2023 Annual Report

San Jacinto Groundwater Basin Groundwater Sustainability Plan

MARCH 2023

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Executive Summary

Eastern Municipal Water District (EMWD), acting as the exclusive Groundwater Sustainability Agency (GSA) for the non-adjudicated portion of the San Jacinto Groundwater Basin (SJGB) within its jurisdiction, has prepared this annual report for the SJGB Groundwater Sustainability Plan (GSP) in compliance with the 2014 Sustainable Groundwater Management Act (SGMA) (California Water Code, Section 10720 et seq.). This annual report covers the non-adjudicated portion of the SJGB (Plan Area). The GSP for the SJGB was submitted to DWR on November 17, 2021. SGMA regulations require that an annual report be submitted to the Department of Water Resources (DWR) by April 1 of each year following the adoption of the GSP. The data presented in the GSP ends in water year 2018. This annual report provides an update on groundwater conditions for water years 2022 (October 1, 2021 through September 30, 2022).

Since 2018, the SJGB has experienced one normal water year (2019) in which precipitation was approximately 110% of the long-term average, one wet water year (2020) in which precipitation was approximately 130% of the long-term average, and two dry water years (2021 and 2022) in which precipitation was approximately 45% of the long-term average. During this period, San Jacinto River flows only extended into the Plan Area during three individual storm flow events and provided minimal recharge to the Plan Area.

Groundwater elevation changes varied with location in the Plan Area during water year 2022. The largest decreases occurred in the Nuevo/ Lakeview Production Area, where the spring 2022 groundwater elevations were approximately 10 to 15 feet lower than the spring 2021 groundwater elevations. These groundwater elevation declines reflect an increase in brackish groundwater extractions in this part of the Plan Area as part of the Perris South Desalination Project. Conversely, in the North Perris Production Area, groundwater elevations increased by approximately 9 feet between spring 2021 and spring 2022.

Groundwater production from the Plan Area was approximately 23,900 acre-feet (AF) in the 2022 water year. Since 2019, agricultural extractions have decreased by approximately 1,100 acre-feet per year (AFY), largely in response to increased use of recycled water for irrigation. Through operation of the Perris South Desalination Project, EMWD extracted approximately 13,250 AF of brackish groundwater from the Plan Area.

Since adoption of the GSP, EMWD has remained committed to protecting current water supplies against future droughts, preventing the degradation of groundwater quality in portions of the primary aquifer with potable groundwater, and ensuring that all beneficial uses and users of groundwater are protected by the established sustainable management criteria. This commitment was exemplified through the following key project milestones: (1) construction of six groundwater extraction wells as part of the Perris North Basin Groundwater Contamination Prevention and Remediation Program, (2) construction of the Perris II Reverse Osmosis Treatment Facility, (3) initiation of an assessment of domestic groundwater extractors in the Plan Area and the potential impacts of future groundwater elevations on their water supplies, (4) deployment of new groundwater level and quality monitoring equipment throughout the Plan Area, (5) initiation of a water availability analysis to identify opportunities to expand the current desalter network, and (6) the pursuit of grant funds to implement projects that support long-term sustainability in the SJGB.

1 Background and Plan Area

1.1 Background

Eastern Municipal Water District (EMWD), acting as the exclusive GSA for the non-adjudicated portion of the San Jacinto Groundwater Basin (SJGB; 8-005), has prepared this annual report for the SJGB in compliance with SGMA (California Water Code, Section 10720 et seq.). SGMA requires that an annual report be submitted to DWR by April 1 of each year following the adoption of the GSP. EMWD adopted a GSP for the SJGB in September 2021 and submitted the GSP to DWR on November 17, 2021. This 2023 annual report is the second annual report for the SJGB since the GSP was submitted, and it applies to the entirety of the non-adjudicated portion of the SJGB, herein referred to as the Plan Area (Figure 1-1). Data from the adjudicated portions of the SJGB are described, as appropriate.

1.1.1 Eastern Municipal Water District

EMWD was organized as a Municipal Water District in 1950 for the primary purpose of providing imported water to its service area. Since its formation in 1950, EMWD has grown to provide water supplies to a population of more than 800,000 (EMWD 2021a). To meet these demands, EMWD has built a diverse water supply portfolio that includes imported State Water Project and Colorado River Aqueduct water, recycled water, and local groundwater.

Approximately 95% of the non-adjudicated portion of the SJGB lies within EMWD's service area[1]. Prior to adoption of the GSP, EMWD actively managed groundwater in the Plan Area under the West San Jacinto Groundwater Basin Groundwater Management Plan, which was adopted in 1995, in accordance with Assembly Bill 3030, as codified in CWC Sections 10750-10756. Following extensive public outreach efforts to ensure that the interests of all beneficial uses and users be considered, the EMWD Board of Directors approved Resolution No. 2016-135, which formalized EMWD's intention to be the exclusive GSA for the West San Jacinto GSA Area (Figure 1-1). DWR approved the formation of the West San Jacinto GSA on April 24, 2017. Accordingly, EMWD, acting as the exclusive GSA in the West San Jacinto GSA Plan Area (Figure 1-1), assumes the responsibility for ensuring ongoing sustainable management of the non-adjudicated portion of the SJGB within its jurisdiction.

The West San Jacinto GSA is governed by EMWD's five-member publicly elected Board of Directors (Board). Directors are elected to a four-year term by registered voters in five geographic divisions of EMWD's service area that are apportioned by population size. Board member terms are staggered with public elections held in at least two divisions every two years. The division boundaries of the Board are periodically revised to reflect comparable numbers of residents. EMWD staff administers the GSA and has overseen the development and now implementation of the GSP.

1.1.2 Adjudicated Portions of the SJGB

Three separate adjudications cover parts of the SJGB (Figure 1-1): (1) the Hemet-San Jacinto Basin, where groundwater was adjudicated in 2013 (Adjudication No. A24), (2) the San Bernardino Basin Area, where groundwater was adjudicated in 1969 (Adjudication ID No. A10), and (3) the Santa Margarita River Watershed,

[1] Approximately 95% of the non-adjudicate portion of the SJGB lies within EMWD's service area, and the remaining 5% is under Federal jurisdiction.

where both surface water and groundwater were adjudicated in 1964 (Adjudication ID No. A12). Each adjudicated area has a watermaster that manages production and distribution of groundwater within each area, in accordance with a court judgement. Combined, the adjudicated areas compose 39% of the SJGB (Figure 1-1). Because the adjudicated areas are managed under their respective court judgements, these areas are not part of the Plan Area.

SGMA requires each watermaster to submit an annual report to DWR by April 1 of each year that contains, to the extent available, groundwater elevation data, annual groundwater extractions, annual surface water supplies used for or available for use for groundwater recharge or in-lieu use, total water use, change in groundwater storage, and the annual report submitted to the court. Reporting for the Hemet-San Jacinto Management Area and San Bernardino Basin Area is on a calendar year basis (e.g., January 1 through December 31), and reporting for the Santa Margarita River Watershed is on a water year basis (e.g., October 1 through September 30). Annual reports submitted to DWR for these three adjudicated areas can be accessed through DWR's Adjudicated Basins Annual Reporting System[2].

1.1.2.1 Current Conditions in the Hemet-San Jacinto Management Area

The adjudicated Hemet-San Jacinto Management Area covers approximately 35% of the SJGB. Although the Hemet-San Jacinto Management Area is managed separately from the Plan Area, there is no hydrologic barrier to flow between these two areas of the SJGB. Therefore, groundwater conditions in the Hemet-San Jacinto Management Area influence groundwater conditions in the Plan Area, and vice-versa. As previously noted, groundwater conditions in the Hemet-San Jacinto Management Area are documented annually via the Watermaster annual reports. These reports document conditions over the previous calendar year, which is different than the GSP water year reporting time frame.

In the 2022 calendar year, total water supplies in the Hemet-San Jacinto Management Area included approximately 12,700 AF of recycled water (a portion of which was delivered in-lieu of pumping), 6,800 AF of imported State Water Project (SWP) and Colorado River Aqueduct (CRA) water, and 670 AF of San Jacinto River water diversions. In addition to these water supplies, approximately 39,400 AF of groundwater was extracted from the management area by EMWD, Lake Hemet Municipal Water District, the City of Hemet, the City of San Jacinto, private pumpers, and the Soboba Tribe.

The Watermaster estimated that groundwater in storage increased by approximately 1,200 AF between spring 2021 and spring 2022. Details of groundwater conditions, supplies, and change in groundwater in storage are described in the 2022 Watermaster Annual Report.

1.1.3 San Jacinto Groundwater Basin Groundwater Sustainability Plan

The GSP for the SJGB was prepared, in accordance with DWR GSP Regulations[3], to define groundwater conditions that ensure ongoing, long-term, sustainable management of the groundwater resources within the Plan Area[4]

[2] https://sgma.water.gov/adjudbasins/report/publicview

[3] GSP Regulations refers to the emergency regulations adopted by DWR as California Code of Regulations (CCR), Title 23 (Waters), Division 2 (Department of Water Resources), Chapter 1.5 (Groundwater Management), Section 350 et seq.

[4] Groundwater conditions described in this report, and defined in the GSP, representative of sustainable conditions apply only to the Plan Area, which is the non-adjudicated part of the SJGB. The remaining areas of the SJGB are under oversight of a Court appointed watermaster.

(EMWD 2021b), with periodic evaluations of the GSP to assess changing conditions (California Water Code, Section 10728.2). The SJGB is a closed basin, where groundwater recharge consists of a combination of native and non-native sources and groundwater discharges occur predominantly in the form of groundwater extractions for municipal, industrial, and agricultural uses. Within the Plan Area, groundwater occurs in a single principal aquifer. This principal aquifer extends into, and is hydraulically connected with, the Hemet-San Jacinto Management Area. Groundwater flows into and out of the Plan Area along this boundary.

To facilitate groundwater management within the Plan Area, the GSP defined five groundwater production areas (Figure 1-2; EMWD 2021b). The groundwater production areas are distinguished by differences in depositional source material and age, and are areas within the Plan Area in which groundwater production has occurred or is planned in the next 5 years (EMWD 2021b). In addition to groundwater production areas, the Plan Area is also divided into eight groundwater management zones (GMZs) for the purposes of managing groundwater quality under the *Water Quality Control Plan for the Santa Ana River Basin* (Figure 1-3; Basin Plan; RWQCB 2019).

The sustainability goal for the Plan Area set forth in the GSP is to, "manage groundwater resources in a way that facilitates long-term sustainable use of groundwater in the San Jacinto Groundwater Basin" (EMWD 2021b). Long-term sustainable management includes:

- Maintaining sufficient groundwater in storage to allow for ongoing groundwater production that meets operations demands of groundwater users in the Plan Area;
- Protecting beneficial uses such as municipal and domestic supplies of fresh groundwater resources in the Lakeview and Perris North Groundwater Management Zones (GMZs) to the extent feasible, by minimizing the northward and eastward migration of brackish groundwater from the Perris South GMZ;
- Avoiding subsidence related to groundwater production that substantially interferes with surface land uses;
- Ensuring that groundwater production does not result in significant and unreasonable loss of groundwater dependent ecosystems (GDEs);

This goal and management strategy was established based on both historical and potential future undesirable results to the groundwater resources of the SJGB from the five sustainability indicators applicable to the basin: chronic lowering of groundwater levels, reduction of groundwater storage, degraded water quality, land subsidence, and depletion of interconnected surface water.

The GSP established minimum threshold groundwater elevations and water quality concentrations that: (1) maintain the average aquifer saturation at, or above, 65% of the potential aquifer saturation[5], and (2) limit TDS concentration exceedances above 1,000 mg/L northeast of the current 1,000 mg/L TDS iso-concentration contour in the Lakeview GMZ[6]. The GSP also established measurable objective groundwater elevations and water quality concentrations that: (1) maintain an average aquifer saturation of 70% of the potential aquifer saturation, and (2) meet the water quality objective for TDS of 520 mg/L in the Lakeview-Hemet North GMZ established in the Santa Ana River Basin Plan (RWQCB 2019). Groundwater elevation minimum thresholds and measurable objectives were defined at seven (7) representative monitoring points (RMPs) and groundwater quality minimum thresholds and measurable objectives were defined at five (5) RMPs. The minimum thresholds and measurable objectives were

[5] Aquifer saturation is defined as the saturated aquifer thickness divided by the total aquifer thickness.
[6] The current extent of impaired groundwater is in the Plan Area is generally associated with the 1,000 mg/L TDS iso-concentration contour displayed in Figure 2-11.

established with consideration of impacts to beneficial uses and users, as well as operational requirements for water quality management projects that aim to protect, and enhance, local groundwater supplies in the Plan Area (EMWD 2021b).

The GSP documented groundwater conditions throughout the Plan Area through the fall of 2018. The first GSP annual report documented groundwater conditions in the Plan Area for water year 2019 through 2021. This report documents groundwater conditions in the Plan Area for water year 2022 based on a review of groundwater elevation data, groundwater extraction data, surface and imported water supplies, and recycled water supplies.

1.2 Plan Area

The SJGB (8-005) is an alluvial basin that underlies the San Jacinto, Perris, Moreno, and Menifee Valleys in western Riverside County (Figure 1-1). The SJGB is bound by the San Jacinto Mountains on the east, the San Timoteo Badlands on the northeast, the Box Springs Mountains on the north, lower-relief hills on the west (e.g., Gavilan Peak and Steele Peak), and the Santa Rosa Hills and Bell Mountain on the south. The bedrock hills and mountains that surround the SJGB prevent hydraulic communication with nearby groundwater basins (EMWD 2021c). As noted in Section 1.1.2, approximately 39% of the SJGB is covered by three separate adjudications (Figure 1-1). Groundwater in the Plan Area is hydraulically connected with these adjudicated areas, with the largest exchanges occurring between the Plan Area and Hemet-San Jacinto Management Area.

Management Areas were not established as part of the SJGB GSP. To facilitate sustainable groundwater management within the Plan Area, sustainable management criteria were established with consideration of current and future groundwater conditions in each groundwater production area, and the basin plan objectives for each GMZ (EMWD 2021c).

1.2.1 Climate

Climate in the SJGB is typical of semi-arid conditions, with average daily maximum temperatures ranging from approximately 85 to 93 ºF in the summer and from 64 to 67 ºF in the winter (EMWD 2016). There are six precipitation stations in the Plan Area (Figure 1-4). For water year 2022, the mean annual precipitation measured at each station ranged from 4.65 inches (measured at the Lake Perris Station) to 6.5 inches (measured at the Winchester Station).

Water year type[7] was characterized in the SJGB GSP using precipitation measurements collected at Lake Perris rain gauge (Station ID: 151; Figure 1-4). The long-term[8] historical average water year[9] precipitation measured at this gauge is 10.3 inches. Since 2018, the SJGB has experienced two dry water years (2021 and 2022), one normal water year (2020), and one wet water year (2019). During this period, water year precipitation ranged from approximately 44% to 130% of the long-term average (Table 1-1).

[7] Water year types were defined in the SJGB GSP using three separate categories: (1) Normal water years, in which annual precipitation between 75% and 120% of the long-term average, (2) Wet water years, in which annual precipitation was greater than 125% of the long-term average, and (3) Dry water years, in which precipitation was less than 70% of the long-term average.
[8] Long-term historical average was calculated using measurements collected between water years 1965 through 2018.
[9] Water Year is defined as October 1 of the preceding calendar year through September 30 of the current calendar year. For example, water year 2022 refers to the period from October 1, 2021 through September 30, 2022.

