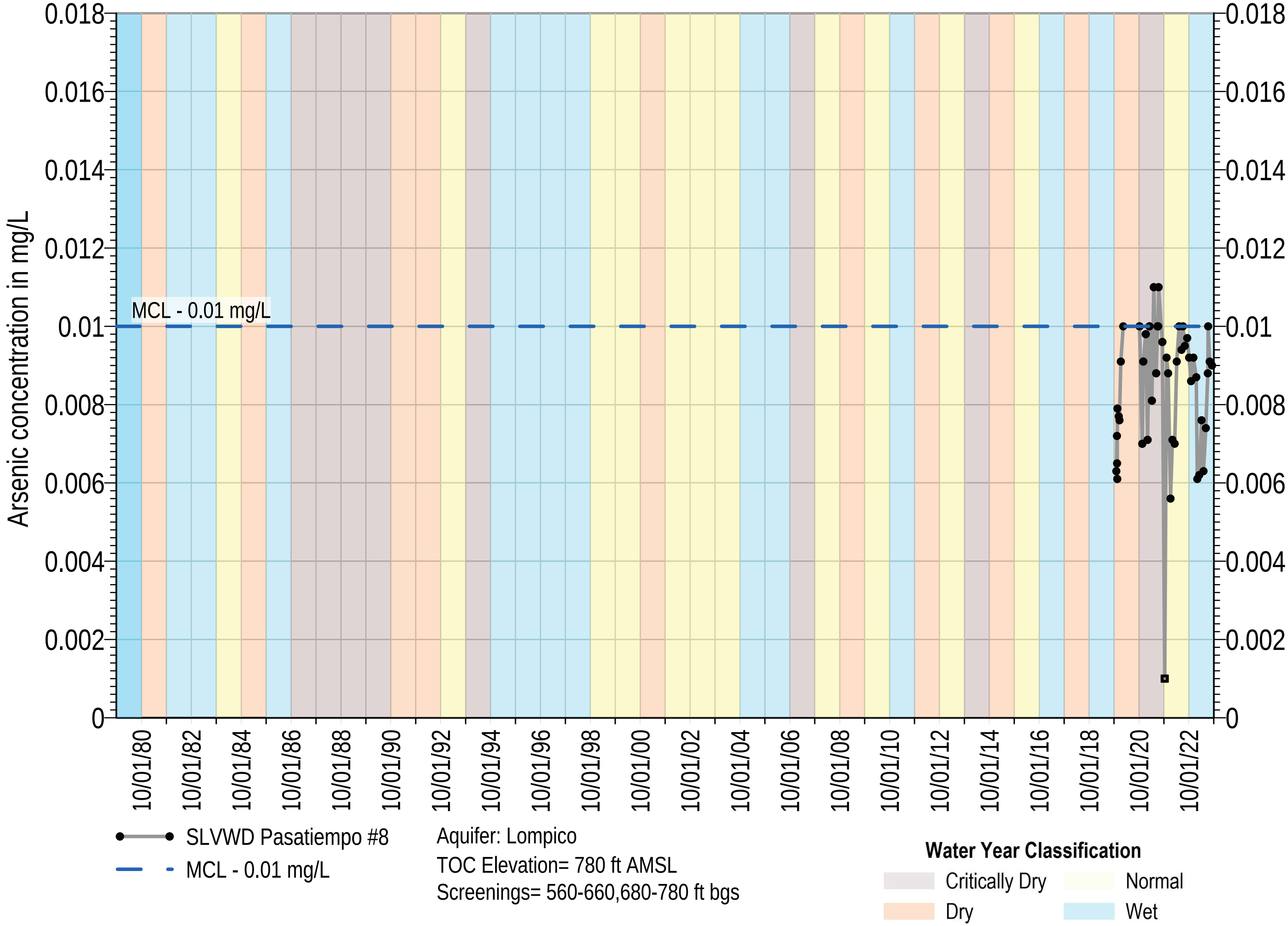
MT - Minimum Threshold, MO - Measurable Objective, RMP - Representative Monitoring Point
ND - Not Detected above reporting limit, all values are in mg/L
Values above MT in bold

