Santa Margarita Groundwater Agency

April 1, 2022

To: California Department of Water Resources

From: Santa Margarita Groundwater Agency

Subject: First Annual Report for the Santa Margarita Groundwater Basin

The Santa Margarita Groundwater Agency (SMGWA) is the Groundwater Sustainability Agency for the Santa Margarita Groundwater Basin (SMB) number 3-027. The SMB is classified by the California Department of Water Resources (DWR) as a medium priority basin.

The SMGWA was formed through a Joint Powers Agreement (JPA) in June 2017 among the Scotts Valley Water District (SVWD), San Lorenzo Valley Water District (SLVWD) and the County of Santa Cruz (County). The SMGWA is governed by a Board of Directors comprising two representatives from each member agency, 1 representative from the City of Scotts Valley, 1 from the City of Santa Cruz, 1 from Mount Hermon Association (MHA) and 2 private well owner representatives. In 2018, the SMGWA commenced development of the Groundwater Sustainability Plan (GSP) through a collaborative effort among the member agencies, technical consultants and other stakeholders.

The GSP was adopted by the SMGWA board on November 17, 2021 and posted to the SGMA Portal on January 14, 2022.

To comply with the SGMA requirements, the SMGWA has prepared the first annual report for SMB and it is ready to be submitted to DWR.

Please contact me with any comments or questions.

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March 30, 2022

Santa Margarita Basin
Water Year 2021 Annual Report

Requirement of Groundwater Sustainability Plan Implementation

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Santa Margarita Groundwater Agency

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ACRONYMS & ABBREVIATIONS

1,2-DCE 1,2-dichloroethene
AF ....acre-feet
AFY............................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
bgs ....below ground surface
CEC............................Constituents of Emerging Concern
County.........................County of Santa Cruz
DLR............................detection limit for reporting
DWR ....California Department of Water Resources
EIR ....Environmental Impact Report
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
PRISM........................Parameter-elevation Regressions on Independent Slopes Model
RMP(s)........................representative monitoring point(s)
SCWD ....City of Santa Cruz Water Department
SLVWD ....San Lorenzo Valley Water District
SGMA ....Sustainable Groundwater Management Act
SMC ....sustainable management criteria
SMGWA ....Santa Margarita Groundwater Agency
SVWD........................Scotts Valley Water District
TCE ....trichloroethene
TDS ....total dissolved solids
USGS ....United States Geological Survey
WISKI ....Water Information Systems by Kisters
WY ....Water Year

EXECUTIVE SUMMARY

The Santa Margarita Groundwater Agency (SMGWA) prepared this first Groundwater Sustainability Plan (GSP) Annual Report (Annual Report) to summarize groundwater extractions, overall water use, groundwater conditions, and progress toward achieving sustainability for the Santa Margarita Basin (Basin) in Water Year (WY) 2021. Per the Sustainable Groundwater Management Act (SGMA), an Annual Report must be submitted to the California Department of Water Resources (DWR) by April 1 each year after completing a GSP. This Annual Report covers WY2021 from October 1, 2020, through September 30, 2021.

WY2021 was a historically dry year in the Santa Margarita Basin with less local precipitation than any year since 1947. Precipitation is the main source of natural groundwater recharge, so recent dry conditions result in reduced groundwater recharge that impacts groundwater levels and groundwater baseflows supporting streamflow during the dry season in summer and fall. Despite critically dry conditions in WY2021, lesser groundwater extraction in the Basin relative to historical highs in the mid-1990s, has helped groundwater levels remain generally stable.

In WY2021, 3,150 acre-feet (AF) of groundwater was extracted from the Basin, which is a similar volume to other recent dry years. About 80% of groundwater extracted is used for public water supply by the 2 biggest water providers in the Basin – the San Lorenzo Valley Water District (SLVWD) and Scotts Valley Water District (SVWD). Groundwater extraction in the Basin is predominantly from the Lompico aquifer (48%) and Santa Margarita aquifer (40%). Santa Margarita aquifer extraction mainly occurs in the SLVWD Olympia and Quail Hollow wellfields, small water systems, and private domestic wells located north of Bean Creek. Lompico aquifer extraction occurs south of Bean Creek and includes the SLVWD Pasatiempo and Mount Hermon Association (MHA) wellfields, SVWD extraction wells in the City of Scotts Valley, and some private domestic wells in the northeast portion of the Basin. The Butano aquifer only accounts for 8% of extracted groundwater. The majority of Butano aquifer extraction is from 2 SVWD wells screened in both the Lompico and Butano aquifers in the northern portion of the City of Scotts Valley. The Butano aquifer is also tapped by some private well owners along the Basin’s northern boundary where the Butano Sandstone is exposed at the surface. SVWD Butano aquifer extraction in WY2021 was half of what it typically is because upgrades to the treatment plant connected to the wells limited their use. The less transmissive Monterey Formation provides only about 3% of groundwater extracted and is used only by private well owners and small water systems.

Surface water is an important supply of water in the Basin. The City of Santa Cruz diverts water from the San Lorenzo River south of the Basin for use outside the Basin. Most of the flow in the San Lorenzo River is from tributaries outside the Basin, but baseflow from groundwater contributes to streams within the Basin during the dry summer months. SLVWD typically obtains about half of its water supply from surface water sources just upstream of the Basin and half from groundwater extracted within the Basin. WY2021 was anomalous because most SLVWD surface water sources and supply lines were destroyed in the August 2020 CZU Complex fire, resulting in greater groundwater pumping to meet customer demand. SLVWD is currently pursuing a change in its water rights to expand conjunctive use to benefit the overdrafted Lompico aquifer south of Bean Creek and fisheries. A change in SLVWD water rights could also potentially allow it to provide surface water to SVWD when excess water is available. Currently, SVWD and MHA do not use surface water as a supply source.

Since the 1970s, and possibly as early as the 1960s, and continuing through the 2000s, there had been a consistent loss of groundwater stored in the Basin, particularly due to over-pumping of the Lompico aquifer in the south Scotts Valley area for public supply, quarry use and groundwater remediation. Even with the quarry and remediation extractions no longer taking place, groundwater extraction and natural discharge are greater than recharge in dry and critically dry years, resulting in groundwater lost from storage. Conversely, groundwater recharge exceeds extraction and natural discharge during wet years which allows groundwater levels to recover. Starting in WY2014, cumulative losses of groundwater in storage appeared to be stabilizing due to effective conservation efforts. However, the overall below-average rainfall from 2018 to present has continued a declining trend in stored groundwater. The estimated loss of groundwater in storage during WY2021 is approximately 5,000 AF, which is similar to other recent dry and critically dry years.

Groundwater quality in the Basin is routinely monitored in public extraction wells and is generally of good quality. Untreated groundwater typically meets primary drinking water standards, however, naturally occurring and anthropogenic groundwater quality constituents of concern are present in some aquifers. Naturally occurring iron and manganese are routinely found at concentrations above the secondary drinking water standards based on aesthetics in untreated groundwater from the Lompico aquifer and parts of the Santa Margarita aquifer. Other naturally occurring constituents are typically found at concentrations below respective drinking water standards. The main anthropogenic groundwater quality concerns are nitrate, point source organic contaminants from several industrial sites, and constituents of emerging concern (CEC) from various sources in the shallow aquifers. Nitrate is occasionally reported at low concentrations below the primary drinking water standards in some shallow wells. Other anthropogenic constituents besides nitrate are rarely detected, and when detected are less than primary drinking water standards.

WY2021 is the first year that SMGWA has assessed groundwater conditions relative to sustainable management criteria (SMC) established in the GSP. Groundwater conditions in WY2021 generally meet the Basin's sustainability goals. The exception is south of Bean Creek, in the Mount Hermon/Pasatiempo/South Scotts Valley area, where Santa Margarita and Lompico aquifer groundwater levels have been lowered from historical overpumping and remain so to date. WY2021's basinwide extractions from the Santa Margarita and Lompico aquifers are higher than their respective reduction of groundwater in storage minimum thresholds (represented by the aquifer-specific sustainable yields). Given emergency conditions following the CZU Complex fire that forced SLVWD to rely on groundwater resources more than usual, this does not constitute an undesirable result. Additionally, at this early stage of GSP implementation, undesirable results are permissible because SGMA allows Groundwater Sustainability Agencies (GSAs) 20 years to adaptively manage their basins to sustainability.

Other than the reduction in storage sustainability indicator, groundwater conditions in WY2021 either met or improved on minimum thresholds established in the GSP. At the representative monitoring points (RMPs) used to assess chronic lowering of groundwater level elevations and as a proxy for depletion of interconnected surface water, SMC are higher than minimum thresholds. Many RMP groundwater elevations are higher than the 2027 interim milestone and even the long-term measurable objectives the SMGWA strives to achieve by 2042. It is recognized that with only 2 RMPs, the network that serves as a proxy to monitor depletion of interconnected surface water has insufficient coverage. To rectify this data gap, new monitoring wells coupled with either existing or new stream gages will be installed in WY2022.

Groundwater quality is good in public extraction well RMPs, with concentrations of chemical of concern below minimum threshold concentrations, except where naturally elevated iron and manganese is found in the Santa Margarita and Lompico aquifers. Iron and manganese in RMP wells are close to long-term average concentrations used to define the measurable objectives. Iron and manganese concentrations are reduced, either through treatment of raw water or by blending to comply with water quality regulations prescribed by United States Environmental Protection Agency and the State Water Resources Control Board.

With changing climate patterns in the region, additional projects or management actions are needed to achieve SMGWA's sustainability goals and to improve water supply reliability. There are projects predating SGMA being carried out by various public agencies that will continue in parallel with GSP implementation. In WY2021, the SMGWA member agencies and other local stakeholders considered several additional projects and management actions to achieve sustainability. Planned and potential projects and management actions focus on improving water use efficiency, increasing groundwater recharge, and increasing conjunctive and flexible use of surface water, recycled water, and other available water sources within the Basin.

The GSP identified several data gaps that were partially addressed in WY2021. Five new stream gages were installed that will be used for monitoring groundwater and surface water interactions. Sites for 9 new monitoring wells to fill groundwater level data gaps were selected with well installations planned for WY2022. Two existing groundwater level monitoring wells were identified and added to the monitoring network, 1 of which (MHA-MW1) has not been monitored in the past. Other less critical data gaps include a stream gage on Carbonera Creek and reference point elevation surveys that will be undertaken as funding becomes available.

Overall, WY2021 was a monumental year for groundwater management in the Basin. The GSP was finalized and adopted by SMGWA in November 2021, laying the foundation for sustainable groundwater management in the future. Apart from being critically dry, WY2021 included unique challenges with CZU Complex fire damage to SLVWD surface water infrastructure forcing greater reliance on groundwater. The combination of critically dry conditions and fire damage resulted in greater groundwater extractions than recent years. Despite increased groundwater extractions, WY2021 groundwater levels in the Basin remain relatively stable, with only slightly increasing or decreasing levels in some wells. Overall, a loss of groundwater in storage was observed in WY2021, similar to other recent critically dry years. The SMGWA and cooperating agencies are in the process of planning projects and management actions to assure that Basin water supplies are managed sustainably despite anticipated climate variability, including longer droughts and more intense rainfall events, similar to conditions observed in the past decade.

1 INTRODUCTION

This Groundwater Sustainability Plan (GSP) Annual Report (Annual Report) for the Santa Margarita Groundwater Basin (Basin) fulfills the requirements of Water Code §10733.6 and the Sustainable Groundwater Management Act (SGMA). The Santa Margarita Groundwater Agency (SMGWA), the sole groundwater sustainability agency (GSA) for the Basin is required to submit an annual report to the California Department of Water Resources (DWR) by April 1 of each year following the adoption of its GSP. The SMGWA Board of Directors unanimously adopted the final GSP after a public hearing on November 17, 2021. The GSP was submitted to the SGMA Portal (https://sgma.water.ca.gov/portal/) on January 3, 2022 and was made available by DWR for a 75-day public comment period on January 14, 2022. DWR is required under SGMA to complete its technical assessment of the GSP by January 31, 2024.

1.1 Purpose of Annual Report

The SMGWA has until the end of January 2042 to achieve sustainable groundwater conditions as described in its sustainability goal. This Annual Report compiles and reports on groundwater data collected during the 2021 Water Year (WY2021) from October 1, 2020, through September 30, 2021. The purpose of the Annual Report is to evaluate groundwater conditions relative to the Sustainable Management Criteria (SMC), summarize total water use, estimate change in groundwater storage, and provide progress updates on projects and management actions implemented to achieve sustainability, and other GSP implementation tasks. Required annual report components are outlined in §356.2 of the GSP Regulations.

1.2 Santa Margarita Groundwater Agency

The SMGWA is the sole GSA for the Basin. The SMGWA was formed through a Joint Powers Agreement (JPA) in June 2017 among the 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 the Basin and member agencies that comprise the SMGWA. The SGMA, JPA, and JPA bylaws grant the SMGWA the legal authority to implement the GSP in the Basin.

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

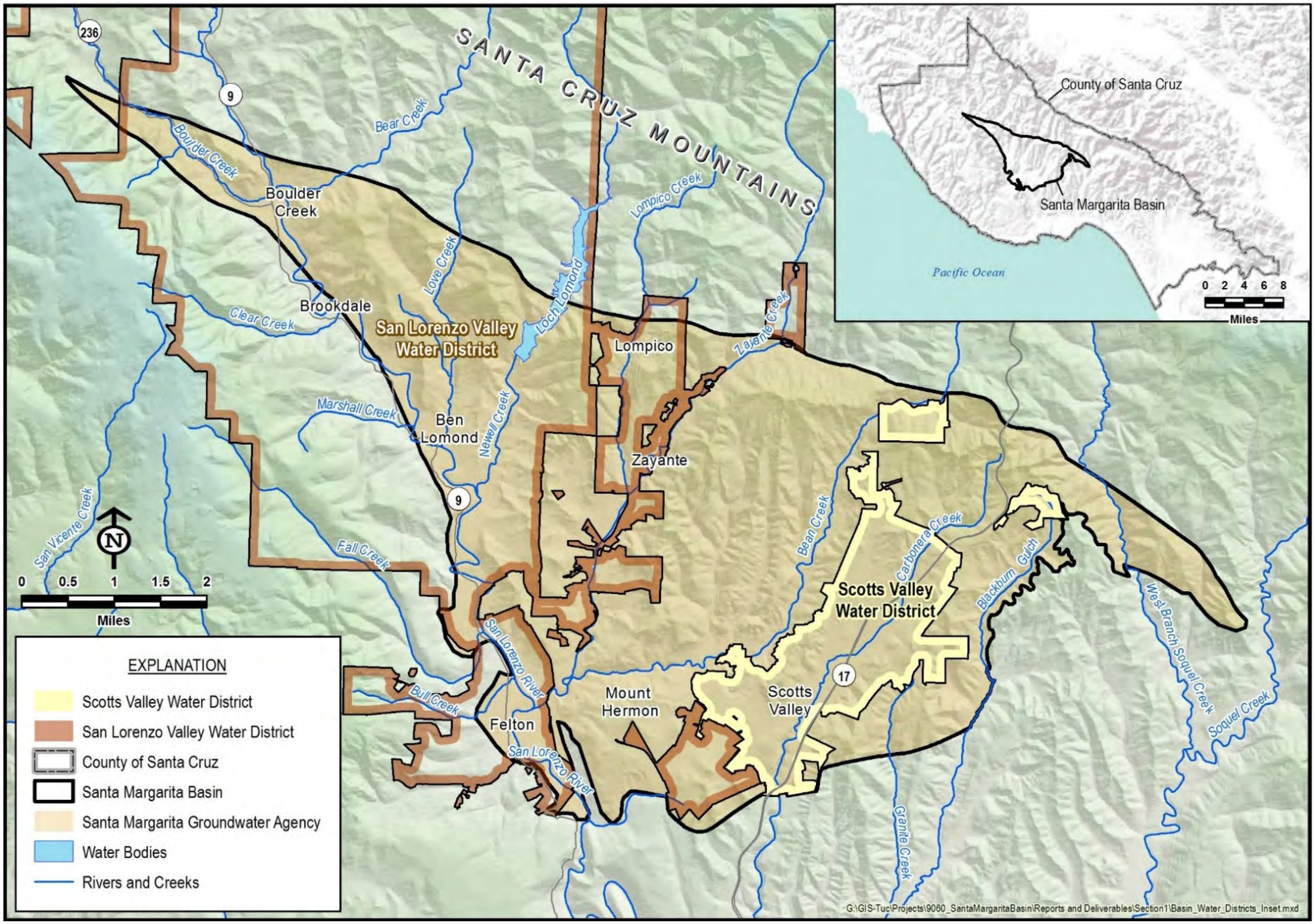

Figure 1. Basin and Member Agency Jurisdictional Boundaries

2 BASIN SETTING

2.1 Basin Description

The Santa Margarita Basin (DWR Basin 3-027) is defined in DWR Bulletin 118 as a medium-priority basin (DWR, 2016b). The Basin is located at the northern end of the Central Coast hydrologic region. The area of the Basin is 34.8 square miles (22,249 acres). To the south and southeast of the Basin is the Santa Cruz Mid-County Basin, and to the south is the West Santa Cruz Terrace Basin. The Santa Margarita Basin includes the City of Scotts Valley, and the communities of Boulder Creek, Brookdale, Ben Lomond, Lompico, Zayante, Felton, and Mount Hermon. Based on 2020 census block data, the population of the Basin is approximately 33,000 (U.S. Census Bureau, 2020).

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. Sedimentary rocks within the Basin include, from oldest to youngest, the Tertiary-aged Butano Sandstone, Lompico Sandstone, Monterey Formation, and Santa Margarita Sandstone. The sandstone formations form the Basin's principal aquifers. 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 the Tertiary sedimentary formations thin over a granitic high and give way to young river and coastal terrace deposits.

2.2 Precipitation and Water Year Type

Precipitation is the primary source of groundwater recharge in the Basin by both direct percolation of rainfall through the soil and infiltration of streamflow through streambeds. Monitoring annual precipitation is a key component for understanding local water supply trends and groundwater conditions. Precipitation measured at 2 weather stations in the Basin: 1) the El Pueblo Yard weather station in Scotts Valley and 2) the Boulder Creek weather station in Boulder Creek (shown on Figure 2).

The water year type is determined using the City of Santa Cruz water year classification based on total annual runoff from October to September in the San Lorenzo River. Runoff for water year type classification is measured at the United States Geological Survey (USGS) Big Trees gage, just south of the San Lorenzo River confluence with Bean Creek. Note that because the water year type is based on runoff, the amount of rainfall in the preceding years influences water year type classification. For example, there was more rainfall in 2014 than in 2020, but 2014 is classified as critically dry while 2020 is classified as dry. This is because 2014's preceding 3 years were average or dryer years that resulted in less runoff in 2014, while the year preceding 2020 was wet.

WY2021 was a critically dry year with only 17.5 inches of precipitation in Scotts Valley and 16.5 inches in Boulder Creek (Figure 2). These are the lowest annual precipitation totals measured in either weather station since WY1947. Total precipitation in WY2021 was about 41% of the long-term annual average in Scotts Valley and 32% of the long-term annual average in Boulder Creek.

The critically dry conditions in WY2021 are an extension of a dry period that is apparent over the past 15 years. The cumulative rainfall deficit since WY2006 is about 5 inches below the long-term average in Scotts Valley and 7 inches below the long-term average in Boulder Creek. The climate pattern since WY2012 has also been more erratic than the historical record. Drought from WY2012 to WY2015 was followed by near record precipitation in WY2017. Since WY2017, 3 of 4 years have been classified as dry or critically dry water years.

Low precipitation in WY2020 and 2021 results in reduced groundwater recharge that not only impacts groundwater levels, but also groundwater baseflows supporting streamflow during the dry season (summer and fall).

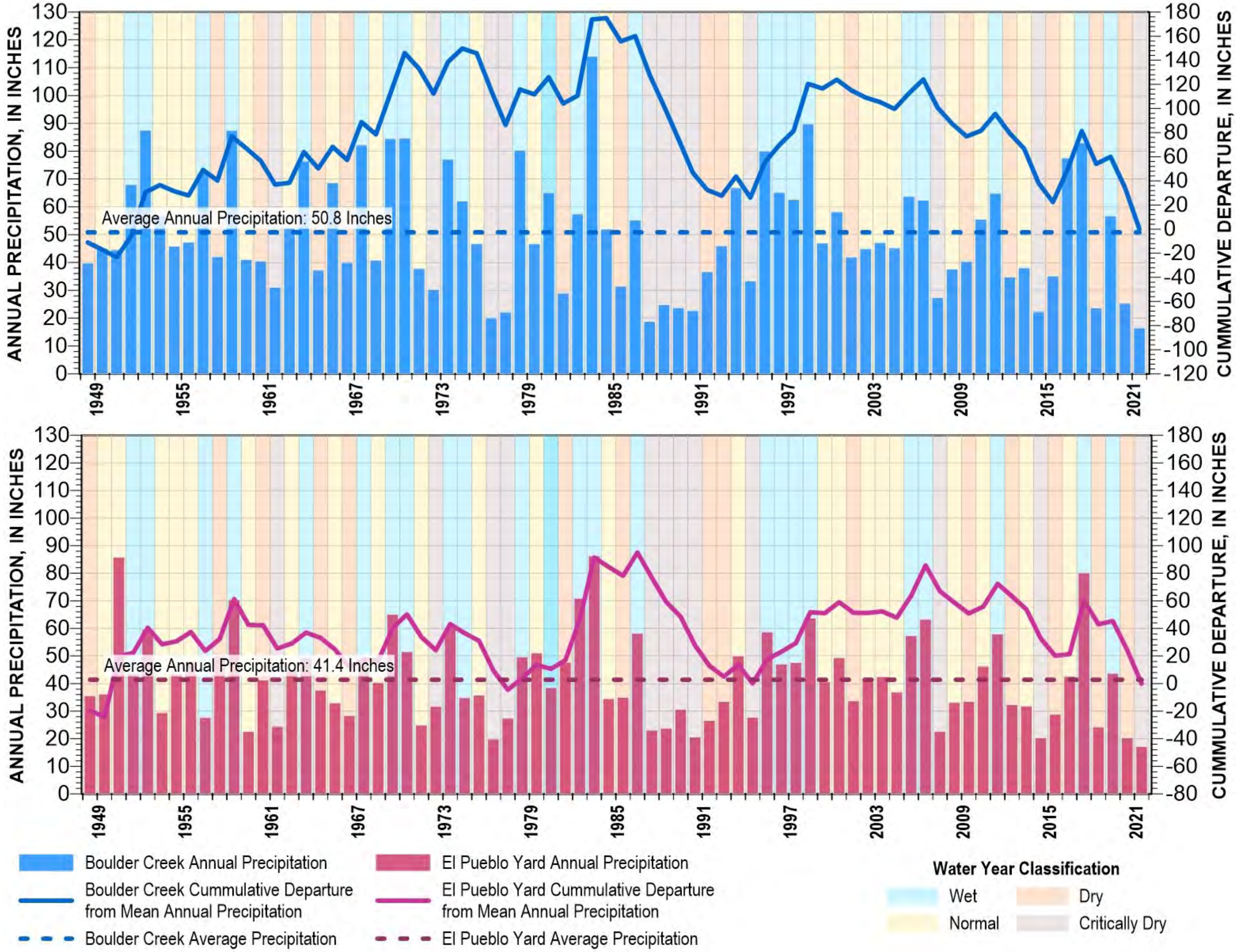

Figure 2. Annual Precipitation, Cumulative Departure from Mean Annual Precipitation, and Water Year Type for the Santa Margarita Basin

3 BASIN CONDITIONS

3.1 Groundwater Elevations

The SLVWD and SVWD each have a network of monitoring and extraction wells that are used to monitor groundwater elevations in their respective jurisdictions. The Mount Hermon Association monitors groundwater elevations in its extraction wells and one monitoring well. The monitoring networks comprise wells within each principal aquifer, mostly in areas of municipal extraction. These wells have been used for decades to evaluate short-term, seasonal, and long-term groundwater trends for groundwater management purposes. There are currently 36 wells in the GSP monitoring network. Spring groundwater elevations typically represent seasonal high conditions while fall groundwater elevations typically represent seasonal low conditions. Clusters of monitoring wells completed in different aquifers at the same location are used to understand seasonal and temporal changes in vertical gradients between aquifers.

Groundwater levels are measured at least semi-annually in nearly all GSP monitoring wells. Groundwater levels are hand measured using groundwater level electronic sounders. SVWD wells also have pressure transducers to measure and record groundwater level data every 6 hours. Groundwater level measurements collected in or near active extraction wells are noted and later removed from the datasets used to generate hydrographs and groundwater elevation contour maps. All groundwater level data are uploaded to the Water Information Systems by Kisters (WISKI) database that converts depth to groundwater to elevation using each well's unique reference point elevation. Groundwater elevations are used to generate seasonal groundwater elevation contour maps for each principal aquifer (Figure 3 through Figure 8) and hydrographs (Appendix A).

Seasonal groundwater elevation contour maps show measured minimum groundwater elevations between April and May 2021 on the spring contour maps and minimum groundwater elevations in September 2021 on the fall contour maps. There are several wells without a September 2021 measurement that use October or November 2021 elevations. For the GSP, groundwater elevation contours for portions of the Basin without measured groundwater elevation data used contours simulated by the calibrated GSP groundwater model. For the Annual Report, groundwater elevation contours are only shown for areas where groundwater elevation data are available. Nine monitoring wells are planned to be installed in WY2022 to address data gaps identified in the GSP. The new well locations will be used to extend the area with groundwater elevation contours in future Annual Reports.

Hydrographs plotting all available non-pumping groundwater elevation data collected in each well through WY2021 are used to evaluate long-term groundwater elevation trends. The hydrograph data shows the manual measurements collected at monthly to semi-annual frequency, and daily transducer measurements. The hydrographs include water year types to show the effects of climate on groundwater elevations. For groundwater level representative monitoring point(s) [RMP(s)], minimum thresholds and measurable objectives are included on the hydrographs.

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

- Appendix A: pages A-2 through A-16: Chronic Lowering of Groundwater Levels RMP Well Hydrographs
- Appendix B: pages B-2 and B-3: Depletion of Interconnected Surface Water RMP Well Hydrographs
- Appendix C: pages C-2 through C-38: GSP Monitoring Network Well Hydrographs

3.1.1 Santa Margarita Aquifer

The Santa Margarita Sandstone is more permeable than other formations in the Basin and has widespread surface exposure in the southern and central portions of the Basin. The mostly unconfined Santa Margarita aquifer's high hydraulic conductivity and extensive surface exposure allow it to recharge quickly in response to rainfall, but also cause its groundwater levels to drop when rainfall is limited. The Santa Margarita aquifer supplies about 40% of total Basin extraction for municipal, domestic, landscape, and sand quarry uses. The Santa Margarita aquifer is the primary aquifer that supports groundwater dependent ecosystems, springs, and baseflow to creeks. The Santa Margarita aquifer has distinct groundwater level patterns in different parts of the Basin, as described below.

Groundwater elevations in the Quail Hollow and Olympia/Mission Springs located north of Bean Creek demonstrate greater seasonal variability related to groundwater pumping cycles. With WY2021 being a critically dry year and SLVWD's loss of surface water infrastructure in the August 2020 CZU Complex fires, Santa Margarita aquifer groundwater elevations in the SLVWD Olympia and Quail Hollow wellfields declined by about 20 to 30 feet from WY2020 levels (Appendix C, pages C-5 through C-6 and C-8 through C-12). This response was also observed in the next most recent critically dry year (WY2014) when these wellfields were relied on more in the winter and spring to supplement reduced surface flows.

The Santa Margarita aquifer in the Mount Hermon/Pasatiempo/Camp Evers area was dewatered in the 1990s due to overpumping. Groundwater elevations in this area have not recovered fully even though the Santa Margarita aquifer is no longer pumped for municipal supplies. Because there is limited Santa Margarita aquifer groundwater use in the area south of Bean Creek, groundwater elevations are more stable and are typically only influenced by recharge and drought events. SLVWD’s Pasatiempo MW-2’s hydrograph (Appendix C, page C-7) shows Santa Margarita aquifer levels decline in response to the drier years and rise in response to wetter years. Over past critically dry water years, such as WY2021, levels at this well have declined about 10 feet but recover quickly in wet years.

Groundwater elevation contour maps for the Santa Margarita aquifer are shown on Figure 3 and Figure 4 for WY2021 spring and fall, respectively. During WY2021, groundwater elevations remained relatively consistent between the spring and fall in most Santa Margarita aquifer wells with typical declines of 1 to 3 feet between seasons (Figure 3 and Figure 4). SLVWD’s Olympia #2 well had one outlying groundwater level measurement in early WY2021 about 50 feet lower than other recent measurements that may have been influenced by nearby pumping (Appendix C, page C-5). Groundwater flow in the aquifer mimics topography, flowing toward areas where groundwater discharges to springs and creeks, particularly along Bean and Zayante Creeks. Groundwater in the aquifer also flows toward localized depressions near extraction wells in the Quail Hollow and Olympia/Mission Springs subareas.

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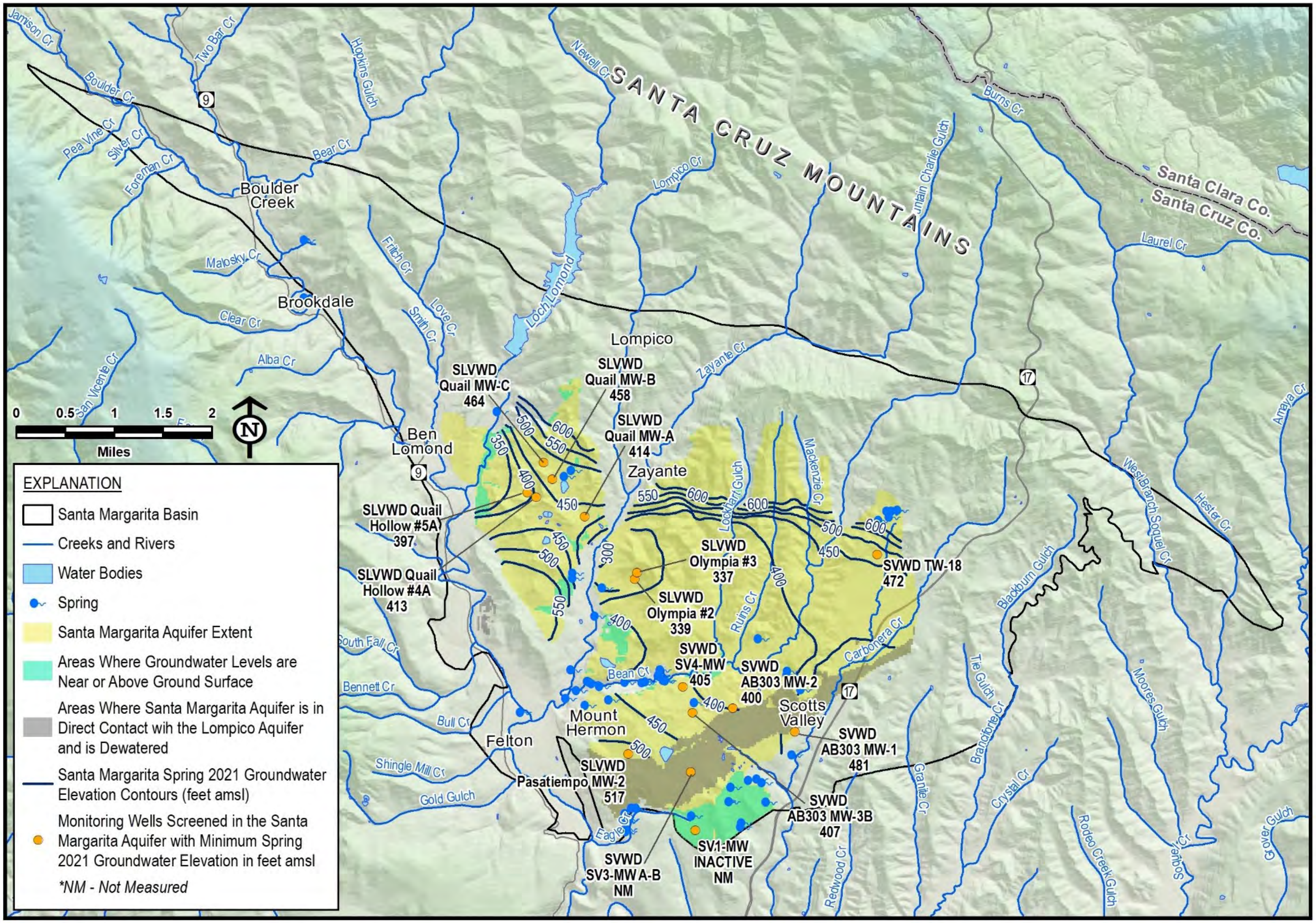


Figure 3. Santa Margarita Aquifer Groundwater Elevations and Contours, Spring 2021

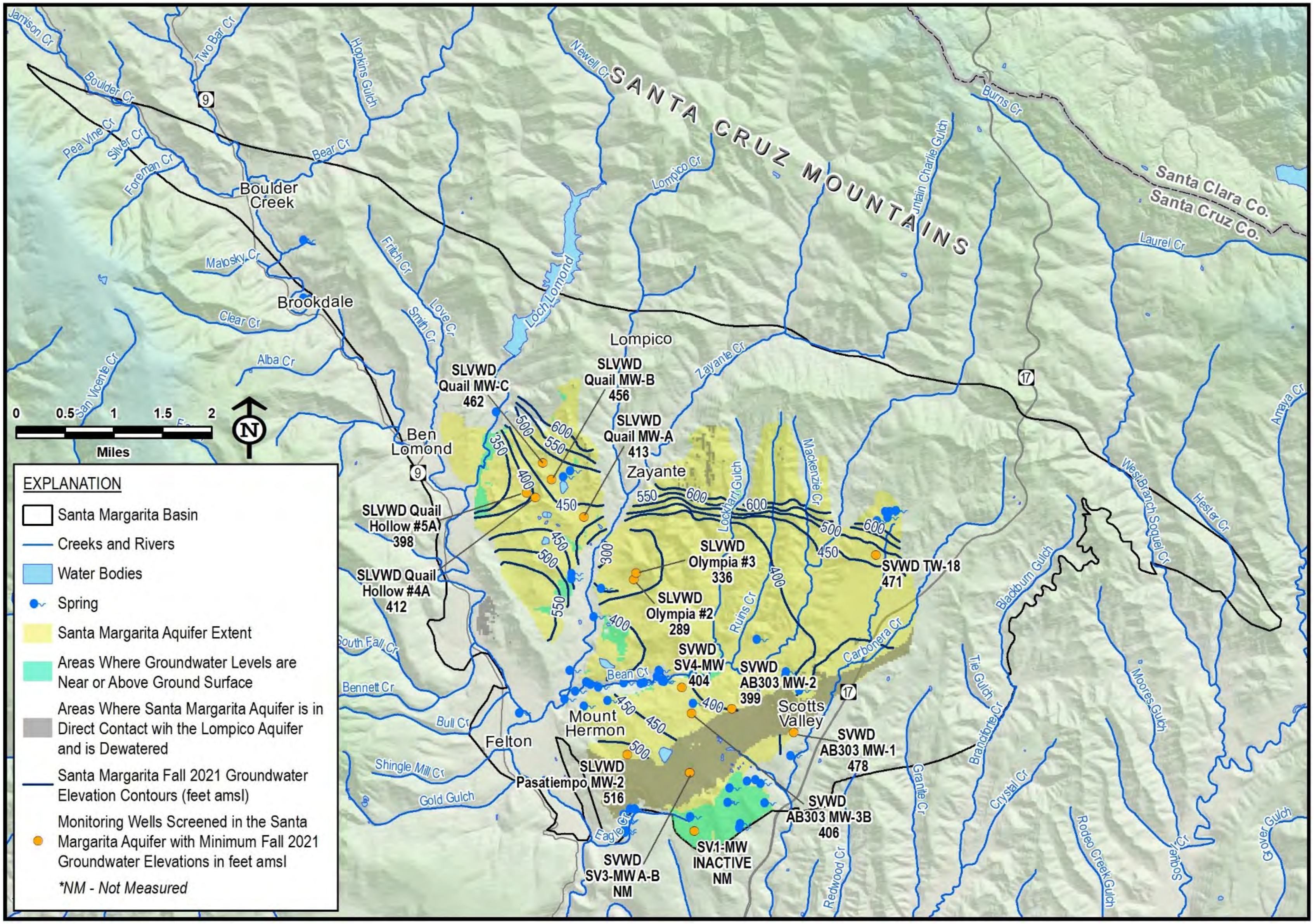


Figure 4. Santa Margarita Aquifer Groundwater Elevations and Contours, Fall 2021

3.1.2 Monterey Formation

The Monterey Formation is a low yielding aquifer and not considered a principal aquifer, even though it is pumped by some Basin residents because there is no alternative water source. Where present, it forms an important regional aquitard that separates the Santa Margarita and Lompico aquifers and prevents the Santa Margarita aquifer from dewatering. As described in Section 3.2, 3% of groundwater extracted in the Basin is from the Monterey Formation.

SVWD Well #9, an inactive extraction well, is the only known groundwater 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 increased groundwater extraction in the overlying Santa Margarita and underlying Lompico aquifers in response to increased water demand and drier than average climate. Since 1998, as groundwater extractions in the area started to decrease, groundwater elevations have recovered by about 50 feet.

Through WY2021, groundwater levels in SVWD Well #9 continue to increase slowly, but are still about 150 feet below elevations in 1980 (Appendix C, page C-16). The groundwater elevation in SVWD #9 increased by about 5 feet over WY2021. Since SVWD Well #9 is the only groundwater level monitoring network well, groundwater elevation contour maps are not produced for the Monterey Formation.

3.1.3 Lompico Aquifer

The Lompico Sandstone is found throughout most of the Basin, but only outcrops along the Basin margins and in a few locations along the San Lorenzo River. The Lompico aquifer is the primary water producing aquifer in the area south of Bean Creek where SVWD, SLVWD, and MHA have water supply wells. The Lompico aquifer accounts for about 48% of total groundwater extracted in the Basin (see Section 3.2). It also is an important source of baseflow to the San Lorenzo River in the limited areas where it outcrops near the river. There is little extraction from the Lompico aquifer north of Bean Creek because it is much deeper than it is south of Bean Creek. Additionally, there are no historical groundwater level monitoring wells north of Bean Creek.

Reliance on groundwater from the Lompico aquifer in the Mount Hermon/Pasatiempo/South Scotts Valley area has contributed to historical groundwater level declines of up to 200 feet since before the 1980s (see SVWD Well #10's hydrograph in Appendix C, page C-27). Since 2005, groundwater levels in the Lompico aquifer have stabilized and from around 2015 to present show slightly increasing groundwater level trends in the south Scotts Valley area (see SLVWD Pasatiempo #7's hydrograph in Appendix C, page C-23).

Groundwater elevation contour maps for the Lompico aquifer are shown on Figure 5 and Figure 6 for WY2021 spring and fall, respectively. Groundwater elevations in the Lompico aquifer do not fluctuate substantially seasonally, with most wells having less than 5 feet of annual groundwater level change between spring and fall. 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 the Lompico aquifer can be recharged directly by percolation of precipitation or streamflow; elsewhere it is covered by younger geologic units that prevent direct recharge. Groundwater flow in the southern portion of the Lompico aquifer is primarily controlled by municipal pumping in the southern Scotts Valley area by SVWD and in the Mount Hermon/Pasatiempo area by SLVWD and MHA. Pumping in these areas has formed groundwater depressions with inward hydraulic gradients toward the pumping centers.

Areas west of the Ben Lomond fault near Felton and further upstream near the communities of Ben Lomond and Boulder Creek where the Lompico aquifer outcrops at the surface, are locations where the aquifer contributes to San Lorenzo River baseflow as shown on the contour maps (Figure 5 and Figure 6).

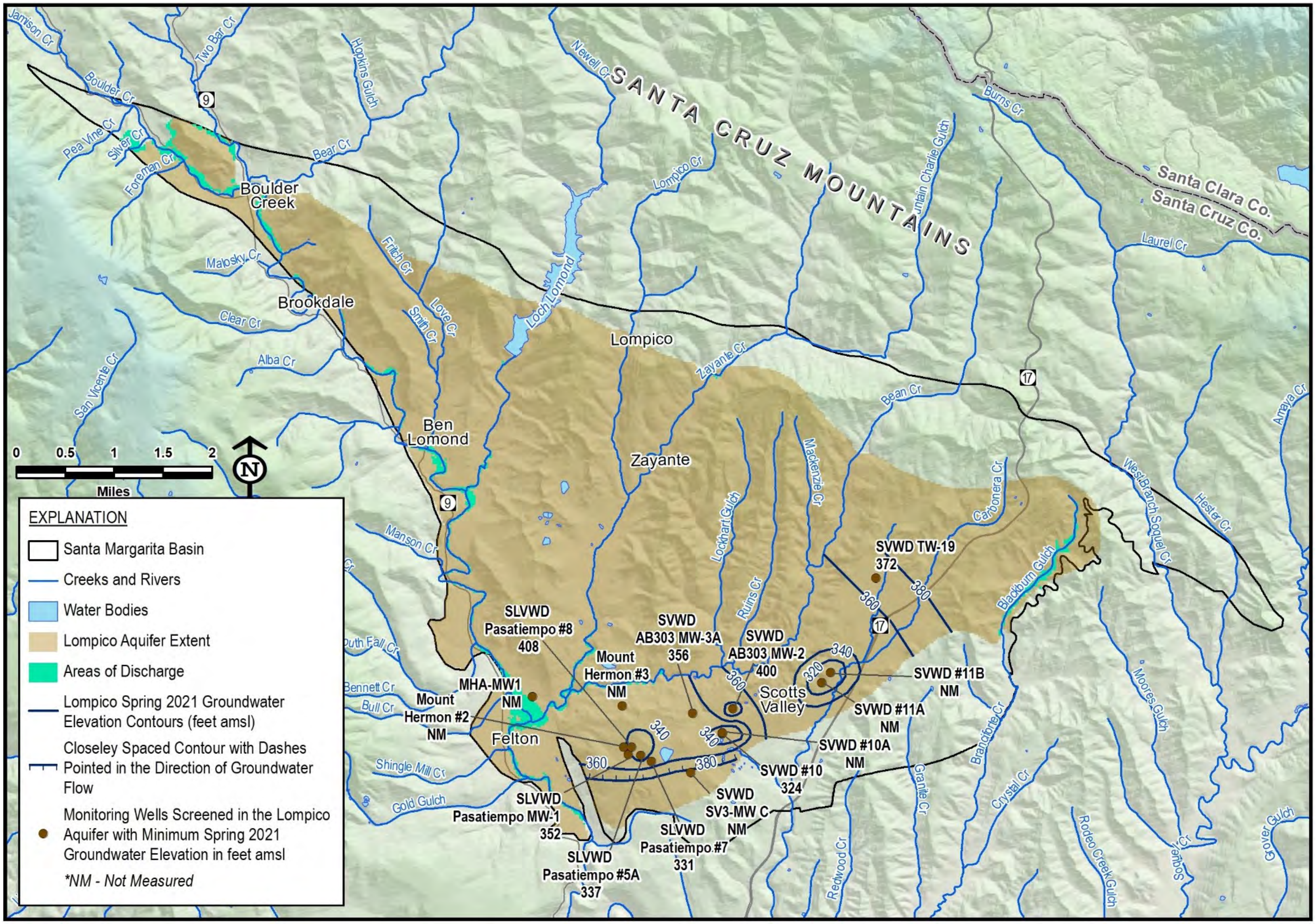


Figure 5. Lompico Aquifer Groundwater Elevations and Contours, Spring 2021

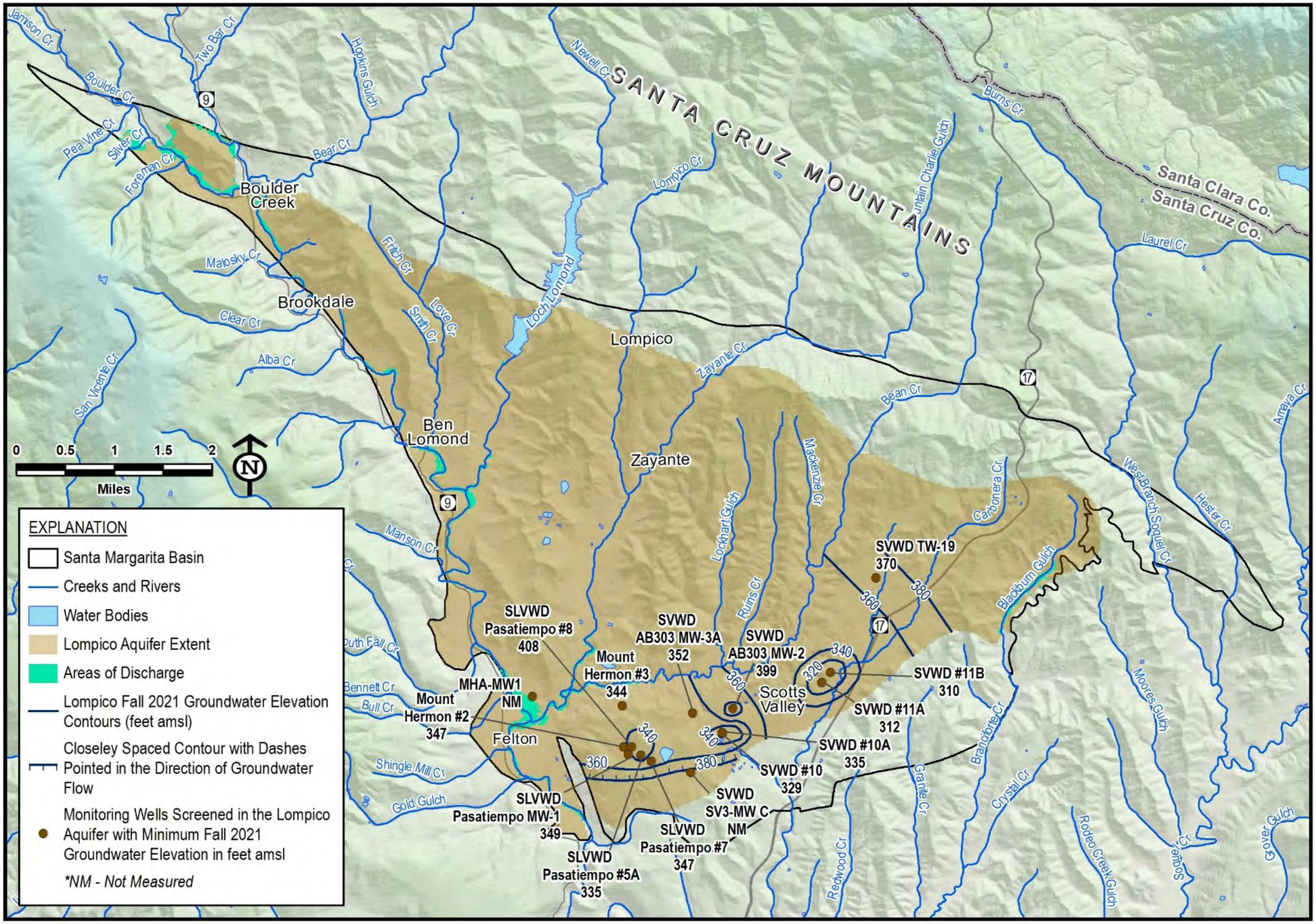


Figure 6. Lompico Aquifer Groundwater Elevations and Contours, Fall 2021

3.1.4 Butano Aquifer

The Butano Sandstone is a relatively deep sedimentary sandstone except where it outcrops along the northern Basin boundary, roughly parallel to the Zayante-Vergeles Fault and at depth in northeastern Scotts Valley. SVWD has 2 deep extraction wells in the northeastern of its service area that extract groundwater from both the Lompico and Butano aquifers. It is estimated the Butano aquifer provides for about 8% of groundwater extracted from the Basin (see Section 3.2).

Groundwater elevation contour maps for the Butano Aquifer are shown on Figure 7 and Figure 8 for WY2021 spring and fall, respectively. Groundwater flow is mostly north to south, from the Butano aquifer's recharge area at the Basin's northern boundary toward the actively pumping SVWD Well #3B and Orchard Well. Due to its great depth, there are currently only 2 dedicated monitoring wells solely in the Butano aquifer: SVWD Canham and Stonewood. These dedicated monitoring wells are installed upgradient of the SVWD Orchard and SVWD #3B extraction wells, which are screened across both the Lompico and Butano aquifers. The SVWD Stonewood well is installed where the Butano aquifer outcrops near the Basin's northern boundary. Apart from the 2 extraction wells mentioned above, there is 1 additional monitoring well (SVWD MW-15) near SVWD #3B that is screened across both the Lompico and Butano aquifers. Groundwater elevations over time in the dedicated Butano aquifer monitoring wells are stable (Appendix C, pages C-37 and C-38), but these wells are not installed close to active extraction wells. The Lompico/Butano extraction wells show more seasonal fluctuations due to pumping cycles, however, like many other Lompico aquifer wells, long-term groundwater level trends have been relatively stable since the late 1990s.

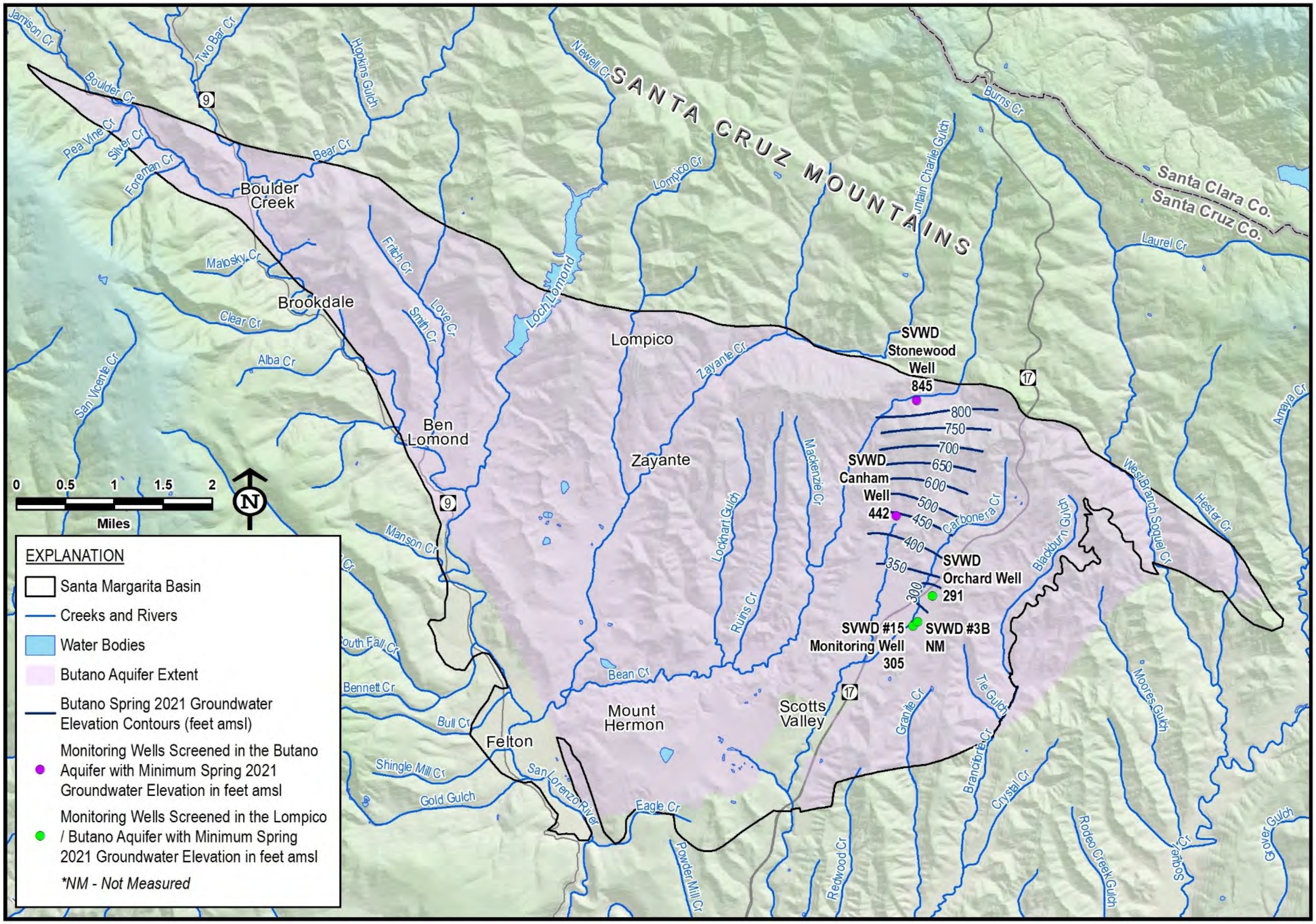


Figure 7. Butano Aquifer Groundwater Elevations and Contours, Spring 2021

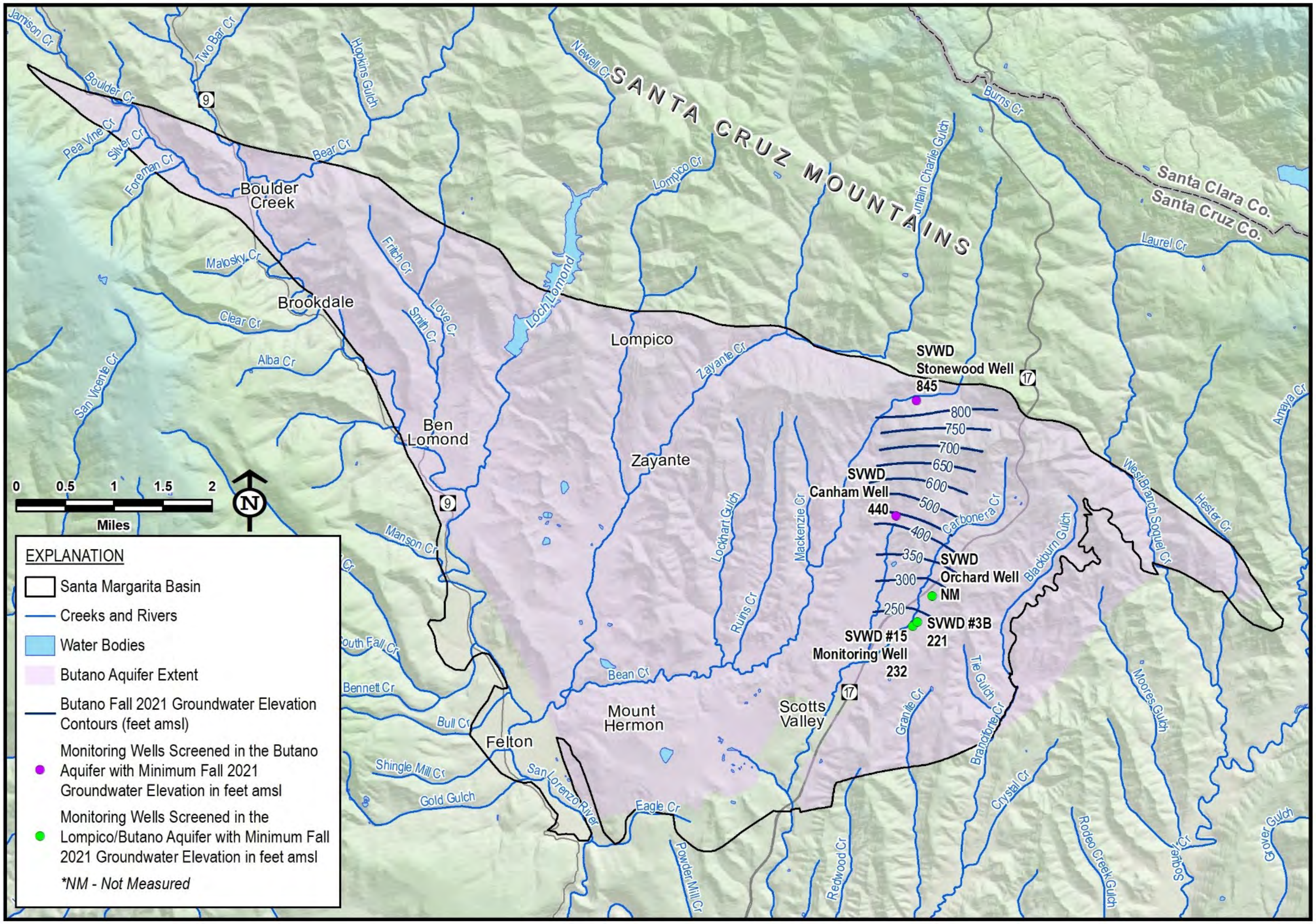


Figure 8. Butano Aquifer Groundwater Elevations and Contours, Fall 2021

3.2 Groundwater Extraction

The total volume of groundwater extracted in WY2021 is 3,151 acre-feet (AF). A volume of 3,121 AF is extracted from the 3 principal aquifers and Monterey Formation, with 30 AF extracted from the Purisima Formation which is not considered a principal aquifer. Table 1 and its notes summarize groundwater extraction by water use sector, aquifer, extraction measurement method, and the relative measurement accuracy.

Figure 9 shows the spatial distribution and volume of groundwater extractions by water use type. Most groundwater extraction in the Basin occurs south of Bean Creek and is used for municipal supply. Aquifers supplying the most groundwater are the Lompico aquifer (48%) and Santa Margarita aquifer (40%). Groundwater from the Monterey Formation is only by private and small water system domestic pumpers, making up about 3% of total basin extractions. Private domestic owners overlying Butano Sandstone and 2 SVWD wells screened in both Lompico and Butano aquifer extracted an approximately 268 AF from the Butano aquifer (8% of groundwater extracted from the Basin). SVWD Butano aquifer extraction in WY2021 was half of what it typically is because upgrades to the wells’ treatment plant limited their use. An estimated 1% of groundwater extracted in the Basin is from the Purisima Formation, which is not a principal aquifer of the Basin.

During WY2021, groundwater extracted by SLVWD and SVWD accounted for 80% of groundwater extracted in the Basin. SLVWD extracted 1,375 AF and SVWD extracted 1,130 AF (Table 1). Typically SVWD extracts more groundwater than SLVWD, but because of damage to surface water infrastructure caused by the CZU Complex fire SLVWD relied more on groundwater than it usually does.

Unmetered domestic and non-domestic extractions in WY2021 are assumed to be the same as estimated for WY2018 in the GSP. It is not expected that year-to-year usage would vary much since population and numbers of domestic wells in the rural areas of the Basin are not changing much. Similarly, small water system groundwater extractions do not fluctuate much as verified by metered data reported to the County.

Table 1. Water Year 2021 Groundwater Extracted in the Santa Margarita Basin

Agency / Extraction Type	Extraction by Aquifer (Acre-Feet)				Non-Principal Aquifer Extraction Purisima Formation" (Acre-Feet)	Total (Acre-Feet)	Agency/Type Percentage of Total Extraction
	Santa Margarita	Monterey	Lompico	Butano			
San Lorenzo Valley Water District[1]	1,010	0	365	0	0	1,375	44%
Scotts Valley Water District[1, 2]	0	0	888	242	0	1,130	36%
Mount Hermon Association[1]	0	0	146	0	0	146	4%
Private Domestic Wells[2]	62	87	28	26	30	233	7%
Non-Domestic Private Groundwater Users[3]	84	0	38	0	0	122	4%
Small Water Systems[4]	70	5	45	0	0	120	4%
Quail Hollow Quarry[5]	25	0	0	0	0	25	1%
Total by Aquifer (Acre-Feet)	1,250	92	1,510	268	30	3,151	100%
Aquifer Percentage of Total Extraction	40%	3%	48%	8%	1%	100%	

[1] Direct measurement by flow meter (most accurate).
[2] For SVWD extraction wells screened in both the Lompico and Butano aquifers, its assumed they extract 40% of their water from the Lompico aquifer and 60% from the Butano aquifer.
[2] Estimated based annual water use factor (WUF) per connection determined from metered Small Water Systems and applied to each residence outside of municipal water service areas (less accurate). WUF for WY2021 was 0.3 AF per connection. Number of private wells is assumed to be 777.
[3] Other private non-domestic uses includes landscape irrigation and water for landscape ponds. Extraction is not metered so the volume is estimated (less accurate).
[4] Metered data are reported to County but timing of reporting is too late for inclusion into the Annual Report. Therefore, only October through December 2020 are true, while January through September 2021 are January through September 2020 (less accurate). The volumes from year to year generally do not vary significantly.
[5] Estimated based on historical usage (less accurate).

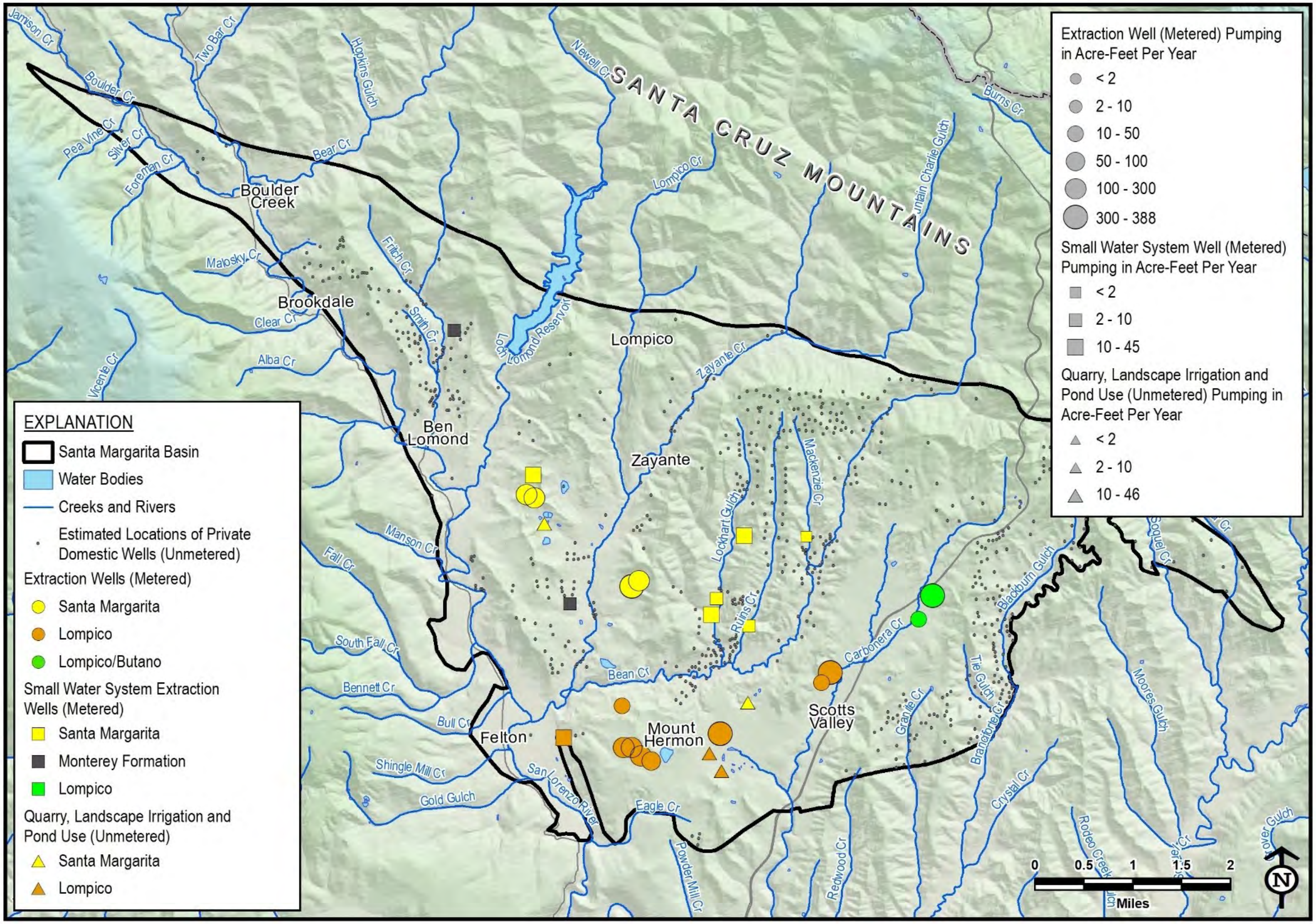


Figure 9. General Location of Water Year 2021 Groundwater Extracted in the Santa Margarita Basin

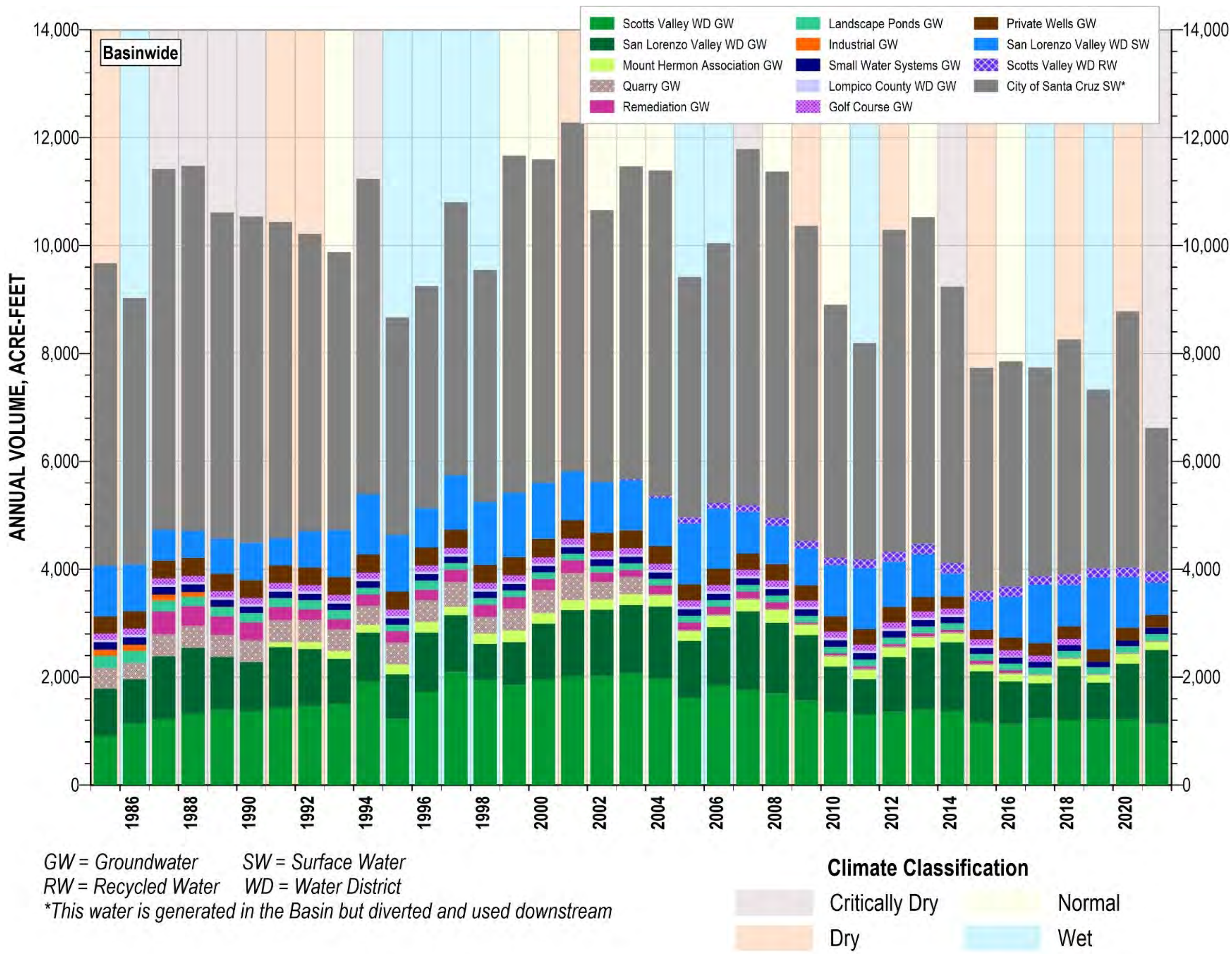


Figure 10. Santa Margarita Basin Water Use, WY 1985 - 2021

3.3 Surface Water Supply Used for Groundwater Recharge or In-Lieu Use

There is currently no managed aquifer recharge of surface water in the Basin. However, SVWD and other private developments recharge stormwater at low impact development (LID) sites in the Scotts Valley area. Table 2 shows the total volumes of known managed aquifer recharge using LID are small, totaling less than 41 acre-feet per year (AFY).

Table 2. Volume Infiltrated at LID Facilities in SVWD Service Areas

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

*Volumes estimated using available data

3.4 Total Water Use

Table 3 summarizes WY2021 total water use by user, use, and water source type. Notes below the table identify measurement method and relative accuracy. In WY2021, total water use decreased compared to the baseline in WY2018, summarized in Table 2-17 of the GSP.

Table 3. Water Year 2021 Santa Margarita Basin Water Use by Source

Water Supplier	Groundwater Use (Acre-Feet)	Surface Water Use (Acre-Feet)	Recycled Water Use (Acre-Feet)	Imported Water Use (Acre-Feet)	Total WY2021 Water Use (Acre-Feet)
Water Use Within the Santa Margarita Basin					
San Lorenzo Valley Water District (SLVWD)[1]	1,375	596	0	0	1,971
Scotts Valley Water District (SVWD)[1]	1,130	0	207	0	1,337
Mount Hermon Association[1]	146	0	0	0	146
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]	120	1	0	38	159
Quail Hollow Quarry[5]	25	0	0	0	25
	3,151	597	207	38	3,993
Water Use Outside the Santa Margarita Basin					
City of Santa Cruz[1]	0	0[6] 2,663[7]	0	0	2,663
Total	3,151	3,260	207	38	6,656

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

[2] Estimated based annual water use factor (WUF) per connection determined from metered Small Water Systems and applied to each residence outside of municipal water service areas (less accurate). WUF for WY2021 was 0.3 AF per connection. Number of private wells is assumed to be 777.

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

[4] Metered data are reported to County but timing of reporting is too late for inclusion into the Annual Report. Therefore, only October through December 2020 are true, while January through September 2021 are January through September 2020 (less accurate). The volumes from year to year generally do not vary significantly.

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

[6] City of Santa Cruz's San Lorenzo River diversion from Felton to Loch Lomond.

[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 used outside of the Santa Margarita Basin in the City.

After the GSP was submitted to DWR, it was discovered the WY2018 City of Santa Cruz surface water use in GSP Table 2-17 was an incorrect volume and in million gallons instead of acre-feet. The number reported, 1,130 million gallons, should be 1,420 million gallons, which converts to 5,234 acre-feet. The surface water diversion values reported in this Annual Report have been corrected..

Figure 10 represents volumes of water used from the Basin between WY1985 and WY2021. The chart shows water use has been decreasing consistently since the early 2000s. Less groundwater extracted has stabilized groundwater levels, which if continued, will partially help SMGWA meet the GSP's sustainability goals. Charts on Figure 11 show volumes of water used north or south of Bean Creek by user and source. The greatest water demand and usage is south of Bean Creek in the area of Mount Hermon and City of Scotts Valley where the greater proportion of the Basin's population resides. The area south of Bean Creek has also seen the greatest reductions in water use since the early 2000s. North of Bean Creek, water use is more consistent with noticeable reductions during drought periods, such as toward the end of the 2012-2015 drought. Surface water use north of Bean Creek was limited in WY2021 due to damage to SLVWD infrastructure caused by the CZU Complex fire.

Table 4 summarizes intertie usage between SLVWD and SVWD, starting spring 2016. All sources on Figure 11 other than the City of Santa Cruz surface water diversions are used within the Basin.

Table 4. Emergency Intertie Usage Between SLVWD and SVWD

Water Year	Positive Flows from SLVWD to SVWD (Acre-Feet)	Negative Flows from SVWD to SLVWD (Acre-Feet)
2016	0	0.3
2017	5.4	0
2018	0	0
2019	0	0
2020	9.1	0
2021	10.1	0

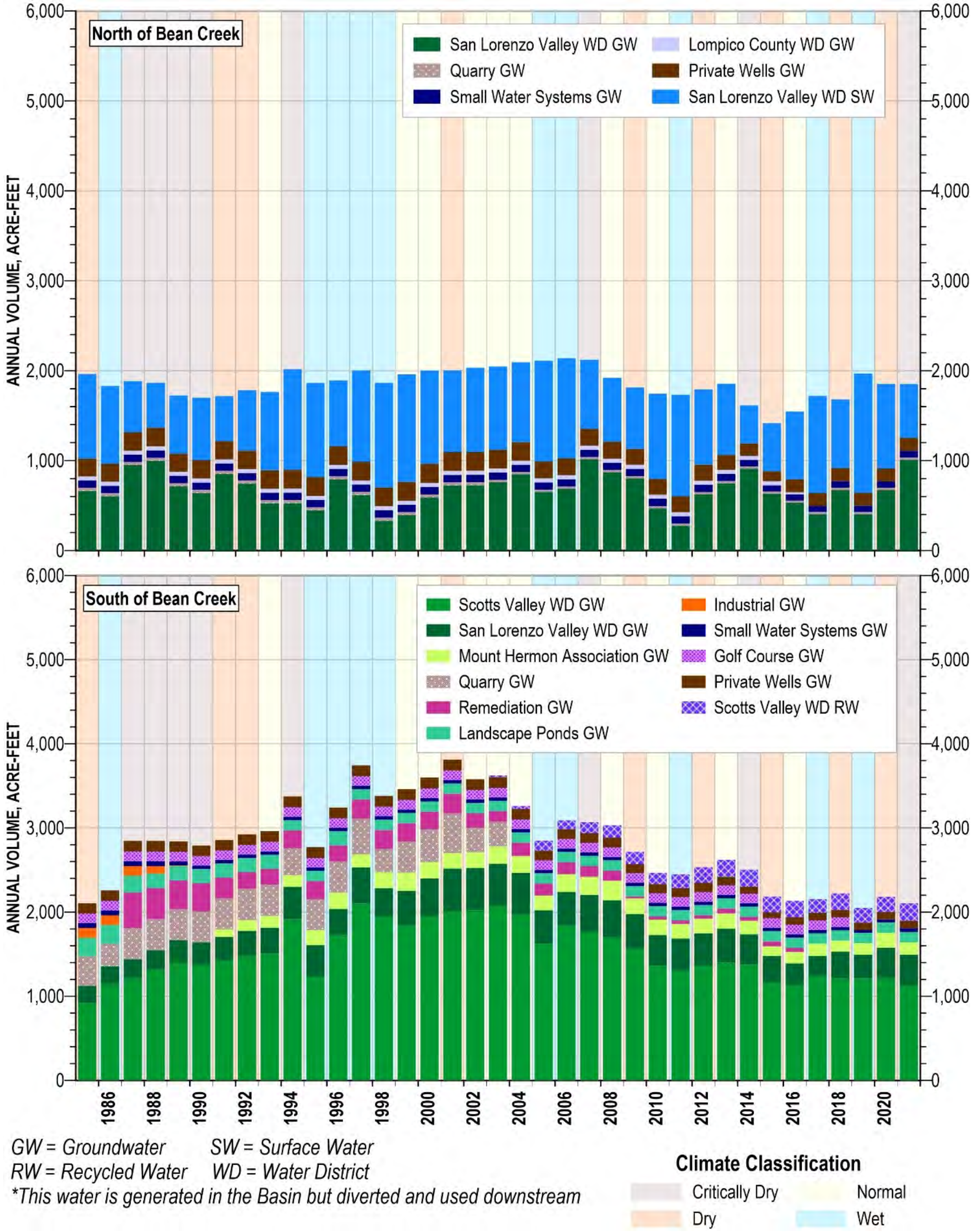


Figure 11. Water Sources Used in the Santa Margarita Basin, WY1985 – 2021

3.5 Change of Groundwater in Storage

Since the 1970s and even possibly starting in the 1960s, there has been a consistent loss of groundwater stored in the Basin due primarily to over-pumping of the Lompico aquifer in the south Scotts Valley area. Individual annual increases of groundwater stored in the Basin correlate with wet years and some normal years if they follow a dry year (Figure 12). Historically, normal or drier water year types generally result in groundwater lost from storage. After WY2014, cumulative change in storage appeared to be leveling out, but the overall below average rainfall from 2018 to present has continued the trend of declining groundwater in storage (Figure 12).

Groundwater in storage change is estimated through WY2021 using the GSP Groundwater Basin Model (Basin Model). The Basin Model was updated with recent climate and groundwater extraction data, including the following:

- Monthly precipitation and temperature data from Parameter-elevation Regressions on Independent Slopes Model (PRISM) Climate Group were used to update precipitation, evapotranspiration, recharge, runoff, and streamflow
- Extraction volumes provided by SLVWD, SVWD, Mount Hermon Association
- Small water system extraction volumes provided by the County

Other parameters assumed to remain constant with the 2018 baseline are domestic, quarry, and landscape pond use groundwater extraction, and septic return flows. Parameters such as surface water and groundwater interactions, stream stage, and groundwater elevations are simulated by the Basin Model. The Basin Model was not recalibrated for this Annual Report.

Figure 12 shows the annual and cumulative change of groundwater in storage for the Basin from WY1985 through WY2021. WY2021 had a decline in groundwater storage of about 5,099 AF, similar to declines in the 2 most recent dry years. The cumulative change of groundwater in storage increased after the WY2012-2015 drought due to reduced pumping and near-record rainfall in WY2017. However, since WY2018 there have been overall losses in stored groundwater for 4 consecutive years, including over a wet year in WY2019.

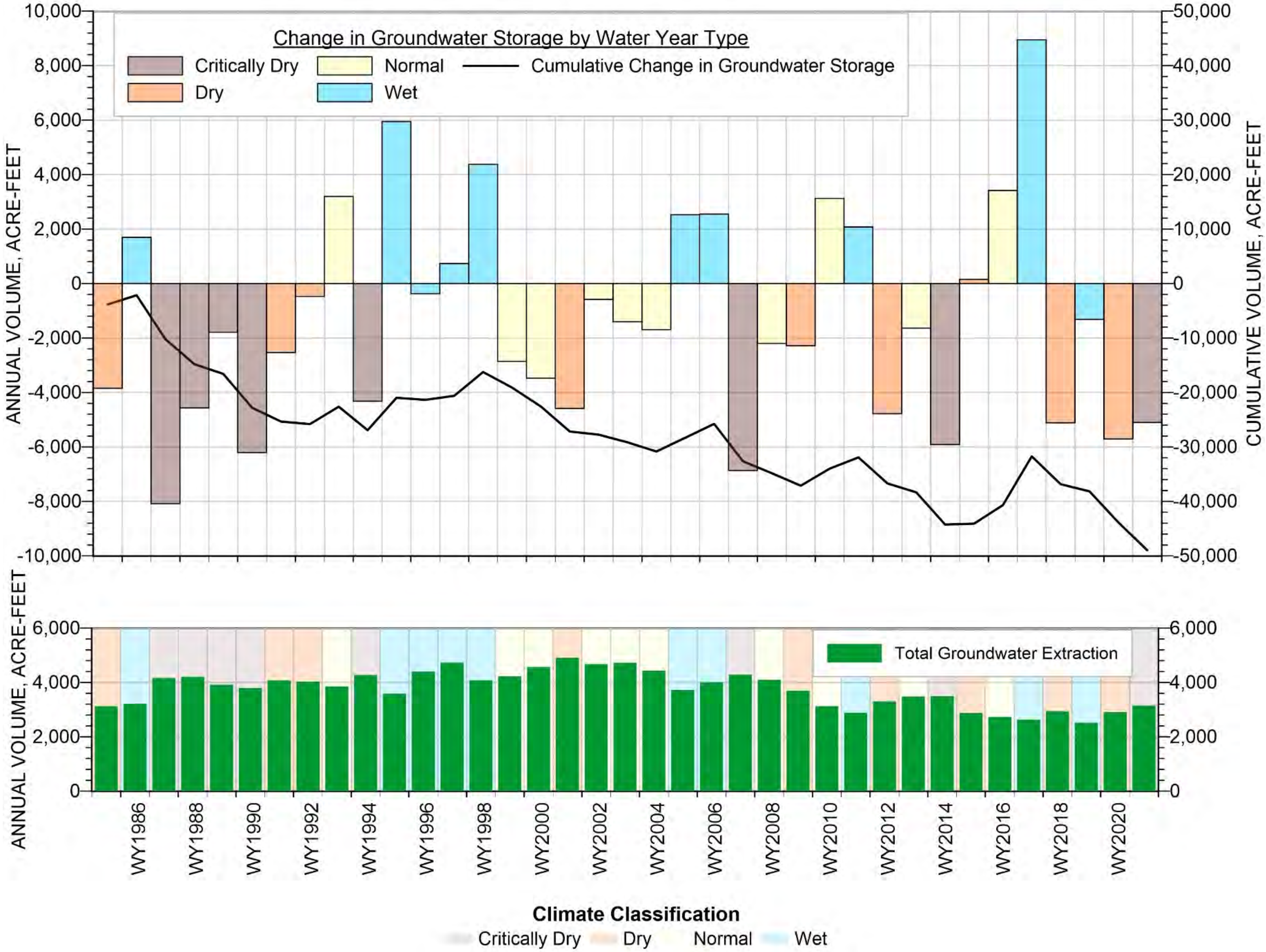


Figure 12. Annual Change in Groundwater in Storage for Santa Margarita Basin

Figure 13 through Figure 16 show model simulated change of groundwater in storage from the end of WY2020 to the end of WY2021 for the Santa Margarita aquifer, Monterey Formation, Lompico aquifer, and Butano aquifer, respectively. The amount of groundwater stored in the unconfined and highly conductive Santa Margarita aquifer is strongly correlated with precipitation. Groundwater levels and groundwater storage decrease when conditions are dry, but also recharge quickly during wet years. The location and relative volume of storage changes for WY2021 shown on Figure 13 depicts large areas of the Santa Margarita aquifer having lost groundwater in storage. Areas around the Quail Hollow wellfield have the greatest reductions in storage. Increased storage of groundwater occurred in the northern upland parts of the aquifer (Figure 13).