Table 1-1. Water Year Type and Annual Precipitation Measured at the Lake Perris Rain Gauge (station ID: 151)

Water Year	Water Year Type	Measured Precipitation [in.]	Percentage of Long-Term Mean [%]
2019	Normal	11.52	112%
2020	Wet	13.36	130%
2021	Dry	4.57	44%
2022	Dry	4.65	45%

1.2.2 Surface Water Bodies and Gauging Stations

Surface water is conveyed through the Plan Area via the San Jacinto River, Perris Drain, and Salt Creek (Figure 1-4). Both Perris Drain and Salt Creek are engineered flood control channels that divert locally derived stormwater runoff through the Plan Area before ultimately discharging to Canyon Lake. The San Jacinto River is the primary drainage feature of the San Jacinto Watershed, an approximately 780 square mile watershed that includes the reservoirs of Lake Elsinore, Canyon Lake, and Lake Perris. Surface water flows in San Jacinto River infiltrate upstream of the Plan Area during periods of average and below average precipitation and extend into the Plan Area during periods of above average precipitation (EMWD 2021c). Surface water conveyed through the Plan Area via San Jacinto River, Perris Drain, and Salt Creek is not a significant source of recharge to the Plan Area[10].

Surface water flows in the Plan Area are measured at stream monitoring sites maintained by the U. S. Geological Survey (USGS) in cooperation with Riverside County Flood Control District (Figure 1-4). Along the San Jacinto River, stream flows are measured at two gauges: San Jacinto River at Ramona Expressway (Gauge ID: 11070210; measurement record: 10/1/2007 to current) and San Jacinto River Near Sun City (Gauge ID: 11070365; measurement record: 8/25/2000 to current). The stream monitoring site located near Sun City is located downstream of the confluence with Perris Drain. Surface water flows along Perris Drain and Salt Creek are measured near the intersection of Perris Drain and Nuevo Road (Gauge ID: 11070270; measurement record: 10/1/1969 to current) and near the intersection of Salt Creek and Murrieta Road (Gauge ID: 11070465: measurement record: 10/1/1983 to current).

The GSP documents flows measured at these four gauges through the end of December 2018. Table 1-2 provides average daily flows measured at each gauge for the period from water year 2012 through water year 2022. Average daily flows measured at each gauge are shown graphically in Figure 1-5.

[10] Model results from the San Jacinto Flow Model (SJFM-2014; EMWD 2016) indicate that surface water conveyed through San Jacinto River, Perris Drain, and Salt Creek contribute less than 1% of the average annual recharge to the Plan Area (EMWD 2022).

Table 1-2. Daily Average Flows (cfs) measured in the Plan Area

Water Year	Water Year Type	Gauge 11070210: San Jacinto River at Ramona Expressway	Gauge 11070270: Perris Drain at Nuevo Road	Gauge 11070365: San Jacinto River Near Sun City	Gauge 11070465: Salt Creek at Murrieta Road
2012	Dry	0.00	2.79	1.29	1.10
2013	Dry	0.00	3.07	2.15	0.58
2014	Dry	0.00	2.74	2.18	1.82
2015	Dry	0.00	3.40	3.16	2.71
2016	Dry	0.00	3.07	2.38	1.56
2017	Normal	0.17	13.52	11.95	6.74
2018	Dry	0.00	1.89	3.71	1.12
2019	Normal	0.05	10.93	11.49	5.91
2020	Wet	0.03	12.09	13.91	6.96
2021	Dry	0.00	2.79	2.20	1.08
2022	Dry	0.00	3.26	2.39	1.49

Notes: cfs = cubic feet per second

Average Daily flows measured in the Plan Area are correlated to water year type, with the strongest response to water year type measured at gauges 11070270 and 11070365 (Table 1-2).

The lowest flows measured in the Plan Area are measured at gauge 11070210 (San Jacinto River at Ramona Expressway). This gauge is located within the Nuevo/Lakeview Production Area and measures San Jacinto River flows entering the Plan Area from the Hemet-San Jacinto management area. Throughout the water year 2019 to 2022 period, San Jacinto River flows extended into the Plan Area during three events: February 2019, March 2019, and April 2020. Combined, surface water flows measured at gauge 11070210 during these three events totaled approximately 60 AF. Surface water flows in San Jacinto River did not extend into the Plan Area during the 2022 water year.

1.3 Annual Report Organization

This is the second Annual Report prepared since the GSP for the SJGB was submitted to DWR. This report is organized according to the GSP Emergency Regulations. Chapter 1 provides the background information regarding the GSP, the SJGB, and EMWD. Chapter 2 provides information on the groundwater conditions in the Plan Area since 2019, including groundwater elevations, groundwater extractions, surface water supply, total water availability, and change in groundwater storage. Chapter 3 provides an update on the GSP implementation process.

2 Groundwater Conditions

This section presents the change in groundwater conditions in the Plan Area between water years 2021 and 2022. Comparison of sequential water year conditions for this period characterizes the impact of water year type, groundwater production, recycled and imported water availability, and the implementation of water quality management projects on conditions in the Plan Area. Data from water year 2018, the last water year reported in the GSP, are provided as context (EMWD 2021c).

2.1 Groundwater Elevations

2.1.1 Groundwater Elevation Contours

Fall and spring groundwater elevation contours for water year 2022 are presented in Figures 2-1 and 2-2. The GSP described groundwater conditions through fall 2018, and the first GSP annual report for the SJGB described groundwater conditions through spring 2021. Accordingly, the groundwater elevation contour maps presented here represent the seasonal low (e.g., fall) and seasonal high (e.g., spring) of the 2022 water year.

Spring groundwater elevations were defined as any groundwater elevation measurement collected during March or April and fall groundwater elevations were defined as any groundwater elevation measurement collected during October or November of each water year. These measurement windows expand on the GSP-recommended measurement windows of March 9 to 22 for the spring and October 9 to 22 for the fall (EMWD 2021c) to ensure adequate spatial coverage of groundwater elevation measurements across the Plan Area. The groundwater elevation measurements presented in this annual report followed the groundwater sampling schedule established under EMWD's implementation of the West San Jacinto Groundwater Basin Groundwater Management Plan. EMWD has begun prioritizing recommendations made in the GSP and is evaluating the feasibility of implementing the recommended March and October sampling windows.

Moreno Valley Production Area

Groundwater in the Moreno Valley Production Area flows from the primary recharge zone along the base of the Box Springs Mountains, south towards the North Perris Production Area and Nuevo/Lakeview Production Area (Figures 2-1 and 2-2). Groundwater conditions in this part of the Plan Area are primarily influenced by groundwater production in the North Perris Production Area.

The spring 2022 groundwater elevations in this part of the Plan Area ranged from a high of approximately 1,802 ft msl in the northeastern corner of the Moreno Valley Production Area, to a low of approximately 1,451 ft msl near the boundary with the North Perris Production Area (Figure 2-1). Spring 2022 groundwater elevations were higher than spring 2021. In the northern part of the Moreno Valley Production, near the base of the Box Springs Mountains, spring groundwater elevations increased by approximately 1 foot over the 2022 water year. Farther south, near the boundary with the North Perris Production Area, spring 2022 groundwater elevations ranged from 2 to 5 feet higher than 2021. Near the base of the Bernasconi Hills, spring 2022 groundwater elevations were approximately 1 foot lower than spring 2021.

Fall groundwater elevations ranged from a high of approximately 1,804 ft msl in the northeastern corner of the Moreno Valley Production Area to a low of approximately 1,442 ft msl. (Figure 2-2). Fall 2021 groundwater elevations were lower than fall 2020 across the production area. Seasonal low declines over the 2022 water year were largest near the base of the Bernasconi Hills, where fall 2021 groundwater elevations were 4 to 6 feet lower than fall 2020.

The groundwater elevation changes over the 2022 water year are much smaller than the long-term groundwater elevation increases measured in the production area, which have exceeded 100 feet since the mid-1990s (EMWD 2021c).

North Perris Production Area

Groundwater elevations in the North Perris Production Area are influenced by groundwater conditions in the Moreno Valley and South Perris Production Areas, municipal groundwater extractions from within the North Perris Production Area, and underflows from the Lake Perris Reservoir. Spring 2022, groundwater elevations were highest at the boundary with the Moreno Valley Production Area, near the southern boundary of March Air Reserve Base (MARB), measuring approximately 1,427 ft msl. Moving south towards the South Perris Production Area, groundwater elevations declined, with the lowest groundwater elevation measuring approximately 1,396 ft msl (Figure 2-1). Spring 2022 groundwater elevations were higher than spring 2021 throughout this part of the Plan Area. Near the boundary with MARB, spring 2022 groundwater elevations were 2 to 15 feet higher than spring 2021. Near the boundary with the South Perris Production Area, spring 2022 groundwater elevations were 10 to 15 feet higher than spring 2021.

Seasonal low groundwater elevations showed similar trends to the spring conditions across the production area. Fall groundwater elevations ranged from a high of approximately 1,425 ft msl near the boundary with MARB and the Moreno Valley Production Area and declined south across the North Perris Production Area to a low of approximately 1,392 ft msl. Over the same period, fall groundwater elevations in the central portion of the North Perris Production Area measured approximately 1,416 ft msl, two feet below the spring groundwater measurements in the same area (Figure 2-2). In this part of the Plan Area, fall groundwater elevation changes between 2020 and 2021 varied geographically. Near the boundary with the Moreno Valley Production Area, fall 2021 groundwater elevations were 3 to 6 feet higher than fall 2020. Farther south, downgradient of Lake Perris and near the South Perris Production Area, groundwater elevation changes between fall 2020 and 2021 ranged from declines of approximately 0.5 feet to recoveries of approximately 0.5 feet.

The groundwater elevation changes measured throughout the 2022 water year are much smaller than the long-term increasing groundwater elevation trends in the North Perris Production Area. In this part of the Plan Area, groundwater elevations have locally risen by more than 170 feet throughout the historical period.

South Perris Production Area

Groundwater in the South Perris Production Area generally flows towards the Nuevo/Lakeview Production Area and is influenced by EMWD's operation of the Perris South Desalination Project, a network of groundwater production wells that extract brackish water from the SJGB for treatment and delivery throughout EMWD's service area.

During water year 2022, the spring groundwater elevations were highest at the base of the Lakeview Mountains and lowest at the boundary with the Nuevo/Lakeview Production Area (Figure 2-1). Spring high groundwater elevations at the base of the Lakeview Mountains ranged from approximately 1,348 ft msl to 1,460 ft msl.

Groundwater elevations near the boundary with the Nuevo/Lakeview Production Area ranged from approximately 1,348 ft msl to 1,351 ft msl. In the central region of the South Perris Production Area, groundwater elevations ranged from approximately 1,355 ft msl to 1,386 ft msl. (Figure 2-1). Near the boundary with the Menifee Production Area, spring groundwater elevations measured approximately 1,365 ft msl for water year 2022.

Groundwater elevation changes between spring 2021 and 2022 varied geographically within the South Perris Production Area. Near the boundary with the Menifee Production Area, the spring 2022 groundwater elevation were approximately 10 feet higher than spring 2021. Farther north, near the boundary with the Nuevo-Lakeview Production Area, spring 2022 groundwater elevations ranged from approximately 2 to 8 feet lower than spring 2021. The decline in seasonal high groundwater elevations in this part of the production area reflects an increase in production from EMWD's groundwater desalination wells, which are operated to address and mitigate groundwater quality concerns in the Plan Area.

Fall 2021 groundwater elevations ranged from approximately 1,348 ft msl to 1,350 ft msl at the boundary with the Nuevo/Lakeview Production Area. Groundwater elevations ranged from 1,359 ft msl to 1,375 ft msl in the central portion of the production area. Similar to spring conditions, the fall 2020 groundwater elevation measured near the boundary with the Menifee Production Area was approximately 1,366 ft msl. The change in groundwater elevations between fall 2020 and 2021 in this part of the Plan Area were similar to seasonal high changes over the 2022 water year.

Menifee Production Area

Groundwater elevations in the Menifee Production Area are highest along the base of Double Butte and decline west towards Canyon Lake and the southwestern corner of the Plan Area (Figure 2-1). In this part of the Plan Area, groundwater conditions are primarily influenced by groundwater extractions via private well owners that utilize groundwater to support agricultural operations.

Spring groundwater elevations for water year 2022 ranged from a high of approximately 1,454 ft msl at the base of Double Butte to a low of approximately 1,354 ft msl in the southeastern corner of the Plan Area (Table 2-1; Figure 2-1). Along the western portion of the Menifee Groundwater Production Area, near Salt Creek, spring groundwater elevations ranged from a high of approximately 1,397 ft msl to a low of 1,381 ft msl for water year 2022 (Figure 2-1). Spring 2022 groundwater elevations were approximately 2 to 35 feet higher than spring 2021.

Fall groundwater elevations were similar to spring high conditions, measuring approximately 1,353 ft msl in the southeastern corner of the production area. Fall groundwater elevations ranged from approximately 1,379 ft msl to 1,383 ft msl along the western boundary of the Production Area, near Salt Creek. Groundwater elevation changes between fall 2020 and 2021 ranged from declines of approximately 5 feet to recoveries of 15 feet.

Nuevo/Lakeview Production Area

Groundwater elevations in the Nuevo/Lakeview Production Area are influenced by variations in both water use patterns and hydrogeologic setting. In the eastern portion of the Production Area, groundwater elevations generally decline from the boundary with the Moreno Valley Production Area, south towards the Hemet-San Jacinto management area (Figures 2-1 and 2-2). In this part of the production area, groundwater conditions are influenced by the San Jacinto Fault Zone and, to a lesser extent, groundwater production that supports agricultural and environmental water users. In the western part of the Nuevo/Lakeview Production Area, groundwater generally flows east from the South Perris Production Area to the groundwater elevation low adjacent to the western splays

of the San Jacinto Fault Zone, underlying the agricultural properties that surround Ramona Expressway (Figures 2-1 and 2-2). In this part of the production area, groundwater conditions are influenced by agricultural production as well as EMWD's operation of 4 groundwater production wells that extract brackish water from the Plan Area as part of the Perris South Desalination Project.

For water year 2022, spring groundwater elevations in the western part of the Nuevo/Lakeview Production Area ranged from a high of approximately 1,329 ft msl at the boundary with the South Perris Production Area to a low of approximately 1,198 ft msl near the boundary with the Hemet-San Jacinto Management Area (Figure 2-1). Along the boundary with the South Perris Production Area, groundwater elevations declined by as much as 15 feet between spring 2021 and 2022. This groundwater level decline reflects increased extractions from EMWD's groundwater desalination wells, which are operated to address and mitigate groundwater quality concerns in the Plan Area. Farther north, near the boundary with the Hemet San Jacinto Management Area, groundwater elevation changes between spring 2021 and 2022 ranged from declines of up to approximately 5 feet to recoveries of up to approximately 2 feet.

There was limited seasonal variability in the western part of the Nuevo/Lakeview Production Area near the boundary with the South Perris Production Area and in the northern part near the boundary with Moreno Valley Production Area. Near the boundary with the Hemet-San Jacinto Management Area, fall groundwater elevations generally ranged from 0 to 10 feet lower than spring elevations. These small seasonal variations are smaller than the long-term groundwater elevation trends in this portion of the Nuevo/Lakeview Production Area, where groundwater elevations have increased by approximately 50 to 100 feet since the mid-1990s.

2.1.2 Groundwater Elevation Hydrographs

Groundwater elevation hydrographs for each of the representative monitoring points identified in the GSP (Figure 2-3) are presented in Figures 2-4 through 2-10. The fall 2021 and spring 2022 groundwater elevations measured at each of these wells are presented in Table 2-1, which also provides a comparison to: (i) water year 2021 conditions, (ii) the established minimum threshold groundwater elevations, and (iii) the established measurable objective groundwater elevations. Interim milestones were not established as part of the SJGB GSP because groundwater elevations in 2018 were higher than the established measurable objectives. Interim milestones were not established for these wells because groundwater levels are higher than the established measurable objectives (EMWD 2021c; Table 2-1).

