Upper Ventura River Valley Basin

Annual Report Water Year 2023

Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

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Upper Ventura River Valley Basin
Annual Report Water Year 2023

Prepared for

Upper Ventura River GROUNDWATER AGENCY SUSTAINABLE MANAGEMENT

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Executive Summary

§356.2 Annual Reports. *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

(a) General information, including an executive summary and a location map depicting the basin covered by the report.

The Upper Ventura River Groundwater Agency (UVRGA) adopted the Groundwater Sustainability Plan (GSP) for the Upper Ventura River Groundwater Basin (UVRGB, or Basin) on January 6, 2022, and this is the third Annual Report in compliance with the California Code of Regulations §356.2 documenting groundwater conditions and GSP implementation for water year 2023 (i.e, October 1, 2022, through September 30, 2023).

Total precipitation in the Basin during water year 2023 was 43.83 inches, compared to the average of 21.09, making the water year type classification for water year 2023 wet. Basin-wide measured groundwater levels were generally higher in water year 2023 compared to the prior water year. Groundwater extraction in water year 2023 was higher than water year 2022; however, surface water use decreased in 2023 relative to 2022, due to a decrease in municipal and industrial (M&I) demands (UVRGA, 2023). Total water use within the Basin meets agricultural, M&I, domestic, and riparian vegetation demands and is sourced from groundwater and local surface water. Estimated total water use in the Basin for water year 2023 was 3,089 acre-feet per year (AF/yr), similar to the prior water year (3,212 AF/yr). The change in groundwater storage for the Basin was calculated using the updated numerical groundwater model of the Basin and increased in storage in water year 2023, primarily due to increases in surface water percolation. Groundwater quality remained stable for the water year 2023, compared to the historical data.

Sustainability is evaluated by comparing monitoring data to the Sustainable Management Criteria (SMC) for each applicable sustainability indicator: chronic lowering of groundwater levels, reduction of groundwater storage, degraded water quality, and depletion of interconnected surface water. The groundwater levels measured in water year 2023 were compared to the SMC established for the chronic lowering of groundwater levels and reduction of groundwater storage sustainability indicators (which has groundwater levels as a proxy), and no monitoring wells exceeded the minimum threshold. Undesirable results associated with water level declines is defined as a minimum threshold exceedance at all seven representative monitoring sites, which has yet to be experienced. For the degraded water quality and depletion of interconnected surface water sustainability indicators, measurable objectives were met during water year 2023. Although the land subsidence sustainability indicator was determined to be not applicable to UVRGB, the GSP included annual review of InSAR data, subject to continued availability from DWR. InSAR measurements of land surface elevation changes during 2023 were well below the accuracy range indicating there was no measurable land subsidence due to groundwater withdrawal within the UVRGB.

GSP implementation efforts during water year 2023 included the following:

- The GSP was approved by DWR during water year 2023; Continued implementation of the GSP management action "Foster Park Protocols to Address Direct Depletion of Interconnected Surface Water";

- Continued groundwater level and streamflow monitoring at existing monitoring sites;

- Continued surface water flow monitoring at existing monitoring sites where and when feasible[1];

- Continued visual streamflow terminus monitoring;

- Continued riparian Groundwater Dependent Ecosystem (GDE) monitoring;

- Continued implementation of UVRGA's well registration, metering, and extraction reporting ordinance;

- Implementation of the GSP management action "Domestic Well Survey", by including a domestic well questionnaire in the well registration forms sent to well owners (45 domestic well surveys were received during water year 2023);

- Progress work continued on implementation of the GSP project "Actions to Address Indirect Depletion of Interconnected Surface Water" consisting of the initiation of monitoring pursuant to UVRGA's monitoring workplan for the Foster Park Aquatic GDE area;

- Work on the GSP project " Groundwater Level Monitoring Data Gaps Project," was initiated and consisted of performing initial outreach to well owners to request access to add wells to the groundwater level and quality monitoring networks;

- Added "Planned Stream Gage A" during water year 2023, completing of the GSP project "Stream Steam Gage Data Gaps Project";

- Progress work on the GSP project "Confluence Aquatic Habitat Area Biological Monitoring Study" by initiating monitoring pursuant to UVRGA's monitoring workplan for the Confluence Aquatic GDE area; and

- Submitted a Sustainable Groundwater Management Program Implementation Grant application, which was not awarded.

[1] Monitoring was suspended due to high flows at some sites and some gages were destroyed by a flooding event in January 2023 and are pending repair/reinstallation.

Table of Contents

List of Figures

List of Tables

Acronyms and Abbreviations

AF/yr	acre-feet per year
cfs	cubic feet per second
CMWD	Casitas Municipal Water District
DMS	Data Management System
DWR	Department of Water Resources
ft	foot/feet
GDE	Groundwater Dependent Ecosystem
GSP	Groundwater Sustainability Plan
InSAR	interferometric synthetic aperture radar
M&I	municipal and industrial
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
MOWD	Meiners Oaks Water District
RWQCB	Regional Water Quality Control Board
SMC	Sustainable Management Criteria
TDS	total dissolved solids
USGS	United States Geological Survey
UVRGA	Upper Ventura River Groundwater Agency
UVRGB	Upper Ventura Groundwater Basin (Upper Ventura River Valley Basin, Department of Water Resources Basin No. 4-003.01)
VRWD	Ventura River Water District
WQO	Water Quality Objective

1.0 Introduction [§356.2(a)]

§356.2 Annual Reports. *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

(a) General information, including an executive summary and a location map depicting the basin covered by the report.

This document is the third Annual Report for the Upper Ventura River Valley Basin (Department of Water Resources [DWR] Basin No. 4-003.01; referred to herein as the Upper Ventura Groundwater Basin [UVRGB] or Basin), fulfilling the requirements set forth by the Sustainable Groundwater Management Act (SGMA) Groundwater Sustainability Plan (GSP) Regulation Code §356.2. The Upper Ventura River Groundwater Agency (UVRGA) adopted its GSP on January 6, 2022 (UVRGA, 2022a). This annual report presents data and information for water year 2023 (i.e., October 1, 2022, through September 30, 2023) for the UVRGB. To track the progress of the GSP implementation, monitoring network data are compared against the Sustainable Management Criteria (SMC) established in the adopted GSP (UVRGA, 2022a). This report also provides updates to the status of GSP implementation, including projects and management actions described in the adopted GSP.

The numerical groundwater model developed for the GSP was updated for this Annual Report to simulate water year 2023 and was used to calculate the groundwater flow directions, groundwater transpiration by riparian vegetation, change in groundwater in storage, and streamflow depletion for the Basin in support of report development.

1.1 Background

The UVRGB is a medium-priority groundwater subbasin in western Ventura County. The Basin is in the central portion of the Ventura River Watershed along the Ventura River near the communities of Casitas Springs, Mira Monte, and Meiners Oaks (Figure 1.1). The Basin is bordered by the Ojai and Lower Ventura River Groundwater basins to the east and south, respectively (DWR Basin Nos. 4-002 and 4-003.02).

The UVRGB is a thin alluvial-fill aquifer which is intimately connected to the Ventura River. The groundwater budget and flow conditions in the alluvial aquifer are dominated by interaction with the Ventura River, which provides most of the recharge (inflows) to the Basin as streamflow percolation in the northern portion of the Basin and receives most of the discharge (outflows) from the Basin as down-valley groundwater flow that feeds springs (i.e., groundwater discharge) in the Ventura River in the southern portion of the Basin. Groundwater extractions are secondary to groundwater discharge to the Ventura River except during dry periods when the spring flows decrease substantially due to low Ventura River streamflow entering the northern end of the Basin.

Groundwater has historically supplied approximately one-third of the water used in the Basin for municipal, agricultural, domestic, and environmental uses, and is sourced from local extractions. Most of the extracted water is used for irrigation and public supply. There are also a number of domestic wells that supply water to homes and limited landscape irrigation. Other sources of water supply for the Basin

include private agricultural spring and creek diversions located adjacent to the Basin and local surface water diverted from the Ventura River by on agricultural entity and by Casitas Municipal Water District (CMWD) for storage in Lake Casitas. The non-groundwater supplies provide approximately two-thirds of the water supply in the Basin.