# Appendix E

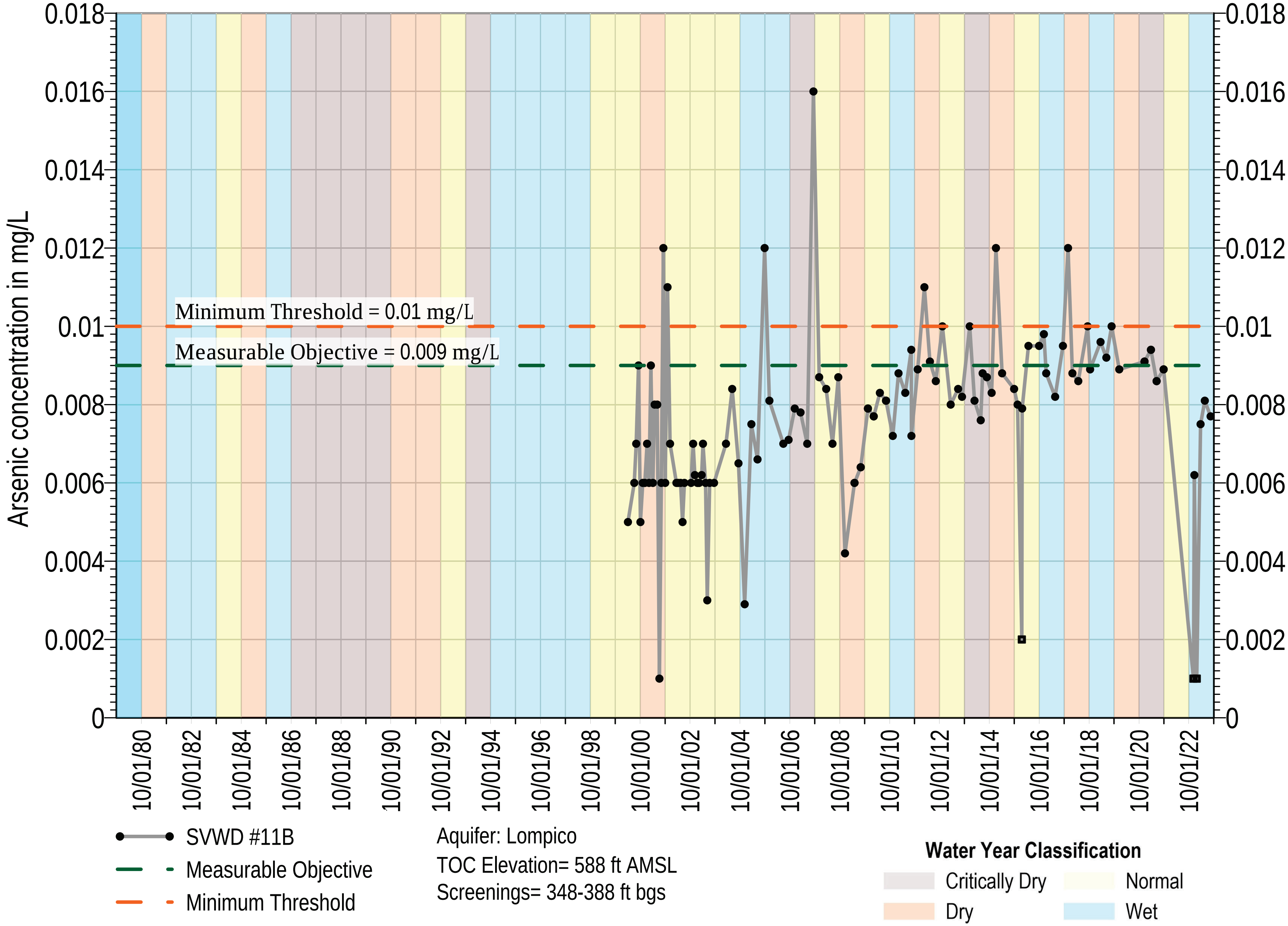
# Well Chemographs

MONTGOMERY & ASSOCIATES

# Arsenic

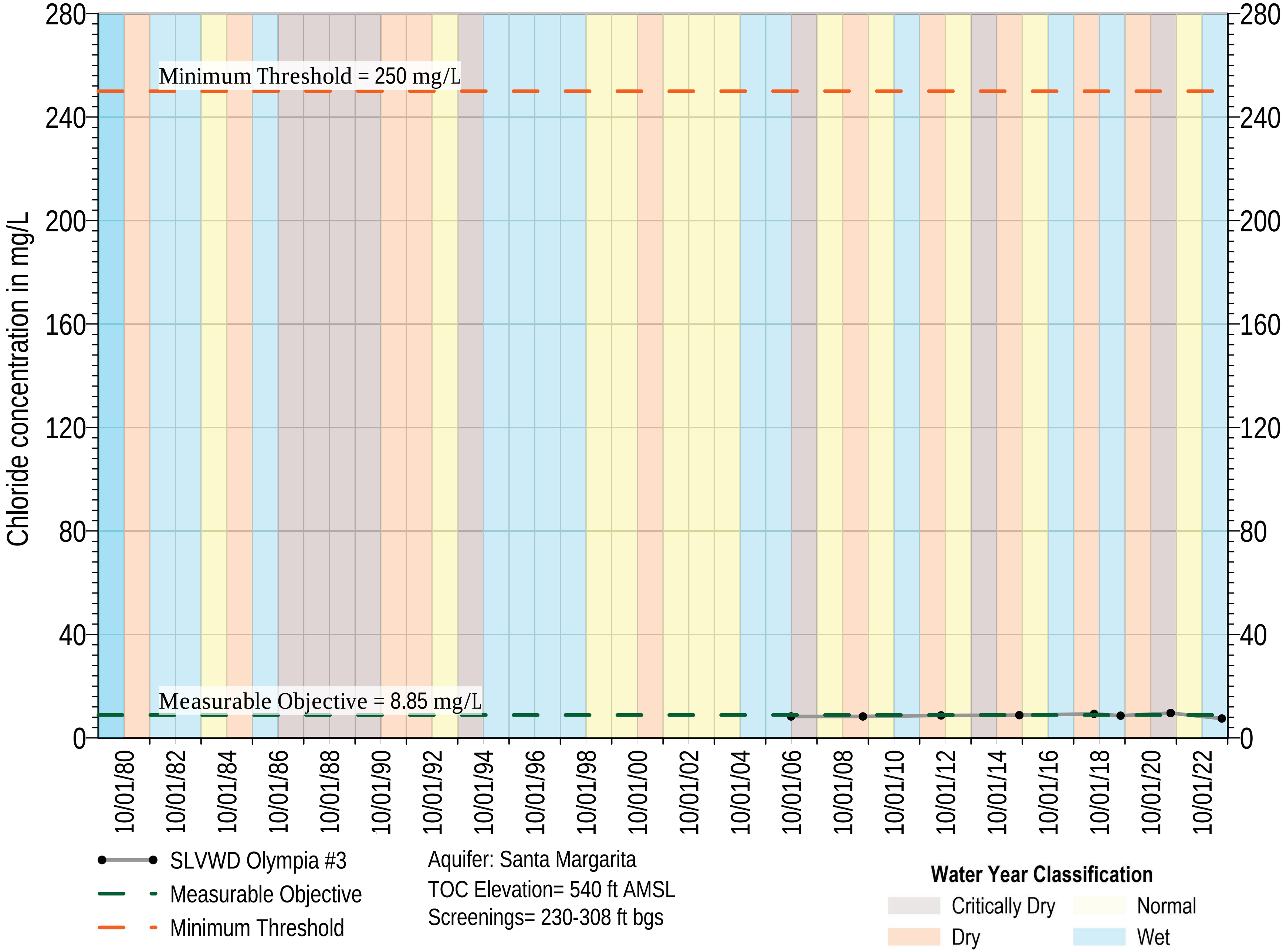



Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result

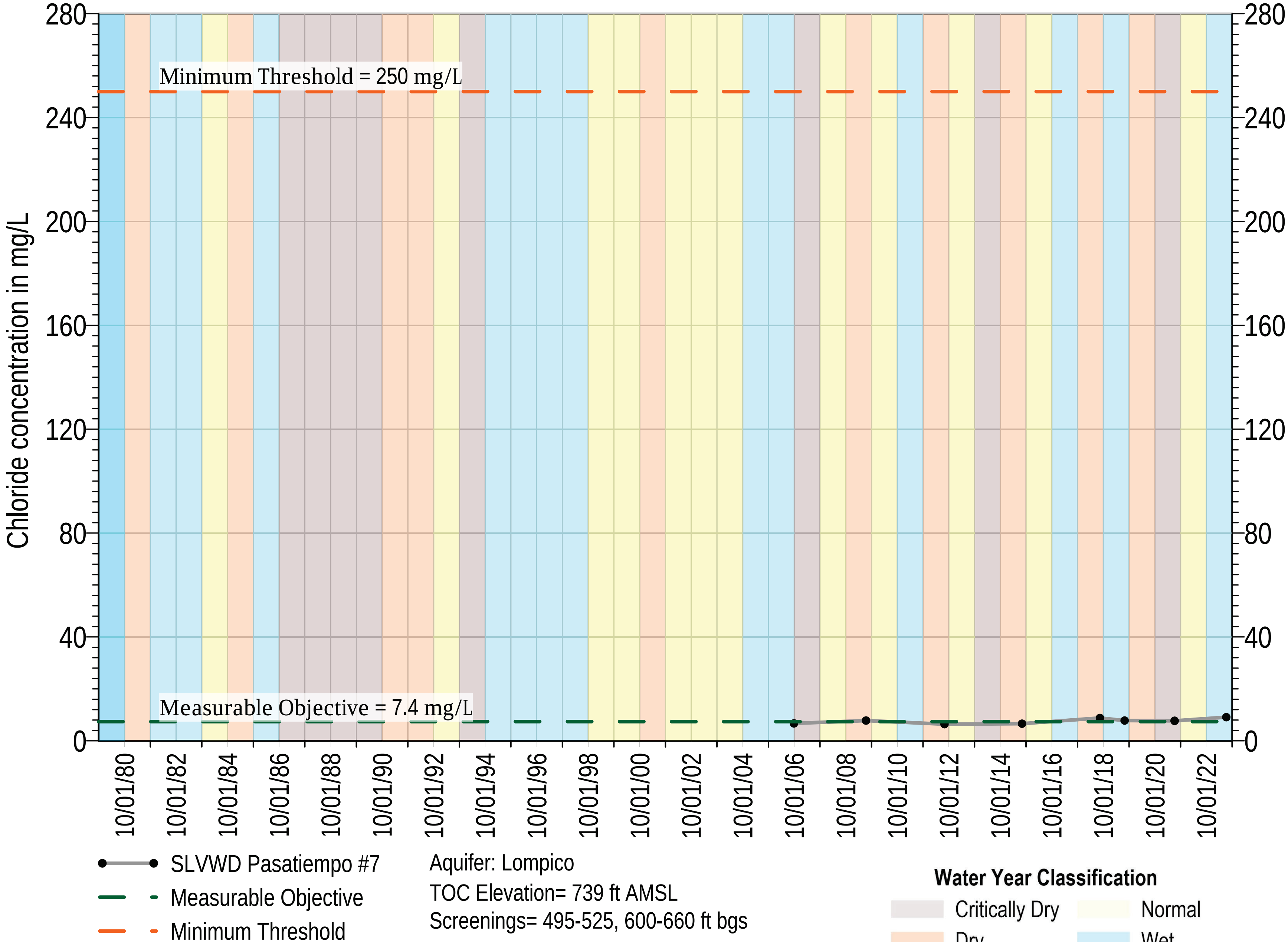



Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result