Table 2-1. Water Year 2022 Groundwater Elevations, Minimum Thresholds, and Measurable Objectives for Representative Monitoring Points

Well Name	Production Area	Fall Groundwater Conditions		Spring Groundwater Conditions		Minimum Threshold (ft MSL)	Measurable Objective (ft MSL)
		2021 Groundwater Elevation (ft MSL)	Change from 2020 (ft)[a]	2022 Groundwater Elevation (ft MSL)	Change from 2021 (ft)[a]		
UCR Scott	Moreno Valley	1,476.3	**-3.3**	1,471.6	**-1.1**	1,300	1,350
EMWD 52 Follico	North Perris	1,392.6	**-0.4**	1,402.4	8.6	1,200	1,250

EMWD Skiland 05	South Perris	1,347.7	**-4.1**	1,348.7	1.6	1,200	1,250
EMWD A1	South Perris	1,370.7	2.7	1,369.9	**-1.4**	1,200	1,250
EMWD 74 Menifee 04	Menifee	1,364.8	**-4.6**	1,377.1	1.6	1,200	1,250
EMWD 94[b]	Nuevo/Lakeview	NM	-	1,291.6	**-12.5**	1,200	1,250
Nutrilite 07	Nuevo/Lakeview	1,242.4	**-5.6**	1,251.0	1.4	1,100	1,150

Notes:
[a]Data in this column shows the difference between water year 2022 and water year 2021 groundwater elevations measured at each representative monitoring site. Positive (+) values indicate that seasonal high or low groundwater elevations have increased from water year 2021 conditions. Negative (-) values indicate that seasonal high or low groundwater elevations have decreased from water year 2021 conditions.
[b]Groundwater elevations are not measured at EMWD 94. Data in this row represent groundwater elevations measured at nearby well Bean Reservoir/12th St.
NM = Not Measured

Spring groundwater elevation changes measured at UCR Scott, the representative monitoring point for the Moreno Valley Production Area, declined approximately 1.1 feet between 2021 and 2022 (Figure 2-4). Since 2018 (the last spring measurement period reported in the GSP; EMWD 2021c), spring groundwater elevations at this well have increased by approximately 1.3 feet. Groundwater elevations at UCR Scott have risen approximately 80 feet since spring 1972, and the 2022 groundwater elevations measured at this well remained approximately 120 feet higher than the measurable objective groundwater elevation (Table 2-1).

The spring groundwater elevation changes measured at EMWD 52 Follico, the representative monitoring point for the North Perris Production Area, increased by approximately 8.6 feet between 2021 and 2022 and approximately 20 feet between 2018 and 2022 (Table 2-1). Groundwater elevations at EMWD 52 Follico have risen approximately 250 feet since spring 1972 (Figure 2-5). The water year 2022 groundwater elevations measured at this well were approximately 150 feet higher than the established measurable objective (Table 2-1).

Groundwater elevations remained stable between 2021 and 2022 at EMWD A1, which is located in the central portion of the South Perris Production Area, and at EMWD 74 Menifee 04, which is located in the Menifee Production Area (Figure 2-3). In this part of the Plan Area, groundwater elevations have risen by approximately 40 to 50 feet since spring 1995 (Figures 2-6 and 2-7). The spring 2022 groundwater elevations in the central portion of the South Perris Production Area and in the Menifee Production Area were approximately 125 feet higher than the established measurable objectives groundwater elevations (Table 2-1).

Spring groundwater elevations declined between 2021 and 2022 near the boundary between the South Perris Production Area and Nuevo/Lakeview Production Area (Table 2-1). Groundwater elevations declined by approximately 12.5 feet at EMWD 94. However, during this period, at EMWD Skiland 05, groundwater elevations increased by approximately 1.6 feet. The groundwater elevation declines at EMWD 94 reflect increasing groundwater extractions in this part of the Plan Area via EMWD's desalination wells. The operation of these desalination wells is part of a broader effort to mitigate the eastward migration of low-quality water throughout the Nuevo/Lakeview Production Area (Section 2.2). In this part of the Plan Area, groundwater elevations are

approximately 30 to 40 feet higher than they were in spring 2000 (Figures 2-8 and 2-9), and the spring 2022 groundwater elevations remained approximately 40 to 100 feet higher the established measurable objective groundwater elevations (Table 2-1).

Spring groundwater elevation at Nutrilite 07 increased by approximately 1.4 feet between 2021 and 2022 (Figure 2-10). Groundwater elevations at this well have increased approximately 65 feet since spring 1995 and the spring 2022 groundwater elevation was approximately 100 feet higher than the established measurable objective groundwater elevation (Table 2-1).

Based on the spring 2022 groundwater elevations, the average aquifer saturation across the Plan Area ranged from approximately 80% to 95%. This is 10% to 15% higher than the measurable objective aquifer saturation level of 70% (EMWD 2021c).

2.2 Groundwater Quality

Time series of Total Dissolved Solids (TDS) concentrations for each of the water quality representative monitoring points identified in the GSP (Figure 2-11) are presented in Figure 2-12. The 2022 water year TDS measurements collected from groundwater sampled at each of these wells are presented in Table 2-2, which also provides a comparison to: (i) water year 2018 conditions, (ii) the established minimum threshold groundwater concentrations, and (iii) the established measurable objective groundwater concentrations. Interim milestones concentrations were not established as part of the SJGB GSP.

Table 2-2. Water Year 2022 Groundwater Quality, Minimum Thresholds, and Measurable Objectives for Representative Monitoring Points

Well Name	Screen Interval (ft. bgs)	Water Year 2022 TDS Concentration (mg/L)	Date Measured	Change from Water Year 2018 (mg/L)[a]	Minimum Threshold (mg/L)	Measurable Objective (mg/L)
Nutrilite 02	Unknown	NM	-	NA	1,000	520
Nutrilite 04	170-186; 198-220; 262-275; 282-292; 310-342; 372-480	522	7/26/2022	No Change	1,000	520
Nutrilite 07	390-697	NM	-	NA	1,000	520
Nutrilite 08	Unknown	856	9/02/2022	No Change	1,000	520
Bootsma, John	350-650	546	8/10/2022	Slight Increase	1,000	520

Notes: NM = Not Measured; ft. bgs = feet below ground surface; NA = not applicable due to lack of measurement
[a]Provides a qualitative assessment of groundwater quality trends since 2013, which is the start of the current conditions reported in the GSP.

TDS concentrations increased in two of the five representative monitoring points between water year 2018 and water year 2022 (Table 2-2; Figure 2-12). The water year 2022 TDS concentrations measured at these wells were

approximately 2 to 340 mg/L higher than the established measurable objective TDS concentrations and approximately 140 mg/L to 480 mg/L lower than the established minimum thresholds (Table 2-2). TDS concentrations in groundwater were not measured at Nutrilite 02 or Nutrilite 07 in water year 2022 (Table 2-2).

The largest increase in TDS concentrations measured at the representative monitoring points in water year 2022, as compared to those measured in water year 2018, occurred at the Nutrilite 08 well (Table 2-2), which is centrally located and to the north of the other water quality representative monitoring points in the Plan Area (Figure 2-11). The water year 2022 TDS concentration measured at the Nutrilite 08 well of 856 mg/L was 50 mg/L higher than the concentration measured at the same well in water year 2018, but 114 mg/L lower than the highest concentration measured at this well, which occurred in water year 2013 (Figure 2-12).

The TDS concentration measured at the Bootsma, John well is 54 mg/L lower than the highest TDS concentration measured at this well (in water year 2020) and 20 mg/L higher than the concentration measured in water year 2018 (Figure 2-12). The TDS concentration measured at the Nutrilite 04 well is 188 mg/L lower than the historic high TDS concentration measured at this well (in water year 1996) and 4 mg/L lower than the concentration measured in water year 2018 (Figure 2-12).

EMWD continues to operate the Perris South Desalination Project, a network of 15 groundwater extraction wells and two reverse osmosis treatment facilities, as part of their Salinity Management Program. Operation of the Perris South Desalination Project is critical to EMWD's water quality management and increases local water supply resiliency by improving groundwater quality and managing brackish groundwater migration throughout the Plan Area (RWQCB 2014). Brackish groundwater extraction from the Plan Area through this project has increased from approximately 1,000 AFY at the start of the project in water year 2003 to a maximum withdrawal of approximately 13,200 AFY in water year 2022 (Table 2-3). To facilitate additional brackish water management in the SJGB, EMWD finished construction of a third treatment facility, the Perris II Reverse Osmosis Treatment Facility (ROTF), in water year 2022. The Perris II ROTF increases EMWD's ability to control hydraulic gradients between GMZs by varying production within a network of groundwater wells that supply the desalters.

2.3 Groundwater Extractions

Groundwater extractions within the SJGB are recorded on a monthly basis for owners participating in the groundwater monitoring program. Extractions are also reported to EMWD pursuant to The Groundwater Recordation Program (California Water Code Sections 4999 et. seq) on an annual basis. This reporting program requires extractors who pump more than 25 AFY to file a report of their annual extractions to EMWD. Monthly data will be requested for future reporting. In addition to maintaining these recordations, EMWD estimates groundwater extractions for 14 wells in the Plan Area that utilize groundwater for agricultural, irrigation, or stock watering purposes. The reported and estimated water year 2019 through 2021 groundwater extractions from the Plan Area are summarized in Table 2-3 and presented in map form in Figures 2-16 through 2-18.

Table 2-3. Water Year 2019 through 2022 Groundwater Extractions from the Plan Area

Water Year	Water Use Sector			Total (Acre-Feet)
	Agricultural[a]	Municipal	Domestic	
2019	8,147	11,814	0	19,961
2020	7,536	14,500	0	22,036
2021	5,602	15,558	0	21,160[b]
2022	7,026	16,883	0	23,909

Note: EMWD does not currently require domestic wells to report extractions under the existing groundwater recordation program. EMWD is implementing a project to better constrain the number and location of domestic well extractions in the Plan Area.
[a]A portion of the agricultural extractions in the GSP Plan Area are estimated annually based on crop type, irrigation efficiency, potential evapotranspiration, and irrigable acreage. In the 2022 water year, approximately 60% of the total agricultural extractions were estimated.
[b]Estimates of extractions were updated during preparation of the SJFM-2020.

Groundwater extractions from the Plan Area increased from approximately 20,000 AFY to approximately 23,900 AFY between 2019 and 2022 (Table 2-3). Over this period, agricultural extractions declined by approximately 1,100 AFY, while municipal extractions increased by approximately 5,100 AFY.

During water years 2019 through 2022, groundwater extractions were largest in the South Perris Production Area, where EMWD operates fifteen (15) desalination wells as part of the Perris South Desalination Project (Figures 2-15 through 2-17). As noted in Section 2.2, operation of these wells is an integral part of EMWD's Groundwater Salinity Management Program, which aims to remove salts from the Perris South GMZ and lower groundwater levels to limit migration of high-TDS groundwater into the Lakeview GMZ (RWQCB 2014). As part of this program in the 2022 water year, EMWD extracted approximately 9,020 AF of brackish water from the South Perris Production Area and an additional 4,240 AF of brackish water from the Nuevo/Lakeview Production Area. Operation of these wells accounted for 55% of the total production from the Plan Area and represent EMWD's commitment to managing and preserving groundwater quality in the Plan Area.

Approximately 3,380 AFY of groundwater was extracted from the North Perris Production Area by EMWD and the McCanna Ranch properties for municipal uses during the 2022 water year (Figures 2-15 through 2-17). Agricultural extractions from the Plan Area occur in the Nuevo/Lakeview Production Area, Menifee Production Area, and to a lesser extent from the Perris South Production Area (Figures 2-15 through 2-17). In the 2022 water year, agricultural extractions were approximately 900 AFY lower than the 2019-2021 average (Table 2-3). These agricultural demands have largely been met by an increase in recycled water availability and delivery in the Plan Area (Table 2-5).

2.4 Surface Water Supplies

Surface water supplies to the Plan Area consist of Colorado River Aqueduct (CRA) water and State Water Project (SWP) water imported by EMWD and either served to local customers or sold wholesale to Nuevo Water Company, City of Perris Water Department, or Box Springs Mutual Water Company. To support domestic and agricultural water demands throughout the SJGB, EMWD imports CRA water and SWP water both as treated potable water and

untreated raw water that is either: (i) delivered directly to customers for domestic consumption, (ii) treated at the Perris Water Filtration Plant (PWFP) or Hemet Water Filtration Plant (HWFP) and delivered to customers for domestic consumption, or (iii) delivered directly to agricultural parcels along Ramona Expressway for irrigation purposes.

Table 2-4 summarizes imported water served throughout the Plan Area between water years 2019 and 2022. During this period, EMWD imported an average of approximately 64,300 AFY of imported water to the Plan Area (Table 2-4). Of this, an average of approximately 64,100 AFY of the imported water was served in the Plan Area as potable water used for domestic consumption, and an average of approximately 100 AFY was delivered as raw water directly to dairy farmers in the Nuevo/Lakeview Production Area (Table 2-4). The largest single source of imported domestic water supplies served in the Plan Area originated as SWP water treated at the Mills Plant (EM-12A).

Local surface water sources do not provide a significant source of water supply in the Plan Area. During the water year 2019 to 2022 period, infiltration of surface water through the Perris Drain is estimated to have provided an average of approximately 300 AFY of recharge to the Plan Area. This corresponds to approximately 1% of the estimated average annual recharge to the Plan Area (Appendix A). As noted in Section 1.1.2.1, approximately 60 AF of San Jacinto River water flowed into the Plan Area between the start of water year 2019 and the end of water year 2023. Minimal surface water recharged in the Plan Area (Appendix A).

Table 2-4. Imported Water Supplies to the Plan Area

Connection ID/Water Type	EM-01A	EM4A/B, EM-22		EM-14	EM-12A	EM-23	EM-17		WMWD EM to WR Transfer	Total Imported Water Supply
Water Year	Untreated Domestic to Dairies	Treated Domestic (PWFP)		Treated Domestic (HWFP Conveyance)	Treated Domestic (Mills Plant)	Treated Domestic (Cactus)	Treated Domestic (Skinner Plant)		Treated Domestic (EMWD-12A)	
	CRA	CRA	SWP	SWP	SWP	SWP	SWP	CRA	SWP	
2019	132	1,288	12,855	1,293	27,382	3,128	7,403	5,812	0	**59,294**
2020	185	1,048	13,063	1,934	28,454	3,851	6,574	8,489	3	**63,601**
2021	89	10,339	3,827	3,404	28,144	5,522	709	15,778	2	**67,815**
2022	52	14,273	1,056	5,100	26,274	4,377	520	14,651	27	**66,330**

Notes: All imported water volumes are reported in the units of acre-feet (AF). Headings that underlie the service connection represent the type of imported water to the Plan Area and delivery system. CRA = Colorado River Aqueduct. SWP = State Water Project.

2.5 Total Water Available

Total water available was tabulated from the groundwater extractions reported in Table 2-3, the imported water supplies reported in Table 2-4, and recycled water served and used within the Plan Area. EMWD operates four regional water recycling facilities (RWRF): San Jacinto Valley RWRF, Moreno Valley RWRF, Temecula Valley RWRF, and Perris Valley RWRF. Combined, these facilities have the capacity to treat approximately 86,300 AF of wastewater annually (EMWD 2021a). EMWD serves recycled water throughout the Plan Area for municipal and agricultural uses. In addition, EMWD sells recycled water to the California Department of Fish and Wildlife (CDFW) for environmental uses within the San Jacinto Wildlife Area and to private duck clubs and bird sanctuaries for ponds (EMWD 2021a). As noted in Section 2.4, the imported water supplies presented in table 2-4 do not represent imported water supplies served specifically within the Plan Area.