The Monterey Formation is not a permeable formation and therefore changes in storage are much smaller than in the Santa Margarita aquifer. Because of this, annual changes in storage are relatively small with the greatest declines in the northern upland areas. The Monterey Formation's location and relative volume of storage changes in WY2021 are shown on Figure 14.

The mostly confined Lompico aquifer is less conducive to storage changes from decreased precipitation then the surficial, unconfined Santa Margarita Sandstone. Since this aquifer is the primary aquifer used for municipal extraction, areas of largest decreases in storage are in the Mount Hermon/Pasatiempo/South Scotts Valley area where the Lompico aquifer is used as a significant municipal supply source (Figure 15). SVWD's Orchard and Well #3B were not pumped as much as recent years because of upgrades to the Orchard treatment plant. Similarly, MHA#3 was pumped half as much as the previous 2 years. The reduced pumping resulted in an increase in stored groundwater as shown by the green areas on Figure 15.

The Butano aquifer, like the Lompico aquifer, is mostly confined and less conducive to storage changes from decreased precipitation than the surficial, unconfined Santa Margarita aquifer. The Butano aquifer is only used as a water supply in the area northeast of Scotts Valley as shown by the extraction wells plotted on Figure 16. The greatest declines in Butano aquifer storage in WY2021 are where it is exposed at the surface near the Basin's northern boundary and pumped by private well owners for domestic purposes (Figure 16). Due to limited data, the Basin Model is not well calibrated for much of the Butano aquifer, so the storage changes beyond the area northeast of Scotts Valley, where there are some monitoring wells screened in the Butano aquifer, are not well understood.

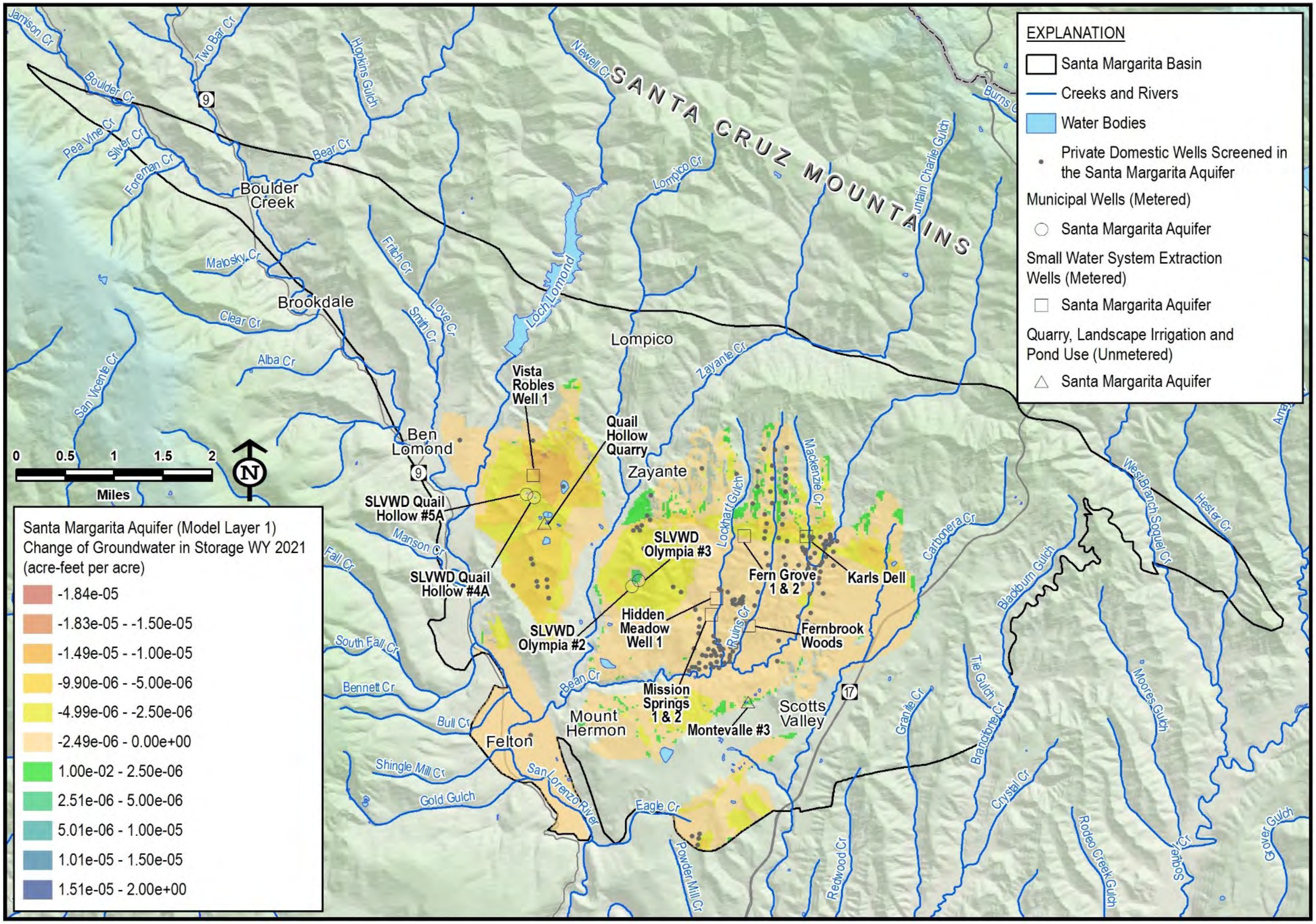


Figure 13. Water Year 2021 Change of Groundwater in Storage in Santa Margarita Aquifer

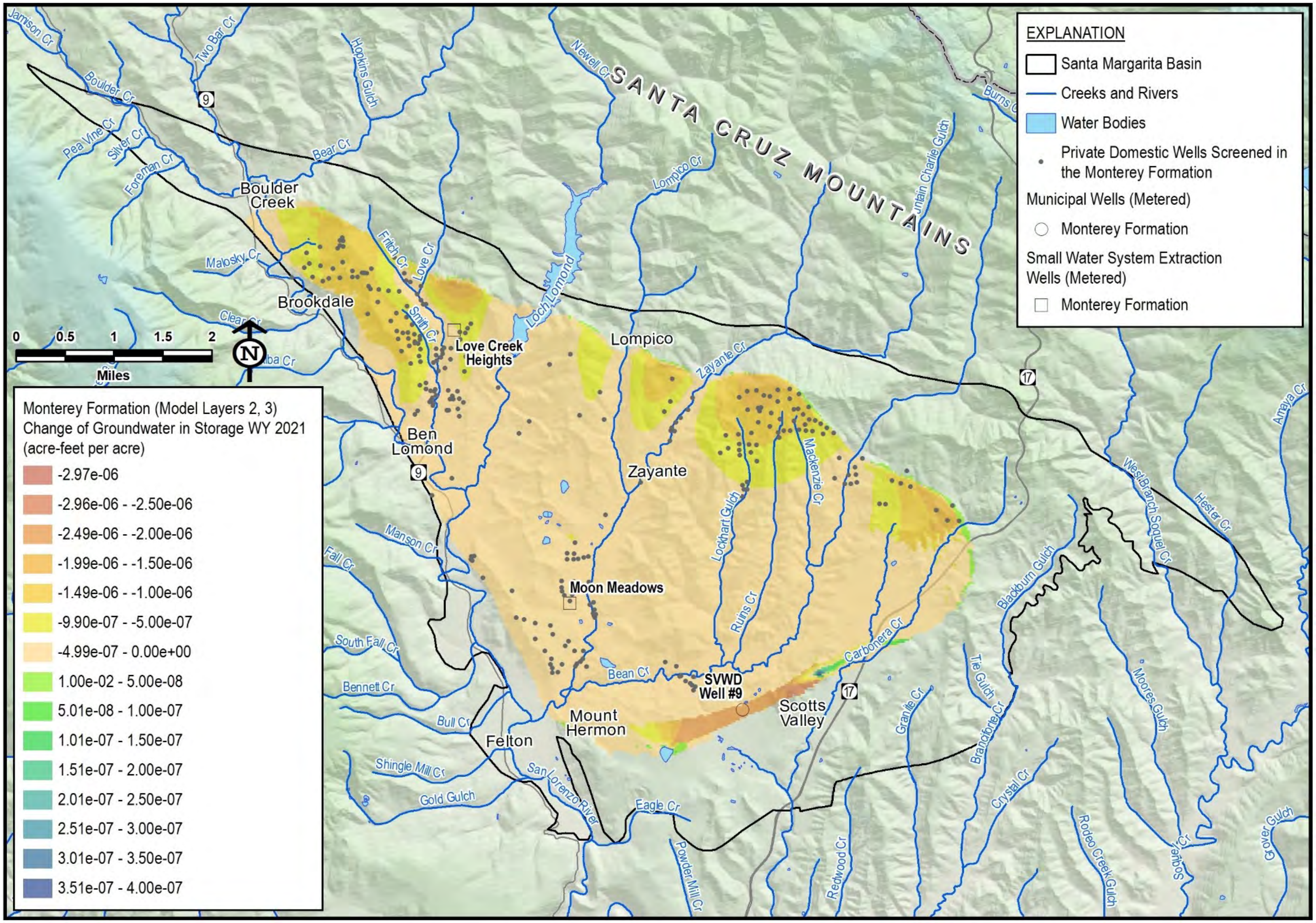


Figure 14. Water Year 2021 Change of Groundwater in Storage in Monterey Formation

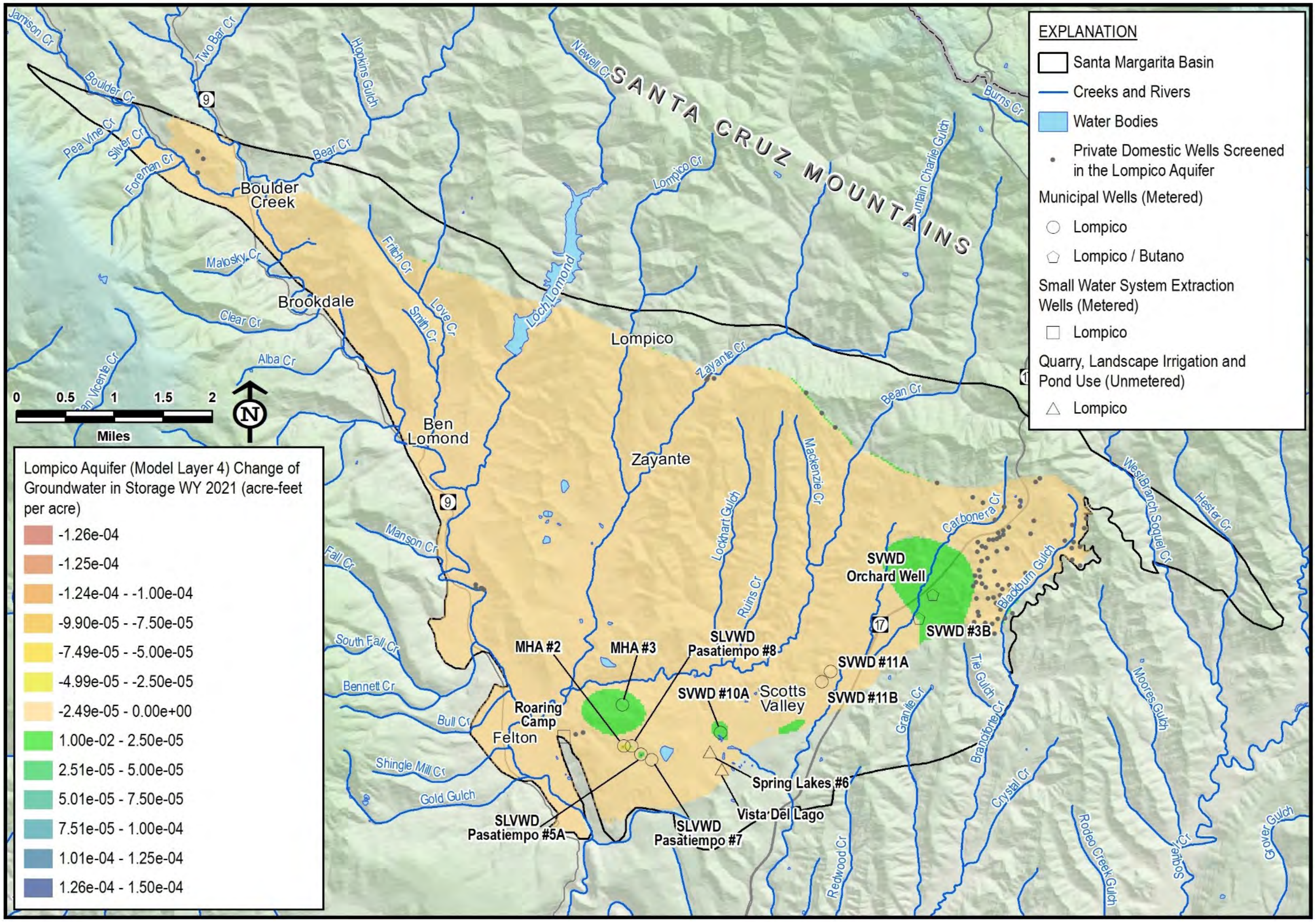


Figure 15. Water Year 2021 Change of Groundwater in Storage in Lompico Aquifer

MONTGOMERY & ASSOCIATES

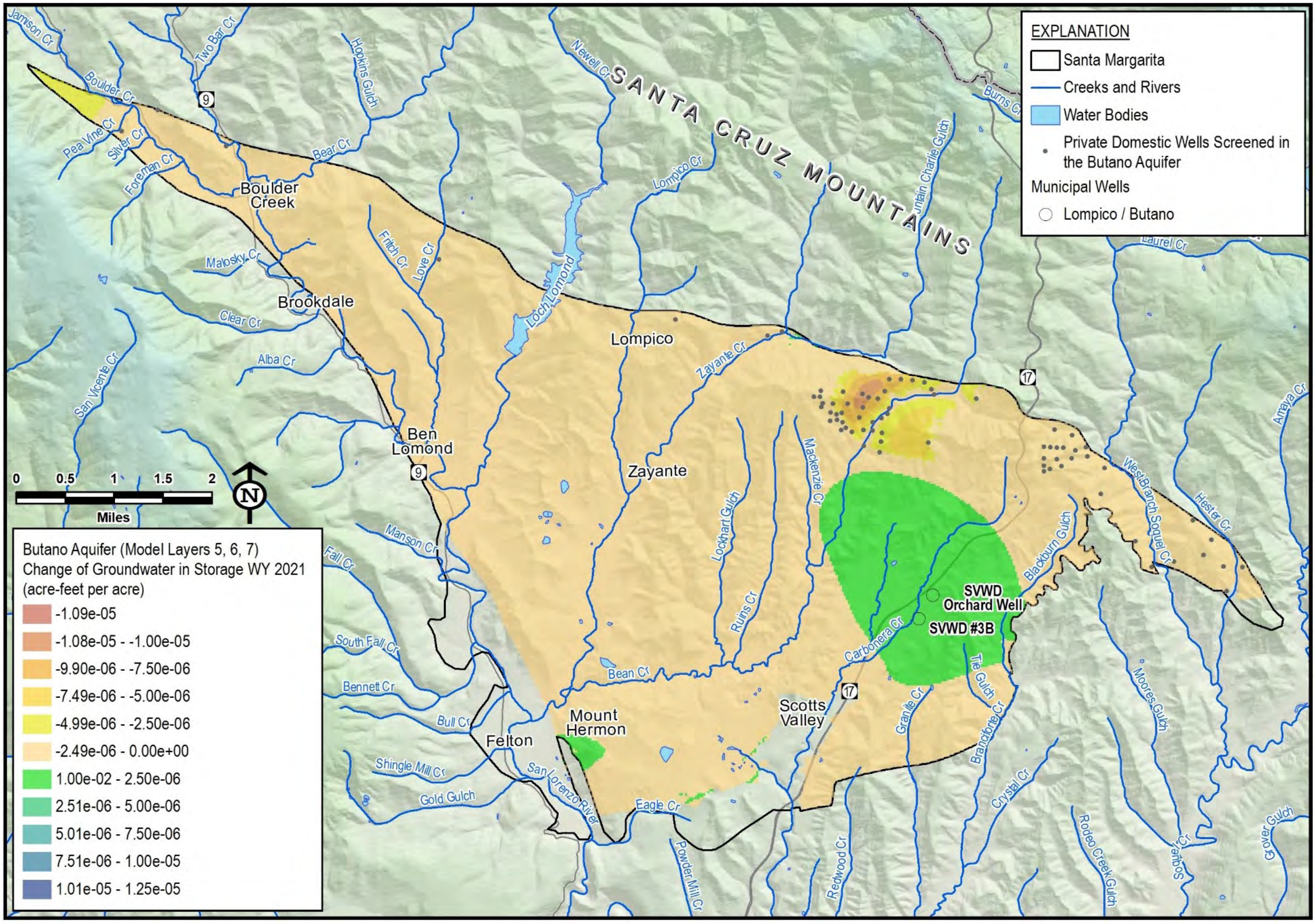


Figure 16. Water Year 2021 Change of Groundwater in Storage in Butano Aquifer

4 PROGRESS TOWARD IMPLEMENTING THE PLAN

This section provides an annual update on progress toward implementing the GSP through WY2021. Groundwater conditions are evaluated to assess how Basin conditions are changing in relation to the SMC for relevant sustainability indicators. Land subsidence and seawater intrusion are not applicable sustainability indicators in the Basin and are not addressed in this report. In some areas, undesirable results are occurring based on the specific undesirable definitions developed in the GSP. Having undesirable results at this early stage of GSP implementation is permissible because SGMA allows GSAs 20 years to adaptively manage their Basins by implementing projects and management actions to avoid all undesirable results from 2042 onward.

The GSP includes projects and management actions that may be necessary to implement to achieve sustainability by WY2042. This section summarizes WY2021 project and management action implementation efforts and outlines major near-term milestones . Finally, this section provides an update on improvements to the GSP monitoring networks that SMGWA made in WY2021 and plans to make in subsequent years.

4.1 Chronic Lowering of Groundwater Levels

Sustainability is achieved for the chronic lowering of groundwater levels indicator when the SMC are achieved at RMPs. The minimum threshold is the groundwater elevation at which undesirable results may start to occur. For this indicator, sustainability is reached when groundwater elevations are at or above the minimum threshold for each RMP. Undesirable results occur if the groundwater elevation in a RMP falls below its minimum threshold in 2 or more consecutive non-drought years. Temporary declines caused by emergency operational issues or extended droughts are not considered an undesirable result. The measurable objective is the groundwater elevation goal in each well, designed to provide operational flexibility to ensure that future droughts and other unforeseen changes to water supplies do not cause unsustainable conditions. Interim milestones are 5-year goals designed to help the SMGWA manage the Basin over the next 20 years to meet measurable objectives by 2042.

Table 5 shows the minimum groundwater elevation at each RMP since WY2017, relative to the minimum threshold, measurable objective, and the first interim milestone in 2027. Hydrographs in Appendix A (pages A-1 through A-16) show all historical data collected at the RMPs relative to the minimum threshold and measurable objective.

In WY2021, all 12 RMP groundwater elevations are above minimum thresholds, with either stable or increasing elevations. The 2027 interim milestone has already been met for 9 RMPs (green and yellow colors in Table 5) with 4 of the 9 already meeting measurable objectives (green color in Table 5).

Of the 4 RMPs in the Santa Margarita aquifer, the 2 RMPs representing SLVWD's Olympia wellfield and the Santa Margarita aquifer in northern Scotts Valley (SVWD TW-18) are above measurable objectives. The 2 RMPs representing the Mount Hermon/Pasatiempo/South Scotts Valley area and SLVWD's Quail Hollow wellfield have groundwater elevations above their minimum thresholds but below their 2027 interim milestones.

The only Monterey Formation RMP, SVWD #9 has a long-term increasing groundwater elevation trend and in WY 2021 is above its 2027 interim milestone, but lower than its measurable objective.

The Lompico aquifer has 4 RMPs in the Pasatiempo and Scotts Valley areas. In WY 2021, only SVWD Well #10 met the measurable objective, while the other 3 RMPs (SLVWD Pasatiempo MW-1, SVWD Well #11A, and SVWD TW-19) have groundwater elevations between 2027 interim milestones and measurable objectives. The Lompico aquifer RMPs have increasing groundwater elevation trends since about WY2016, except for SLVWD Pasatiempo MW-1, which has been decreasing since WY2019 (Appendix A, pages A-9 through A-12).

SVWD #15 monitoring well is the only RMP screened in both the Lompico and Butano aquifers. The groundwater elevation in this well is above the minimum threshold but is not yet at its 2027 interim milestone. The 2 Butano RMPs, SVWD Stonewood Well and SVWD Canham Well, have stable groundwater elevations that are both above the minimum threshold. The Stonewood well's groundwater elevation is above its 2027 interim milestone and measurable objective, while the Canham Well is below its 2027 interim milestone.

Table 5. Water Year 2021 Minimum Groundwater Elevations at Representative Monitoring Points for the Last 5-Years Compared to Chronic Lowering of Groundwater Levels Sustainable Management Criteria

Aquifer	Well Name	Groundwater Elevation (feet above mean sea level)							
		Minimum Threshold	Interim Milestone #1 (2027)	Measurable Objective	Minimum WY2017 Elevation*	Minimum WY2018 Elevation*	Minimum WY2019 Elevation*	Minimum WY2020 Elevation*	Minimum WY2021 Elevation*
Water Year Type					Wet	Dry	Wet	Dry	Critically Dry
Santa Margarita	SLVWD Quail MW-B	449	472	472	451.4	462.4	460.4	462.4	455.8
	SLVWD Olympia #3	302	307	307	305.0	344.0	332.0	351.4	335.9
	SLVWD Pasatiempo MW-2	498	514	514	513.7	523.7	517.7	519.6	512.7
	SVWD TW-18	462	471	471	469.6	469.9	469.9	471.8	471.8
Monterey	SVWD #9	301	340	358	337.6	338.6	342.1	346.7	351.0
Lompico	SLVWD Pasatiempo MW-1	334	339	372	338.7	346.7	357.4	346.6	340.4
	SVWD #10	286	302	322	291.9	297.4	308.8	317.9	330.3
	SVWD #11A	288	299	317	290.8	292.6	302.3	310.4	308.0
	SVWD TW-19	314	357	376	347.7	342.5	361.6	373.1	370.4
Lompico/Butano	SVWD #15 Monitoring Well	291	310	333	311.0	308.5	298.1	302.8	307.1
Butano	SVWD Stonewood Well	836	844	844	845.5	846.8	849.1	848.3	845.0
	SVWD Canham Well	427	447	467	444.3	443.2	443.0	442.0	441.7

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

Table 6 shows the minimum thresholds and measurable objectives for reduction of groundwater in storage, which is based on sustainable yields estimated in the GSP for the principal aquifers and Monterey Formation. Minimum thresholds and measurable objectives for the reduction of groundwater in storage indicator were established using a simulation from the Basin Model that projects pumping and climate change through WY2072. Minimum thresholds are developed based on pumping in the baseline model simulation (no projects or management actions implemented), and measurable objectives are based on projected pumping that corresponds with implementing a 540 AFY conjunctive use project to reduce SLVWD and SVWD’s November through April groundwater extraction in an effort to recover groundwater levels in the Mount Hermon/Pasatiempo/South Scotts Valley area. The 2027 interim milestones are equal to the minimum threshold through 2027, and thereafter equal to the measurable objective through 2042. Undesirable results for reduction of groundwater in storage are defined numerically as groundwater extraction volumes that exceed the reduction in groundwater storage minimum thresholds in one or more principal aquifers.

In WY2021, groundwater extraction was greater than the minimum threshold in the Santa Margarita and Lompico aquifers and less than the measurable objective in the Monterey Formation and Butano aquifer. Groundwater pumping is also slightly greater than SMC now because the proposed projects and management actions are still in the planning phases. WY2021 pumping volumes resulted in undesirable results for this sustainability indicator. Implementation of the planned projects and management actions described in Section 4.5 will help the SMGWA meet the sustainable yield and reduction in groundwater storage SMC.

Table 6. Water Year 2021 Groundwater Extractions Compared to Reduction in Groundwater in Storage Sustainable Management Criteria

Aquifer	Groundwater Extraction, Acre-Feet per Year		
	Minimum Threshold*	Measurable Objective	WY2021
Santa Margarita	850	615	1,250
Monterey	140	130	92
Lompico**	1,290	1,000	1,510
Butano**	540	380	268

* The first interim milestones 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
Measurable objective met

4.3 Degraded Water Quality

Table 7 shows minimum thresholds and WY2021 maximum concentrations at degraded groundwater quality RMPs. Minimum thresholds are based on drinking water standards for each constituent. SMC for this sustainability indicator are met when concentrations are at or below the criteria.

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 and areas. The main naturally occurring groundwater quality constituents in the Basin that occasionally approach or are greater than relevant drinking water standards are iron, manganese, arsenic, and salinity (measured as total dissolved solids and chloride). The main anthropogenic groundwater quality constituents that are occasionally detected at concentrations less than relevant drinking water standards are nitrate, organic point source contaminants from several industrial sites, and constituents of emerging concern (CEC) from wastewater sources.

Iron and manganese are naturally elevated in the Lompico aquifer and parts of the Santa Margarita aquifer, such as the Olympia wellfield. Iron and manganese concentrations in untreated groundwater from wells in these aquifers regularly exceed their applicable secondary drinking water standards. SLVWD and SVWD treat or blend raw groundwater to meet state drinking water standard. Since these are naturally occurring exceedances of minimum thresholds and the exceedances are not being caused by groundwater use, undesirable results are not being caused.

For wells where iron and manganese typically exceed minimum thresholds, measurable objectives are established at concentrations higher, instead of lower, than the minimum thresholds. Table 8 shows the WY2021 maximum concentrations for iron and manganese relative to measurable objectives for RMPs that failed to meet the minimum threshold. Measurable objectives are based on average concentrations at each well between January 2010 and December 2019. Interim milestones for groundwater quality are the same as measurable objectives. Chemographs in Appendix D show groundwater quality in RMPs over time, relative to the RMP's minimum threshold and measurable objective.

RMP concentrations for the other GSP-defined constituents of concern are lower than minimum thresholds and measurable objectives, as shown in Table 7, Table 8, and Appendix D. The only RMP well not sampled in WY2021 is SVWD Well #9, which is an inactive extraction well screened in the Monterey Formation.

Table 7. Water Year 2021 Groundwater Quality Compared to Minimum Thresholds

Aquifer Unit	Well Name	Concentration [milligrams per Liter (mg/L)]										
		Total Dissolved Solids (TDS)	Chloride	Iron	Manganese	Arsenic	Nitrate as Nitrogen	Methyl-tert-butyl-ether (MTBE)	Chlorobenzene	Trichloroethylene (TCE)	Tetrachloroethylene (PCE)	1,2-Dichloroethylene (1,2-DCE)
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	9.1	ND	ND	0.0022	2.7	ND	ND	ND	ND	ND
	SLVWD Olympia #3	650	9.6	0.19	0.13	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	150	7.7	0.55	0.14	0.0012	0.49	ND	ND	ND	ND	ND
	SVWD #10A	290	33	0.80	0.10	ND	ND	ND	ND	ND	ND	ND
	SVWD #11A	540	30	0.38	0.11	0.0014	ND	ND	0.0015	ND	ND	ND
	SVWD #11B	360	22	1.0	0.075	0.0094	ND	ND	ND	ND	ND	ND
Lompico/ Butano	SVWD #3B	810	130	0.34	0.10	ND	ND	ND	ND	ND	ND	ND
	SVWD Orchard Well	470	46	0.01	0.0027	ND	ND	ND	ND	ND	ND	ND

Minimum threshold not met
Minimum threshold and measurable objective met or analyte not detected (ND)
NS – not sampled

Table 8. Water Year 2021 Groundwater Quality Compared to Measurable Objectives

Aquifer	Well Name	Concentration (mg/L)			
		Iron Measurable Objective	Maximum WY2021 Iron Concentration	Manganese Measurable Objective	Maximum WY2021 Manganese Concentration
Santa Margarita	SLVWD Olympia #3	0.502	0.19	0.157	0.13
Lompico	SLVWD Pasatiempo #7	0.539	0.55	0.099	0.14
Lompico	SVWD #10A	1.51	0.80	0.099	0.10
Lompico	SVWD #11A	0.459	0.38	0.112	0.11
Lompico	SVWD #11B	0.826	1.0	0.077	0.075
Lompico/ Butano	SVWD #3B	0.380	0.34	0.042	0.10

Measurable objective not met

Measurable objective met

4.4 Depletion of Interconnected Surface Water

Table 9 compares 5 years of groundwater elevations for depletion of interconnected surface water RMPs with minimum threshold and measurable objectives. This indicator's metrics are defined using groundwater elevations as a proxy at 2 RMPs. The SMC for this indicator are met when groundwater elevations are at or above proxy groundwater elevations. Undesirable results occur if the groundwater elevation in any RMP falls below the minimum threshold in 2 or more consecutive non-drought years.

The WY2021, groundwater elevations in both RMPs remained stable and higher than the minimum thresholds even though it was a critically dry year following a dry year. The groundwater elevation in SVWD SV4-MW is 17 feet higher than the measurable objective, while the groundwater elevation in SLVWD Quail MW-A is 2.7 feet lower than the measurable objective. Hydrographs for depletion of interconnected surface water RMPs are shown in Appendix B, pages B-2 and B-3.

Table 9. Groundwater Elevation Proxy for Depletion of Interconnected Surface Water

Aquifer	Well Name	Groundwater Elevation (feet above mean sea level)						
		Minimum Threshold	Measurable Objective*	Minimum WY2017 Elevation	Minimum WY2018 Elevation	Minimum WY2019 Elevation	Minimum WY2020 Elevation	Minimum WY2021 Elevation
Water Year Type				Wet	Dry	Wet	Dry	Critically Dry
Santa Margarita	SLVWD Quail MW-A	413	416	411.7	413.7	413.7	414.4	413.3
	SVWD SV4-MW	381	387	401.3	398.9	406.6	401.6	404.1

* 2027 interim milestones are equal to the measurable objective

Minimum threshold not met

Minimum threshold met, but measurable objective not met

Measurable objective met

4.5 Update on Implementation of Projects and Management Actions

SMGWA's member agencies have managed groundwater resources in the Basin for the past several decades. There are ongoing activities that predate SGMA and will continue to be implemented during GSP implementation. However, with changing climate patterns in the region, additional projects or management actions are needed to achieve the SMGWA's sustainability goals and improve individual agency water supply reliability. The need for future projects and management actions is driven by lowered groundwater levels and ongoing reliance on groundwater extraction from the Lompico Aquifer in the Mount Hermon/Pasatiempo/South Scotts Valley area. Historical groundwater level declines have been mitigated by water use efficiency programs and use of recycled water for non-potable uses. However, additional projects are needed to achieve the SMGWA's sustainability goals accounting for projected future climate.

This Annual Report summarizes progress toward implementing projects and management actions for groundwater sustainability during WY2021. The estimated costs, timing, and benefits of ongoing, planned, and potential projects and management actions are described in detail in the GSP. Existing projects and management actions are defined in the GSP as Group 1, the most likely projects and management actions to be pursued during GSP implementation are defined in the GSP as Group 2, and additional conceptual project and management action options are defined in the GSP as Group 3.

4.5.1 Existing Projects and Management Actions (Group 1)

4.5.1.1 Water Use Efficiency

SLVWD, SVWD, the County, and the City of Santa Cruz carry out a number of water use efficiency and conservation activities that reduce water demand in the region including the Santa Margarita Basin. These agencies are all members of the Water Conservation Coalition of Santa Cruz County, which serves as a regional information source for countywide water reduction measures, rebates, and resources. The Water Conservation Coalition provides water saving tips, information on countywide rebate programs, and educational materials (e.g., drought-tolerant plants suitable for local conditions). The organization works collaboratively to produce press releases, newspaper ads, radio ads, and informational booths at local events

Continuation and further expansion of water use efficiency activities is foreseen in the future by SLVWD, SVWD, the County, and the City of Santa Cruz. These agencies continue building awareness about indoor and outdoor water use efficiencies, promoting water efficient behaviors, and reducing water waste. The programs comprise education, outreach, rebates, and enforcement of water waste policies.

While education and outreach programs increase awareness and efficiency on the customer side, SLWVD, SVWD, and the City of Santa Cruz Water Department (SCWD) also focus on improving efficiencies within their respective distribution systems through upgrades to the metering infrastructure, reduction of non-revenue water, and evaluation of system pressure. New metering infrastructures allow for increased accuracy, leak detection, and improved customer accountability. In 2016, SLVWD began deploying new meters in its Lompico service area, and a multi-year system wide meter change out program that has upgraded 27% of meters system wide through WY2021. In 2016, SVWD began deploying advanced metering infrastructure and achieved 100% completion in WY2021. SLVWD has increased contracted system wide leak detection from every three years to every two years. As part of regular capital improvements, SLVWD is in the process of replacing older storage tanks and pipelines. Systemically addressing water losses increases overall efficiency and reduces non-revenue loss thereby decreasing consumption and groundwater extractions. Several storage tanks within SLVWD are made of redwood and are known sources of water loss. Three redwood tank replacements are budgeted for 2022, and others may also be replaced if state grants can be secured.

4.5.1.2 SVWD Low Impact Development (LID) Projects

SVWD monitors 3 LID facilities, which were developed prior to SGMA. In WY2021, 30 AF of stormwater capture is reported at the 3 LID facilities, as summarized in Table 2.

The infiltrated stormwater recharges the Santa Margarita aquifer in a manner similar to natural processes. The infiltration helps augment groundwater levels and sustains groundwater contributions to creek baseflow that supports local fishery habitats. The 3 LID facilities overlie and infiltrate stormwater into the Santa Margarita Sandstone in areas where the underlying Monterey Formation restricts recharge of that water into the Lompico aquifer beneath the Monterey Formation. Because of this geological sequence there is limited potential of the LID facilities recharging the Lompico aquifer which has the greatest need for recovery and is the source of most of SVWD’s water supply.

A complicating factor in implementing LID projects in the Scotts Valley area is that there is no centralized stormwater collection system. This limits large scale projects and direct recharge to the most beneficial areas. Costs of past projects have been in large part been offset by grant funding. SVWD continues to evaluate opportunities for additional LID projects in the future.

4.5.1.3 SVWD Recycled Water Program

The SVWD Recycled Water Program is a cooperative effort between SVWD and the City of Scotts Valley. Recycled water has been used by SVWD since 2002 in lieu of groundwater for non-potable uses to augment the water supply and help the SVWD meet water use efficiency goals. Recycled water is produced at the City of Scotts Valley Tertiary Treatment Plant, where it undergoes treatment including 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 mostly used for landscape irrigation and dust control to a lesser extent.

Recycled water use within the Basin represents an equivalent reduction in groundwater pumping. Groundwater not pumped from the basin is assumed to be available for future beneficial use. Therefore, recycled water use results in a reduction in groundwater pumping and an increase in groundwater levels in the Basin.

SVWD continues to provide recycled water for irrigation and is exploring options to maximize the beneficial use of recycled water in the future. Costs of operating the recycled water system are built into SVWD and City of Scotts Valley budgets and are not anticipated to be passed on to the SMGWA.

Figure 17 charts recycled water demand since it was made available to SVWD customers in 2012. Low rainfall years, such as during the 2012-2015 drought and WY2021, have increased recycled water demand.

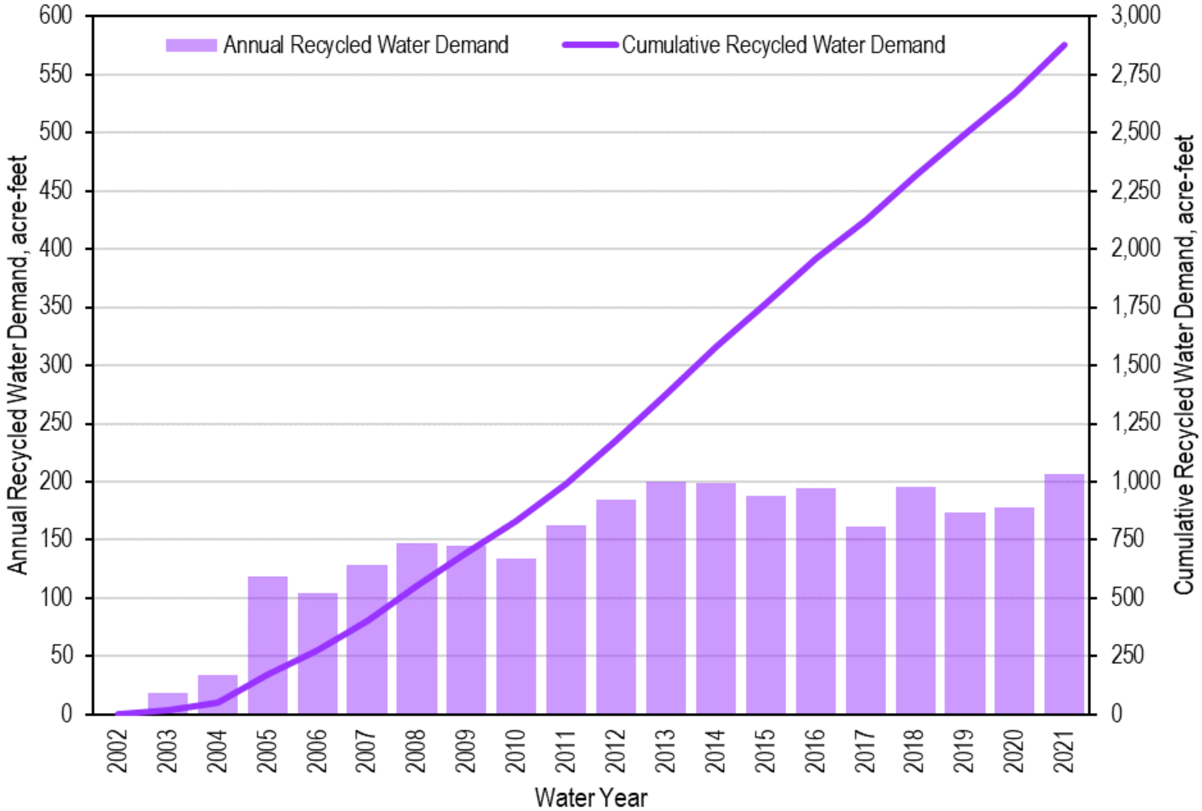


Figure 17. Recycled Water Demand by SVWD Customers

4.5.1.4 SLVWD North System Conjunctive Use

The SLVWD owns, operates, and maintains 2 permitted water systems: San Lorenzo Valley System (comprising 2 connected distribution systems: North System and South System) and Felton System, which supply separate areas from independent water sources (Figure 1). The North System uses surface water and groundwater conjunctively, the South System relies solely on groundwater, and the Felton System relies solely on surface water. The Felton System is connected to the San Lorenzo Valley System by an intertie that is only for emergency use.

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 benefits are reduced groundwater pumping in the Santa Margarita aquifer Quail Hollow and Olympia wellfields, increased groundwater levels around the wells that are resting, and increased creek baseflow. 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 56% of its water supply from stream diversions and 44% from groundwater pumping (Exponent, 2019). SLVWD plans to continue implementing the North System conjunctive use strategy for the foreseeable future.

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

This group focuses on conjunctive use, which is the optimized, sustainable use of multiple water sources throughout repeated climatic cycles under physical, legal, and environmental constraints. In general, availability of excess surface water is constrained by a number of factors, including drinking water treatment capacity, water rights place of use restrictions, required minimum fish flows, and availability of adequate surface water supplies. Conjunctive use is currently implemented by SLVWD to efficiently manage water use in their North System (described in Section 4.5.1.4). Expansion of conjunctive use was identified in the GSP as a priority project and management action to achieve sustainability.

Expanding conjunctive use can be implemented using a variety of sources, conveyance infrastructure, and regulatory frameworks:

- **Phase 1 of Expanded Conjunctive Use**: Excess surface water available to the SLVWD from its existing diversion points can likely be conveyed with minimal modifications to existing infrastructure to other areas of the Basin where it is not currently used. There is on average, an estimated 227 AFY 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. The SLVWD is currently in the planning phase with an Environmental Impact Report (EIR) anticipated to be completed by the end of 2024. Phase 1 of expanded conjunctive use will likely be implemented after completion of environmental permitting and necessary system improvements.
- **Phase 2 of Expanded Conjunctive Use**: An additional 313 AFY of raw surface water from Loch Lomond could be available for conjunctive use in the Basin with improvements to water treatment and conveyance, agreements with the City of Santa Cruz, and completion of environmental compliance permitting. The SLVWD plans to complete a feasibility study for the use of Loch Lomond water in 2023.

If planning for Phase 1 or 2 projects shows the approaches are not feasible or do not result in the desired benefits, water sources from outside the Basin could be considered for conjunctive use through coordination with the City of Santa Cruz.

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

4.5.3.1 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 relies on imported treated surface water to offset some or all SLVWD and SVWD groundwater pumping demands during the wet season months. Treated source water would be provided by the City of Santa Cruz from its San Lorenzo River and North Coast sources when excess water is available.

In January 2022, SVWD submitted a 2021 Urban and Multi-benefit Drought Relief grant application for a Regional Drought Resiliency Project. The project comprises the design and construction of 2 critical pieces of infrastructure to improve drought resiliency for SVWD and the SCWD:

1. A 12-inch diameter bi-directional intertie pipeline and pump station between the SCWD and SVWD distribution systems to facilitate transfers of water supply in droughts or other emergencies, and
2. A new groundwater well in Scotts Valley that will allow for increased extraction capacity to strengthen SVWD's ability to provide redundancy and meet potential increased demand 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 by importing wet season surface water, which could be made available as a regional groundwater supply during periods of drought. If the grant request is successful, it is anticipated the project will be completed by mid-2024.

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

Over the past few years, the City of Santa Cruz has explored the possibility of an aquifer storage and recovery (ASR) project in the area of Scotts Valley where Lompico aquifer groundwater levels are lowered and there is the most storage capacity. The potential project would use treated surface water from the City of Santa Cruz's San Lorenzo River and North Coast sources to create an underground reservoir in the Basin for drought supply.

The City of Santa Cruz has used the Basin groundwater model to simulate preliminary options for ASR configurations and operations. The ASR feasibility study, however, has been deferred while other potential projects are explored by SLVWD and SVWD.

4.5.4 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 supply in the Basin. Purified wastewater projects require larger initial investment than conjunctive use projects. However, the advantage of using purified wastewater is that it is available year-round and is a drought resilient source, while conjunctive use relies on excess surface water in wet years. With concerns that changing climate is altering the timing and intensity of rainfall events that impact surface water runoff, conjunctive use may not solely provide the benefits needed to achieve sustainability. SVWD and City of Santa Cruz have both completed initial studies, but further studies are necessary to determine the feasibility and return on investment on these conceptual projects.

4.5.5 Other Projects and Management Actions Requiring Future Evaluation

Should the ongoing, planned, and conceptual projects and management actions described above prove to not be feasible or not achieve sustainability goals, SMGWA may look into the feasibility of additional projects or management actions. These potential projects, identified in the GSP as Group 3, will be evaluated as necessary and discussed in future annual reports or the 5-year GSP update.

4.6 Update on Improvement of Monitoring Network

4.6.1 Groundwater Level Monitoring Improvements

During WY2021, 1 new monitoring well in the Lompico aquifer was added to the monitoring network. The new monitoring well, MHA-MW1, is a test well originally installed by South County Housing in 2005 on a parcel subsequently purchased by MHA in 2012. MHA-MW1 is located close to where the Lompico aquifer is potentially interconnected with the San Lorenzo River. Groundwater level monitoring by MHA in the well began in June 2021 and will be used to assess chronic lowering of groundwater levels and interconnected streamflow depletion.

One groundwater monitoring well in the Lompico aquifer was omitted from the GSP monitoring network. SVWD AB303 MW-2 was installed in 2003 and has been monitored routinely by SVWD since 2014. Other nearby Lompico aquifer wells used for groundwater level monitoring include SVWD AB303 MW-3B and SVWD #10.

There are areas of the Basin where groundwater is extracted, but no historical or current monitoring wells exist. Areas with monitoring network data gaps are identified in: 1) communities where there are many private domestic wells pumping from either the Santa

Margarita aquifer or Monterey Formation; 2) the deep Butano aquifer; and 3) areas where shallow groundwater is connected to surface water and groundwater extraction may be causing depletion of surface water. In WY2021, sites for 9 new monitoring wells were selected. The wells are scheduled to be installed in WY2022. Each well's purpose is described in Table 10 and locations shown on Figure 18. Installation of the new monitoring wells is funded using Proposition 68 and SMGWA member agency match funds.

Groundwater level monitoring well reference point elevations are used to convert depth to groundwater in wells to a groundwater elevation that can be compared to other wells to assess groundwater flow directions. Well reference point elevations were compiled during GSP preparation from several member agency datasets. The reference points were established over many years and measured using a variety of survey techniques or estimates. A comprehensive survey would improve understanding of groundwater flow in the Basin by standardizing the reference elevations at each monitoring location. A reference point elevation survey is a monitoring network improvement to be considered by the SMGWA as funding allows.

Table 10. Rationale for Proposed New Monitoring Well Locations

Location Type	Aquifer	General Location	Purpose
Monitoring in Areas of Concentrated Private Domestic Pumping	Santa Margarita	On Nelson Road near Ruins Creek (Ruins Creek on Figure 18)	Address a data gap in the aquifer where there is no historical groundwater level data
	Monterey	At the headwaters of Mackenzie Creek (Weston Road on Figure 18)	Collect data from an area with a high concentration of private domestic pumping and no records of historical groundwater levels
	Monterey	Northwest of Basin, near Love Creek (Love Creek on Figure 18)	Collect data from an area with a high concentration of private domestic pumping and no records of historical groundwater levels
Deep Butano Sandstone	Butano	Near Vine Hill School, west of Highway 17 (Vine Hill School on Figure 18)	Establish a monitoring well screened only in the Butano aquifer near SVWD's Butano aquifer extraction wells
Shallow wells to Monitor Surface Water / Groundwater Interactions	Santa Margarita	Bean Creek, downstream of Mackenzie Creek (labeled as such on Figure 18)	Collect groundwater data near a portion of Bean Creek that periodically runs dry in summer months
	Santa Margarita	Bean Creek, near its confluence with Ruins/ Lockhart Creek (Nelson Road/Lockhart Gulch on Figure 18)	Monitor an area that has a high concentration of private domestic pumping and is the location where Bean Creek flow resurfaces when the upgradient reach is dry
	Santa Margarita	Zayante Creek, above confluence with Bean Creek (Bahr Drive on Figure 18)	Monitor an area where groundwater seeps out of the valley side and into Zayante Creek
	Santa Margarita	At inactive SLVWD Quail Hollow #8 extraction well site (Glen Arbor Road on Figure 18)	Monitor groundwater levels in the Quail Hollow subarea contributing to Newell Creek
	Monterey	Bean Creek, next to an existing stream gage and slightly downstream of the Lockhart Gulch confluence (Mt Hermon Road near Bean Creek on Figure 18)	Establish a correlation between groundwater and surface water levels in an area downgradient to a high concentration of private domestic users

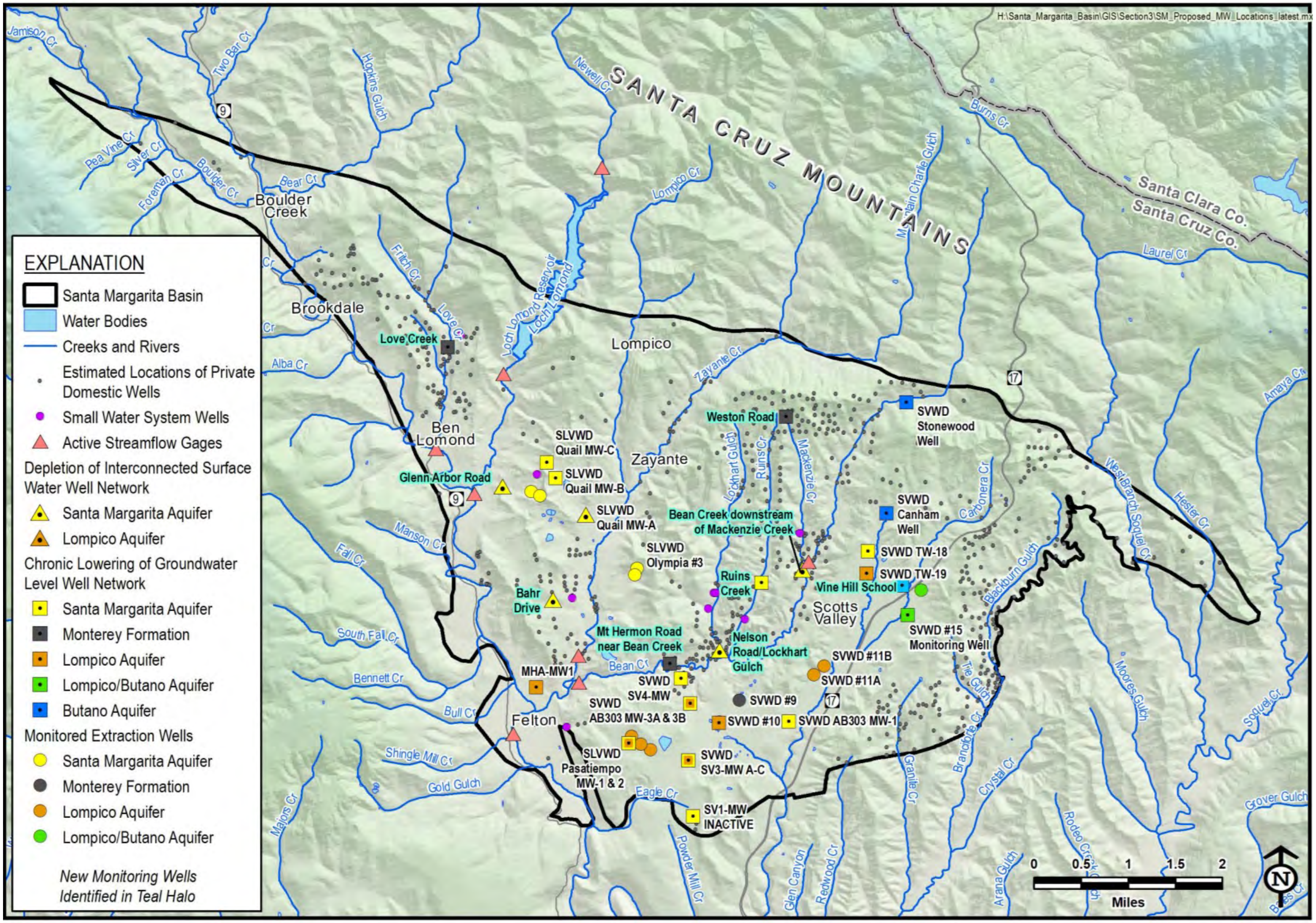


Figure 18. New Monitoring Wells (Teal Label) in Relation to Existing Monitoring Features and Private Wells

4.6.2 Groundwater Extraction Monitoring Improvements

As part of GSP implementation, the SMGWA will initiate a new well metering program requiring measurement and reporting of all non-*de minimis* groundwater extraction greater than 2 AFY. Currently active non-municipal extractors using more than 2 AFY include the Quail Hollow Quarry, those that pump groundwater for large scale irrigation or to fill landscape ponds, and small water systems with more than 5 connections. Small water systems with more than 5 connections have been metered since 2015. A non-*de minimis* metering program will likely be developed over WY2022 and 2023 and implemented once complete.

4.6.3 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 insufficient because some analytes are only sampled once every 3 years per State Water Resources Control Board Division of Drinking Water requirements. Increasing the frequency of groundwater quality sampling will generate a better data set that can be used to detect degradation of groundwater quality from projects and management actions implemented to achieve the Basin's sustainability goals. SLVWD will increase the sampling frequency on the groundwater quality RMP wells (Olympia #3 and Quail Hollow #4A).

4.6.4 Streamflow Monitoring Improvements

During GSP development, streamflow monitoring data gaps were identified. To address the data gaps, 3 streamflow gages were upgraded, and 2 new gages were installed and calibrated early in 2021. The gages are being monitored by the SMGWA and where possible will be paired with new monitoring wells to be constructed in 2022 (see Section 4.6.1). There is one streamflow monitoring data gap of lower priority identified near Carbonera Creek which is not as connected to groundwater as most other creeks in the Basin. This is a lower priority data gap to be addressed as funding becomes available.

REFERENCES

City of Santa Cruz, 2016. 2015 Urban Water Management Plan, August. Accessed September 20, 2021. https://www.cityofsantacruz.com/home/showpublisheddocument/55168/636084244271470000

[DWR] California Department of Water Resources, 2016. Bulletin 118 Interim Update 2016. December 22. Accessed June 5, 2020. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/B118-Interim-Update-2016_ay_19.pdf

Exponent, 2019. Water Availability Assessment for San Lorenzo River Watershed Conjunctive Use Plan. Prepared for San Lorenzo Valley Water District. Accessed June 17, 2021. https://www.slvwd.com/sites/g/files/vyhlif1176/f/uploads/water_availability_assessment_v3_with_tables_figures_0.pdf

Santa Margarita Groundwater Agency (SMGWA), 2021. Santa Margarita Groundwater Agency Groundwater Sustainability Plan. November.

[SLVWD] San Lorenzo Valley Water District, 2020. San Lorenzo Valley Water District Budget FY 2020/21. June 2020. Accessed September 20, 2021. https://www.slvwd.com/sites/g/files/vyhlif1176/f/uploads/fy2021_budget_package_final.pdf

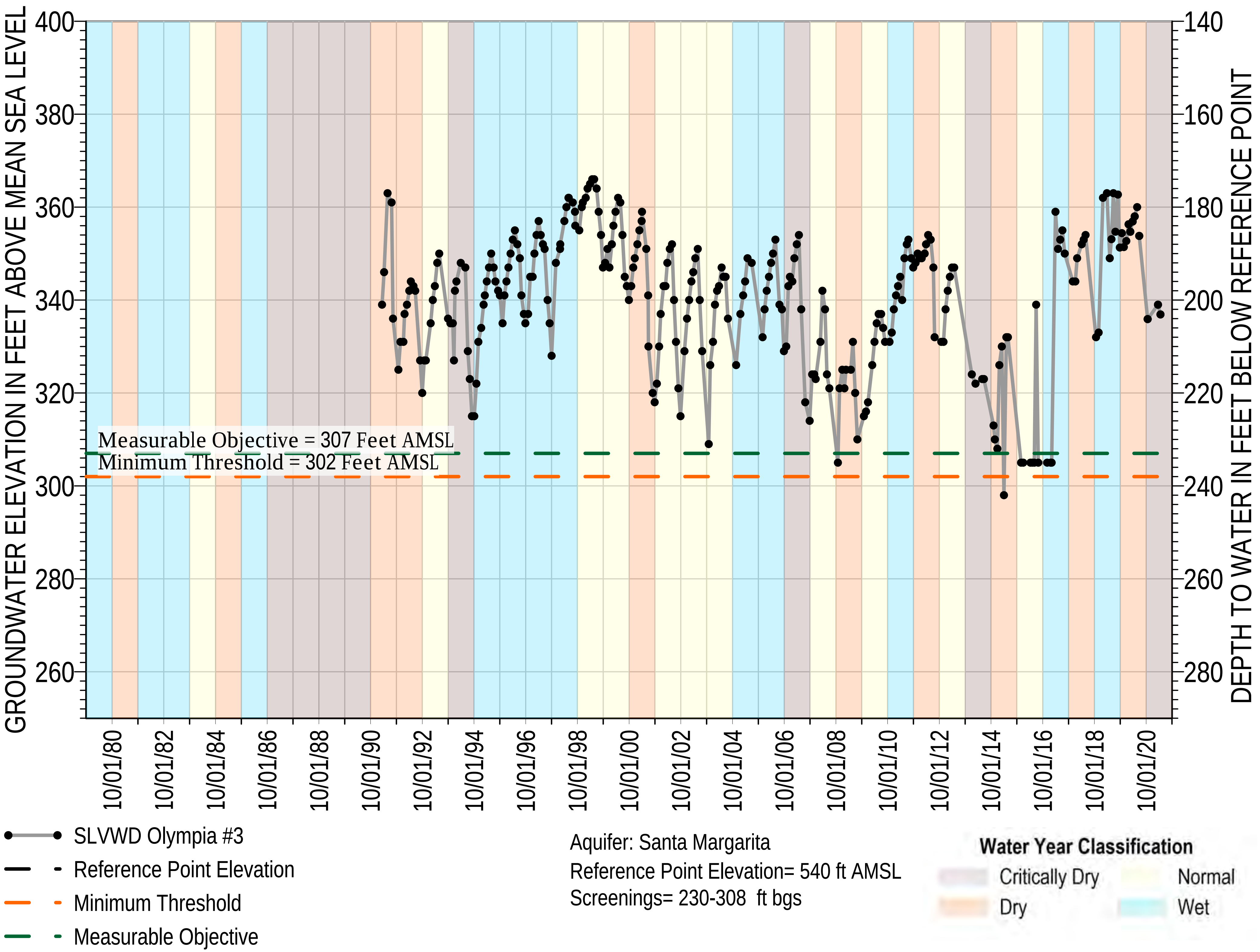
U.S. Census Bureau, 2021. Decennial Census Total Population, 2020 Census Redistricting Data (Public Law 94-171). https://data.census.gov/cedsci/table?q=scotts%20valley,%20ca%20population&y=2020&tid=DECENNIALPL2020.P1

[WSC and M&A] Water Systems Consulting, Inc. and Montgomery & Associates, 2021. 2020 Urban Water Management Plan for the Scotts Valley Water District and San Lorenzo Valley Water District, July. Accessed September 20, 2021. https://www.svwd.org/sites/default/files/documents/reports/UWMP_2020.pdf

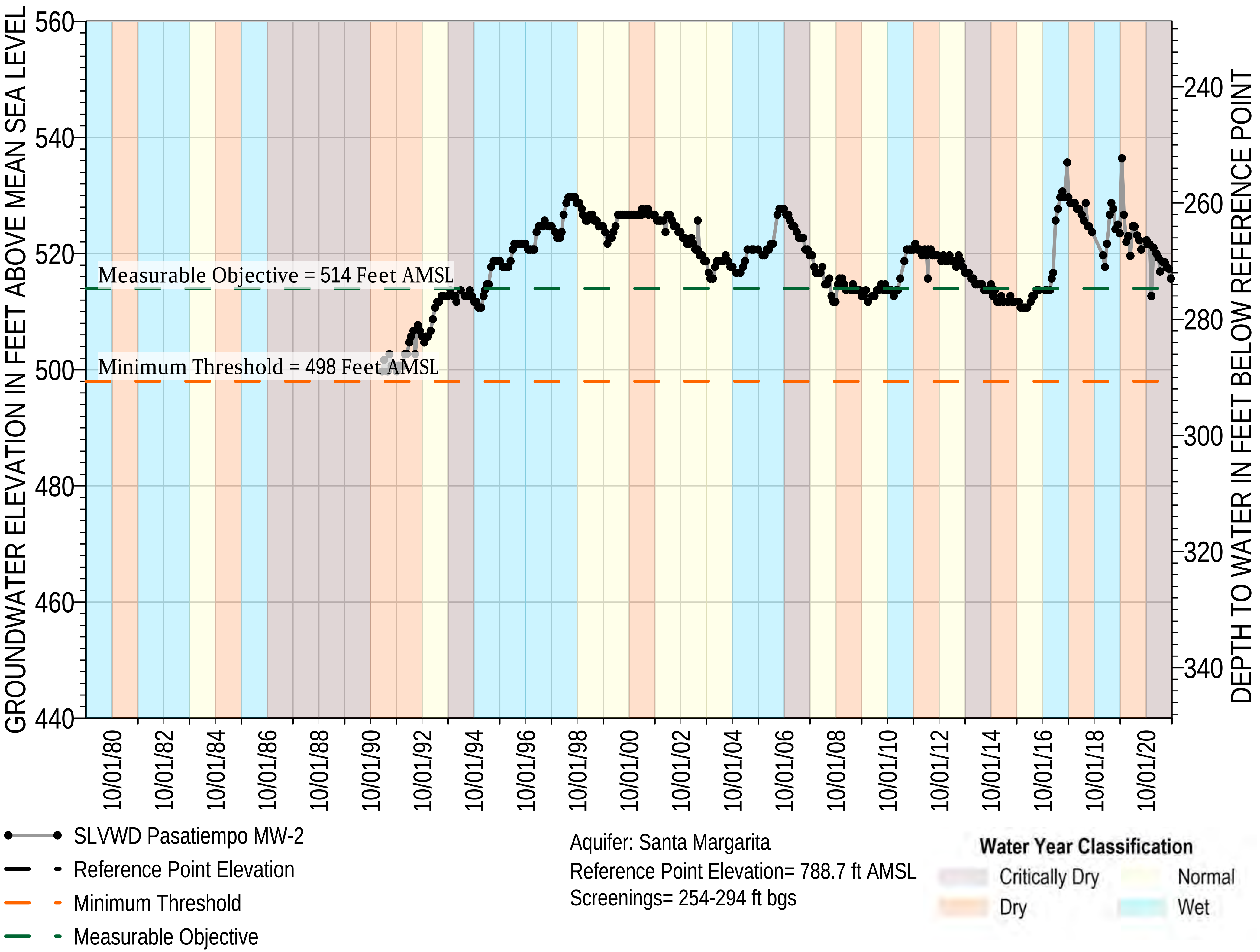
Appendix A

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

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.



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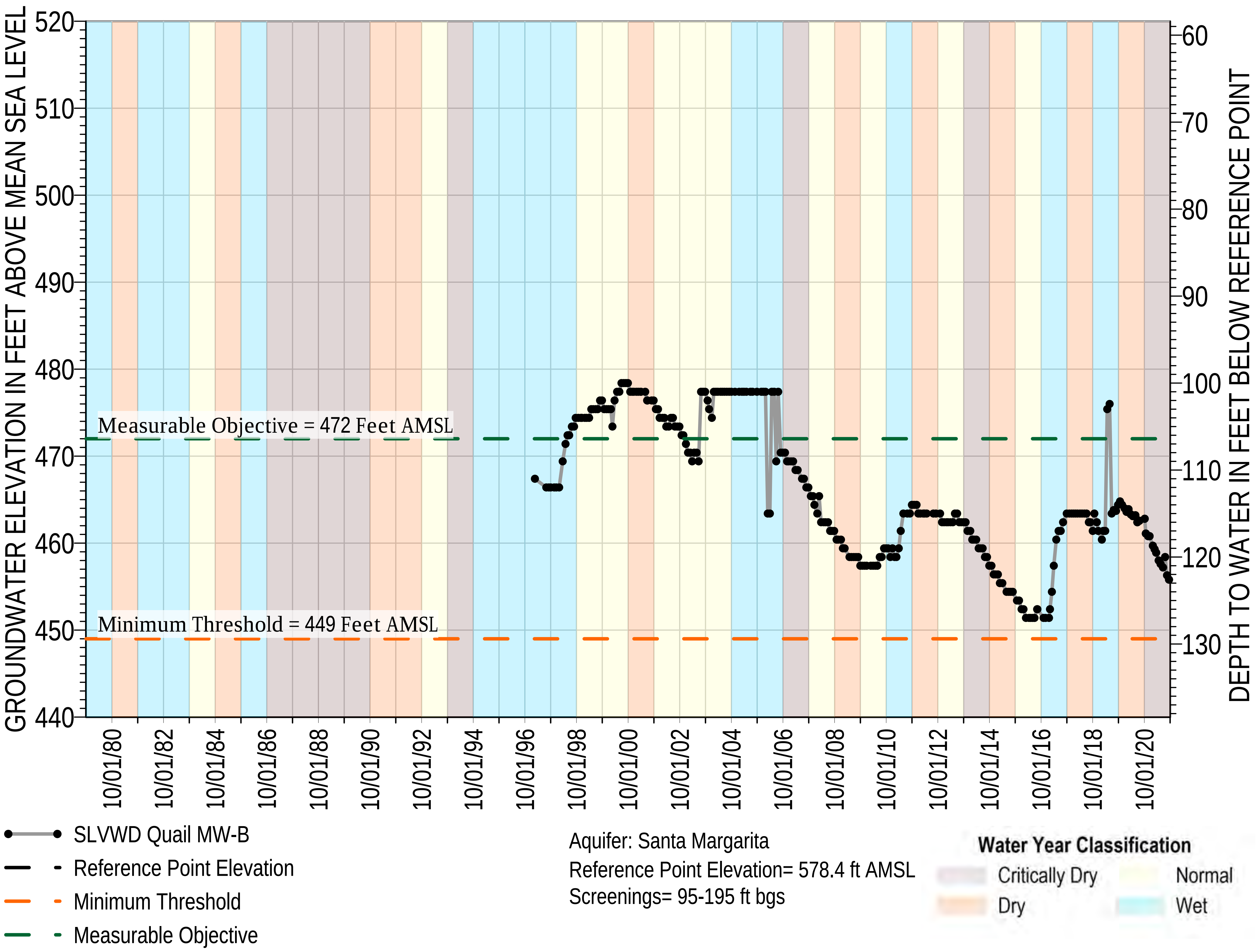
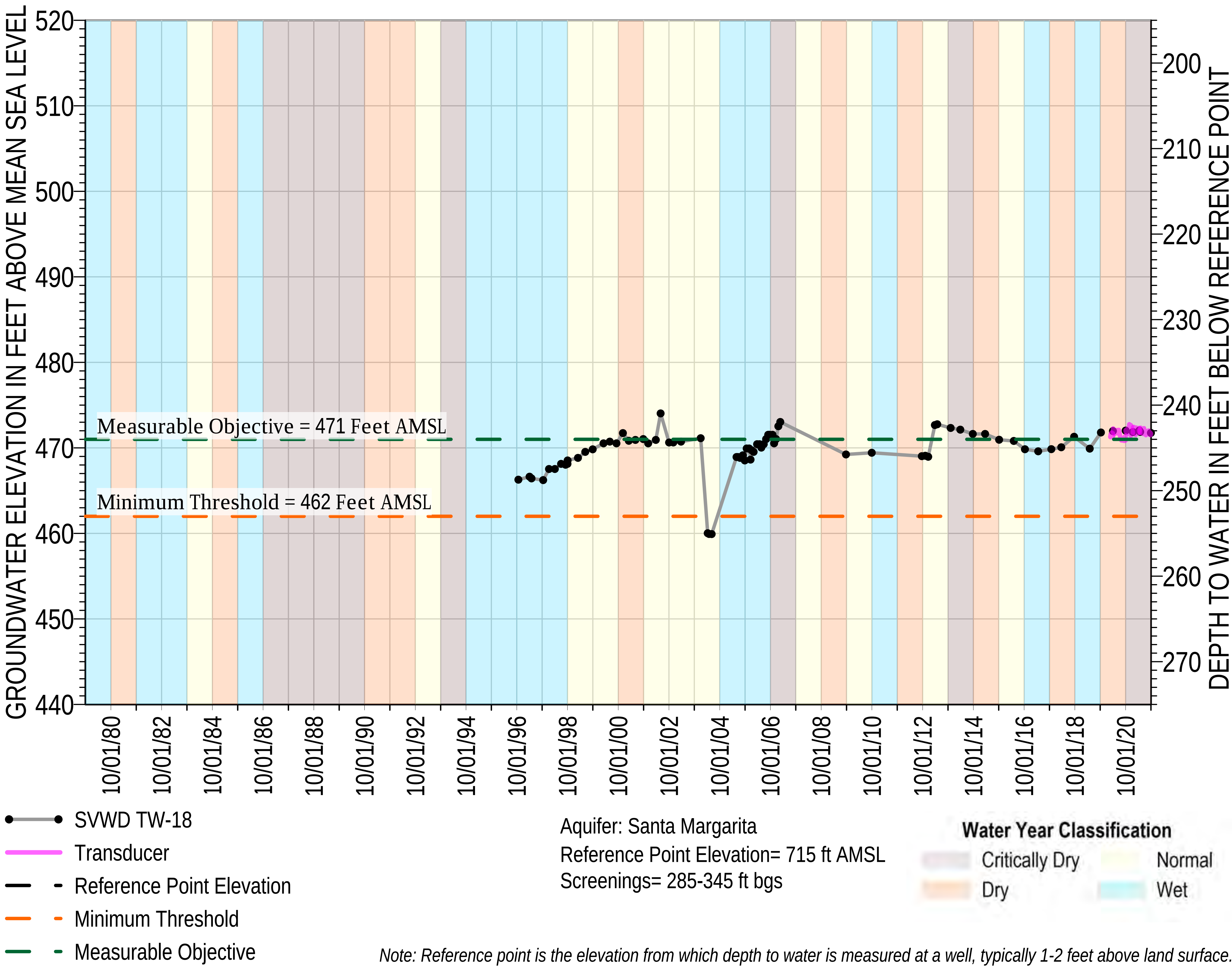


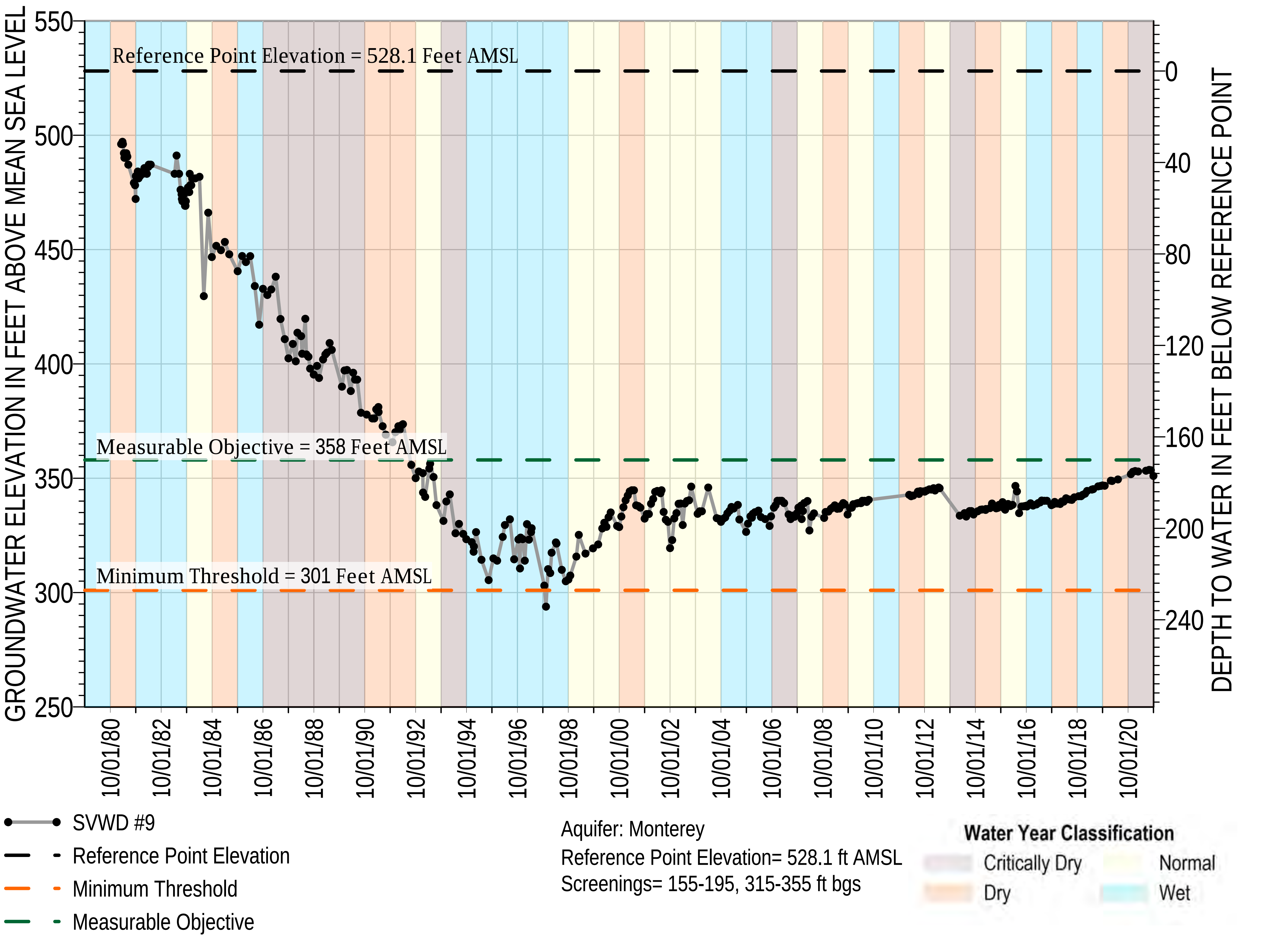
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.



Aquifer: Santa Margarita
Reference Point Elevation= 715 ft AMSL
Screenings= 285-345 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.