2.0 Groundwater Conditions [§356.2(b)]

This section describes precipitation and water year type for the Basin, groundwater elevations, groundwater quality, groundwater extraction, surface water supplies, total water use, and the change in groundwater in storage for the Basin. Groundwater data for water year 2023 were collected from a variety of agencies and incorporated into the UVRGA Data Management System (DMS), which is described further in the GSP (UVRGA, 2022a).

2.1 Precipitation and Water Year Types

Precipitation data were provided by the Ventura County Public Works Agency from gages 020B (Ventura River County Water District) and 218 (Meiners Oaks – County Fire Station) and were updated for water year 2023 (Figure 2.1). Total precipitation for water year 2023 was 43.83 inches, compared to the average of 21.09 inches at gages 020B and 218 for 1926-2023 (Figure 2.2).

The water year type for 2023 was classified as wet (Figure 2.2) based on total annual precipitation (from Ventura County Watershed Protection District rainfall gage 20B) for a given water year compared to long-term historical precipitation trends from precipitation gages within the Basin (see Section 3.1.1.1 in the GSP [UVRGA, 2022a]). Forty percent of the precipitation for water year 2023 was during the month of January and most of the months experienced above average precipitation, including a rare significant precipitation event during August 2023.

2.2 Numerical Groundwater Model Update

The numerical groundwater model constructed for the GSP simulated the historical period (2006-2019) to calculate the historical and current water budget components based on observed and estimated data for extraction rates, natural recharge and return flows, evapotranspiration, and streamflow (Appendix H in the GSP; UVRGA, 2022a). The model was updated for previous Annual Reports to include data for their respective reported water years. For this third Annual Report, the numerical model was updated to include data for water year 2023. An additional update to the numerical model for water year 2023 included updating the MODFLOW streamflow routing package (SFR) to address significant changes in the Ventura River channel morphology resulting from a significant flooding event that occurred in January 2023. Light Detection and Ranging (LiDAR) data was collected within the UVRGB to provide a basis for updating the SFR package.

2.3 Groundwater Elevations [§356.2(b)(1)(A),(B)]

§356.2 Annual Reports. *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

(b) *A detailed description and graphical representation of the following conditions of the basin managed in the Plan:*

(1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:

(A) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.

(B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.

Groundwater levels were monitored by the County of Ventura, UVRGA, Meiners Oaks Water District (MOWD), and a private well owner. Groundwater elevations were updated through water year 2023 for the monitoring wells in the UVRGB monitoring network (Figure 2.3). Figure 2.3 also shows the hydrogeologic areas for the Basin identified in the GSP, which are used to facilitate explanation of conditions in different areas of the Basin. Generally, groundwater flow is from a northern to southern direction, following the surface drainage and the topographic gradient of the Basin. In the Mira Monte/Meiners Oaks hydrogeologic area, groundwater flow is generally to the southwest and west towards the Upper Ventura River.

2.3.1 Groundwater Elevation Contours [§356.2(b)(1)(A)]

Modeled groundwater levels were used to produce the groundwater level contour maps discussed below. Observed groundwater levels for the seasonal highs (spring) and lows (fall) for water year 2023 are included on the contour maps for reference. Observed data may not agree with the contours due to differences in measurement date compared to modeled date and differences inherent in the model calibration.

Groundwater level contours for the water year 2023 spring-high season (March of 2023) indicate flow directions and gradient were generally from north to south, which is consistent with previous years (Figure 2.4). Groundwater level contours for the water year 2023 fall-low season (September of 2023) indicate flow directions were consistent with the spring-high season for the same water year (Figure 2.5). Groundwater level measurements were on average approximately 8 feet (ft) lower in September compared to March during the 2023 water year, with most of the declines occurring in the central part of the Basin adjacent to the Upper Ventura River channel.

2.3.2 Groundwater Elevation Hydrographs [§356.2(b)(1)(B)]

Groundwater elevation hydrographs for representative monitoring wells in the Basin are shown with water year types in Figure 2.6. The temporal trend during water year 2023 is upward for all monitoring wells except for well 03N23W08B07S. The upward trends at most monitoring wells are due to an exceptionally wet year following consecutive years of below average streamflow and precipitation.

2.4 Groundwater Quality

Groundwater quality data was collected by the County of Ventura and potable water suppliers reporting to the California Division of Drinking Water. Maps of average concentrations of the key indicator constituents for water year 2023 in the UVRGB are shown in Figures 2.7 through 2.11.

The average nitrate concentrations in water year 2023 ranged from 2.3 milligrams per liter [mg/L] to 11.5 mg/L (Figure 2.7) and are consistent with the historical data for the Basin (see GSP section 3.2.4; UVRGA, 20232023). Nitrate concentrations are highest in the Mira Monte/Meiners Oaks area to the east of the Ventura River, with one well having average nitrate concentrations above the Maximum Contaminant Level (MCL) of 10 mg/L with an average concentration of 11.5 mg/L for water year 2023. The Mira Monte/Meiners Oaks area is known to be a source of nitrate for the Basin (UVRGA, 2022a). All the remaining wells in the Basin have average concentrations below the MCL, which is consistent with the historical record. While nitrate levels of up to 10 mg/L as Nitrogen are acceptable based on drinking water standards, the Water Quality Objective (WQO) for total Nitrogen in the Ventura River within the UVRGB, as defined in the Regional Water Quality Control Board (RWQCB) Basin Plan (RWQCB-LA, 2019), is 5 mg/L (Nitrate-N + Nitrite-N). Nitrate concentrations in groundwater outside of the Mira Monte/Meiners Oaks area are lower than the (RWQCB) Basin Plan WQO of 5 mg/L, except for one well (5.7 mg/L in 04N23W09B04S; see Figure 2.7).

The average total dissolved solids (TDS), sulfate, chloride, and boron concentrations for water year 2023 are all consistent with the historical data for the Basin (Figures 2.8 through 2.11). Some of the sampled wells were not analyzed for these constituents during water year 2023; however, the spatial distribution of available water quality data was adequate for annual reporting purposes. Please see the GSP section 3.2.4 for additional detail on the groundwater quality for the Basin (UVRGA, 2022a).

2.5 Groundwater Extraction [§356.2(b)(2)]

> **§356.2 Annual Reports.** *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*
>
> ***(b)*** *A detailed description and graphical representation of the following conditions of the basin managed in the Plan:*
>
> ***(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.***

Groundwater extractions were metered by Ventura River Water District (VRWD), MOWD, CMWD, and the City of Ventura and some private well owners. Pursuant to UVRGA's well registration, metering, and reporting ordinances (Ordinance Nos. 1 through 3), all wells extracting more than 2 acre-feet per year of groundwater are required to have a calibrated flow meter installed and report groundwater extractions to UVRGA quarterly. Implementation of the ordinances began during water year 2023, but the timing of implementation was such that metered extraction data for the entirety of water year 2023 was not

obtained. Therefore, the extractions for private, non-*de minimis* wells and *de minimis* domestic wells were estimated using the assumptions included in the GSP.

Monthly groundwater extraction data were provided by the City of Ventura, CMWD, VRWD, and MOWD, which report volumes supplying municipal and industrial (M&I) water uses for the Basin. Agricultural groundwater supplies within the Basin were estimated using the methods described in the GSP (UVRGA, 2022a). Domestic well extractions were estimated by assuming domestic wells in the Basin were providing a de minimis amount (2 acre-feet per year [AF/yr]) of water for domestic use. Groundwater extraction due to riparian vegetation[2] was calculated using the numerical groundwater model (see Appendix H in GSP; UVRGA, 2022a). The values discussed in this section and presented in Table 2.1 reflect total extracted groundwater from the UVRGB. It is noted that significant volumes of extracted groundwater are exported from the Basin, explaining the differences between the values for extracted groundwater and groundwater use within the Basin (i.e., difference in reported values in Tables 2.1 and 2.2). The extracted volumes for water year 2023 are summarized by water use sector in Table 2.1. Total extraction via pumping wells (i.e., excluding the riparian vegetation evapotranspiration[1]) for water year 2023 (4,011 AF/yr) was less than the historical average of 5,035 AF/yr (2006-2019). Agricultural groundwater use accounts for 14% of the total extraction via pumping wells for water year 2023, compared to 6% for the historical average, although it is noted that the agricultural extractions are estimated. Domestic extraction rates were consistent with the historical period and M&I extraction rates were slightly lower (82% of the total extraction via pumping for water year 2023, compared to 90% for the historical average), although it is noted that the domestic extractions are estimated. The reported/estimated volumes extracted from each well during water year 2023 are shown on Figure 2.12.