Total water available in the Plan Area increased between 2019 and 2022 (Table 2-5). The largest increases in total water supply during this period were in the imported water and recycled water usage sector. During this period, imported water supplies increased by approximately 7,000 AFY to support growth within EMWD's service area and provided the primary source of potable water in the Plan Area (Table 2-5). Between 2019 and 2022, recycled water usage increased by approximately 10,600 AFY (Table 2-5); this increase was primarily driven by an increase in recycled water usage for agricultural irrigation and environmental uses in the Lakeview, Perris South, and San Jacinto Lower Pressure GMZs. Over this same period, agricultural extractions within Lakeview and San Jacinto Lower Pressure GMZ decreased (Section 2.3)

Table 2-5. Total Water Supplies in the Plan Area

Water Year	Groundwater (acre-feet)				Imported Water[a]			Recycled Water (acre-feet)					TOTAL (acre-feet)
	Ag	Muni	Dom	*Subtotal*	Ag[b]	Muni	*Subtotal*	Ag	Irr[c]	Env	Other[d]	*Subtotal*	
2019	8,147	11,814	0	*19,961*	329	58,965	*59,294*	6,329	1,816	2,546	356	*11,047*	**90,302**
2020	7,536	14,500	0	*22,036*	401	63,200	*63,601*	8,591	2,276	3,598	548	*15,013*	**100,650**
2021	5,602	15,558	0	*21,160*	304	67,510	*67,815*	10,103	2,542	4,572	596	*17,813*	**106,788**
2022	7,026	16,883	0	*23,909*	524	65,806	*66,330*	11,437	4,281	4,885	1,012	*21,616*	**111,855**

Notes: Ag = Agricultural, Muni = Municipal; Dom = Domestic; Irr = Landscape Irrigation; Env = Environmental
[a]Represents total water imported SWP and CRA water served in the Plan Area.
[b]Represents both imported raw water and potable water used for agricultural applications
[c]Represents recycled water used for both recreational and industrial irrigation.
[d]Represents recycled water deliveries to unspecified use types.

2.6 Change in Groundwater in Storage

The change in groundwater in storage in the Plan Area was estimated using the San Jacinto Flow Model (SJFM-2014) during development of the GSP and preparation of the first GSP annual report. The SFJM-2014 is a numerical groundwater flow model designed to calculate water budgets and project groundwater conditions across the SJGB, including the Hemet-San Jacinto Management Area (EMWD 2016). The SJFM-2014 simulates groundwater conditions in the principal aquifer of SJGB using three to four model layers that extend vertically from land surface to bedrock and the areal extent of the model domain covers approximately 80% of the Plan Area.

Since submittal of the first GSP annual report in March 2022, EMWD has completed a model update of the SJFM-2014. This update, herein referred to as SJFM-2020:

(1) Refined the representation of alluvial aquifer thickness across the San Jacinto Groundwater Basin;

(2) Refined model estimates of areal recharge, mountain front recharge, and Lake Perris Dam seepage;

(3) Updated the active model domain to be coincident with the B118 boundary for the San Jacinto Groundwater Basin; and

(4) Extended the model simulation/calibration period through water year 2022.

The details of the model update will be provided in the SJFM-2020 model documentation, which is anticipated to be finalized in the 2023 calendar year.

The SJFM-2020 now represents the numerical model standard for the San Jacinto Groundwater Basin and is currently being used to evaluate ongoing and potential future projects; groundwater conditions in the Hemet-San Jacinto Management Area; and is anticipated for use during the first 5-year periodic evaluation of the GSP. Because this tool represents a significant improvement in the numerical representation of groundwater conditions and hydrogeologic processes in the Plan Area, the SJFM-2020 was used to estimate the change in groundwater in storage over the 2022 water year (Table 2-6).

Table 2-6. Annual and Cumulative Change in Groundwater Storage in the Plan Area

Water Year	Tool used to estimate change in storage		Water Year Type	Annual Change in Storage (Acre-Feet)		Cumulative Change in Storage (Acre-Feet)	
2019	SJFM-2014		Normal	15,300		15,300	
2020	SJFM-2014		Wet	8,800		24,100	
2021	SJFM-2014	SJFM-2020	Dry	200	-2,100	24,300	22,000
2022	SJFM-2020		Dry	300		22,300[a]	

[a]Calculated using the SJFM-2020 estimates of change in storage for both the 2021 and 2022 water year.

In addition to estimating the water year 2022 change in storage, EMWD recalculated the water year 2021 change in storage using the SJFM-2020 to provide a comparison to the estimates generated using SJFM-2014. As shown

in Table 2-6, SJFM-2020 predicts a storage decline of approximately 2,100 AF in water year 2021, compared to SJFM-2014's prediction of a storage increase of approximately 200 AF over the same period (Table 2-6). This difference primarily reflects updates to the model-estimates of mountain front recharge, which are constrained using the Basin Characterization Model (BCM) in the SJFM-2020, and a reduction in estimated recycled water pond recharge, which was updated with input from various stakeholders and technical advisors (Appendix A). These updates provide an improved representation of climatological impacts to native recharge and losses during percolation of recycled water into the SJGB.

As noted, the 2022 change in groundwater storage is estimated using the SJFM-2020 model. Based on this model, groundwater in storage in the GSP Plan Area is estimated to have increased by approximately 300 AF over the 2022 water year. Within the Plan Area, the largest change in groundwater storage occurred in the North Perris Production Area, where groundwater in storage increased by approximately 2,100 AF. Conversely, in the Menifee Production Area, groundwater in storage was estimated to decline by approximately 900 AF. However, estimates of change in groundwater in storage in the Menifee Production Area are subject to large uncertainty due to quality of data, including the groundwater level, seepage from Diamond Valley Lake, seepage from other sources, and groundwater production (EMWD 2021c). EMWD anticipates re-evaluating the hydrogeologic conceptual model for this part of the Plan Area during GSP implementation.

Based on the model results, it is estimated that groundwater in storage in the South Perris Production Area declined by approximately 800 AF in the 2022 water year. This reduction in storage reflects an increase in brackish groundwater extraction (Section 2.3) as part of EMWD's broader Salinity Management Program. Additionally, in the Nuevo-Lakeview Production Area, it is estimated that there was no net change in groundwater in storage over the 2022 water year. This estimate generally reflects the decline in water levels on the western edge of the production area, near the boundary with South Perris in response to an increase in EMWD's brackish water extractions, and groundwater level recovery on the eastern end of the production area, where agricultural production has been decreasing since 2019. Groundwater in storage is estimated to have increased by approximately 500 AF in the Moreno Valley Production Area[11]

[11] Total change in storage reported in Table 2-6 differs from the production area totals by approximately 600 AF. The storage change value presented in Table 2-6 was calculated using a water budget for the Plan Area (Appendix A) that excludes the portion of the Plan Area overlying Lake Perris. The area overlying Lake Perris was included when calculating the production area totals.

3 GSP Implementation Progress

The GSP for the SJGB was submitted to DWR in November 2021. This is the second annual report prepared since the GSP was submitted.

Project Implementation Progress

During development of the GSP, EMWD identified four projects that would facilitate ongoing and future sustainable groundwater management within the Plan Area. These projects included:

1) Assessing the feasibility of Recycled Water Delivery to Private Producers in the Menifee Production Area

2) Additional investigations and/or technical studies in the event that groundwater levels approach the minimum threshold groundwater elevation at three or more groundwater elevation RMPs, or the concentration of TDS in three or more groundwater quality RMPs approaches 1,000 mg/L and other projects and management actions have failed to improve groundwater conditions

3) Construction of additional dedicated monitoring wells

4) Determination of the location and status of domestic wells in the Plan Area

Following adoption of the GSP, EMWD began a desktop investigation of the domestic wells in the Plan Area by reviewing DWR's well completion report database, EMWD's current monitoring network, Riverside DEH's well permit database, and Riverside County's assessor's parcel database to identify potentially active wells that are not monitored in the Plan Area. This desktop evaluation resulted in the identification of up to approximately 170 potentially active, but non-reporting wells in the GSP Plan Area. As a follow-on to this desktop evaluation, EMWD is currently evaluating opportunities to perform field investigations to verify these desktop results and initiate communication with domestic groundwater users in the Plan Area.

Prior to and during development of the GSP, EMWD was implementing water quality management and water supply projects that protect and enhance groundwater supplies in the SJGB. These projects include implementation of the Perris North Basin Groundwater Contamination Prevention and Remediation Program, a water quality management project aimed to contain and remediate non-point-source comingled VOC, perchlorate, and nitrate plumes underlying the cities of Perris and Moreno Valley, and the expansion of the Perris South Desalination Program through the construction of the Perris II ROTF. Since adoption of the GSP, EMWD has constructed six (6) new extraction wells in the City of Moreno Valley as part of the Perris North Basin Groundwater Contamination Prevention and Remediation Project and has completed construction of the Perris II ROTF.

EMWD continues to evaluate opportunities to expand their desalter complex to prevent migration of low-quality groundwater throughout the Perris South and Nuevo-Lakeview production areas. As part of this, EMWD initiated a water availability analysis to better characterize the volume of groundwater available for extraction via desalter wells in the Perris South production Area. This analysis included a re-evaluation of model-estimated groundwater recharge and incorporation of results from the Basin Characterization Model (Flint 2021) into an update and recalibration of the SJFM. These efforts are complimentary to the recent completion of the Perris II ROTF and will be used to inform and identify opportunities for desalter complex expansion.

In addition to the execution and completion of these water quality and water supply management projects, EMWD deployed new monitoring equipment throughout the Plan Area to improve the frequency and quality of groundwater level and quality monitoring. Through implementation of the *West San Jacinto Groundwater Sustainability Plan and Monitoring Project*, which was funded under DWR's Sustainable Groundwater Management (SGM) grant program, EMWD procured: (i) procured one sampling trailer to support water level and quality monitoring; (ii) one nitrate and one multiparameter sonde to better delineate the lateral and vertical extent of contaminants of potential concern in the Plan Area; (iii) one hundred snap samplers to support long-term ambient water quality monitoring; and (iv) twenty-seven pressure transducers and telemetry equipment to better assess the hydrogeologic conditions in the Plan Area relative to changes in groundwater elevations and storage throughout GSP implementation. EMWD deployed this monitoring equipment in December 2022.

EMWD continued development of projects that are consistent with the GSP and support long-term sustainable groundwater management in the San Jacinto Groundwater Basin. Specifically, in December 2022, EMWD applied for funding through DWR's Sustainable Groundwater Management Grant Program's SGMA Implementation Round 2 funding opportunity. In their application, EMWD provided scope and fee estimates for projects that: (1) reduce data gaps, including the number and location of domestic well users and the degree to which shallow groundwater supports riparian habitat in the Plan Area; (2) enhance groundwater level and quality monitoring through the construction of additional dedicated monitoring wells; and (3) update and enhance the hydrogeologic conceptual model and numerical model. EMWD is awaiting response from DWR on funding through this grant application.

EMWD's efforts to remain resilient against future drought, protect potable aquifer, assess potential impacts to domestic water users, and pursue funding opportunities to support GSP implementation activities demonstrates EMWD's ongoing commitment to sustainable groundwater management in the SJGB.

Management Action Progress

The management actions defined in the GSP were defined to have an implementation timeline triggered by the onset, or potential onset, of undesirable results in the Plan Area. Current groundwater elevations in the Plan Area are approximately 100 to 150 feet higher than the established measurable objective groundwater elevations, and current TDS concentrations in groundwater are approximately 150 mg/L to 450 mg/L lower than the established minimum threshold concentrations. In addition, since October 2018, groundwater elevations have risen in 5 out of the seven representative monitoring points and groundwater in storage has increased in the Plan Area by approximately 22,300 AF. Consequently, the Plan Area is not experiencing undesirable results and management actions to avoid undesirable results are not warranted at this time.

4 References

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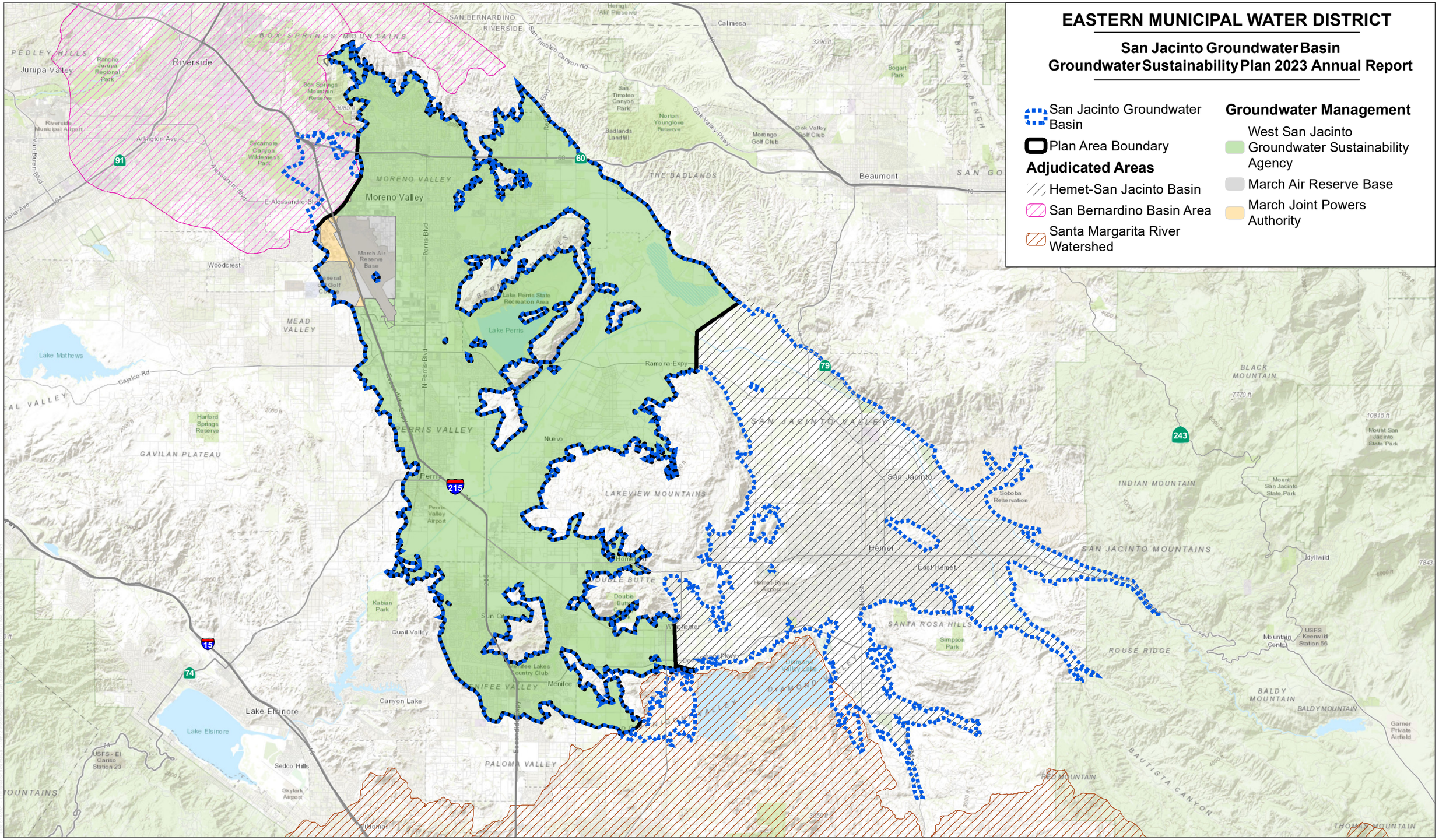
Figures



SOURCE: Esri, Eastern Municipal Water District, California Department of Water Resource

FIGURE 1-1

San Jacinto Groundwater Basin, Plan Area Boundary, and Groundwater Sustainability Agency