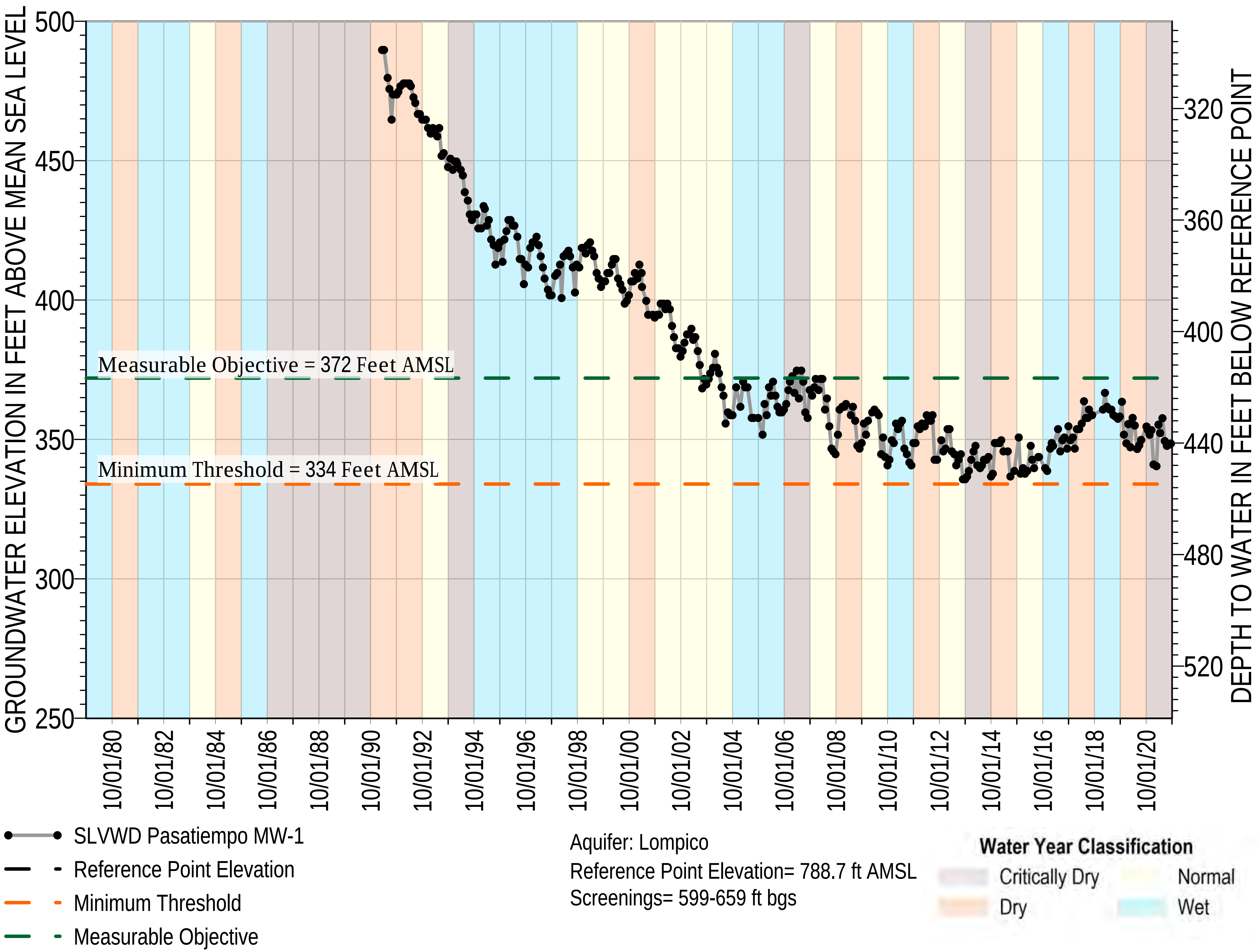
Monterey Formation



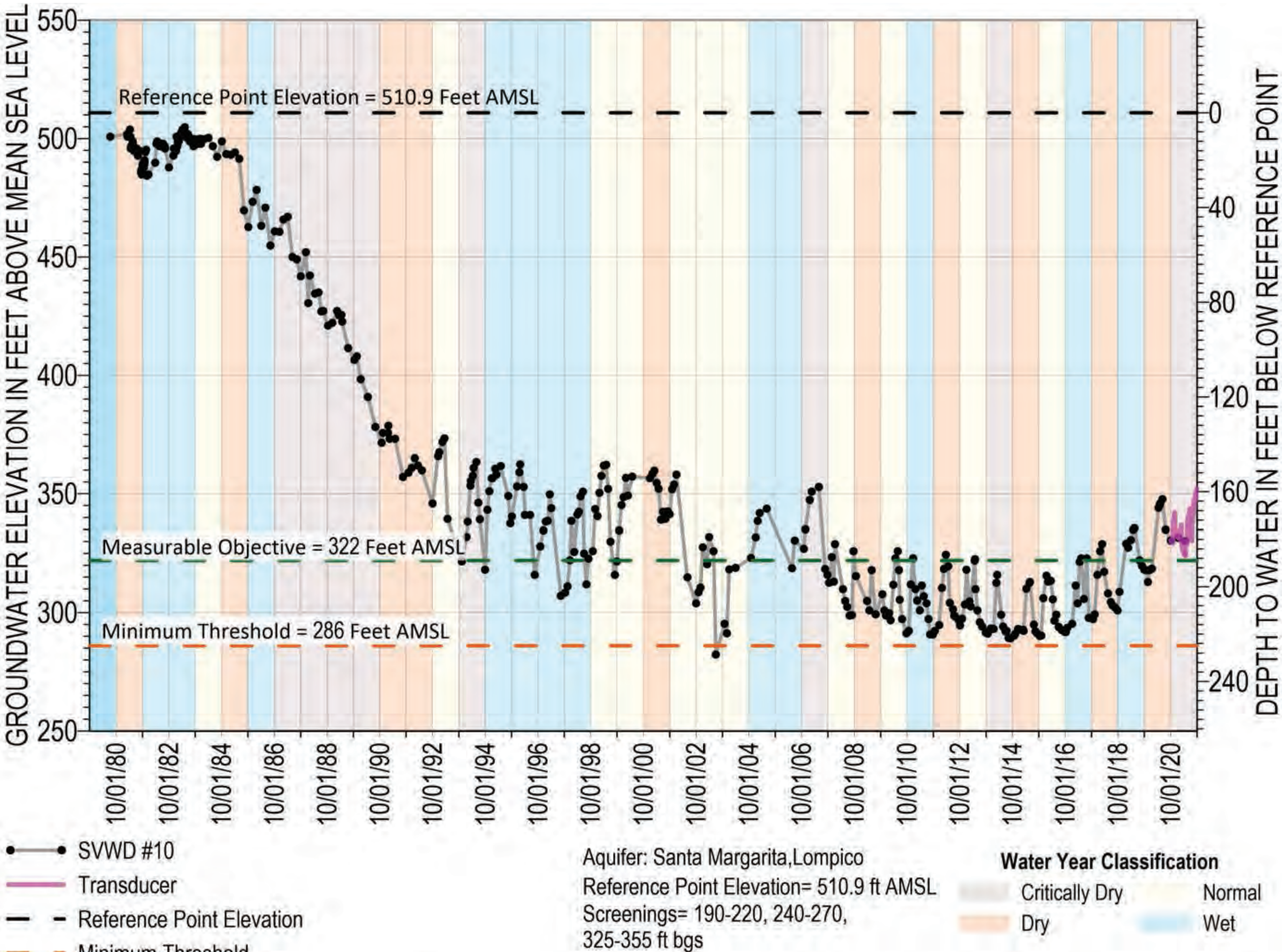
Aquifer: Monterey
Reference Point Elevation= 528.1 ft AMSL
Screenings= 155-195, 315-355 ft bgs

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

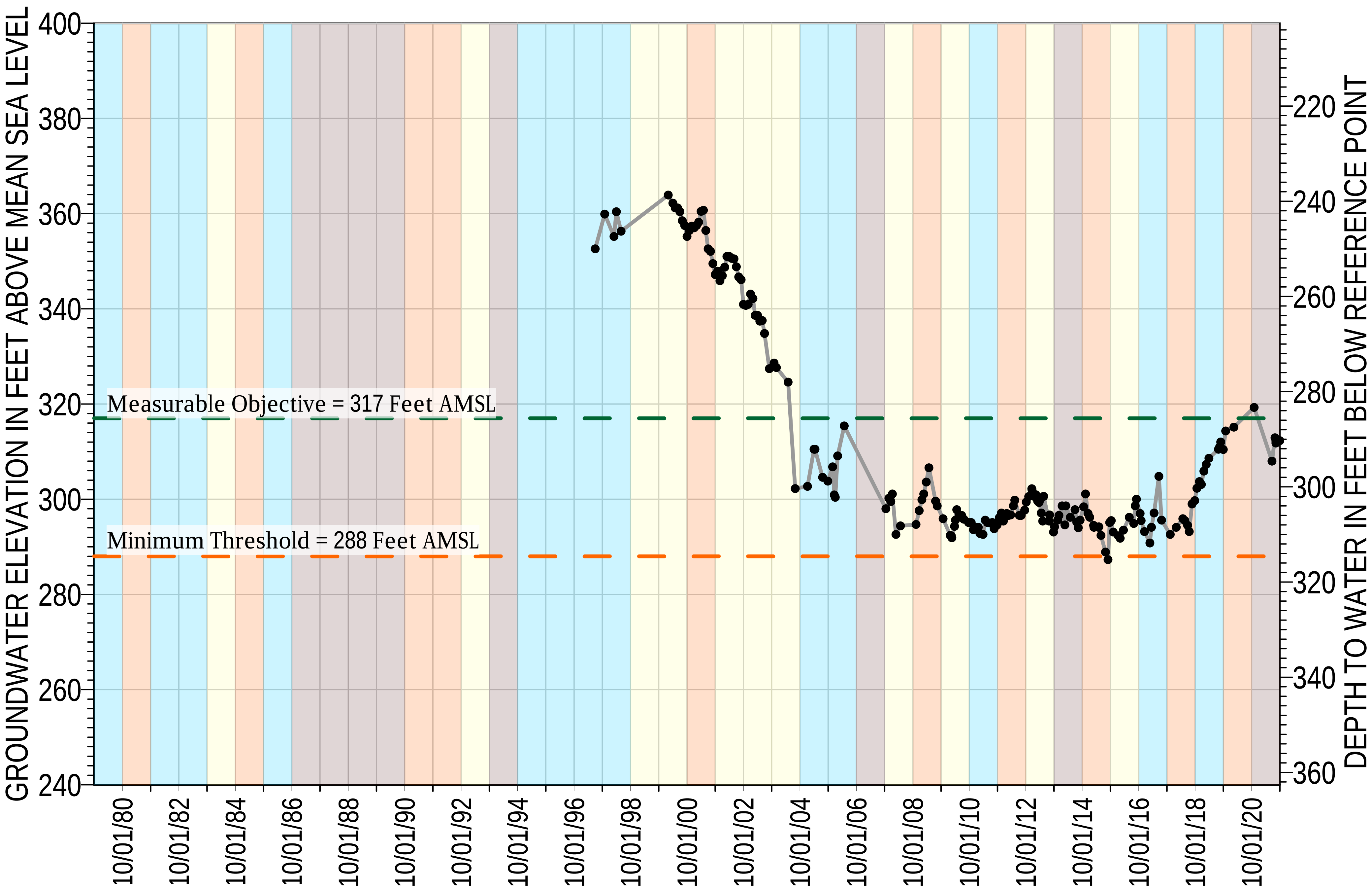
Lompico Sandstone



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

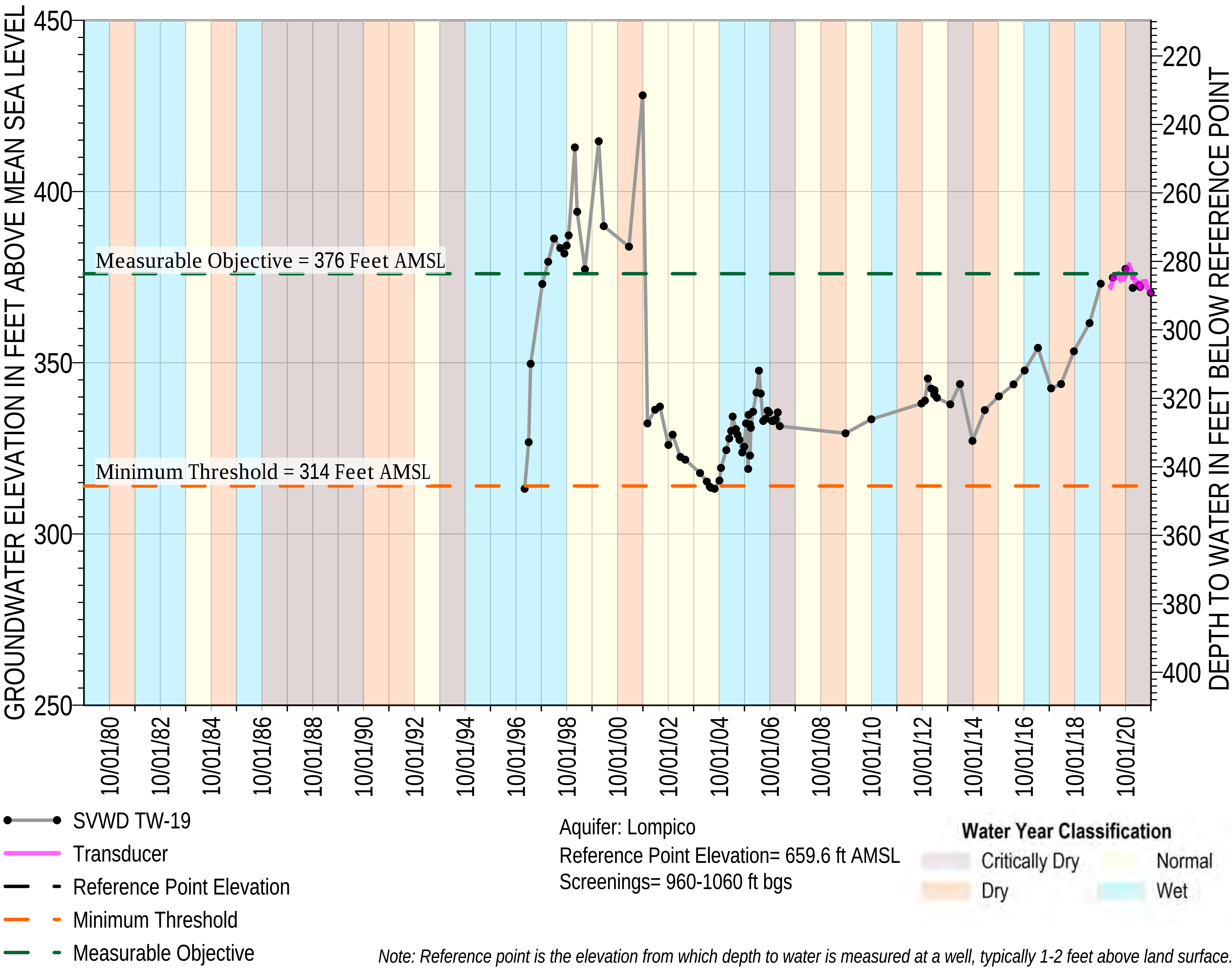


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



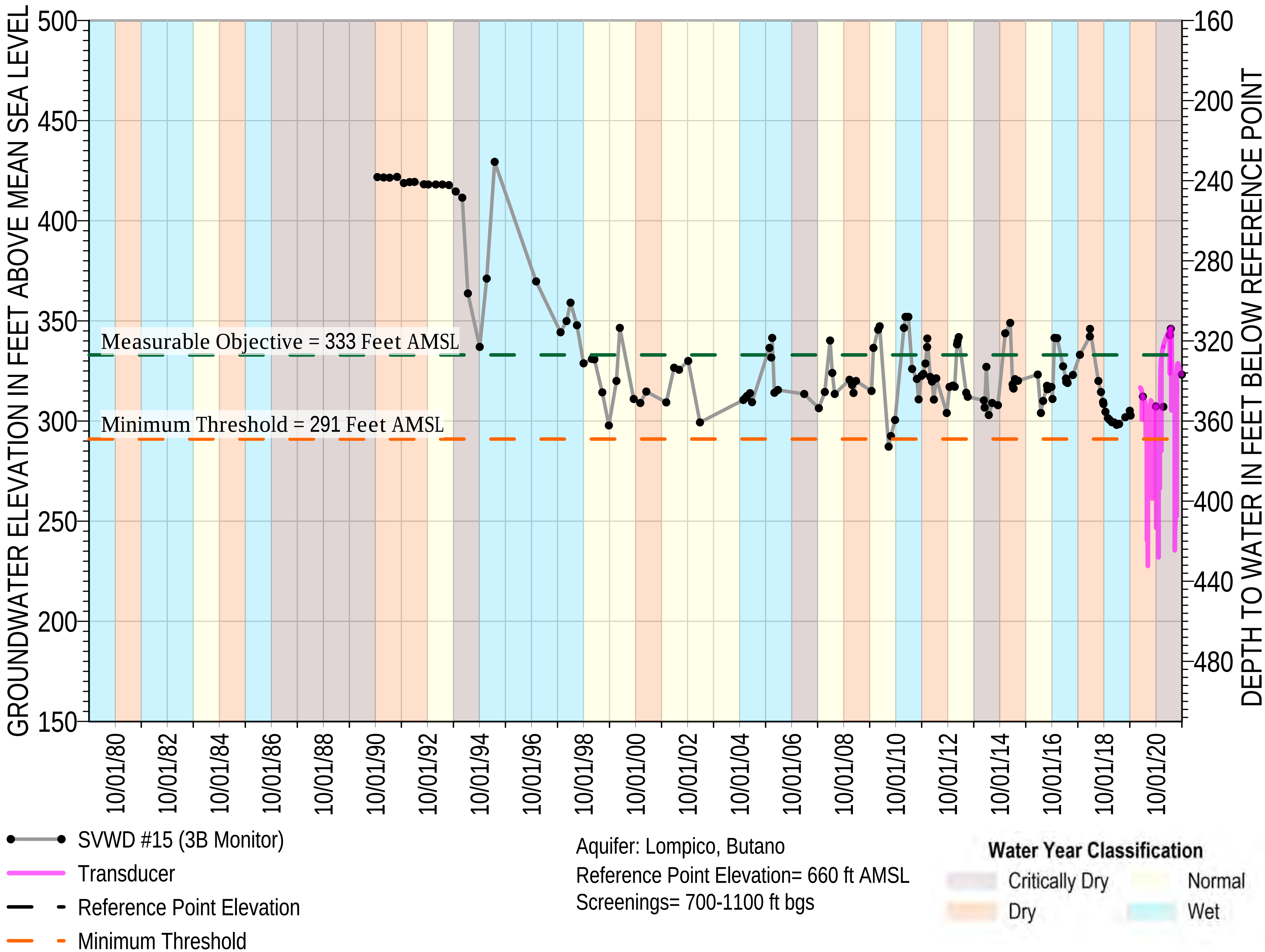
Aquifer: Lompico
Reference Point Elevation= 602.6 ft AMSL
Screenings= 399-419, 459-469, 495-515 ft bgs

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



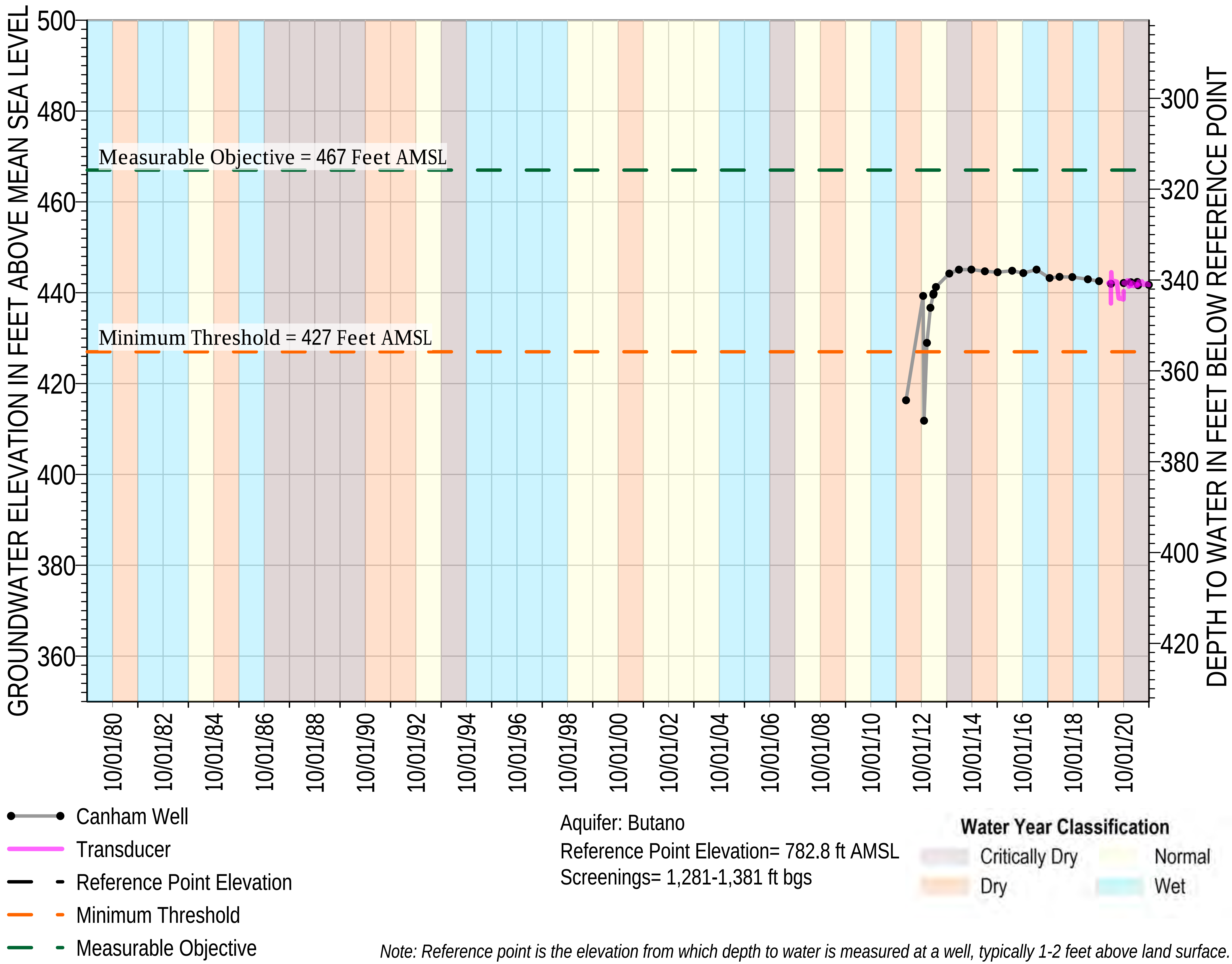
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

Lompico/Butano Sandstones



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

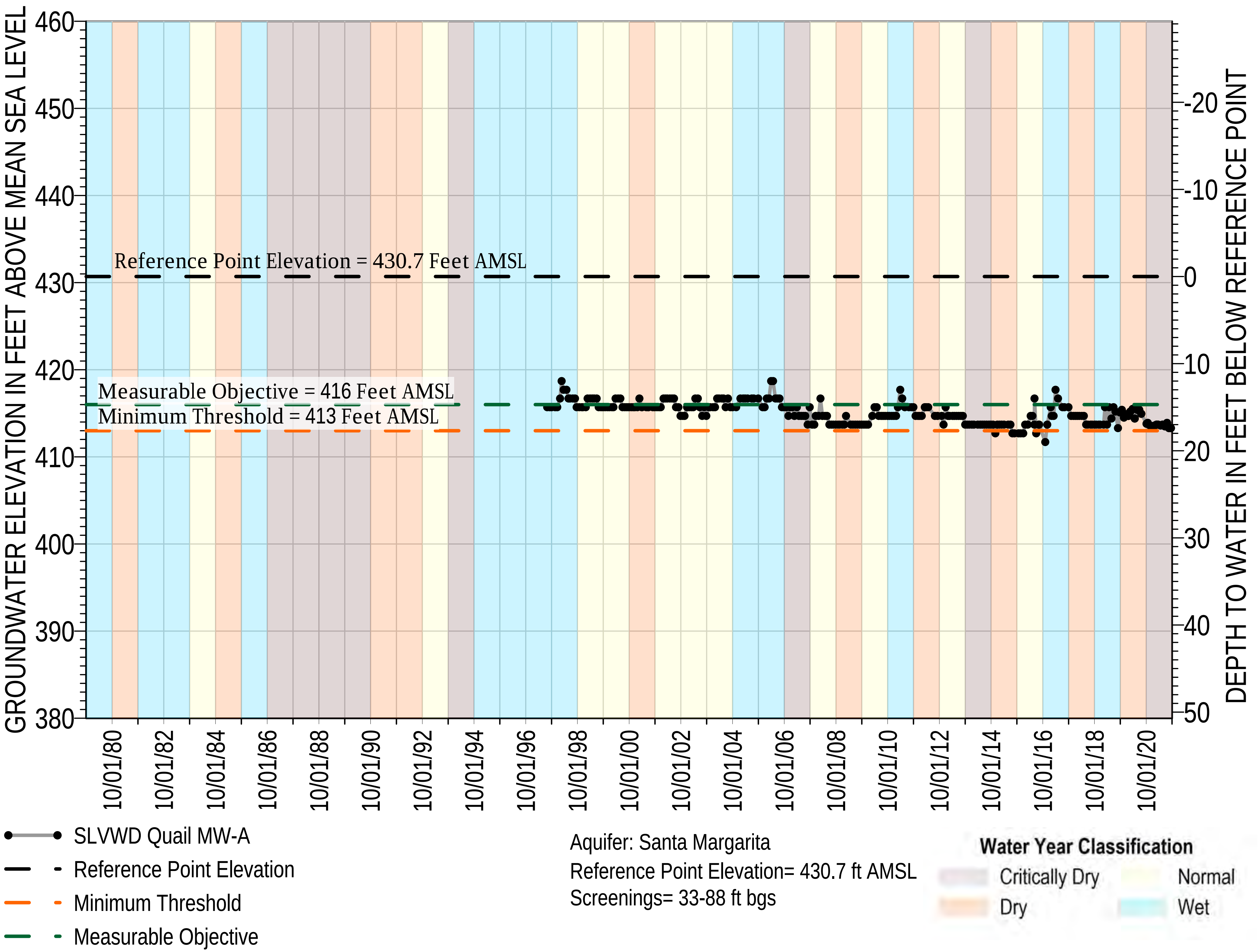
Butano Sandstone



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

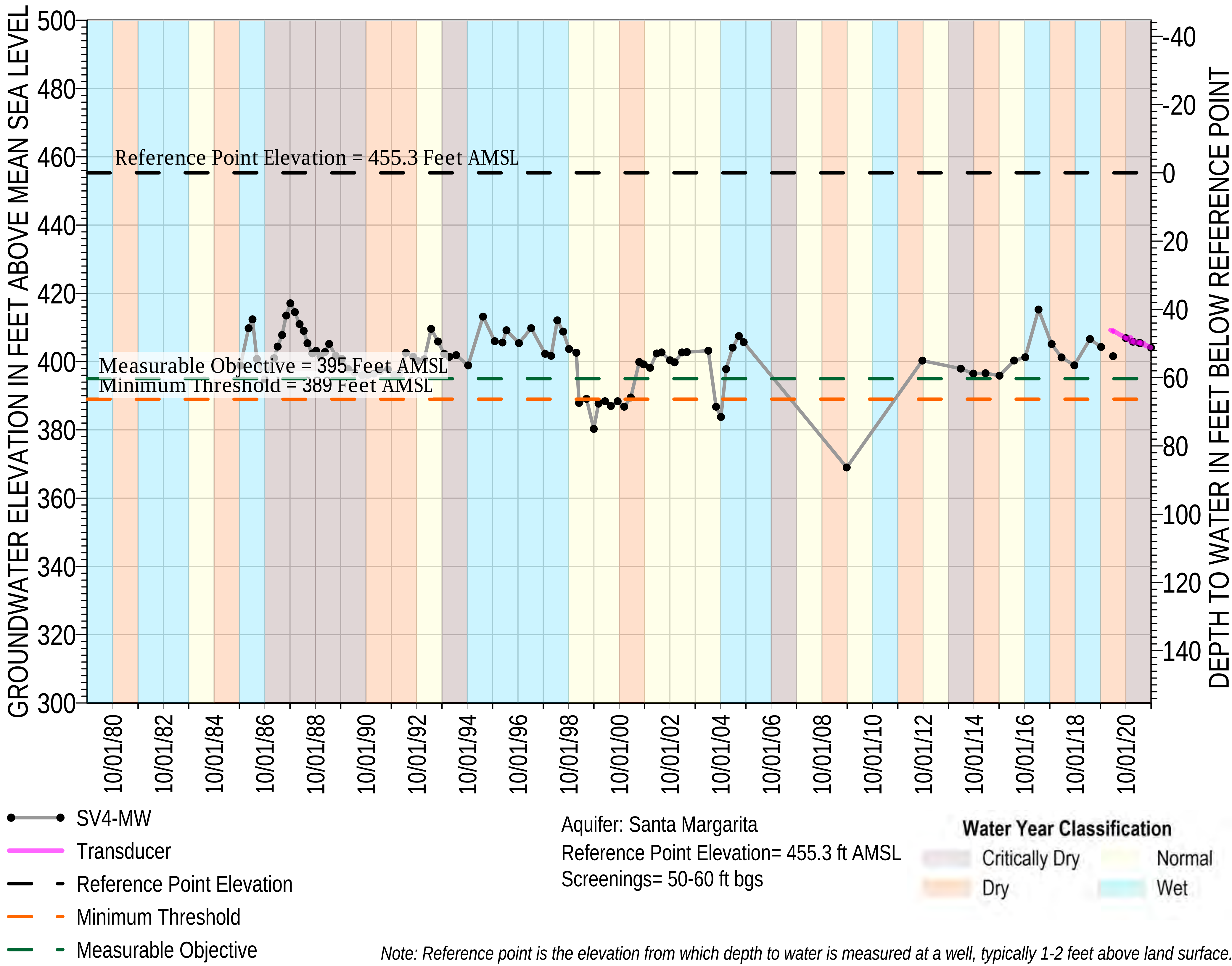
Appendix B

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



Aquifer: Santa Margarita
Reference Point Elevation= 430.7 ft AMSL
Screenings= 33-88 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.

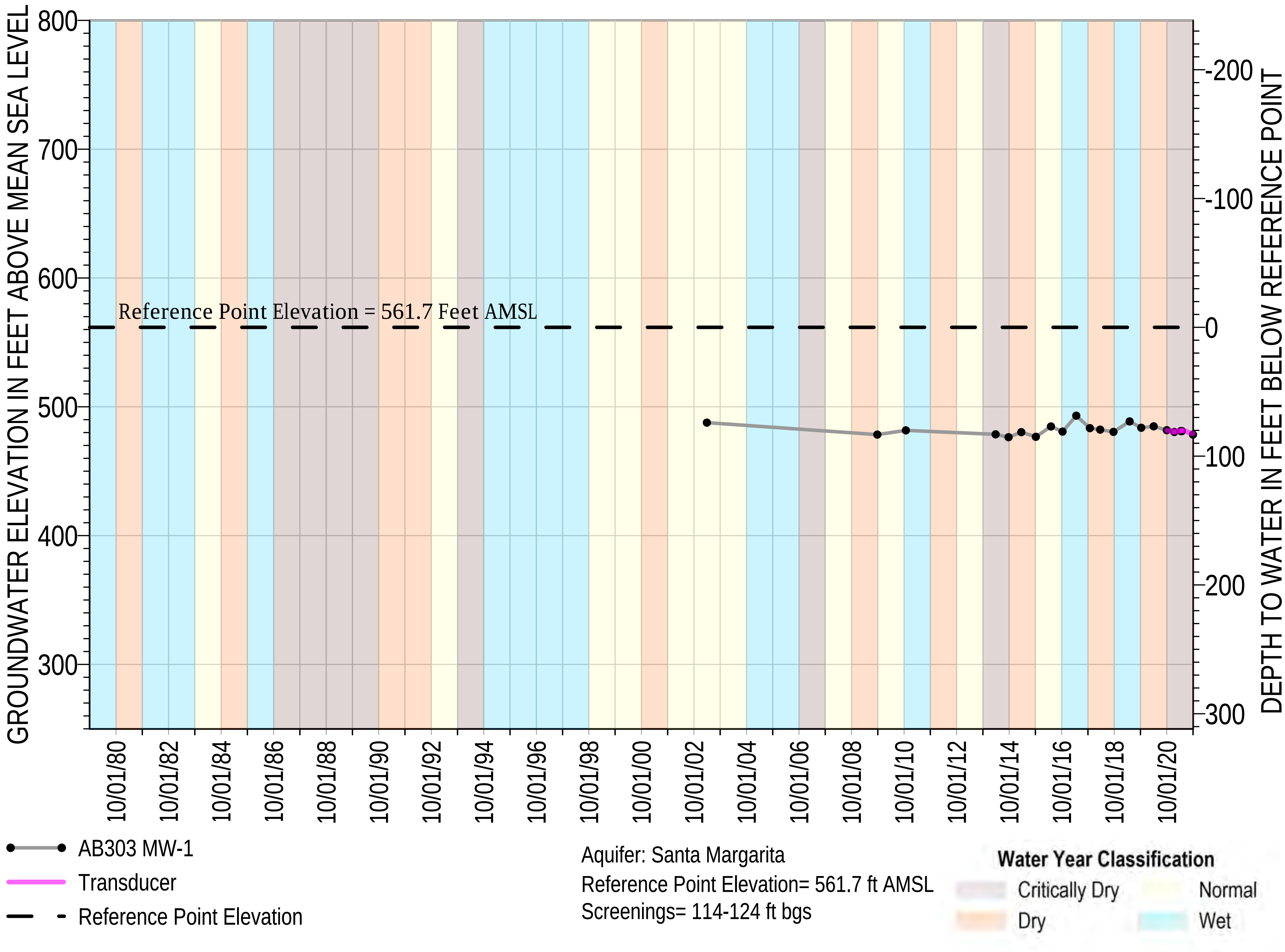


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

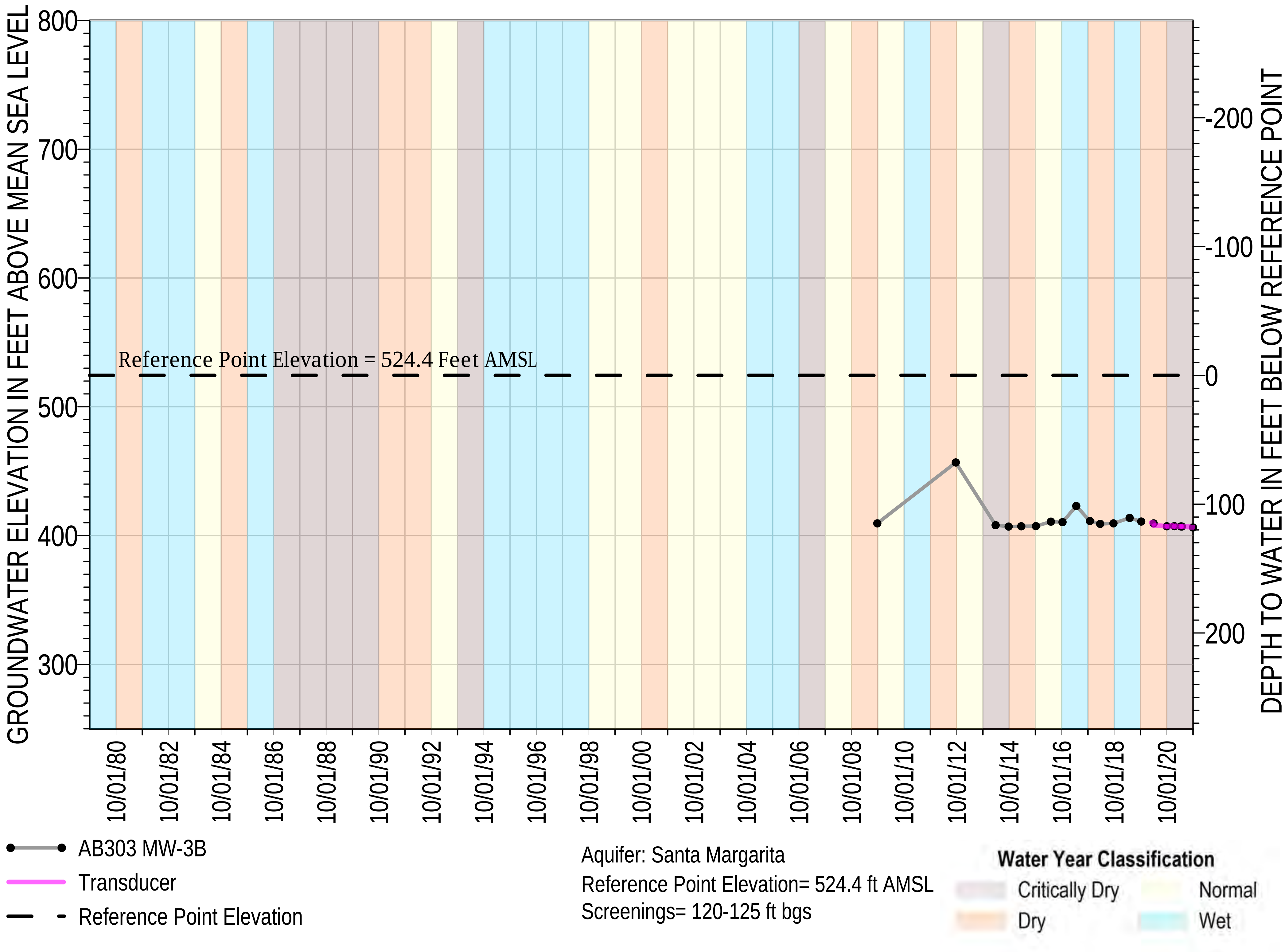
Appendix C

GSP Monitoring Network Hydrographs

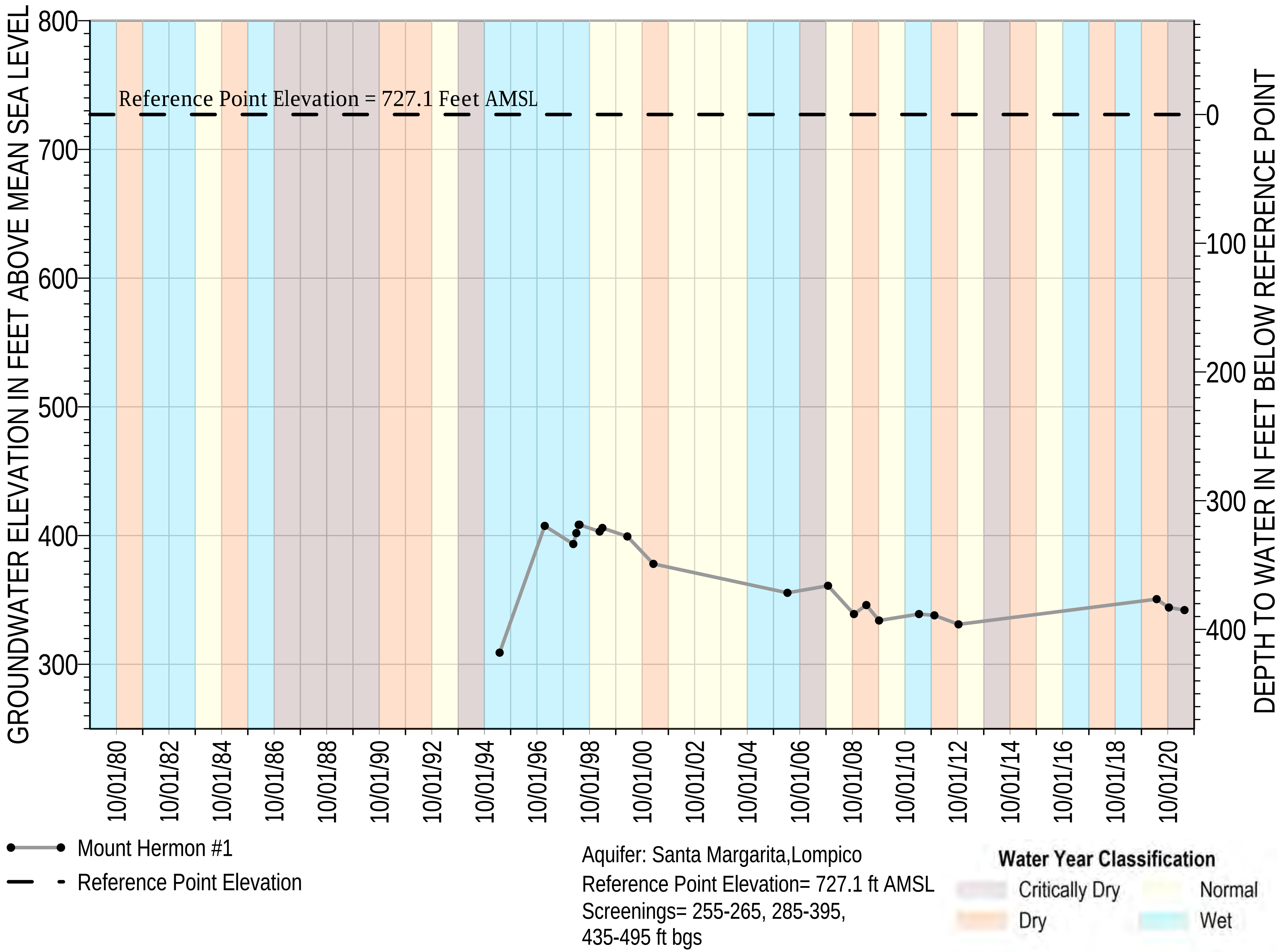
Santa Margarita Sandstone



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

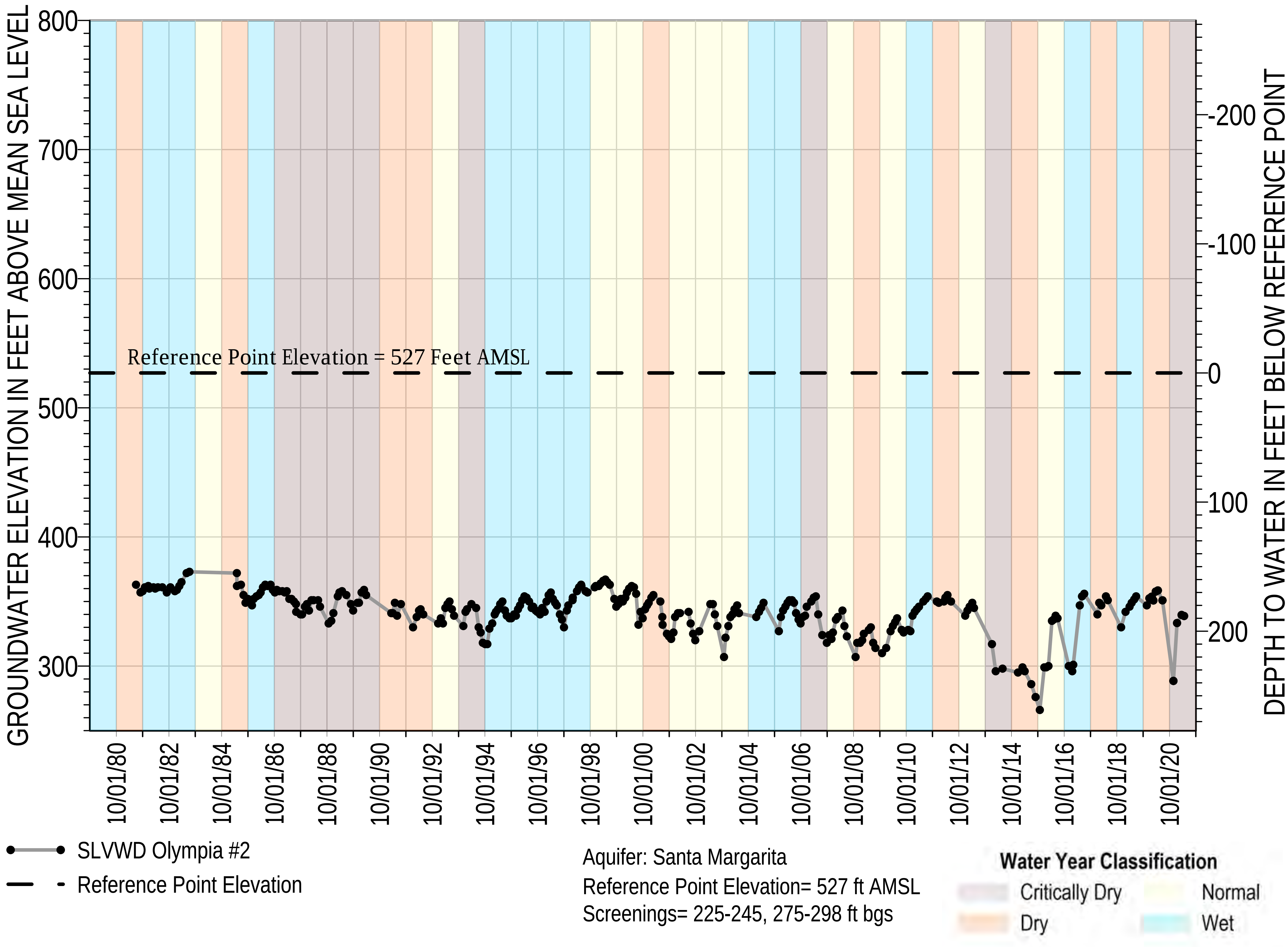


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



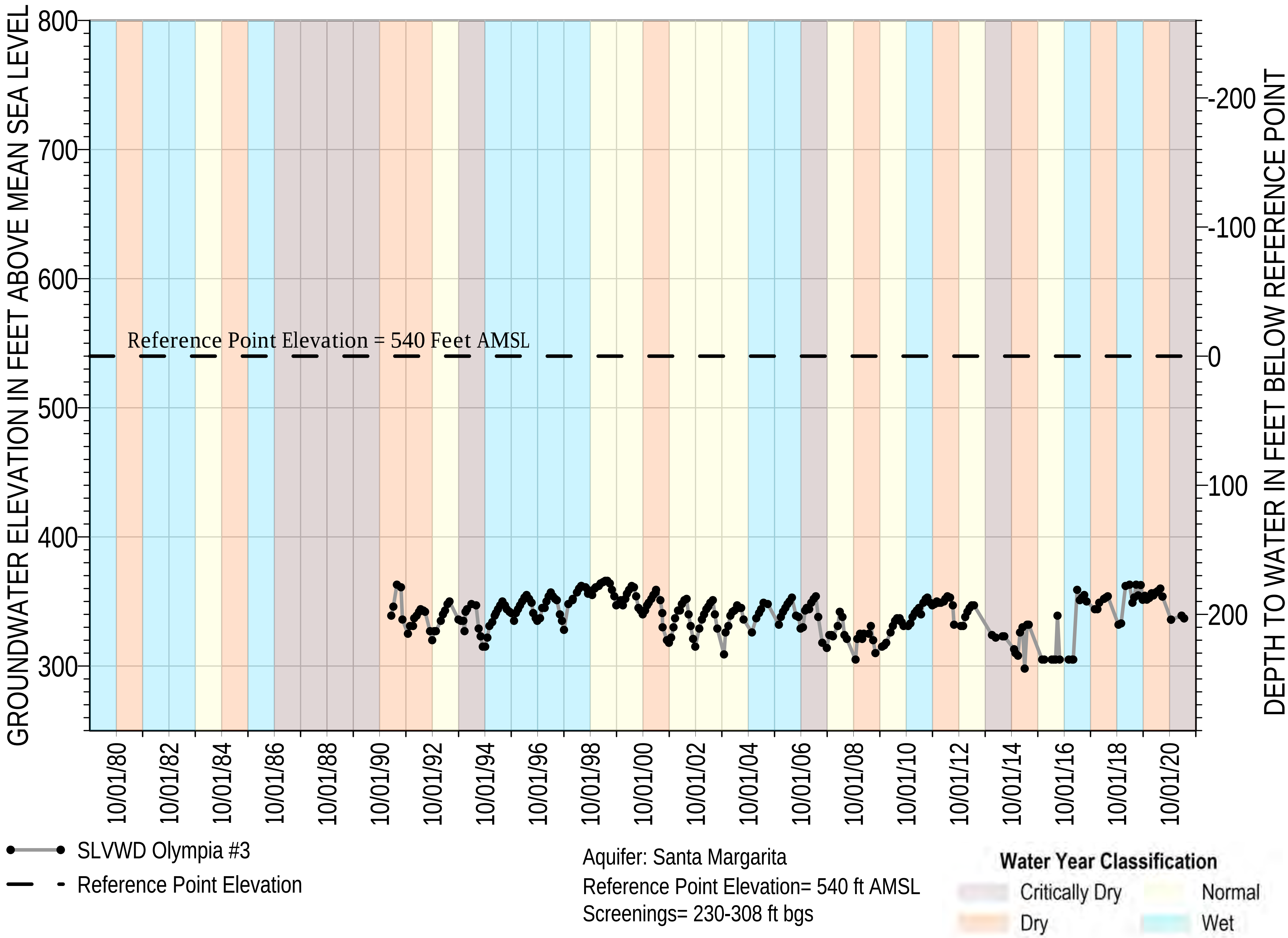
Aquifer: Santa Margarita,Lompico
Reference Point Elevation= 727.1 ft AMSL
Screenings= 255-265, 285-395, 435-495 ft bgs

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

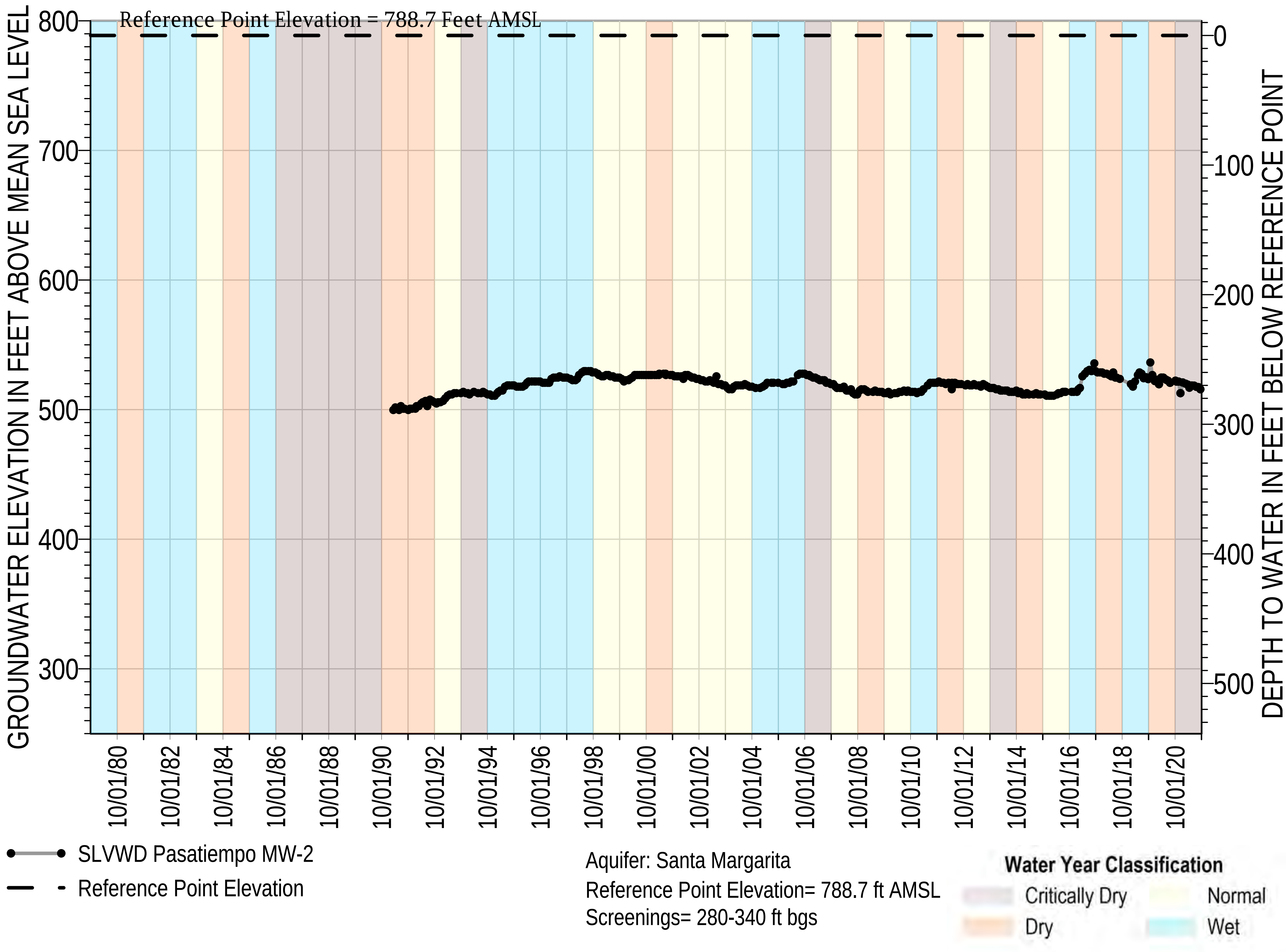


Aquifer: Santa Margarita
Reference Point Elevation= 527 ft AMSL
Screenings= 225-245, 275-298 ft bgs

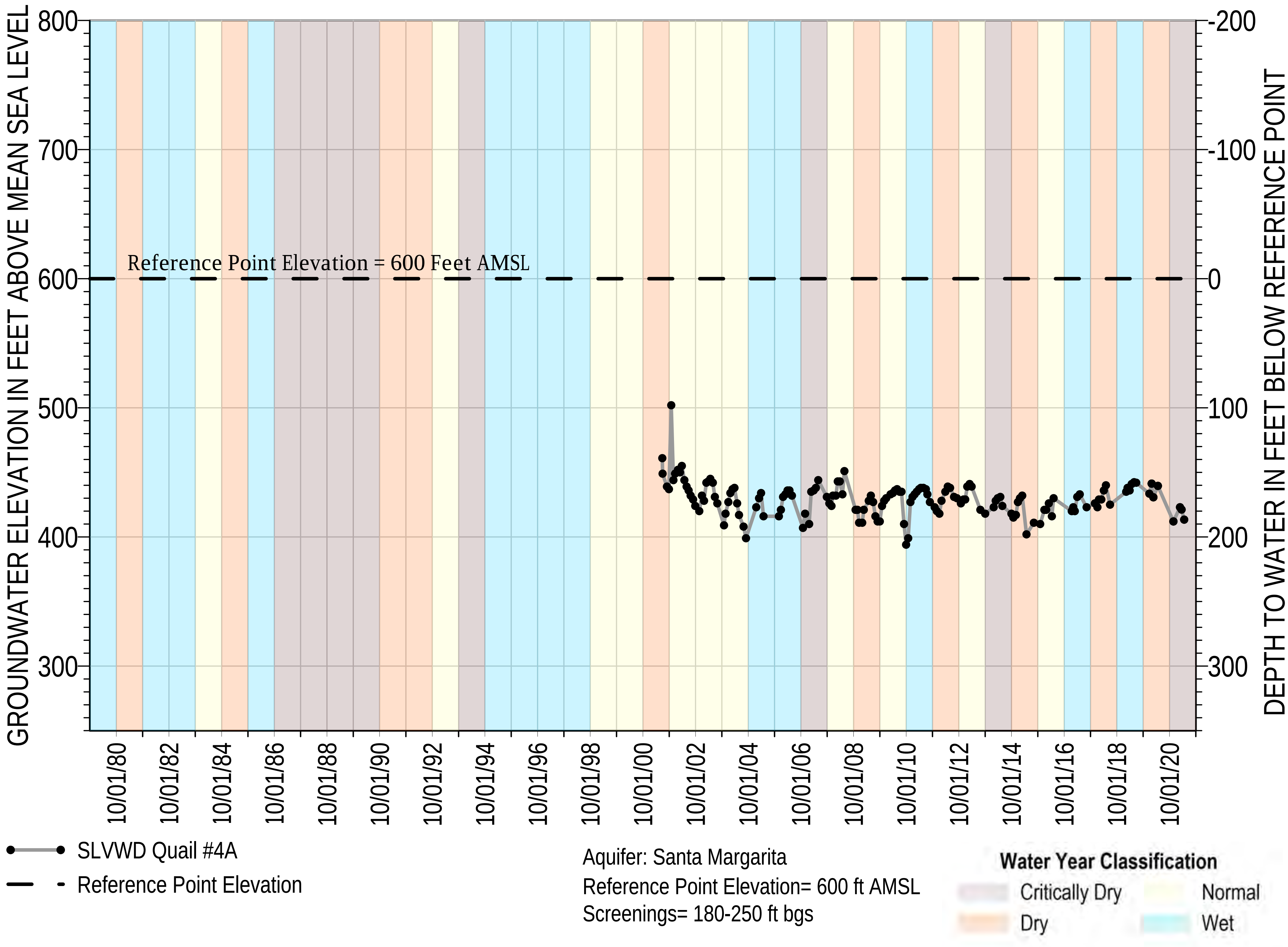
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



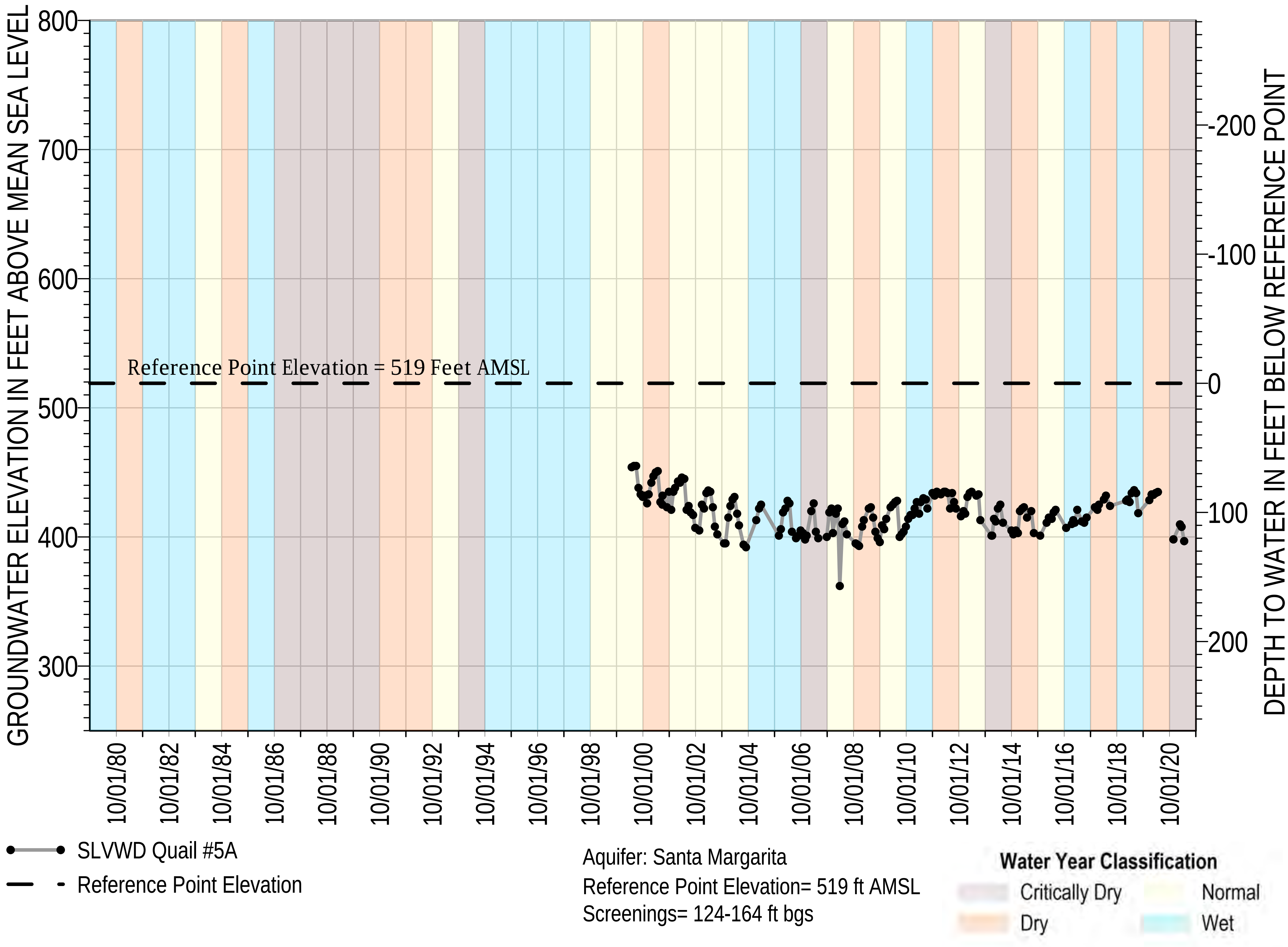
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



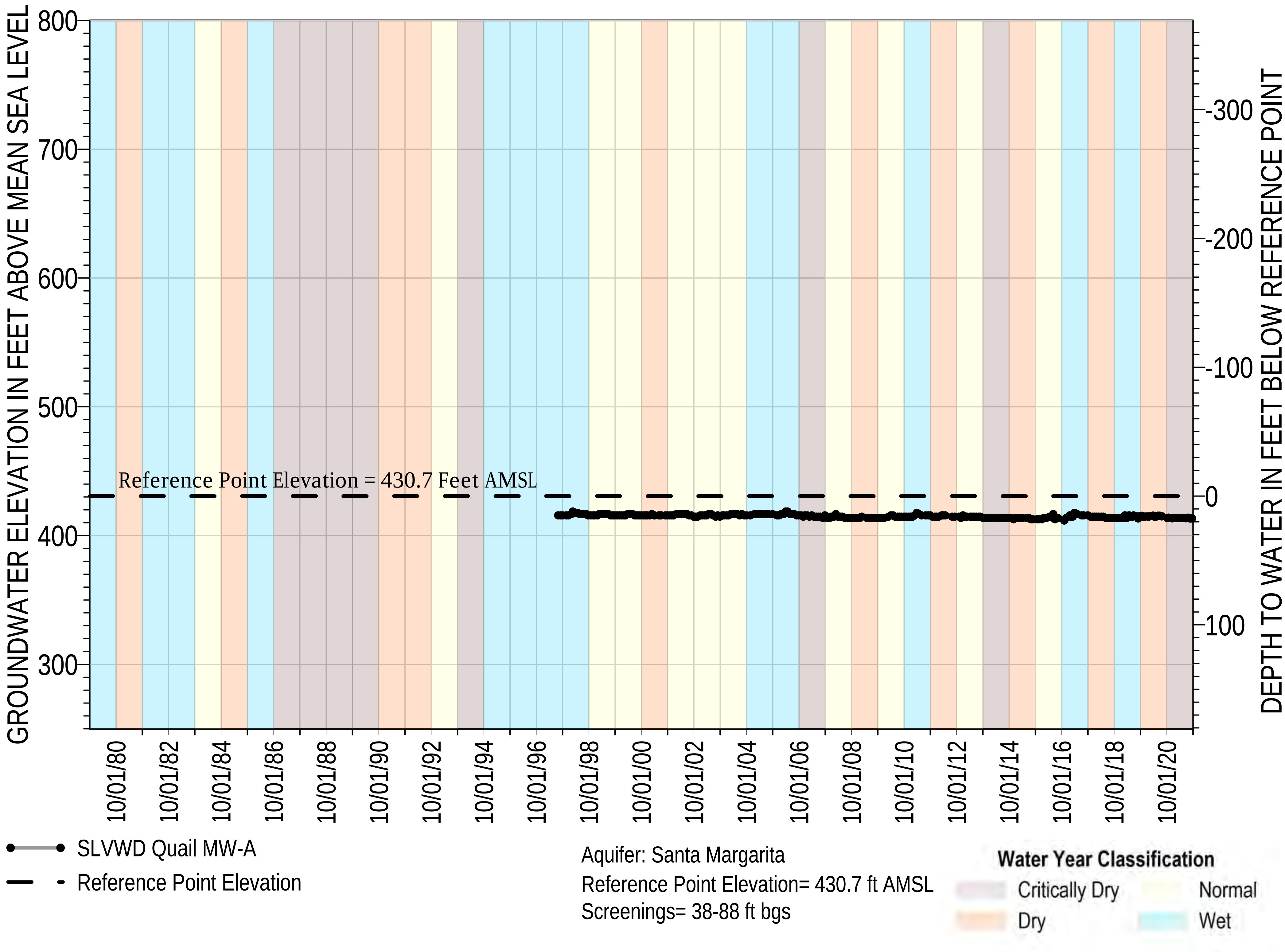
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



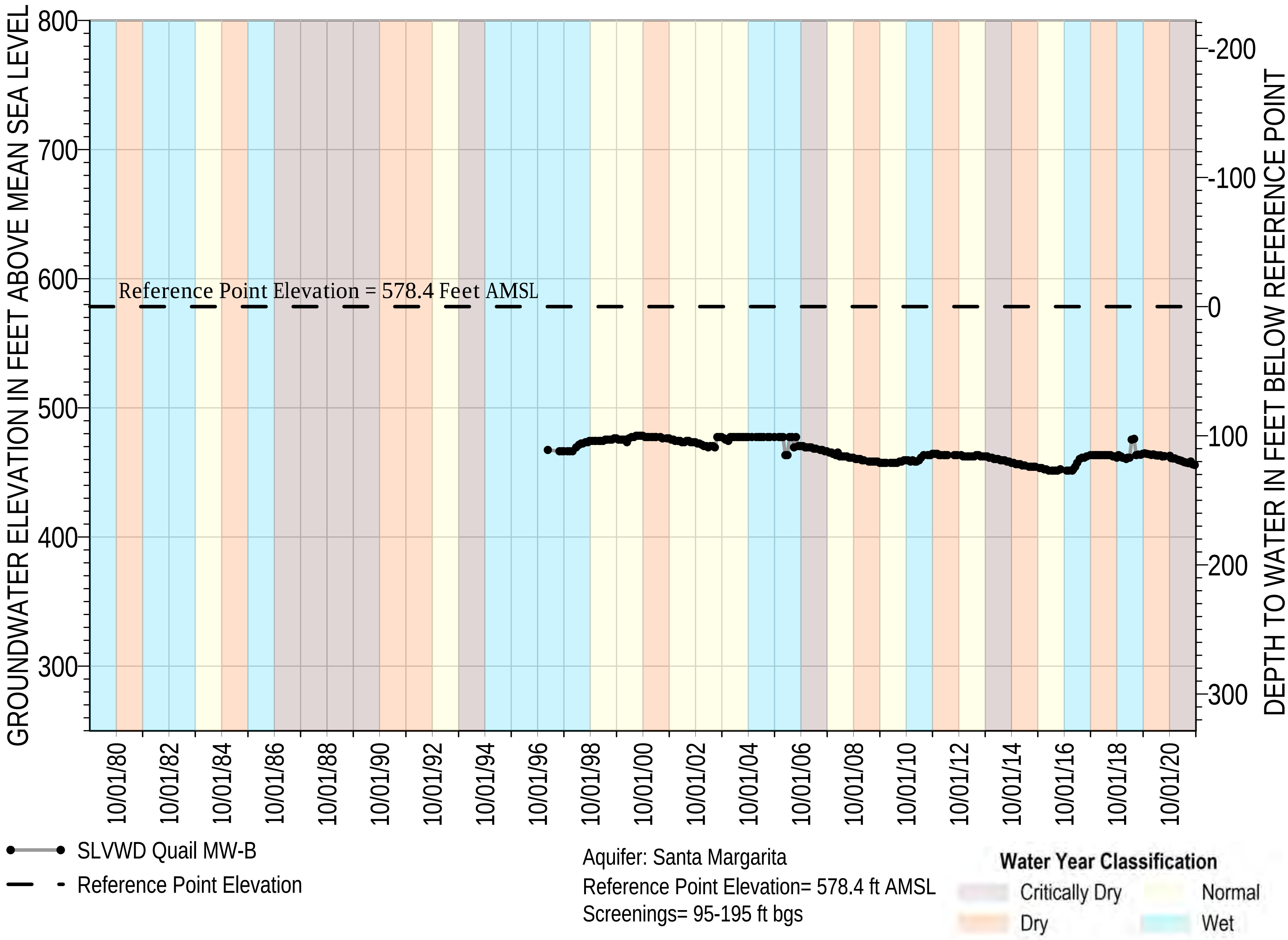
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



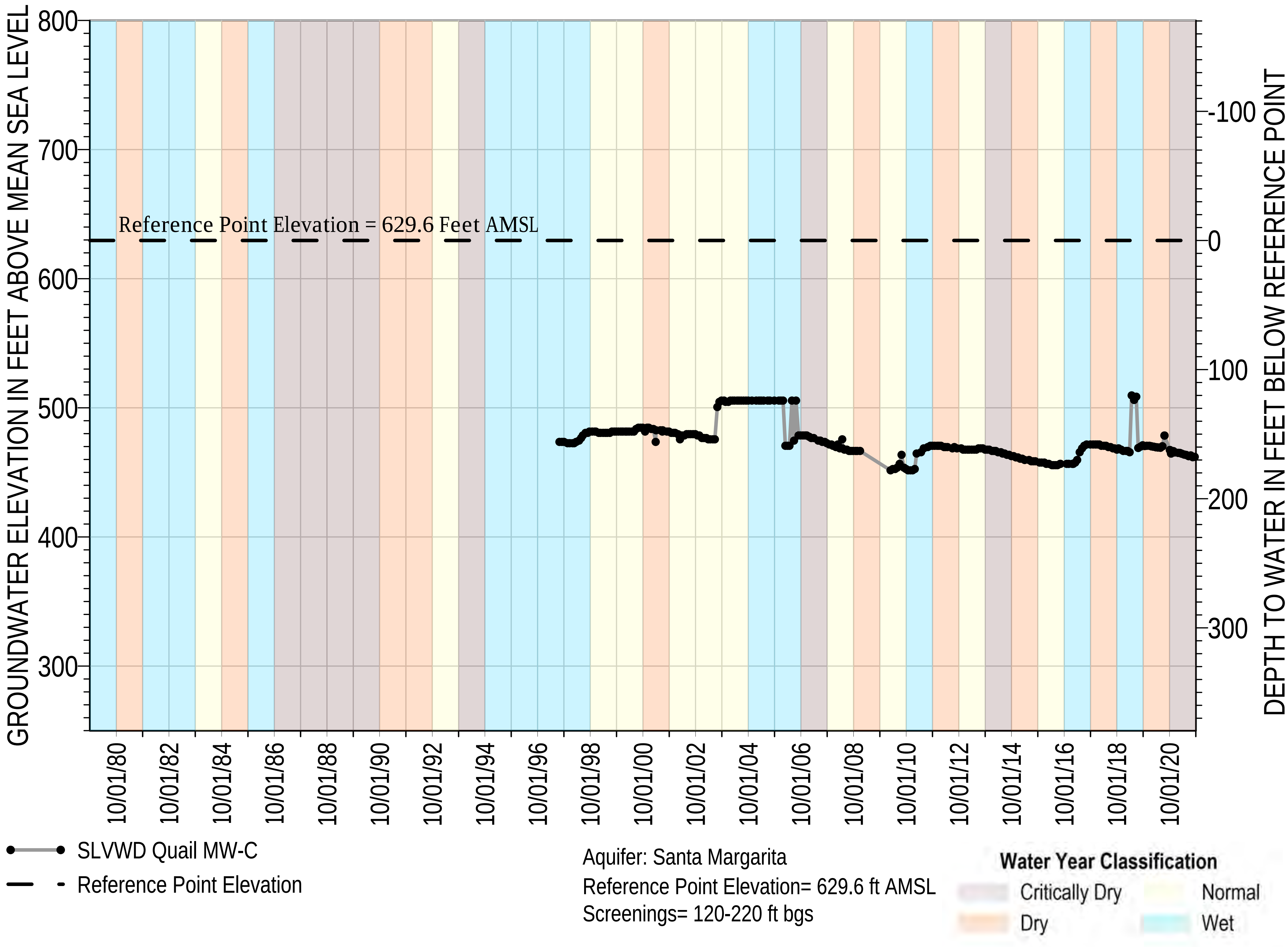
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



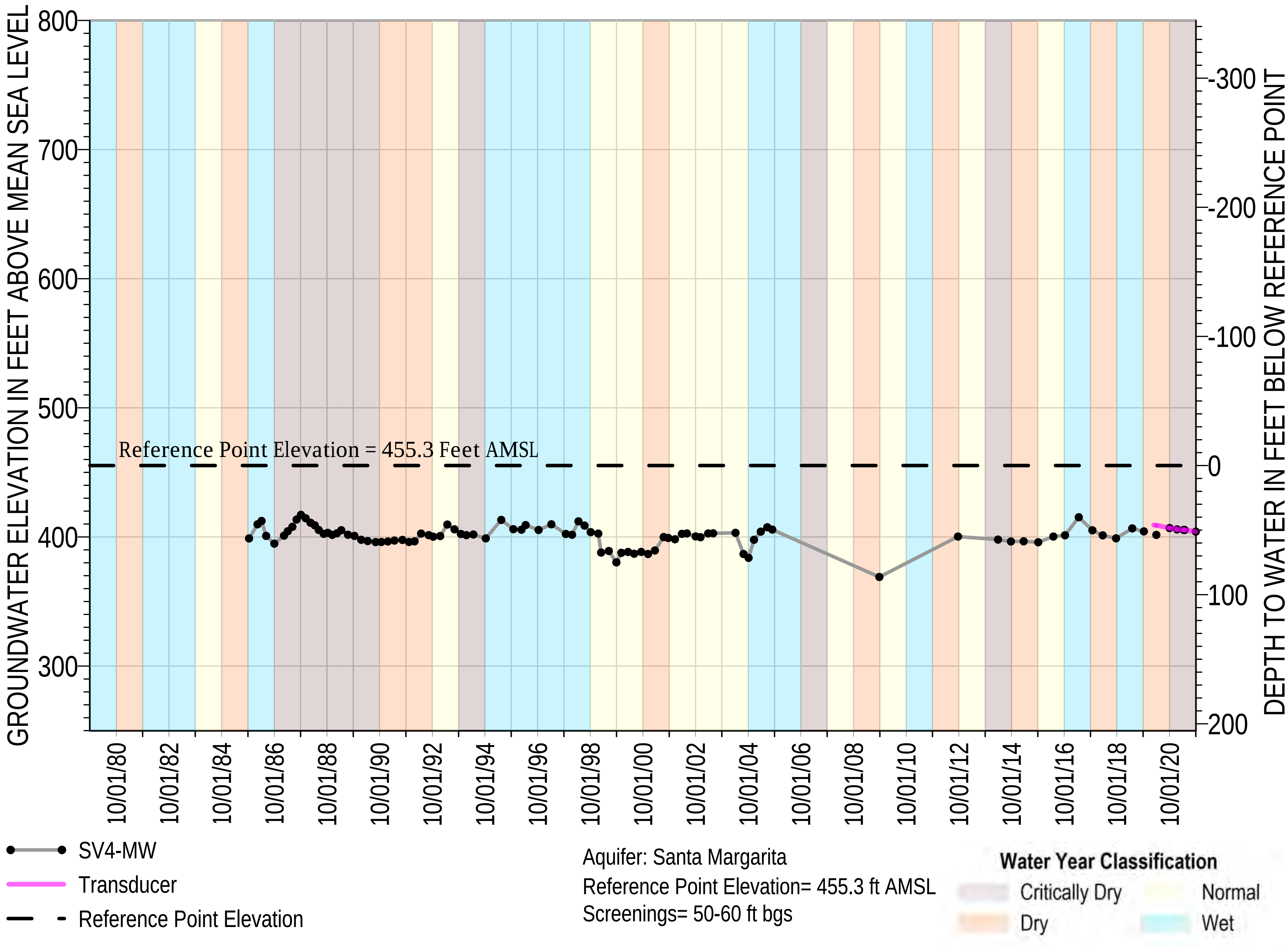
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



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

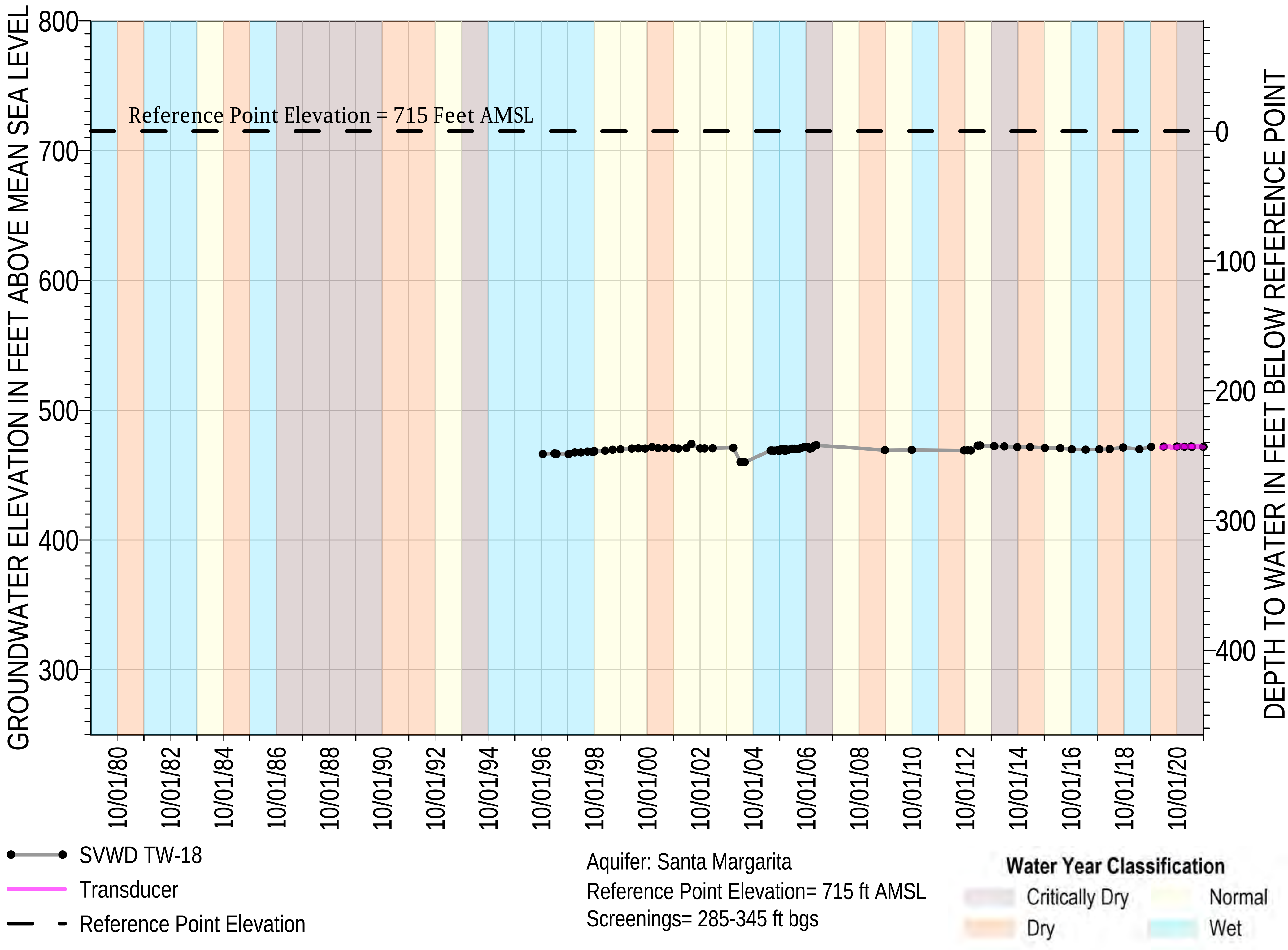


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



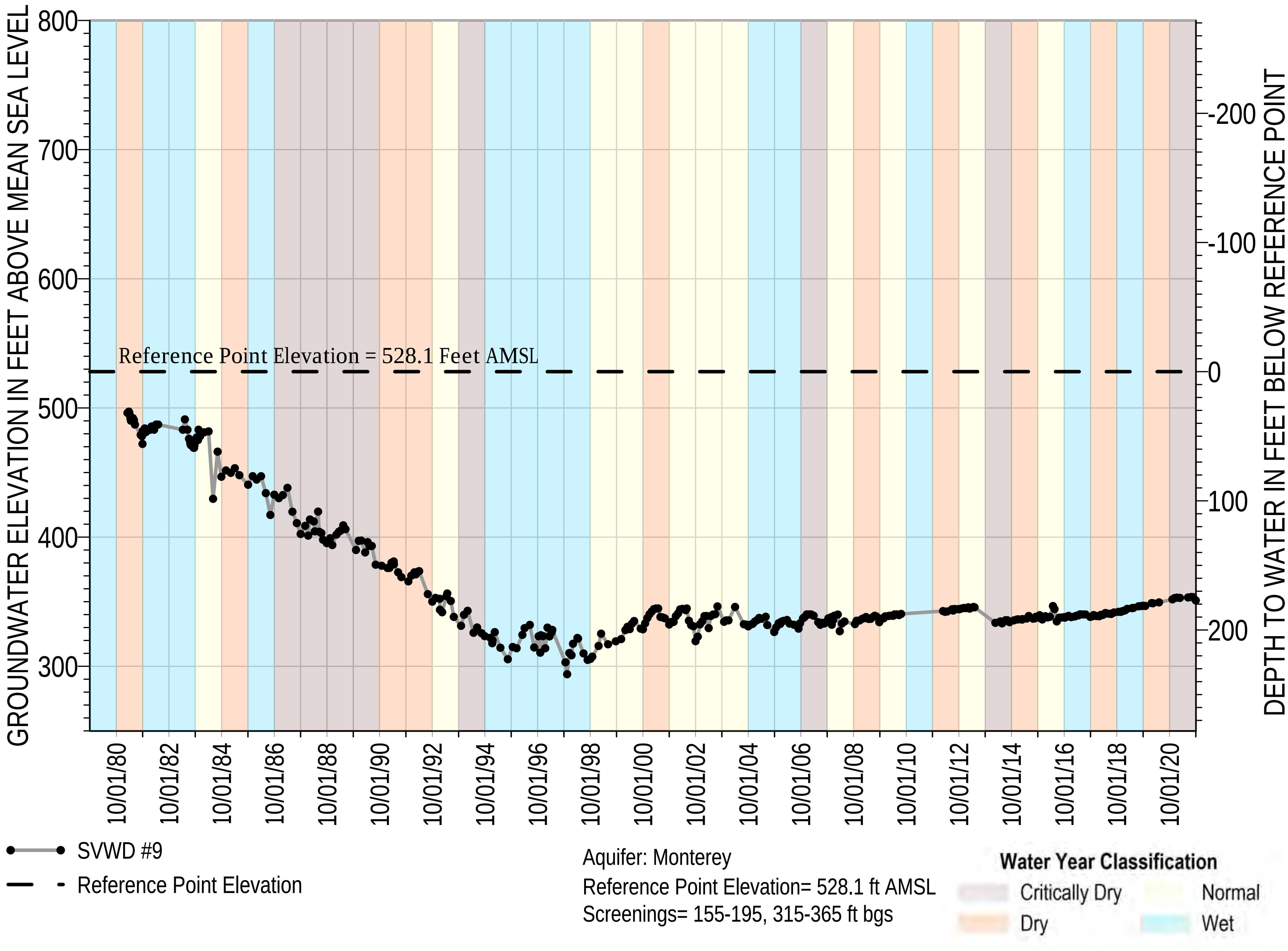
Aquifer: Santa Margarita
Reference Point Elevation= 455.3 ft AMSL
Screenings= 50-60 ft bgs

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



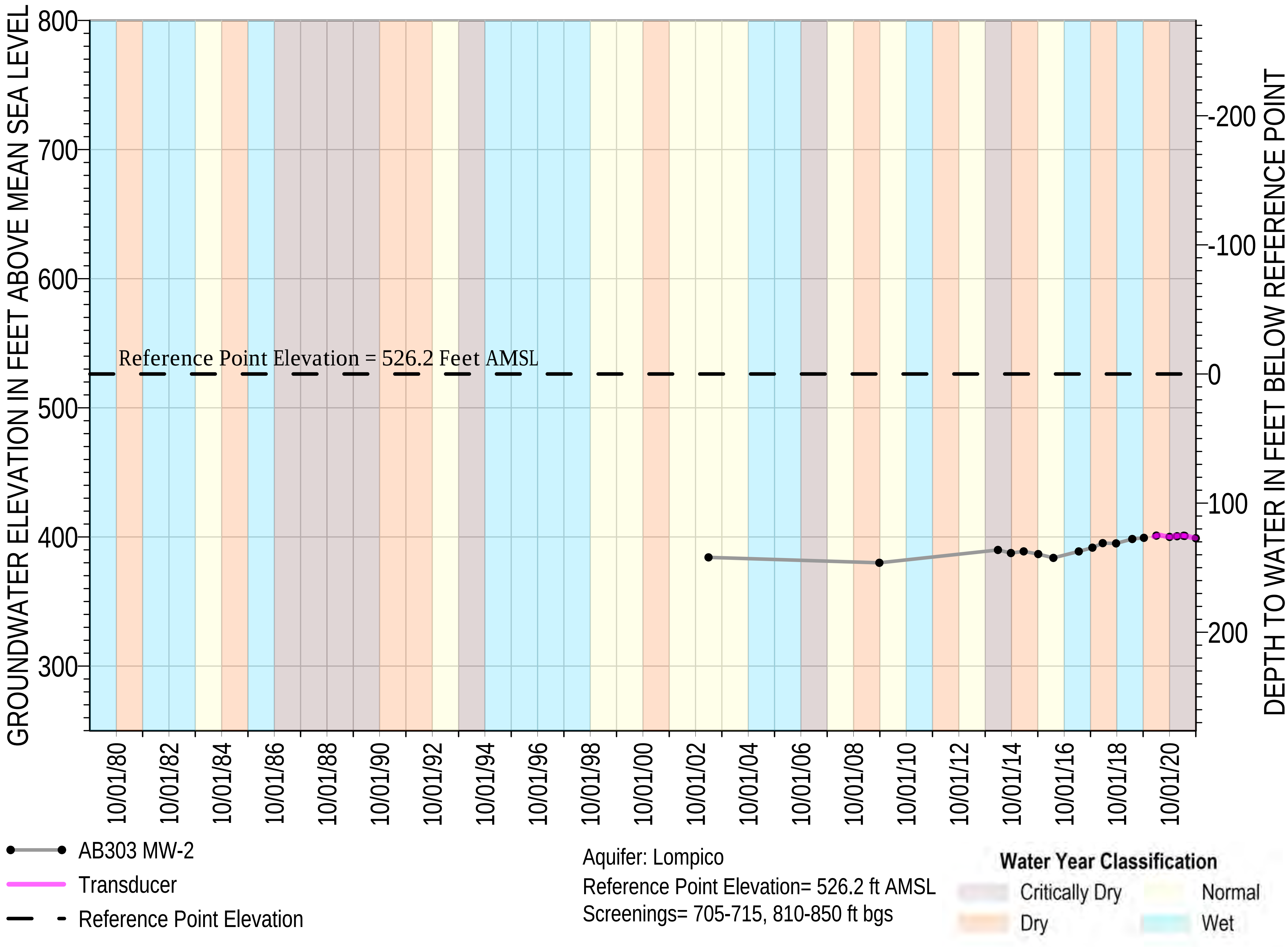
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.