2.6 Surface Water Supply [§356.2(b)(3)]

§356.2 Annual Reports. *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

(b) *A detailed description and graphical representation of the following conditions of the basin managed in the Plan:*

(3) Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.

Surface water supply data were provided by MOWD and VRWD. Surface water is supplied to the Basin by CMWD as direct deliveries to CMWD retail M&I and agricultural customers and as wholesale deliveries to the retailers VRWD and MOWD for M&I and agricultural use. Historically, surface water is estimated to be ~26% of the total deliveries (UVRGA, 2022a). Monthly purchases from CMWD were provided by VRWD and MOWD. Data for direct retail deliveries by CMWD were not available and were estimated using the methods described in the GSP (UVRGA, 2022a). The total estimated surface water supply volume for water year 2023 was 1,340 AF/yr (see Table 2.2 and Figure 2.13).

[2] Includes the invasive species Arundo.

2.7 Total Water Use [§356.2(b)(4)]

§356.2 Annual Reports. *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

(b) *A detailed description and graphical representation of the following conditions of the basin managed in the Plan:*

(4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.

Water demands in the UVRGB consist of M&I, agricultural, and domestic demands, which are met by a mix of groundwater extractions and surface water deliveries. Additional groundwater use is calculated for evapotranspiration by riparian vegetation[3] using the numerical model (see Appendix H in GSP; UVRGA, 2022a). Water year 2023 data sources are detailed in Table 2.2 and Figure 2.13. The total water use components were measured or estimated using methods described in the GSP (UVRGA, 2022a).

The total water used within UVRGB during water year 2023 was 3,089 AF/yr (see Table 2.2 and Figure 2.13).

2.8 Change in Storage [§356.2(b)(5)(A),(B)]

§356.2 Annual Reports. *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

(b) *A detailed description and graphical representation of the following conditions of the basin managed in the Plan:*

(5) Change in groundwater in storage shall include the following:

(A) Change in groundwater in storage maps for each principal aquifer in the basin.

(B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.

The updated numerical groundwater model was used to calculate the change in storage for the UVRGB for water year 2023, which is shown in Figure 2.14.

The total change in storage between spring-high groundwater levels in water years 2022 and 2023 was calculated to increase by 11,898 AF (Figure 2.14). The increase in storage calculated for water year 2023 2023 is due primarily to increases in surface water percolation. The change in storage for the Basin was

[3] Includes the invasive species Arundo.

also calculated for each hydrogeologic area and the greatest changes in storage are in the Robles, Mira Monte/Meiners Oaks, and Santa Ana areas (Figure 2.14).

Figure 2.15 shows the water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the Basin, starting in 2006. The cumulative change in storage for the Basin from water years 2006 to 2023 was -584 AF.

3.0 Plan Implementation [§356.2(c)]

§356.2 Annual Reports. *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

(c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.

The plan implementation for the UVRGA GSP was initiated with the submittal of the GSP to DWR in January of 2022. The GSP was approved by DWR in April 2023. Progress towards implementing the UVRGA GSP is evaluated by comparing monitoring data to the SMC for each applicable sustainability indicator for the past water year (2022). The monitoring data consists of groundwater levels, groundwater quality, and streamflow. The monitoring networks for the Basin are still being built-out, regardless, all currently available data are evaluated for this Annual Report.

3.1 Chronic Lowering of Groundwater Levels and Reduction of Groundwater Storage

The SMC are the same for both the chronic lowering of groundwater levels and reduction of groundwater storage sustainability indicators because groundwater levels are used as a proxy for the reduction of groundwater storage indicator. Groundwater levels were evaluated for the seven representative monitoring wells within the Basin and were plotted against their respective minimum thresholds, measurable objectives, and interim measures (Figure 3.1).

The minimum threshold was not exceeded in any wells. One well (05N23W33B03S) had post-wet season groundwater levels between the 5-year interim milestone and measurable objective and the remaining six wells met their respective measurable objectives in water year 2023 (Table 3.1). Groundwater levels for water year 2023 were relatively high due to the wet water year and is reflected in the hydrographs' upward trends (see Figure 3.1). Undesirable results associated with water level declines is defined as a minimum threshold exceedance at all seven representative monitoring sites, which has not been experienced.

3.2 Degraded Water Quality

Water year 2023 groundwater quality data was available for seven of the eight monitoring wells or closely spaced groups of wells (Figure 3.2). Well group 1 and well 04N23W15B02S were not analyzed for the

primary constituents (Nitrate, TDS, chloride, sulfate, and boron), and well groups 2 and 3 and wells 04N23W15B02S, 04N23W16A01S, and 03N23W05A01S were not analyzed for TDS, chloride, sulfate, and boron during water year 2023. However, the spatial distribution of available water quality data was adequate for annual reporting purposes.

Nitrate is the only constituent of concern for the degraded water quality sustainability indicator (UVRGA, 2022a). The minimum threshold was defined as any nitrate isocontour exceeding 10 mg/L located outside of the Mira Monte/Meiners Oaks Area, encompassing domestic wells that produce groundwater from the alluvial aquifer that do not have an alternative source of drinking water that is determined by UVRGA to be caused by pumping or GSP projects/management actions. The Mira Monte/Meiners Oaks Area is recognized as a source area for nitrate in groundwater and as such, minimum thresholds do not apply in this area. The public water supply well operators currently manage nitrate by blending with surface water from Lake Casitas. Nitrate measurable objectives were developed for two distinct areas of the Basin: (1) areas with predominantly percolating groundwater (Kennedy, Robles, and Santa Ana areas), and (2) areas with predominantly rising groundwater (in the Casitas Springs Area) (see Table 3.2 for further explanation). An isocontour value of 7.5 mg/L (as nitrogen) is the measurable objective for the percolating groundwater, and an isocontour value of 3 mg/L (as nitrogen) is used for the measurable objective in the Casitas Springs Area.

Figure 3.3 shows the nitrate (as total nitrogen) isocontours for water year 2023, which is based on annual average concentrations observed at the six wells and well groups with available data. Based on the interpreted contours, water year 2023 results meet the measurable objectives for both areas of predominately percolating groundwater (Kennedy, Robles, and Santa Ana areas) and predominantly rising groundwater levels (Casitas Springs Area). Table 3.2 summarizes the SMC and nitrate results for water year 2023.

3.3 Depletion of Interconnected Surface Water

The Ventura River is considered an interconnected stream system with complex groundwater-surface water interactions that vary significantly with time and location in the Basin. The GSP concluded that significant and unreasonable effects on the Foster Park Habitat Area (see Figure 2.3) could potentially occur under certain low-flow conditions (UVRGA, 2022a). SMC established for this area are shown on Table 3.3. The minimum threshold and measurable objective are the same for this sustainability indicator, and the 5-year interim milestone is equal to the maximum simulated depletion in excess of the measurable objective during the historical period (2006-2019), which is equal to 10.7 cubic feet per second (cfs) (UVRGA, 2022a).

Numerical modeling output was analyzed to assess the frequency, duration, and volume of depletions that are simulated to cause undepleted[4] Ventura River flows at the Foster Park USGS stream gage to be depleted below 2 cfs during water year 2023 (Table 3.3 and Figure 3.4). The top chart in Figure 3.4 shows undepleted flows (blue) and depleted flows (red). The difference between the blue and red lines at any point in time is the total depletion, which is shown as the black line on the bottom chart. The bottom chart on Figure 3.4 also shows the direct depletion in blue. Indirect depletion is not plotted explicitly; it is the distance between blue direct depletion line and the black total depletion line. The minimum threshold is

[4] Streamflow that would exist if no groundwater pumping had occurred.

plotted in orange. Undepleted flow was not simulated to be below 2 cfs during water year 2023. The modeled depletion results for water year 2023 did not exceed the minimum threshold and met the 5-year interim milestone and measurable objective.

3.4 Land Subsidence

The GSP concluded that the land subsidence sustainability indicator is not applicable to UVRGB because of the small aquifer thickness, coarse-grained nature of the aquifer, lack of significant clay units within the aquifer, and extremely rapid recovery of groundwater levels during recharge events. Nonetheless, the GSP included annual review of interferometric synthetic aperture radar (InSAR) data (subject to continued availability from DWR) to confirm the absence of land subsidence related to groundwater conditions.