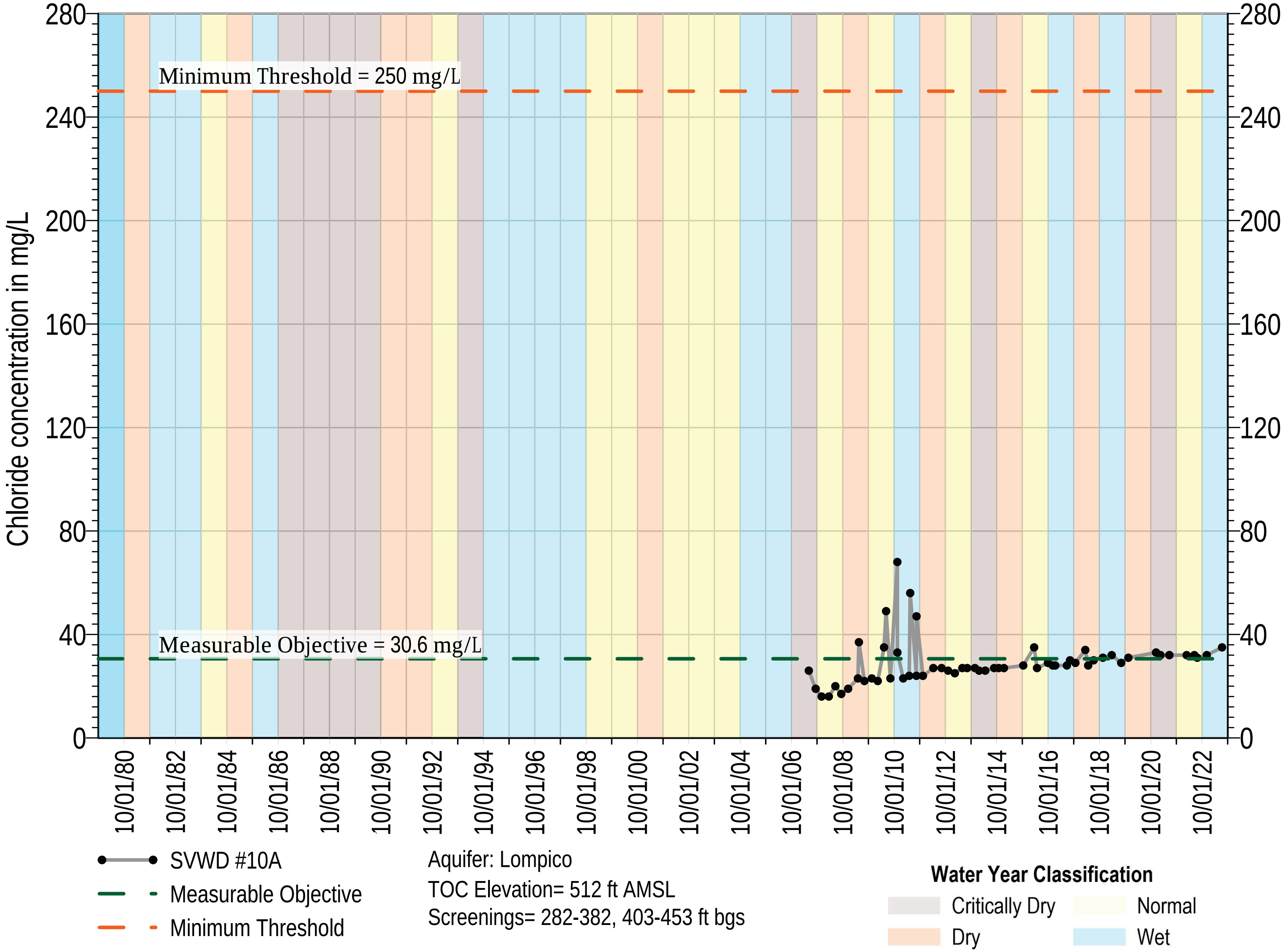
# Chloride



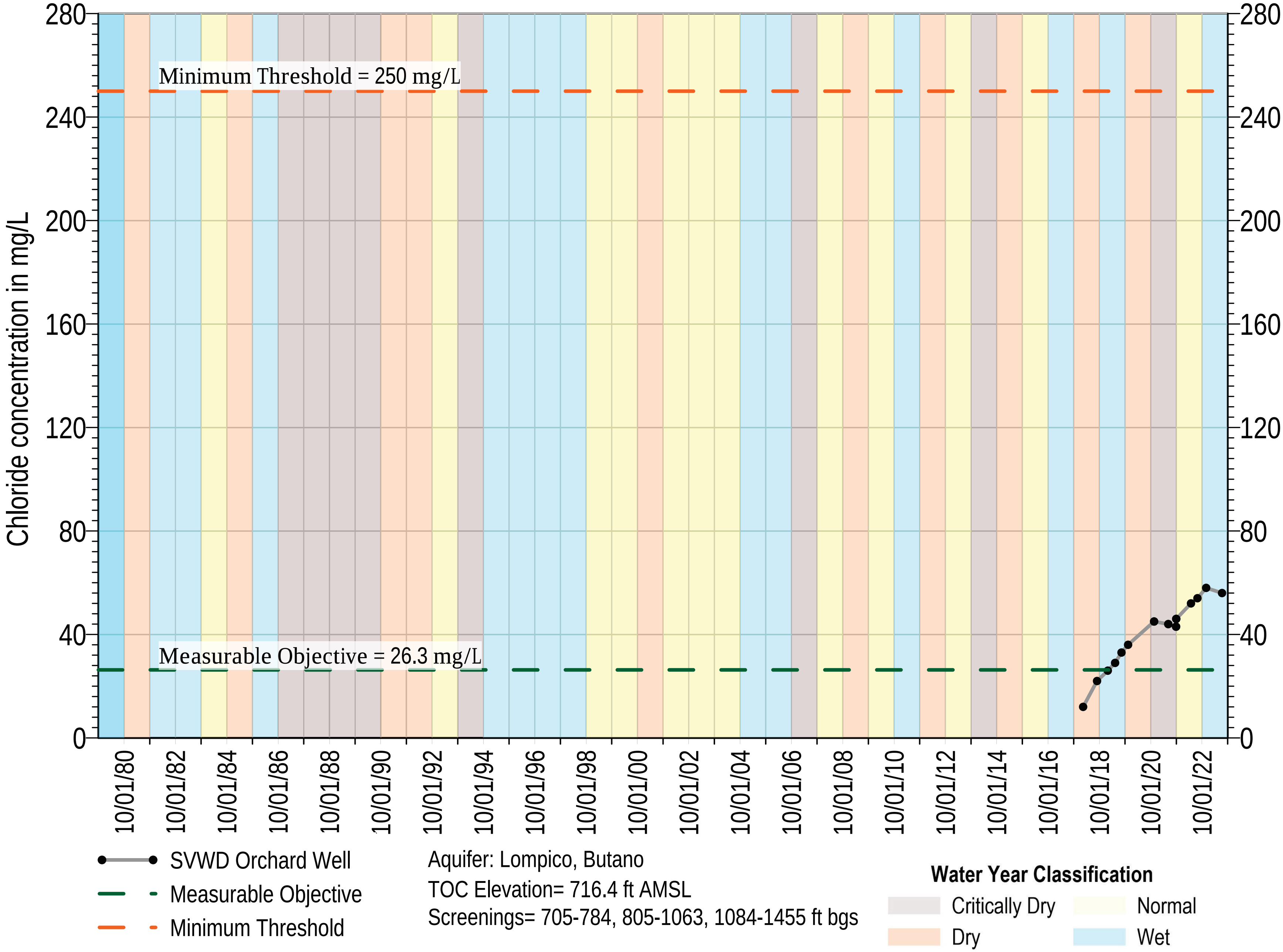

Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result