Monterey Formation

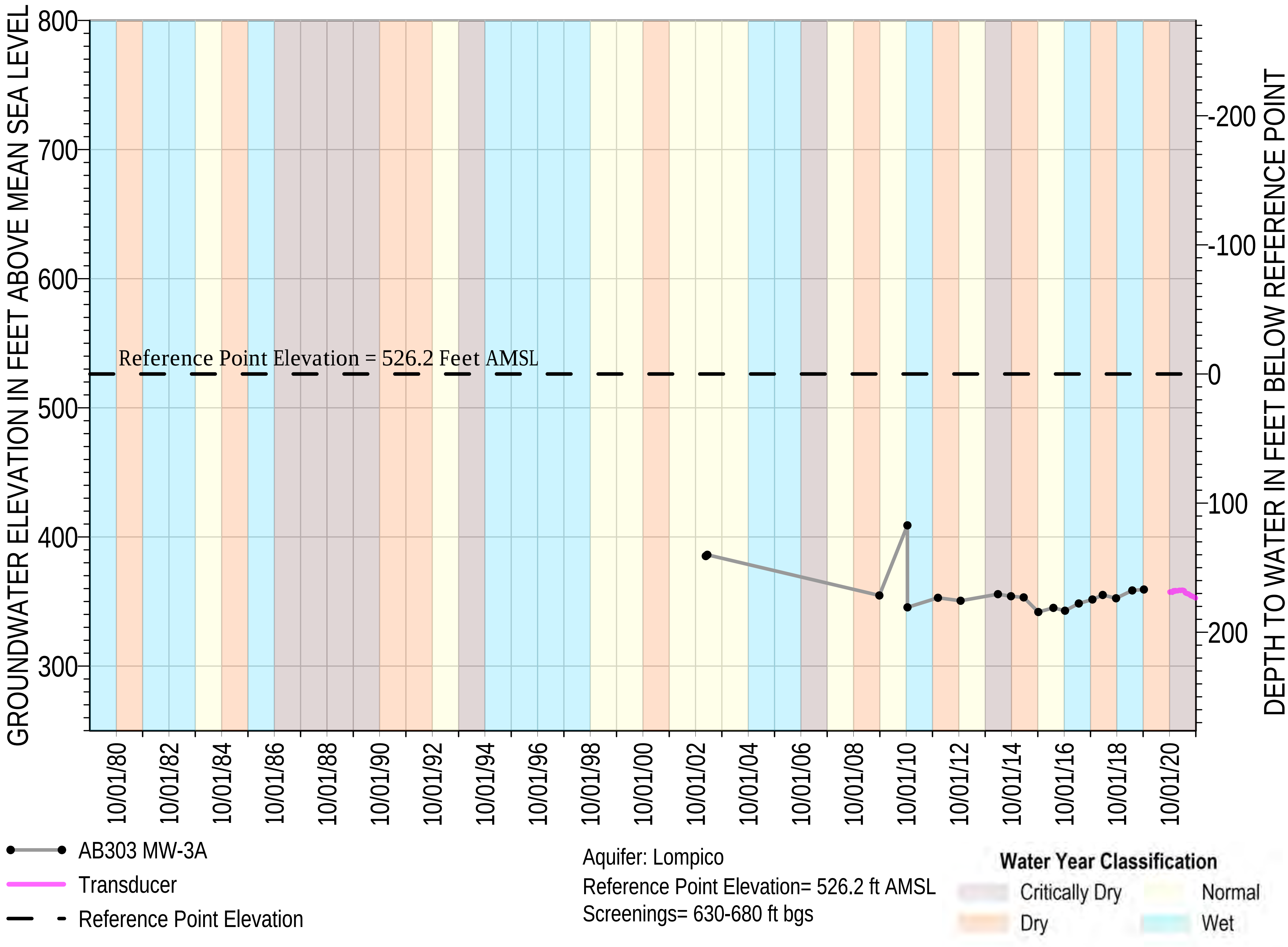


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.

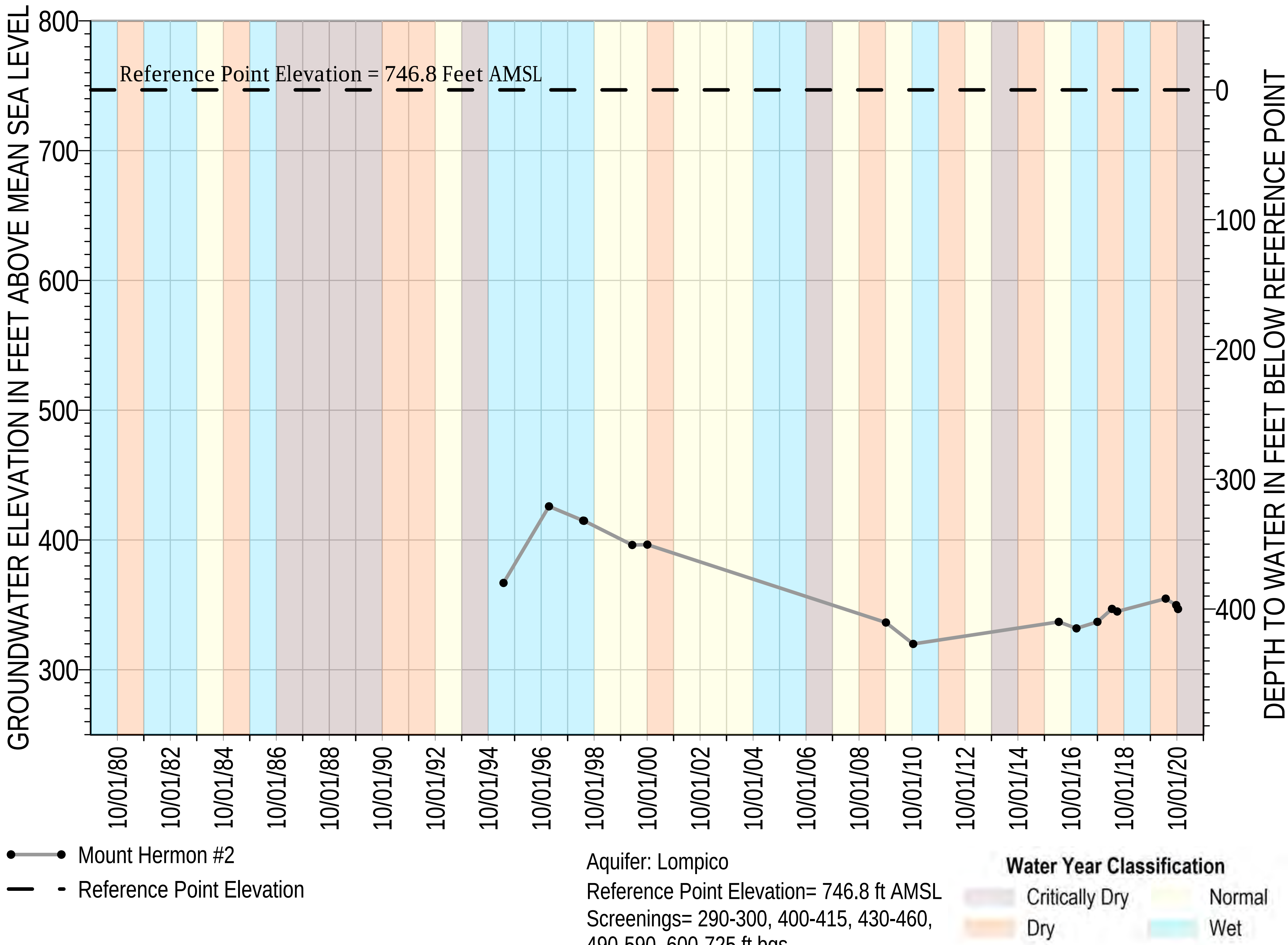
Lompico Sandstone



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

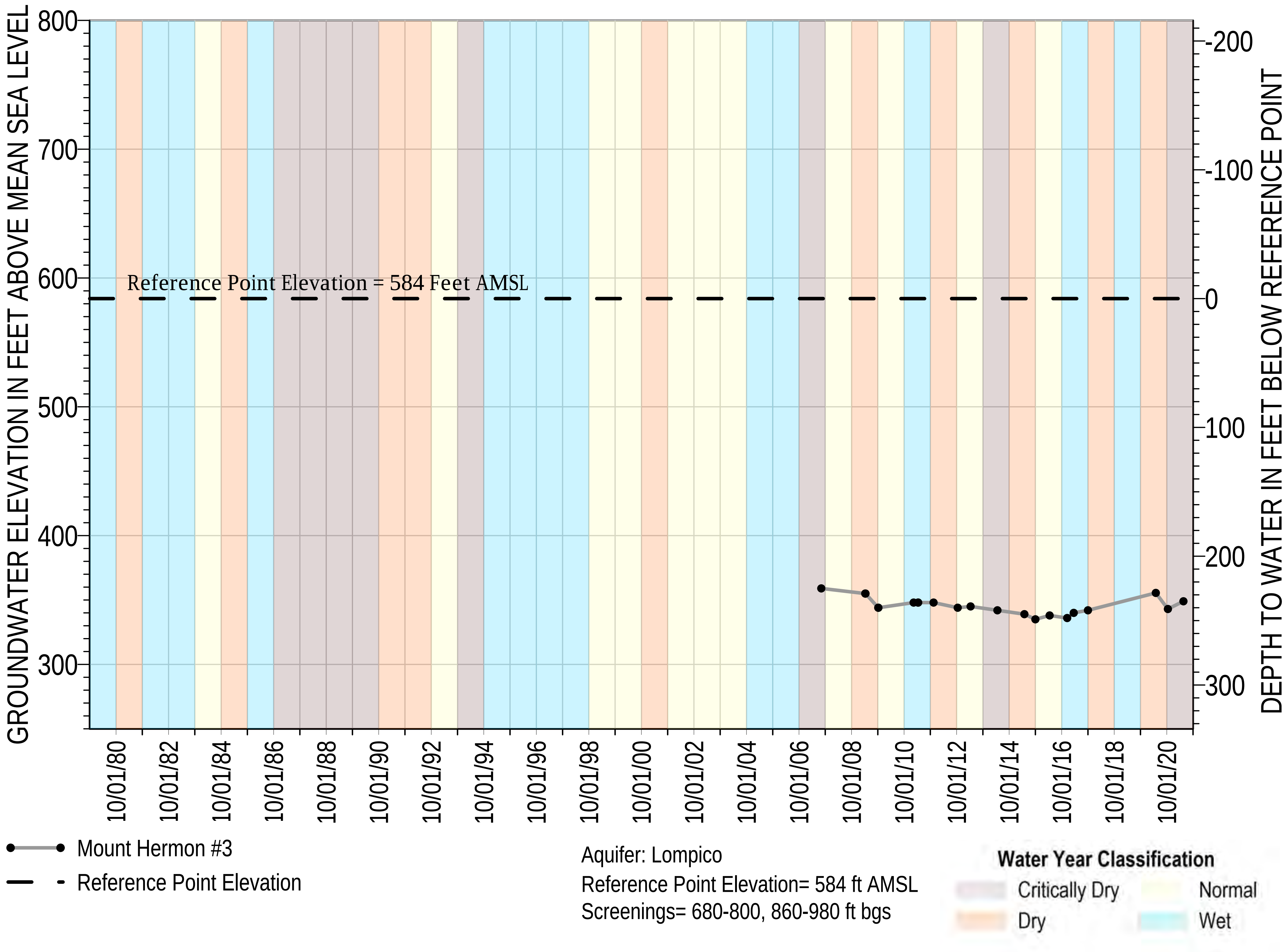


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.

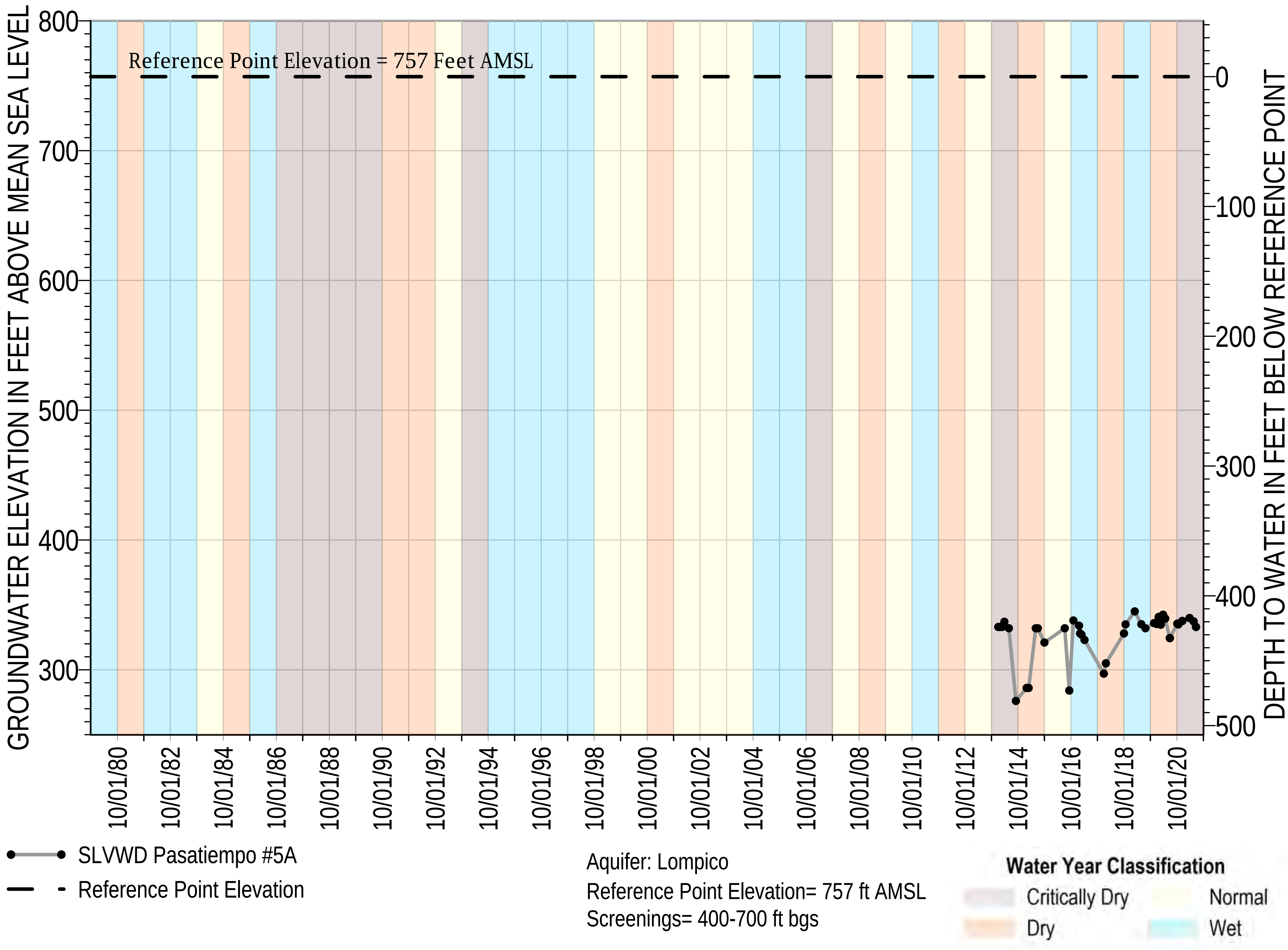


Aquifer: Lompico
Reference Point Elevation= 746.8 ft AMSL
Screenings= 290-300, 400-415, 430-460, 490-590, 600-725 ft bgs

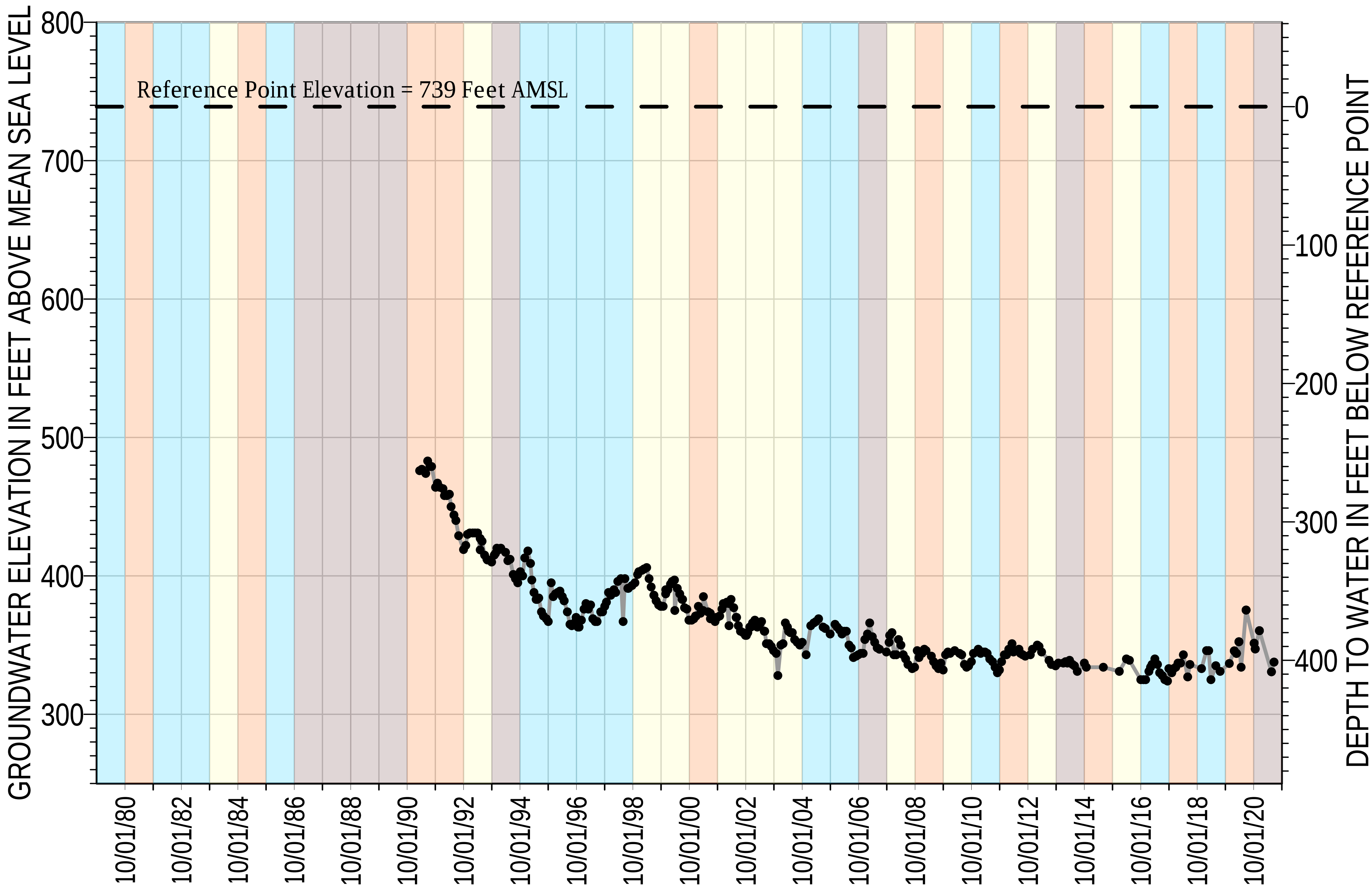
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



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



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



SLVWD Pasatiempo #7

Reference Point Elevation

Aquifer: Lompico

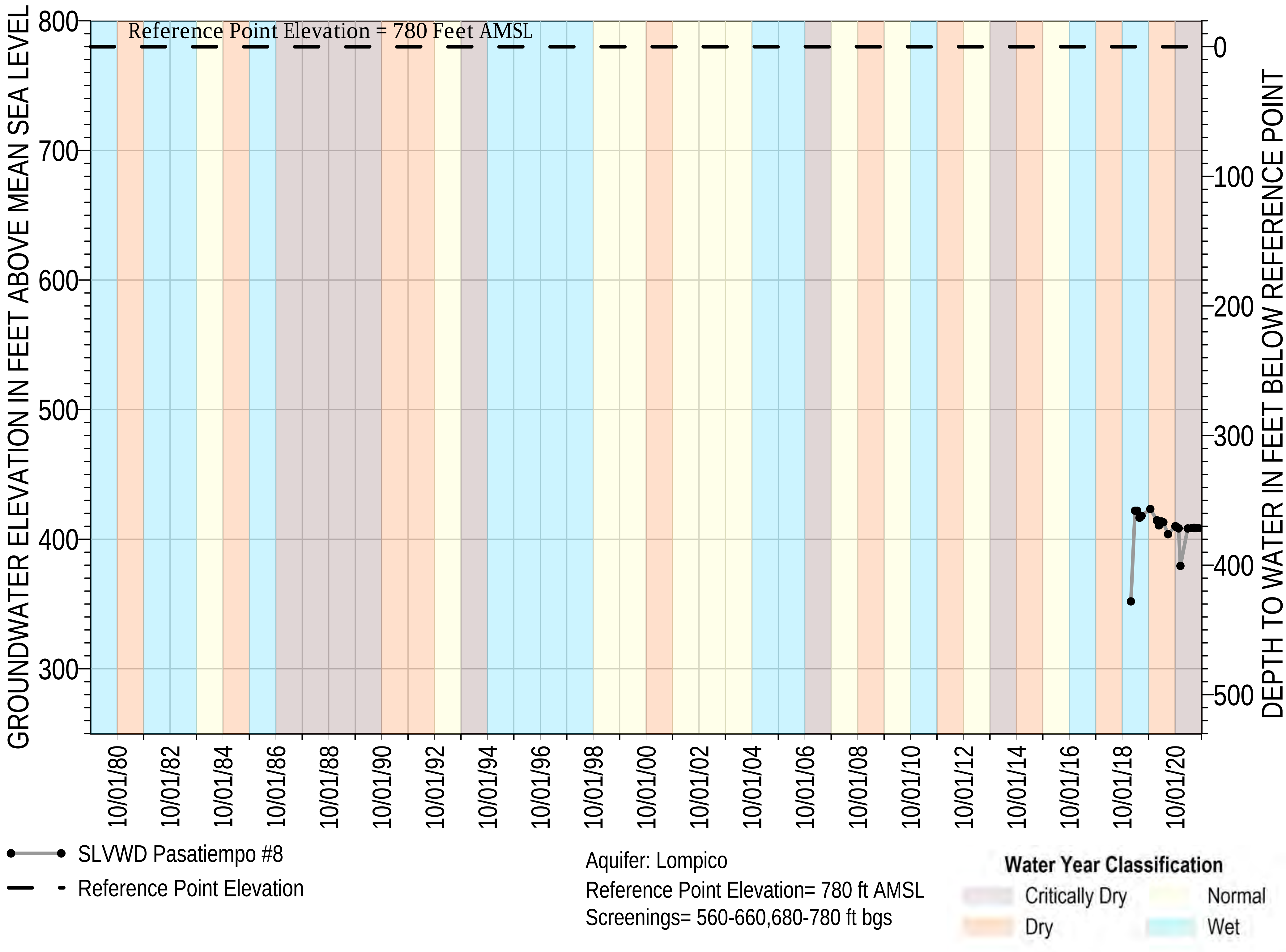
Reference Point Elevation= 739 ft AMSL

Screenings= 495-525, 600-660 ft bgs

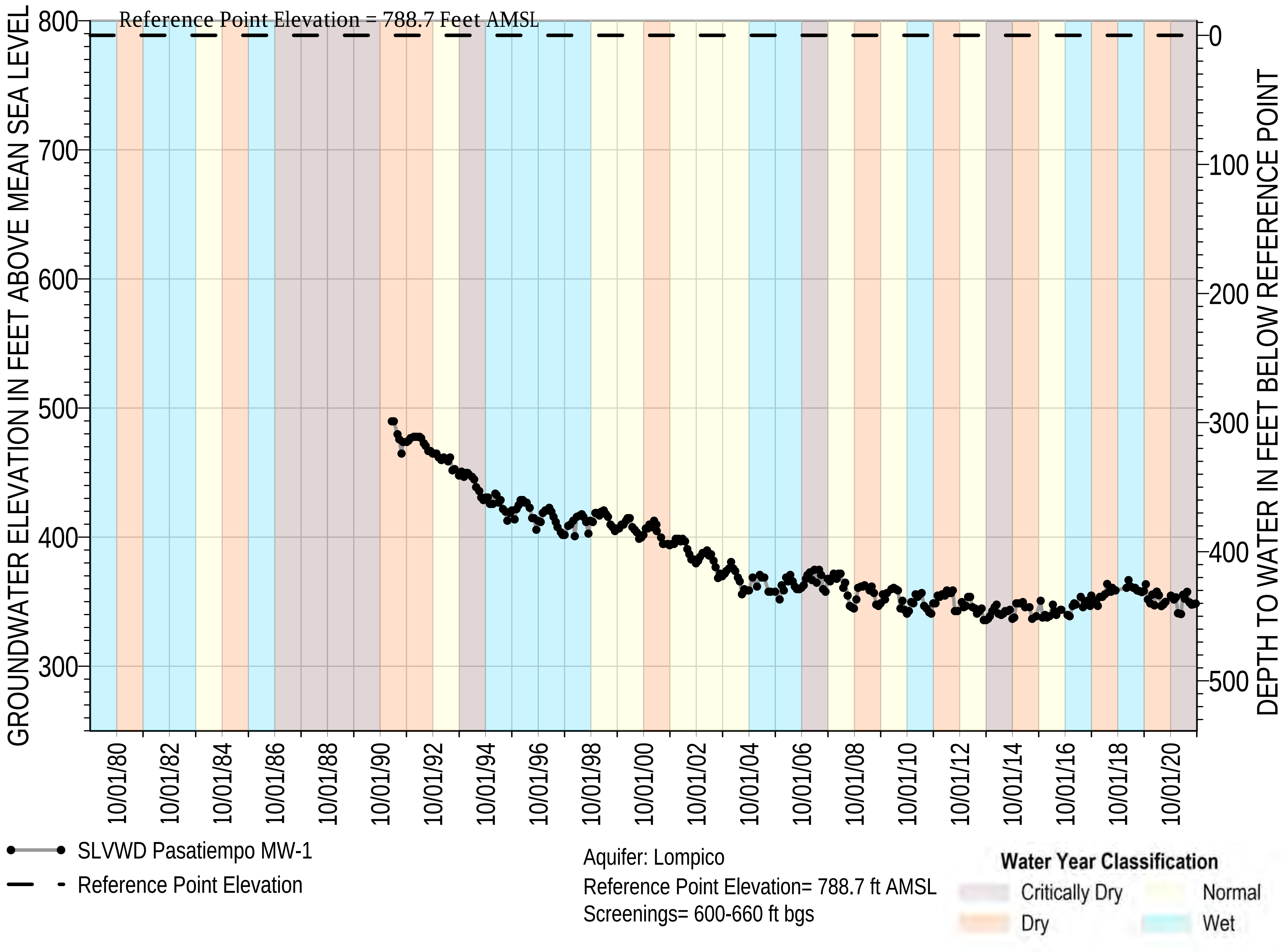
Water Year Classification

Critically Dry | Normal | Dry | Wet

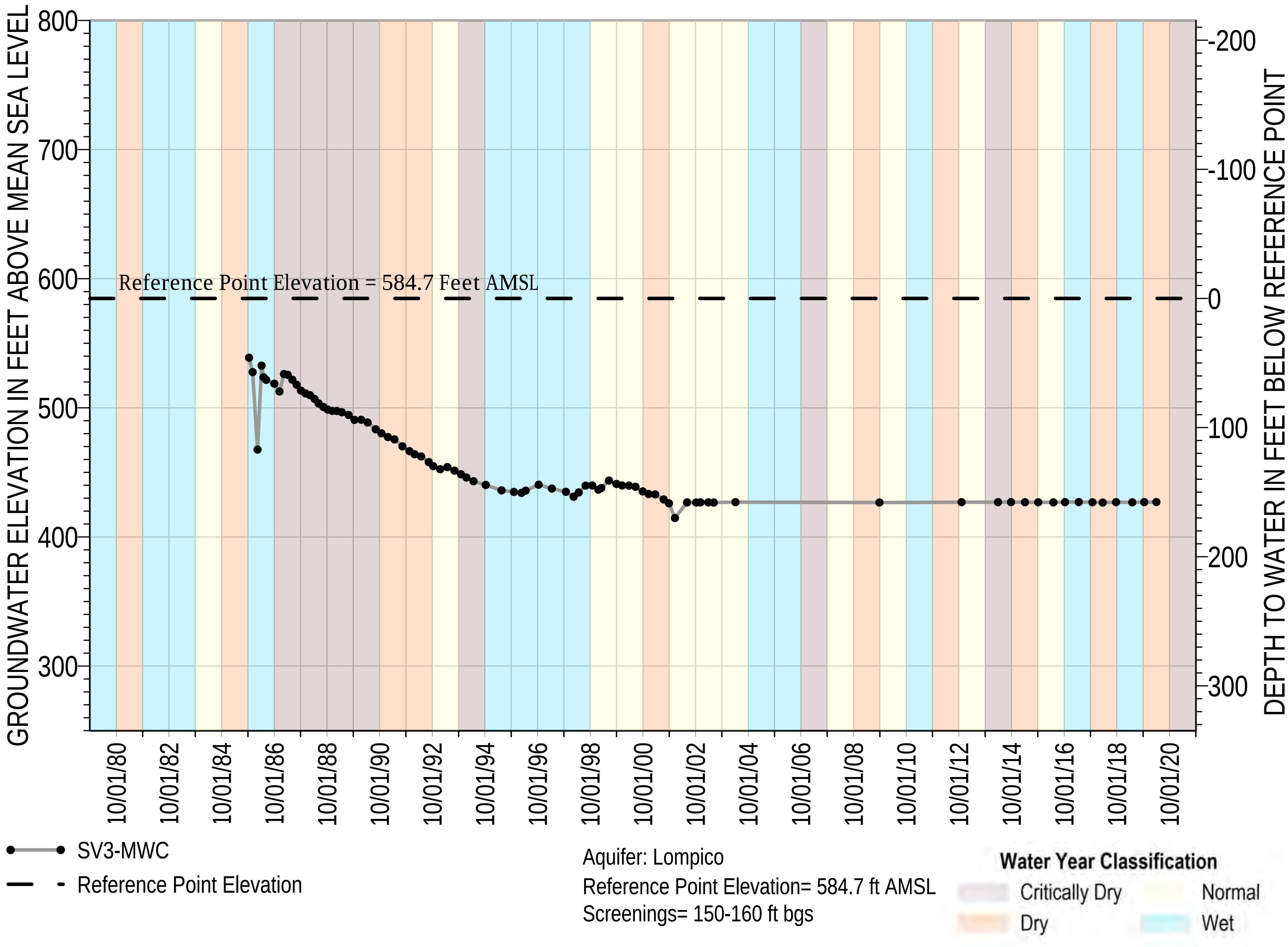
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



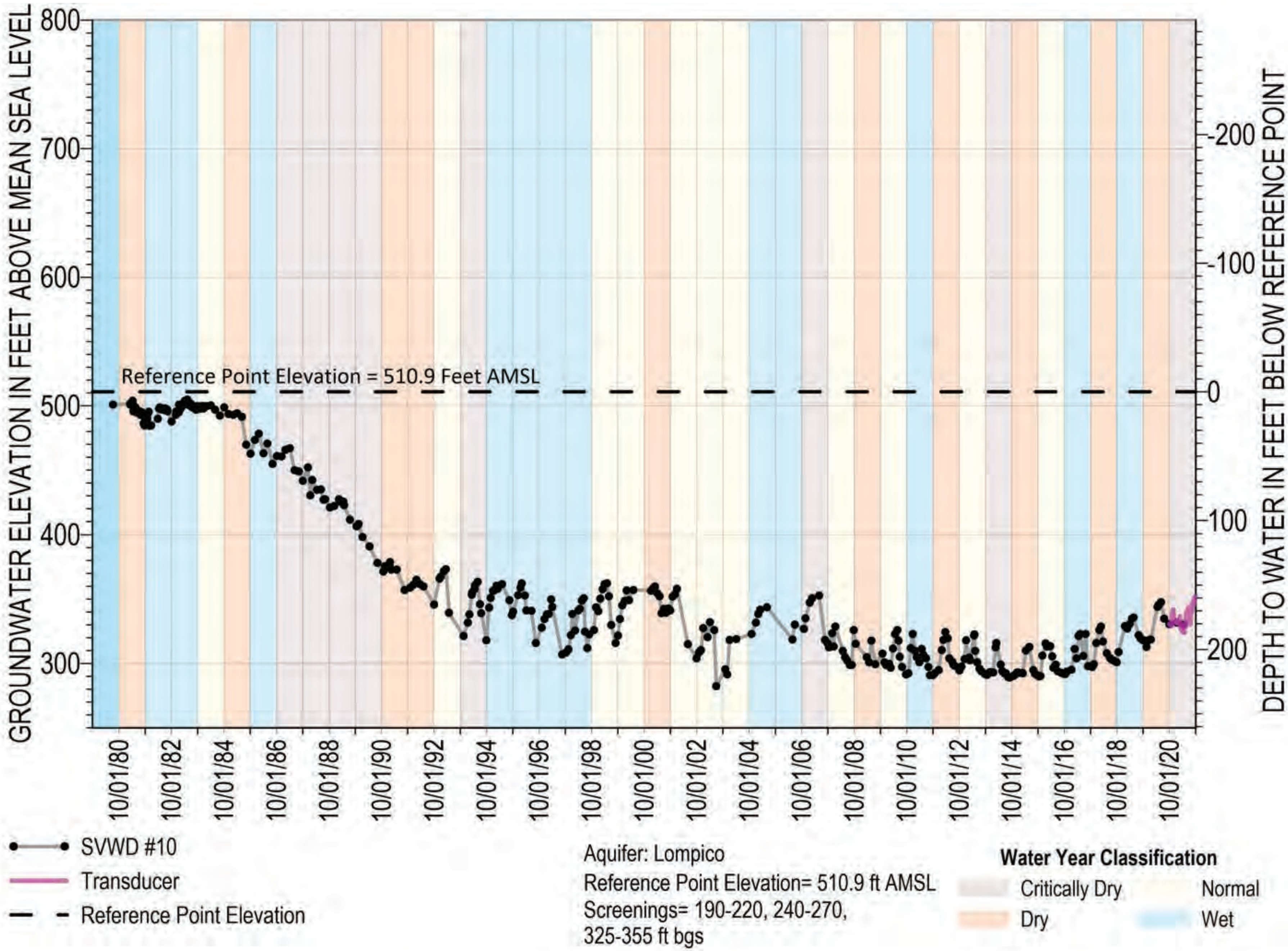
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



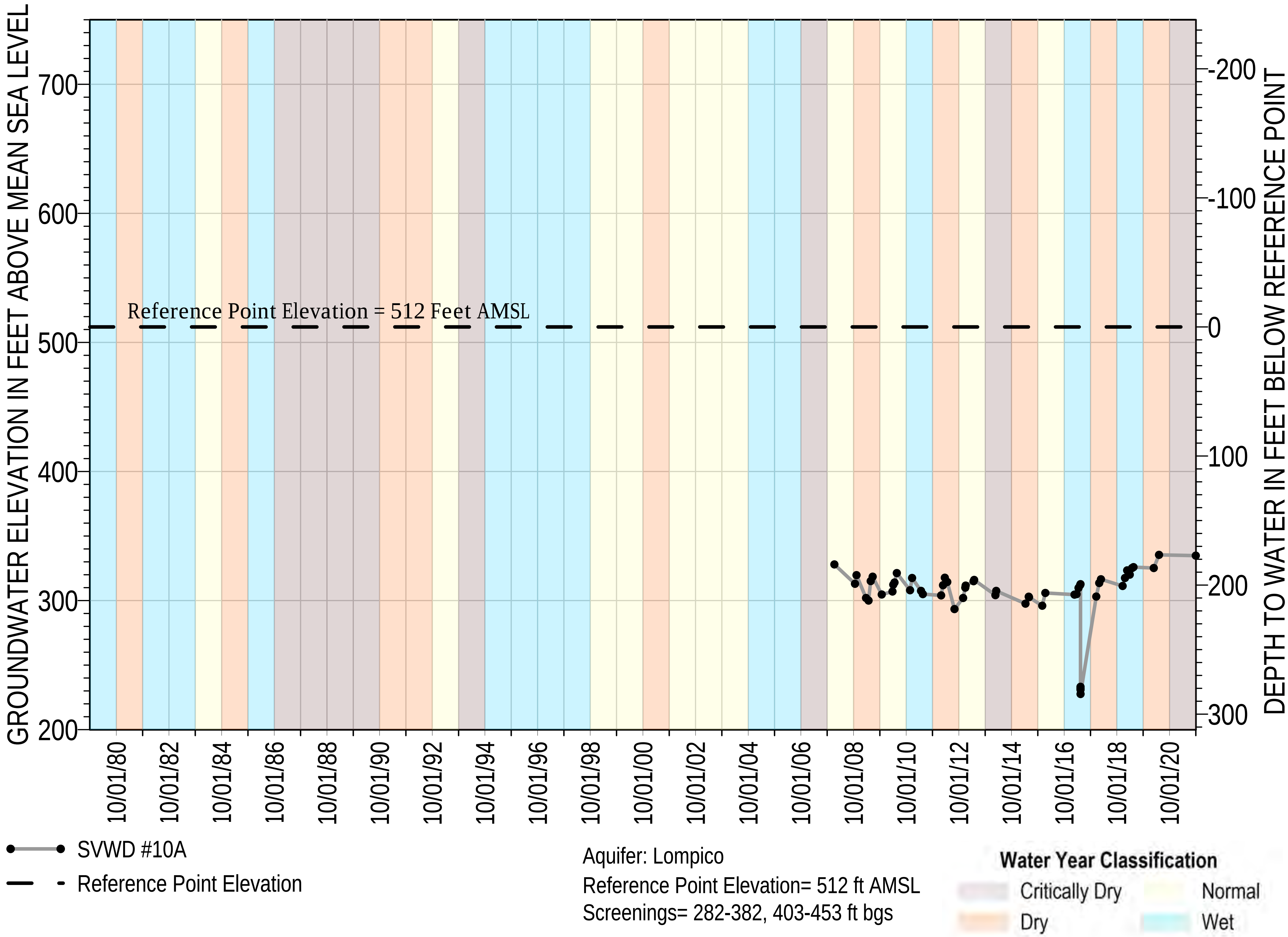
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



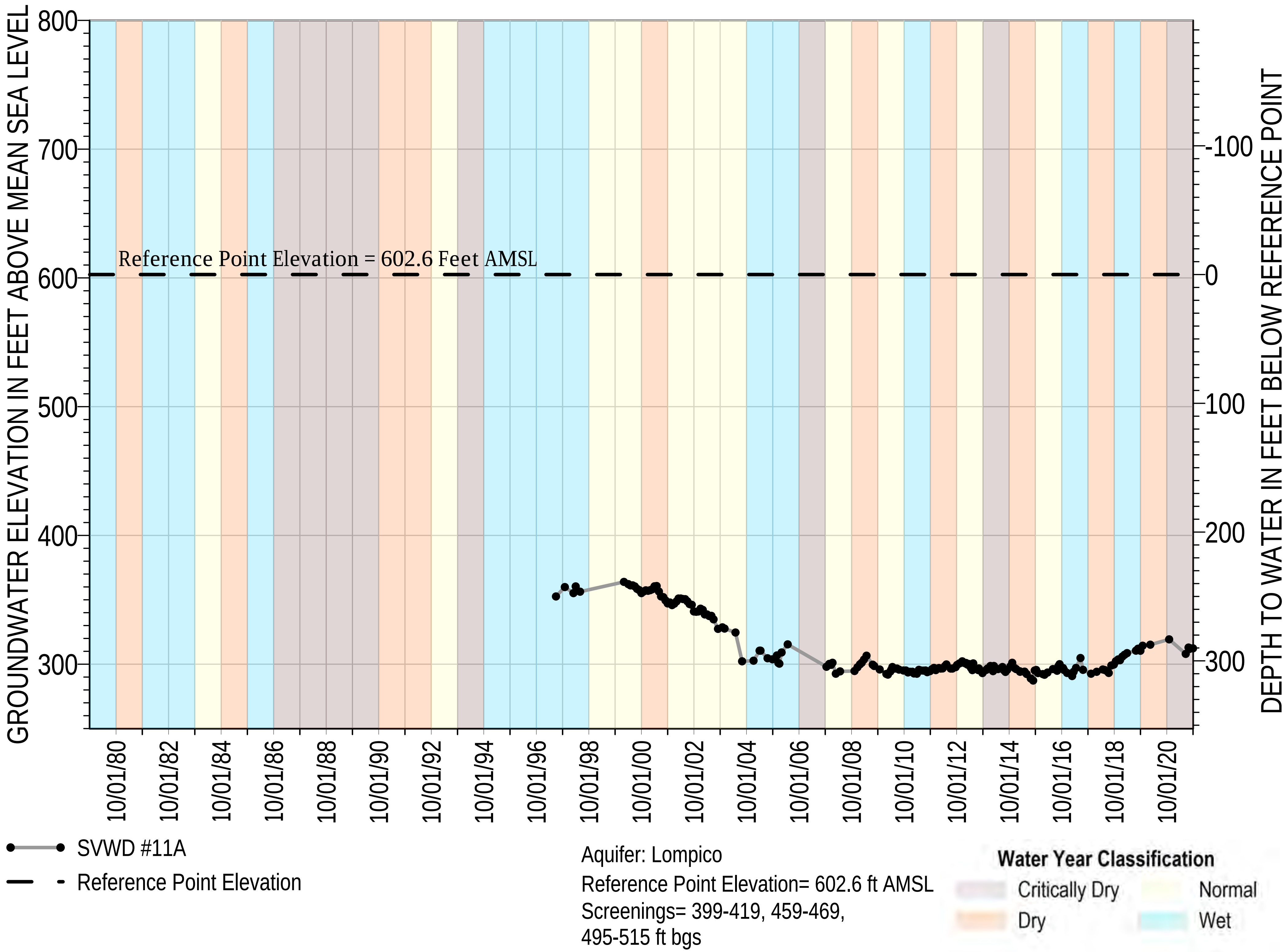
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



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

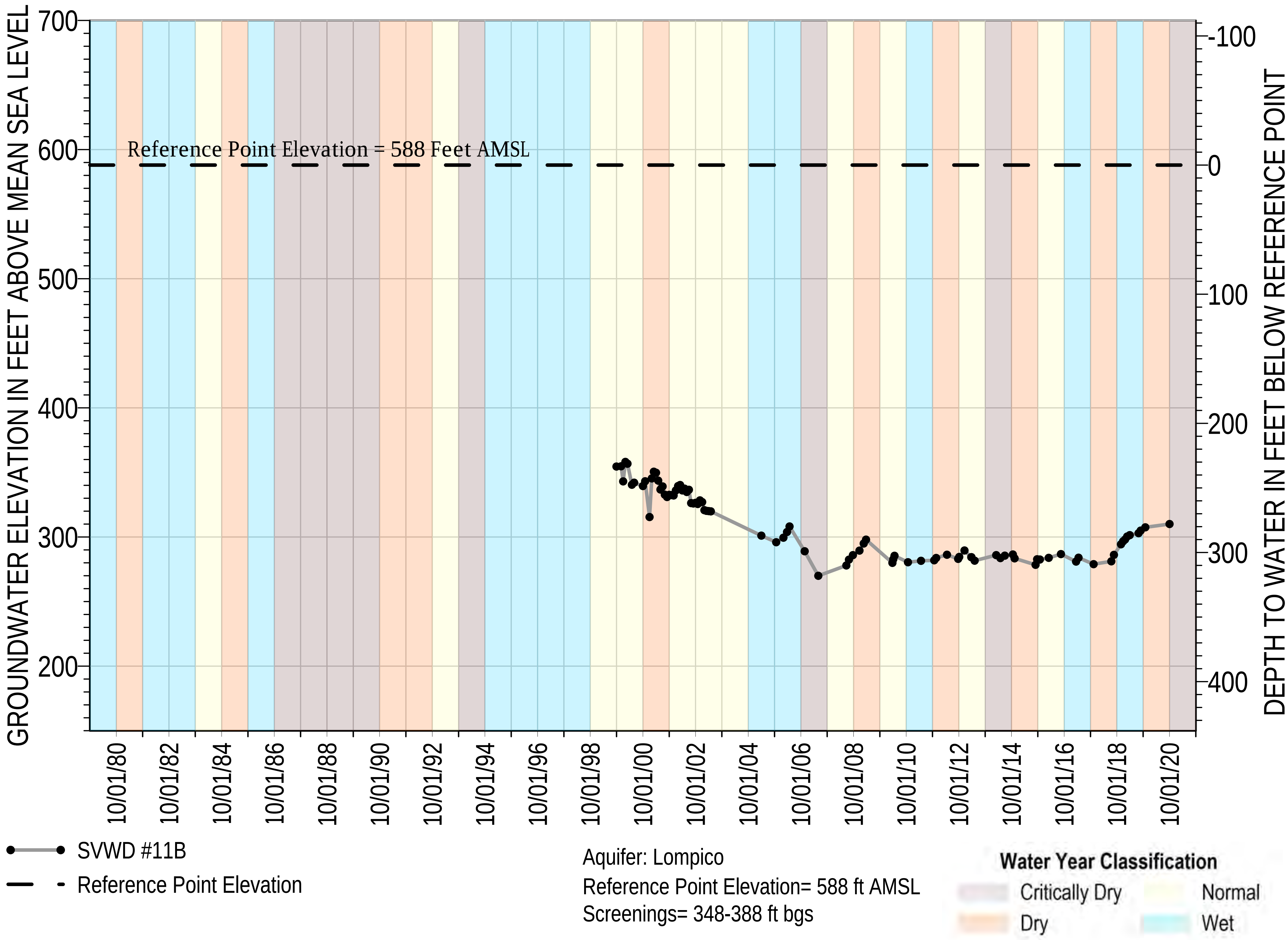


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



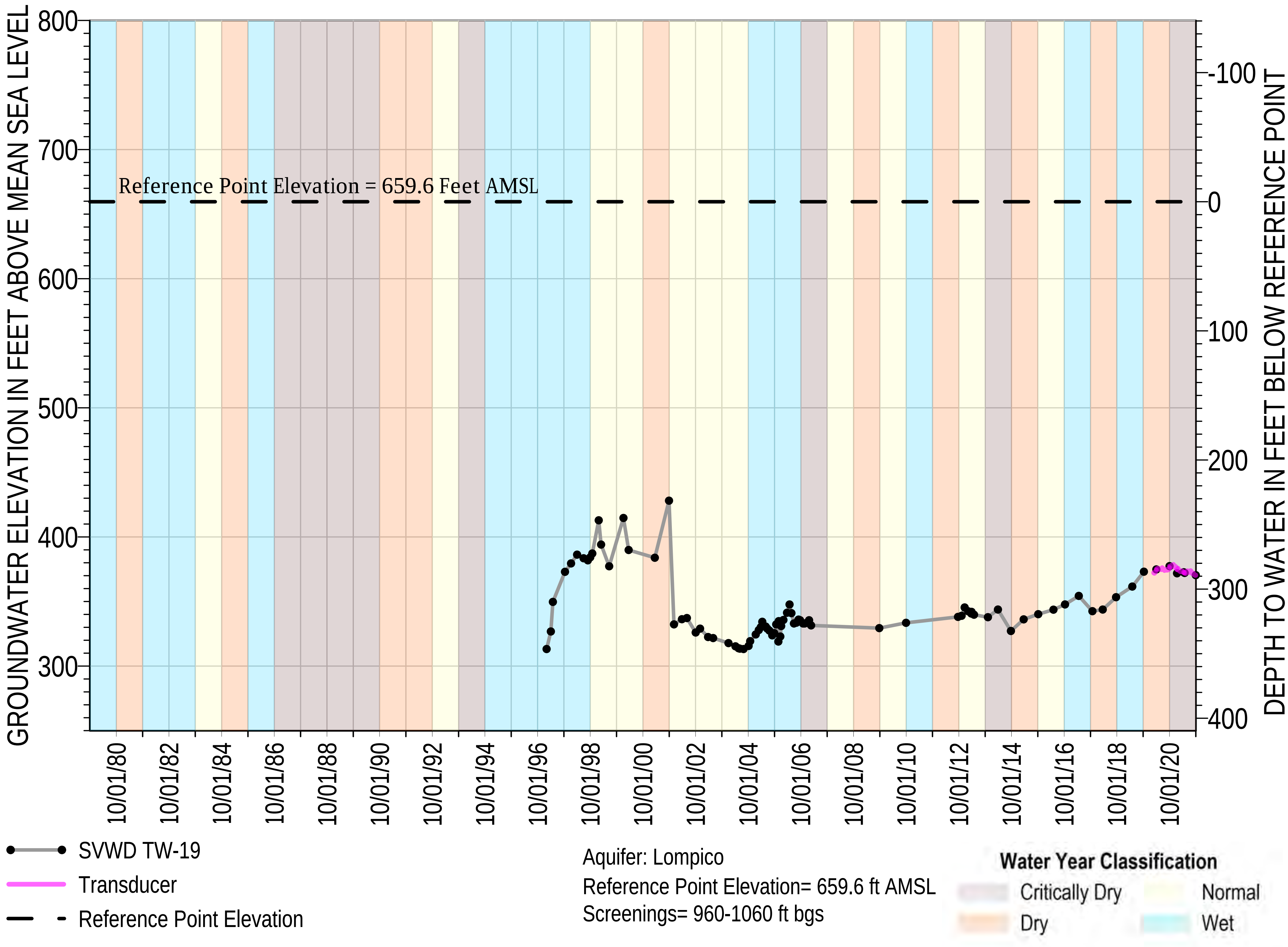
Aquifer: Lompico
Reference Point Elevation= 602.6 ft AMSL
Screenings= 399-419, 459-469,
495-515 ft bgs

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



Aquifer: Lompico
Reference Point Elevation= 588 ft AMSL
Screenings= 348-388 ft bgs

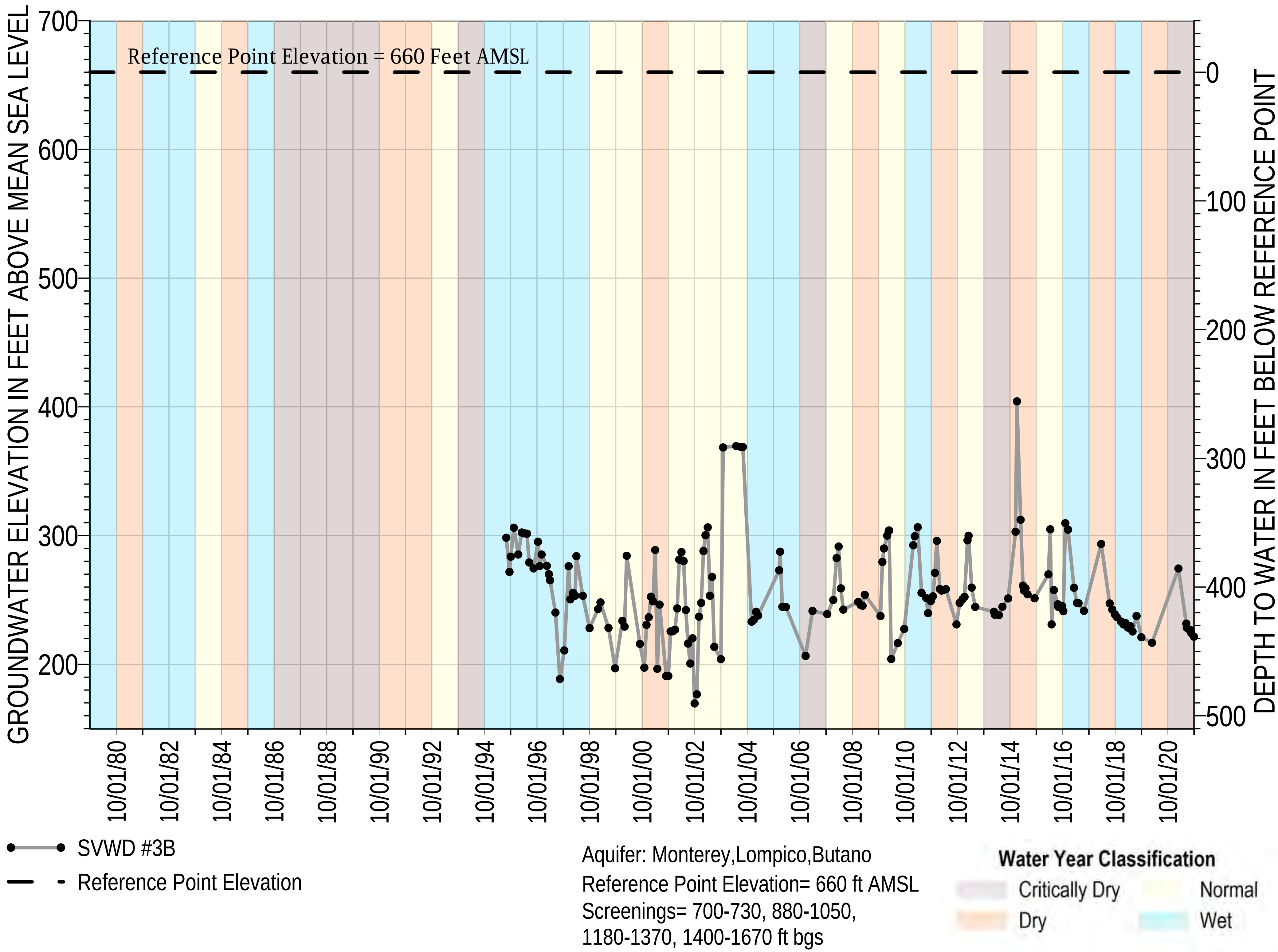
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



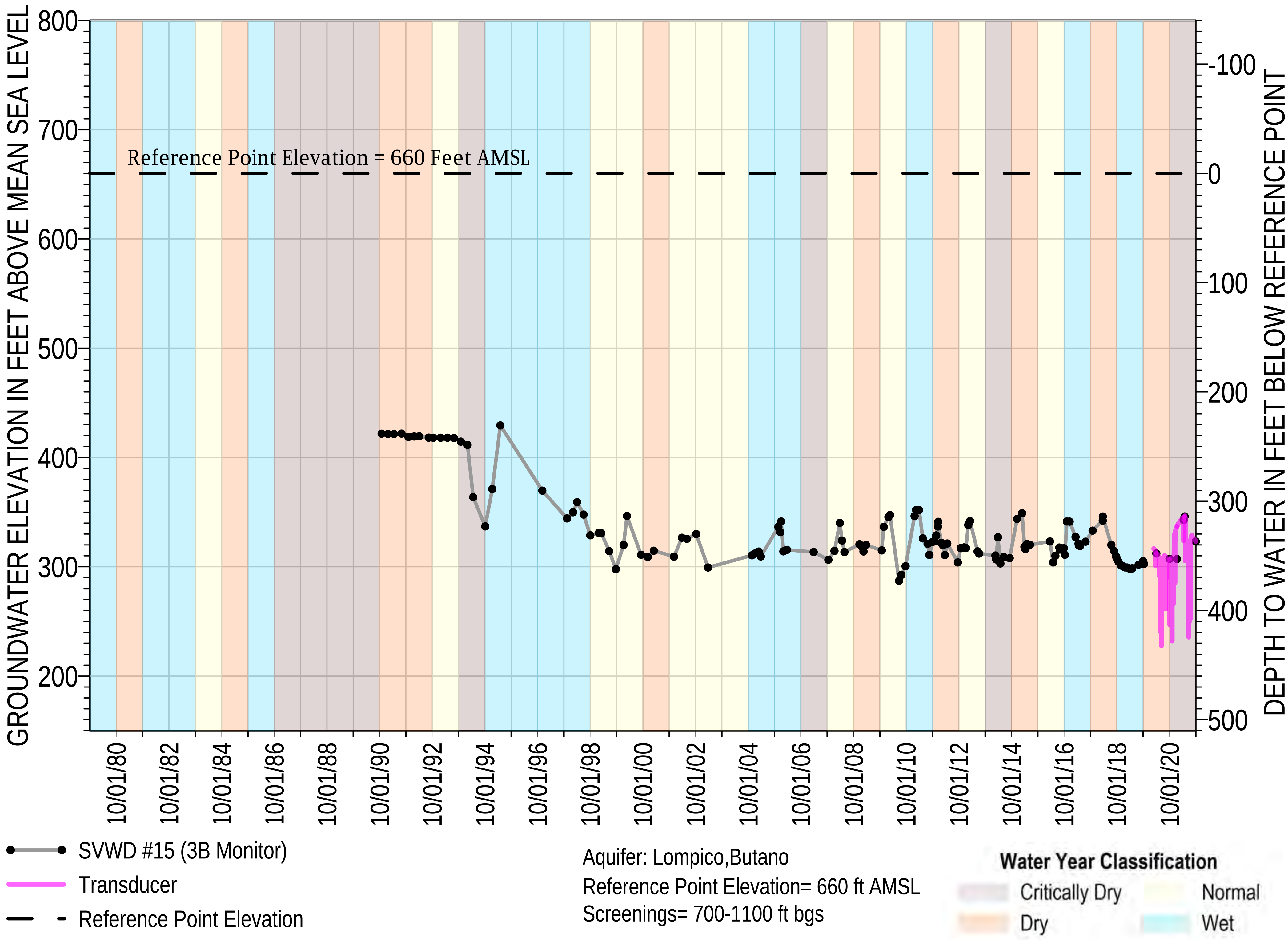
Aquifer: Lompico
Reference Point Elevation= 659.6 ft AMSL
Screenings= 960-1060 ft bgs

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

Lompico/Butano Sandstones

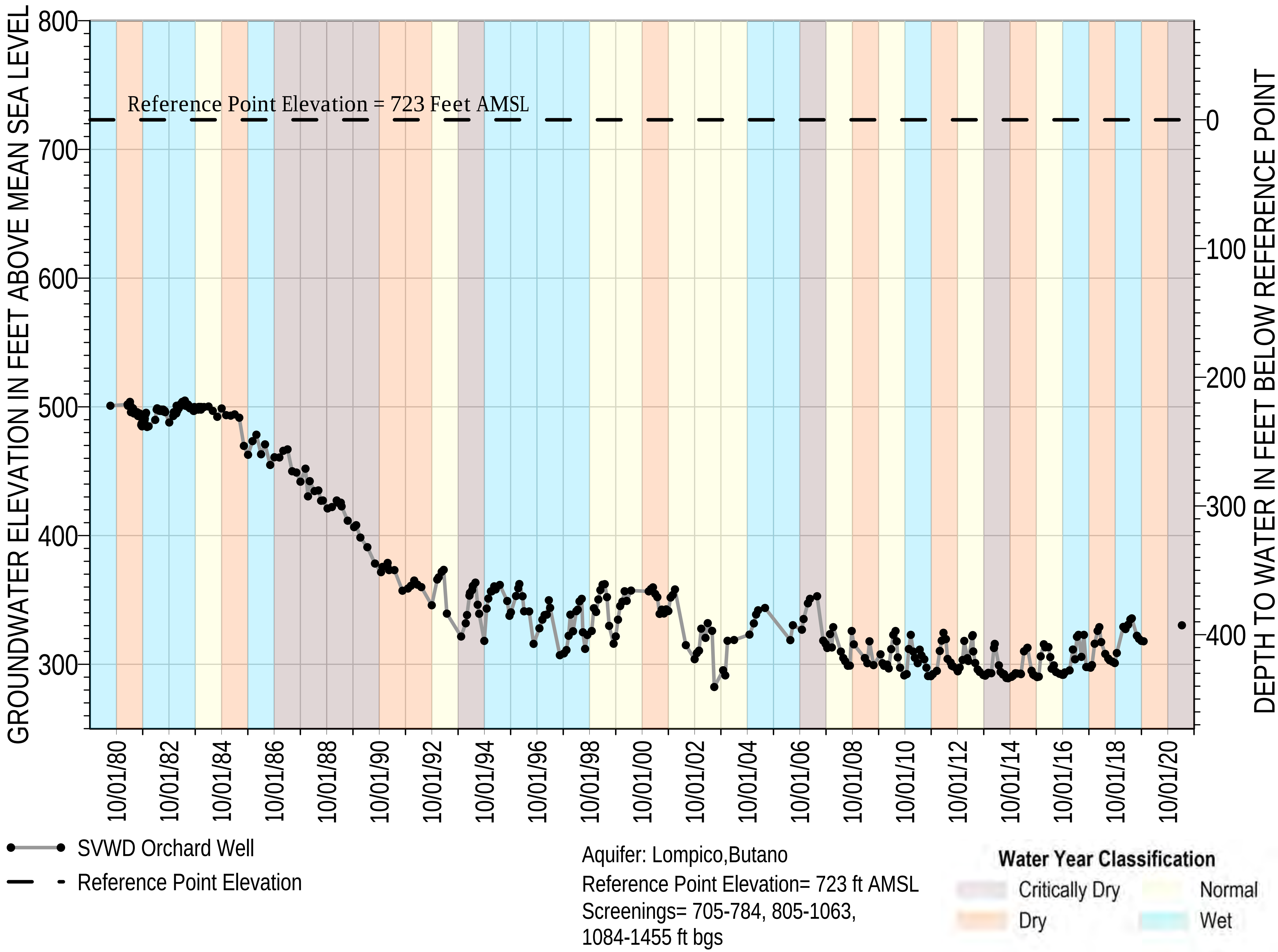


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



Aquifer: Lompico,Butano
Reference Point Elevation= 660 ft AMSL
Screenings= 700-1100 ft bgs

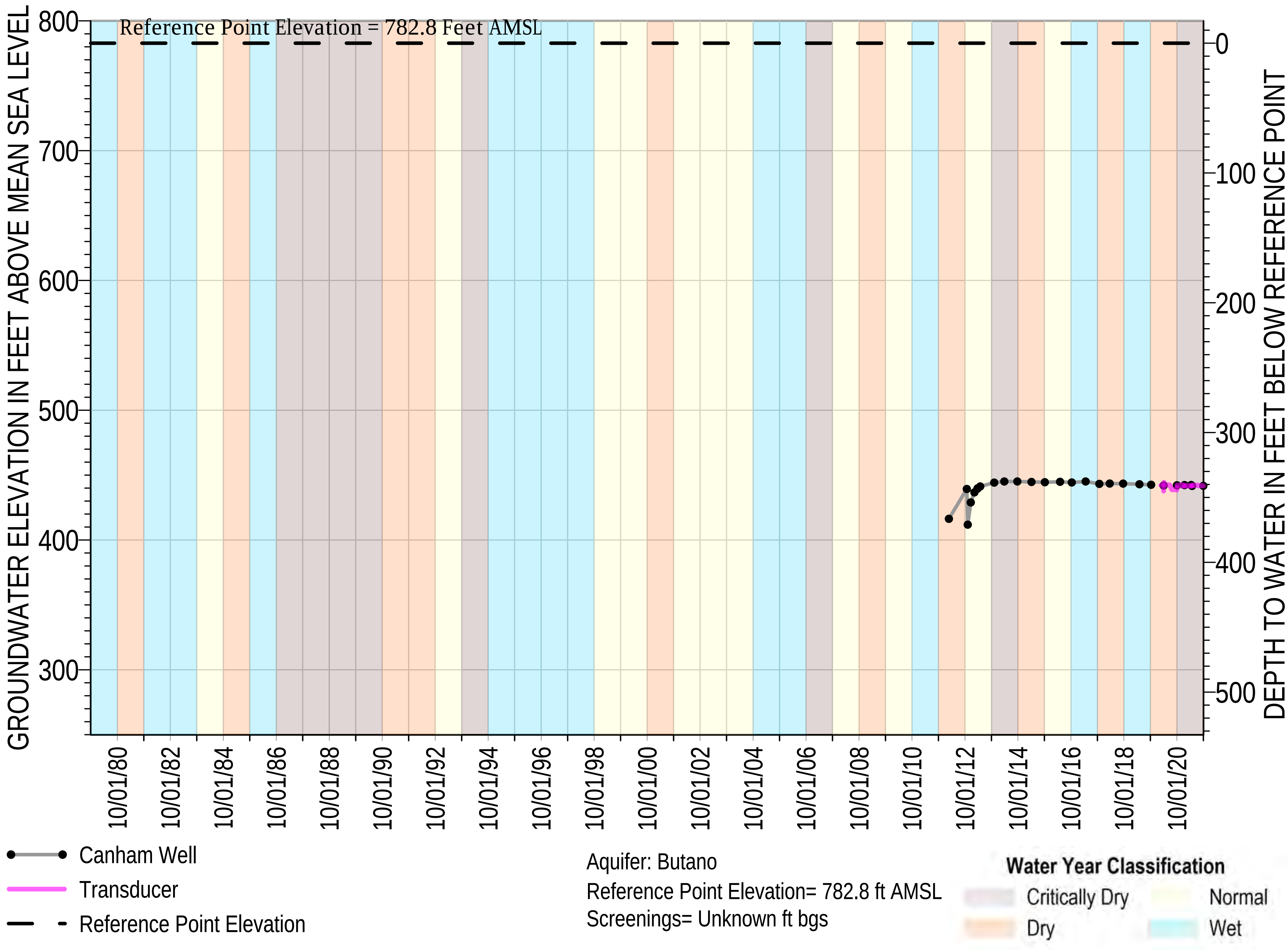
Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface. Pumping measurements are removed from hand soundings but not from transducer data.



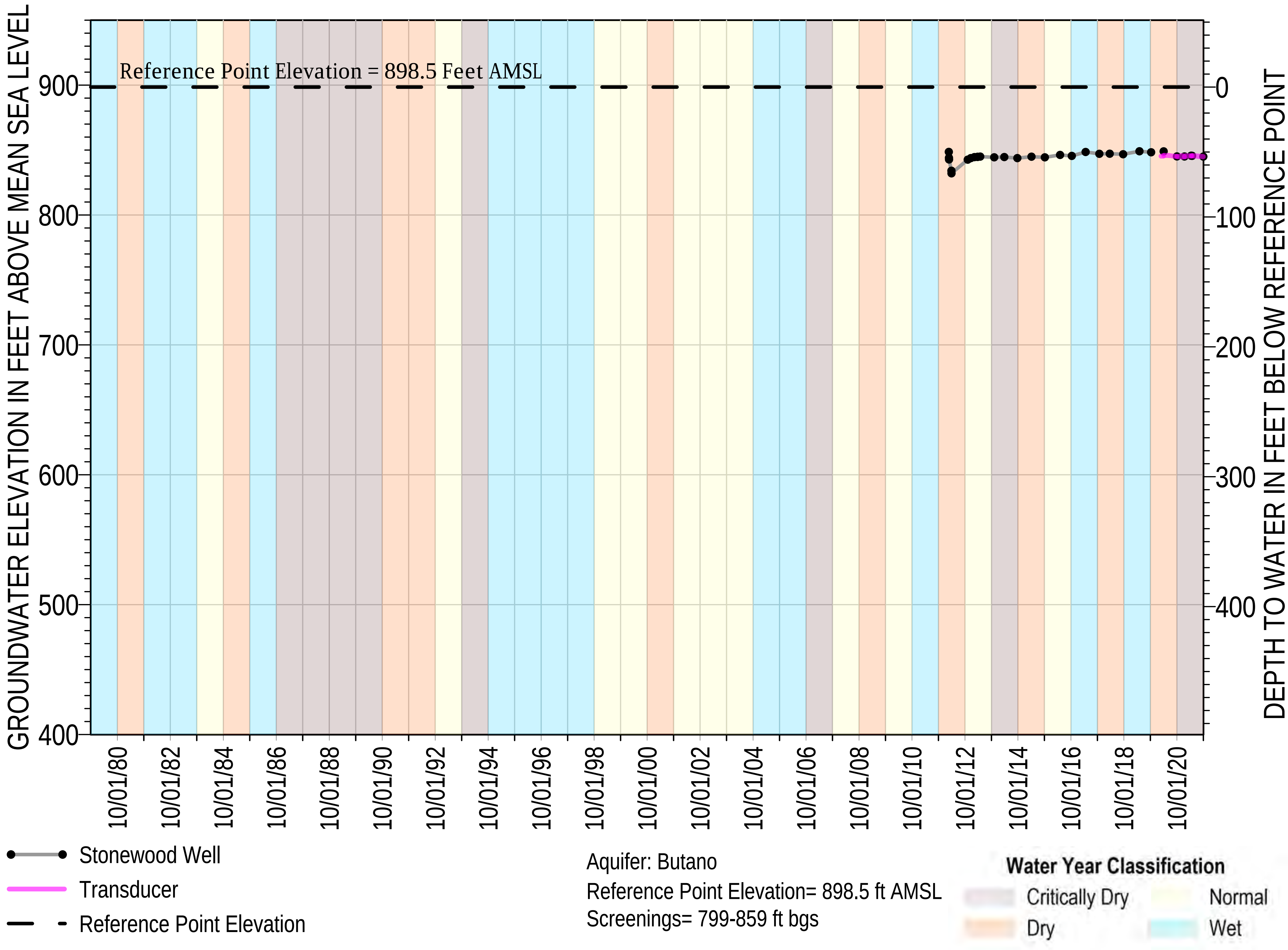
Aquifer: Lompico,Butano
Reference Point Elevation= 723 ft AMSL
Screenings= 705-784, 805-1063, 1084-1455 ft bgs

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

Butano Sandstone



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



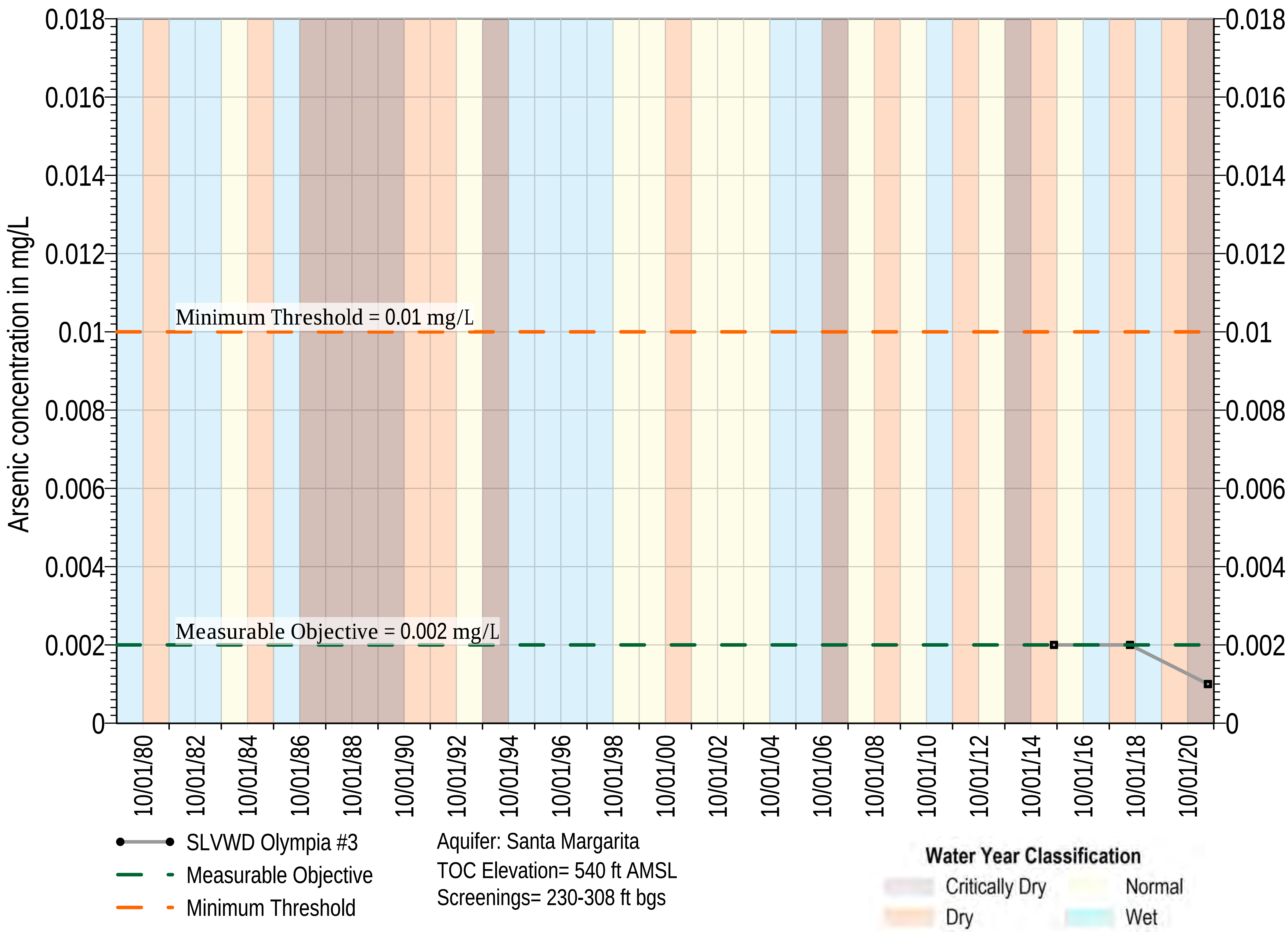
Aquifer: Butano
Reference Point Elevation= 898.5 ft AMSL
Screenings= 799-859 ft bgs