DWR provides land surface displacement data for the UVRGB on their SGMA Data Viewer Web-based geographic information system viewer (DWR, 2022), which includes InSAR measurements for water year 2022 (TRE Altamira, Inc., 2020). This land surface displacement dataset was downloaded and reviewed. DWR has stated that on a statewide level for the total vertical displacement measurements between June 2015 and June 2018, the errors due to measurement are as follows (Paso Robles GSA, 2020):

- The error between InSAR data and continuous global positioning system (GPS) data is 16 mm (0.052 ft) with a 95% confidence level, and
- The measurement accuracy when converting from the raw InSAR data to the maps provided by DWR is 0.048 ft with 95% confidence level.

Therefore, a land surface change of less than 0.1 ft (the cumulative error) is within the noise of the data collection and processing and is considered equivalent to no measurable subsidence in this GSP.

The reported cumulative vertical displacement from the InSAR measurements during water year 2023 were consistently well below the accuracy range and areas falling below the accuracy range are shown in gray on Figure 3.5. This indicates that there is no measurable land subsidence due to groundwater withdrawal within the UVRGB.

3.5 Seawater Intrusion

The GSP concluded that the seawater intrusion sustainability indicator is not applicable to UVRGB because it is an inland basin with no connection to the ocean. UVRGB is located 6 miles inland from the Pacific Ocean and the base of the Basin (bedrock elevation) along the southern boundary (also the lowest point in the Basin) is ~160 ft above mean sea level.

3.6 Projects and Management Actions

3.6.1 Domestic Well Survey

The UVRGA Board of Directors adopted the Ordinance Establishing Well Registration, Metering, and Reporting Requirements in July 2022. The ordinance requires the well owners to register existing and new

wells with UVRGA, flowmeters on all non-de minimis wells, period flowmeter calibration verification, and quarterly reporting of groundwater extractions. The well registration form developed for ordinance implementation serves as the primary tool for performing the domestic well survey. The registration form collects information about domestic wells including whether the well is used for drinking water supply and whether a backup potable water supply is available. The form also offers nitrate testing (to be paid for by UVRGA) for interested domestic well owners. Implementation of this management action was initiated during water year 2023 by reaching out to well owners to register their wells. As mentioned above, the well registration form includes a domestic well questionnaire. During water year 2023, 45 domestic well surveys were received.

3.6.2 Foster Park Protocols to Address Direct Depletion of Interconnected Surface Water

The Foster Park Protocols management action consists of operational protocols for the City of Ventura extraction facilities in the Foster Park Aquatic Habitat Area, which will address direct depletion of ISW. The Foster Park Protocols involve monitoring river gages and shutting down the City's extraction facilities when certain surface water flow thresholds are reached.

The implementation trigger for implementing the Foster Park Protocols was the settlement agreement between the City of Ventura and Santa Barbara Channelkeeper regarding the action titled Santa Barbara Channelkeeper v. State Water Resources Control Board and the City of San Buenaventura (Los Angeles County Superior Court, Case No. 19STCP01176) (Appendix D of the GSP). The settlement agreement was executed in September 2019 and amended in August 2020 (Appendix D of the GSP). The Foster Park Protocols have been operative since September 2019 and expected to be operative in perpetuity (Personal communication, e-mail from Jenny Tribo of City of Ventura to Bryan Bondy, dated May 19, 2021).

3.6.3 Actions to Address Indirect Depletion of Interconnected Surface Water

Action No. 1-2 of GSP Table 6.1-01 (Initiate Foster Park Aquatic Habitat Area Monitoring Program) was completed during water year 2023.

3.6.4 Groundwater Level Monitoring Well Data Gaps Project

Work on this project was initiated during water year 2023 and consisted of initial outreach to well owners to request access to add wells to the groundwater level and quality monitoring networks.

3.6.5 Stream Gage Data Gaps Project

Stream gaging was initiated at Camino Cielo Road and the location identified in the GSP "Planned Stream Gage A" during water year 2023. The third stream gage called for in this project near Santa Ana Boulevard was previously installed by DWR in 2021. Thus, this GSP project has been completed.

3.6.6 Confluence Aquatic Habitat Area Biological Monitoring Study

The Confluence Aquatic Habitat Area Aquatic GDE Monitoring Program was initiated during water year 2023.

3.6.7 Additional Projects and Management Actions for the GSP

This section describes any new projects or management actions that have been identified since adoption of the initial GSP. Projects or management actions described in this subsection are being described in the annual report to ensure they are eligible for funding under the Sustainable Groundwater Management Implementation Grant Program and/or other funding opportunities.

3.6.7.1 Optional Monitoring Wells to Improve Groundwater Levels and Quality Monitoring Networks

Upon additional evaluation, UVRGA determined that sustainable management of the Basin may require additional groundwater level and/or quality data in areas that were not identified in the initial GSP but have been identified since the GSP was prepared. Through the first annual report, UVRGA added optional monitoring well locations to the GSP for potential consideration during the GSP implementation period (Figures 3.6 and 3.7) to reflect UVRGA's current thinking about areas where additional monitoring wells may be required and/or improve the monitoring networks. UVRGA reserves the right to consider other areas for optional monitoring wells based on the status and availability of existing monitoring wells going forward, site access negotiations, ongoing monitoring data, GSP implementation progress, and other factors.

During water year 2022, UVRGA began working on a Sustainable Groundwater Management Implementation Grant application that includes a funding request for the optional monitoring wells. Unfortunately, the UVRGA did not receive a grant award. UVRGA was further informed by DWR staff that technical support services (TSS) for installation of monitoring wells are oversubscribed and new TSS applications are not being accepted. Due to the lack of grant and TSS funding, the optional monitoring wells are not currently being pursued, but may be reconsidered if new grant or TSS funding opportunities arise in the future.