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

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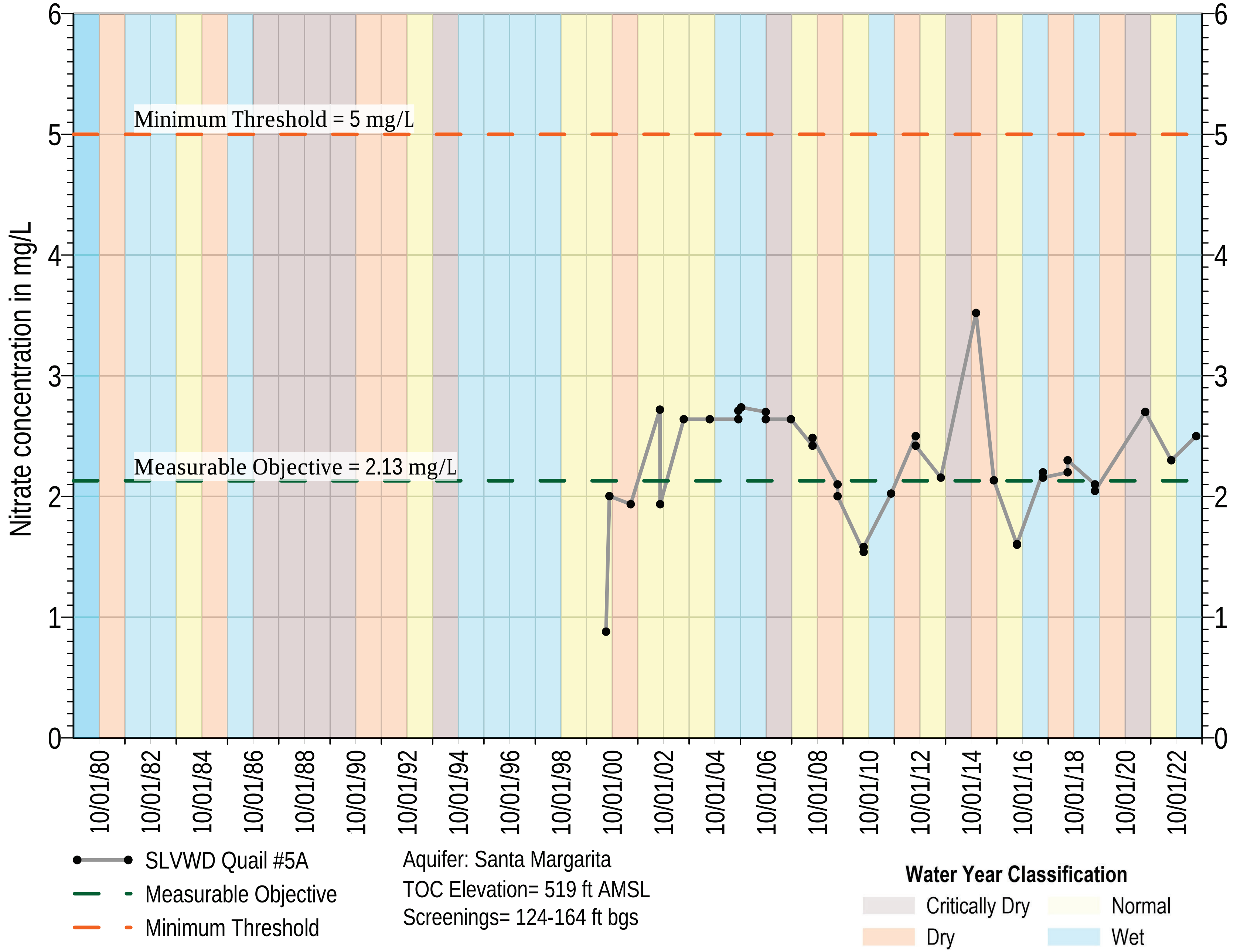
MONTGOMERY
& ASSOCIATES