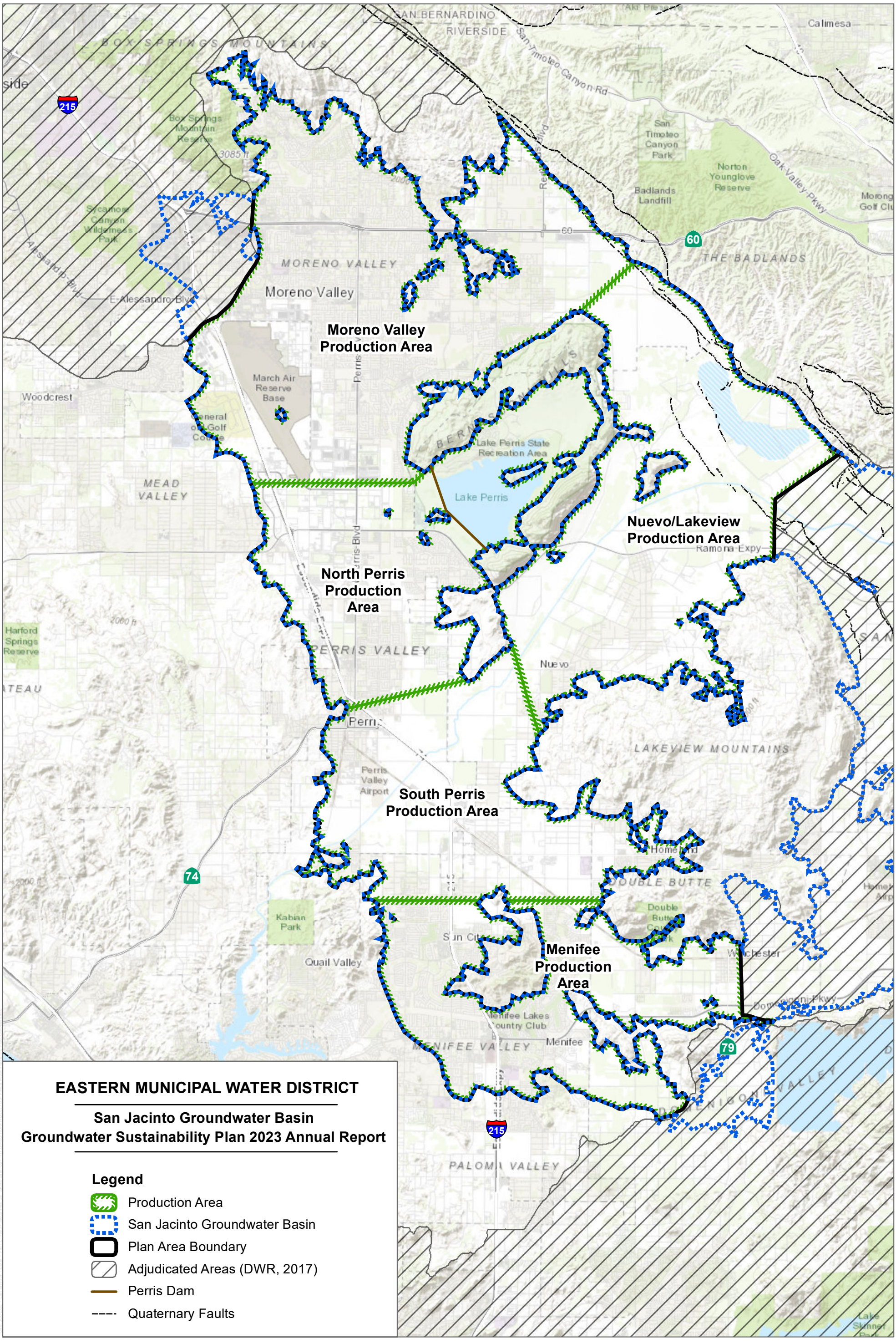
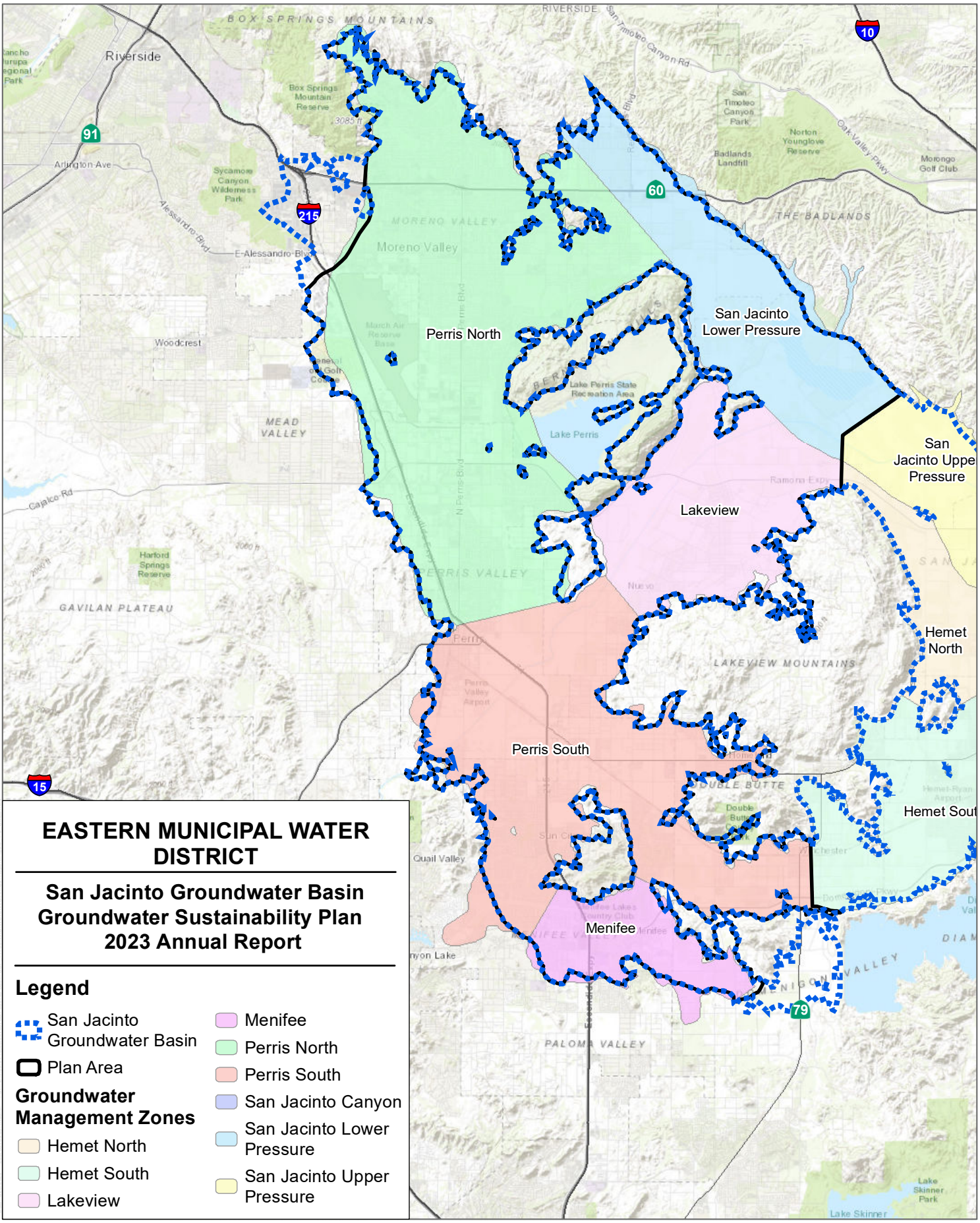


FIGURE 1-2

Groundwater Production Areas in the Plan Area

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report



SOURCE: EMWD

emwd EASTERN MUNICIPAL WATER DISTRICT

0 1 2 Miles

FIGURE 1-3

Groundwater Management Zones

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

EASTERN MUNICIPAL WATER DISTRICT

San Jacinto Groundwater Basin
Groundwater Sustainability Plan 2023 Annual Report

Legend

- CIMIS Weather Stations
- USGS Real-time Stream Gauges
- RCFCWCD Rain Gauge
- Inactive/Destroyed RCFCWD Rain Gauge
- San Jacinto River
- San Jacinto Groundwater Basin
- Plan Area

124 – Moreno Valley East
238 Moreno Valley
161 – San Jacinto Valley
151 – Lake Perris
11070210
134 – Lakeview
11070150
11070270
186 – San Jacinto
11070070
240 Perris-Menifee
11070365
11069500
212 – Sun City
180 – Hemet Ryan
248 – Winchester
11070465
179 Winchester
239 Hemet

SOURCE: EMWD, U.S. Geological Survey

0 2.5 5 Miles

FIGURE 1-4

Precipitation, Evapotranspiration, and Streamflow Monitoring Locations by Agency

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

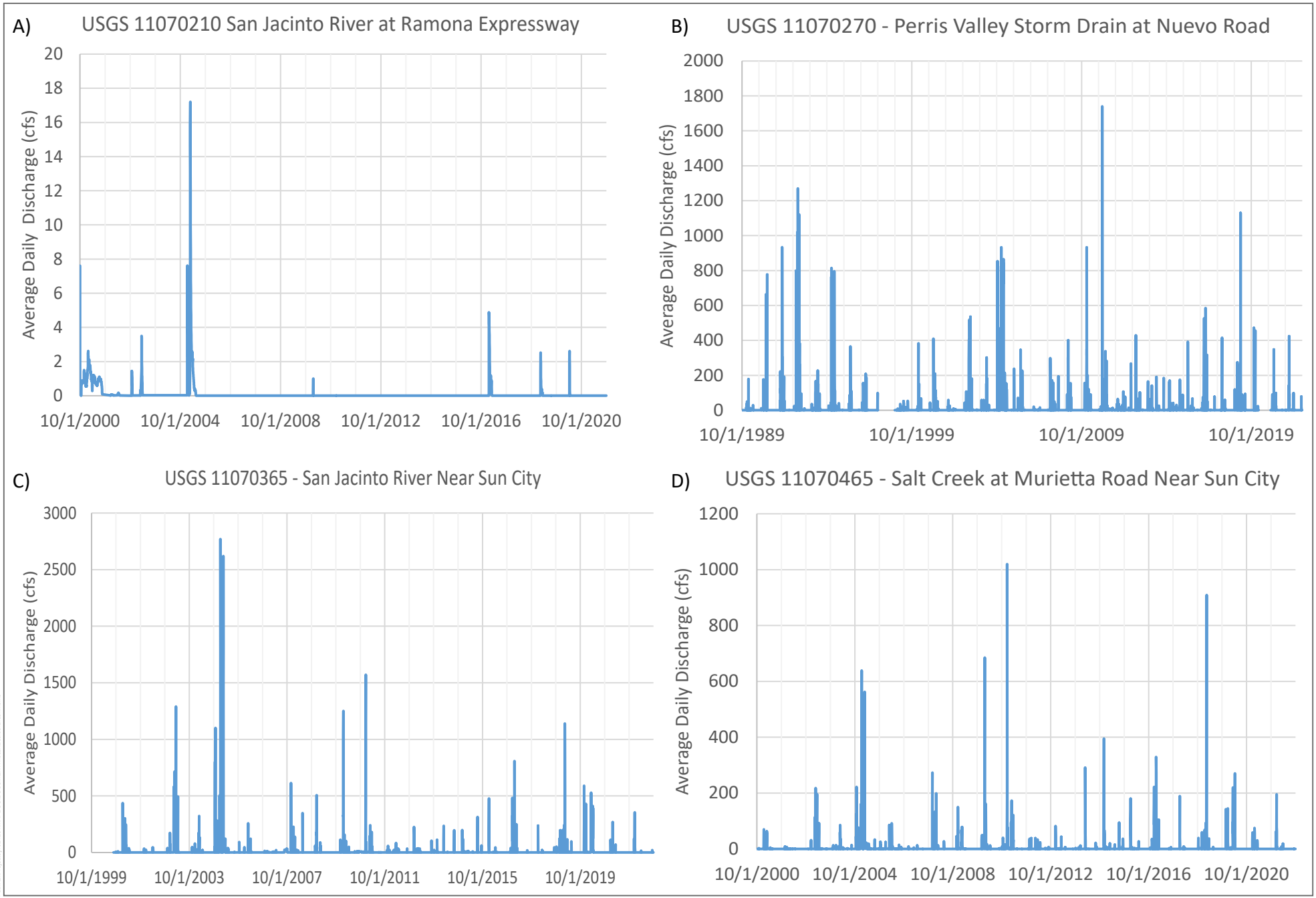


FIGURE 1-5

Stream Gauge Hydrographs for Gauges in the Plan Area

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

EASTERN MUNICIPAL WATER DISTRICT

San Jacinto Groundwater Basin
Groundwater Sustainability Plan
2023 Annual Report

Legend

Groundwater Elevation (ft. msl)

- 1091 - 1150
- 1151 - 1200
- 1201 - 1250
- 1251 - 1300
- 1301 - 1350
- 1351 - 1400
- 1401 - 1450
- 1451 - 1500
- 1501 - 1550
- 1551 - 1600
- 1601 - 1650
- 1651 - 1700
- 1701 - 1750
- 1751 - 1800
- 1801 - 1850
- Well Not Contoured
- Contour Interval (Dashed where Inferred)
- Plan Area Boundary
- West San Jacinto GSA Boundary
- DWR Bulletin 118 San Jacinto Basin (Updated 2018)
- Production Area
- Adjudicated Areas (DWR, 2017)
- Quaternary Faults

SOURCE: Data provided by EMWD, California Department of Water Resources, California Geologic Survey

0 1 2 Miles

FIGURE 2-1

Fall 2021 Groundwater Elevations

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

EASTERN MUNICIPAL WATER DISTRICT

San Jacinto Groundwater Basin
Groundwater Sustainability Plan
2023 Annual Report

Legend

Groundwater Elevation (ft. msl)

- 1084 - 1150
- 1151 - 1200
- 1201 - 1250
- 1251 - 1300
- 1301 - 1350
- 1351 - 1400
- 1401 - 1450
- 1451 - 1500
- 1501 - 1550
- 1551 - 1600
- 1601 - 1650
- 1651 - 1700
- 1701 - 1750
- 1751 - 1800
- 1801 - 1850
- Well Not Contoured
- Contour Interval (Dashed where Inferred)
- Quaternary Faults
- Production
- Plan Area
- Adjudicated Areas (DWR, 2017)
- West San Jacinto GSA Boundary
- DWR Bulletin 118 San Jacinto Basin (Updated 2018)

SOURCE: Data provided by EMWD, California Department of Water Resources, California Geologic Survey

emwd EASTERN MUNICIPAL WATER DISTRICT

0 1 2 Miles

FIGURE 2-2

Spring 2022 Groundwater Elevations

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

EASTERN MUNICIPAL WATER DISTRICT

San Jacinto Groundwater Basin
Groundwater Sustainability Plan 2023 Annual Report

Legend

- San Jacinto Groundwater Basin
- Plan Area
- Production

Adjudicated

- Hemet-San Jacinto Basin
- San Bernardino Basin Area
- Santa Margarita River Watershed

Historical Monitoring Network Type

- Quality
- Level
- Quality, Level
- Water Level Representative Monitoring Points