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

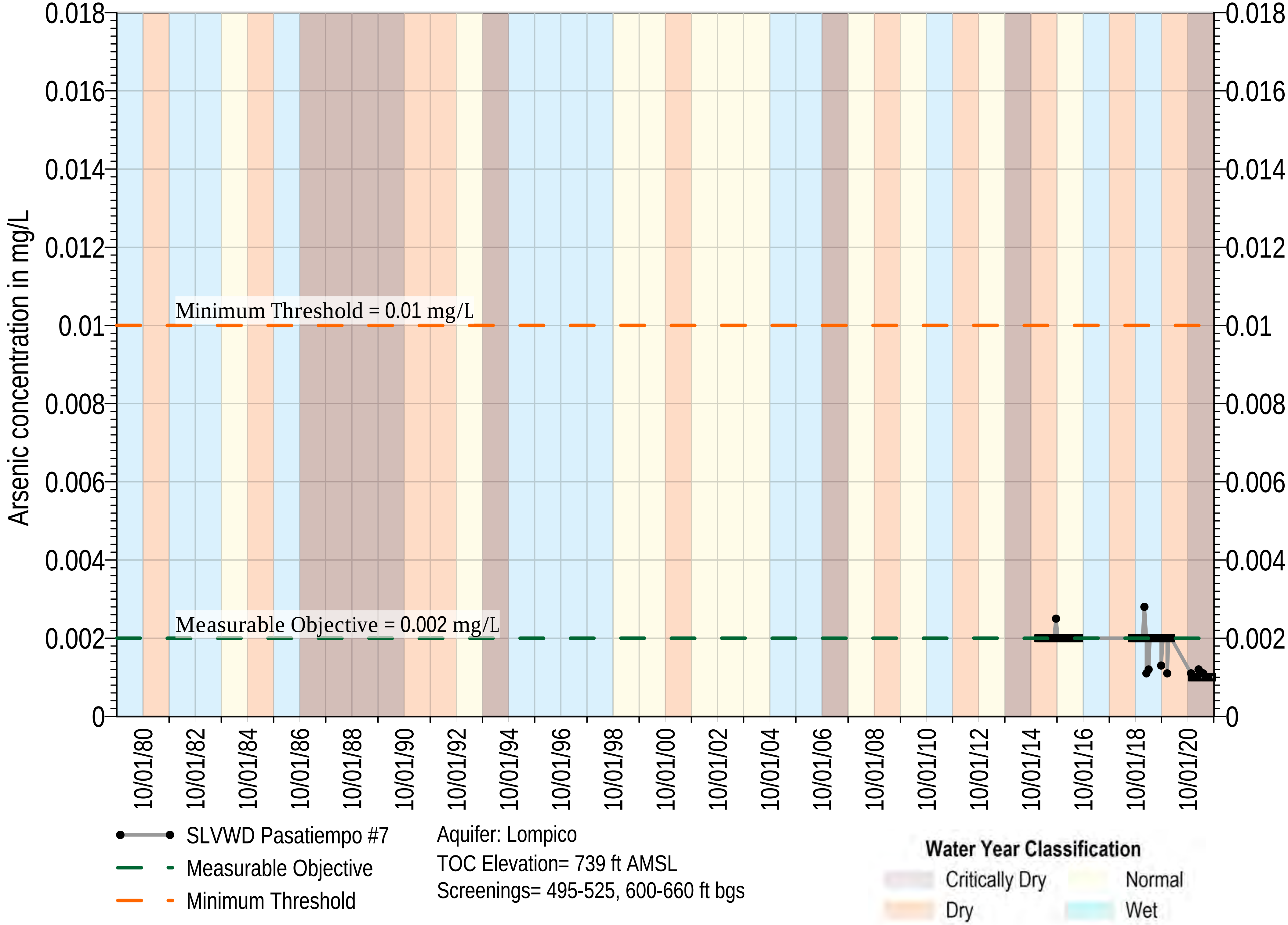
Appendix D

Well Chemographs

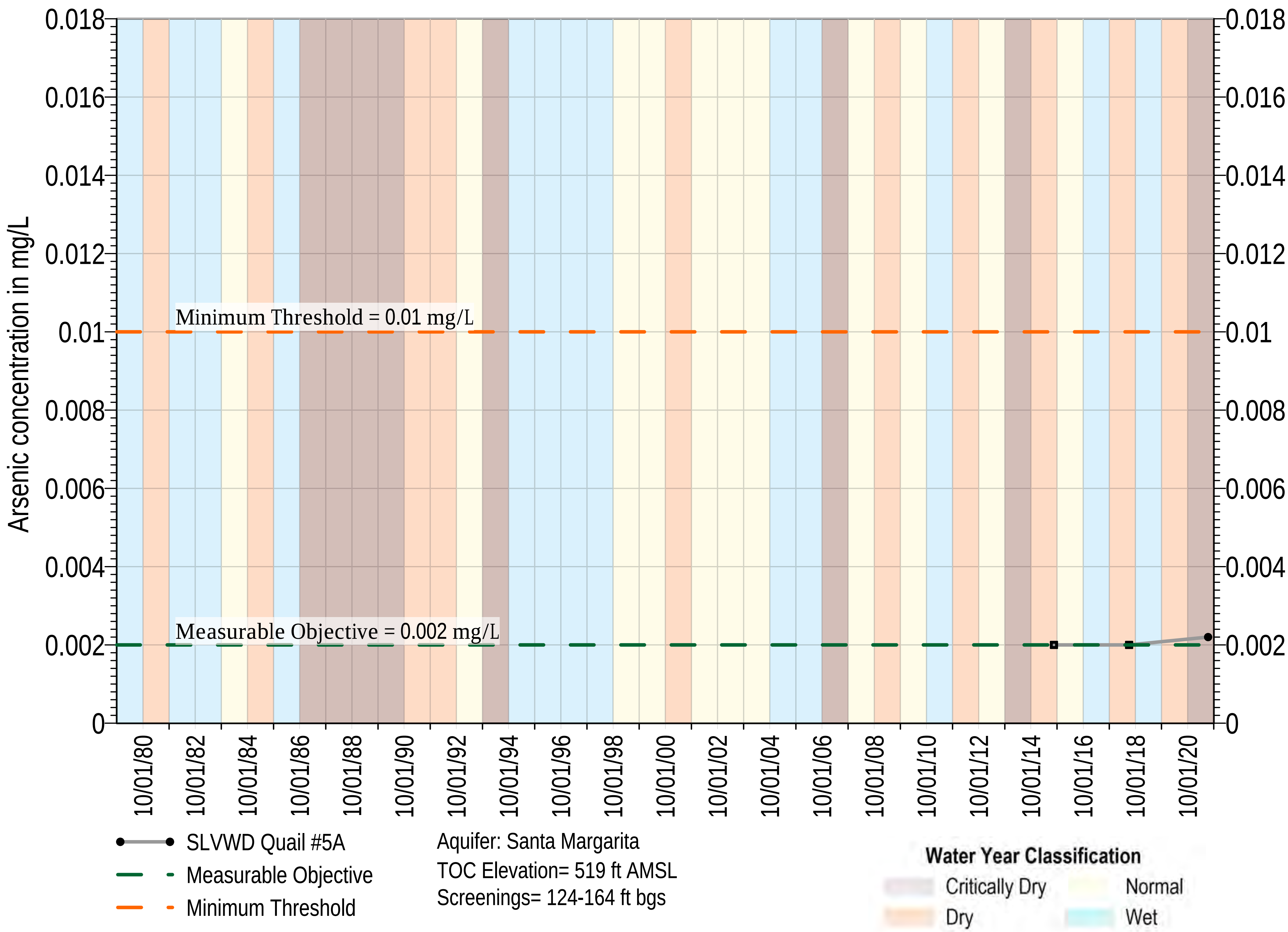
Arsenic



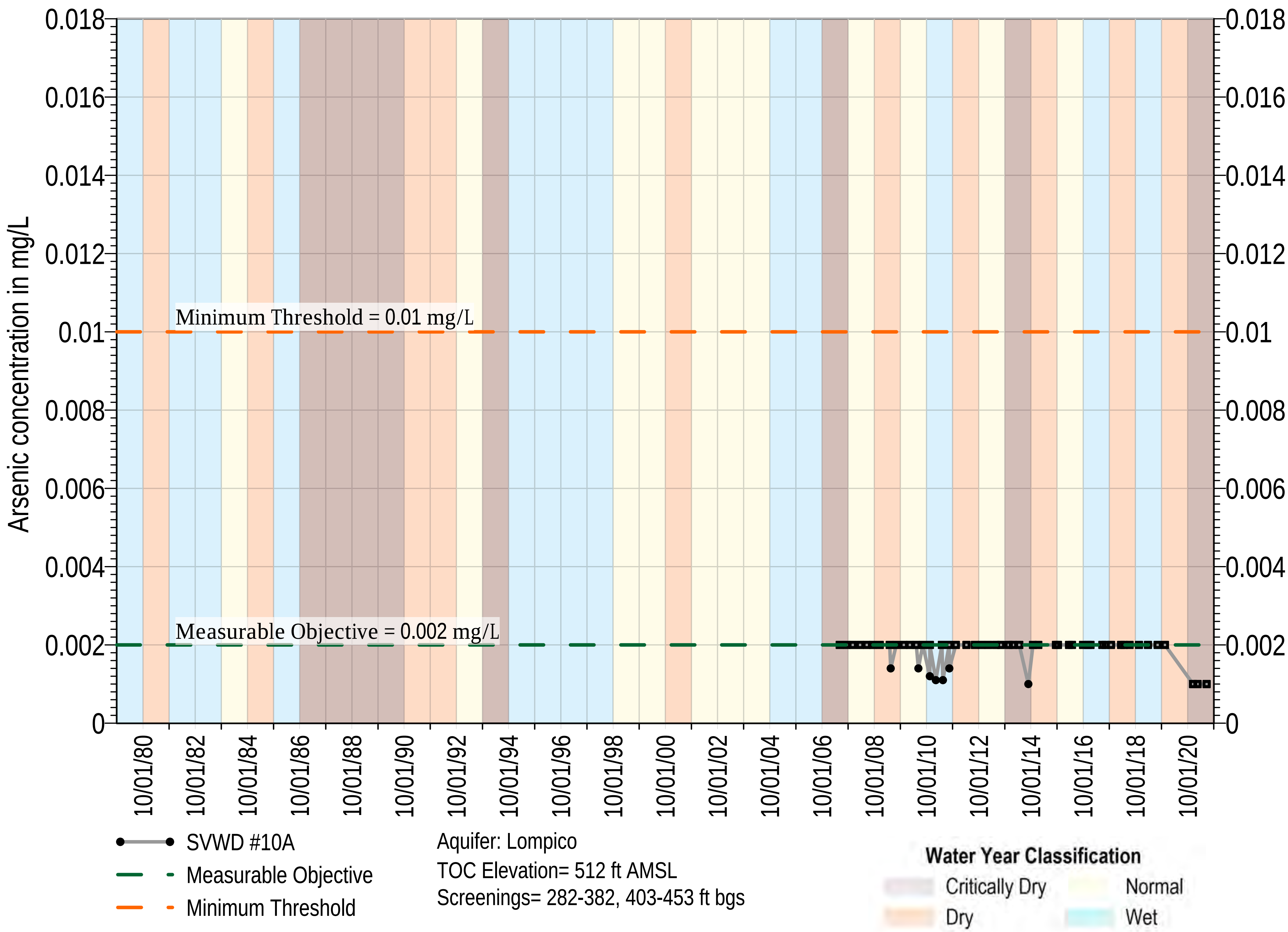
Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result



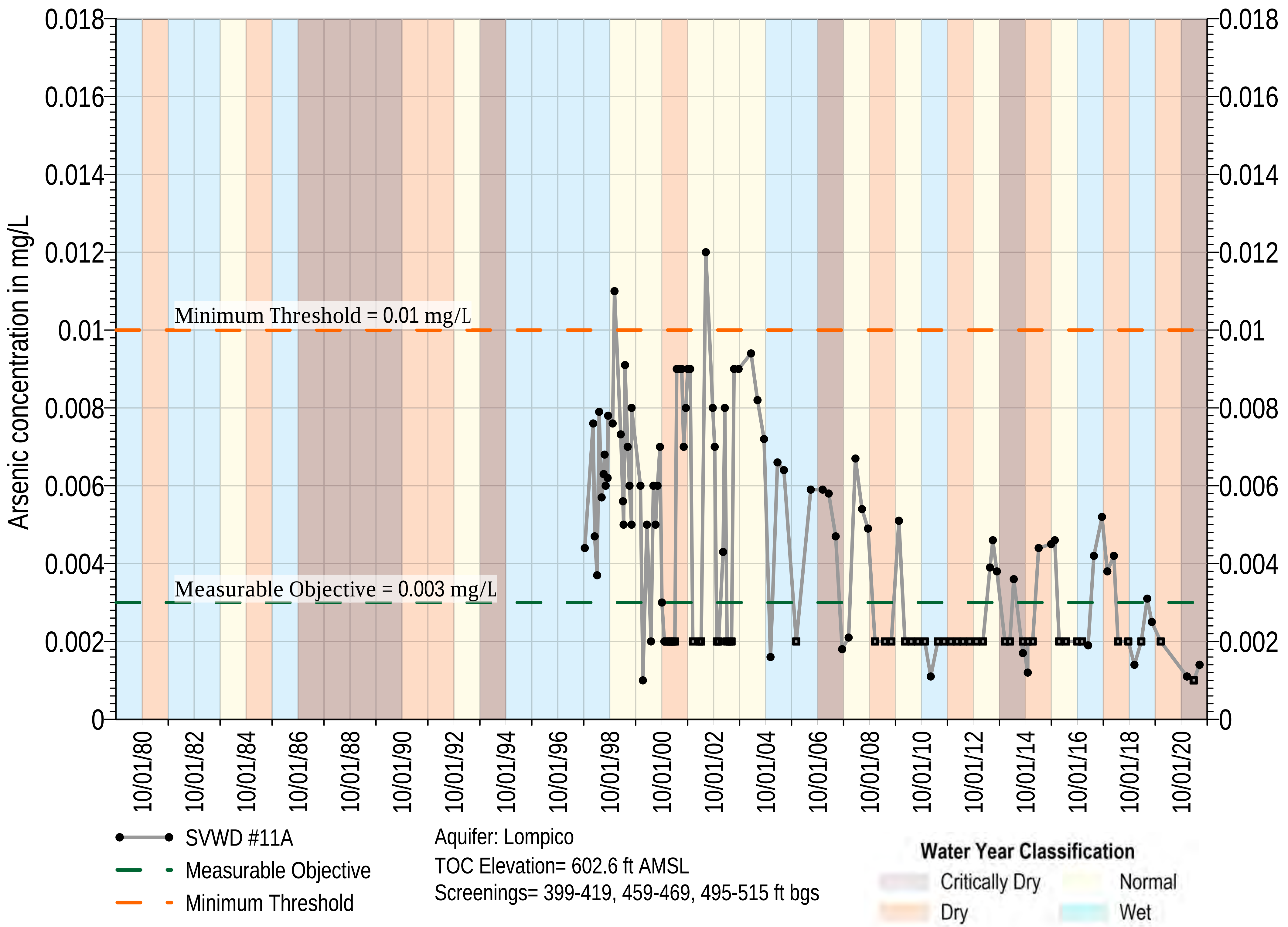
Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result



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



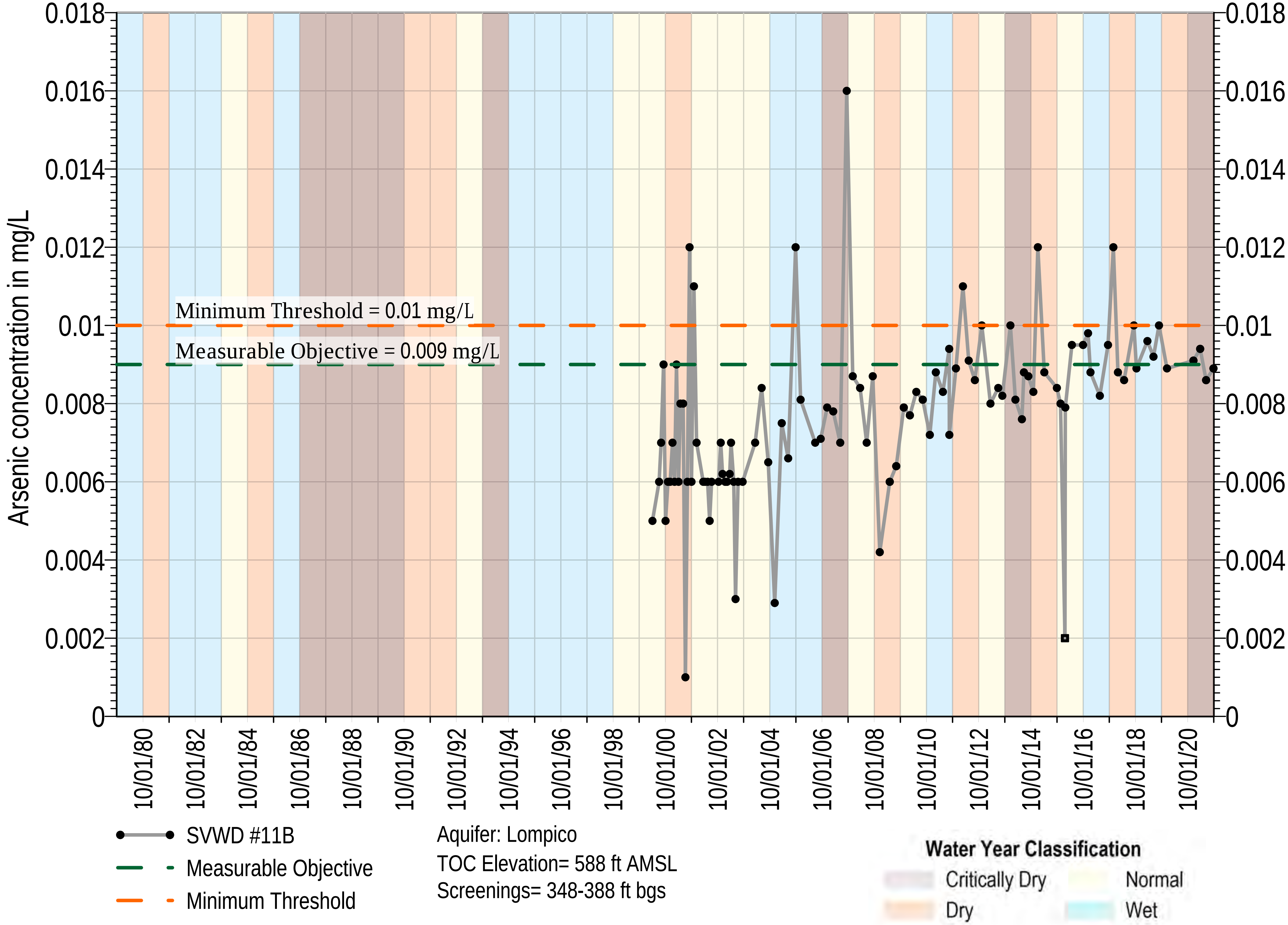
Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result



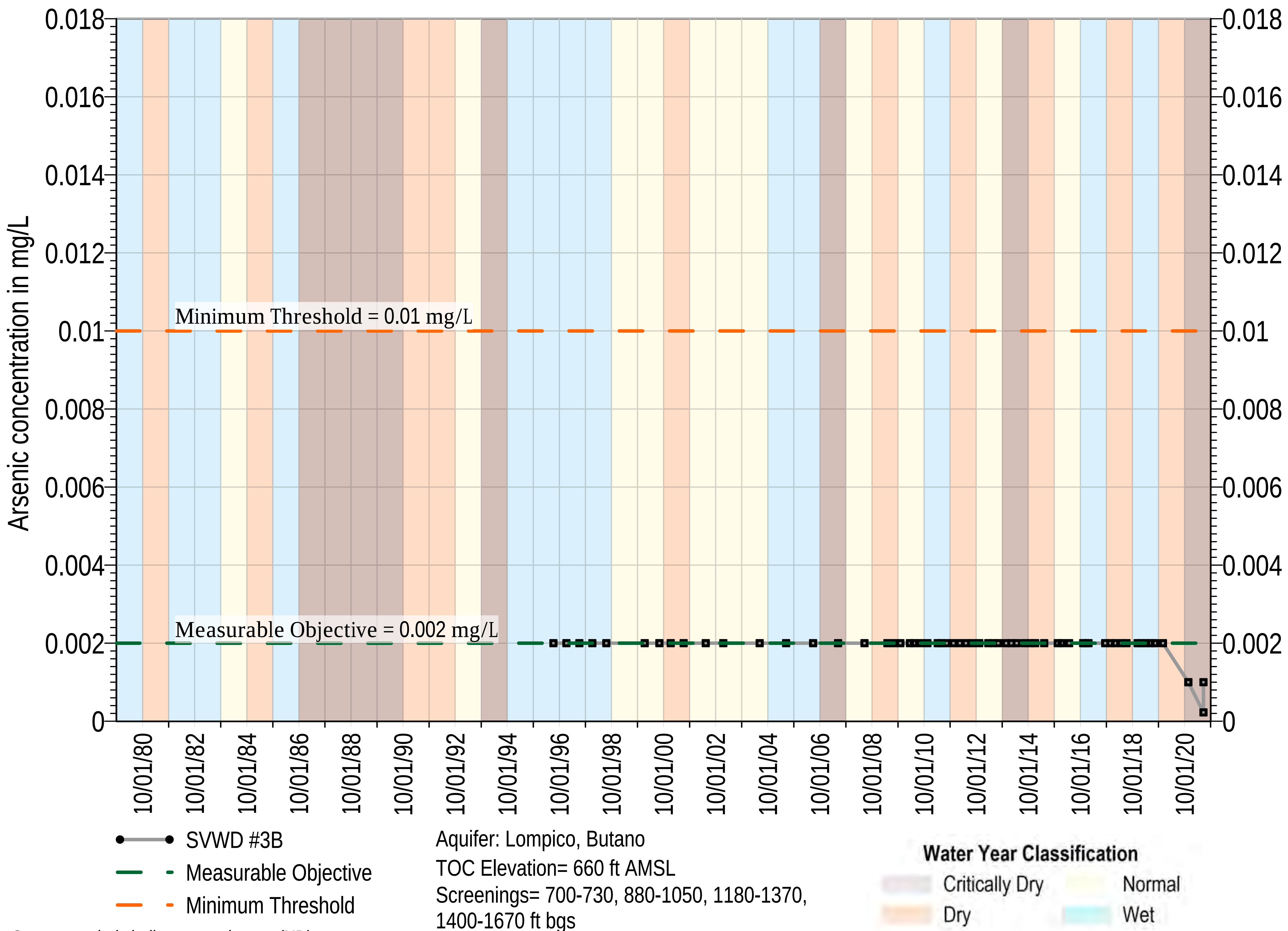
Square symbols indicate non-detects (ND)

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

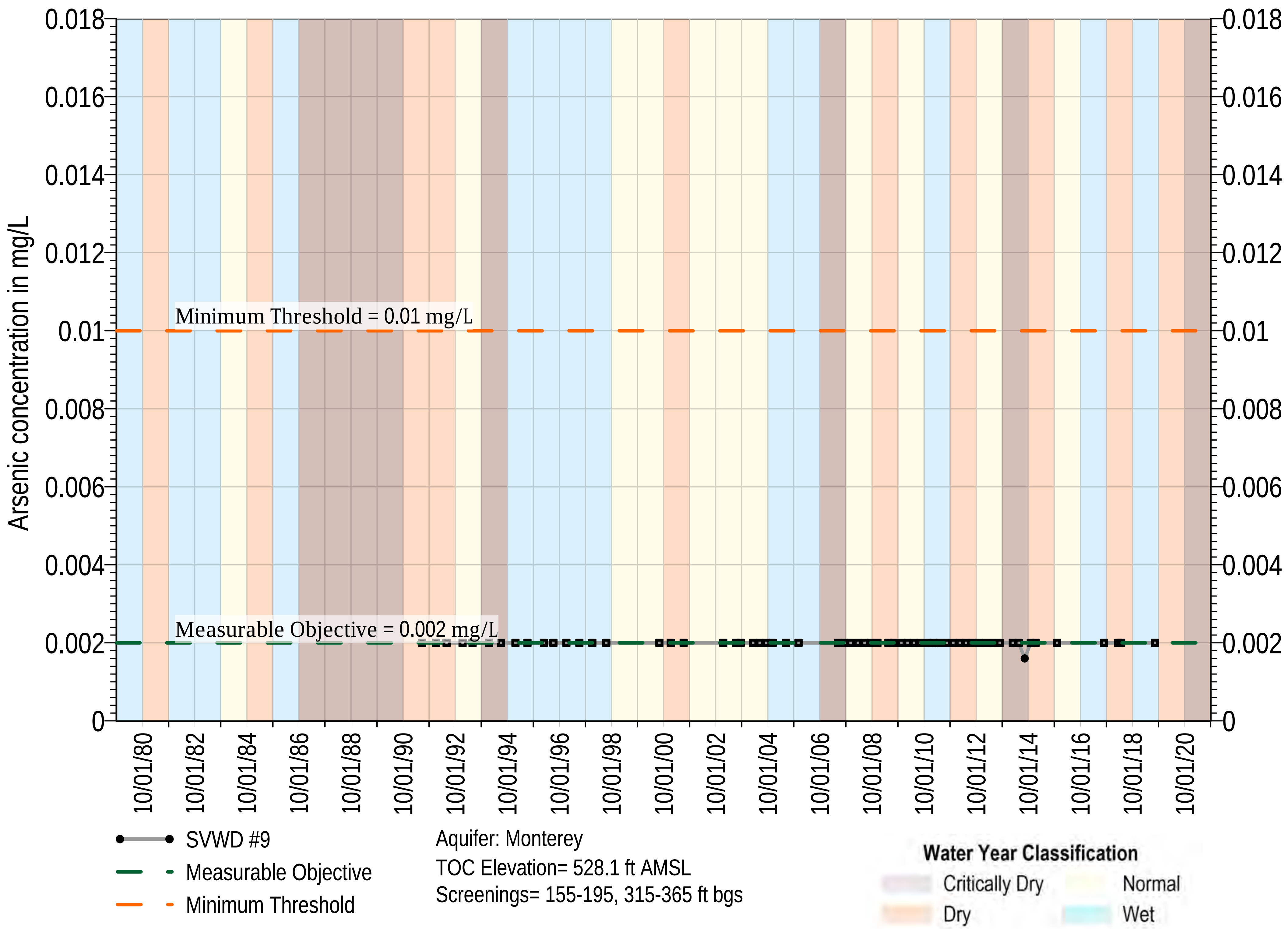
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result



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



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

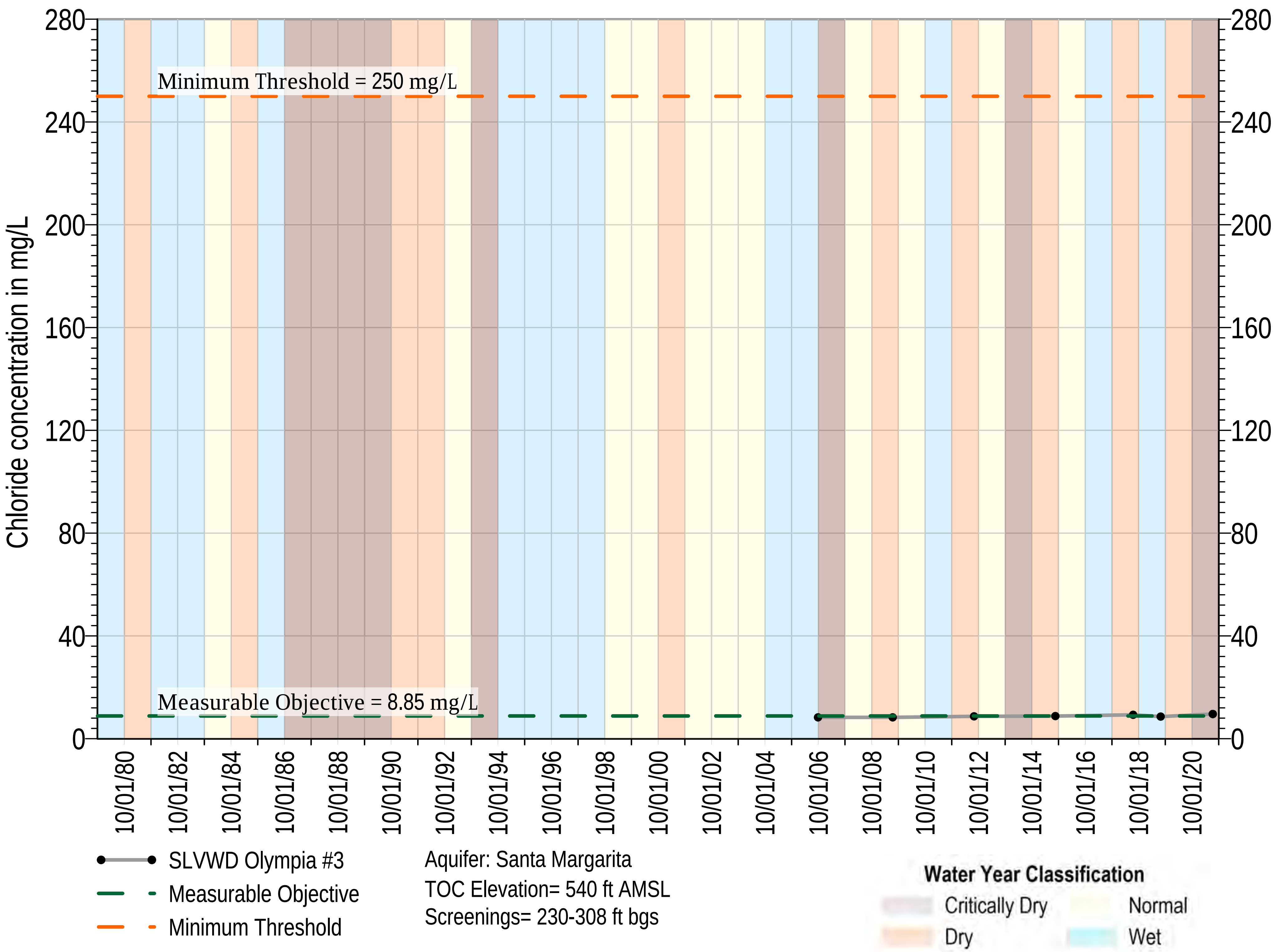


Square symbols indicate non-detects (ND)

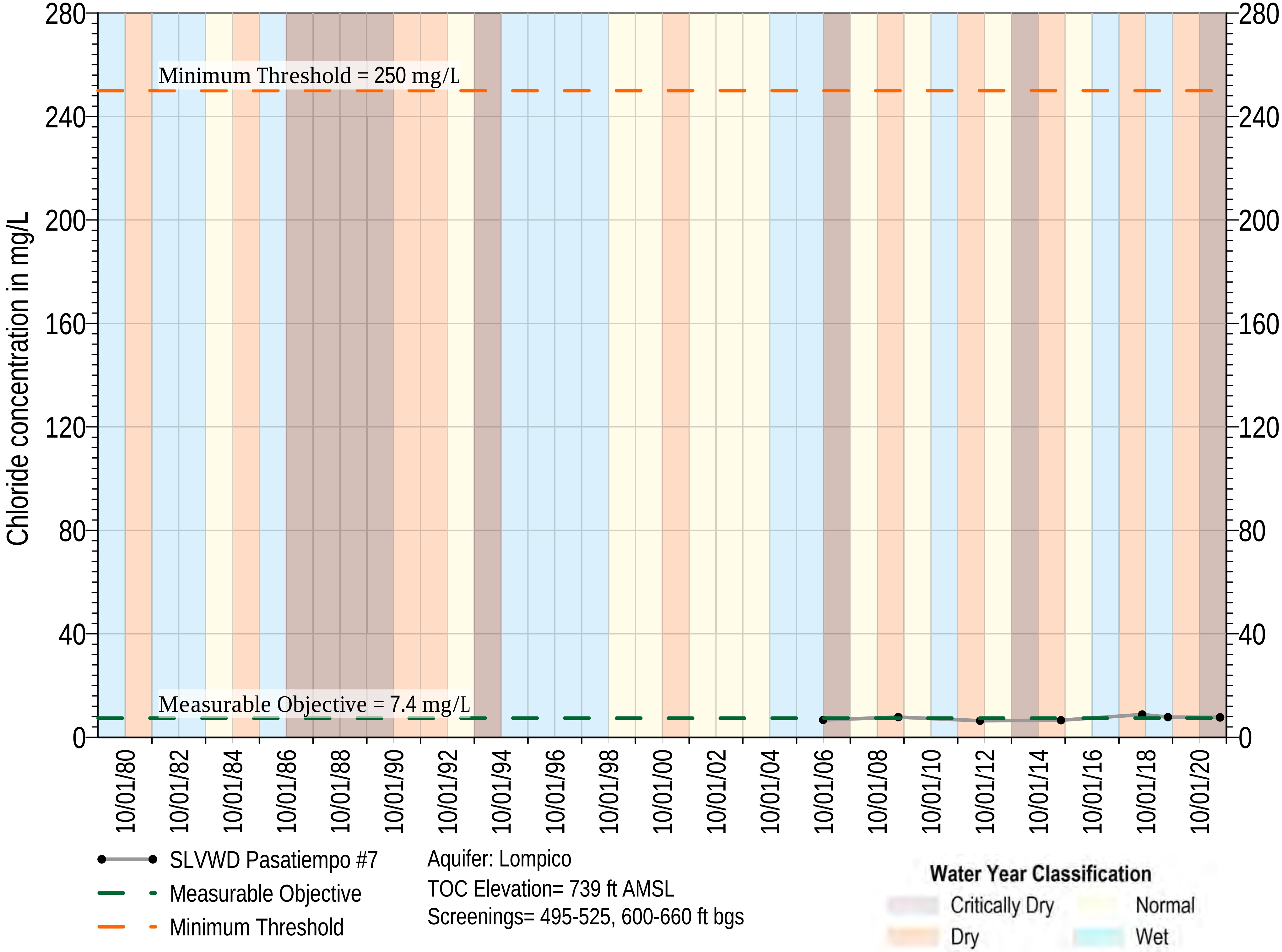
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)

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

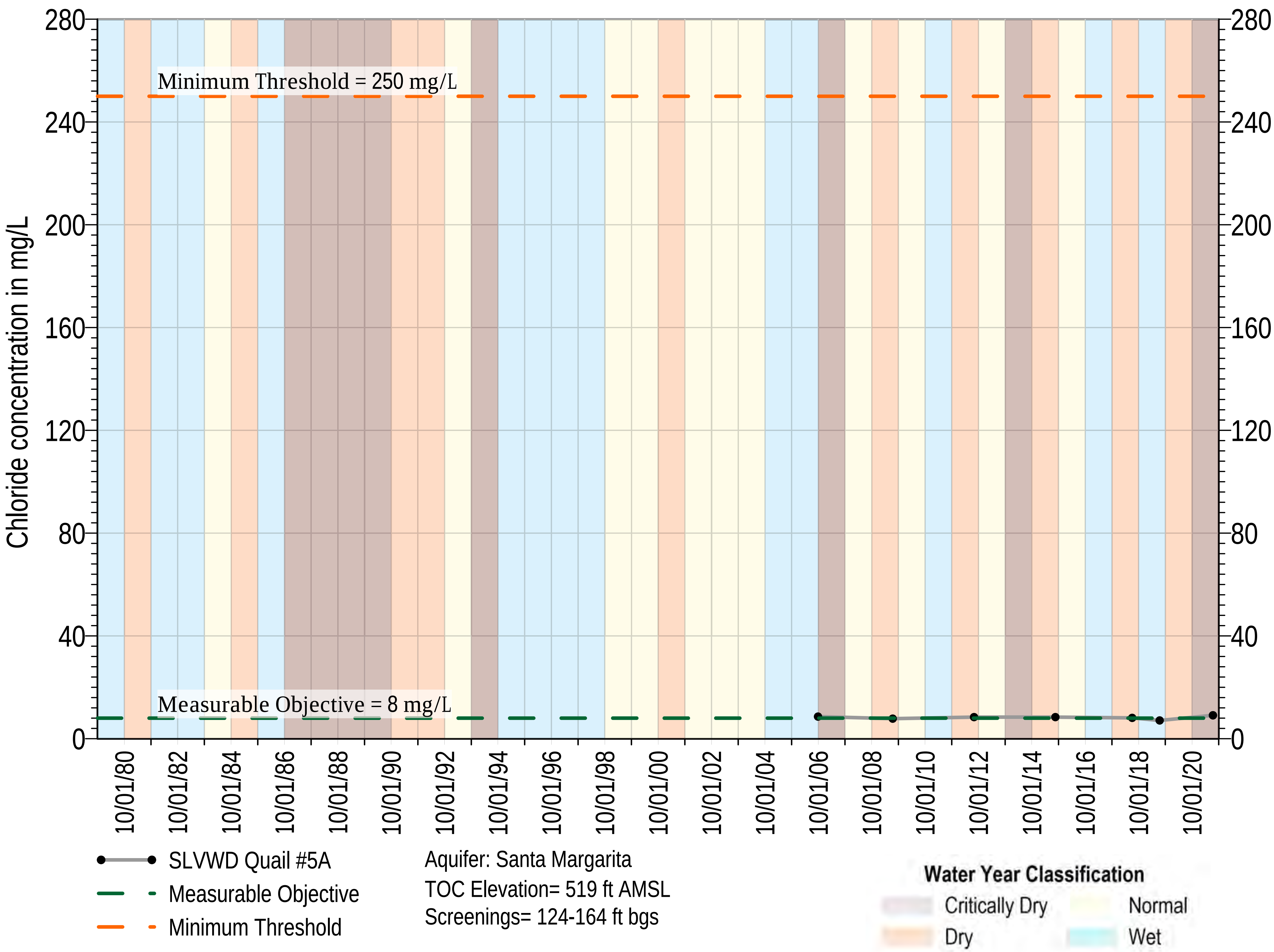
Chloride



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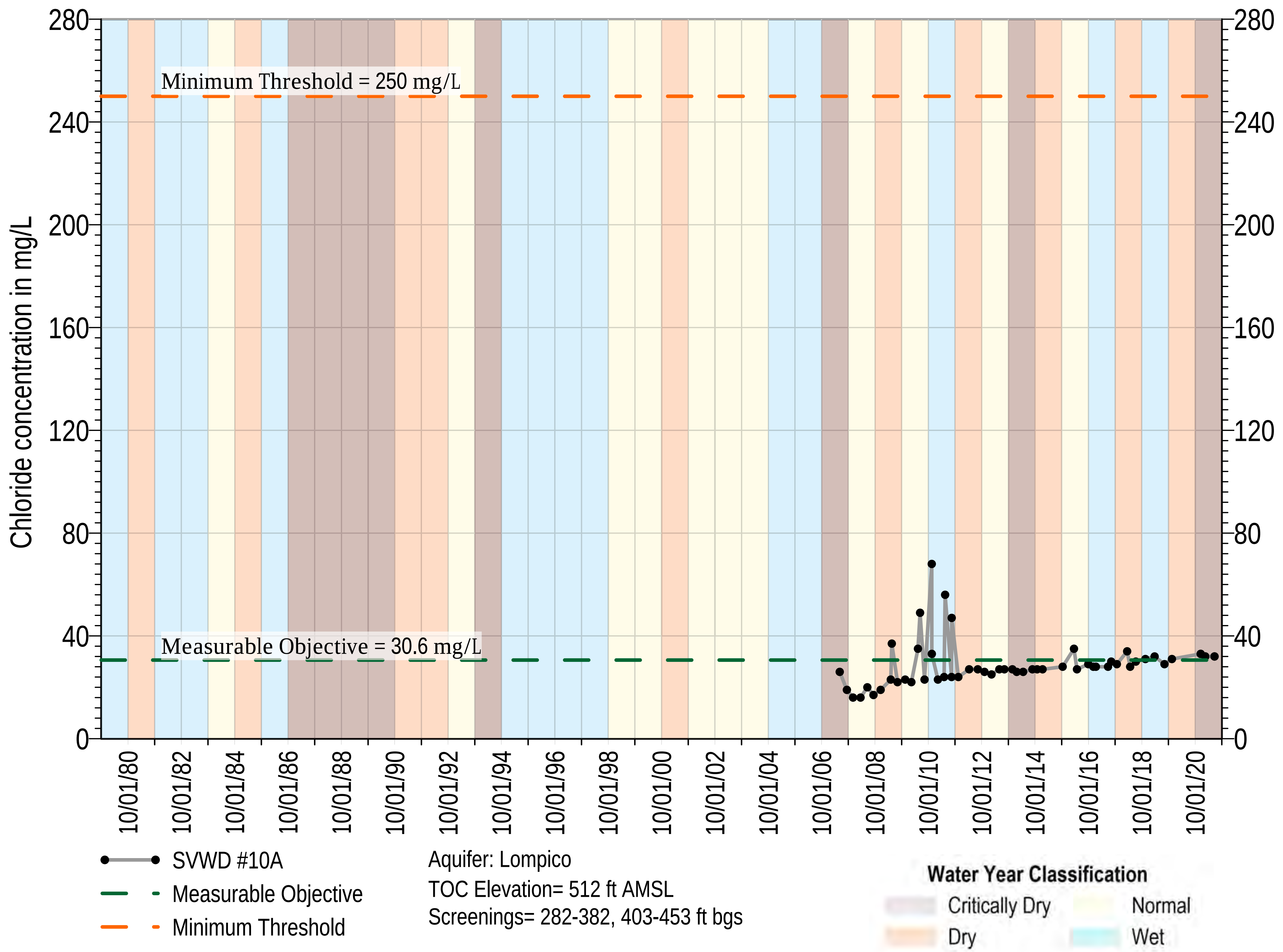
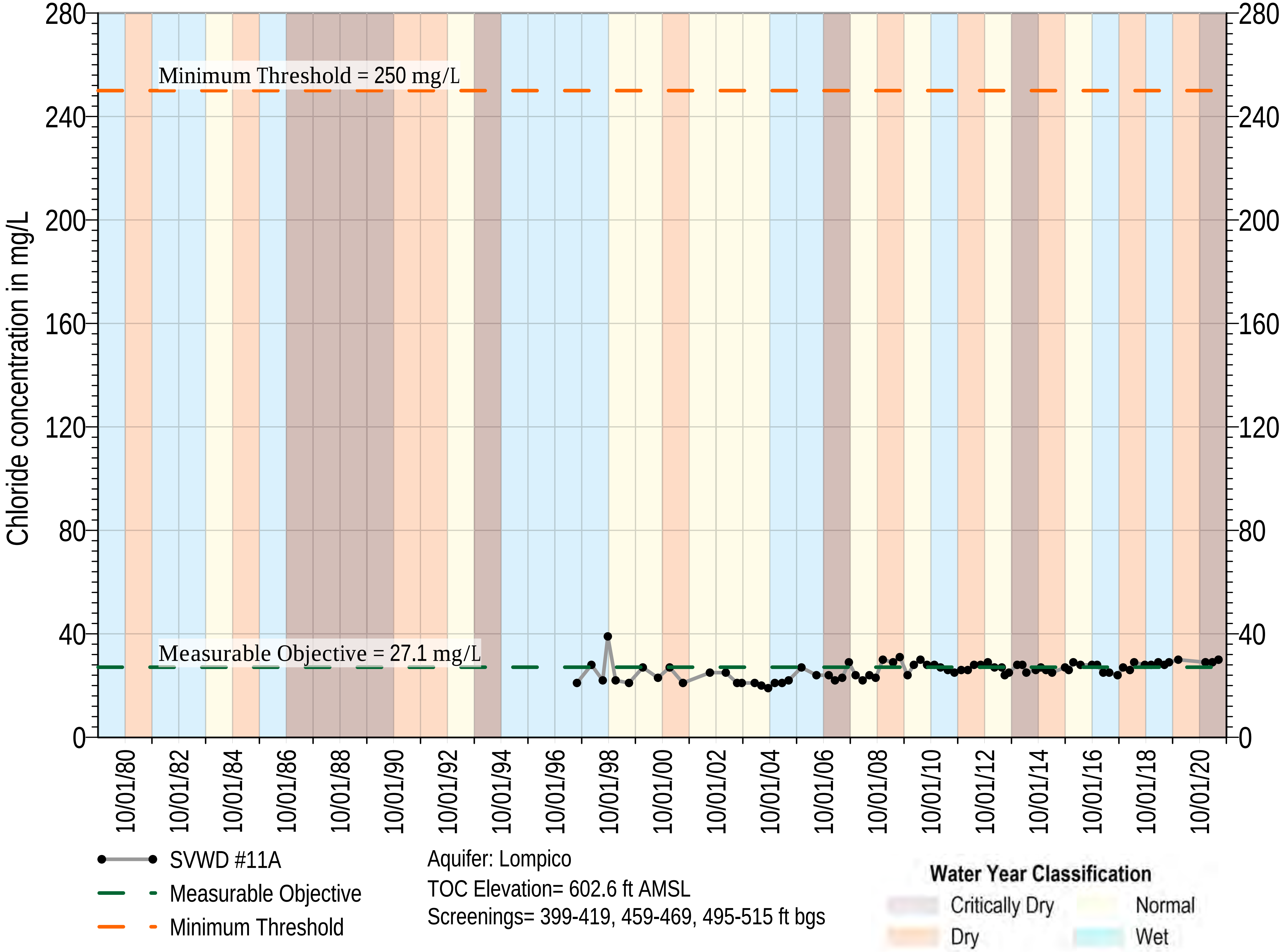
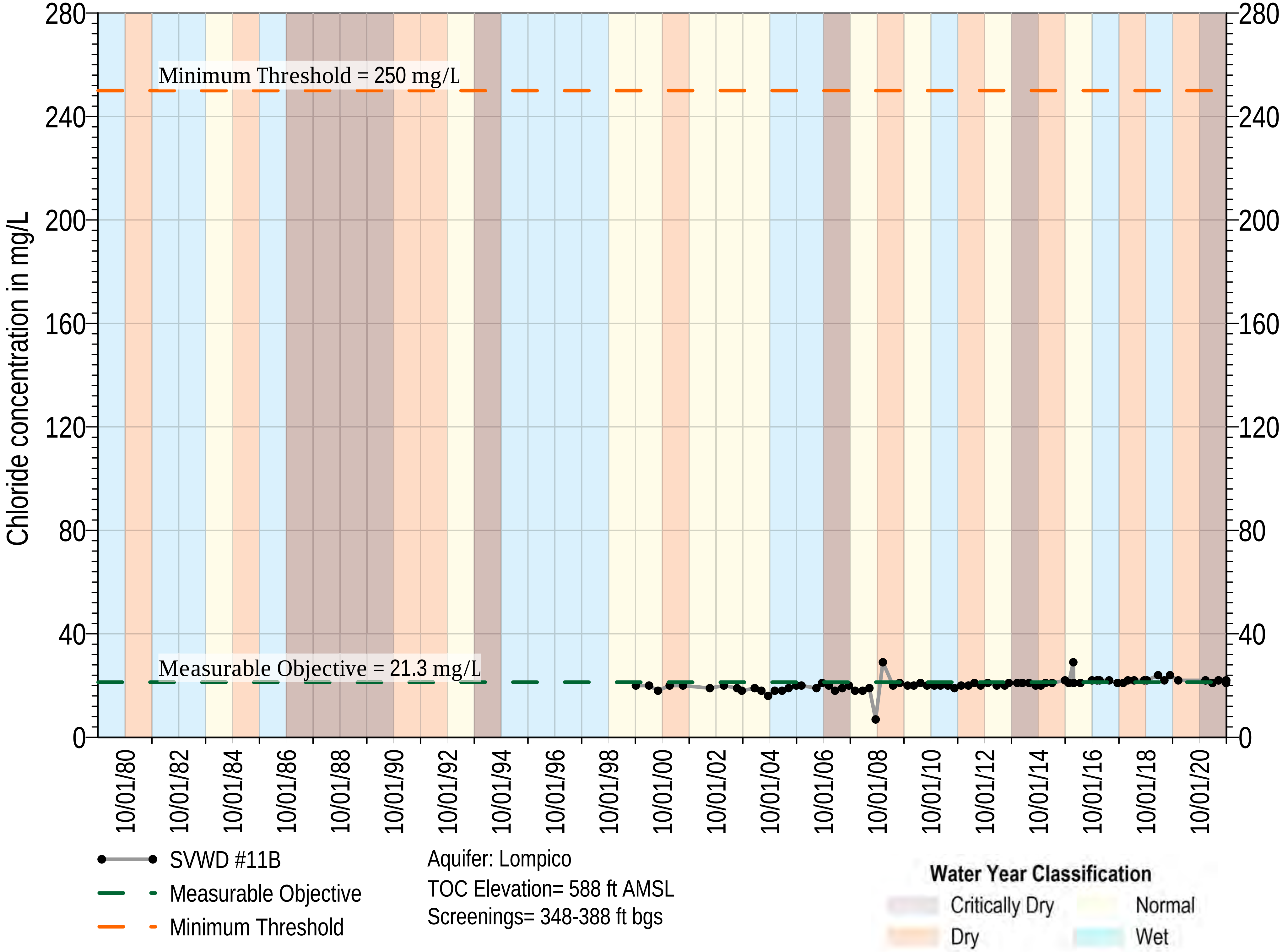
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result



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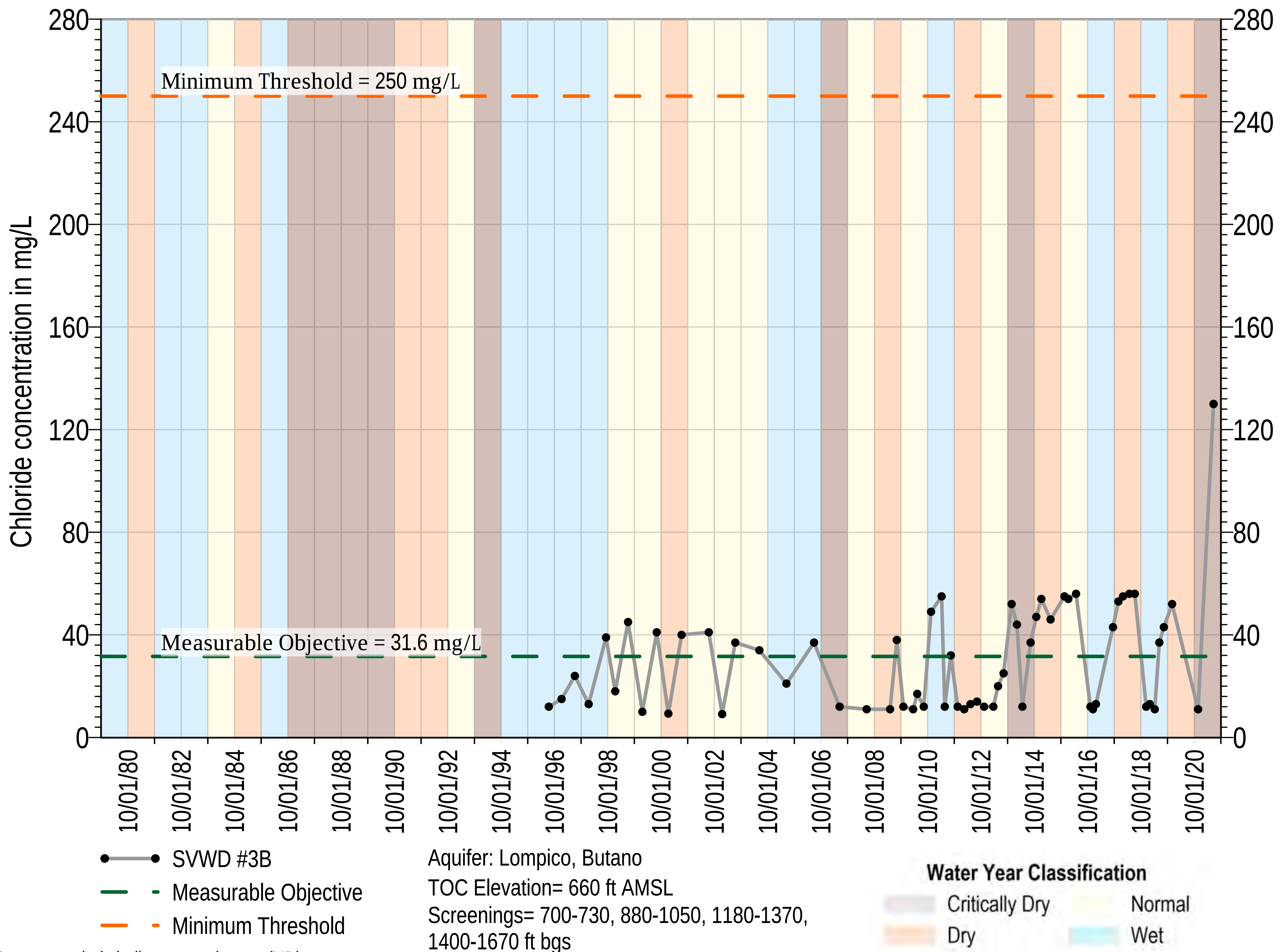
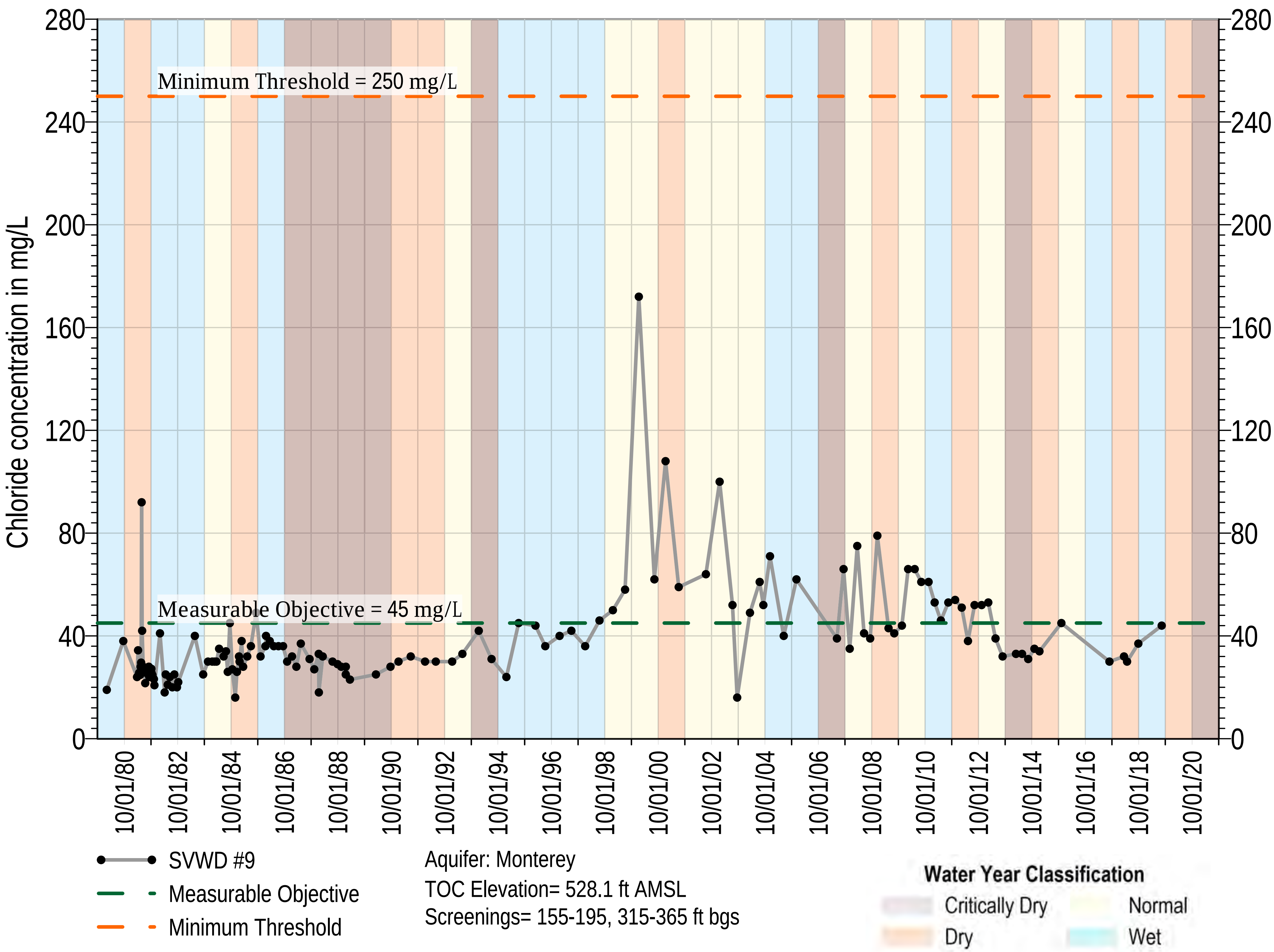
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result

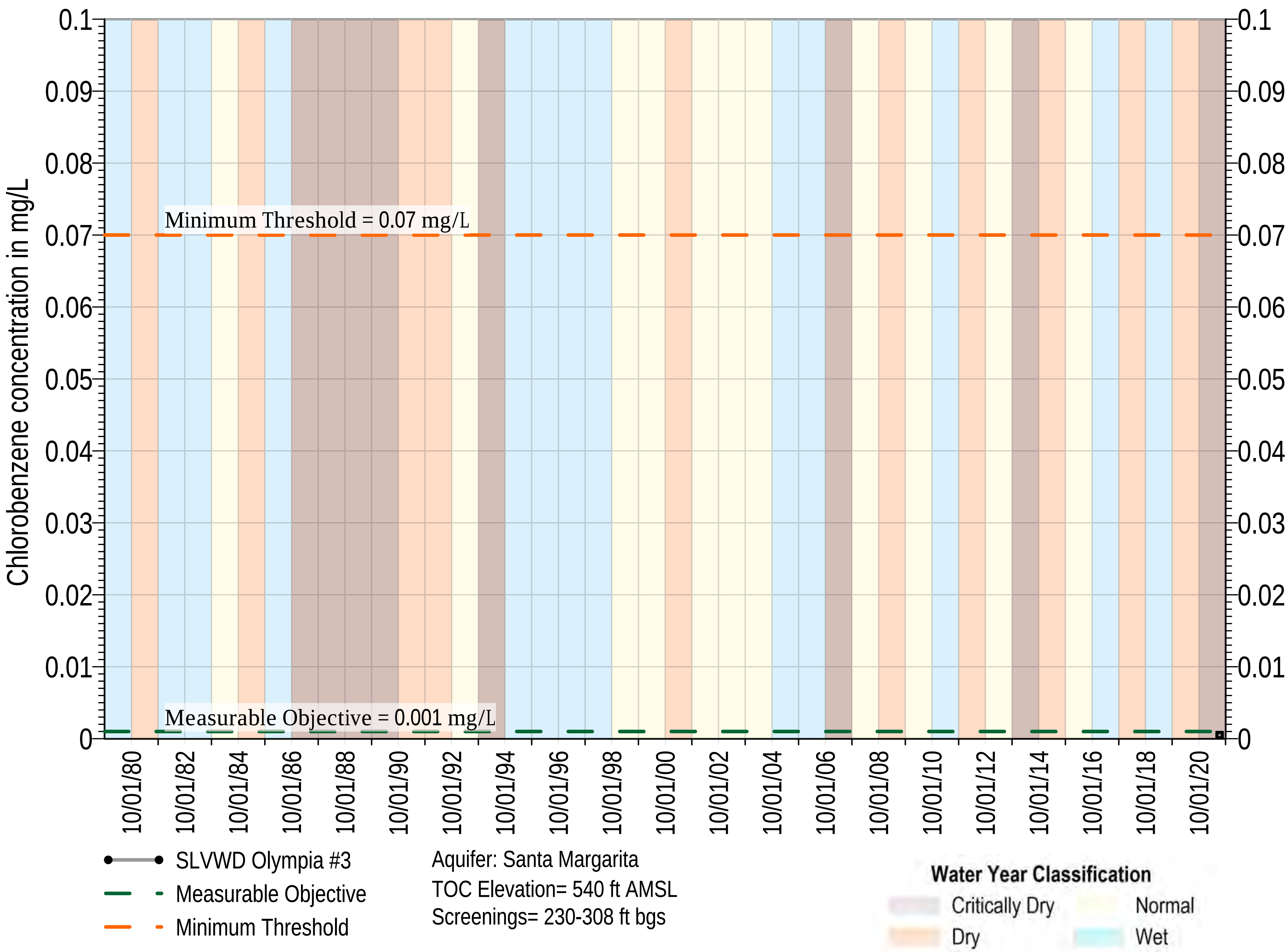


Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result

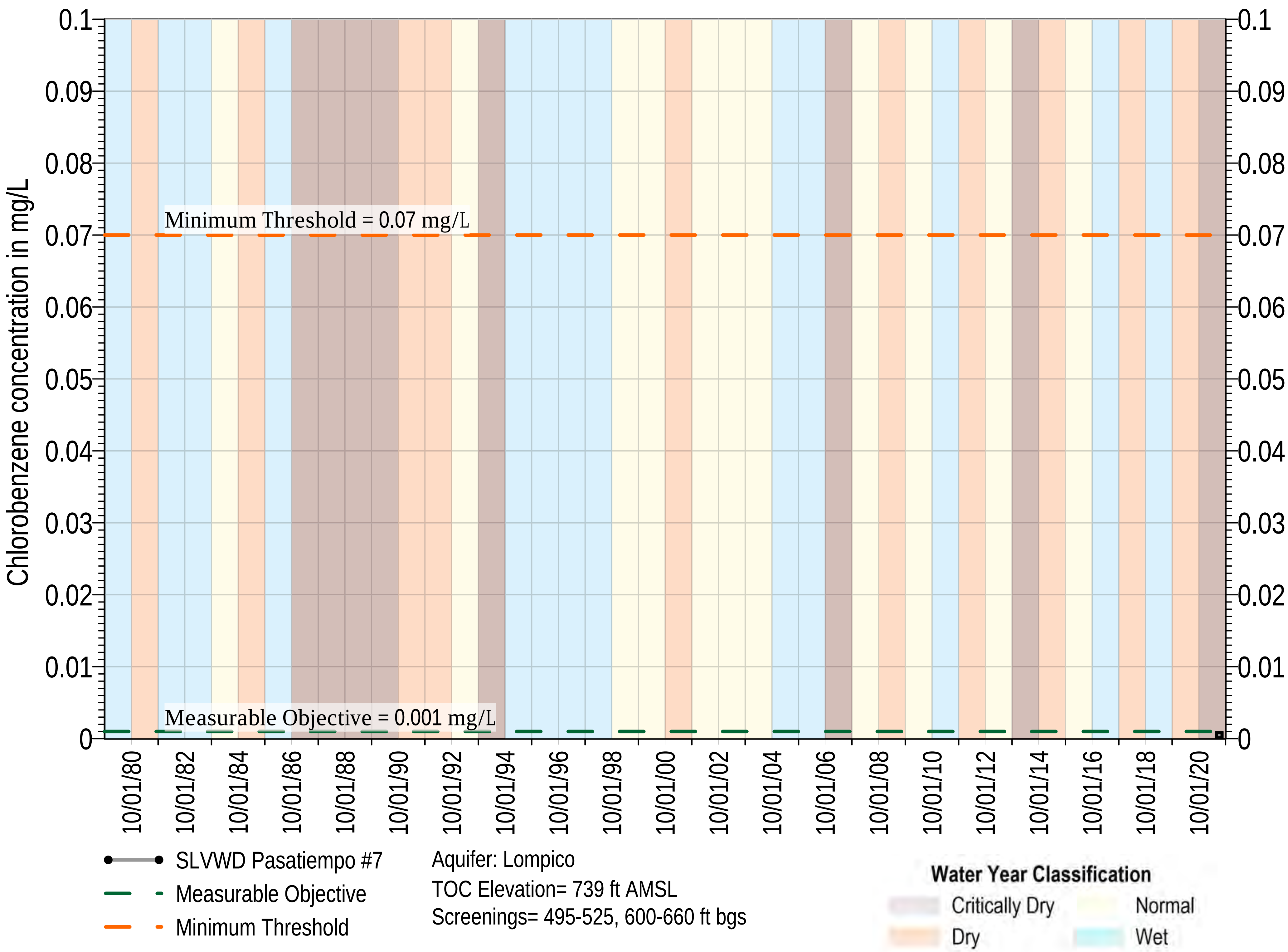


Square symbols indicate non-detects (ND)
ND are set at the state detection limits for purposes of reporting (DLR) (Title 22 §64400.34)
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result

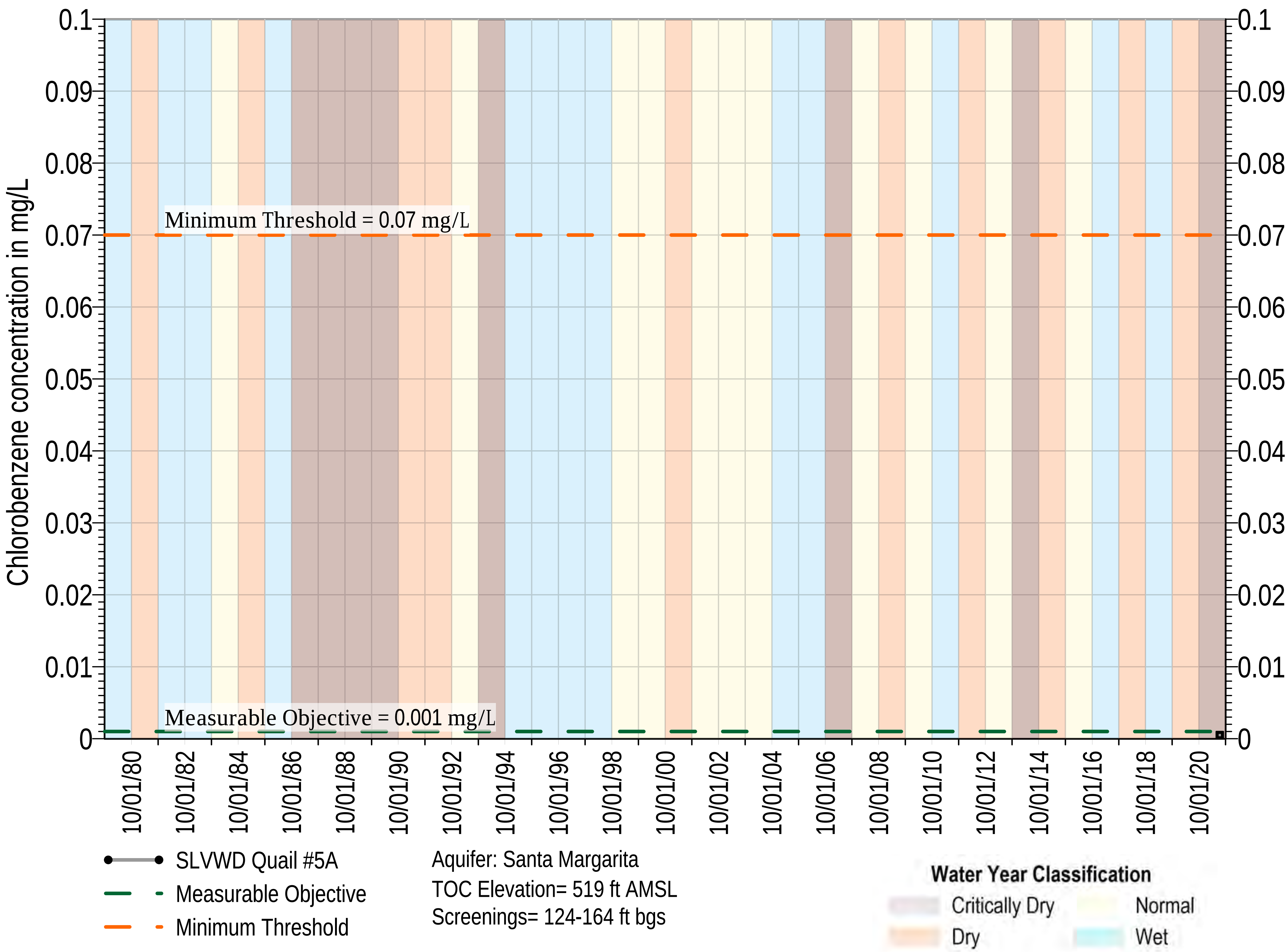
Chlorobenzene



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)

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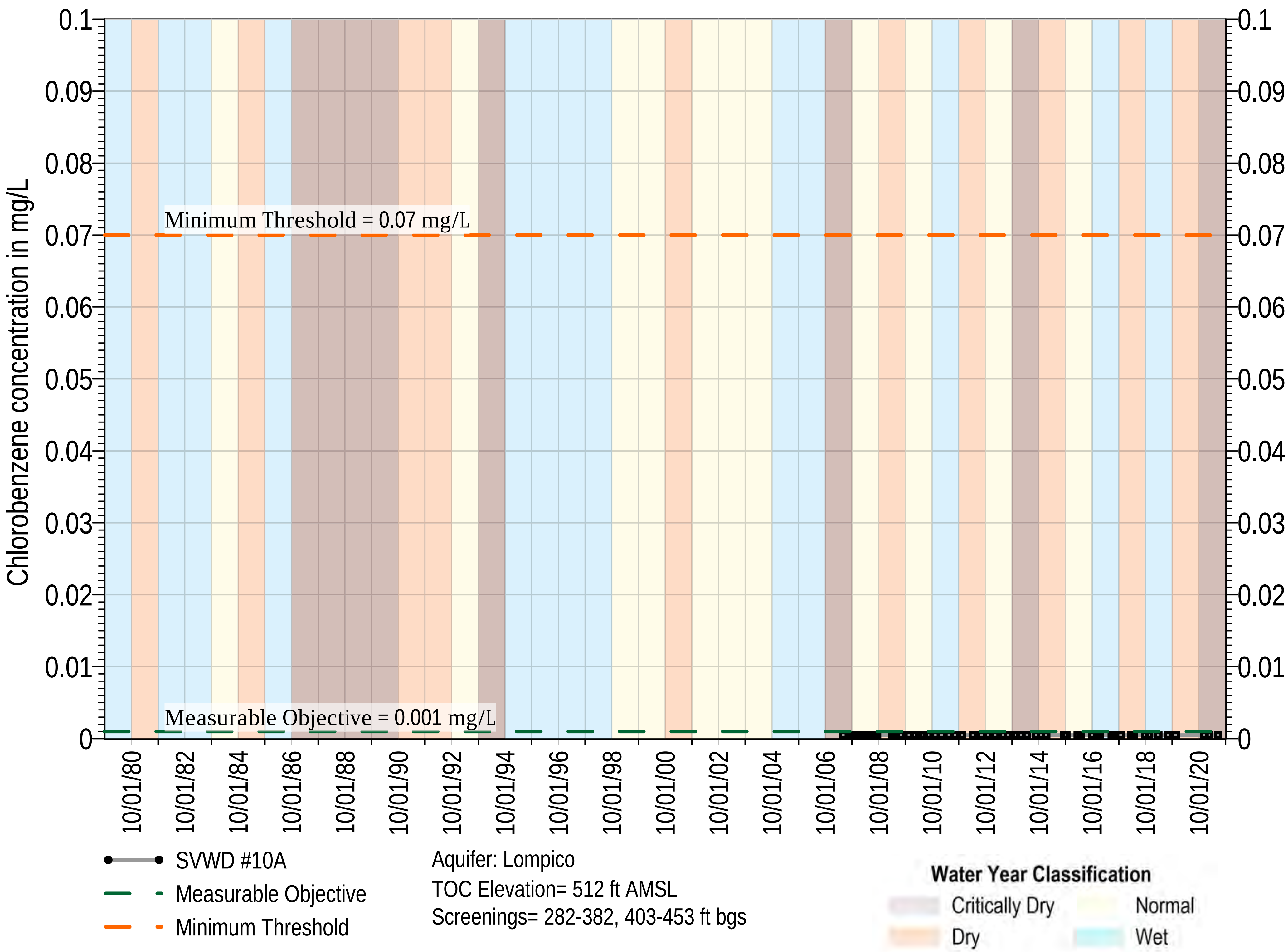

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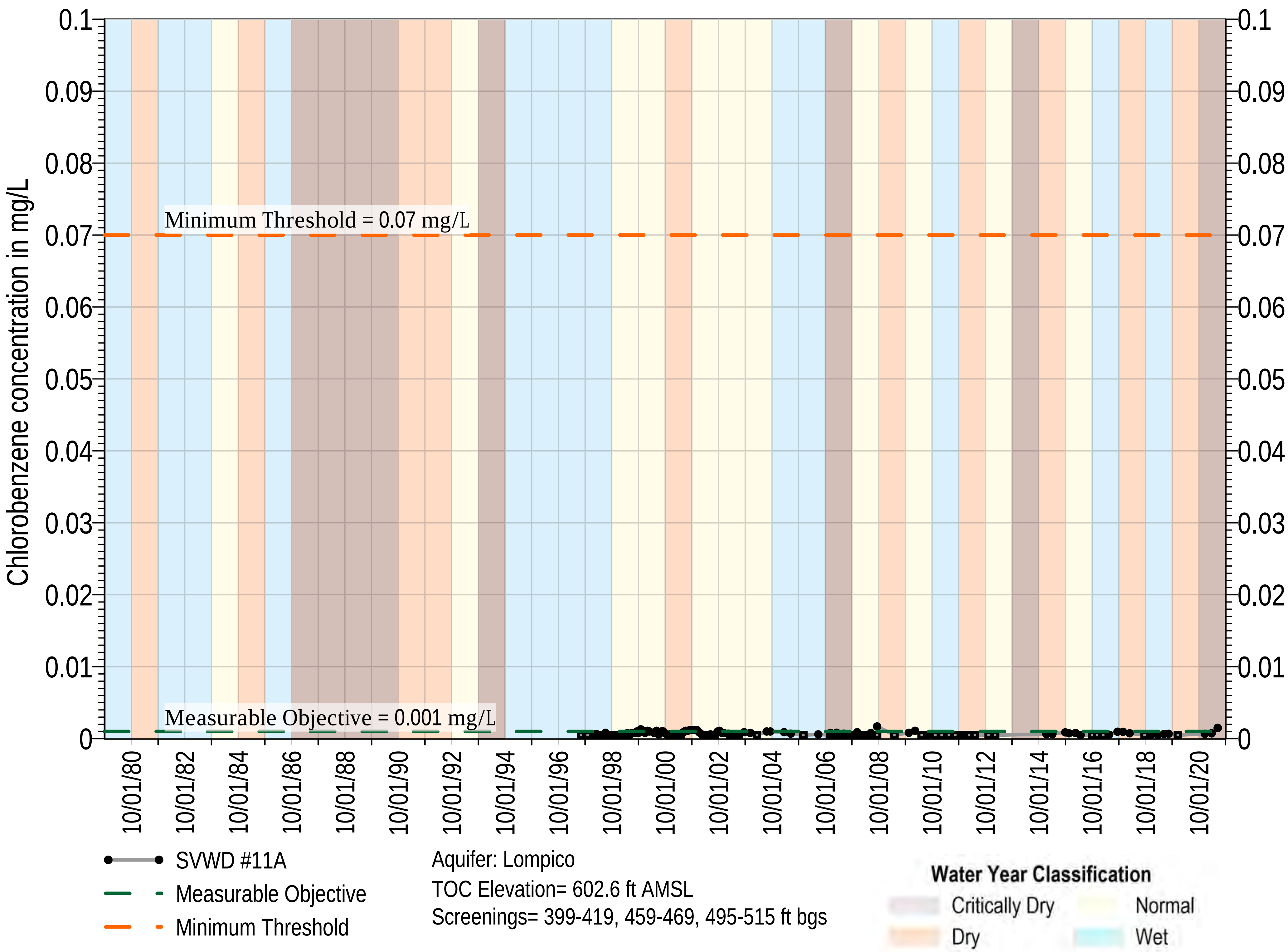

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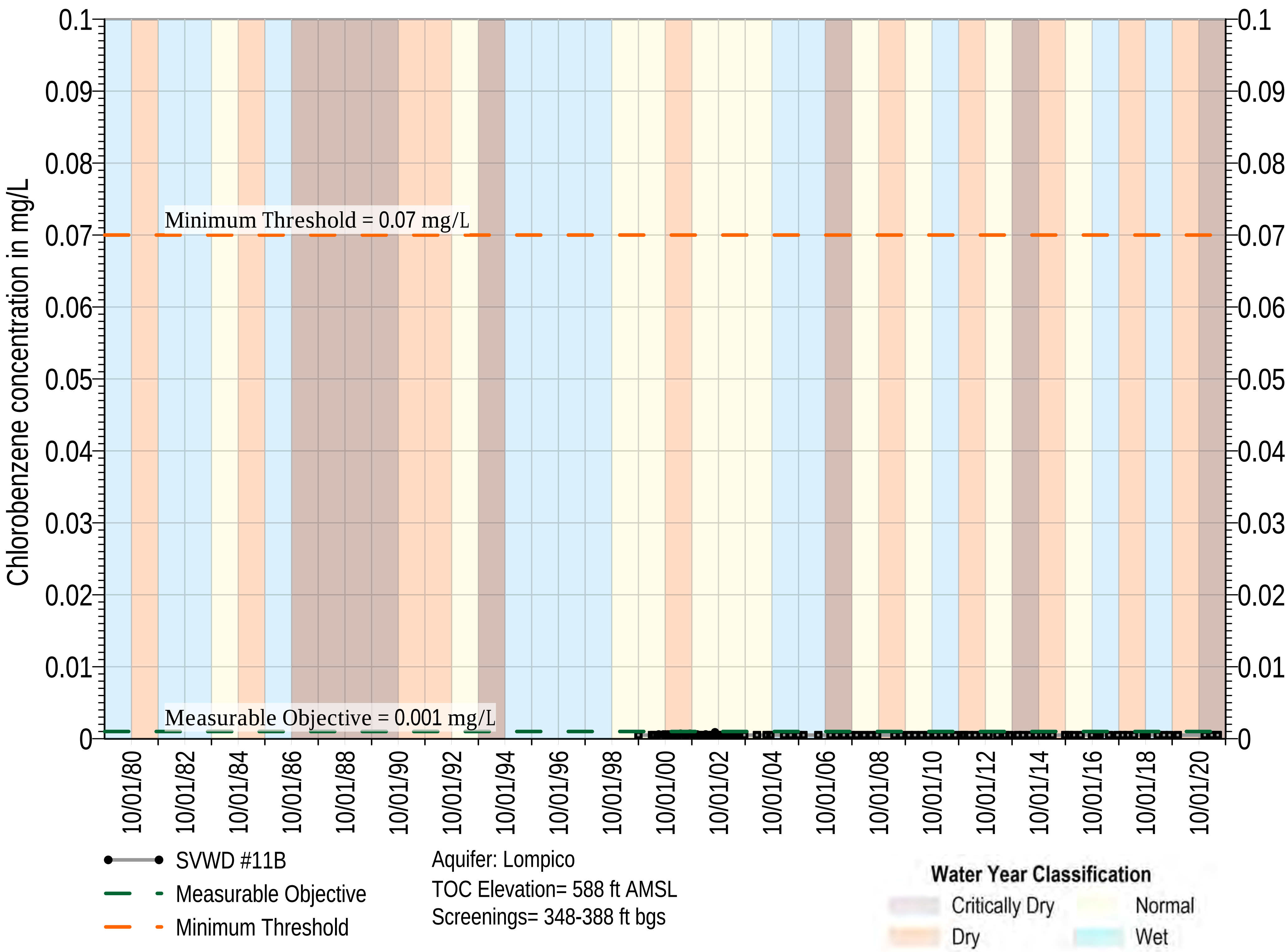

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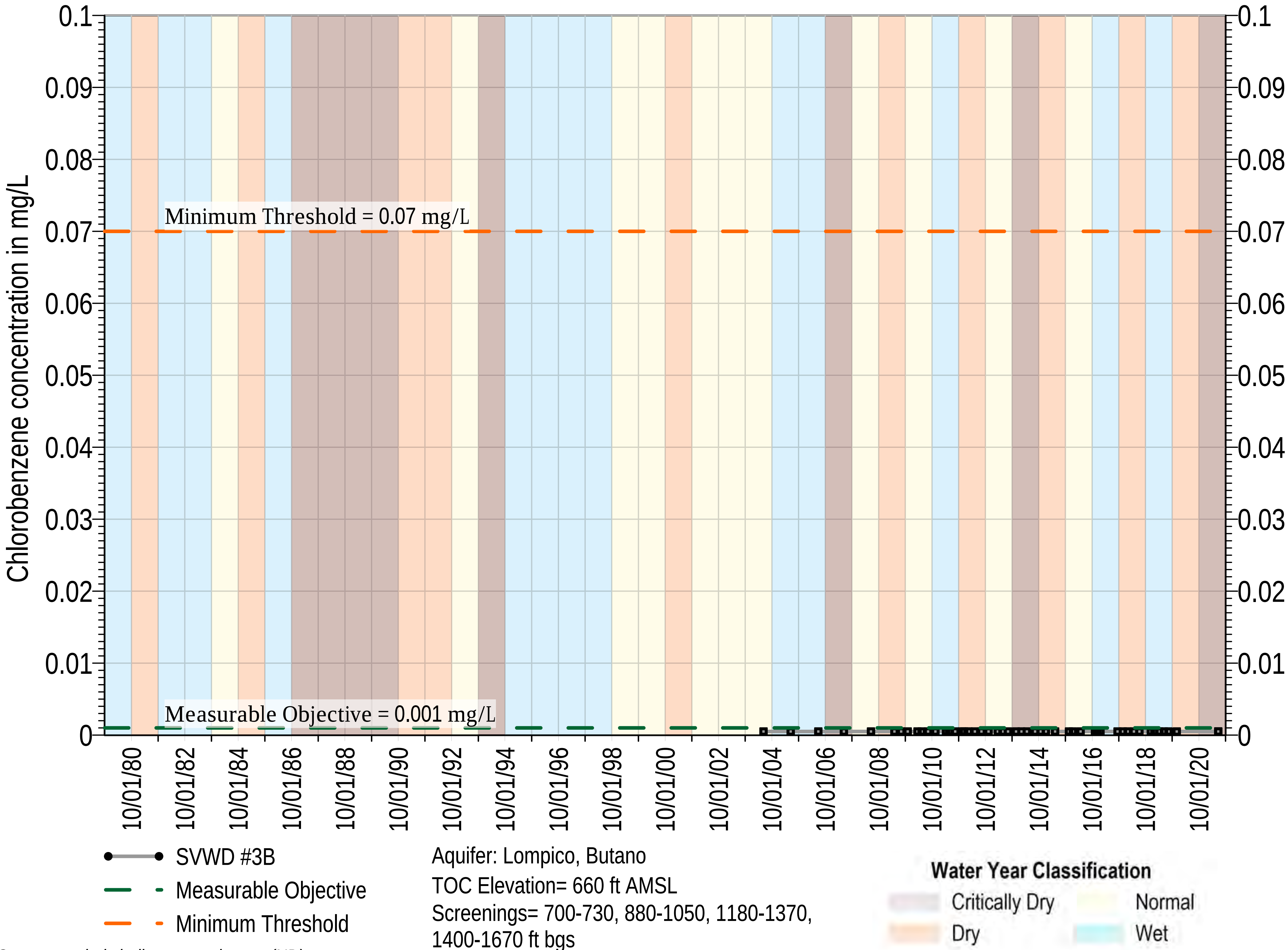