# Nitrate




Square symbols indicate non-detects (ND)
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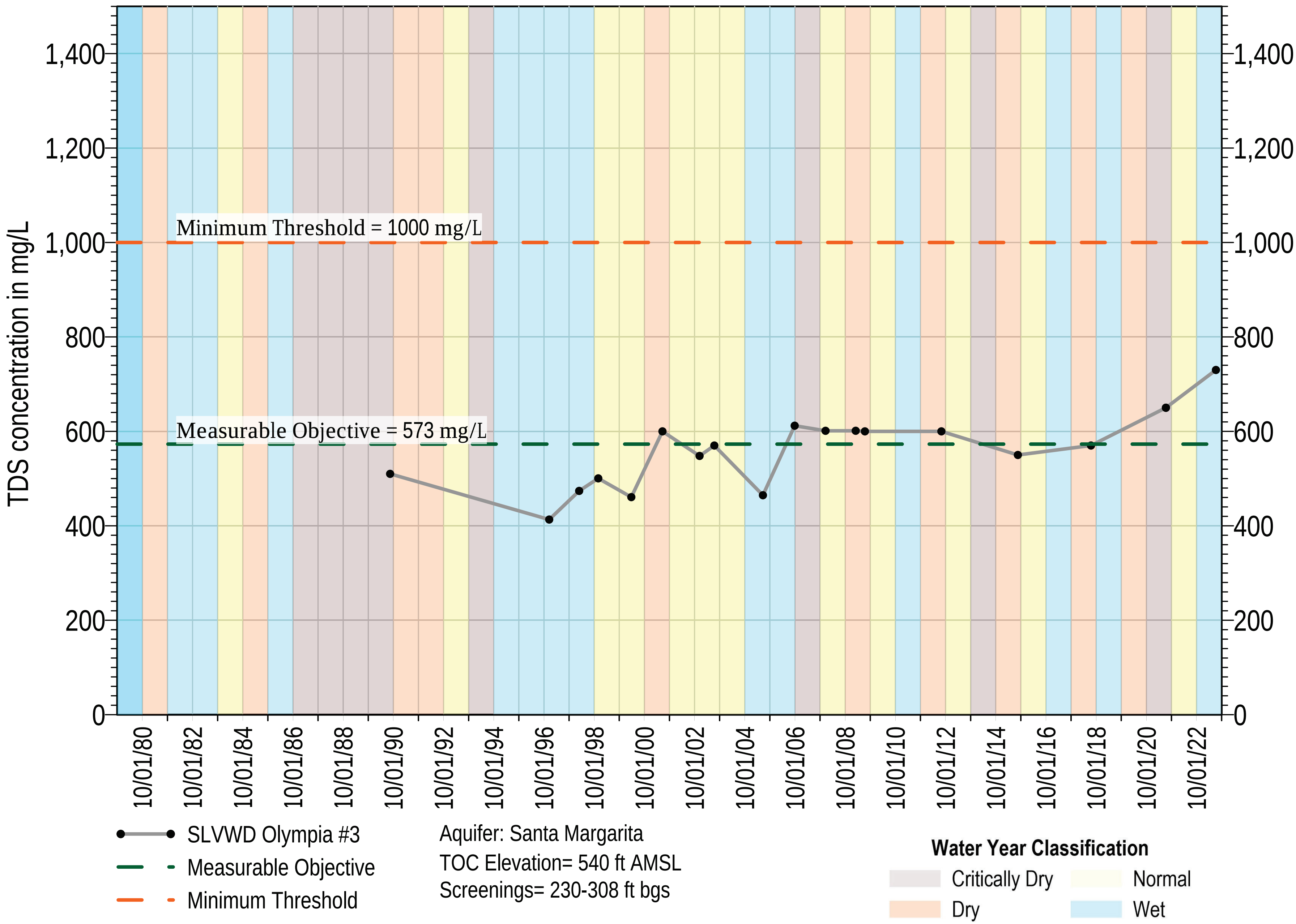
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result