Moreno Valley Production Area

North Perris Production Area

South Perris Production Area

Nuevo/Lakeview Production Area

Menifee Production Area

UCR Scott

EMWD 52 Follico

EMWD 94

EMWD Skiland 05

EMWD A1

Nutrilite 07

EMWD 74 Menifee 04

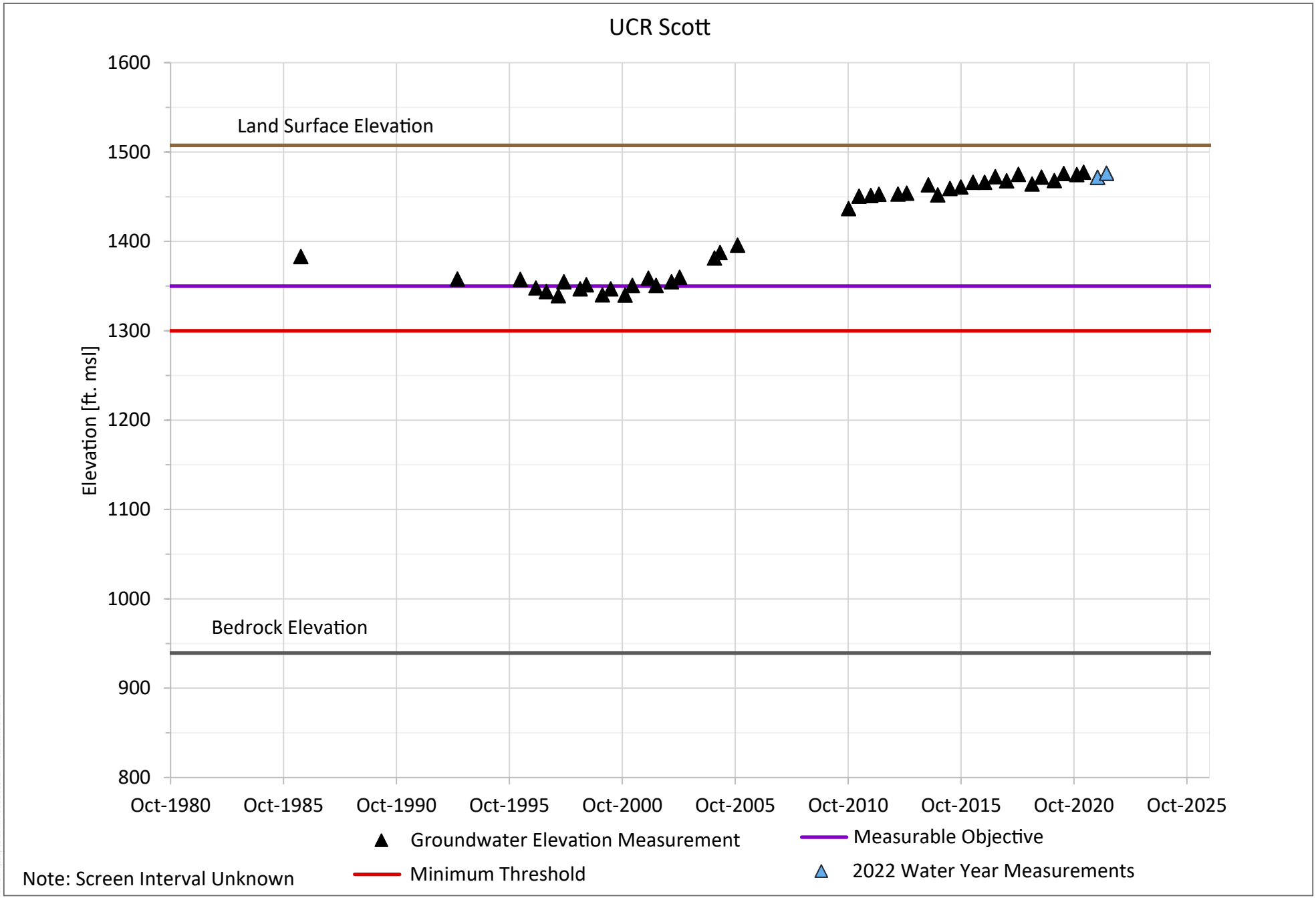
SOURCE: EMWD 2022

0 1 2 Miles

FIGURE 2-3

Water Level Representative Monitoring Points

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

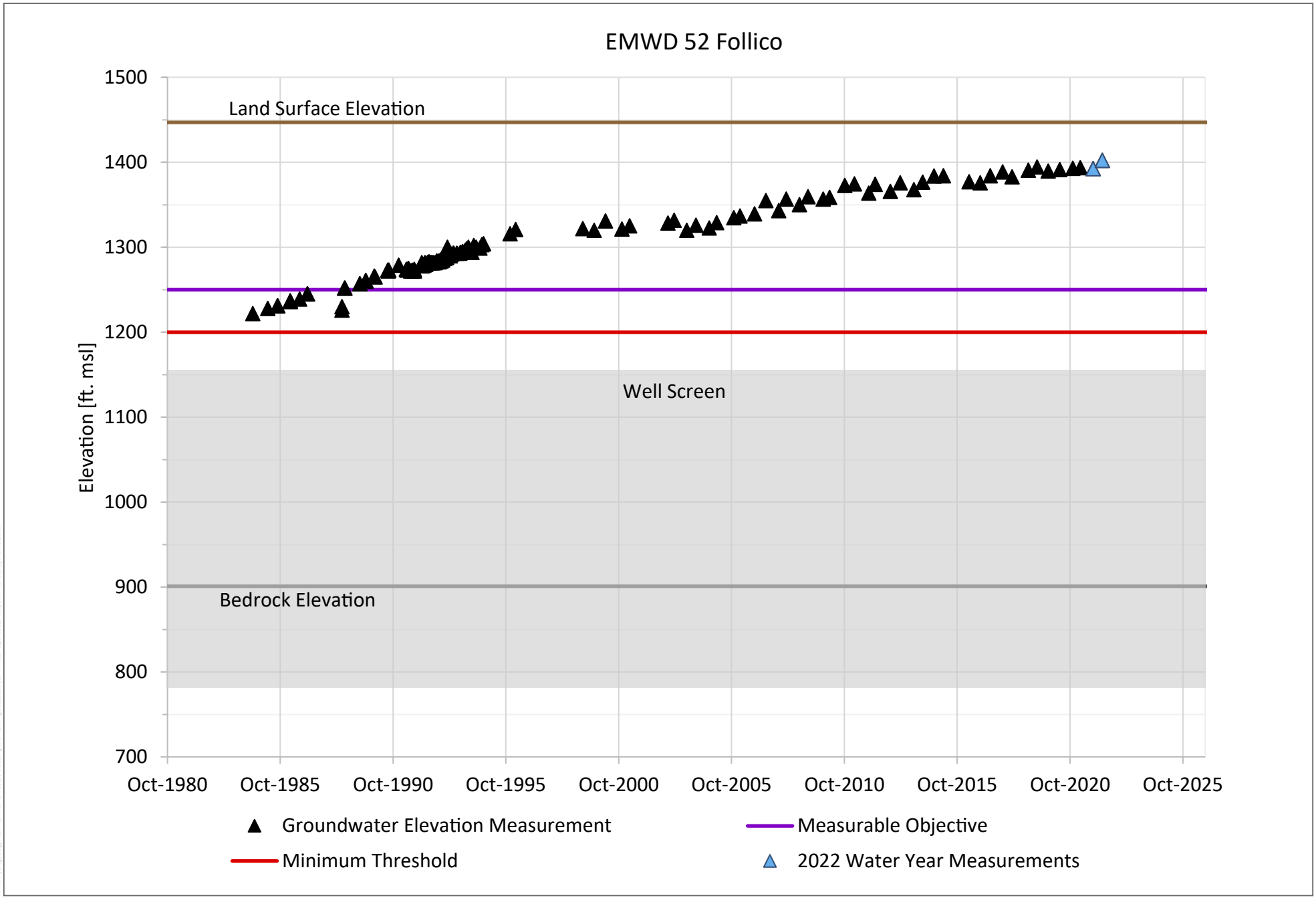


SOURCE: EMWD

FIGURE 2-4

Groundwater Elevations Measured at UCR Scott

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

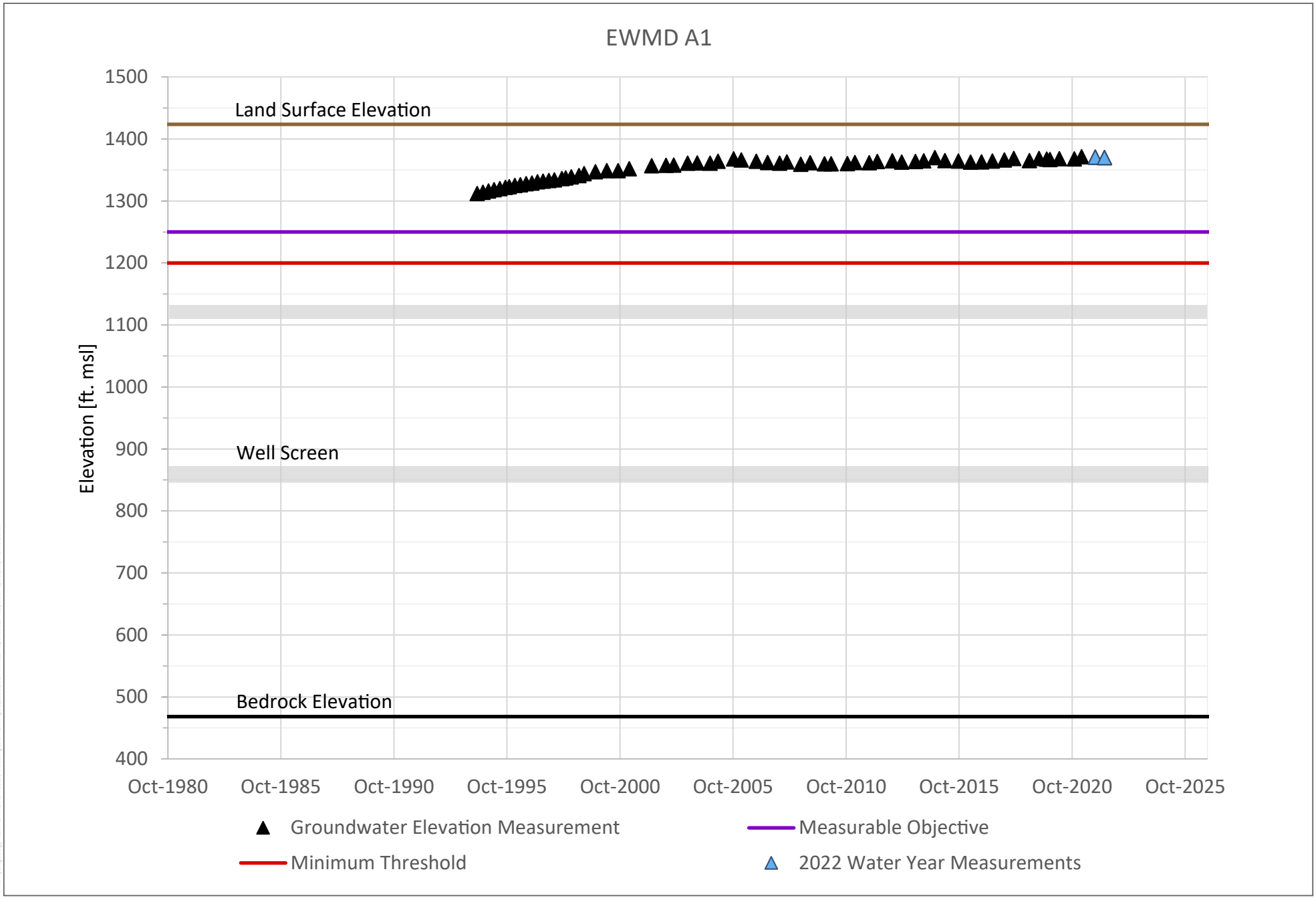


SOURCE: EMWD

FIGURE 2-5

Groundwater Elevations Measured at EMWD 52 Follico

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

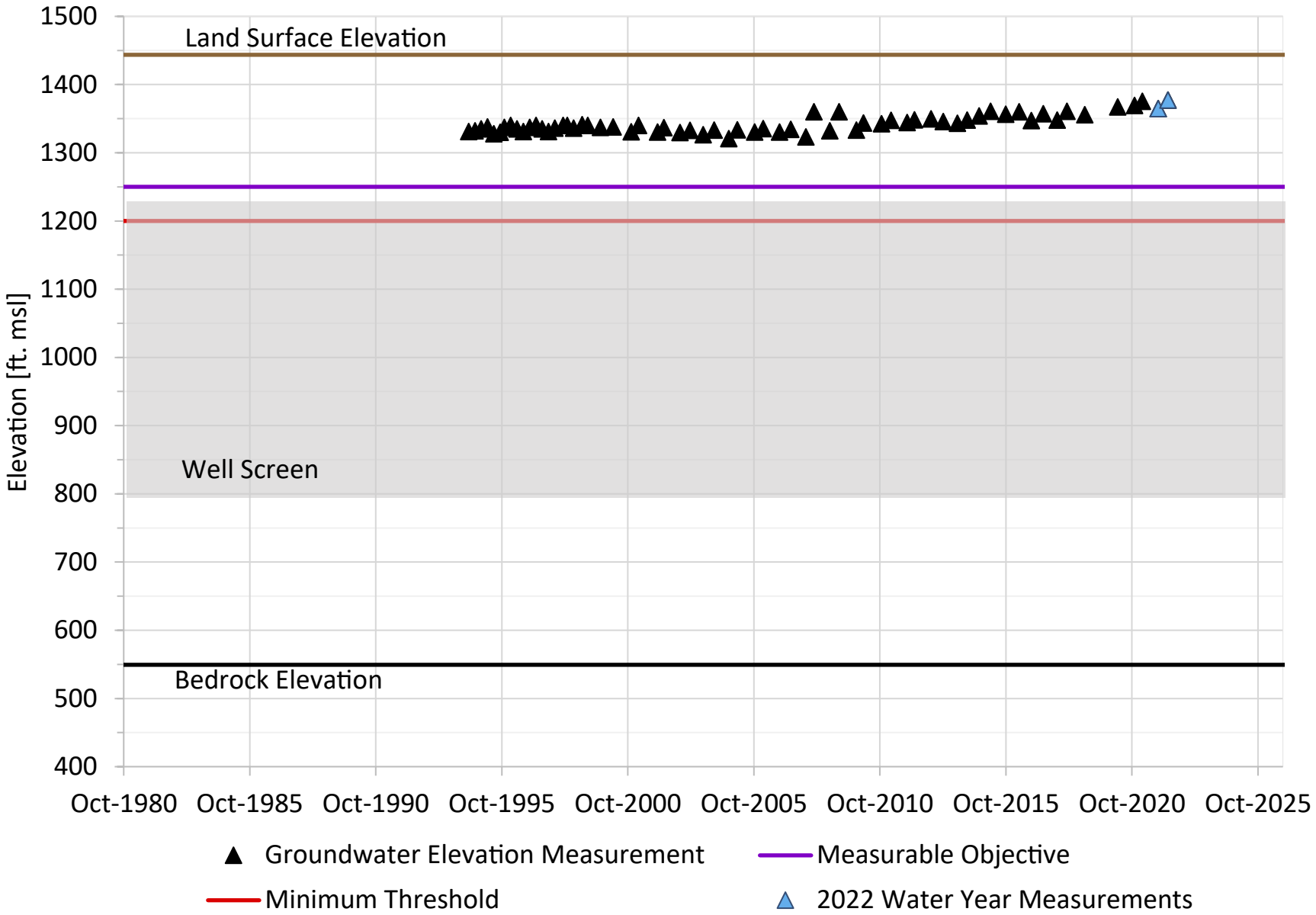


SOURCE: EMWD

FIGURE 2-6

Groundwater Elevations Measured at EMWD A1

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

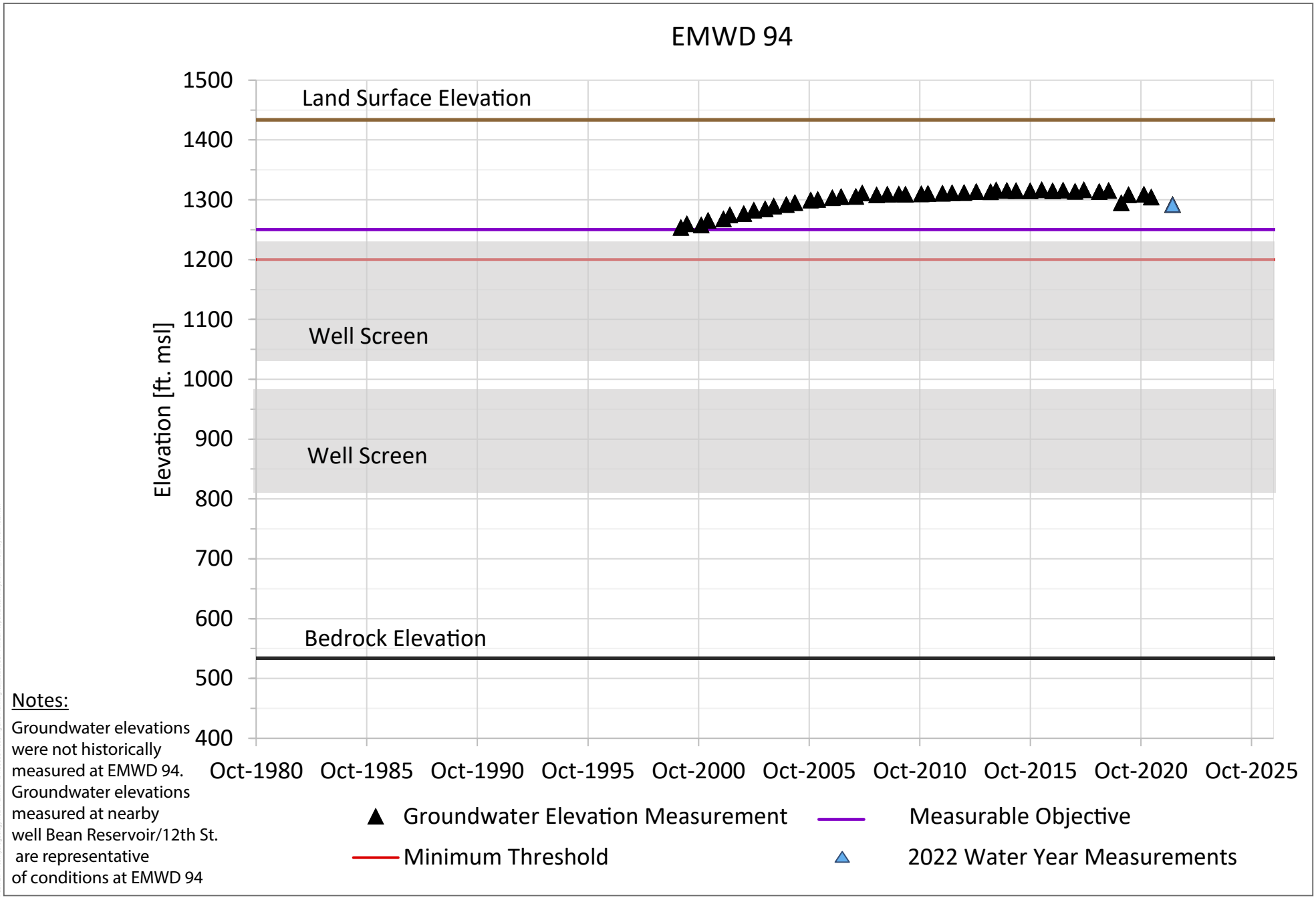


SOURCE: EMWD

FIGURE 2-7

Groundwater Elevations Measured at EMWD 74 Menifee 04

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report



Notes:

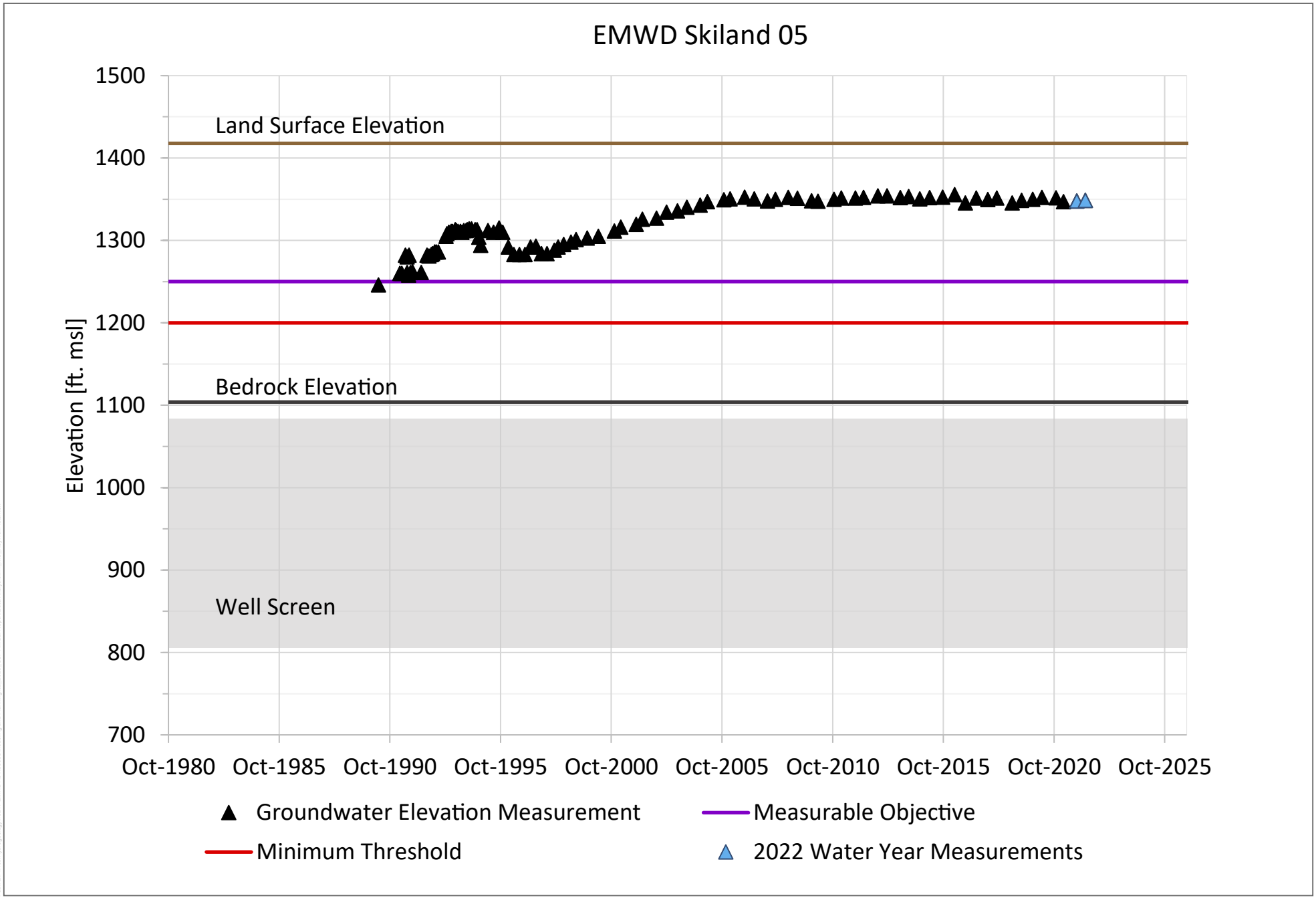
Groundwater elevations were not historically measured at EMWD 94. Groundwater elevations measured at nearby well Bean Reservoir/12th St. are representative of conditions at EMWD 94

SOURCE: EMWD

FIGURE 2-8

Groundwater Elevations Measured at EMWD 94/Bean Reservoir/12th St.