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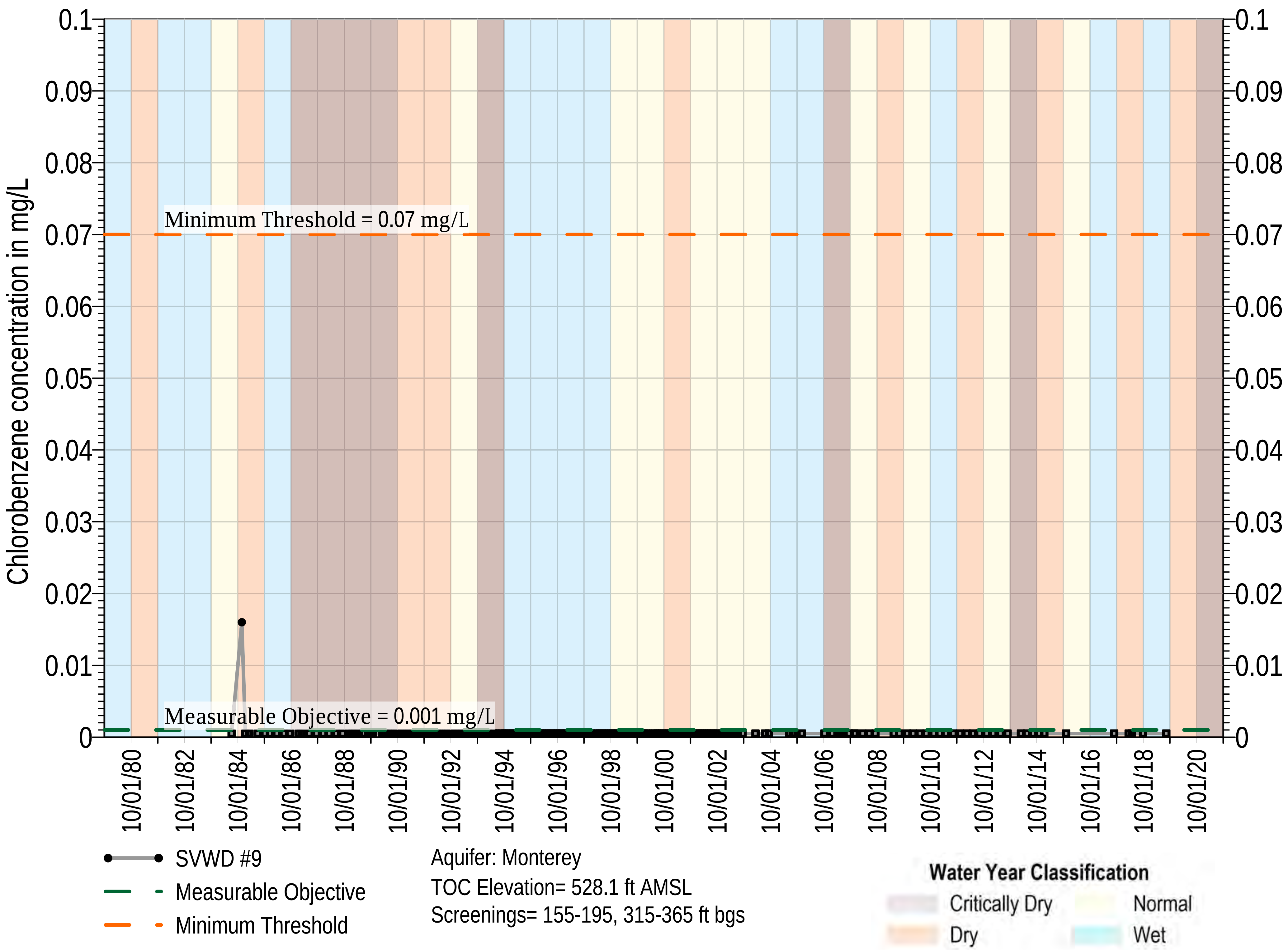

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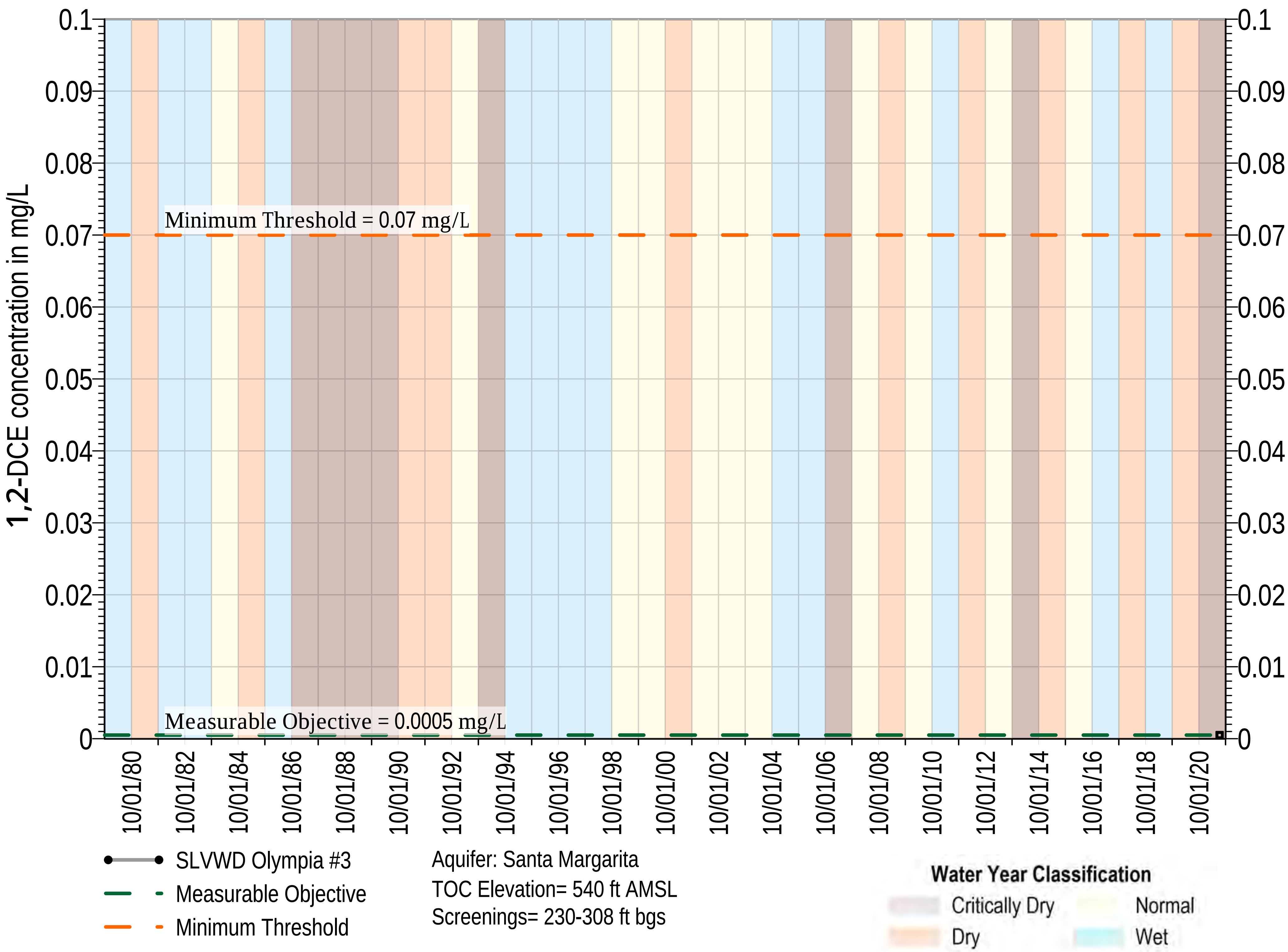
1,2-DCE



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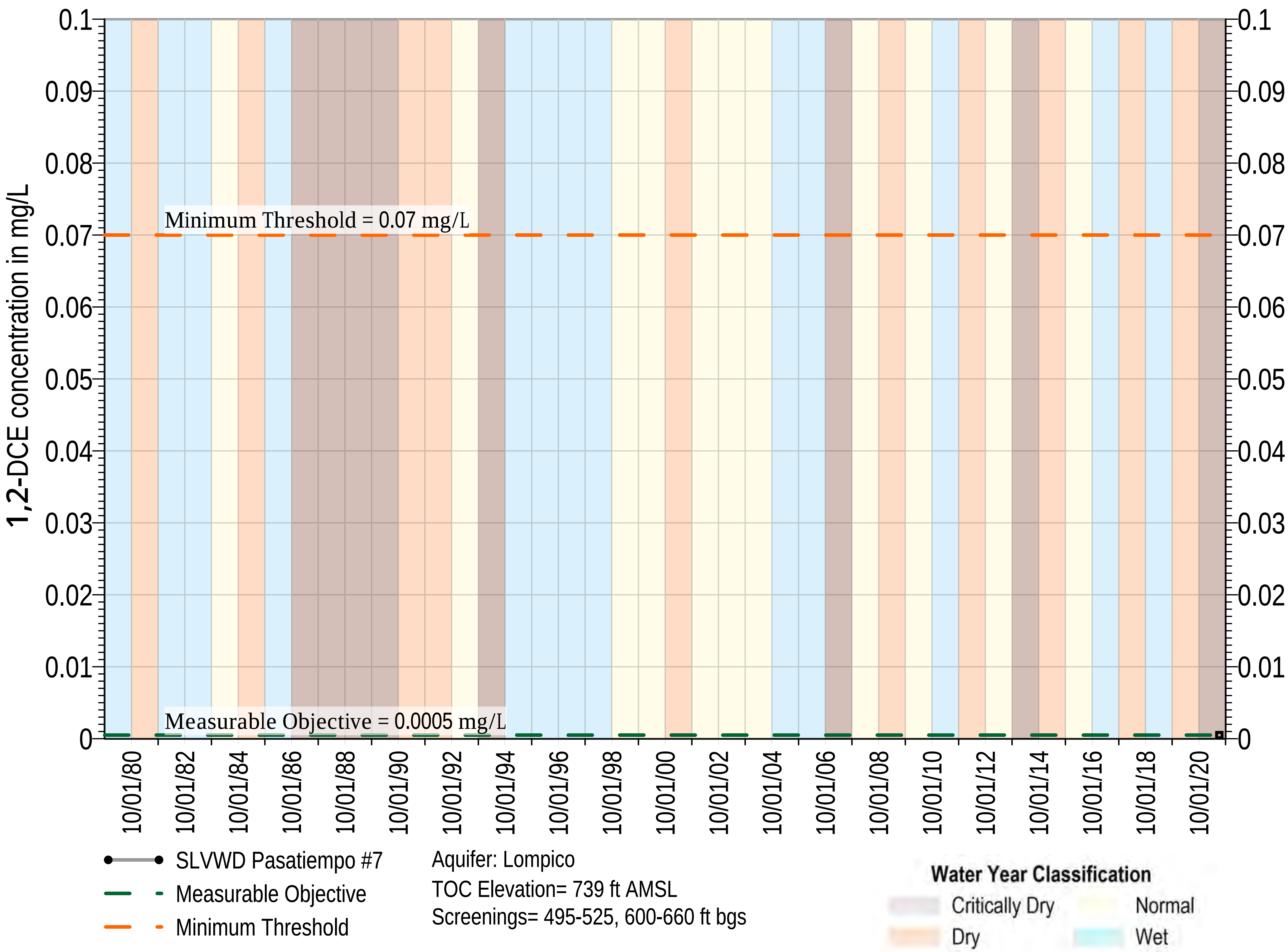

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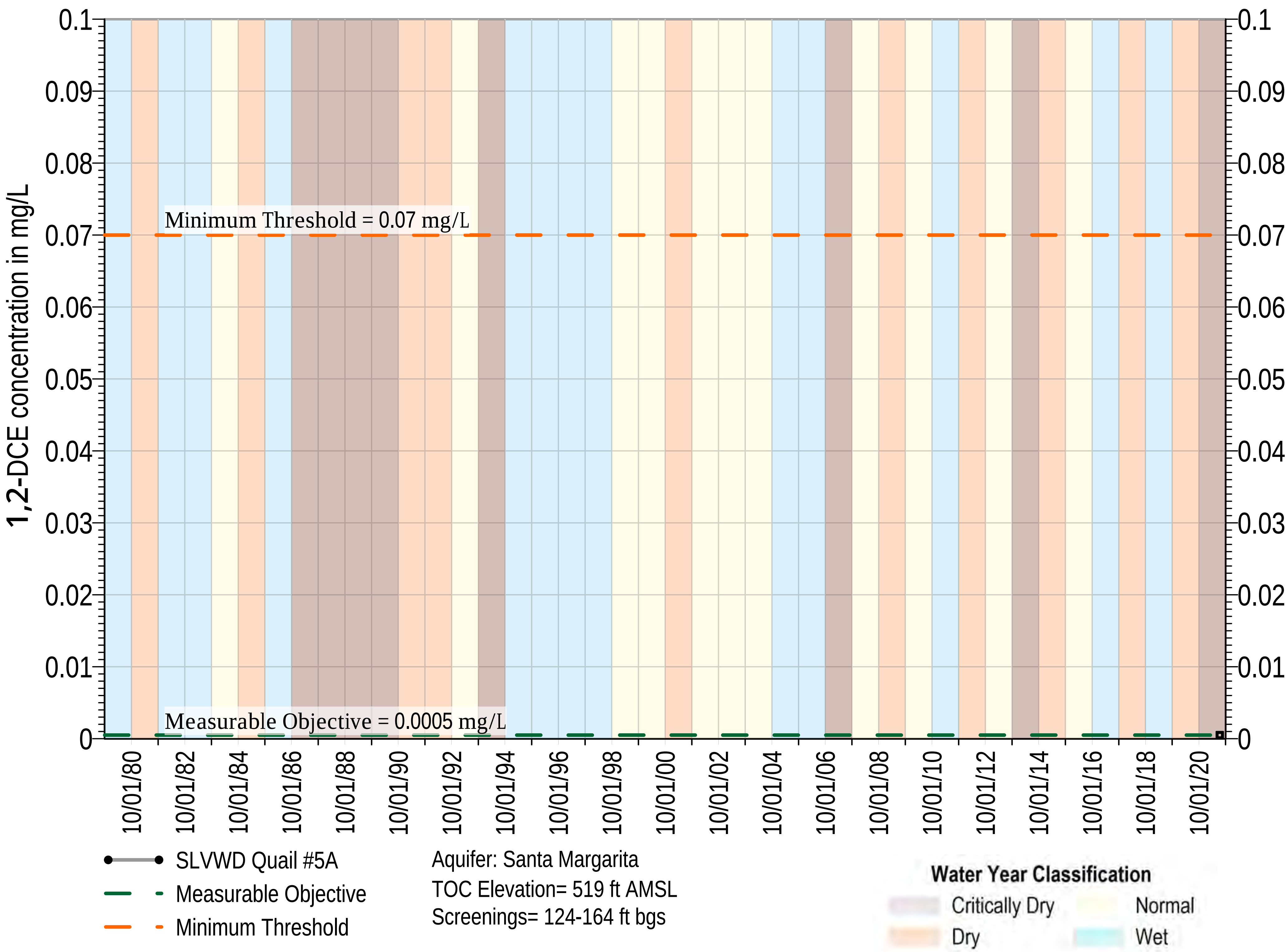

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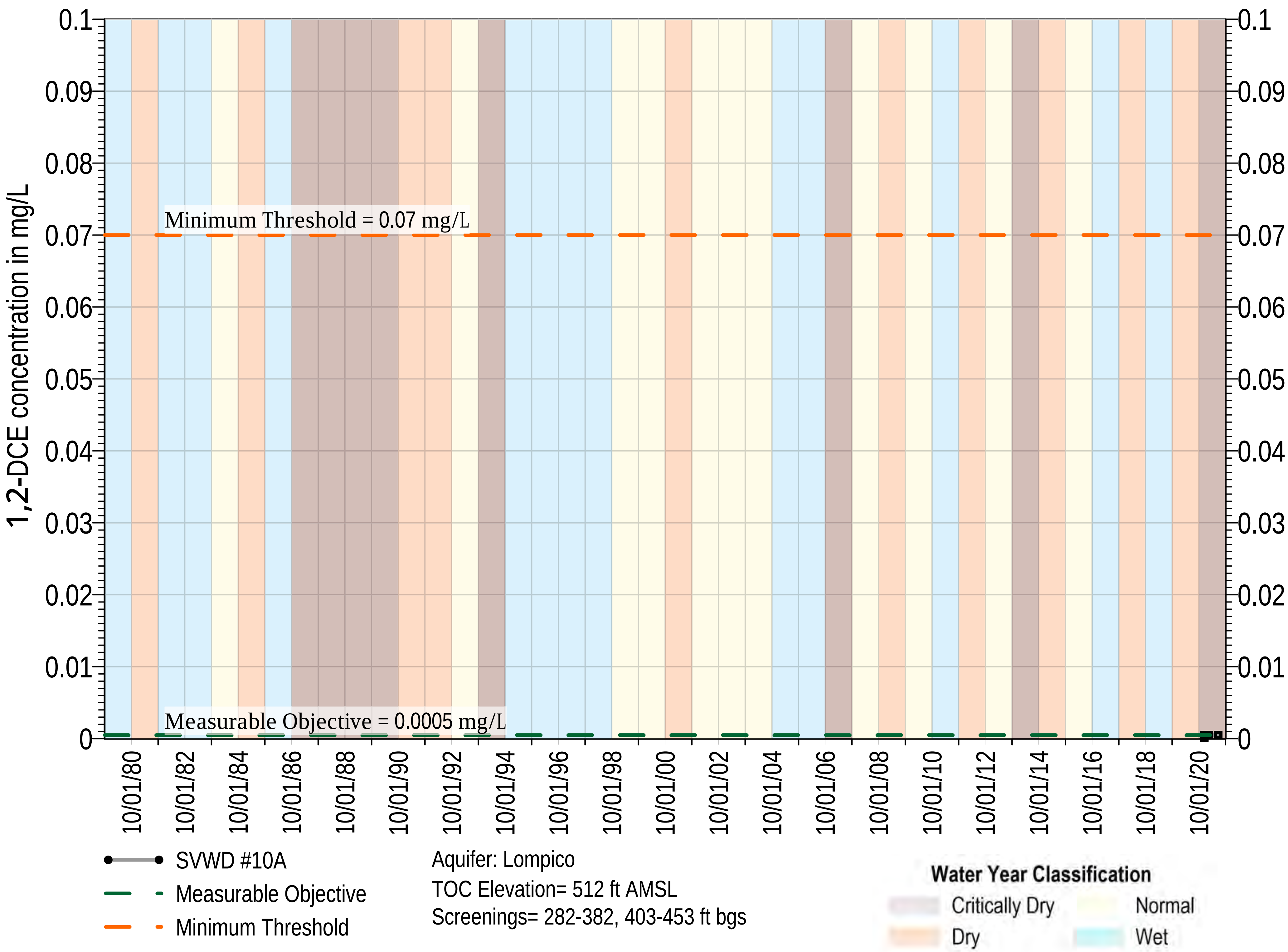

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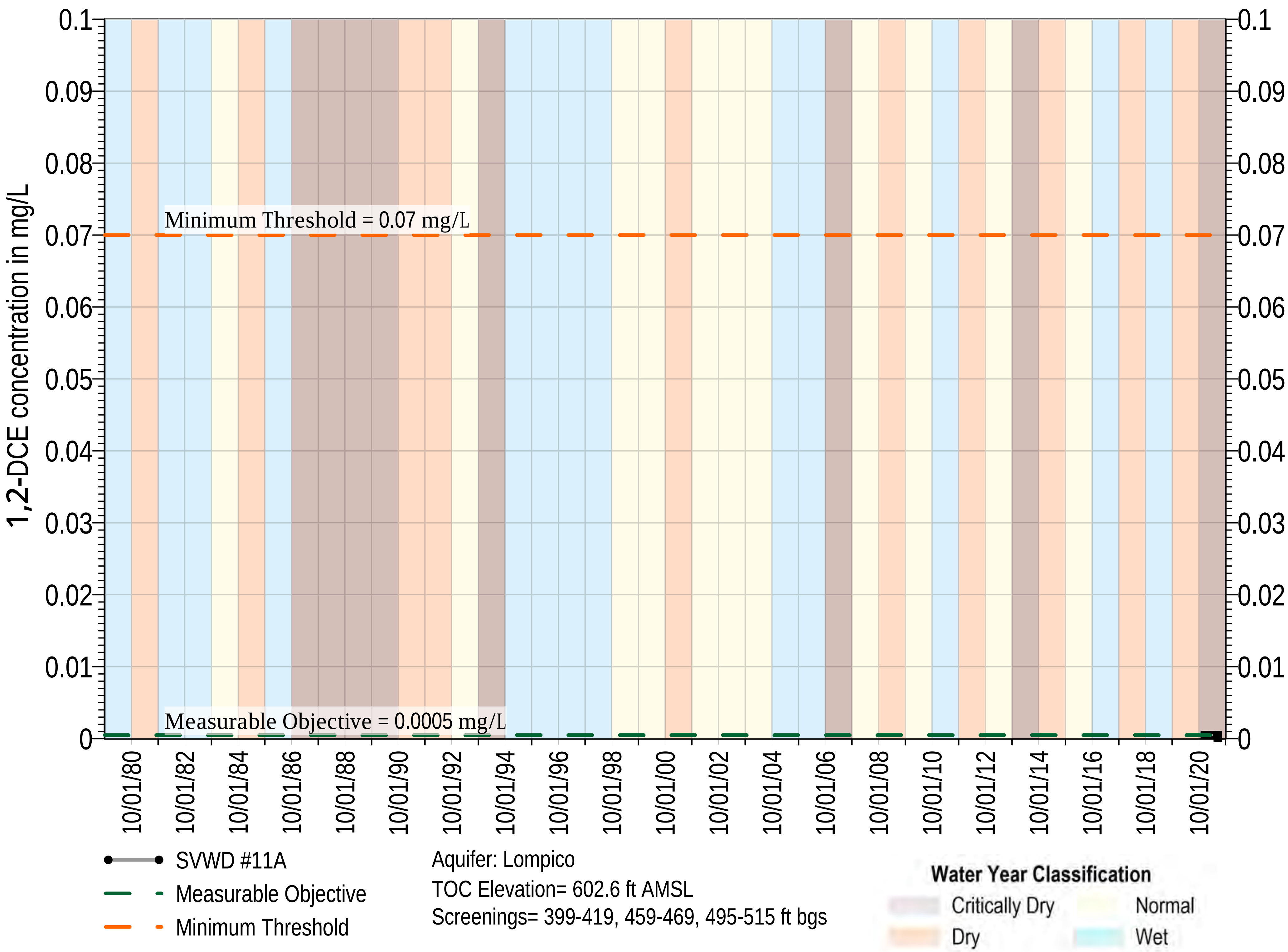

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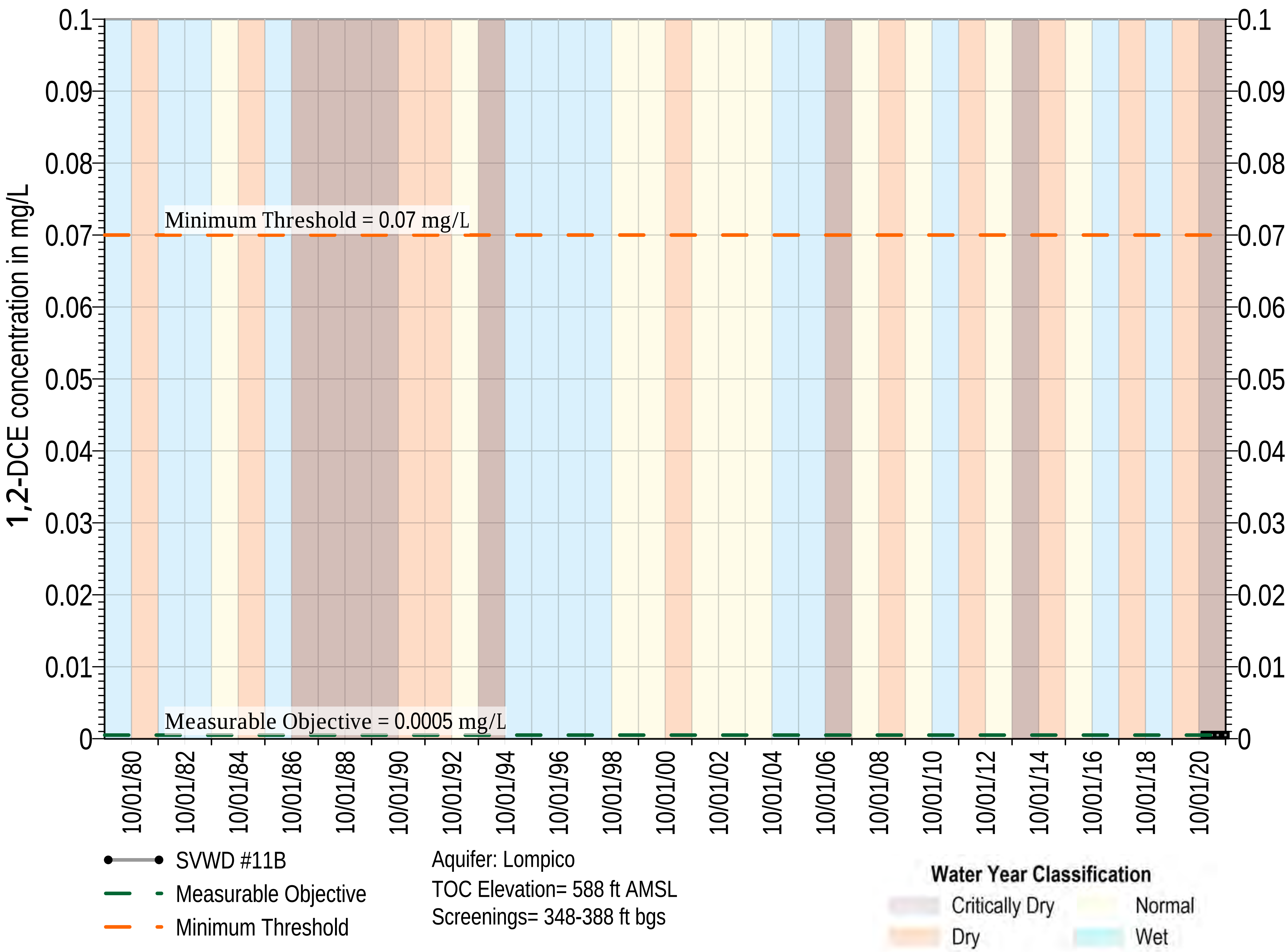

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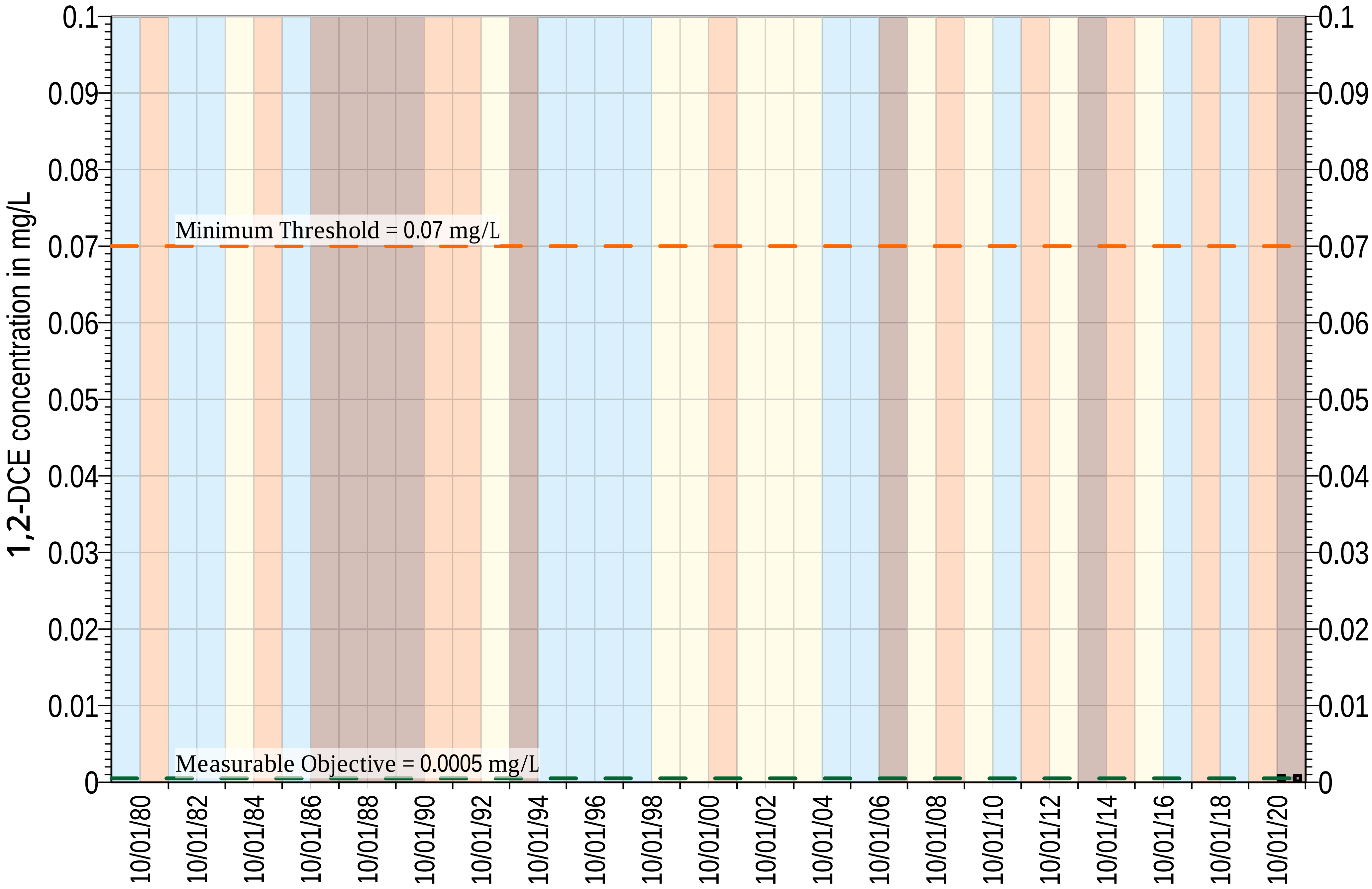

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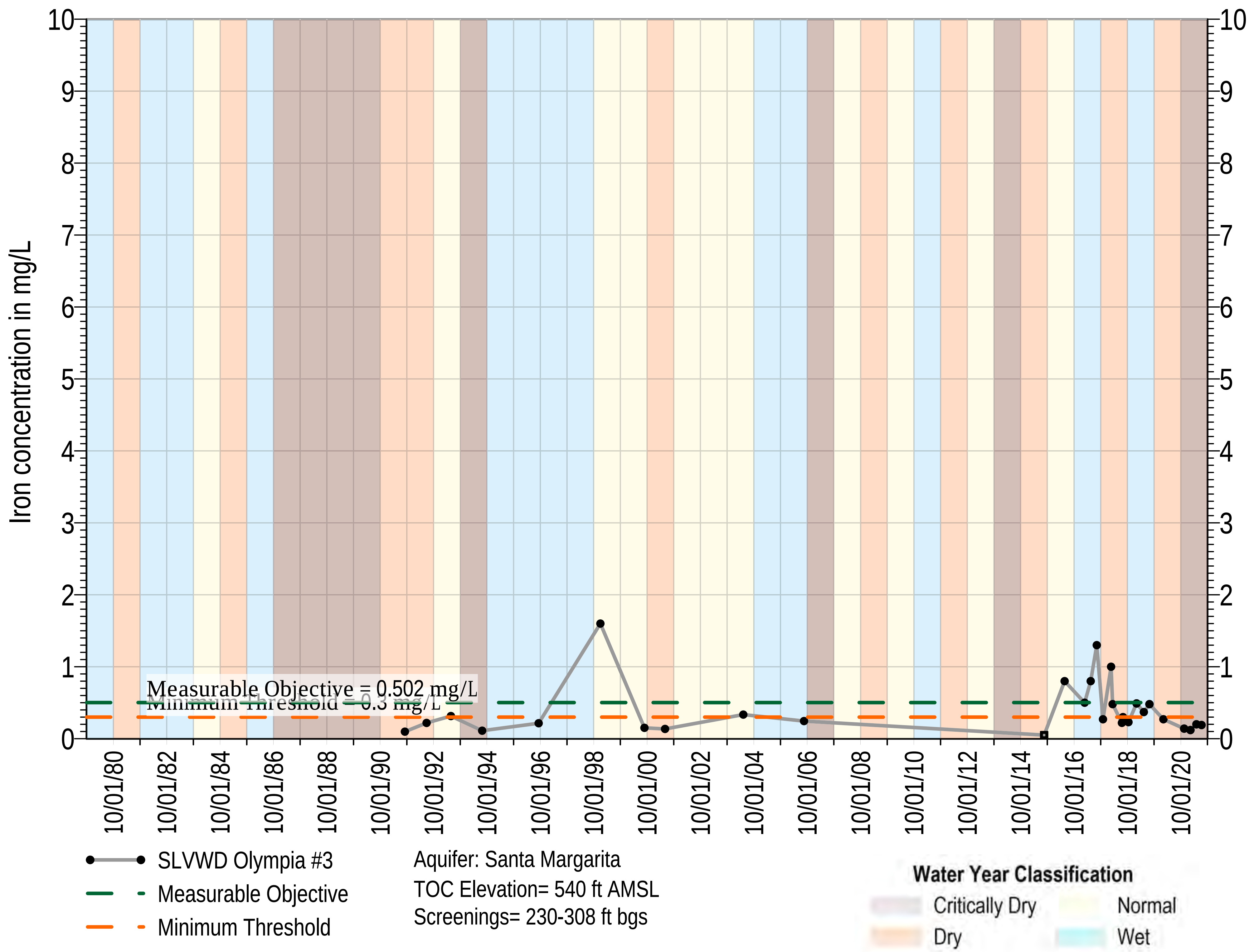
Iron



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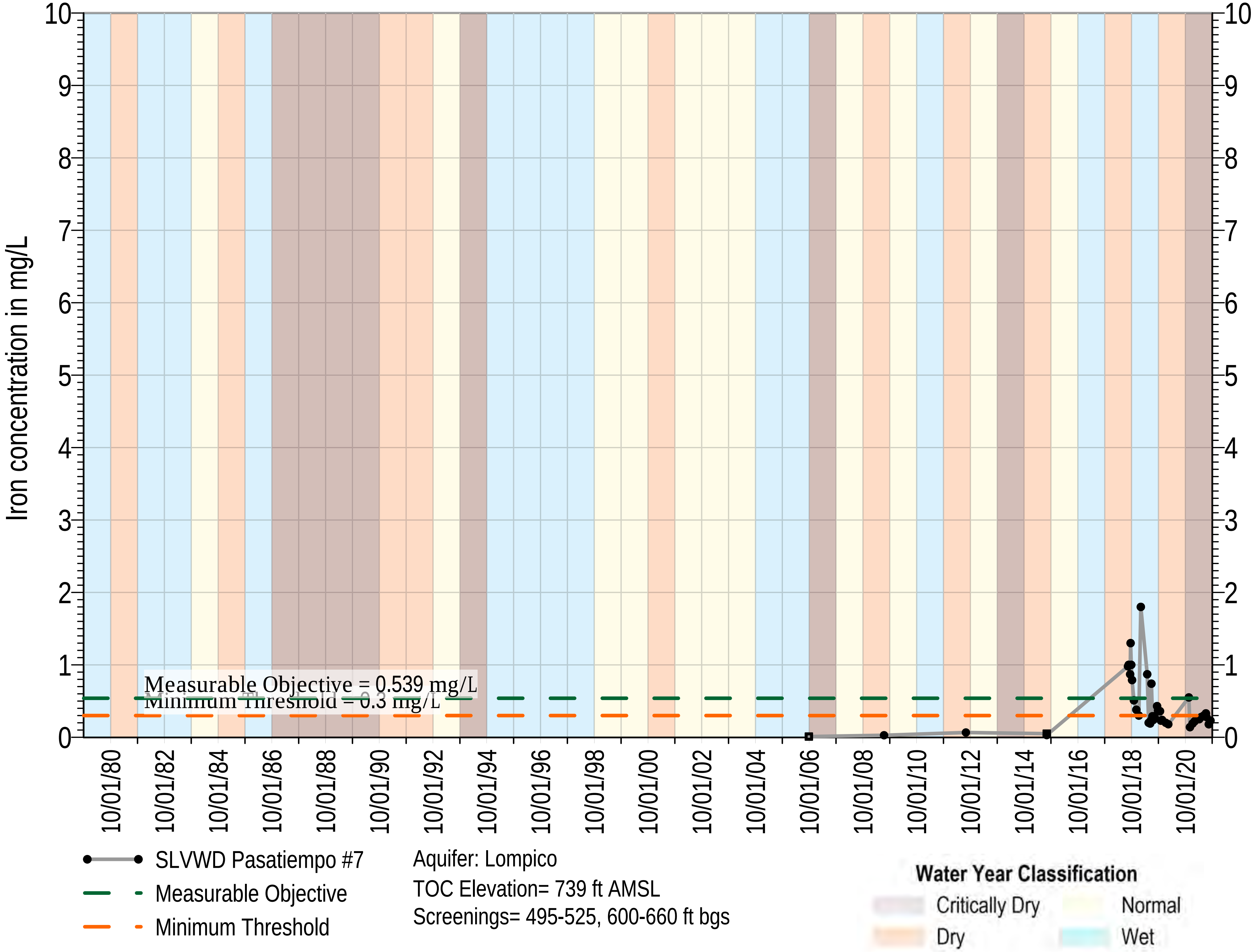

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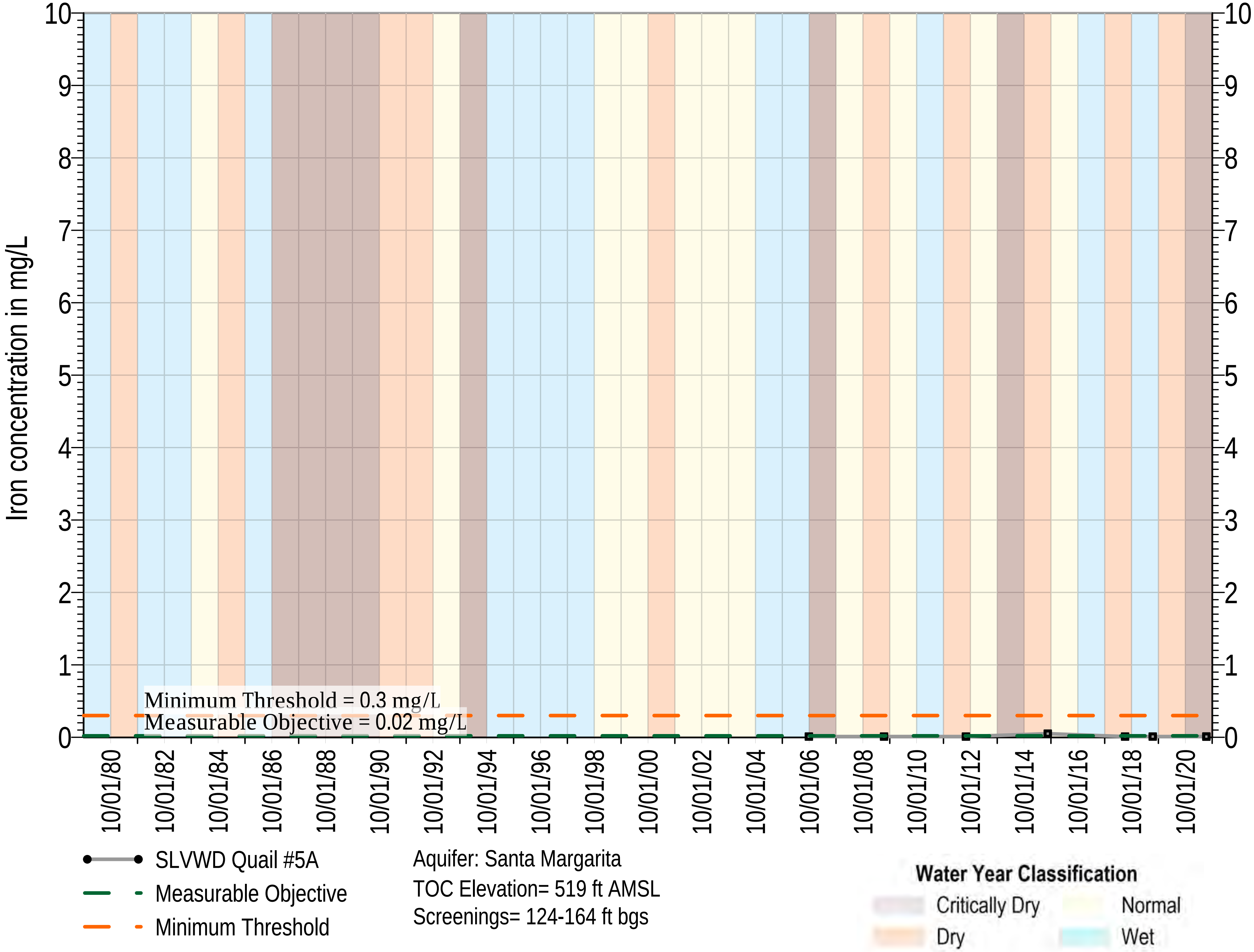

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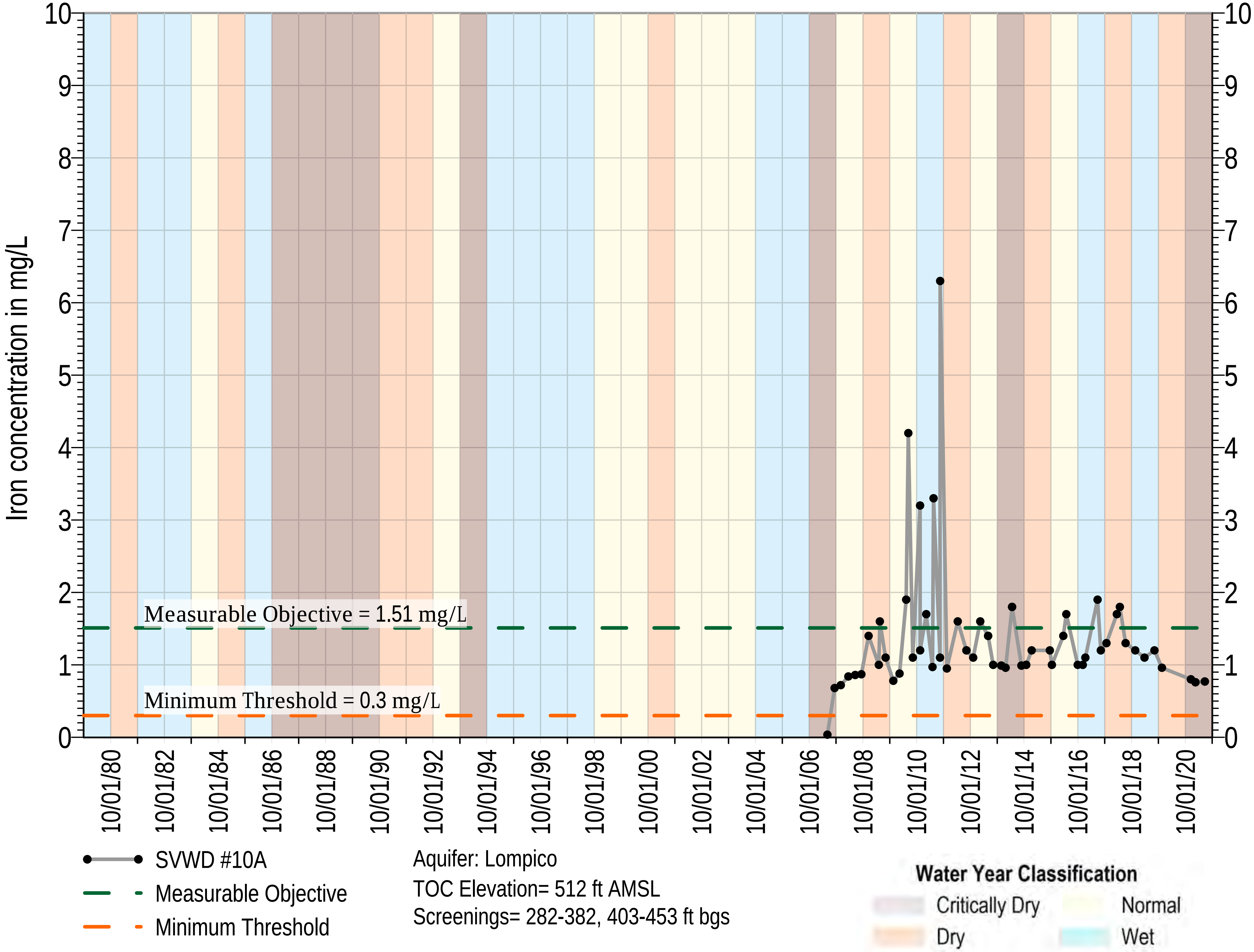

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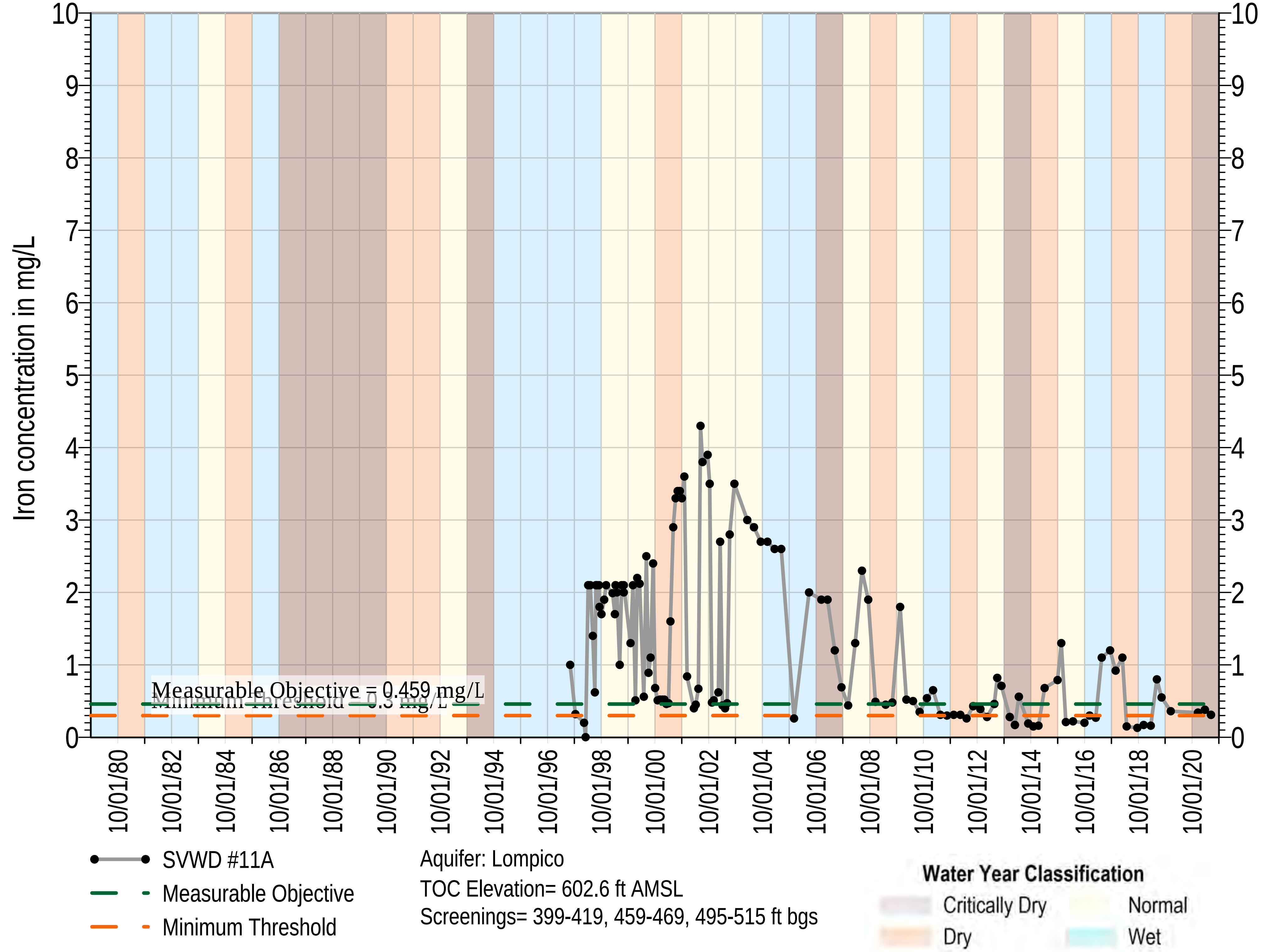

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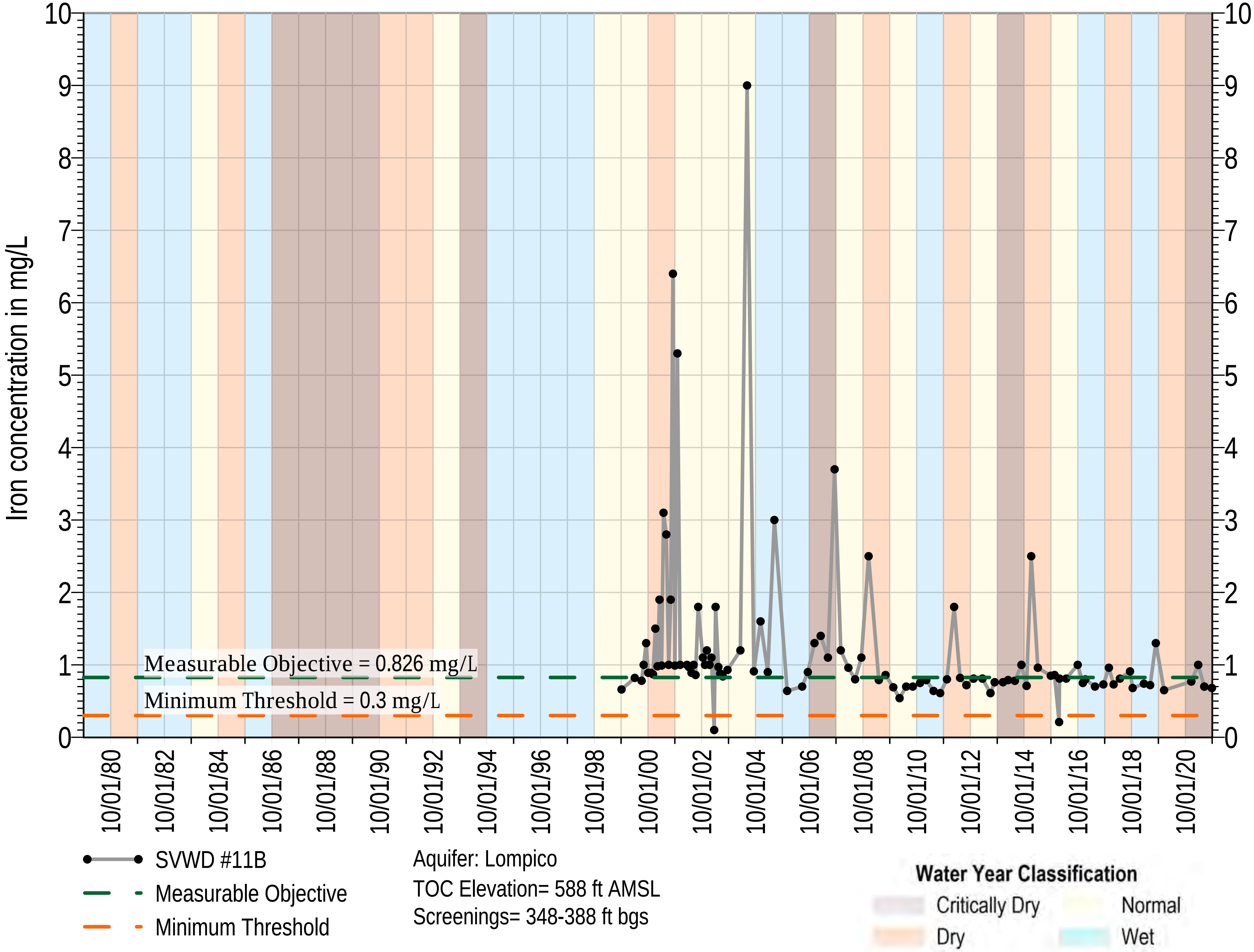

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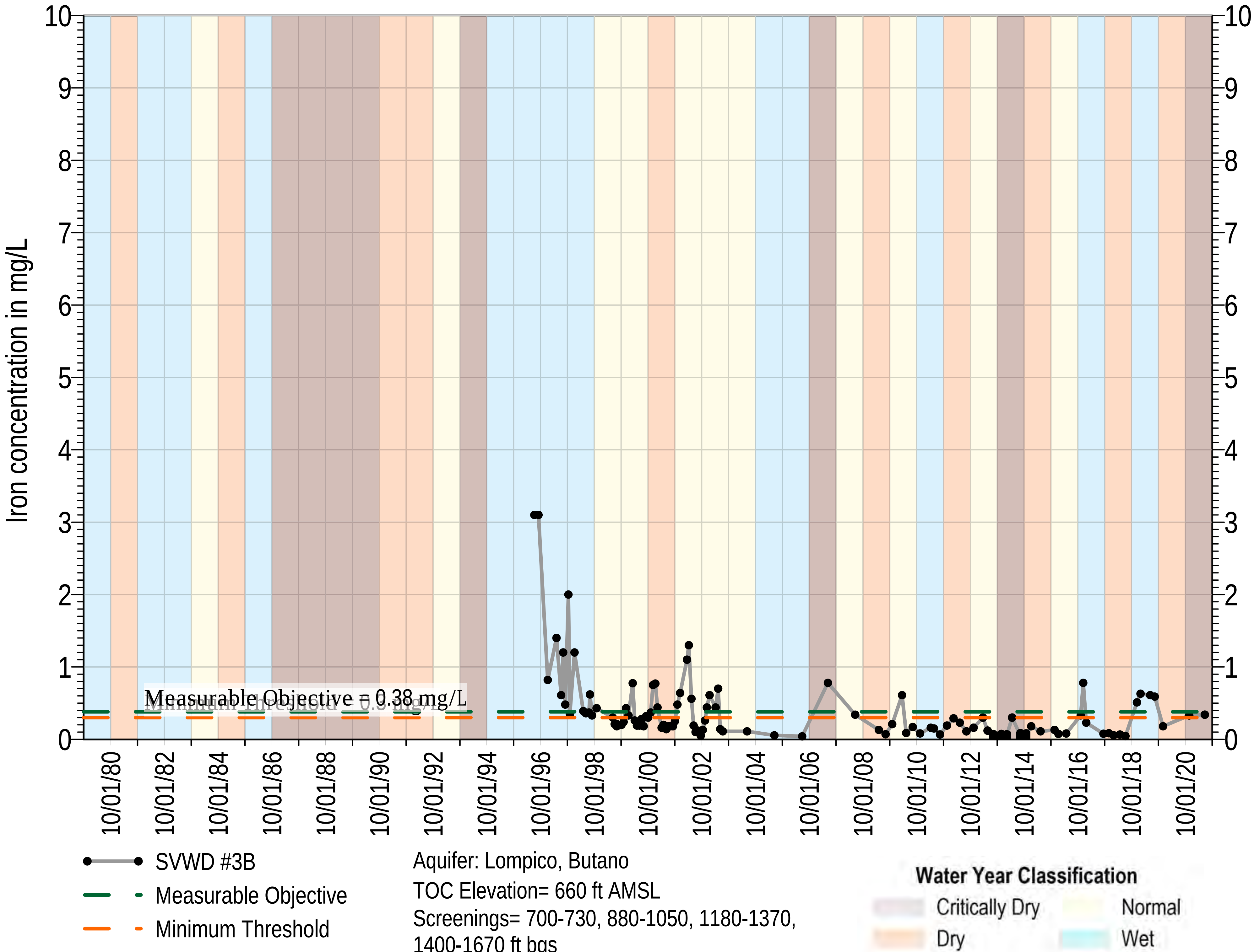

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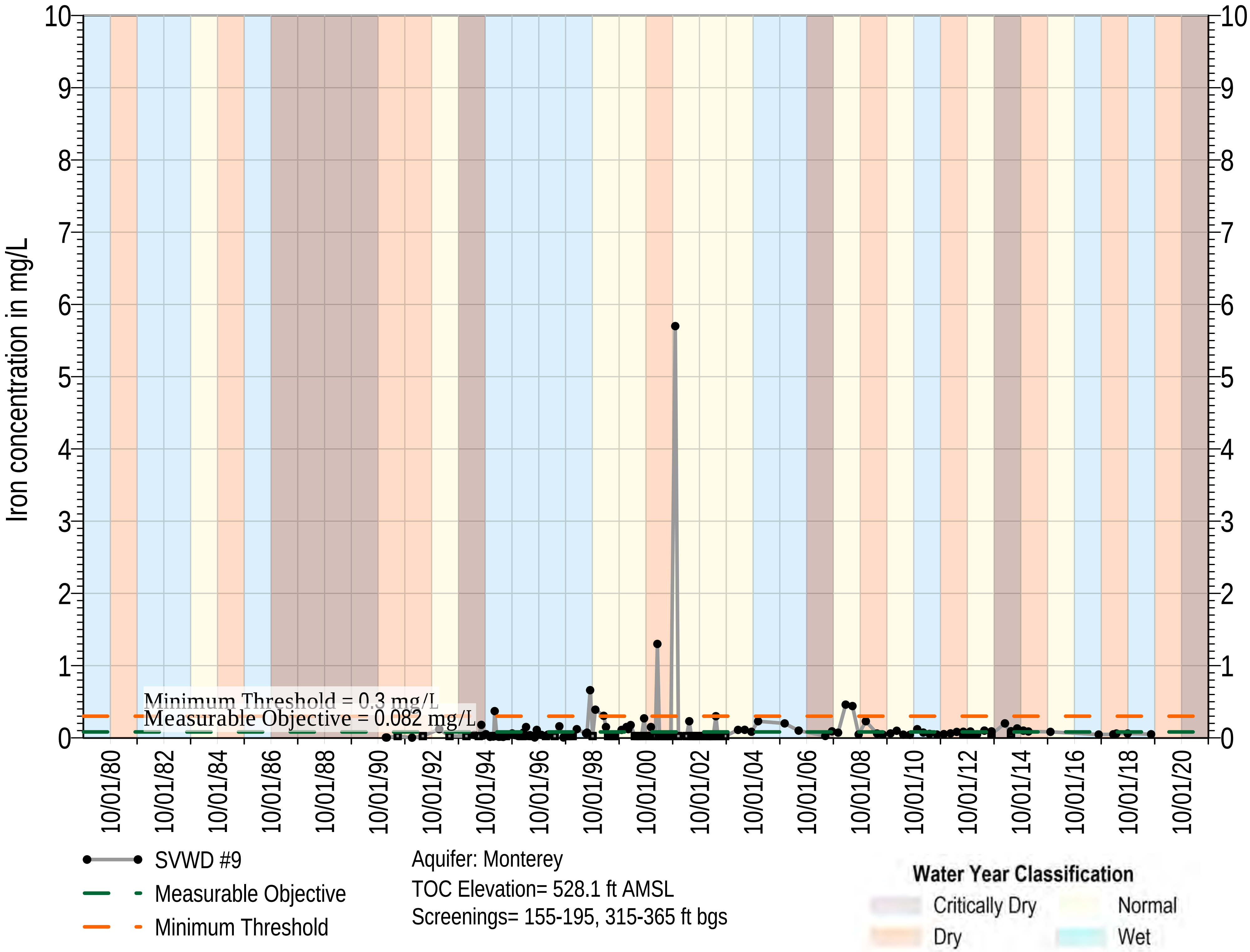

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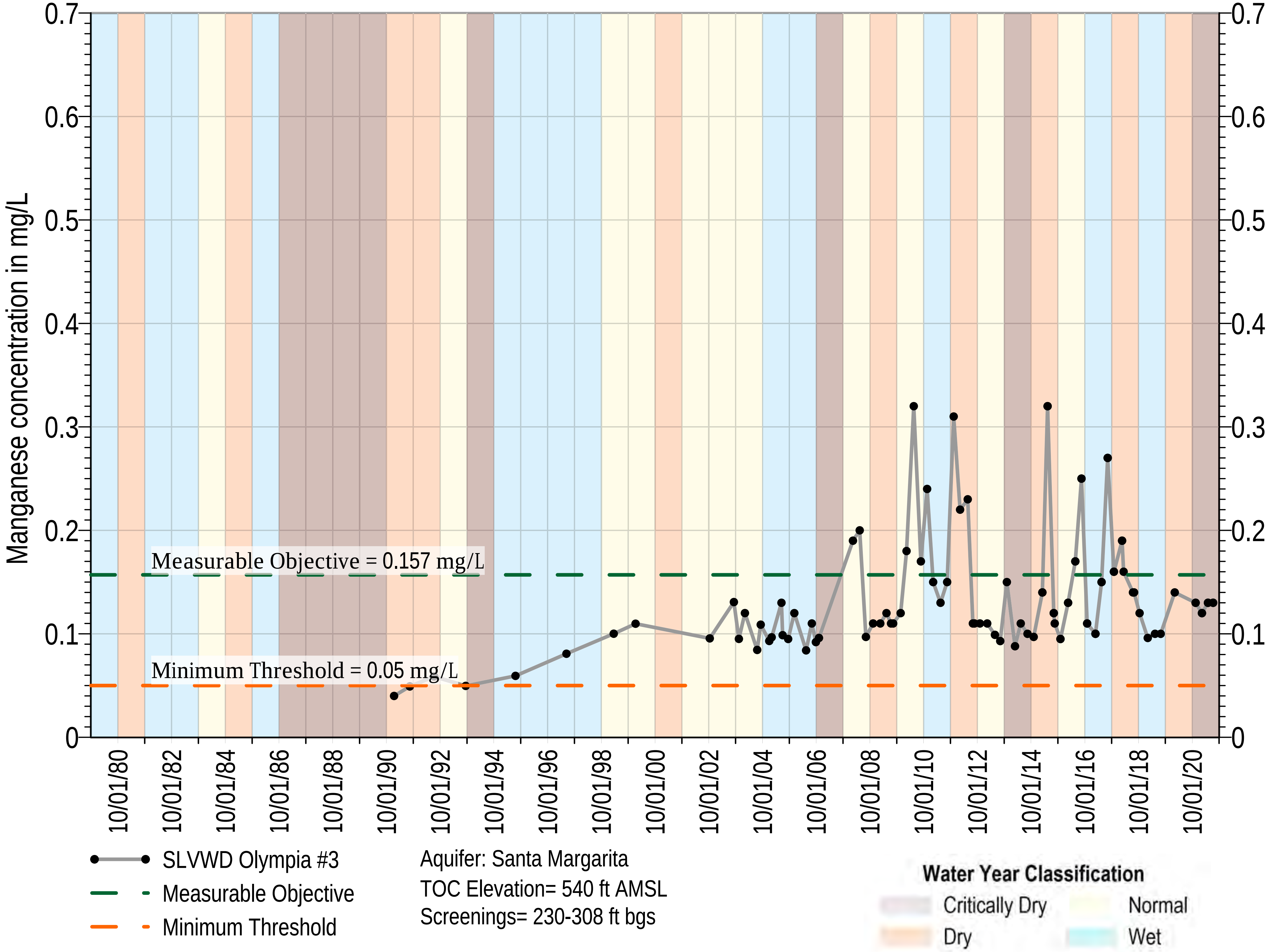
Manganese



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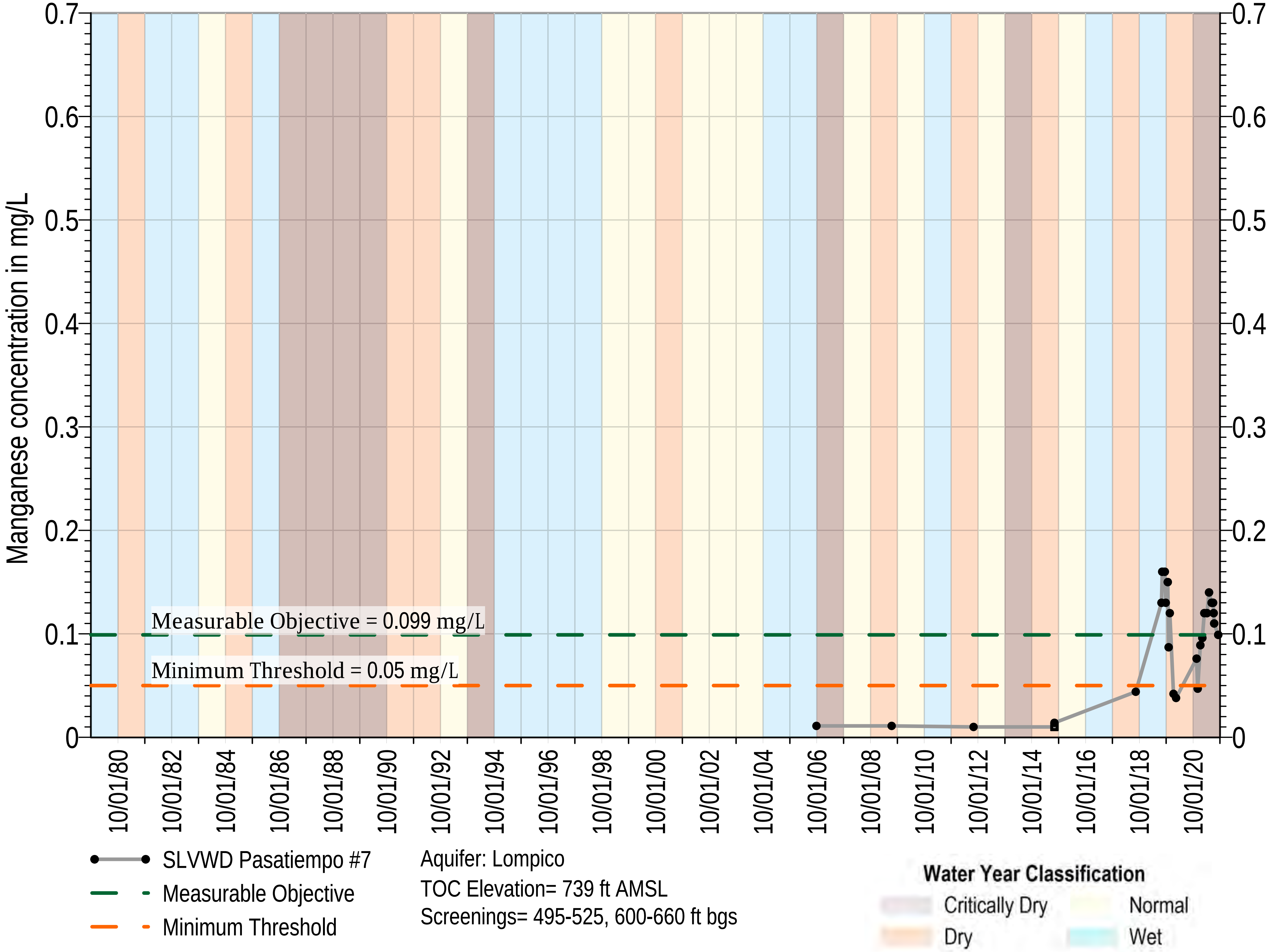

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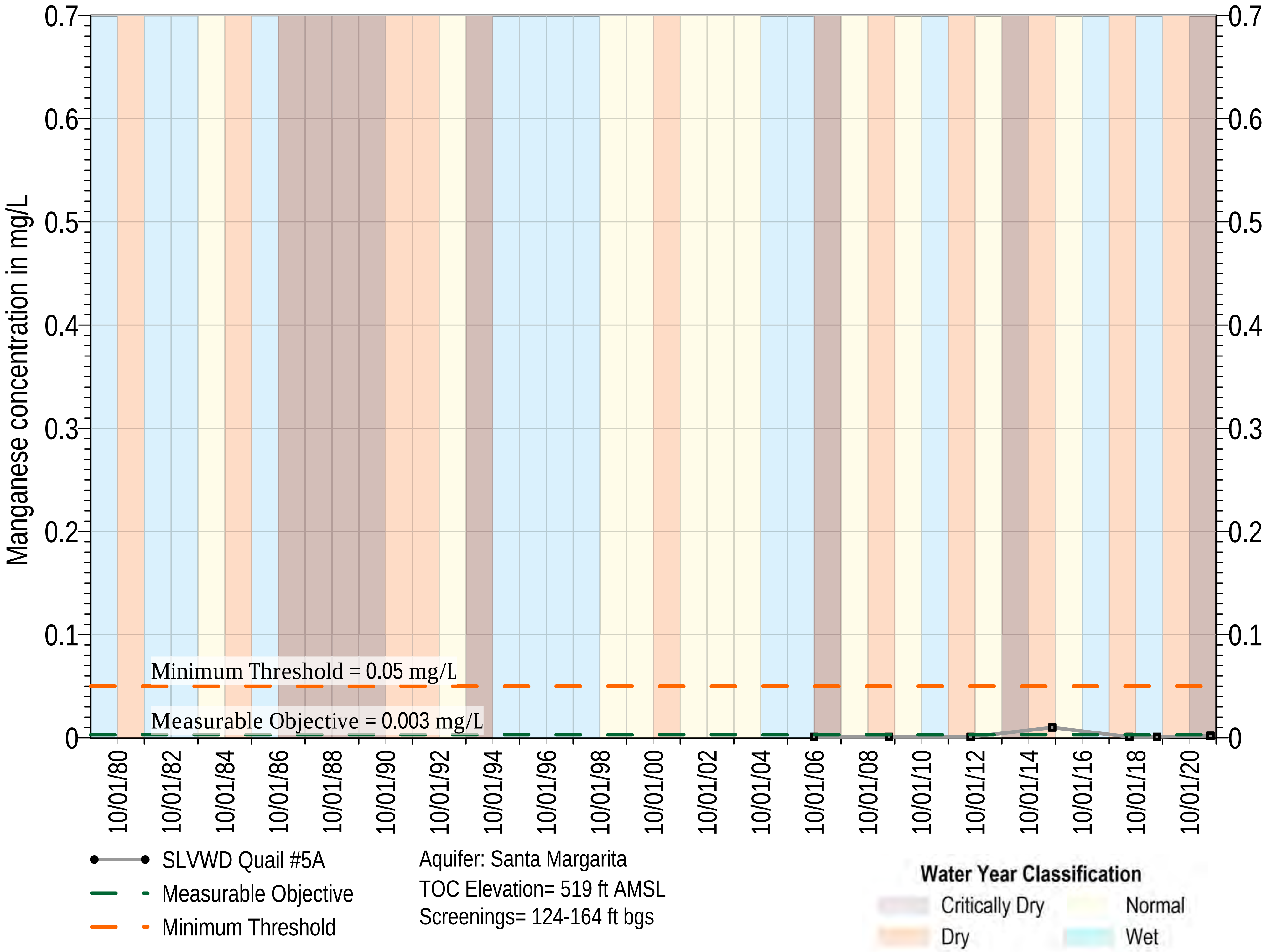

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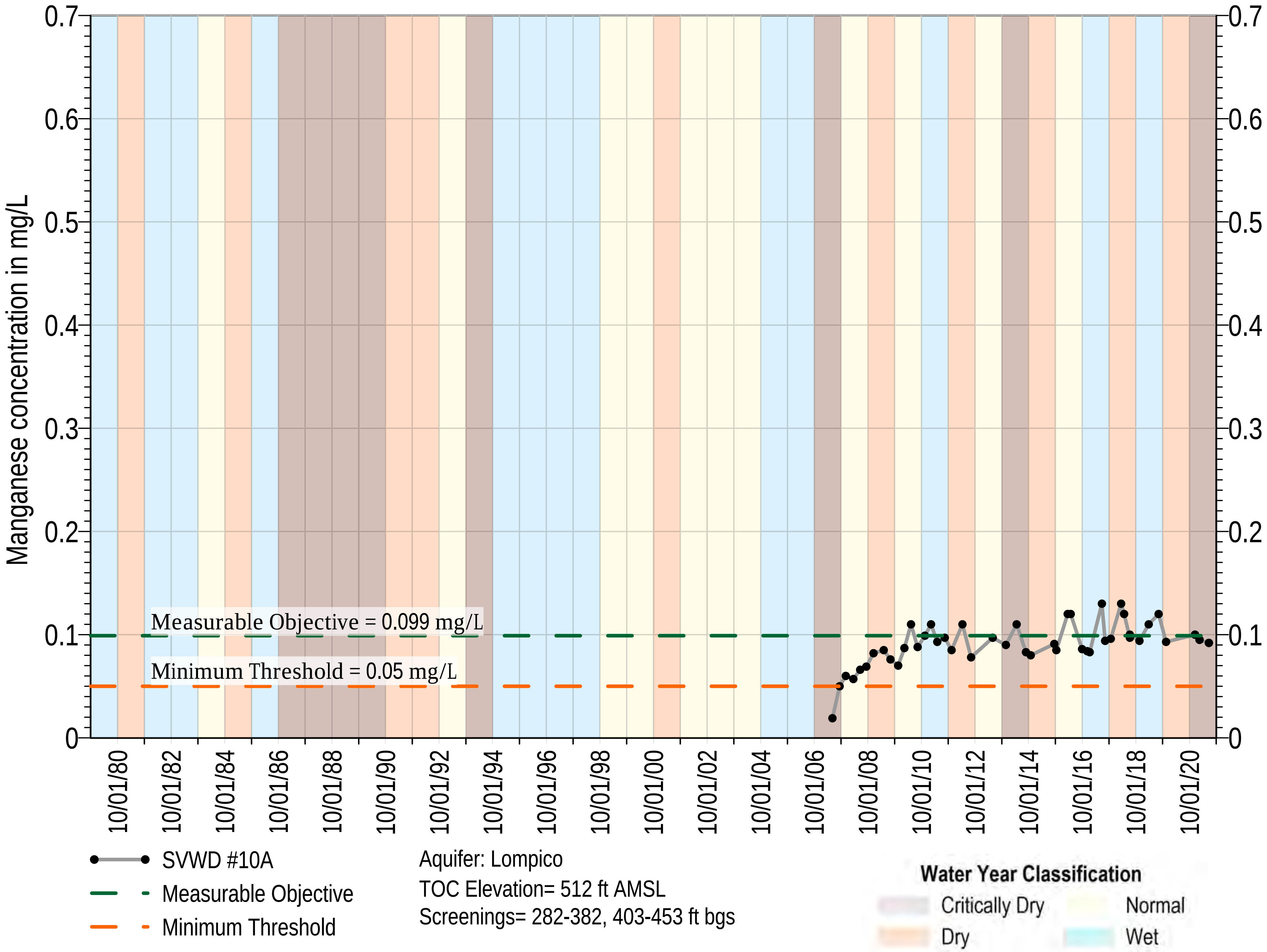

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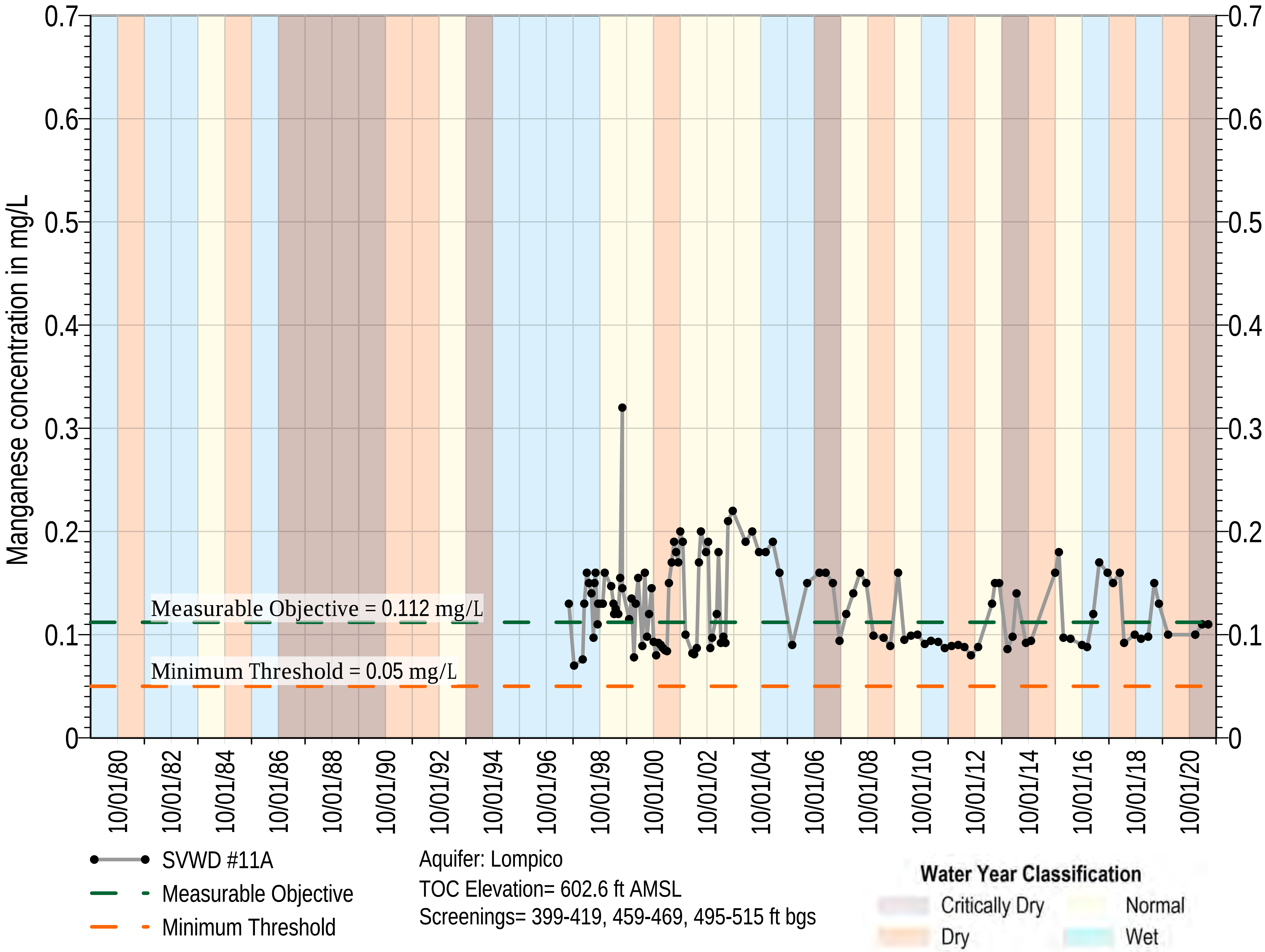

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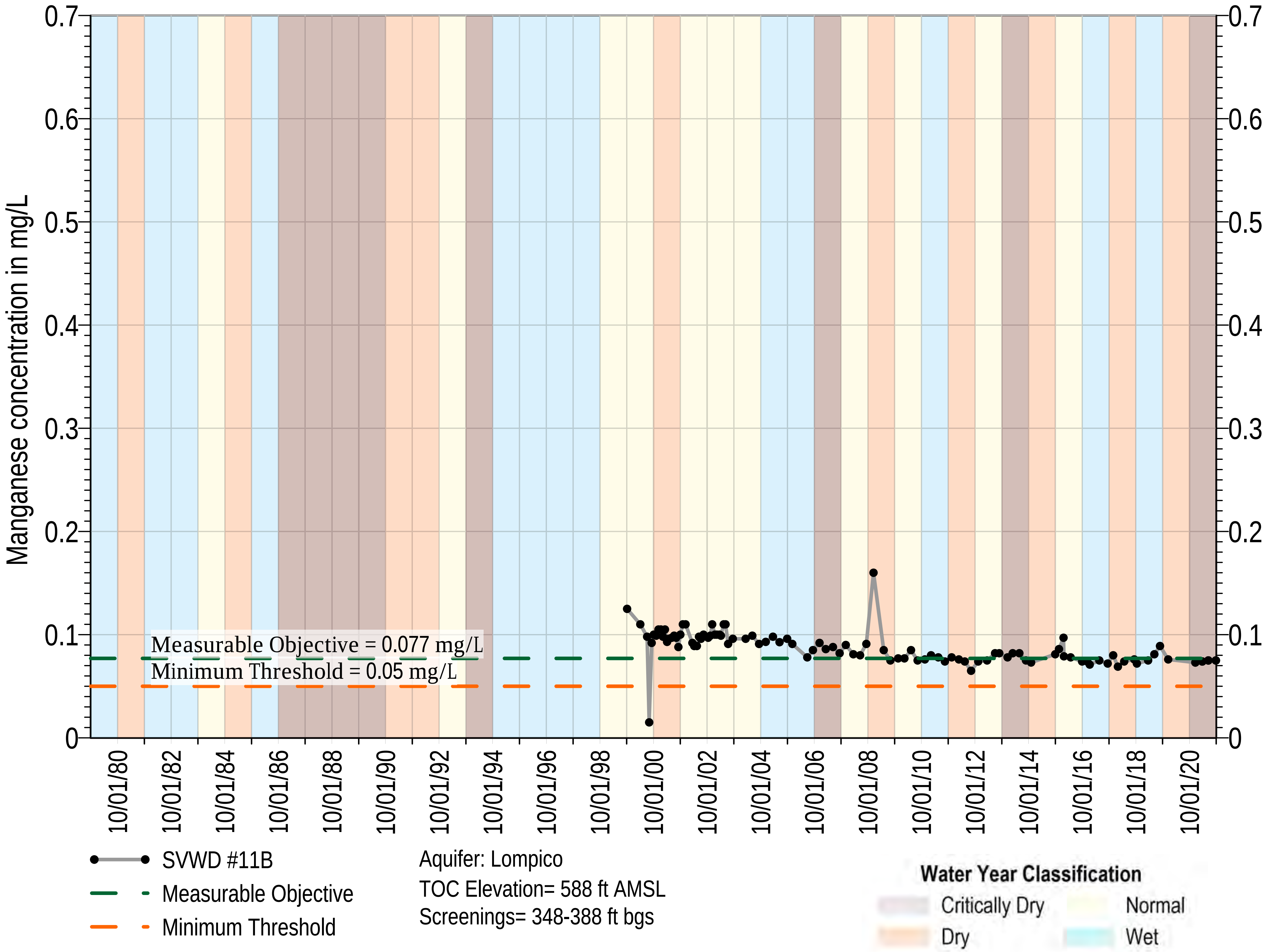