4.0 References

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Figures

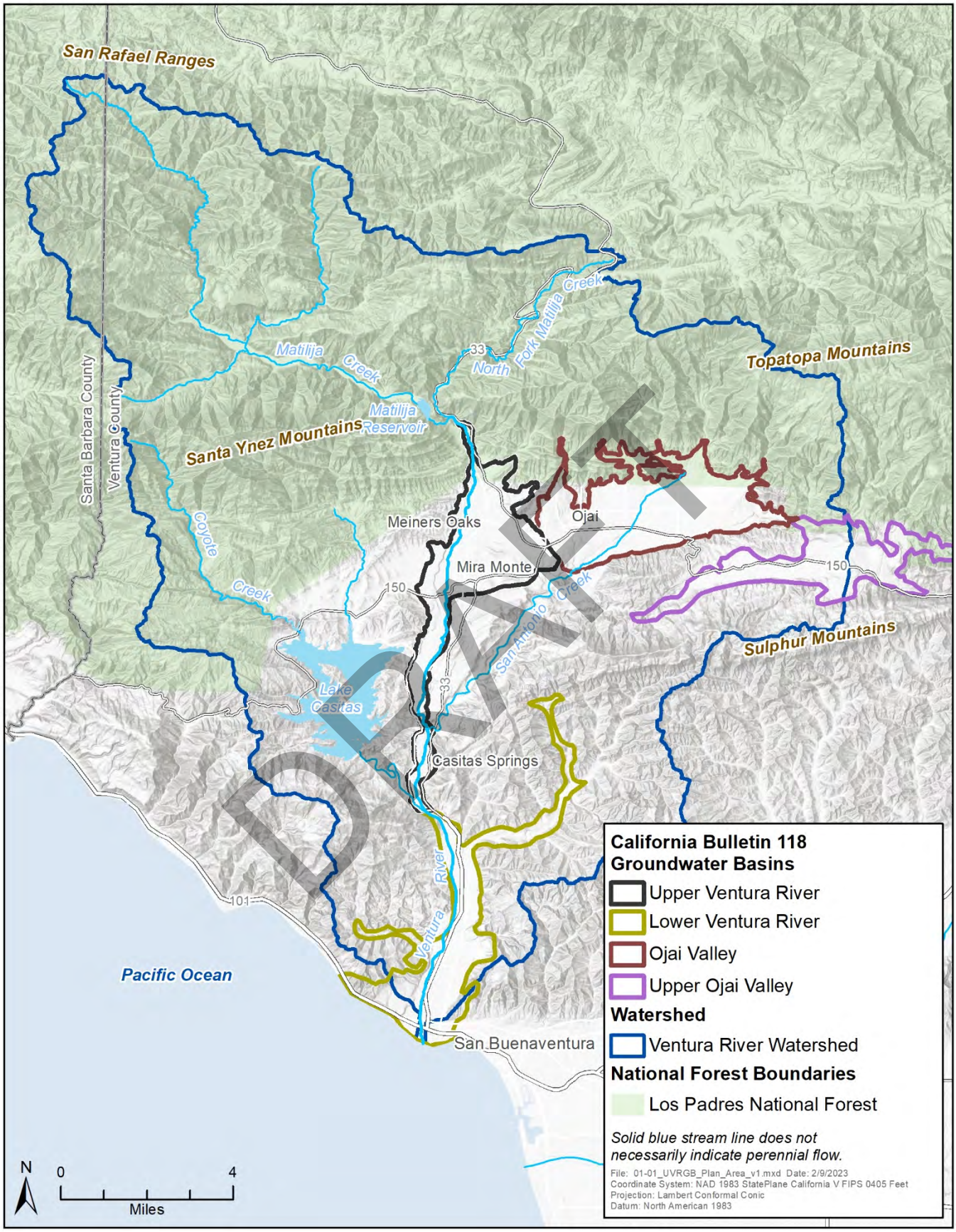


Figure 1.1 Upper Ventura River Groundwater Agency Basin Boundary Map.

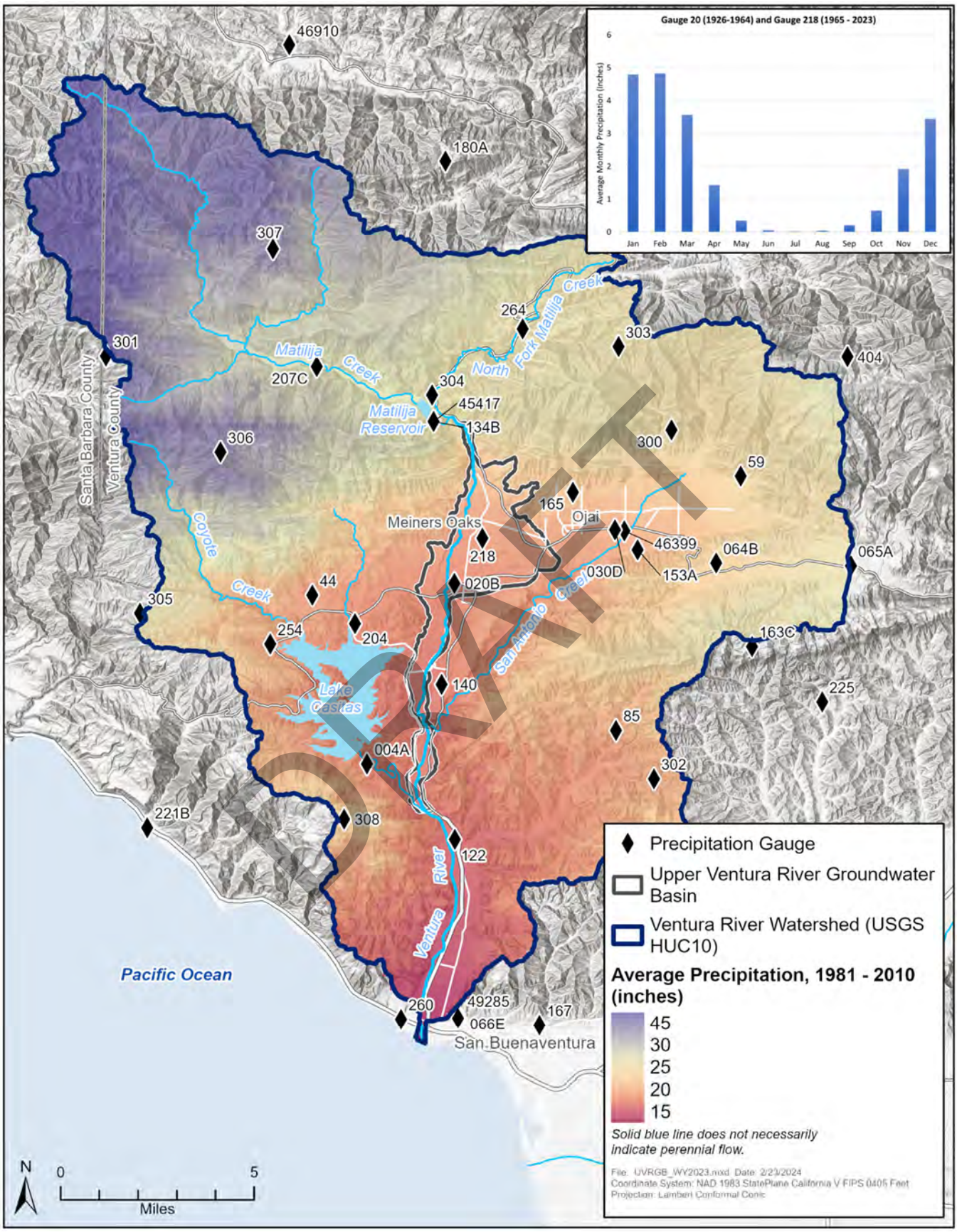
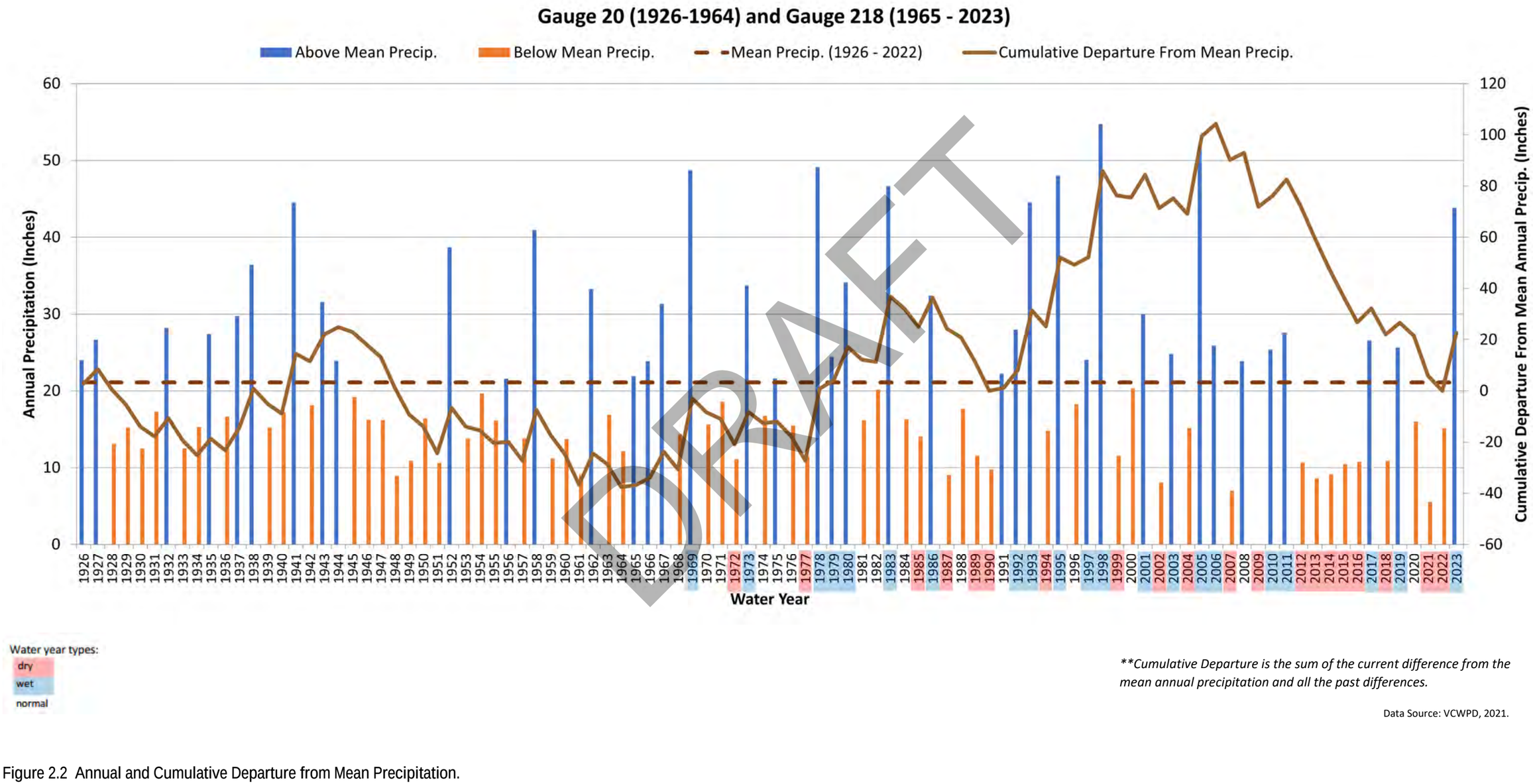


Figure 2.1 Precipitation Map in the Ventura River Watershed.