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

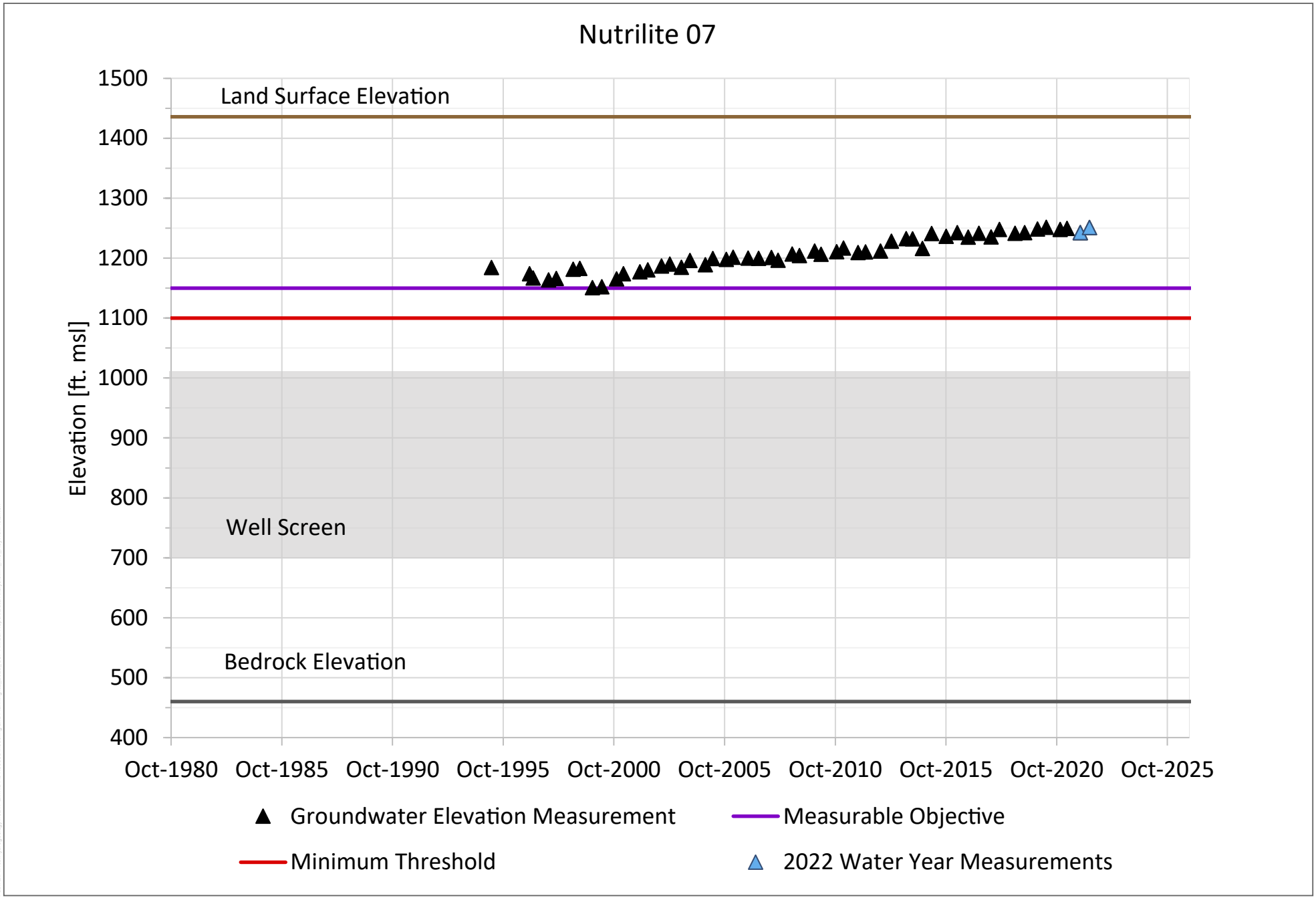


SOURCE: EMWD

FIGURE 2-9

Groundwater Elevations Measured at EMWD Skiland 05

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report



SOURCE: EMWD

FIGURE 2-10

Groundwater Elevations Measured at Nutrilite 07

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

EASTERN MUNICIPAL WATER DISTRICT

San Jacinto Groundwater Basin
Groundwater Sustainability Plan 2023 Annual Report

Legend

- San Jacinto Groundwater Basin
- Plan Area
- Groundwater Management Zone

Adjudicated

- Hemet-San Jacinto Basin
- San Bernardino Basin Area
- Santa Margarita River Watershed

- > 1,000 mg/L TDS
- Water Quality Representative Monitoring Points

Perris North GMZ

San Jacinto Lower Pressure GMZ

Lakeview GMZ

Perris South GMZ

Menifee GMZ

Nutrilite 04

Nutrilite 07

Bootsma, John

Nutrilite 08

Nutrilite 02

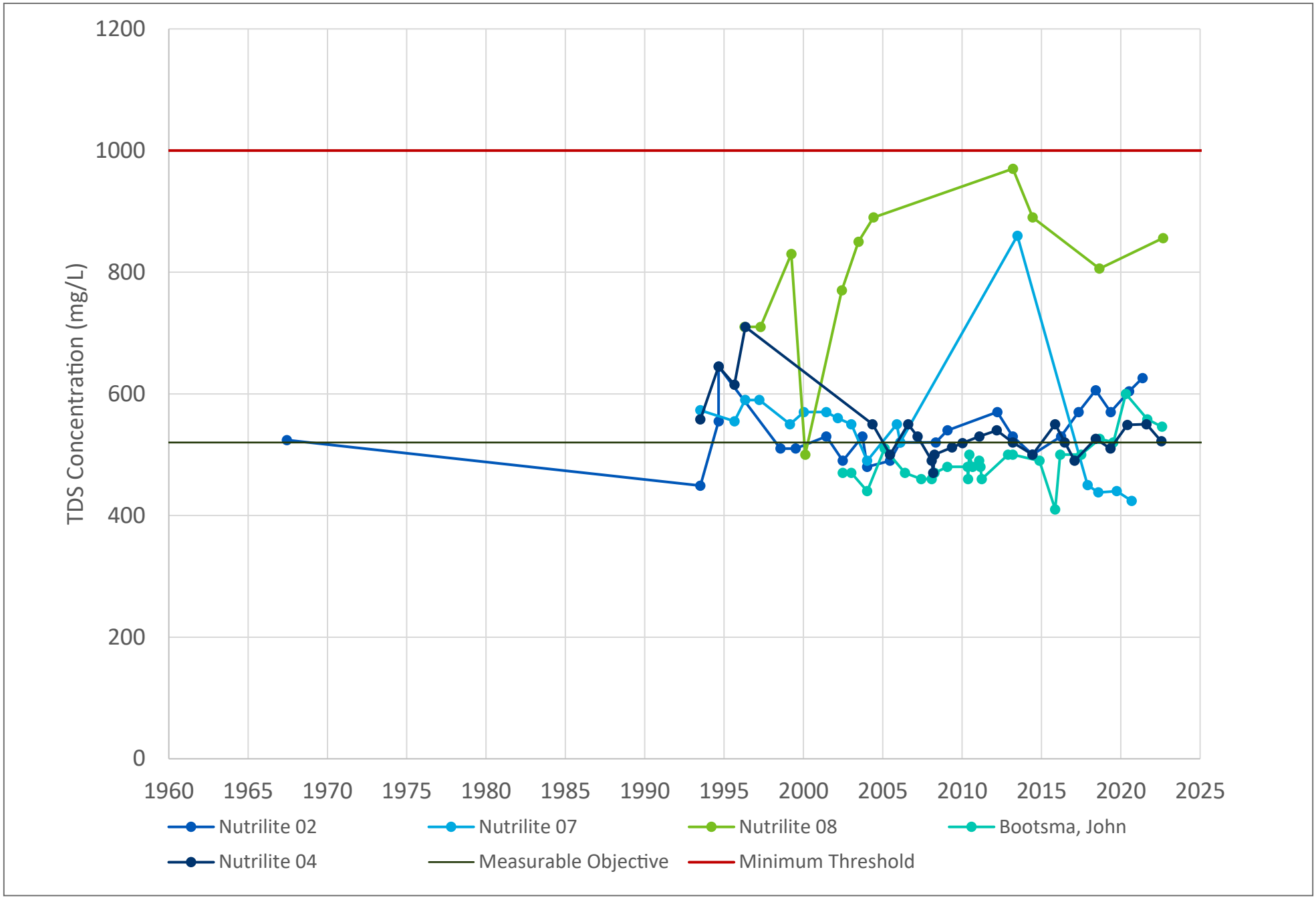
SOURCE: EMWD 2022

FIGURE 2-11

Water Quality Representative Monitoring Points

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

0 1 2 Miles



SOURCE: EMWD

FIGURE 2-12

Representative Monitoring Point TDS Water Quality Hydrographs

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report

EASTERN MUNICIPAL WATER DISTRICT

San Jacinto Groundwater Basin
Groundwater Sustainability Plan 2023 Annual Report

- Plan Area
- San Jacinto Groundwater Basin
- Production Areas

Water Year 2022 Extractions (Acre-Feet)