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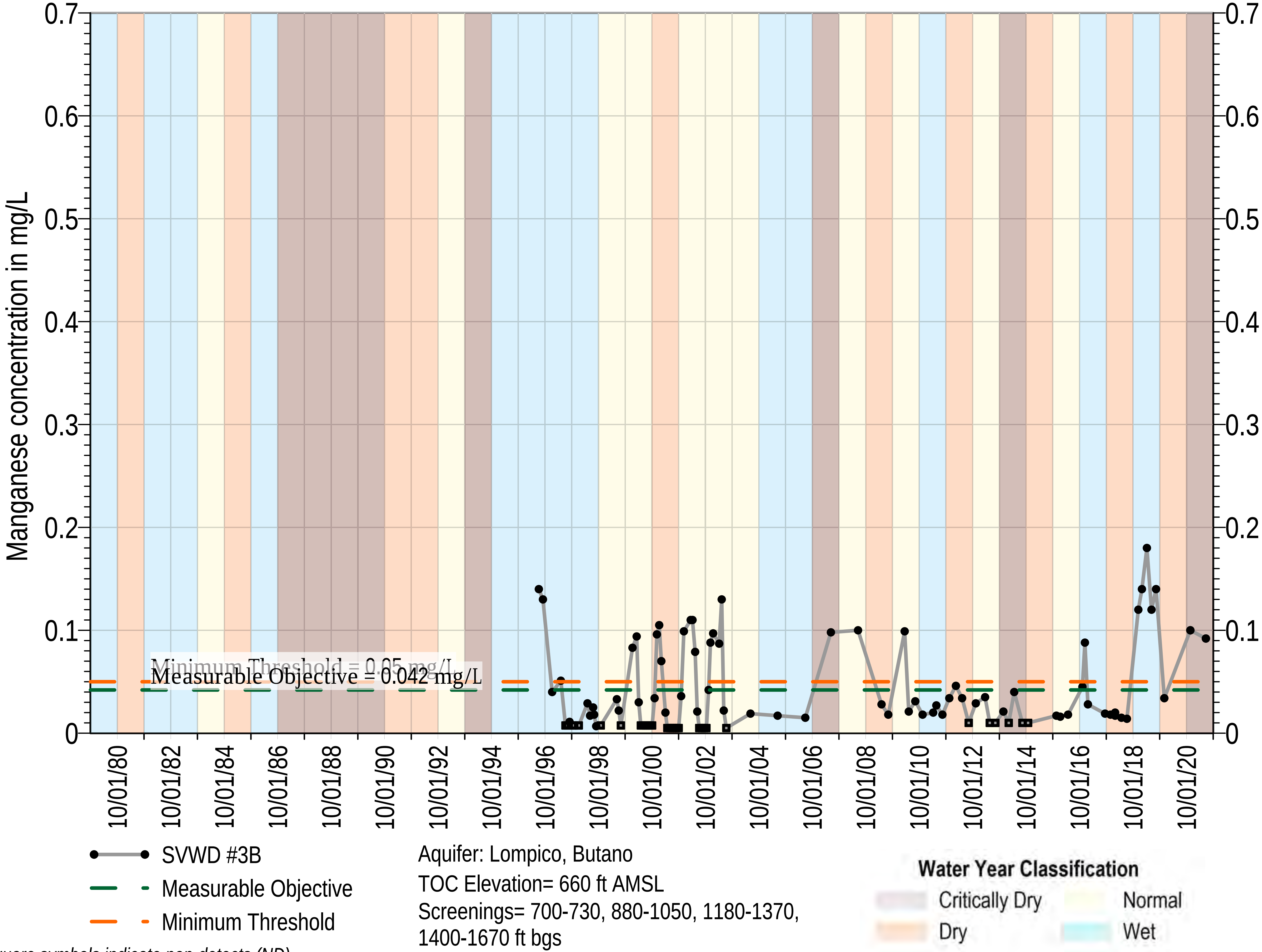

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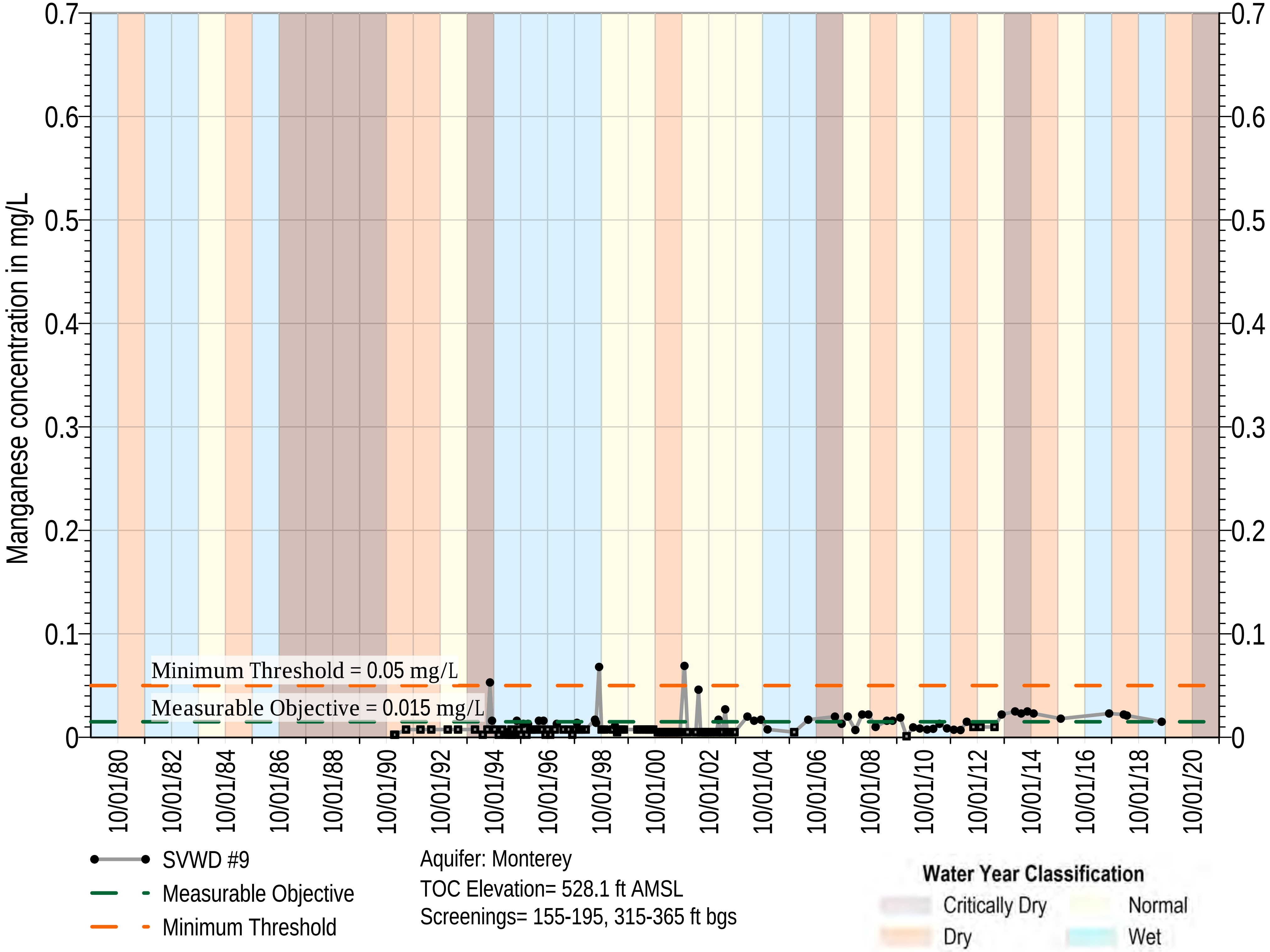

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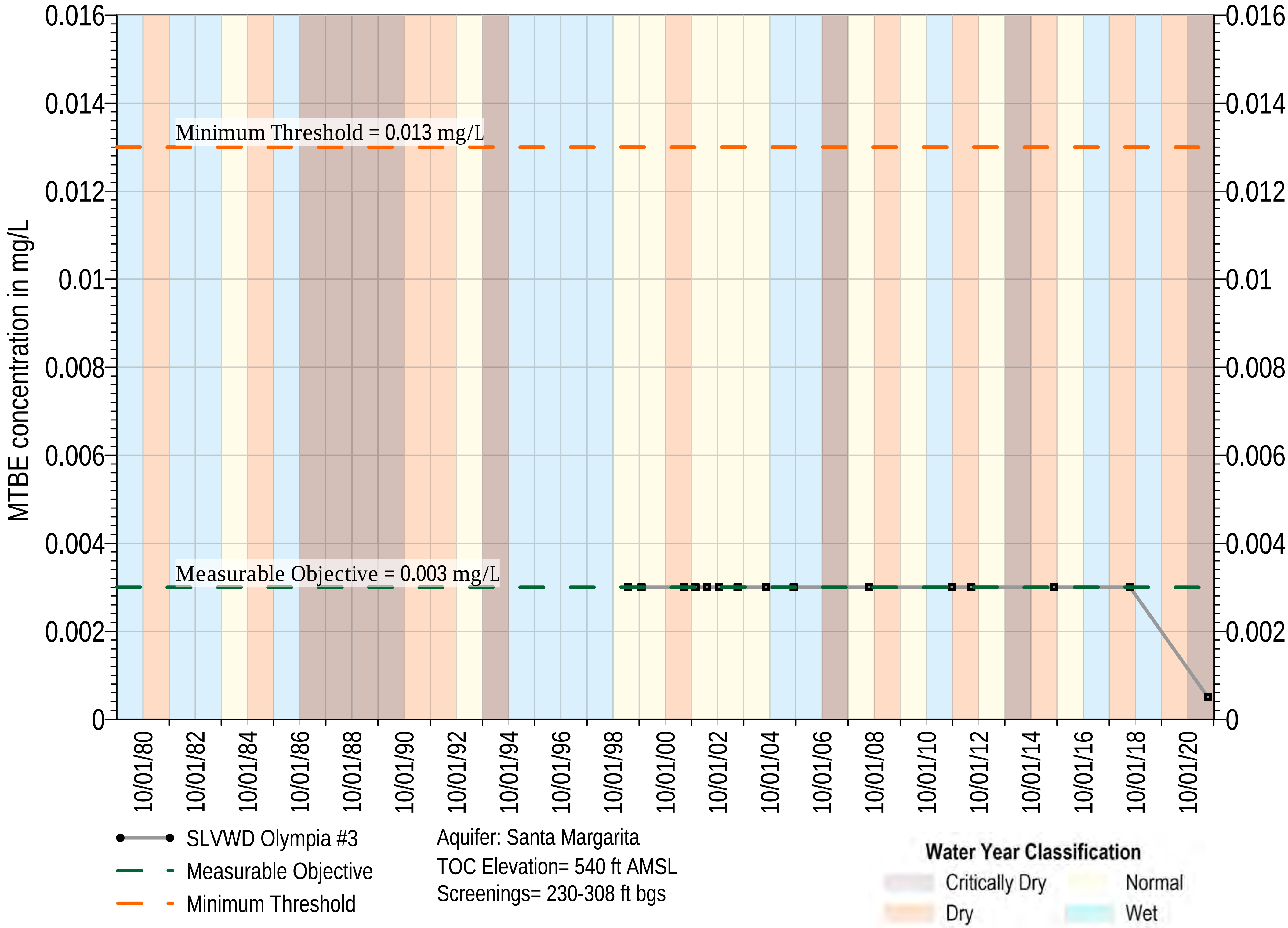
MTBE



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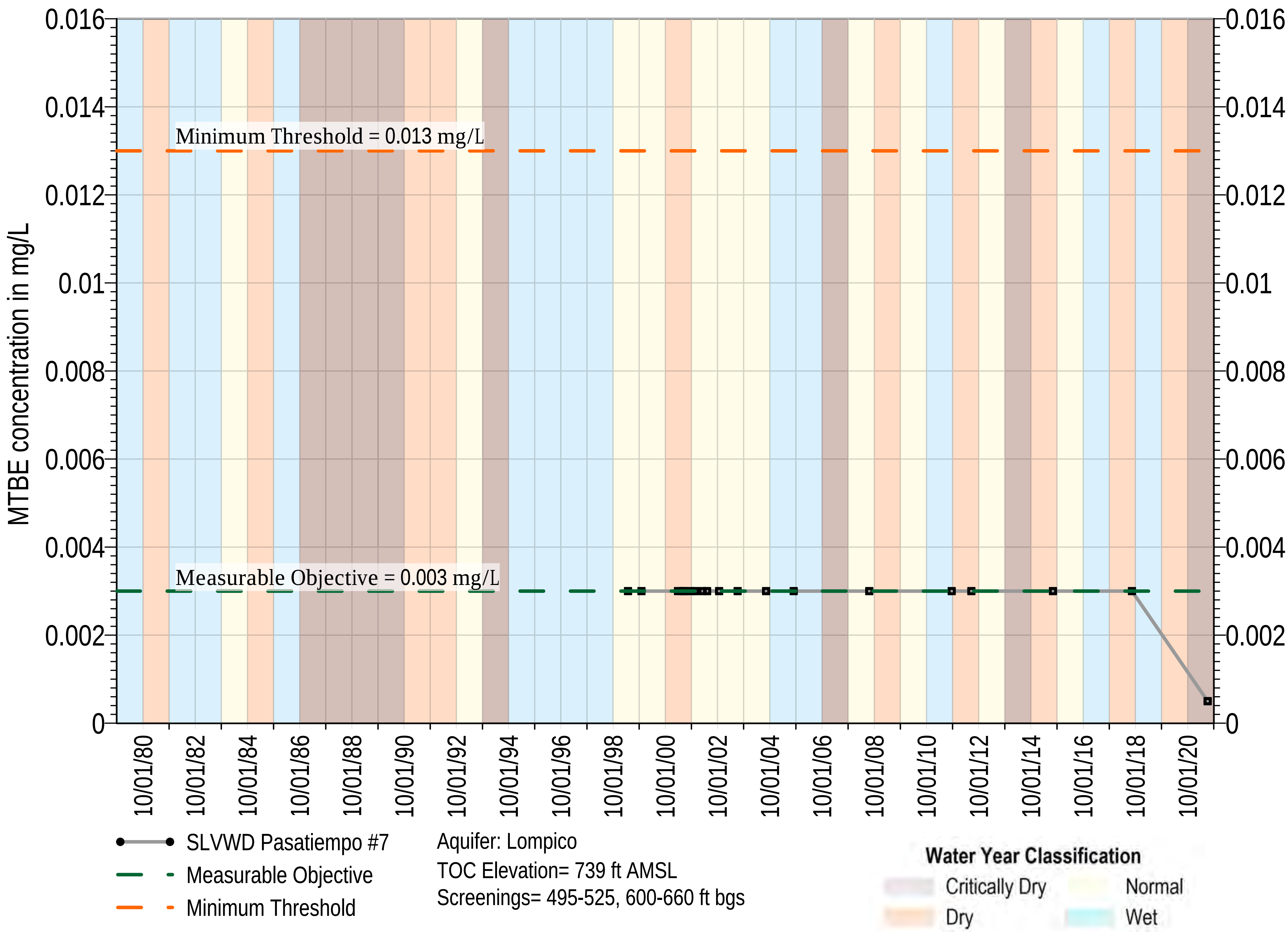

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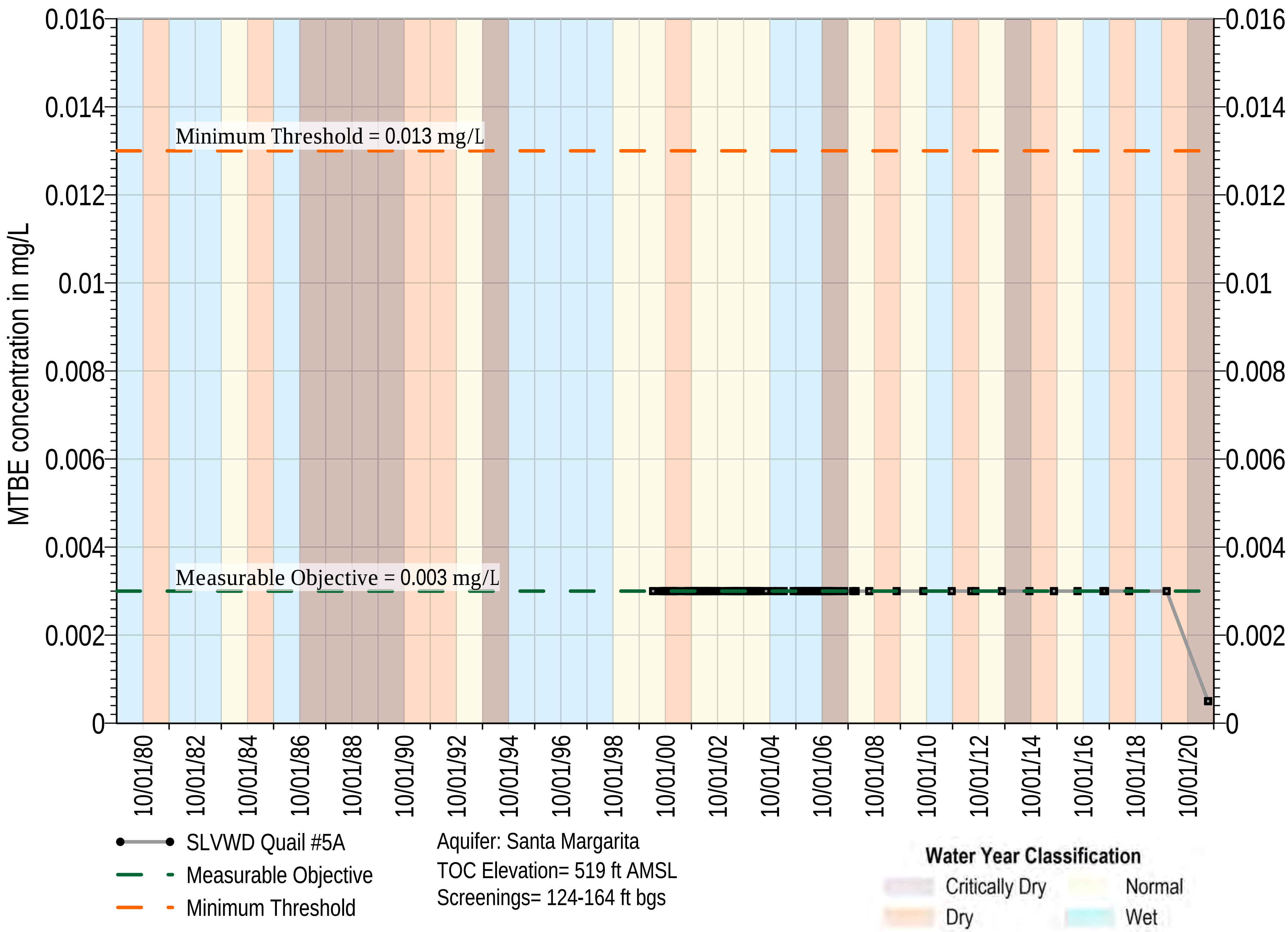

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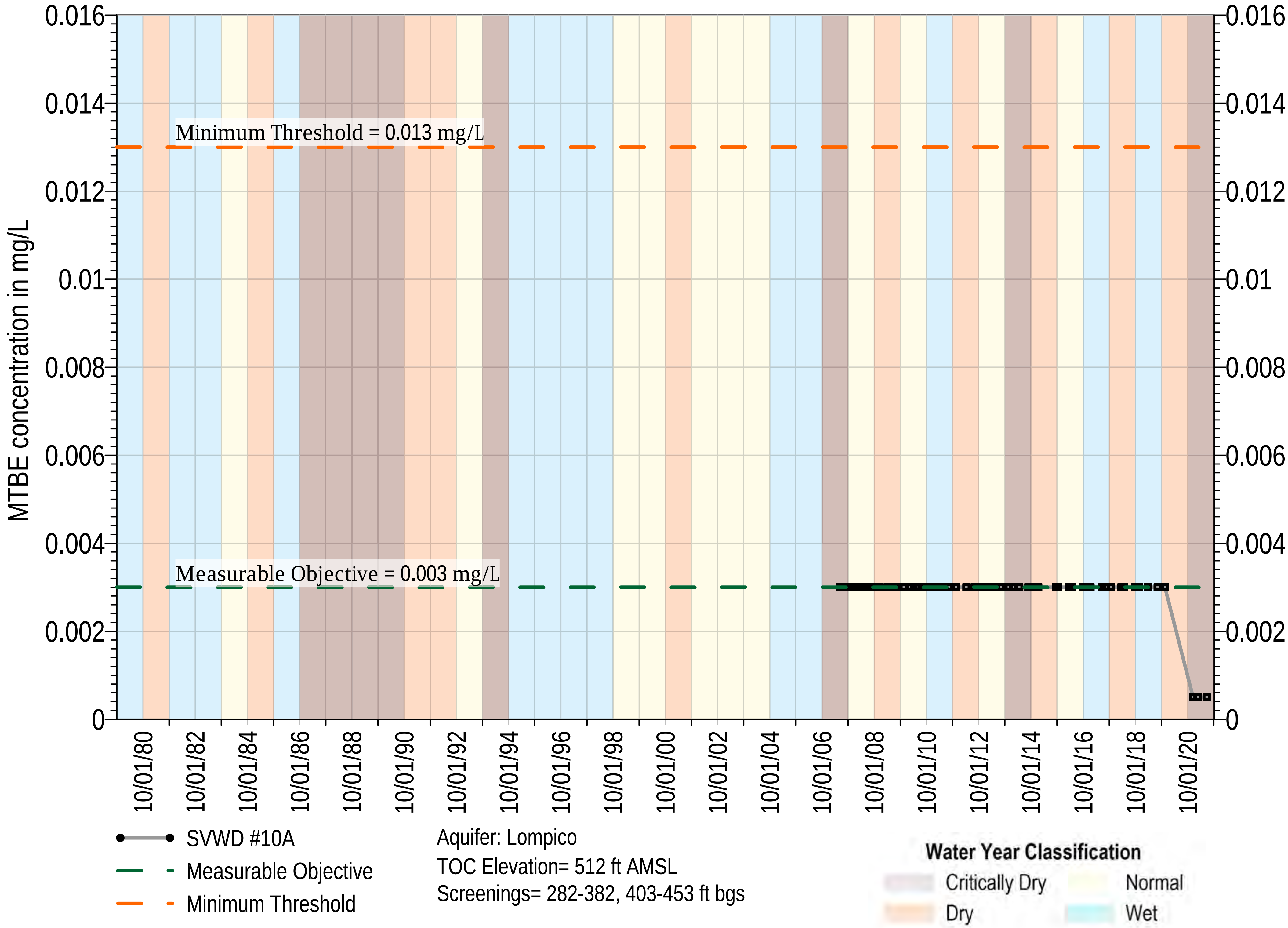

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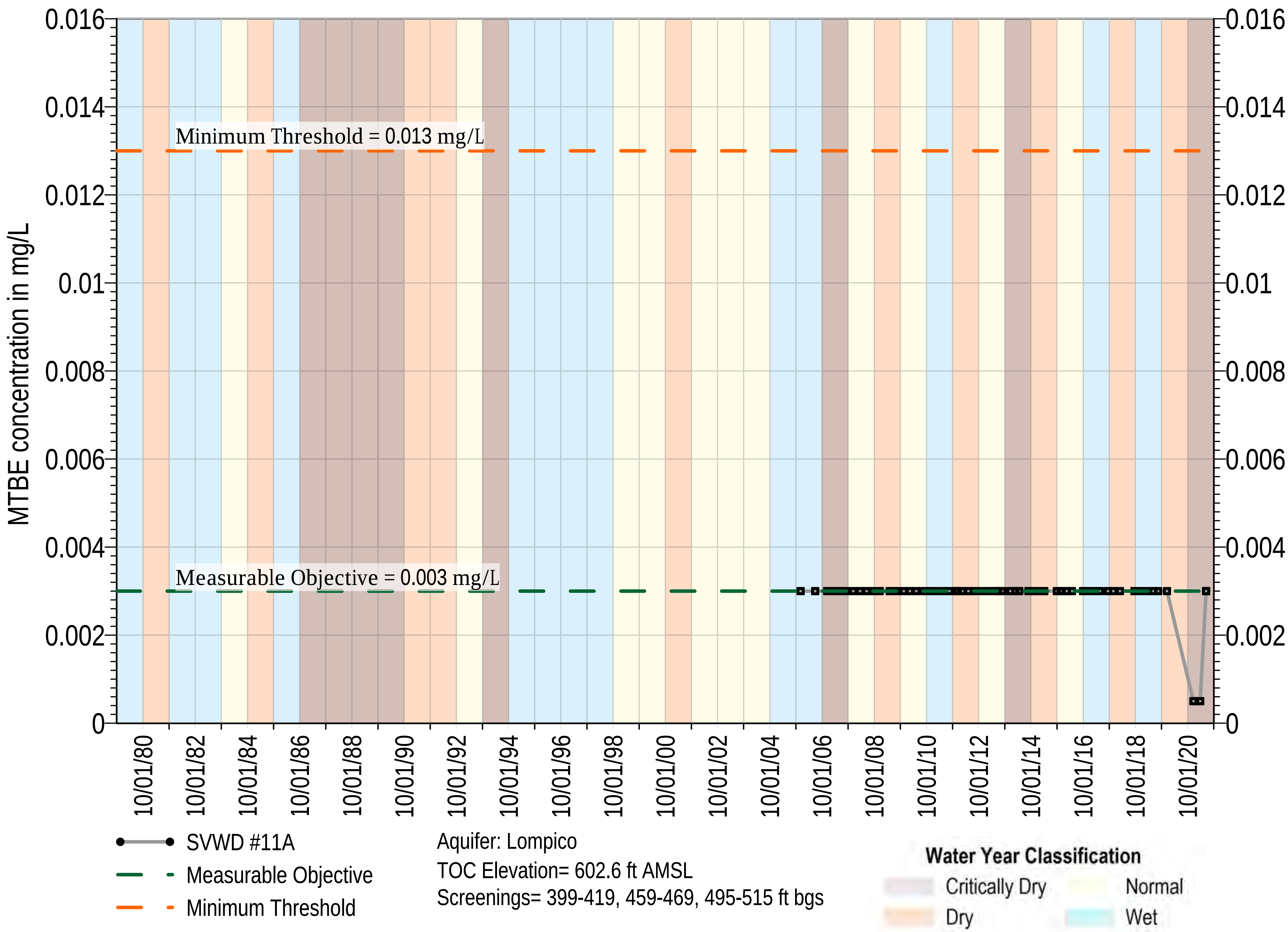

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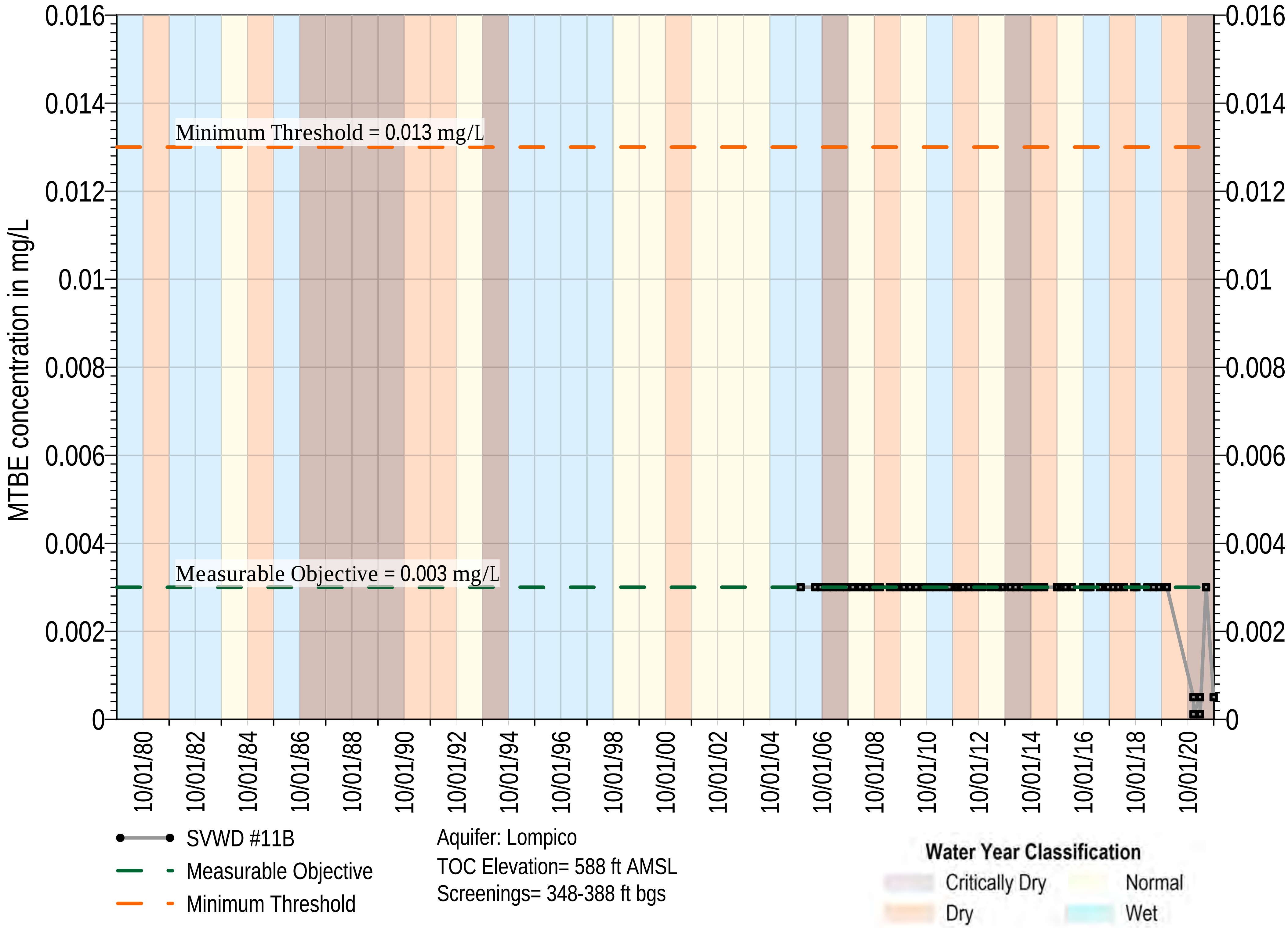

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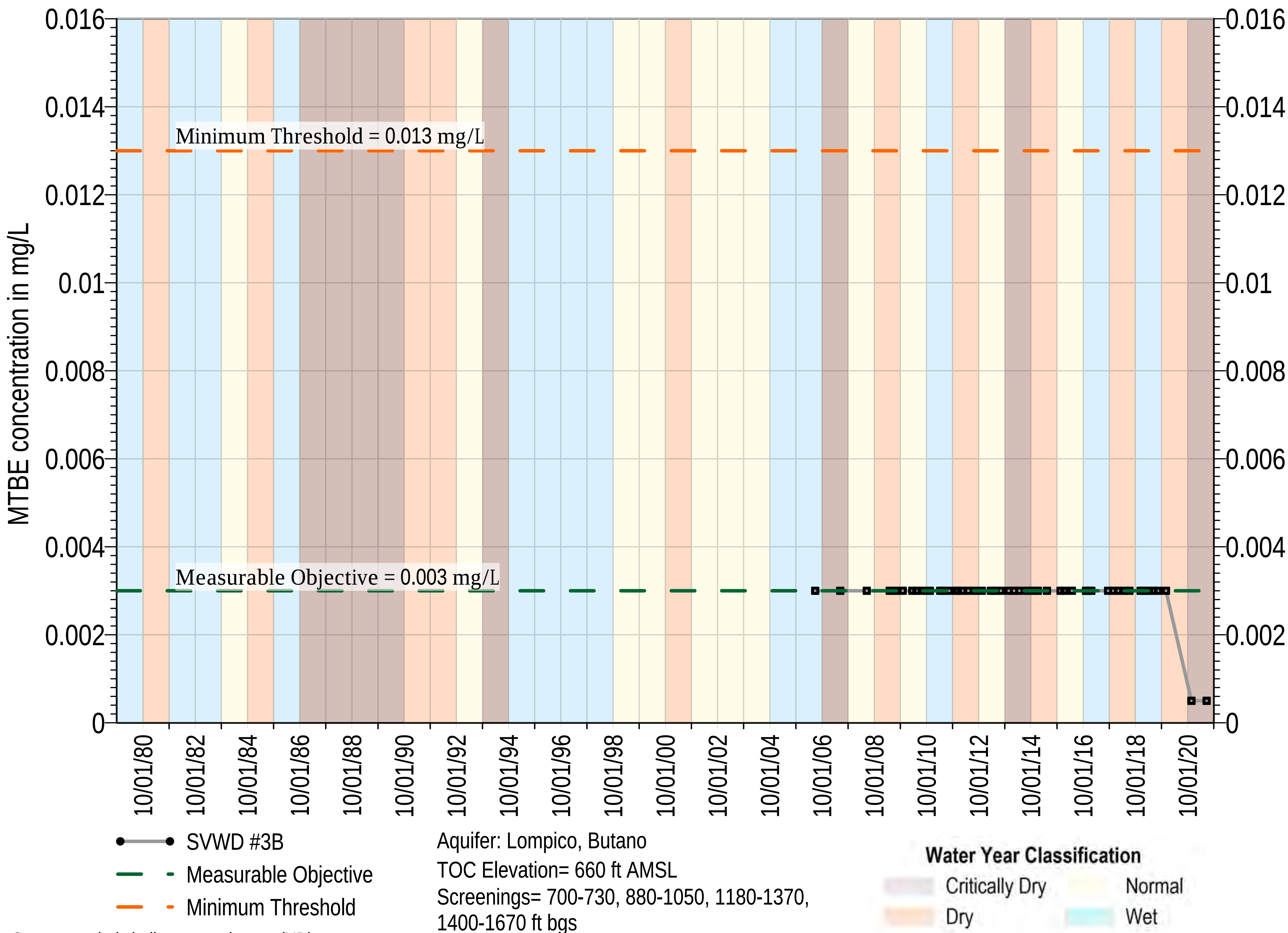

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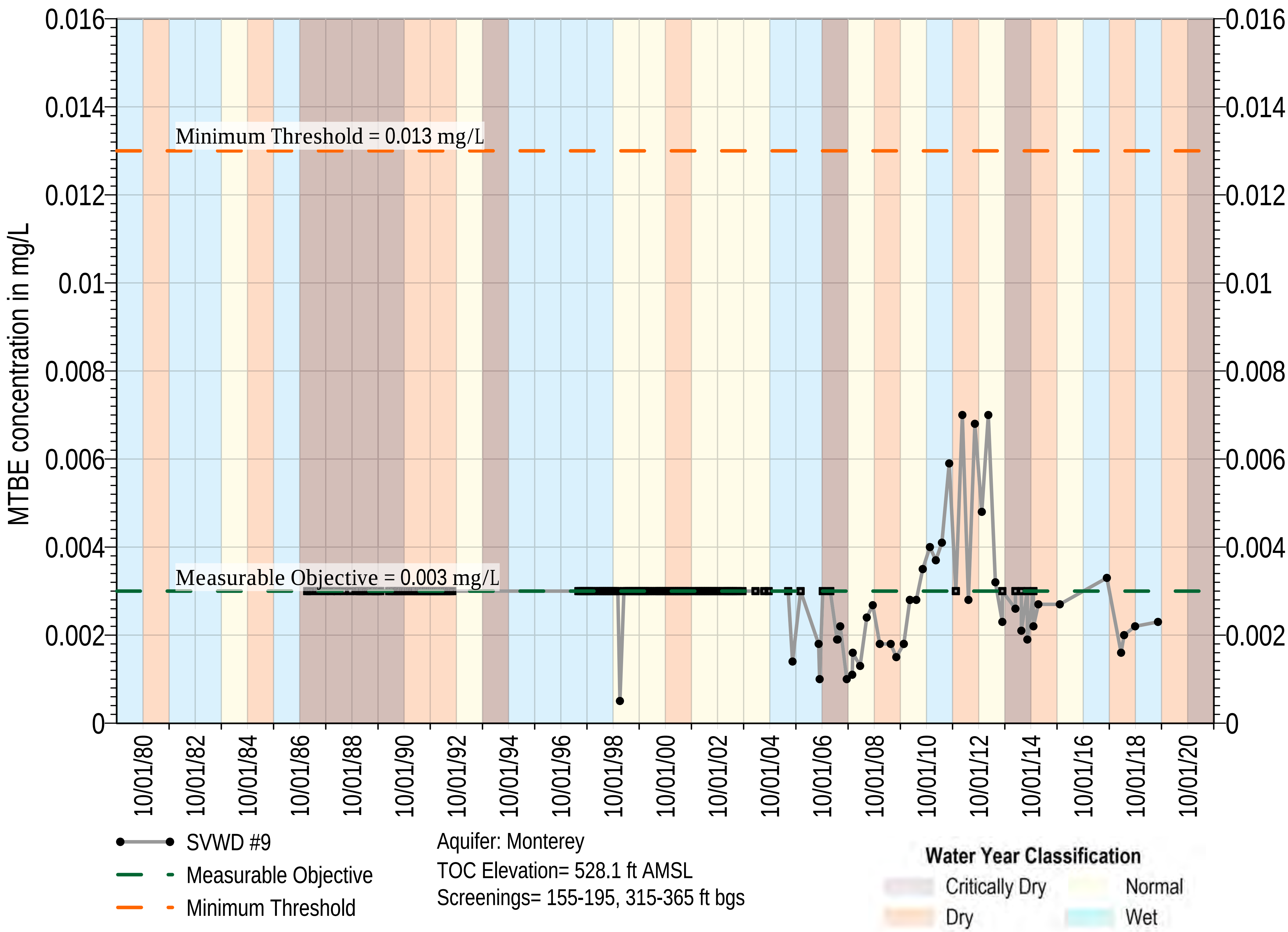

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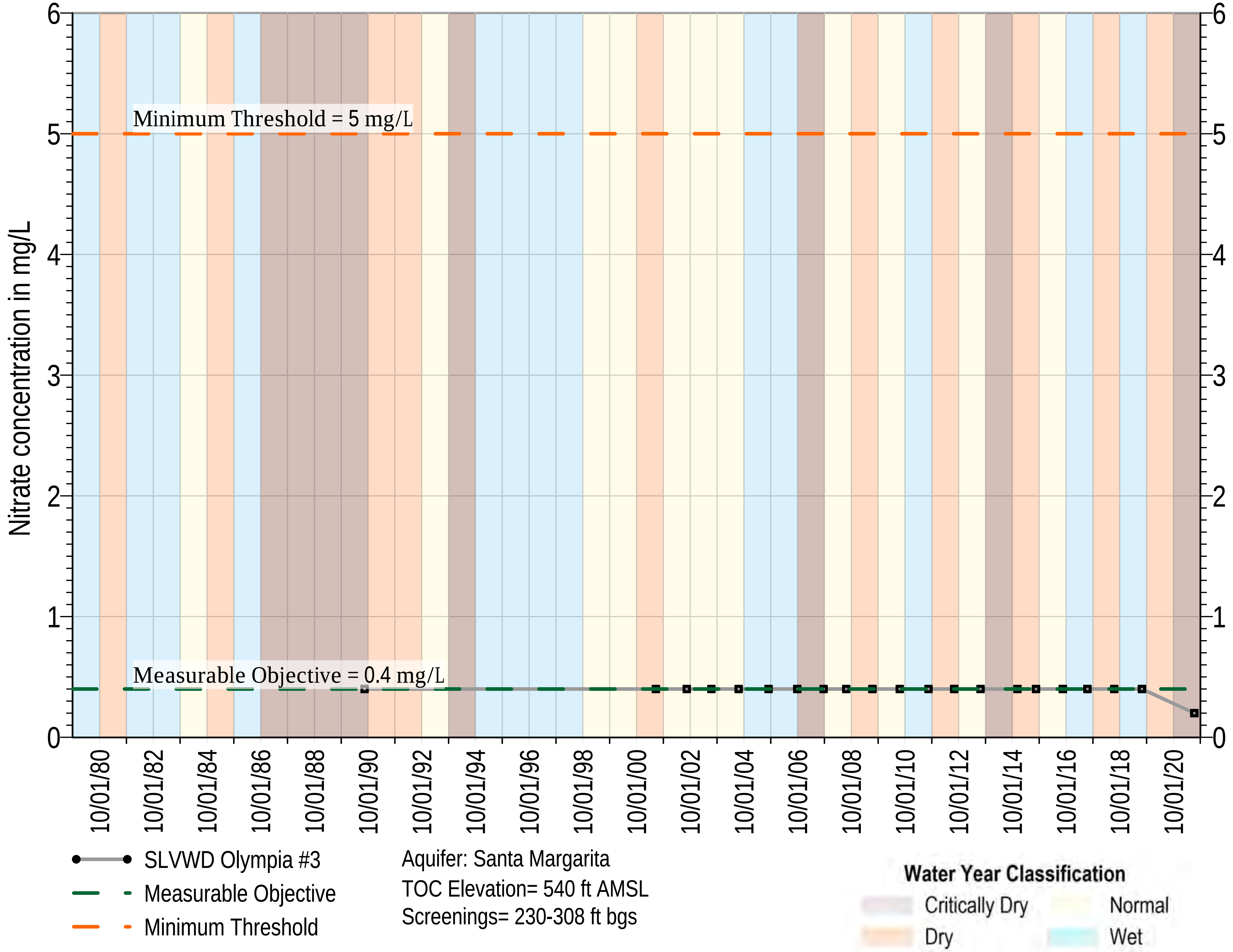
Nitrate as N



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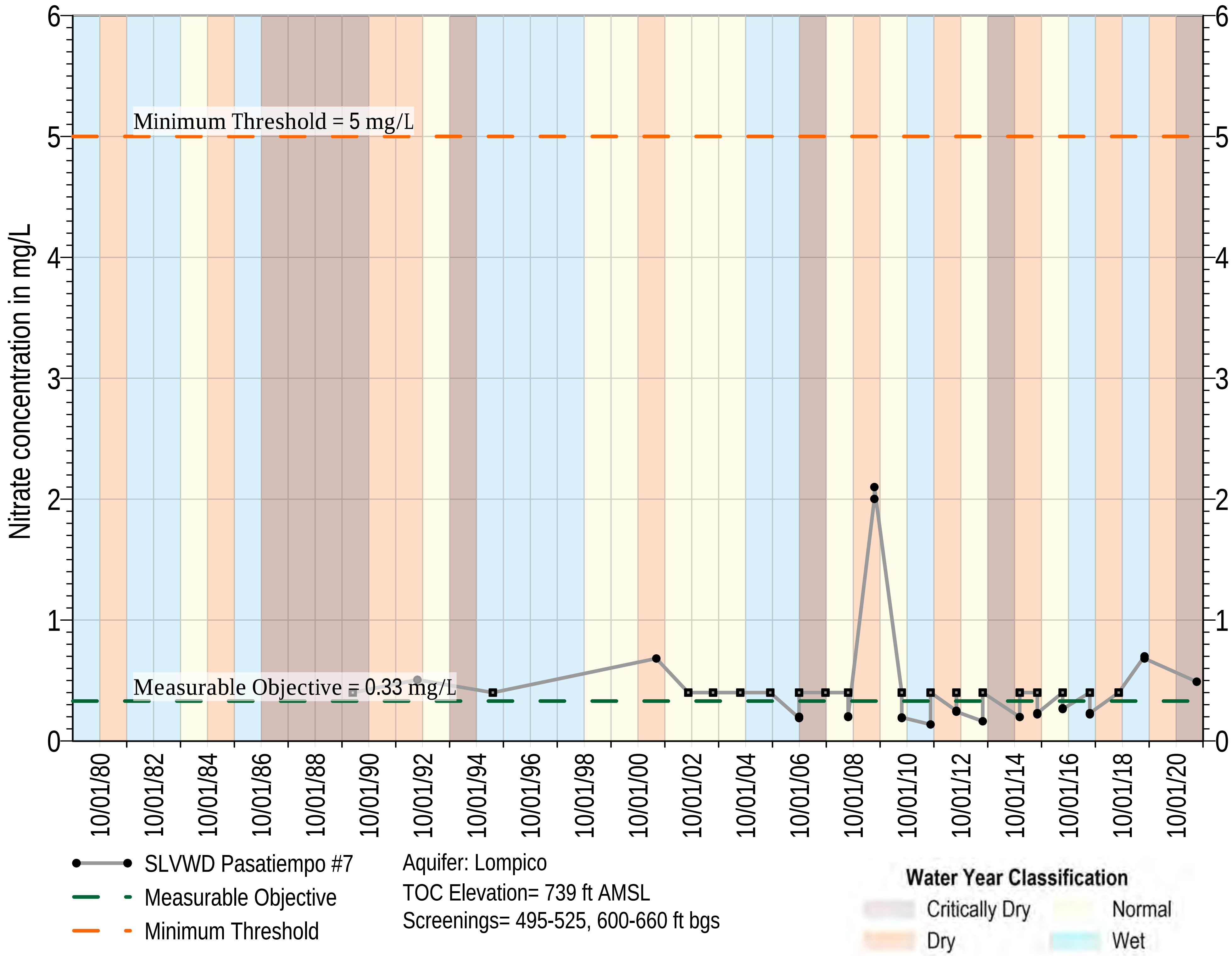

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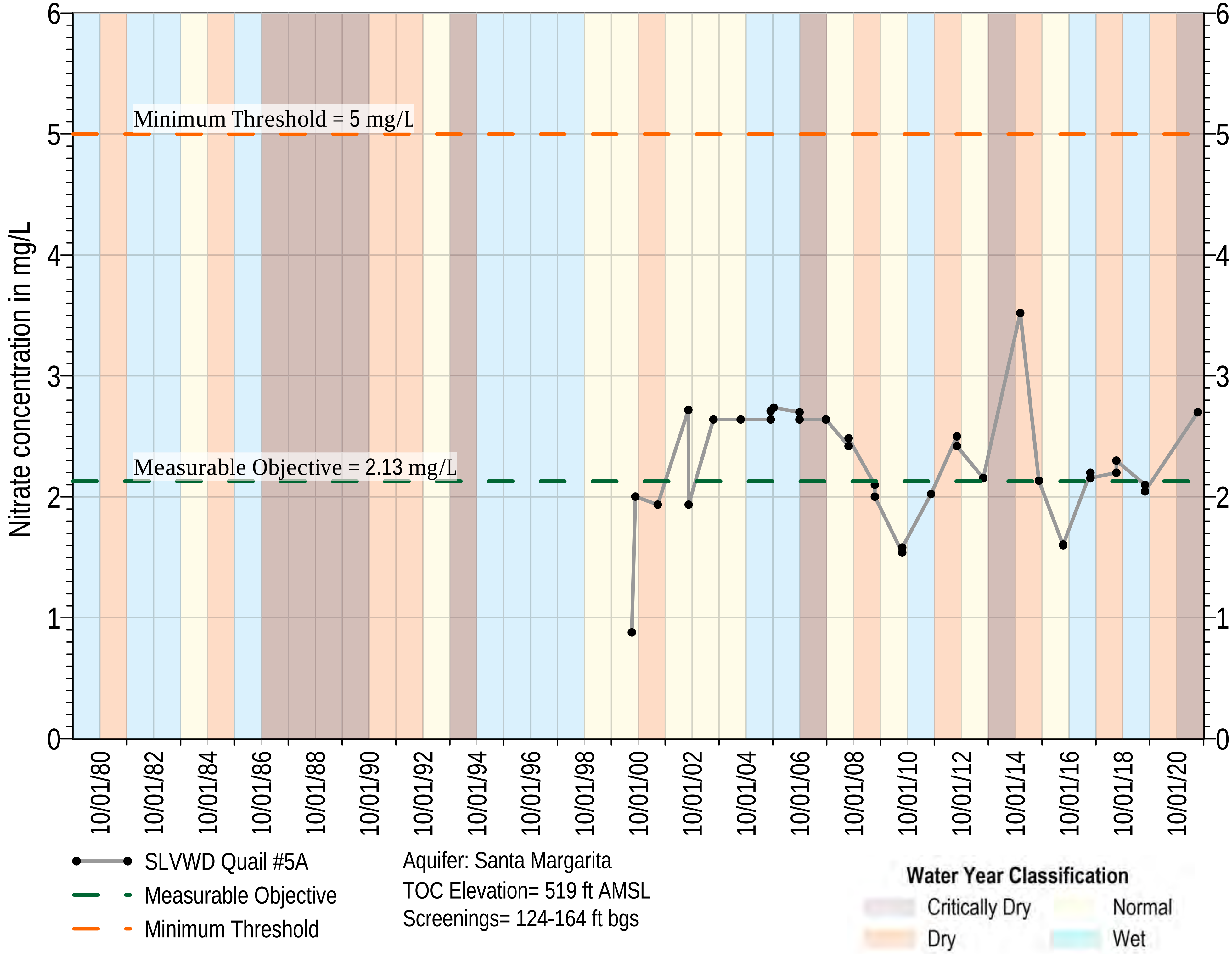

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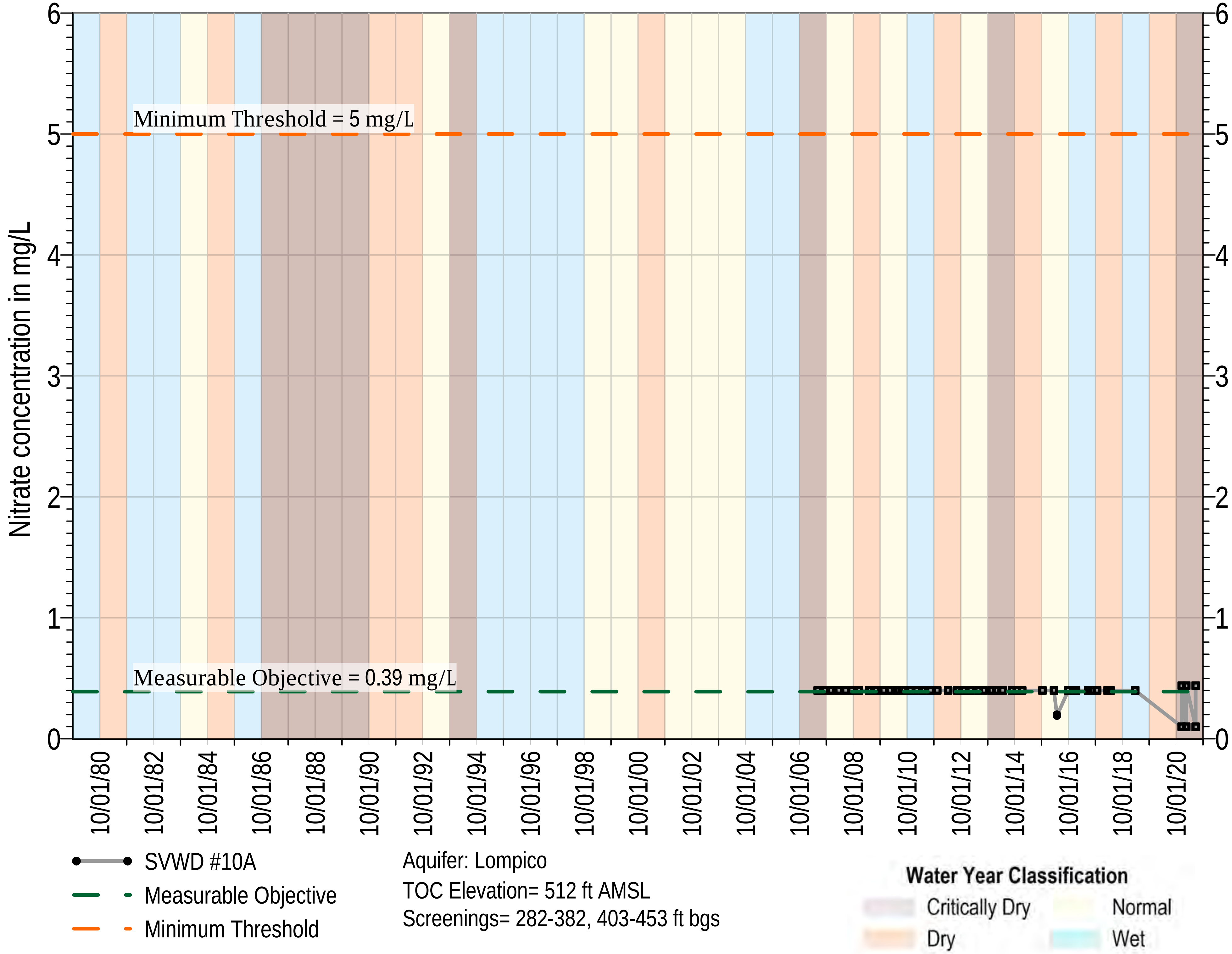

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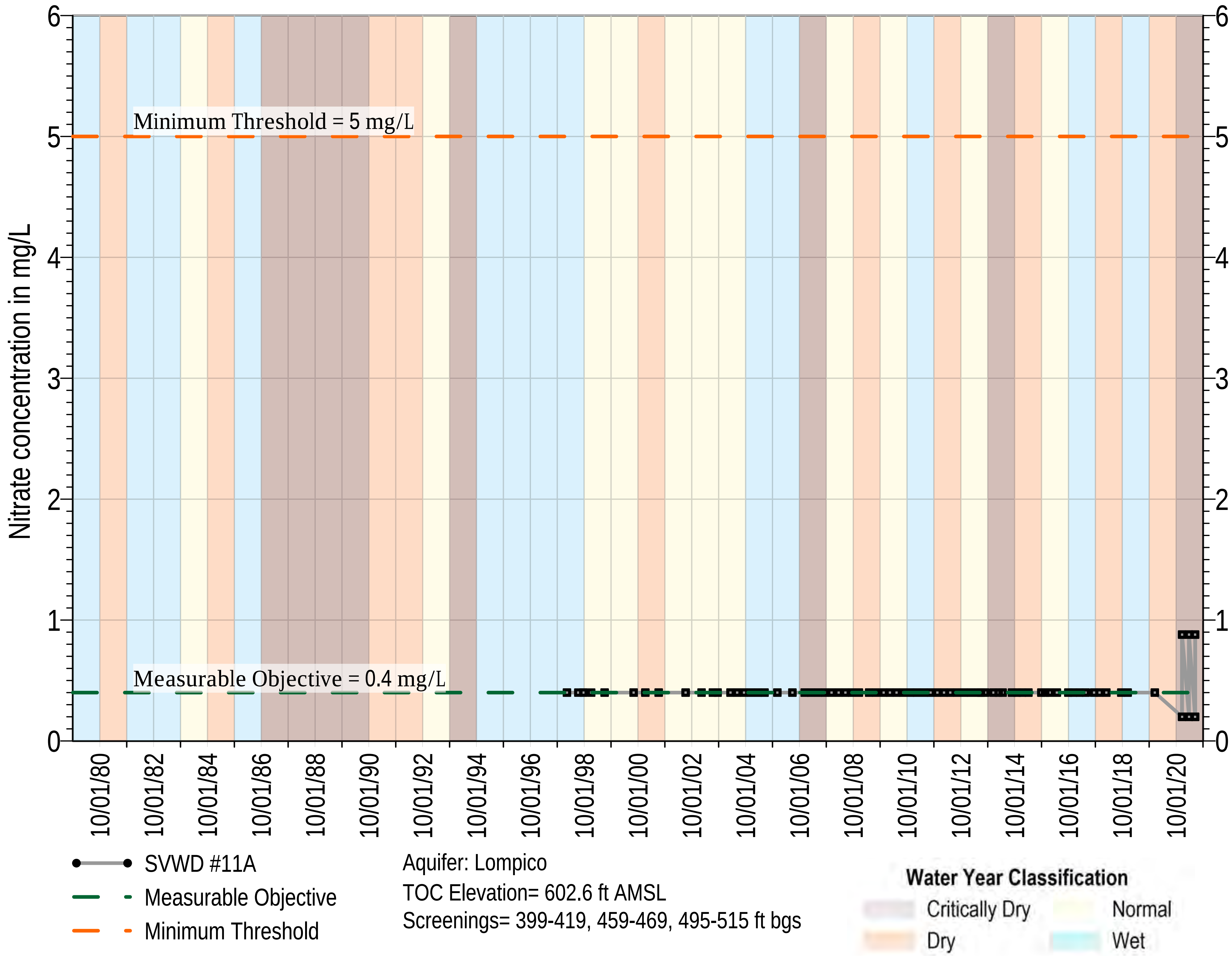

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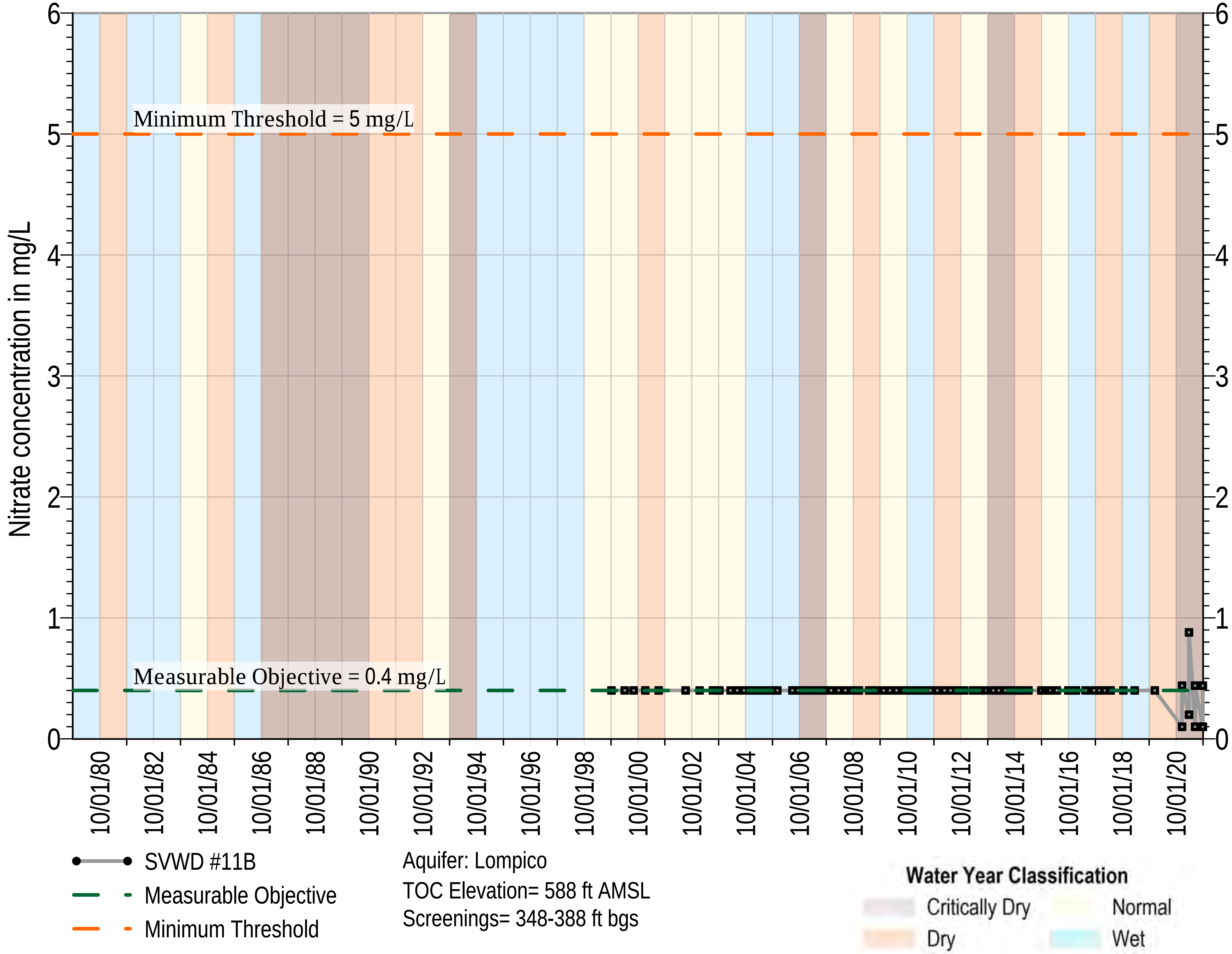

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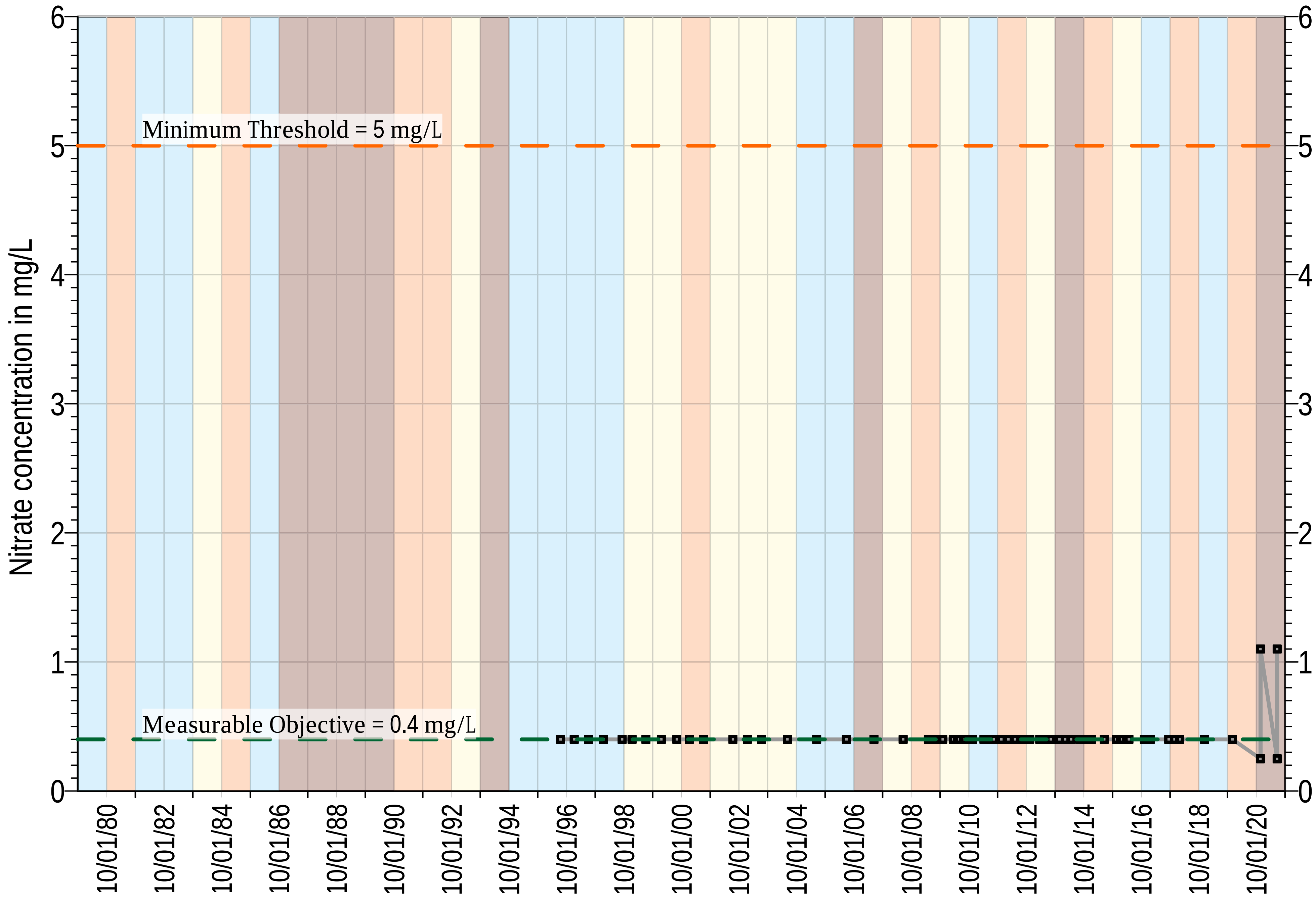

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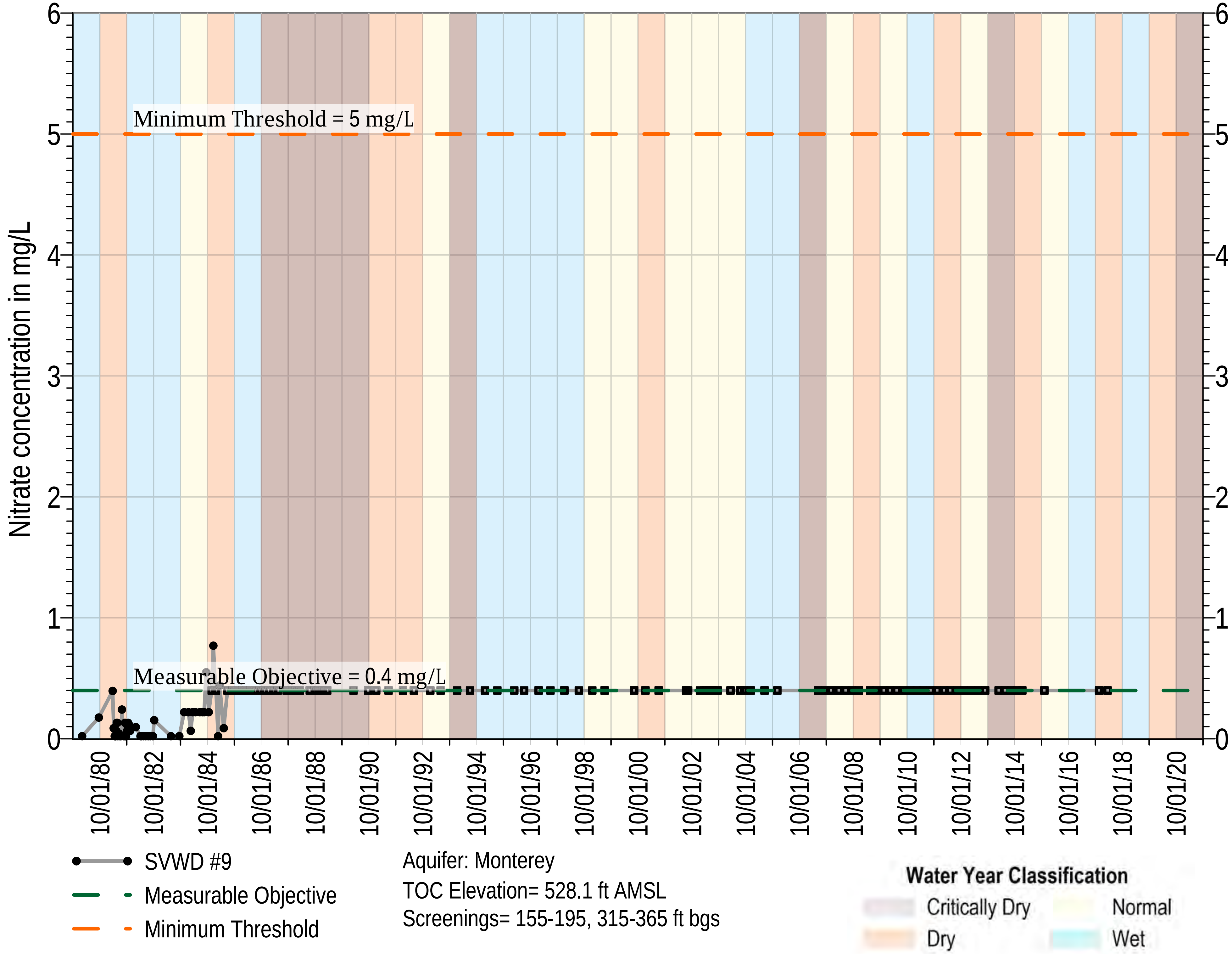

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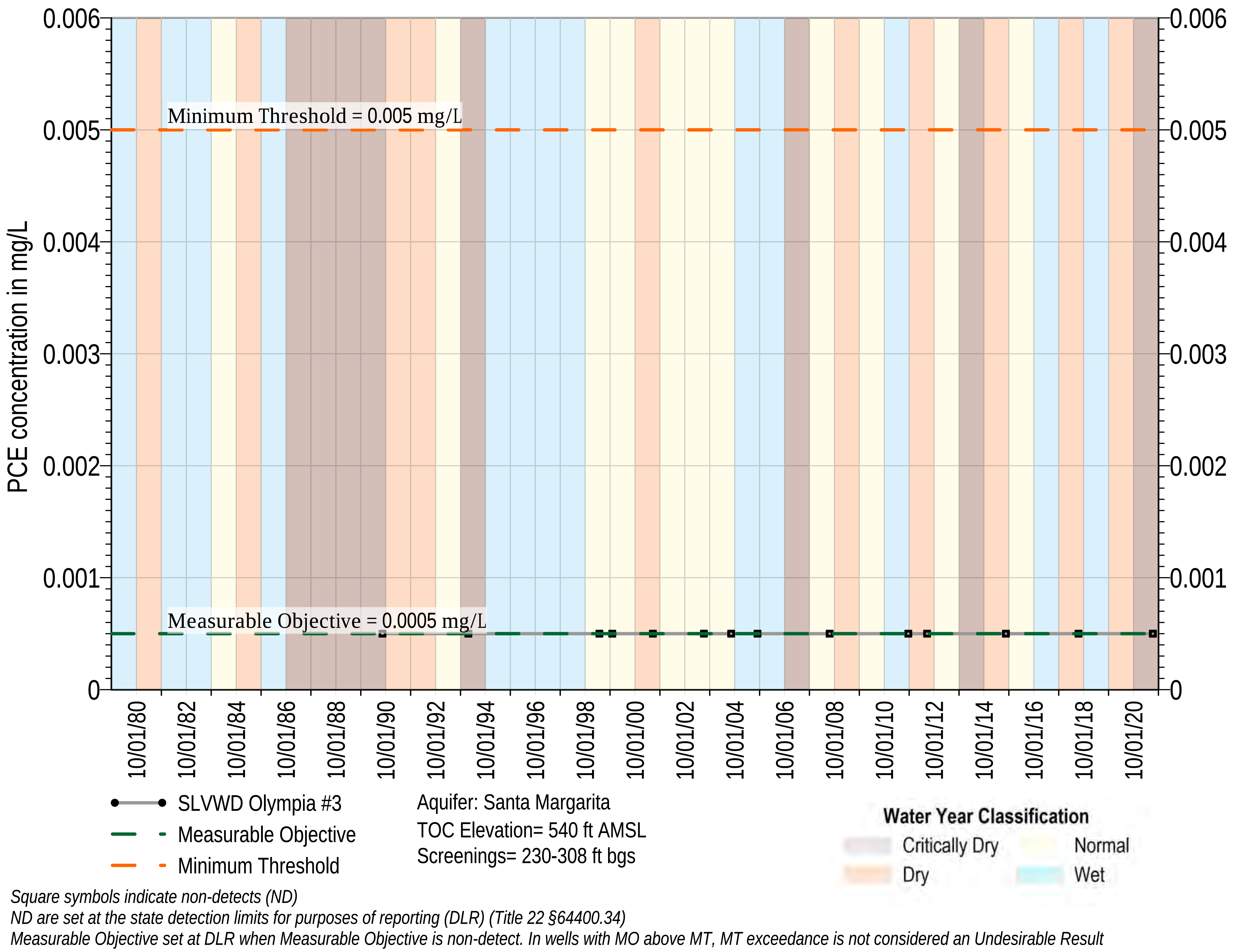
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result

PCE



PCE concentration in mg/L
0.006
0.005
0.004
0.003
0.002
0.001
0
Minimum Threshold = 0.005 mg/L
Measurable Objective = 0.0005 mg/L
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
SLVWD Olympia #3
Measurable Objective
Minimum Threshold
Aquifer: Santa Margarita
TOC Elevation= 540 ft AMSL
Screenings= 230-308 ft bgs
Water Year Classification
Critically Dry
Normal
Dry
Wet
Square symbols indicate non-detects (ND)
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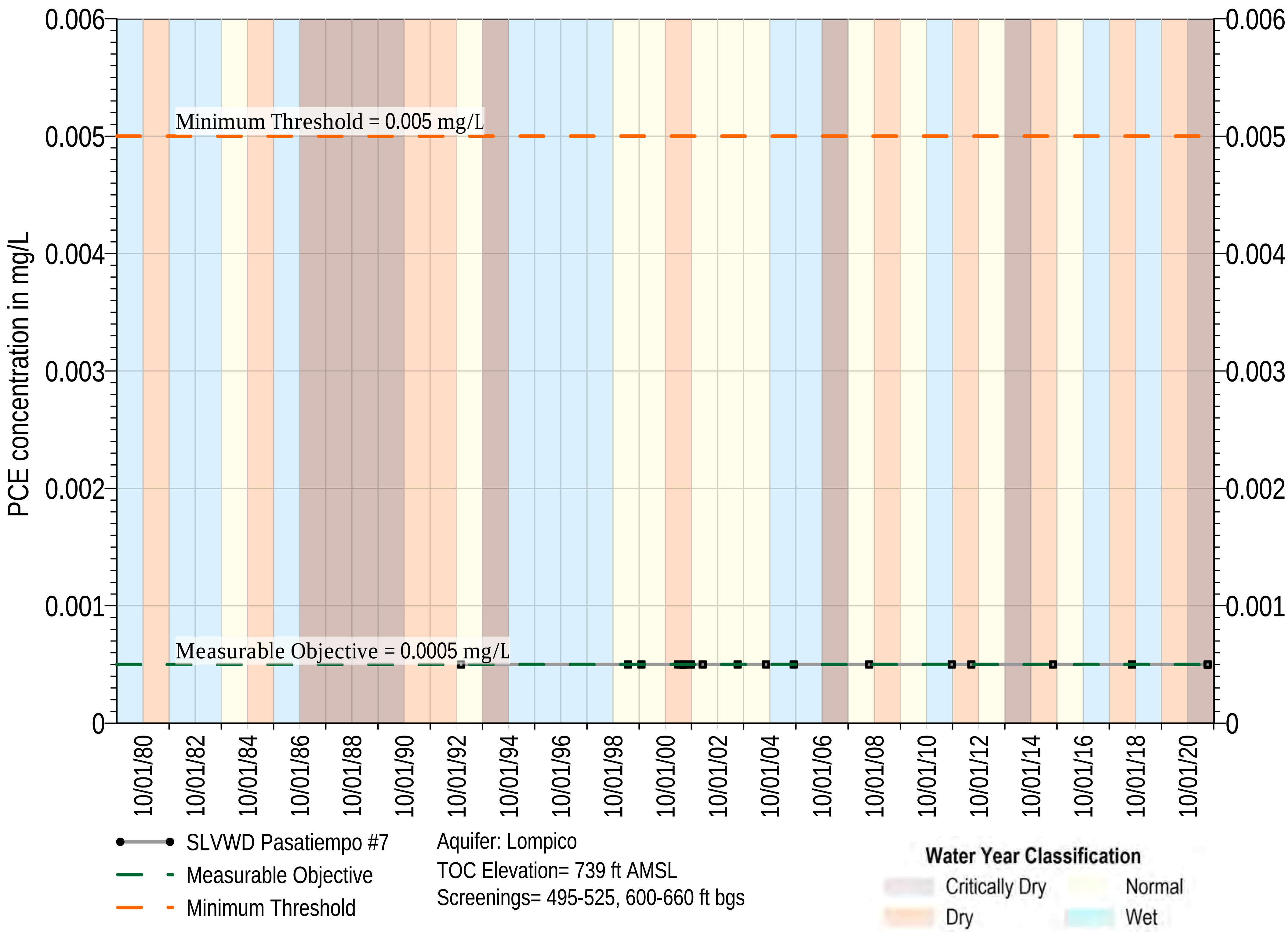

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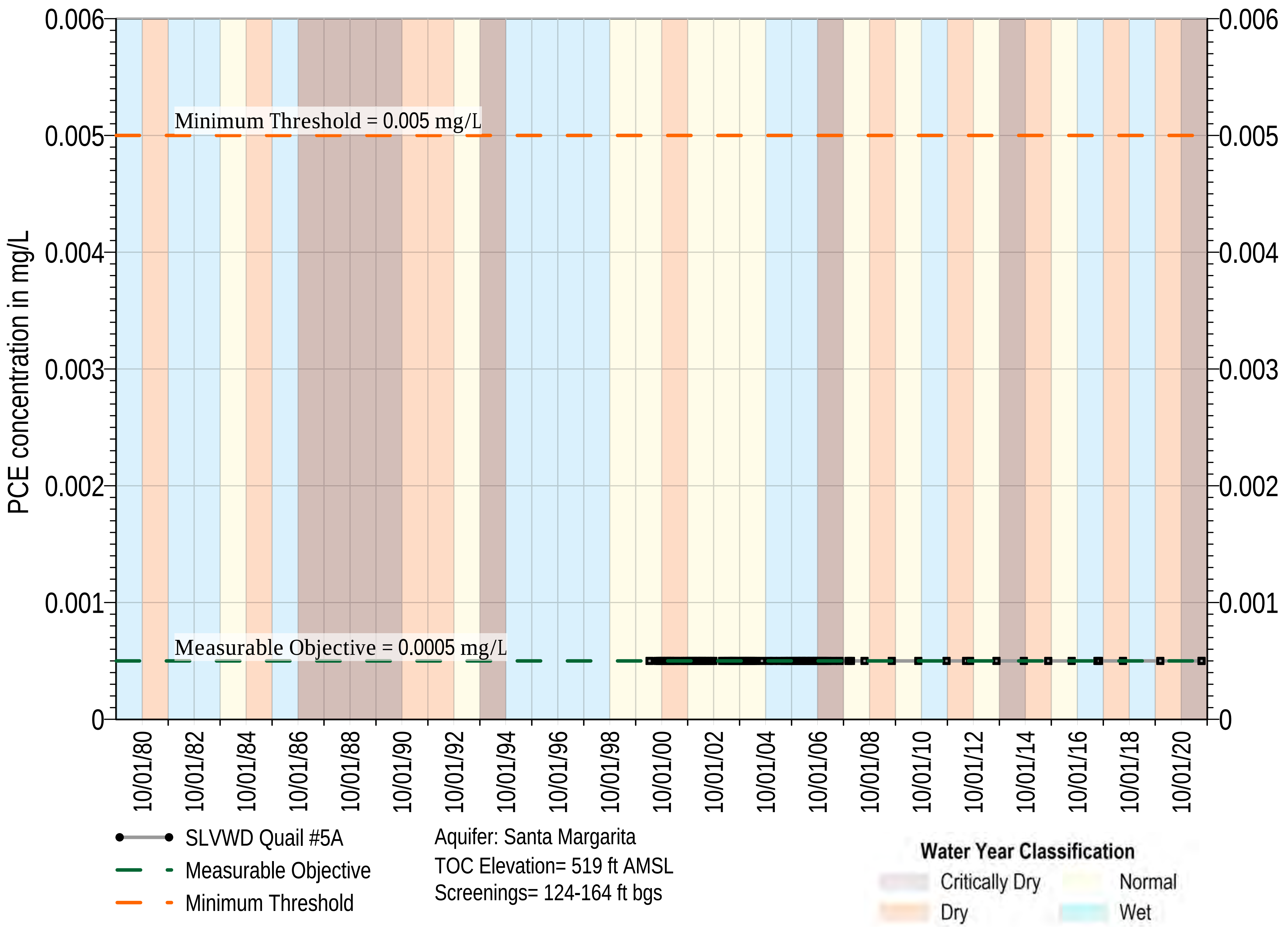