# TDS




Square symbols indicate non-detects (ND)
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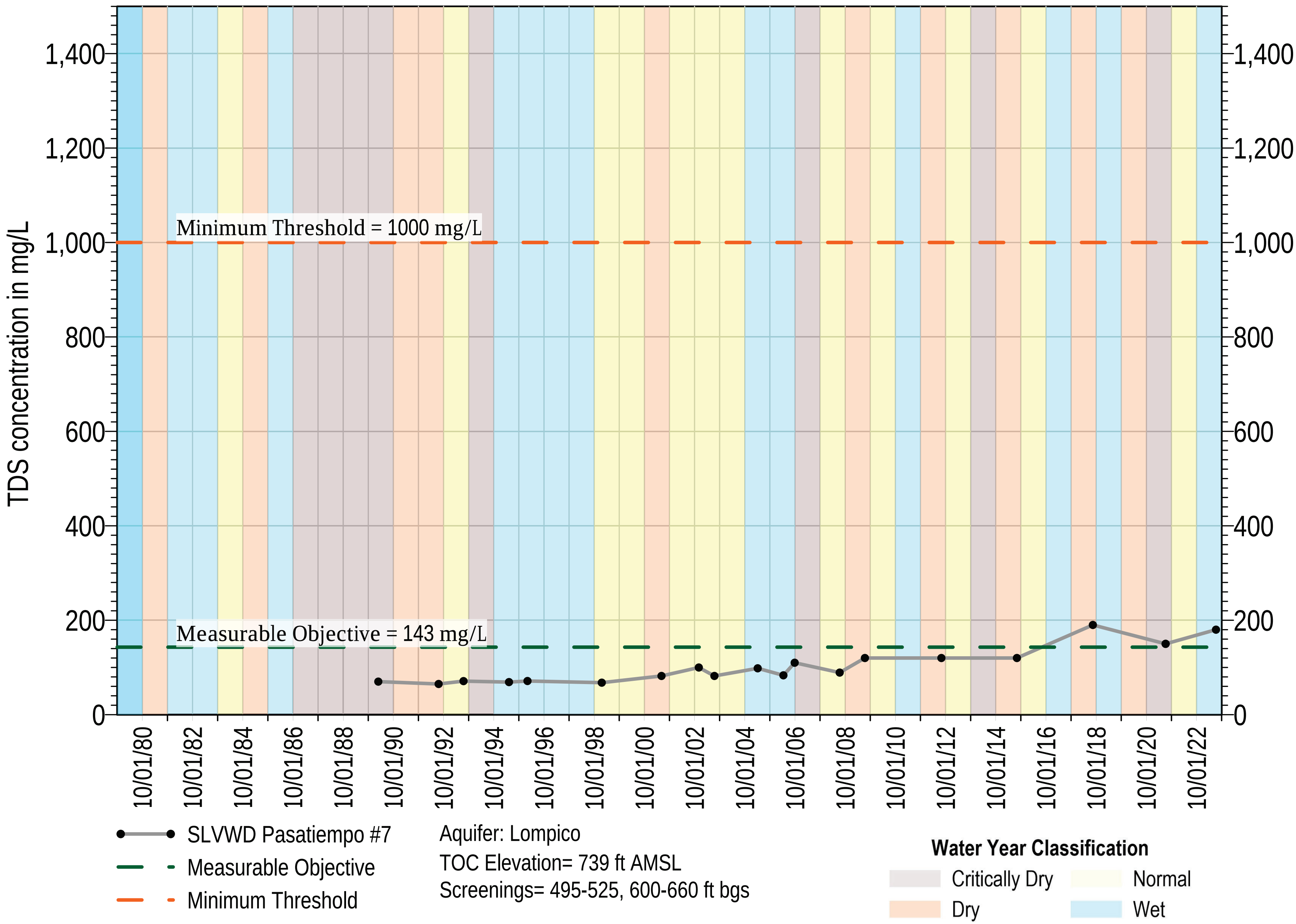
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result

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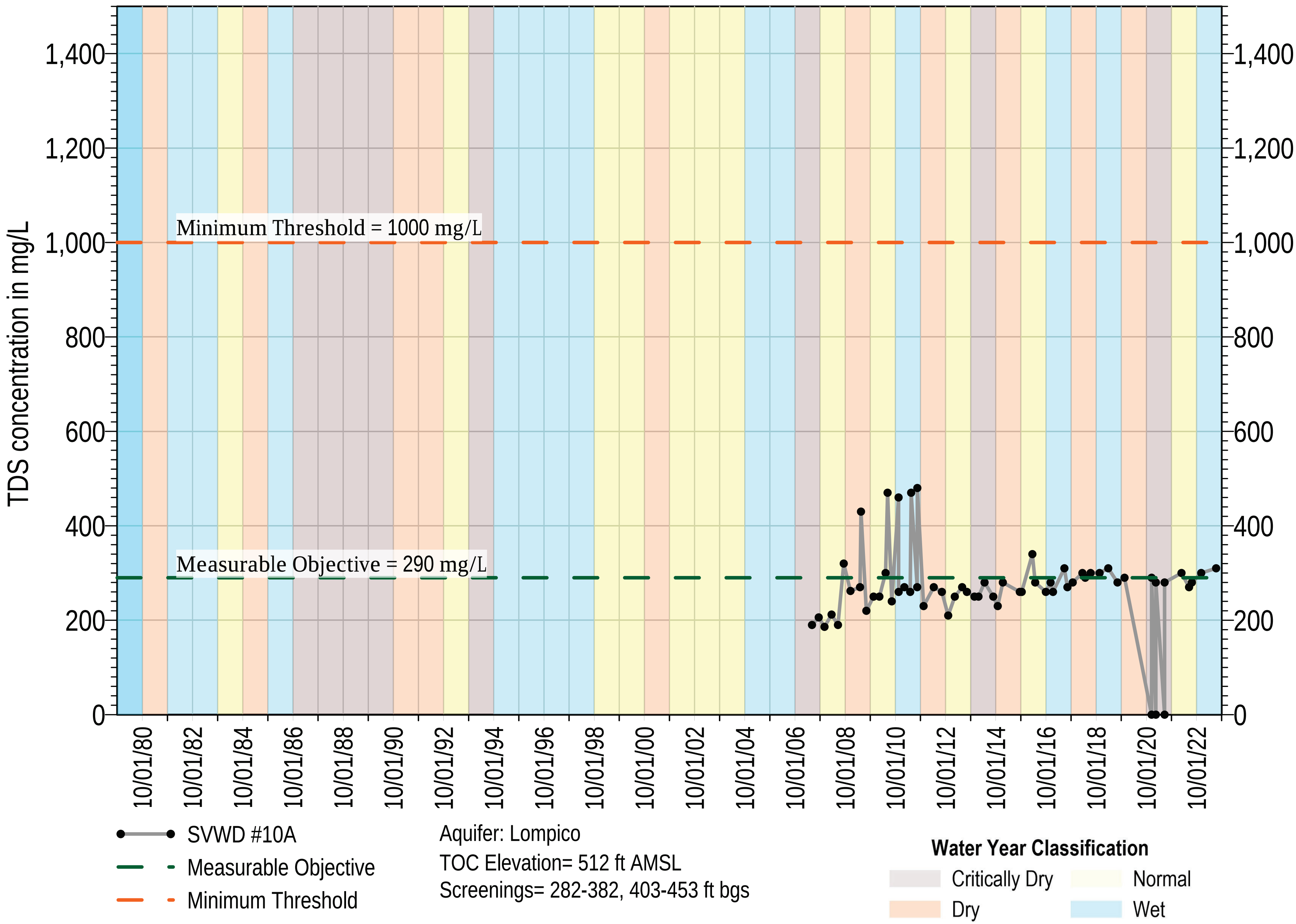