- <100
- 101-250
- 251-500
- 500-1,000
- >1,000

Moreno Valley Production Area

Nuevo/Lakeview Production Area

North Perris Production Area

South Perris Production Area

Menifee Production Area

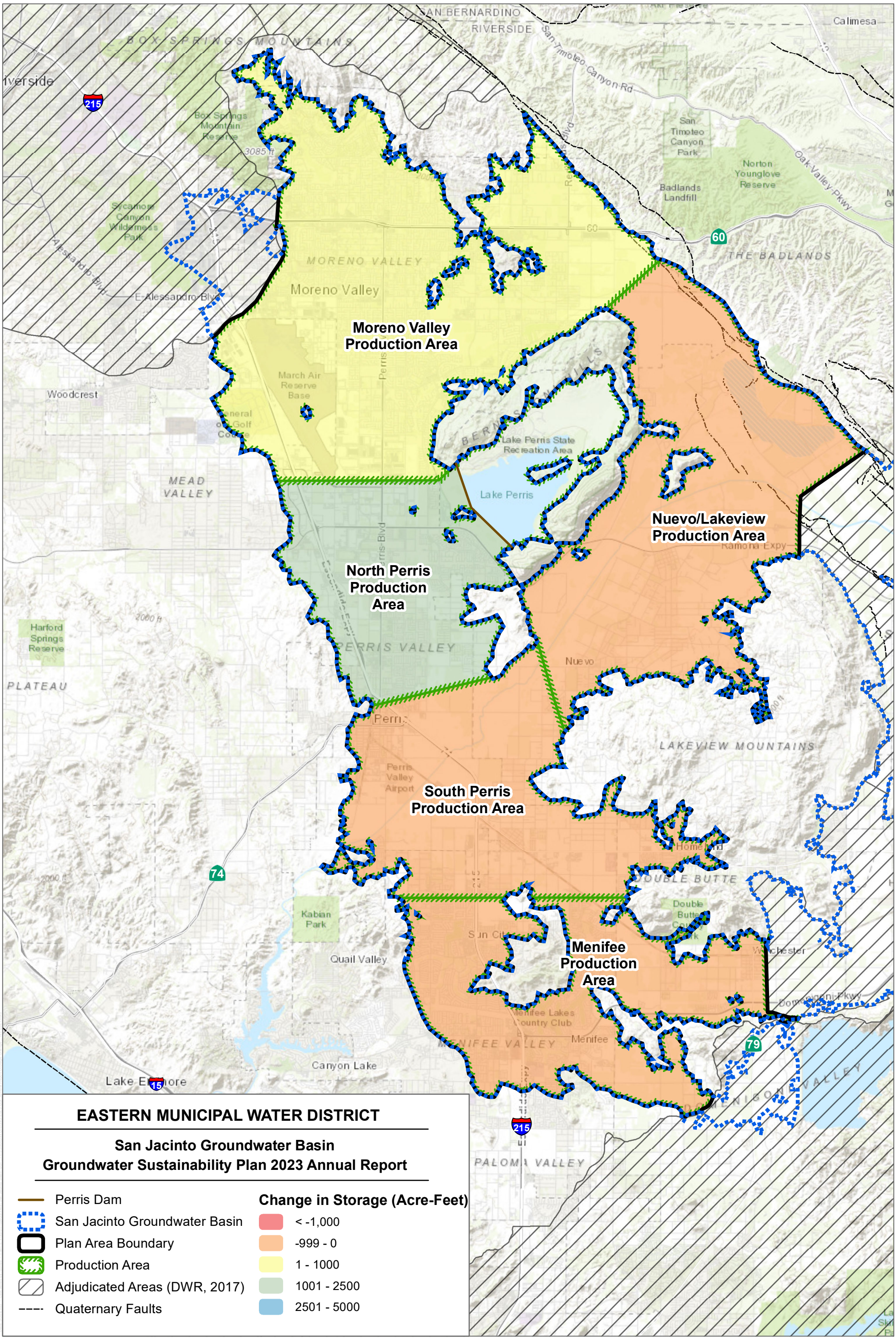
SOURCE: Esri, EMWD

0 5,000 10,000 Feet

FIGURE 2-13

Water Year 2022 Groundwater Extractions in the Plan Area

San Jacinto Groundwater Basin Groundwater Sustainability Plan 2023 Annual Report



SOURCE: Data provided by EMWD

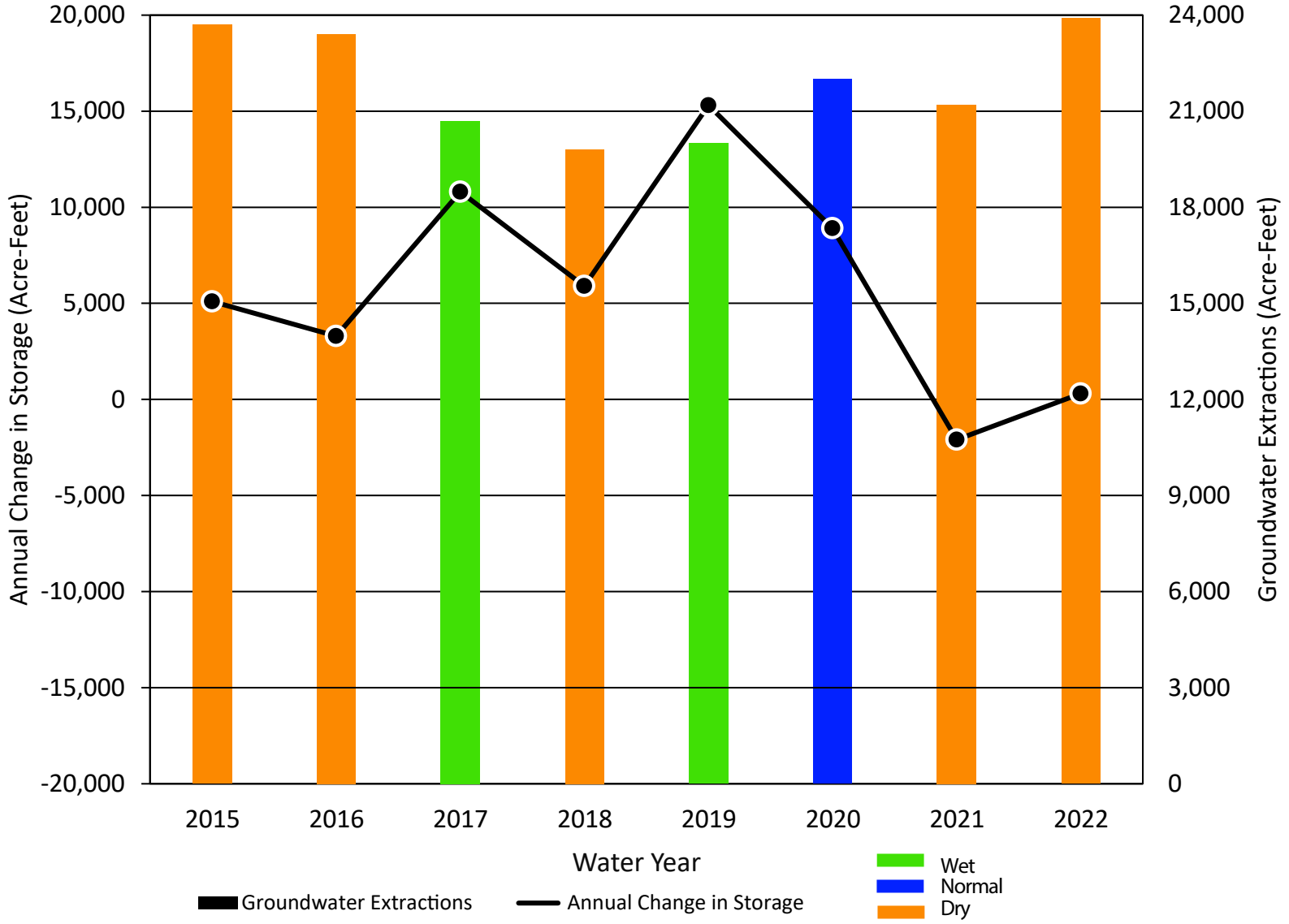
emwd EASTERN MUNICIPAL WATER DISTRICT

0 1 2 Miles

FIGURE 2-14

Water Year 2022 Change in Groundwater in Storage (Acre-Feet)

Groundwater Sustainability Plan 2023 Annual Report for the San Jacinto Groundwater Basin



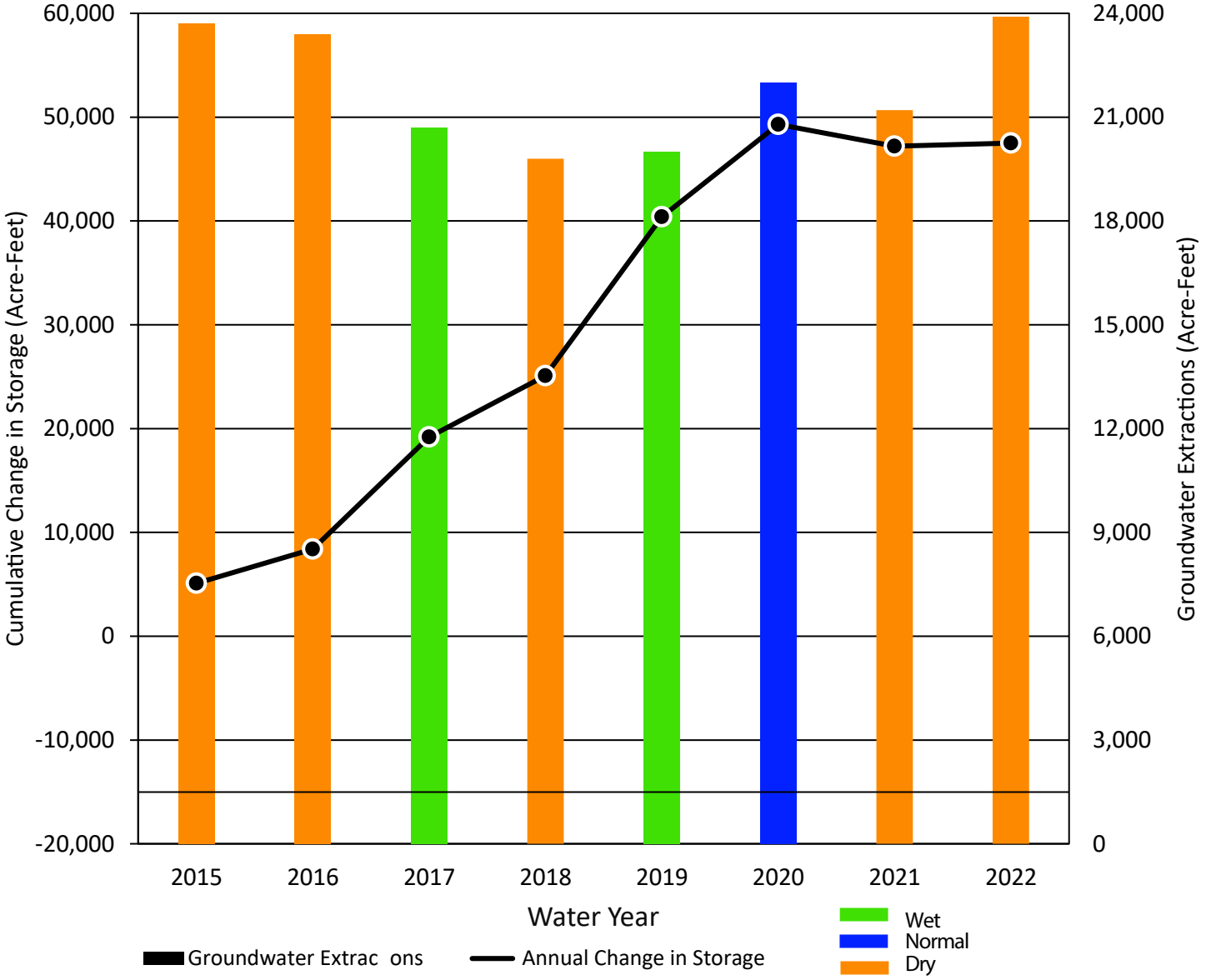
Notes:

(1) Water year is October 1 to September 30
(e.g. water year 2012 is Oct. 1, 2011 to Sept. 30, 2012)
(2) Water Year Type is based on Lake Perris Rain Gauge (Gauge ID: 151) Precipitation
(3) Dry Water Year Type: Measured Precipitation < 6.5 inches per water year
(4) Normal Water Year Type: 6.5 inches< Measured Precipitation < 11.5 inches per water year
(5) Wet Water Year Type: 11.5 inches per water year < Measured Precipitation

SOURCE: San Jacinto Flow Model (2014)

FIGURE 2-15

Water Year Groundwater Extractions and Annual Change in Storage in the Plan Area



Notes:

(1) Water year is October 1 to September 30
(e.g. water year 2012 is Oct. 1, 2011 to Sept. 30, 2012)
(2) Water Year Type is based on Lake Perris Rain Gauge (Gauge ID: 151) Precipitation
(3) Dry Water Year Type: Measured Precipitation < 6.5 inches per water year
(4) Normal Water Year Type: 6.5 inches< Measured Precipitation < 11.5 inches per water year
(5) Wet Water Year Type: 11.5 inches per water year < Measured Precipitation

SOURCE: San Jacinto Flow Model (2014)

FIGURE 2-16

Water Year Groundwater Extractions and Cumulative Change in Storage in the Plan Area

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Appendix A

Water Budget Tables for the GSP Plan Area: Water Year 2019 through 2022

Water Years 2019-2022 Water Budget for the SJGB GSP Plan Area

			All values reported in units of acre-feet (AF)																				
			Inflows to Groundwater in the Plan Area; units reported in Acre-Feet (AF)											Outflows (Acre Feet)									
			Return flows from retail water sales					Stream Leakage						Groundwater Extractions				Lake Perris Seepage Recovery					
Water Year	Water Year Type	Model	Non-agricultural potable water sales	Agricultural Irrigation	Recycled Water Sales	Reclaimed Ponds	Deep percolation of precipitation	Perris Valley Drain	San Jacinto River	Mountain Front Recharge	Underflows from HSJ South of San Jacinto River	Underflows from HSJ North of San Jacinto River	Lake Perris Seepage	**Total Inflow (AF)**	Agricultural	Municipal	Domestic	**Total Groundwater Extractions**	Toe Drains[a]	Underflows to HSJ North of San Jacinto River	Underflows to HSJ South of San Jacinto River	**Total Outflow (AF)**	**Annual Change in Storage**
2019	Normal	SJFM-2014	4,500	1,800	1,300	10,000	8,800	300	0	7,400	300	300	7,200	**41,900**	8,100	11,800	0	20,000	3,400	3,200	0	**26,600**	**15,300**
2020	Wet	SJFM-2014	4,000	1,700	1,200	7,900	6,500	300	0	7,700	300	200	7,200	**37,000**	7,500	14,500	0	22,000	3,400	2,800	0	**28,200**	**8,800**
2021	*Dry*	*SJFM-2014*	*2,400*	*900*	*800*	*6,800*	*3,200*	*300*	*0*	*7,800*	*300*	*200*	*7,200*	***29,900***	*7,900*	*15,500*	*0*	***23,400***	*3,400*	*2,900*	*0*	***29,700***	***200***
2021	Dry	SJFM-2020	5,500	600	1,000	2,600	5,300	100	0	4,700	100	0	6,500	**26,400**	5,700	15,500	0	**21,200**[b]	3,400	3,800	100	**28,500**	**-2,100**
2022	Dry	SJFM-2020	4,700	800	500	6,300	3,600	100	0	9,300	100	0	6,300	**31,700**	7,000	16,900	0	23,900	3,400	4,000	100	**31,400**	**300**
2019-2022 Average[c]			**4,700**	**1,200**	**1,000**	**6,700**	**6,100**	**200**	**0**	**7,300**	**200**	**100**	**6,800**	**34,300**	**7,100**	**14,700**	**0**	**22,000**	**3,400**	**3,500**	**100**	**28,700**	**5,600**

[a]Estimates of toe drain losses at the base of Lake Perris dam are implicitly incorporated into the modeled boundary conditions (EMWD 2016)

[b]Estimates of agricultural extractions were updated during preparation of SJFM-2020.

[c]Average excludes the SJFM-2014 water budget data for the 2021 water year.