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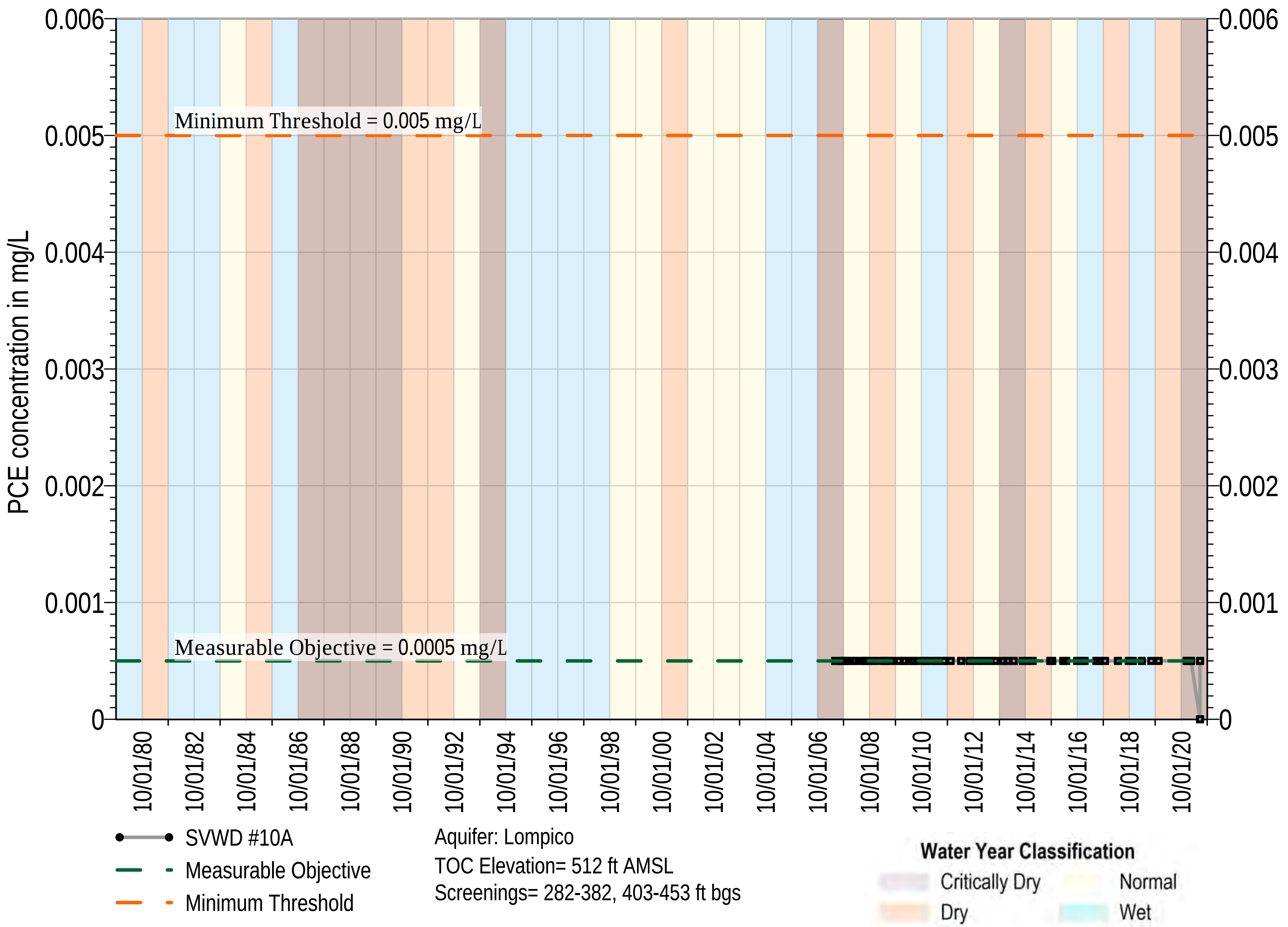

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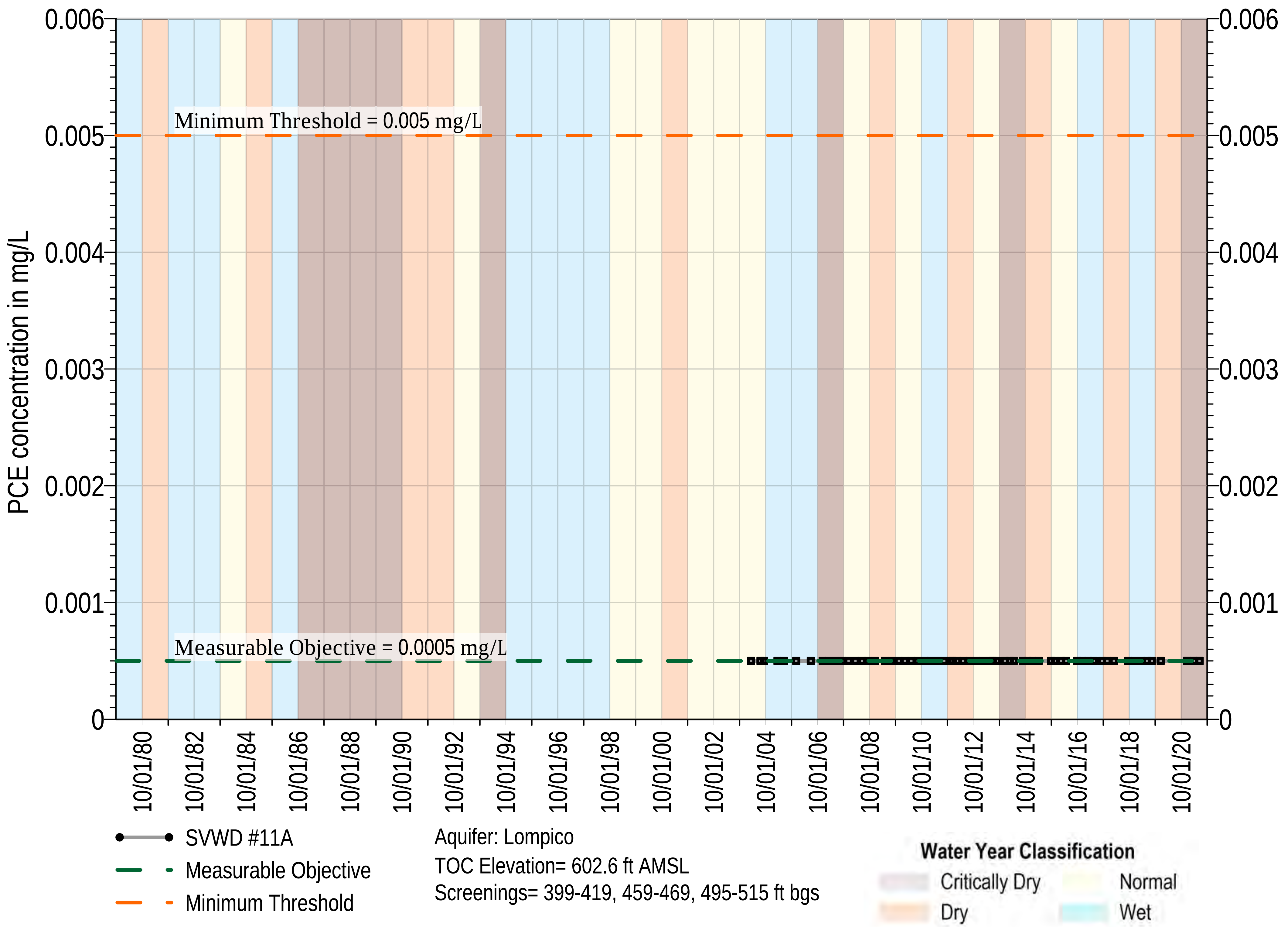

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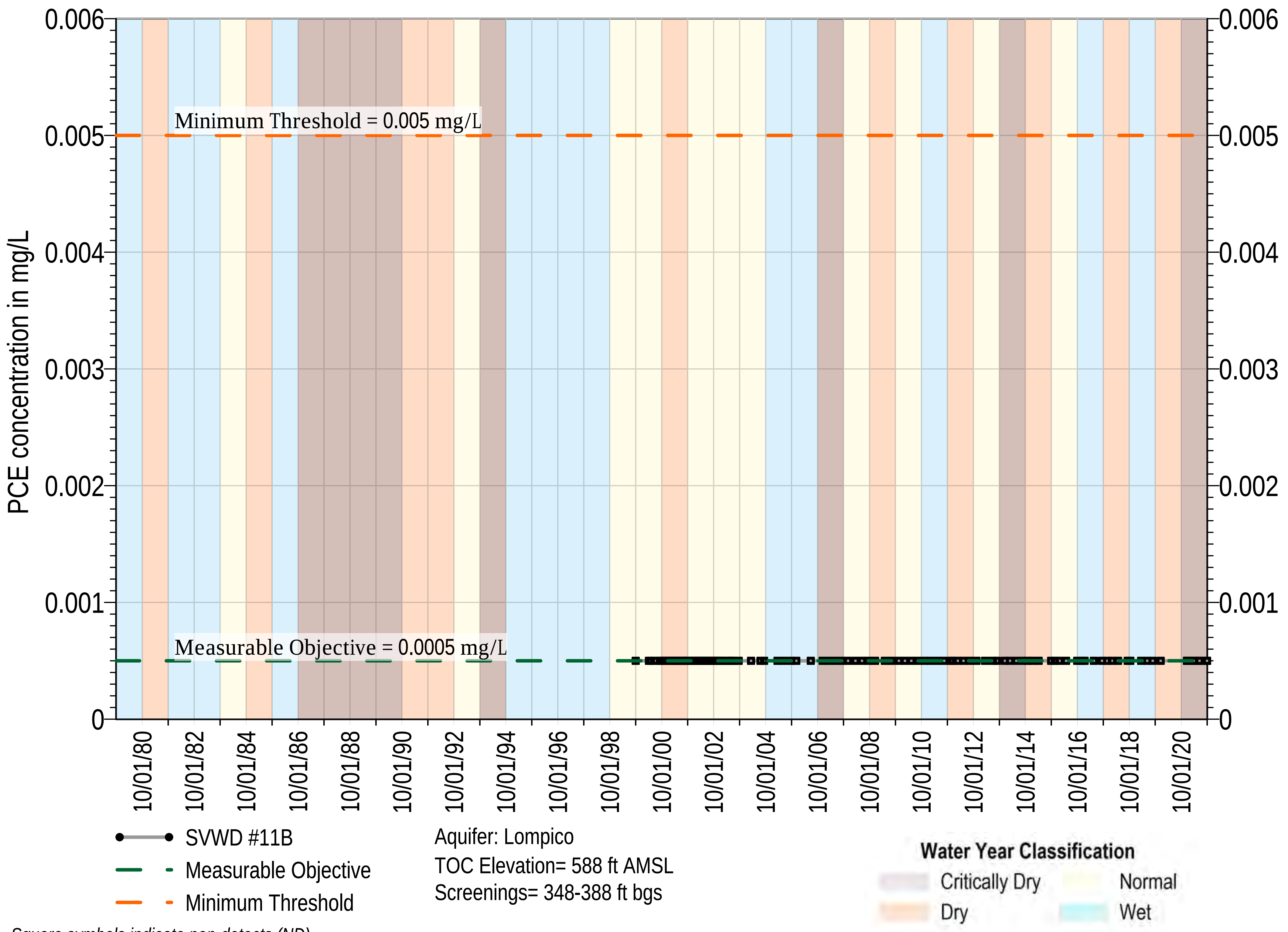

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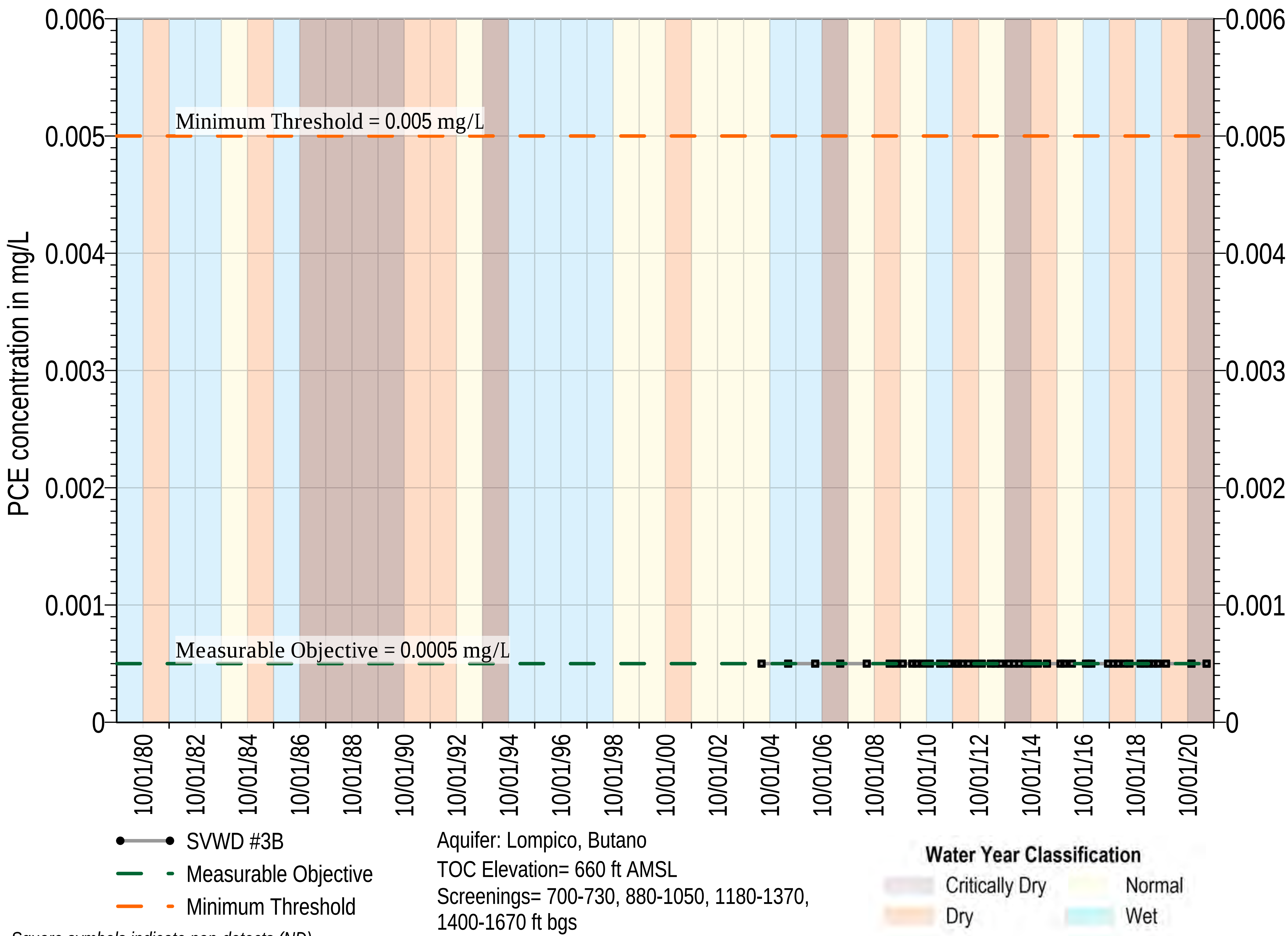

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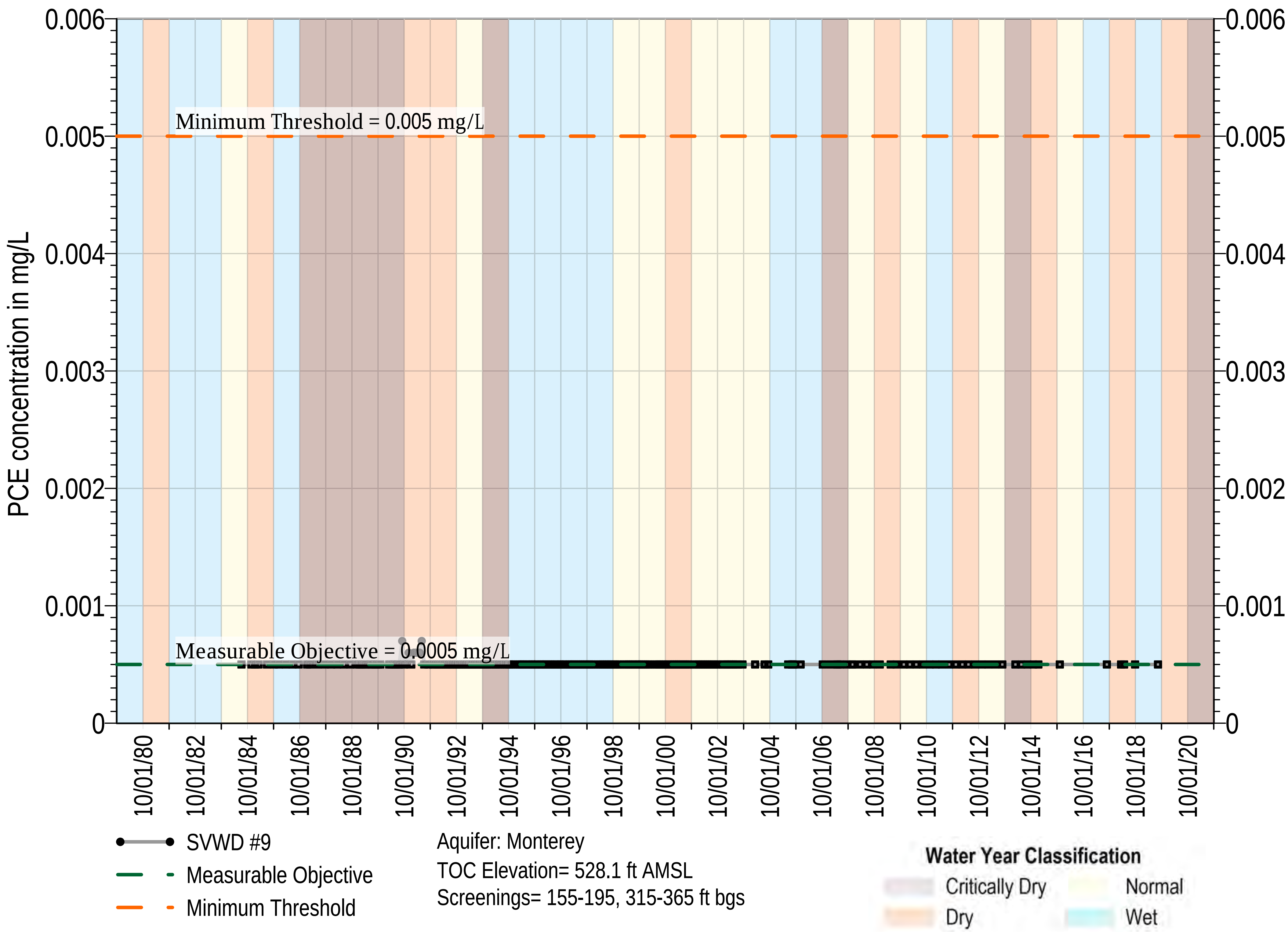

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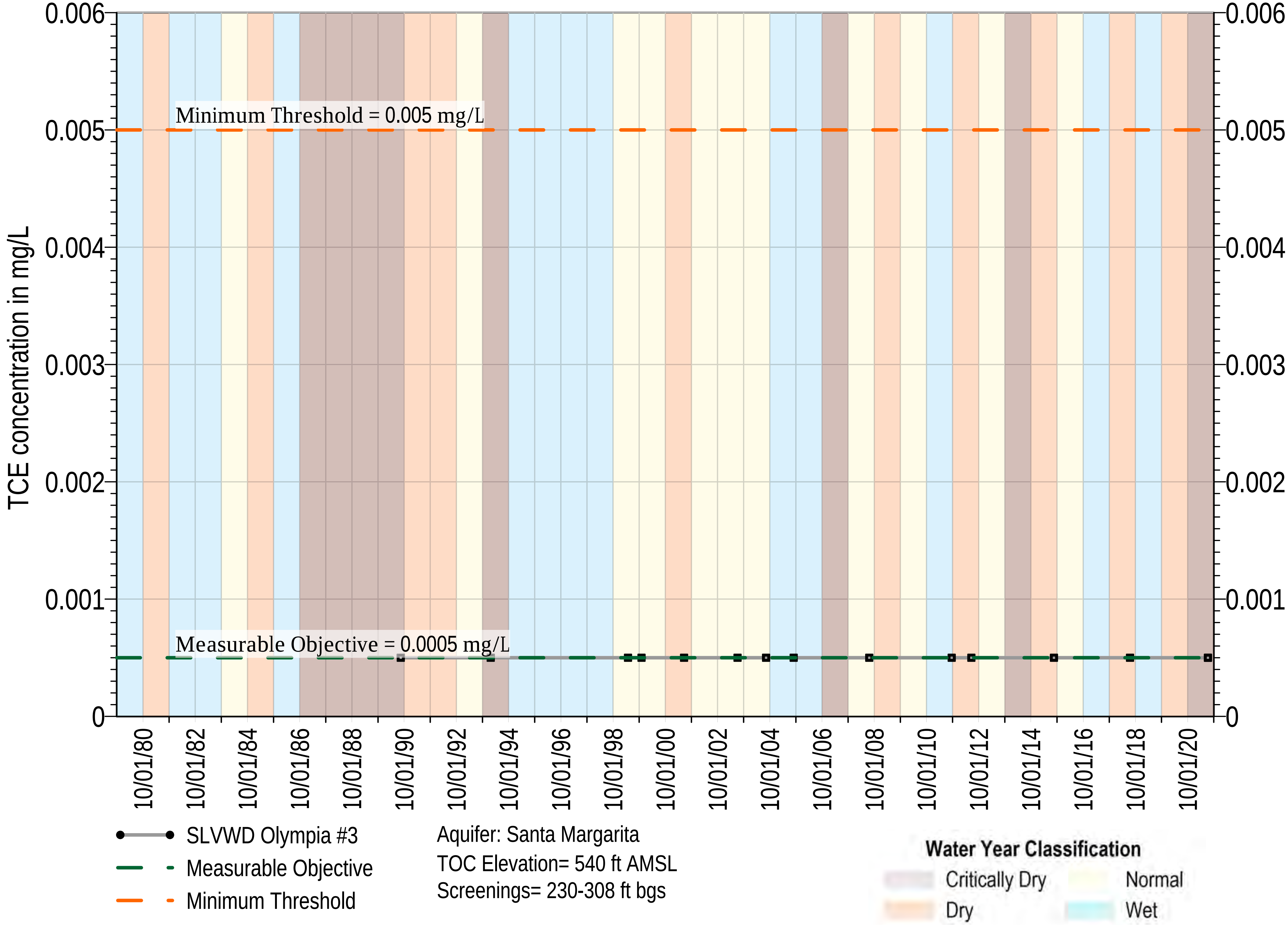
TCE



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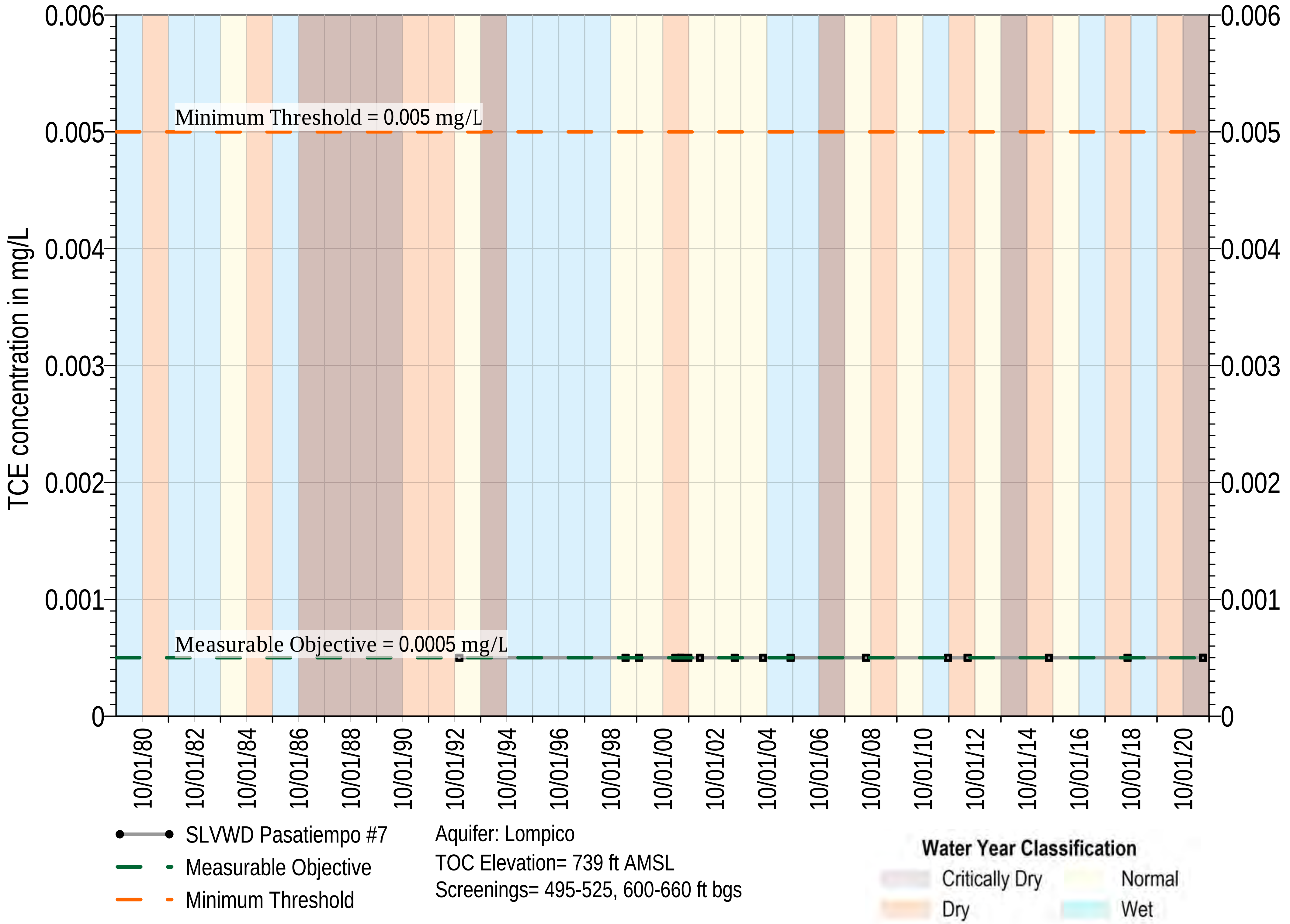

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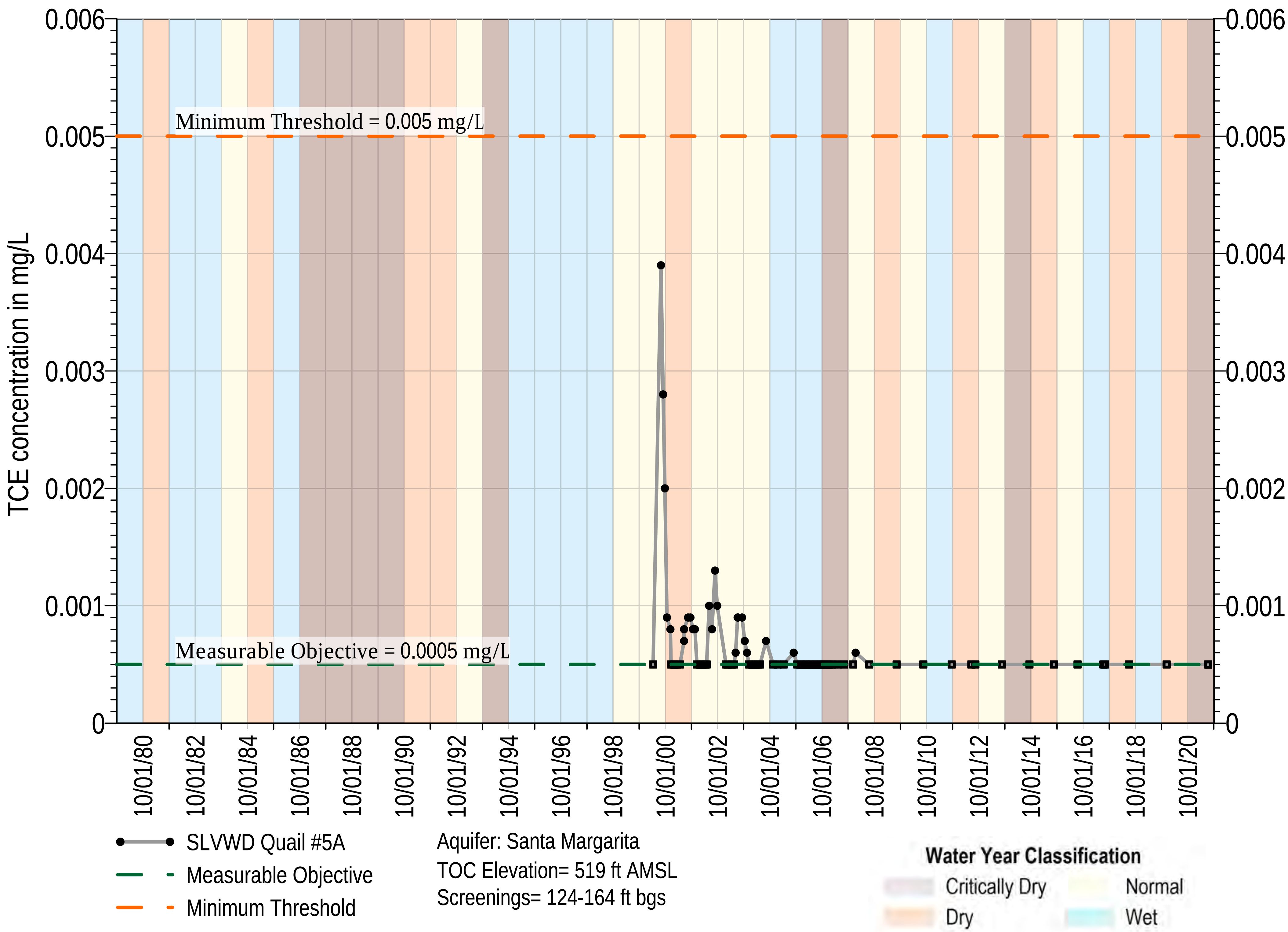

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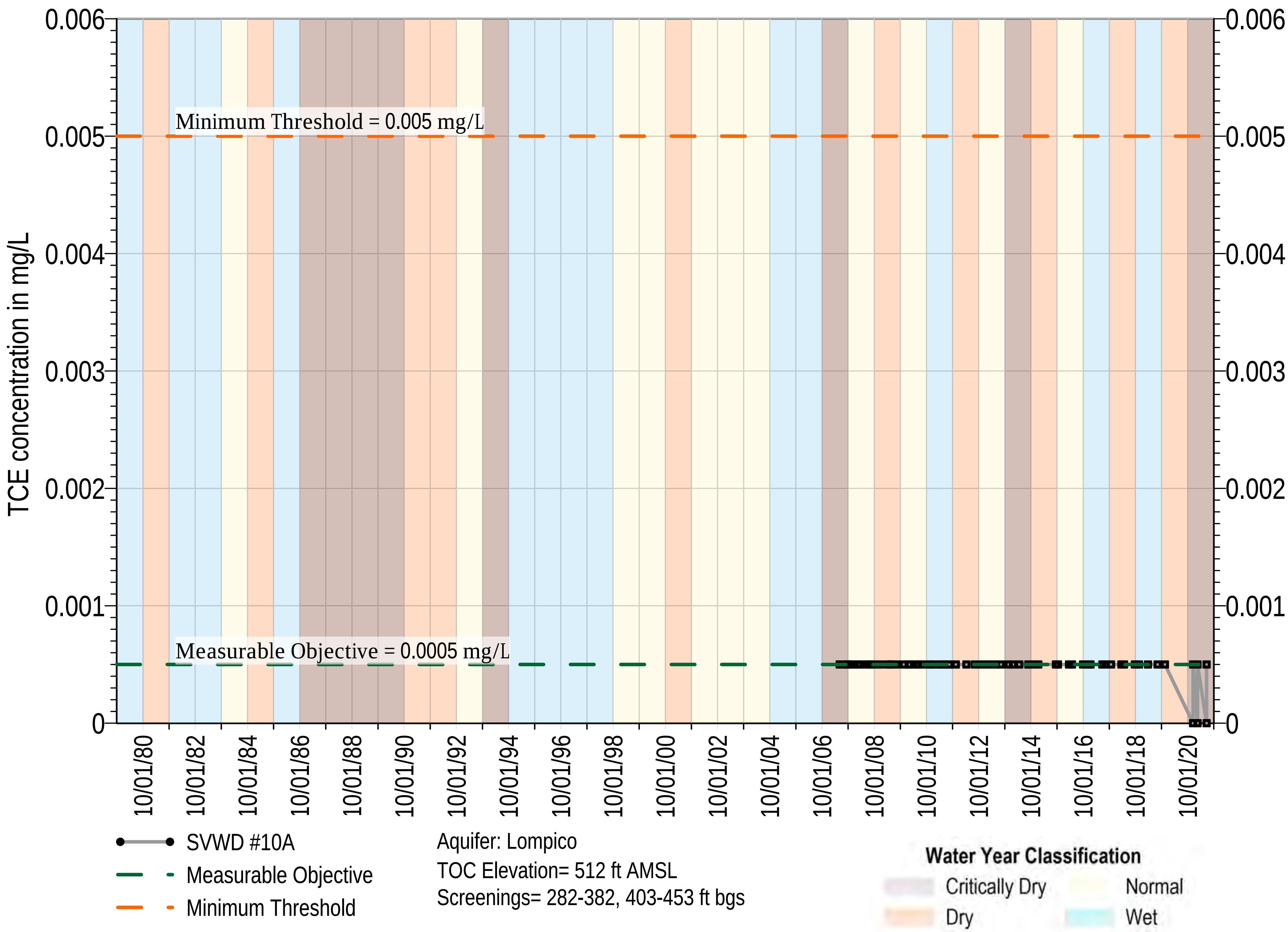

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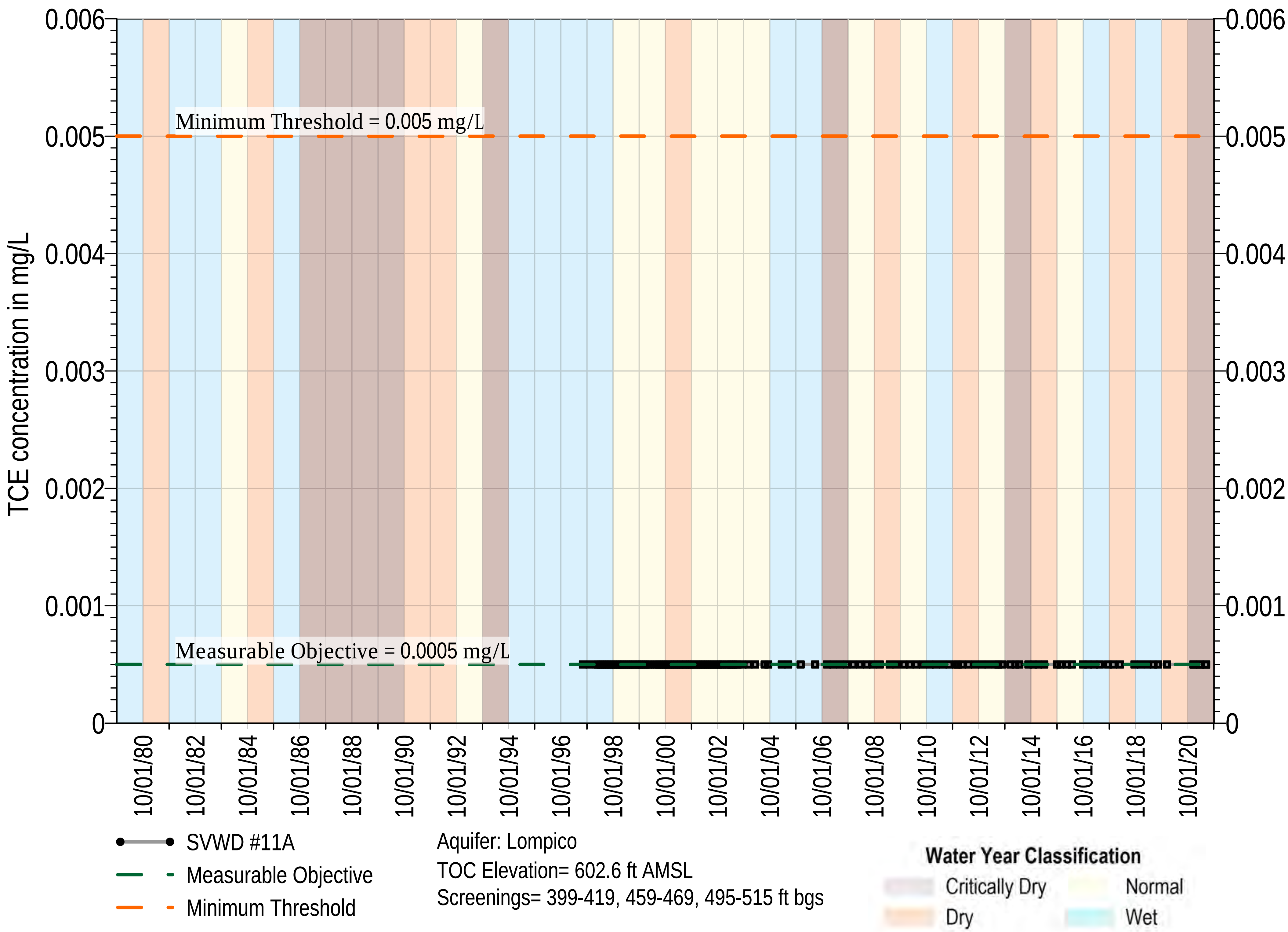

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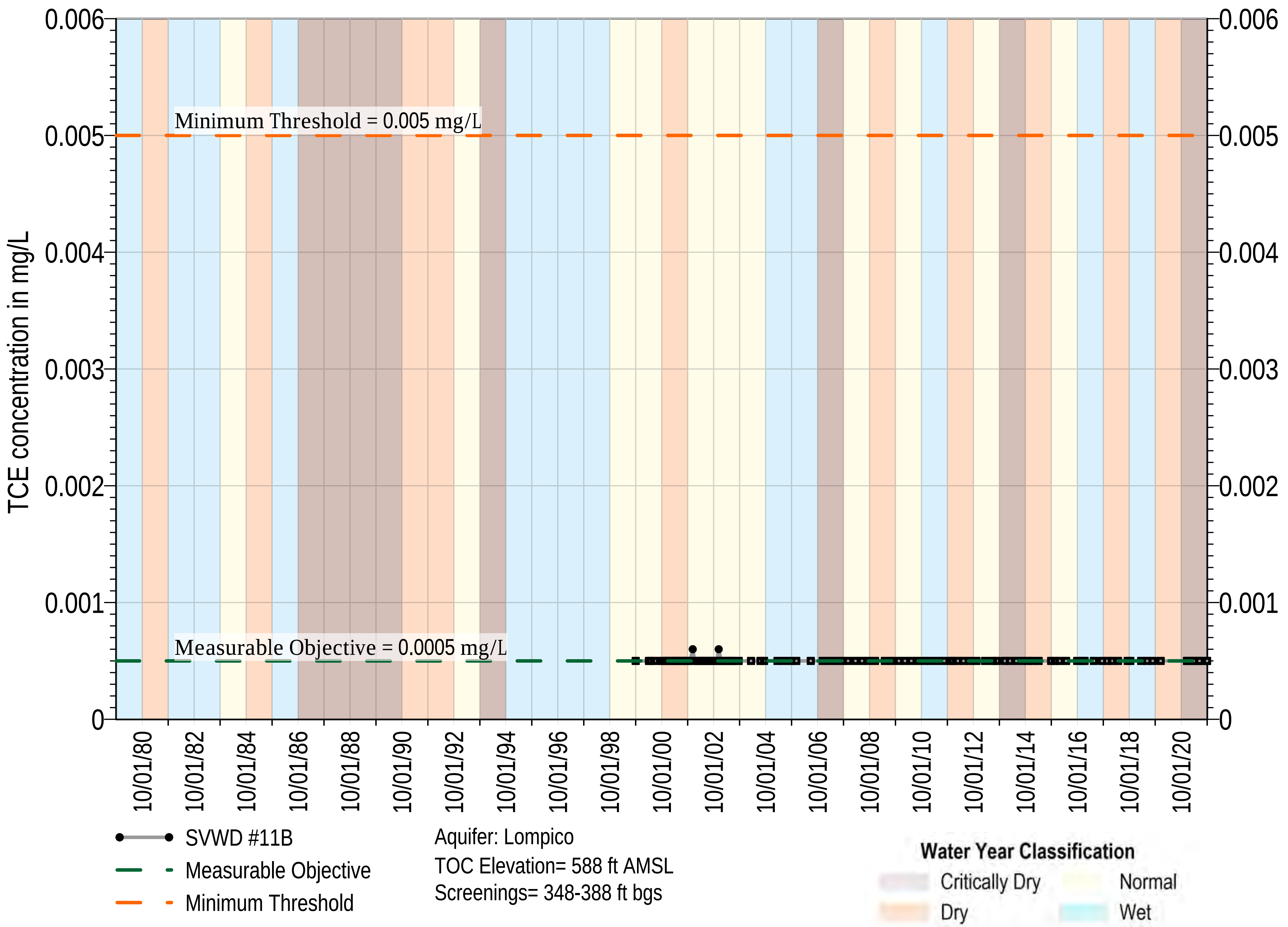

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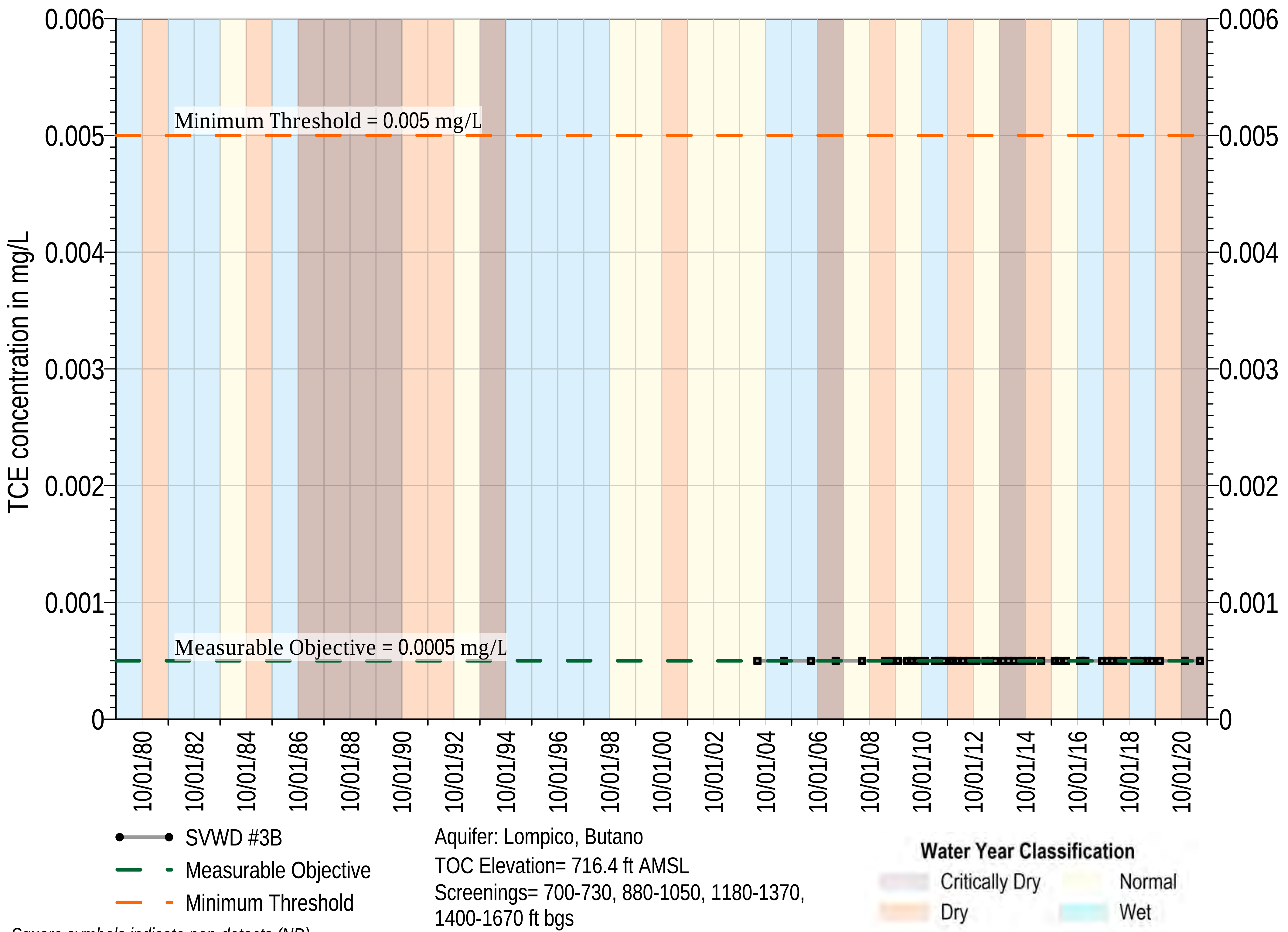

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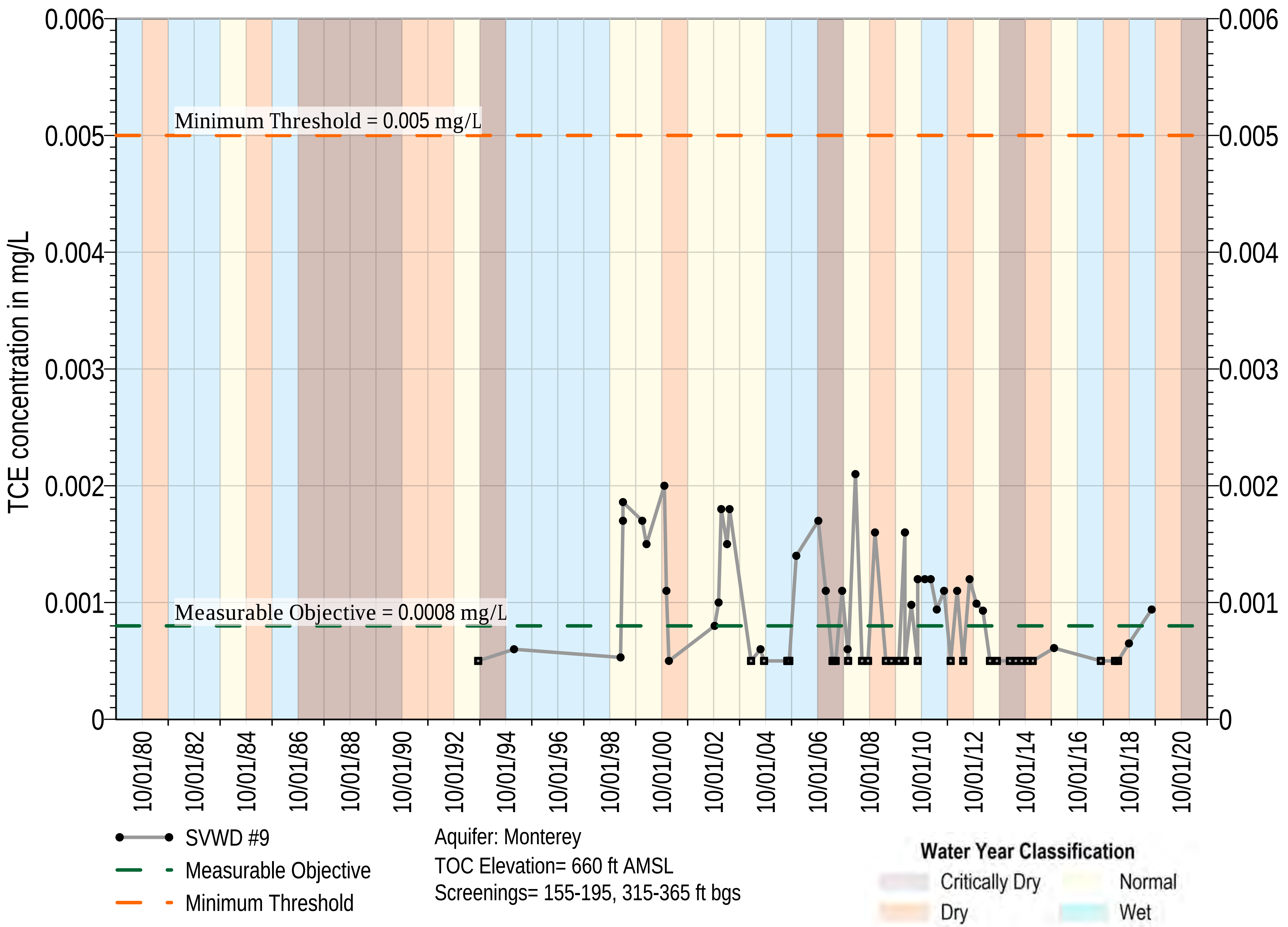

Square symbols indicate non-detects (ND)

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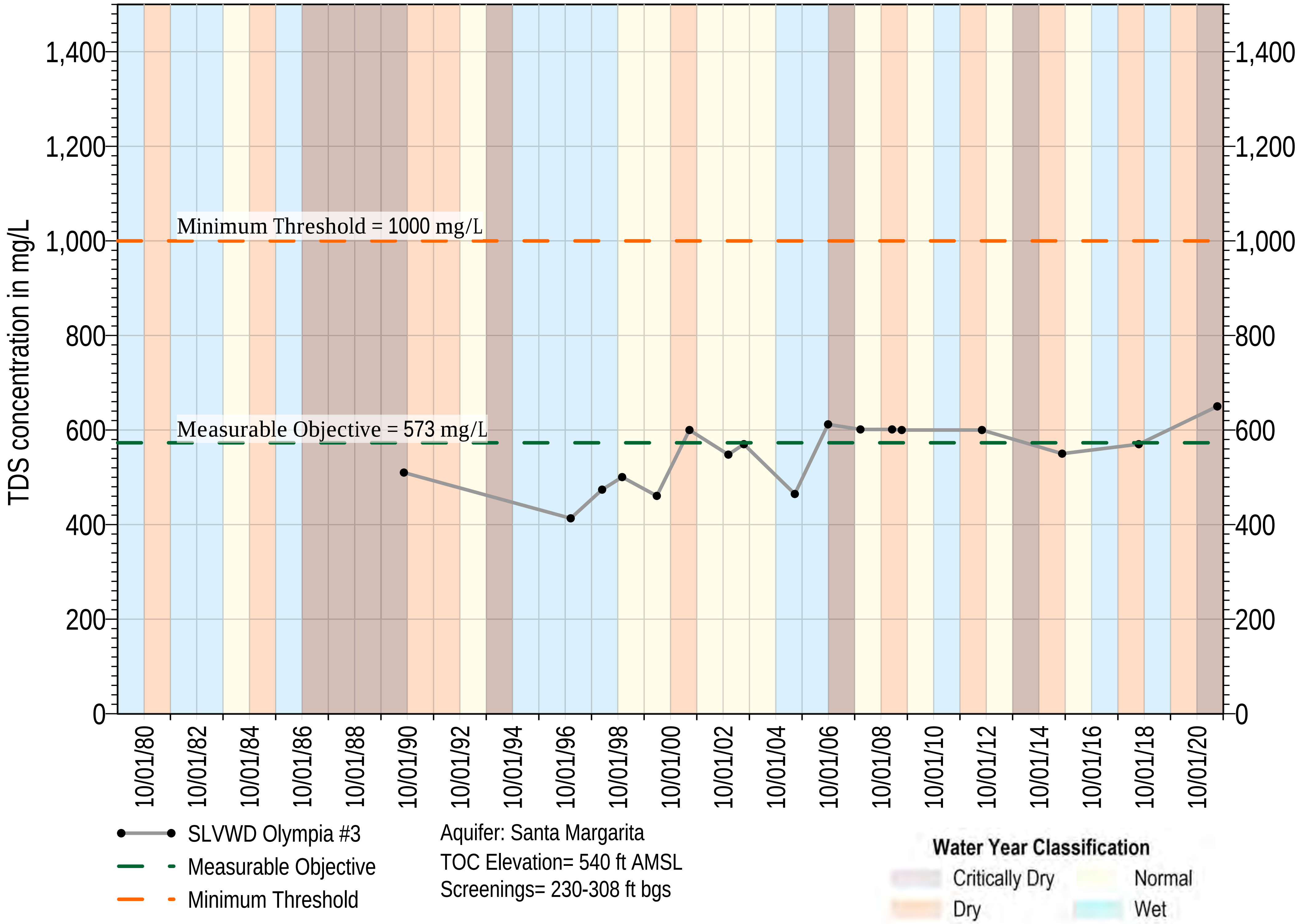
Measurable Objective set at DLR when Measurable Objective is non-detect. In wells with MO above MT, MT exceedance is not considered an Undesirable Result

TDS



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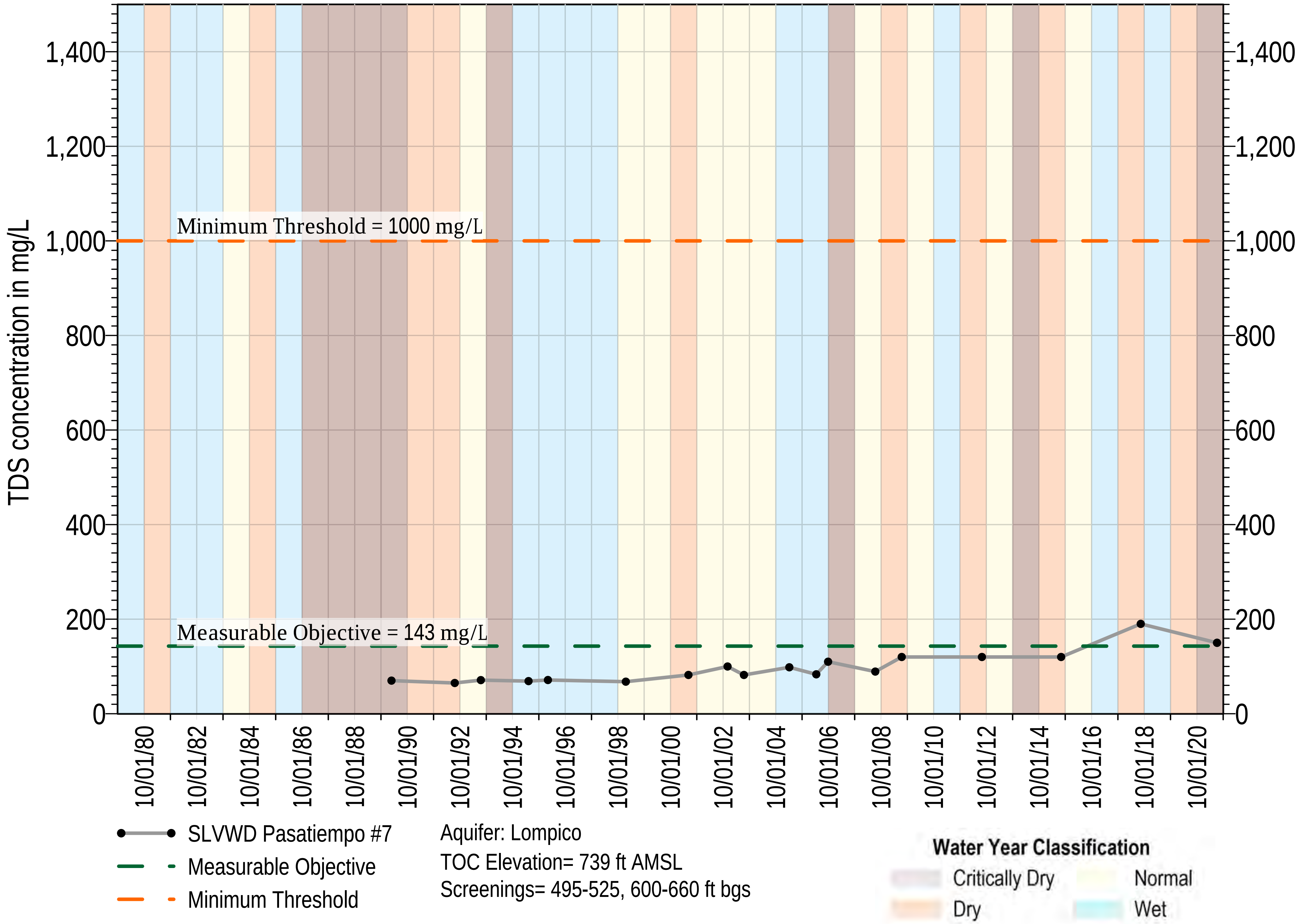

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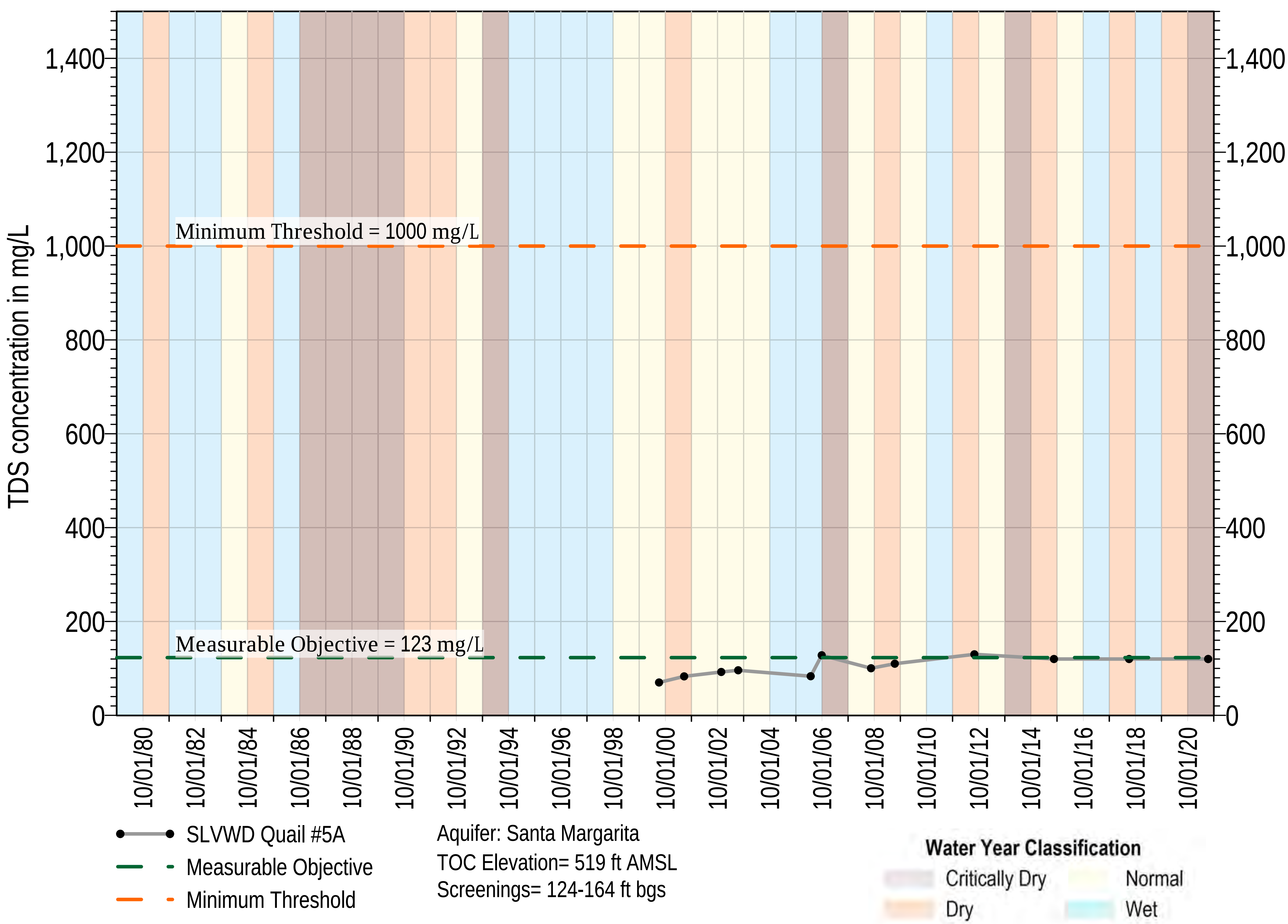

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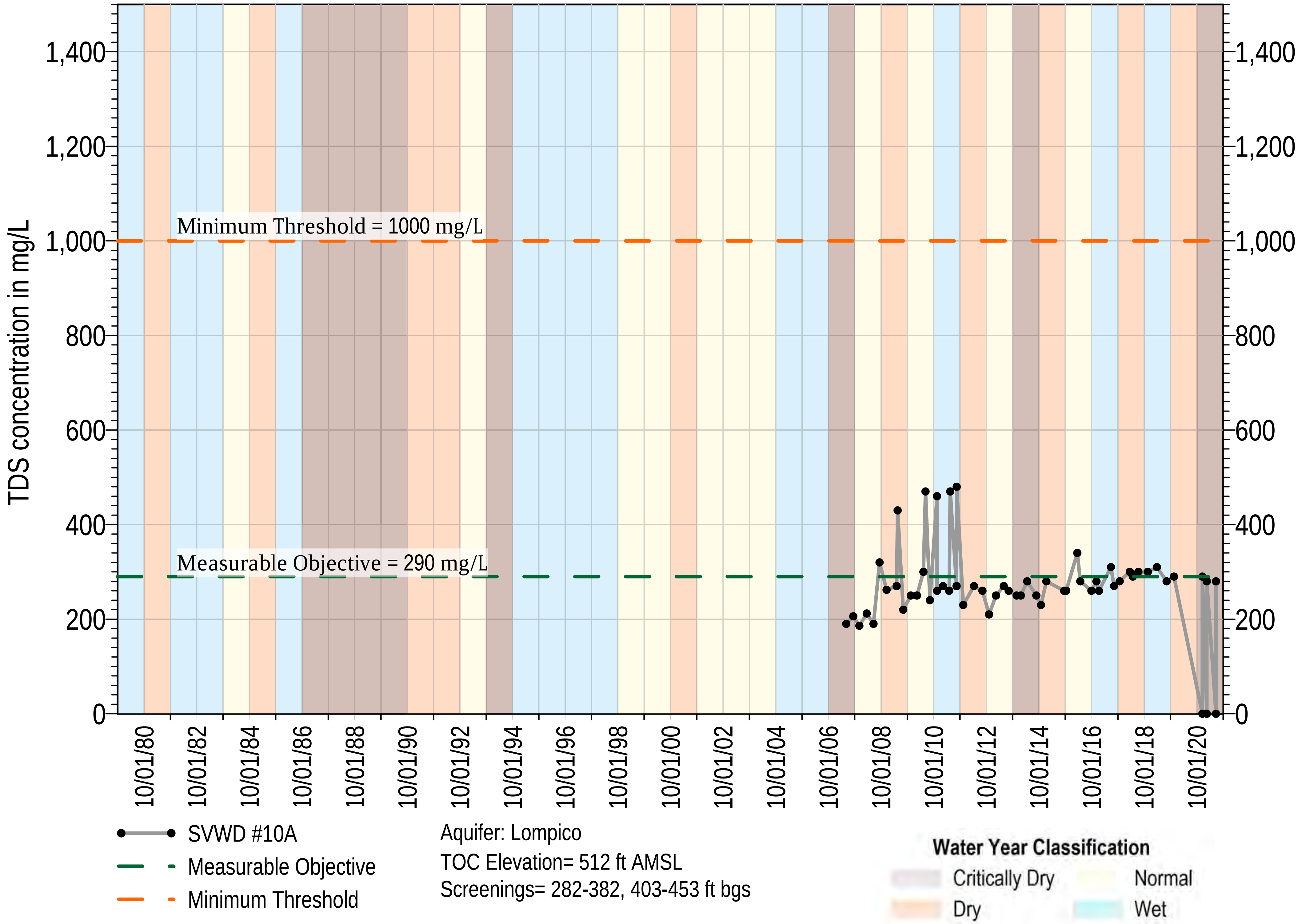

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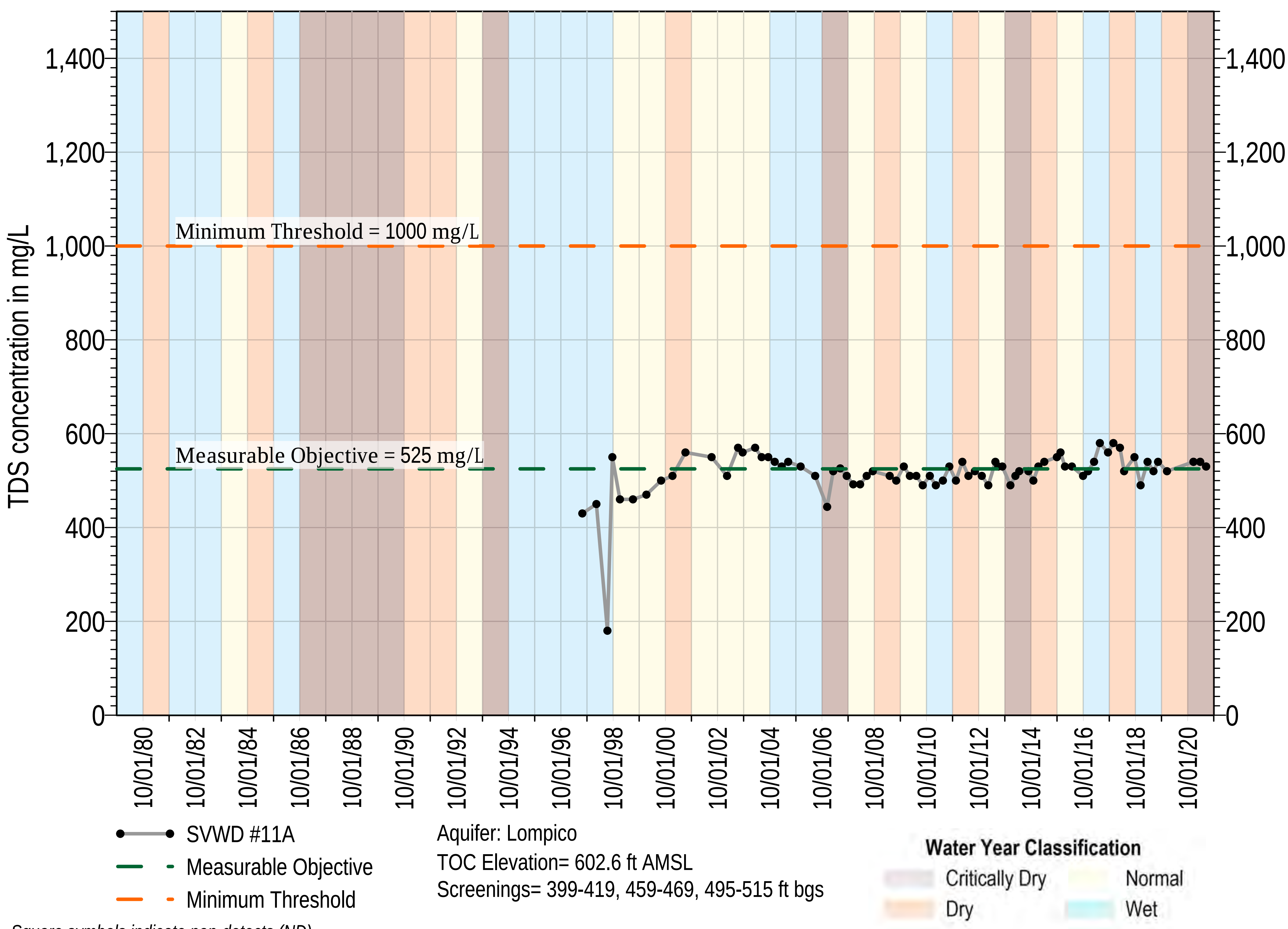

Aquifer: Lompico
TOC Elevation= 602.6 ft AMSL
Screenings= 399-419, 459-469, 495-515 ft bgs

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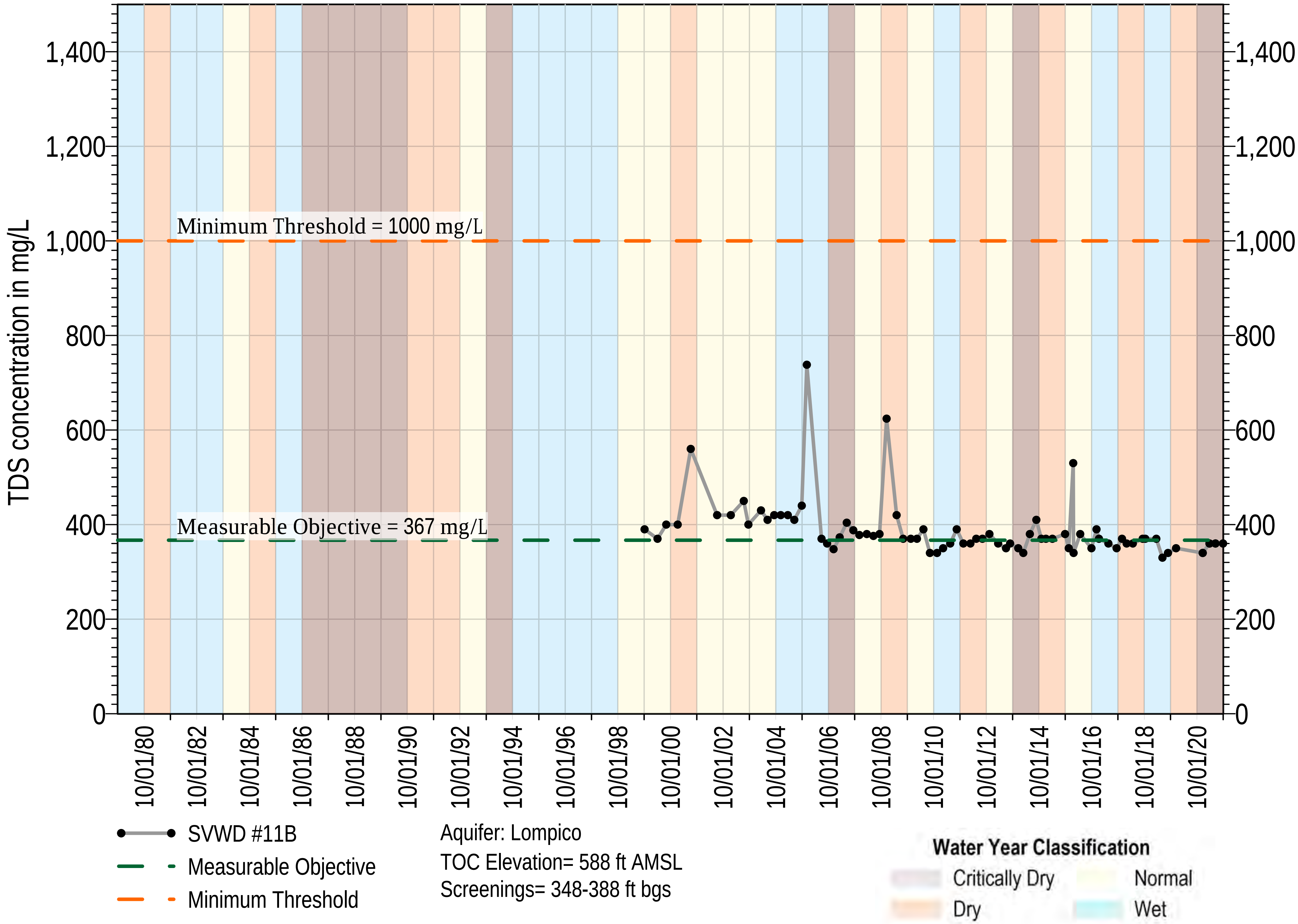

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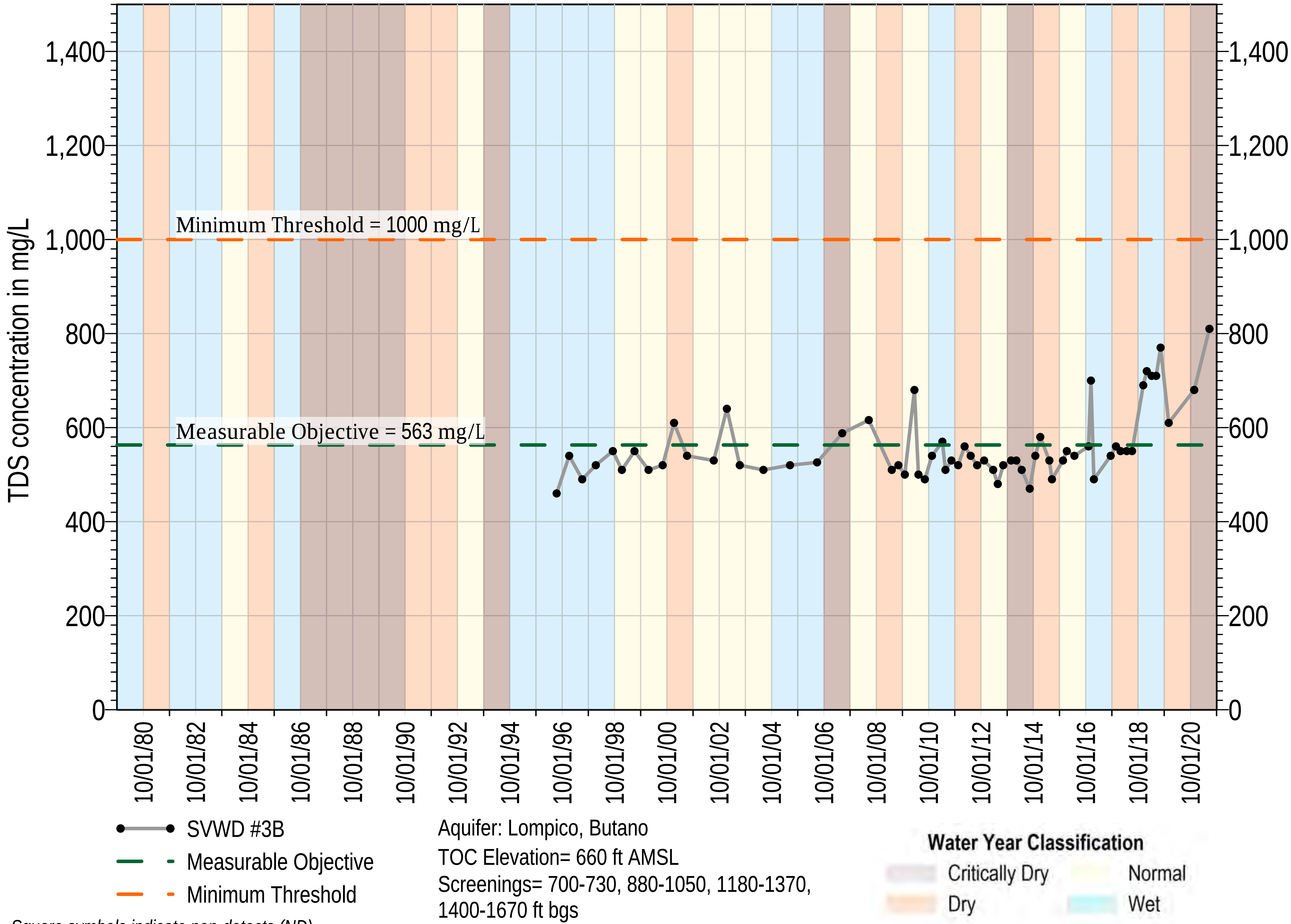

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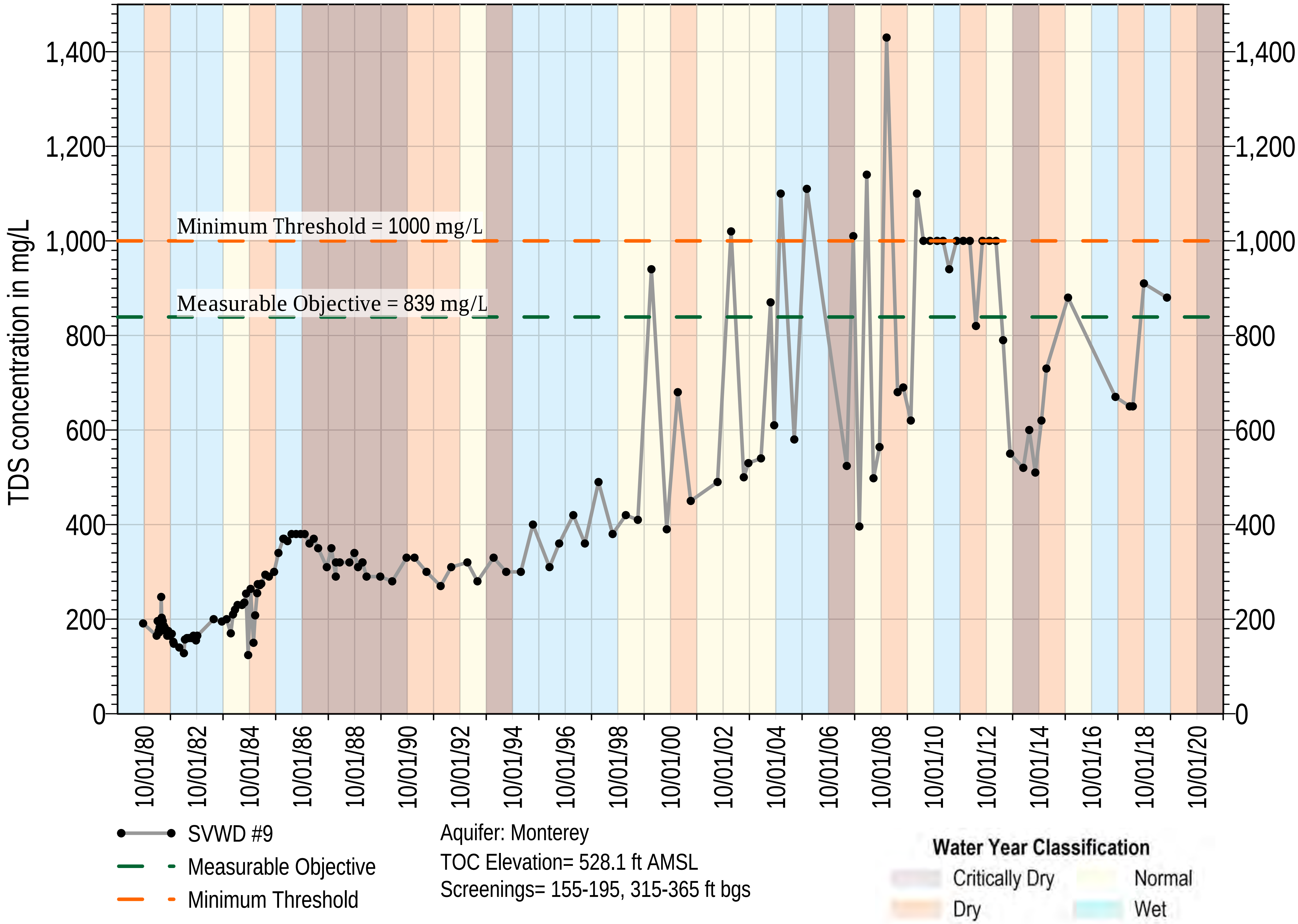

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