***Cumulative Departure is the sum of the current difference from the mean annual precipitation and all the past differences.*

Data Source: VCWPD, 2021.

Figure 2.2 Annual and Cumulative Departure from Mean Precipitation.

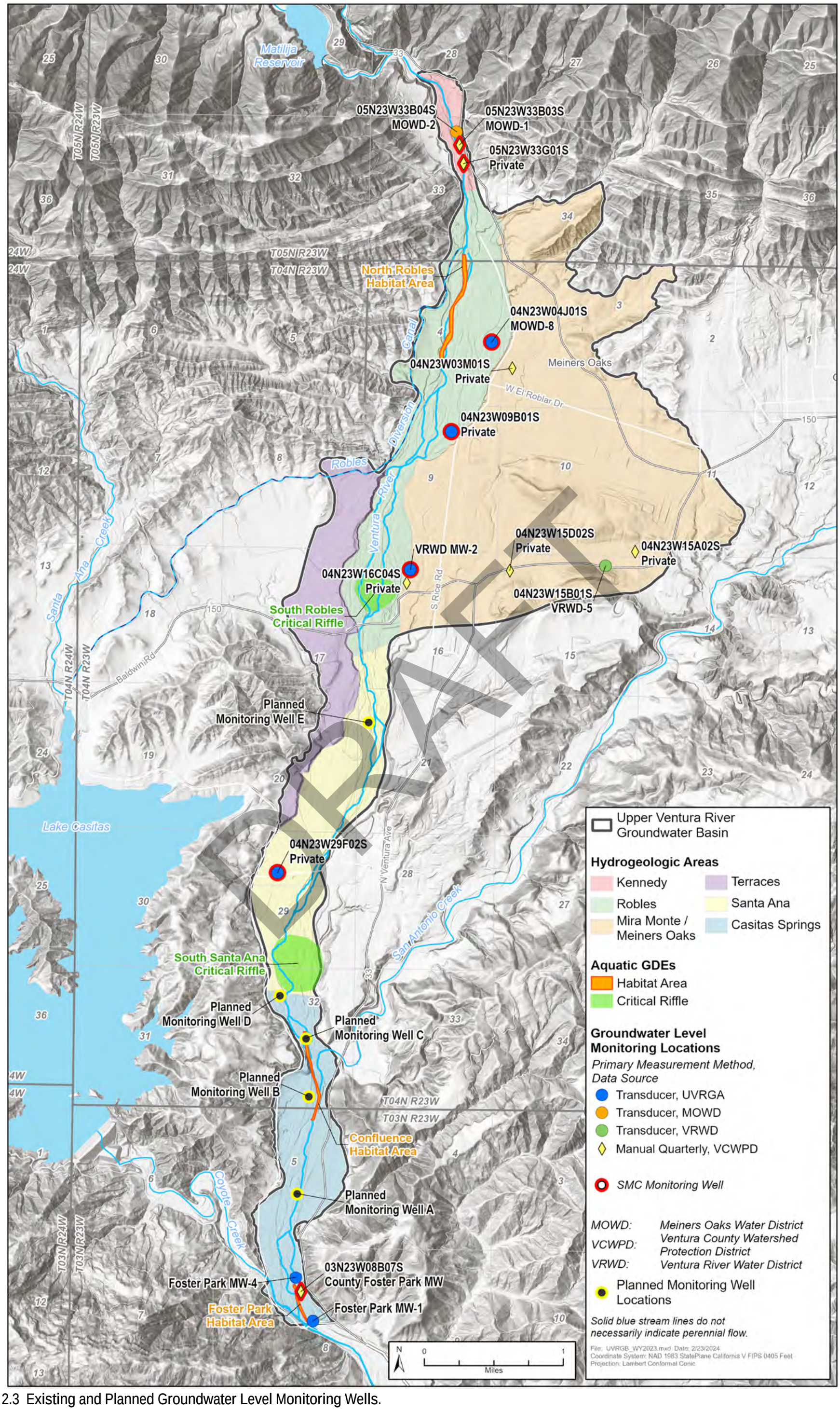


Figure 2.3 Existing and Planned Groundwater Level Monitoring Wells.

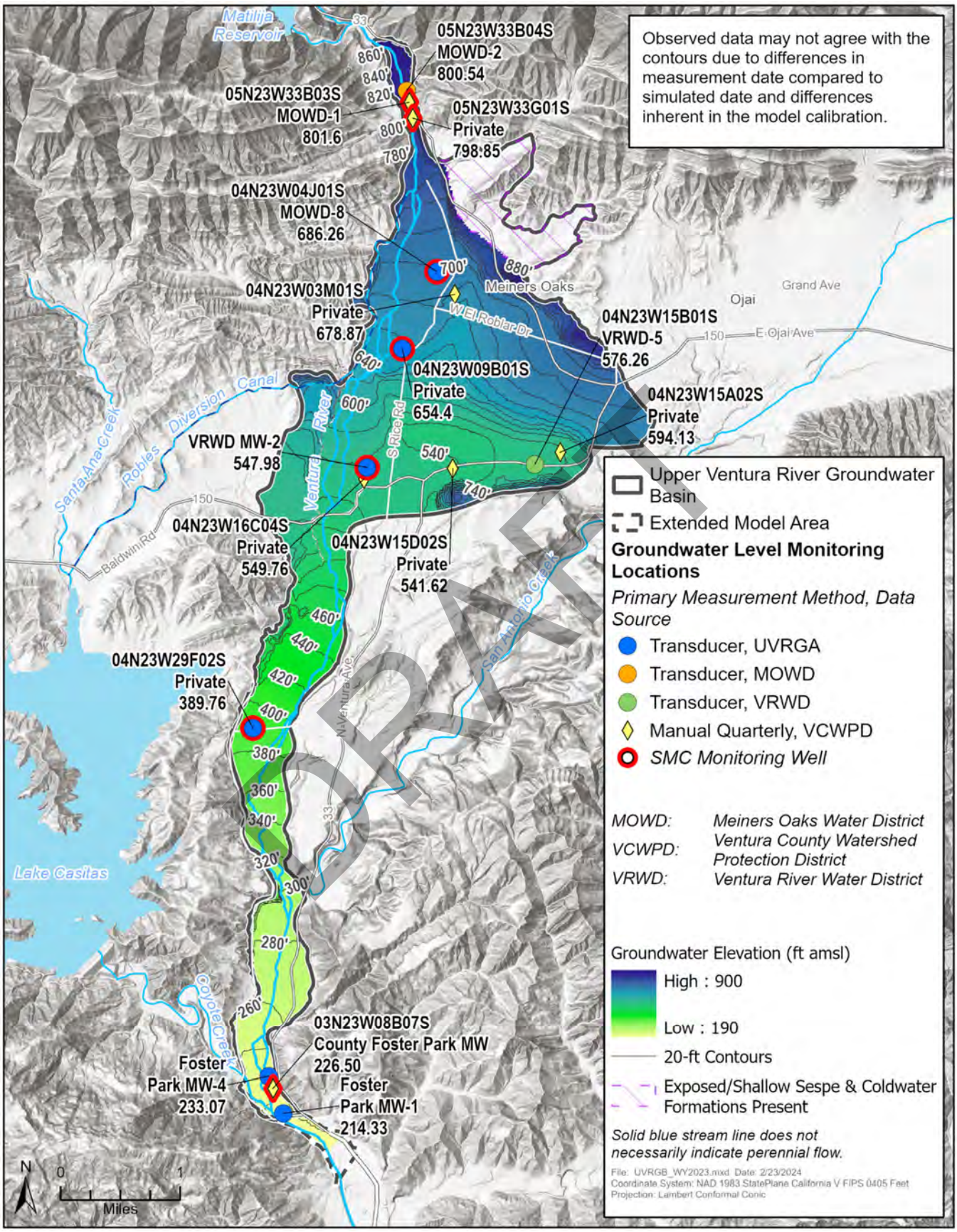


Figure 2.4 Contour Map for High Modeled and Observed Groundwater Levels (Wet Season) – March 2023.