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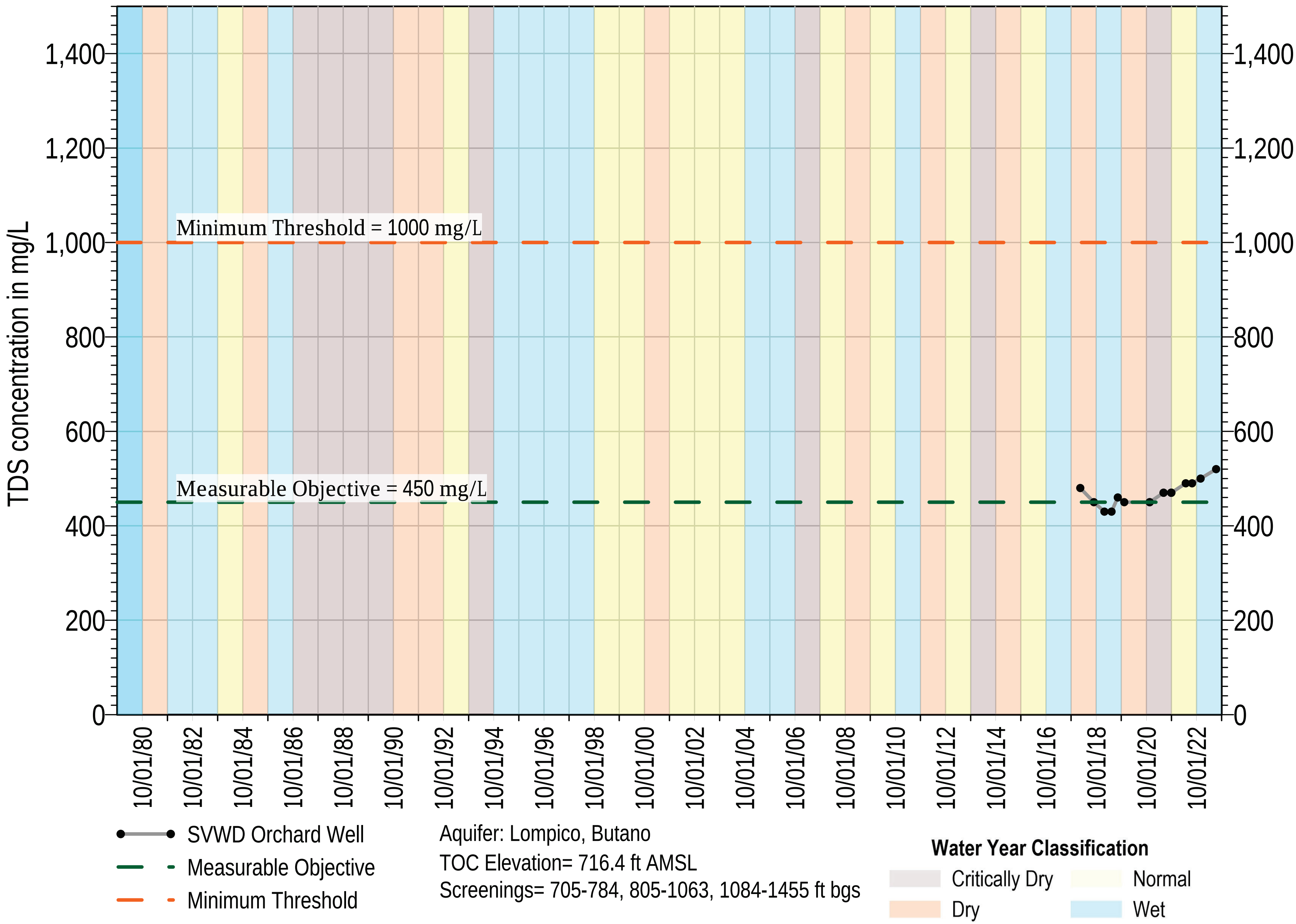


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