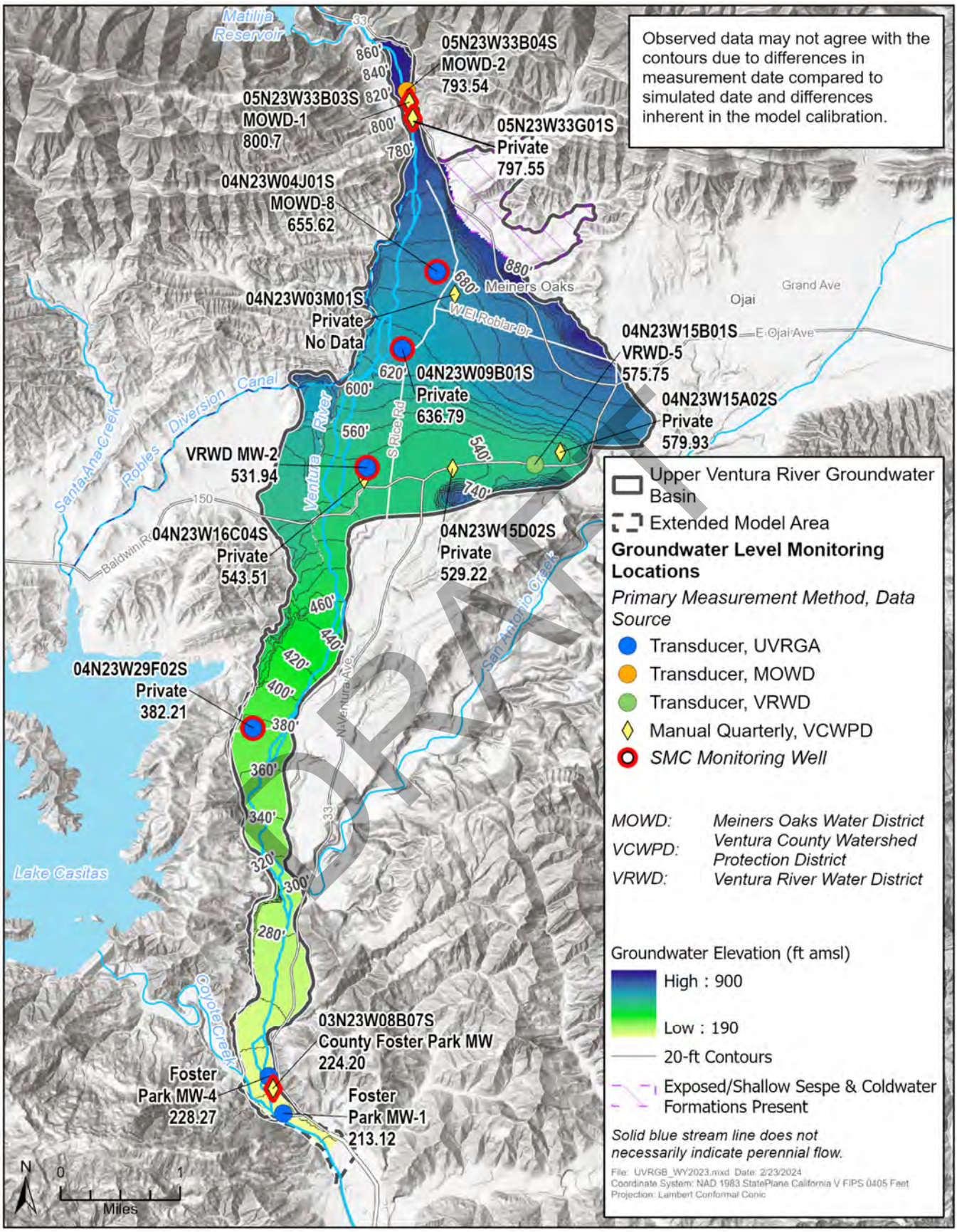


Figure 2.5 Contour Map for Low Modeled and Observed Groundwater Levels (Dry Season) – September 2023.

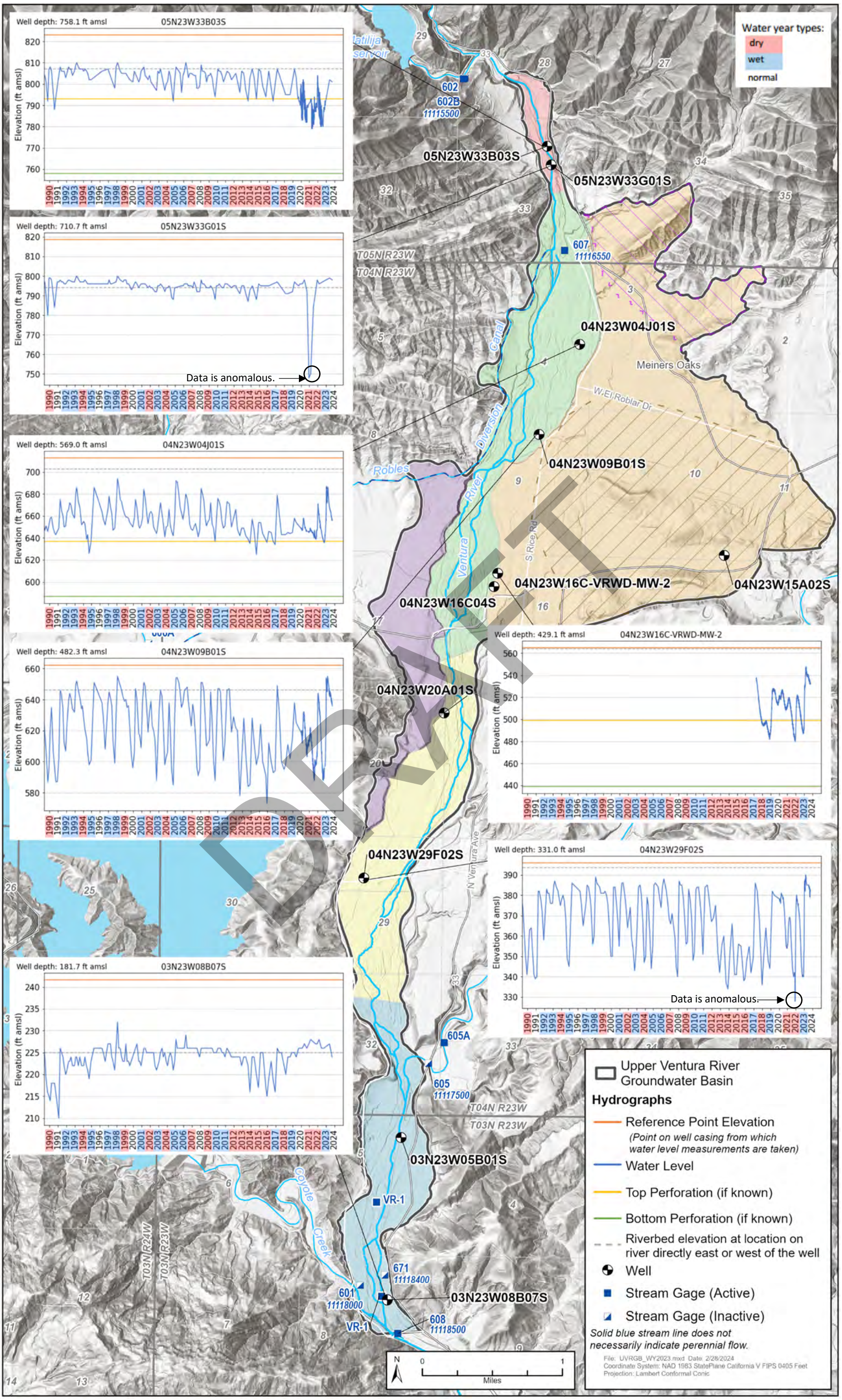


Figure 2.6 Groundwater Level Hydrographs for Key Wells in the UVRGB.

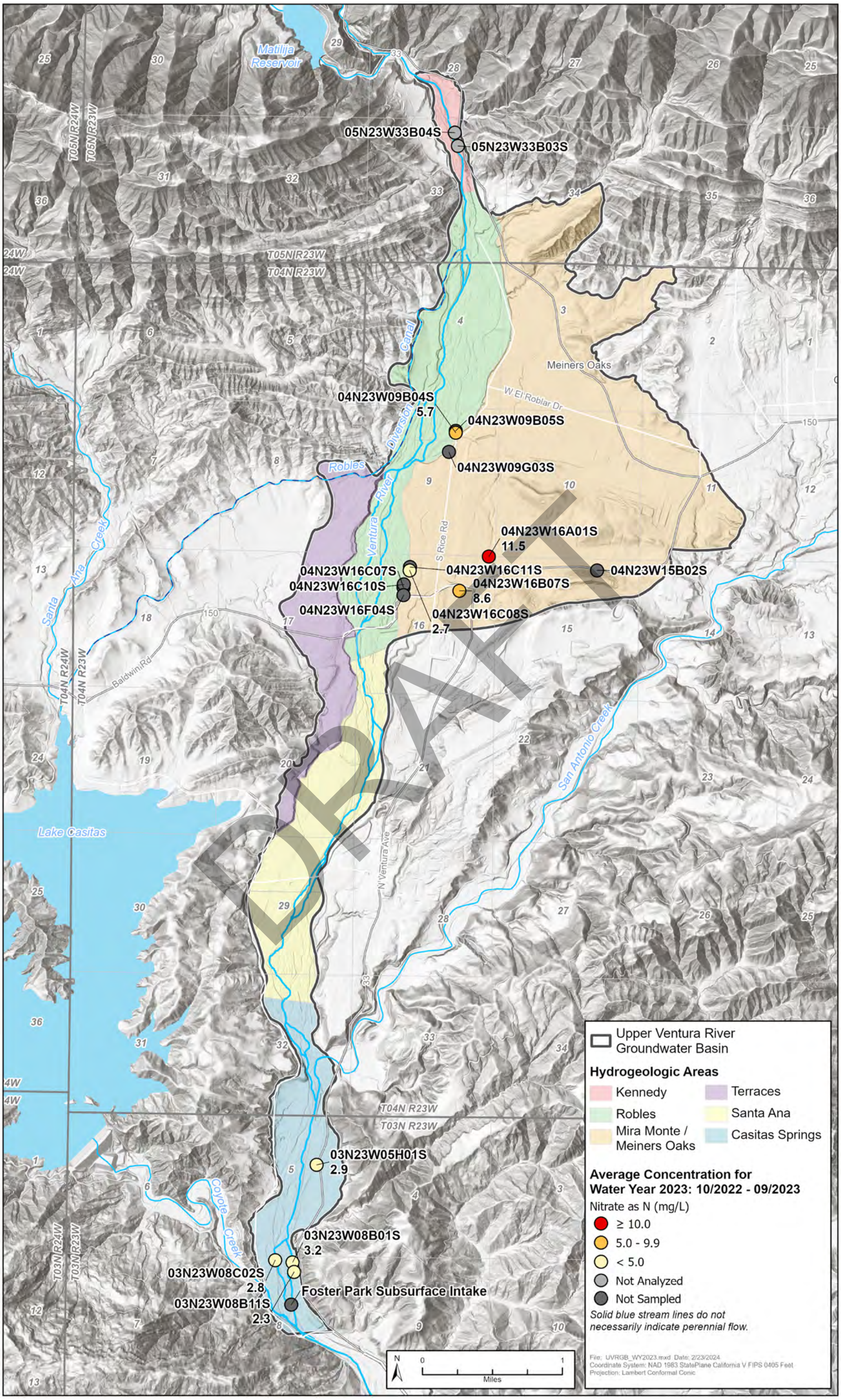


Figure 2.7 Average Nitrate as Nitrogen (N) Concentration in UVRGB, Water Year 2023.

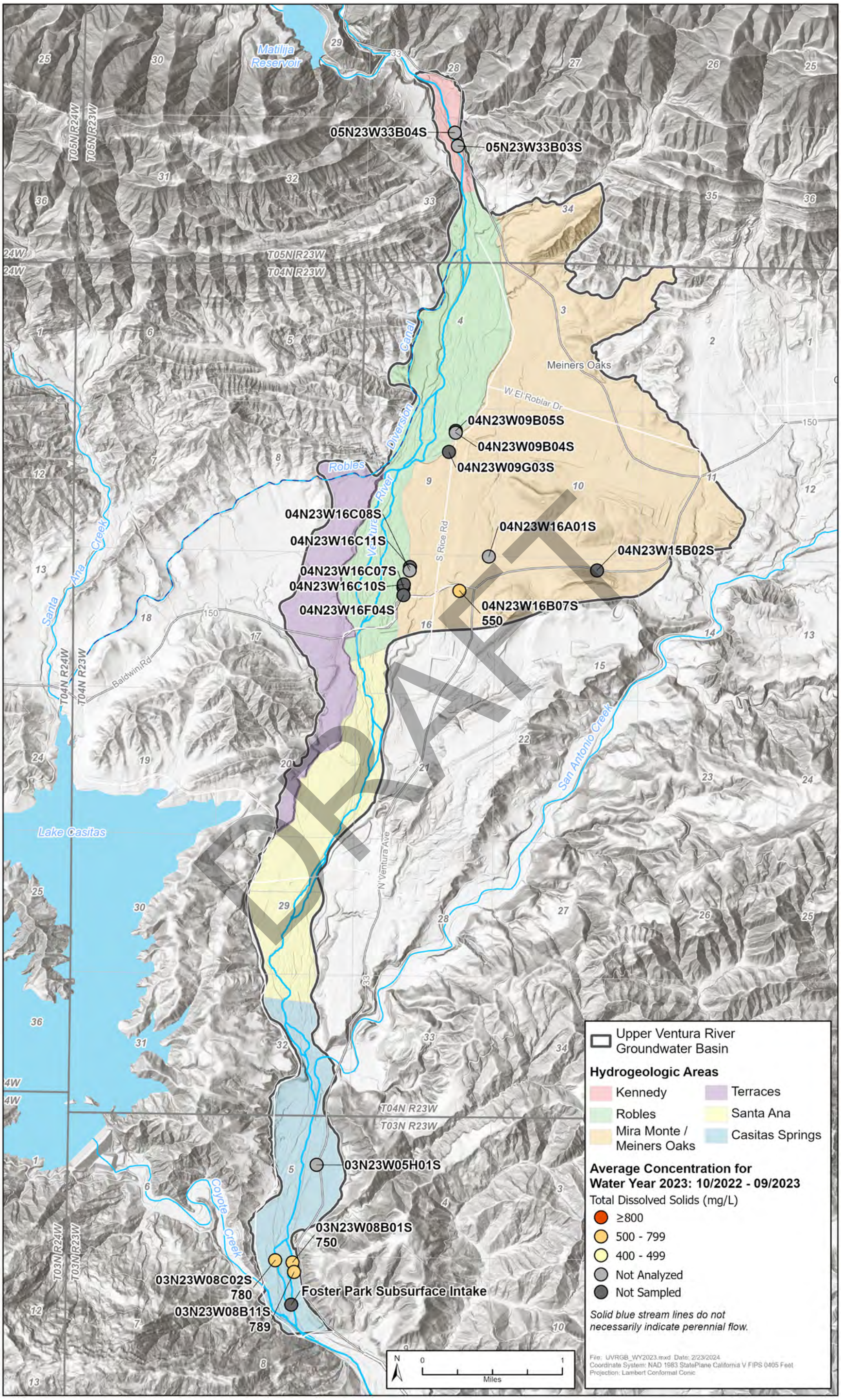


Figure 2.8 Average Total Dissolved Solids Concentration in UVRGB, Water Year 2023.

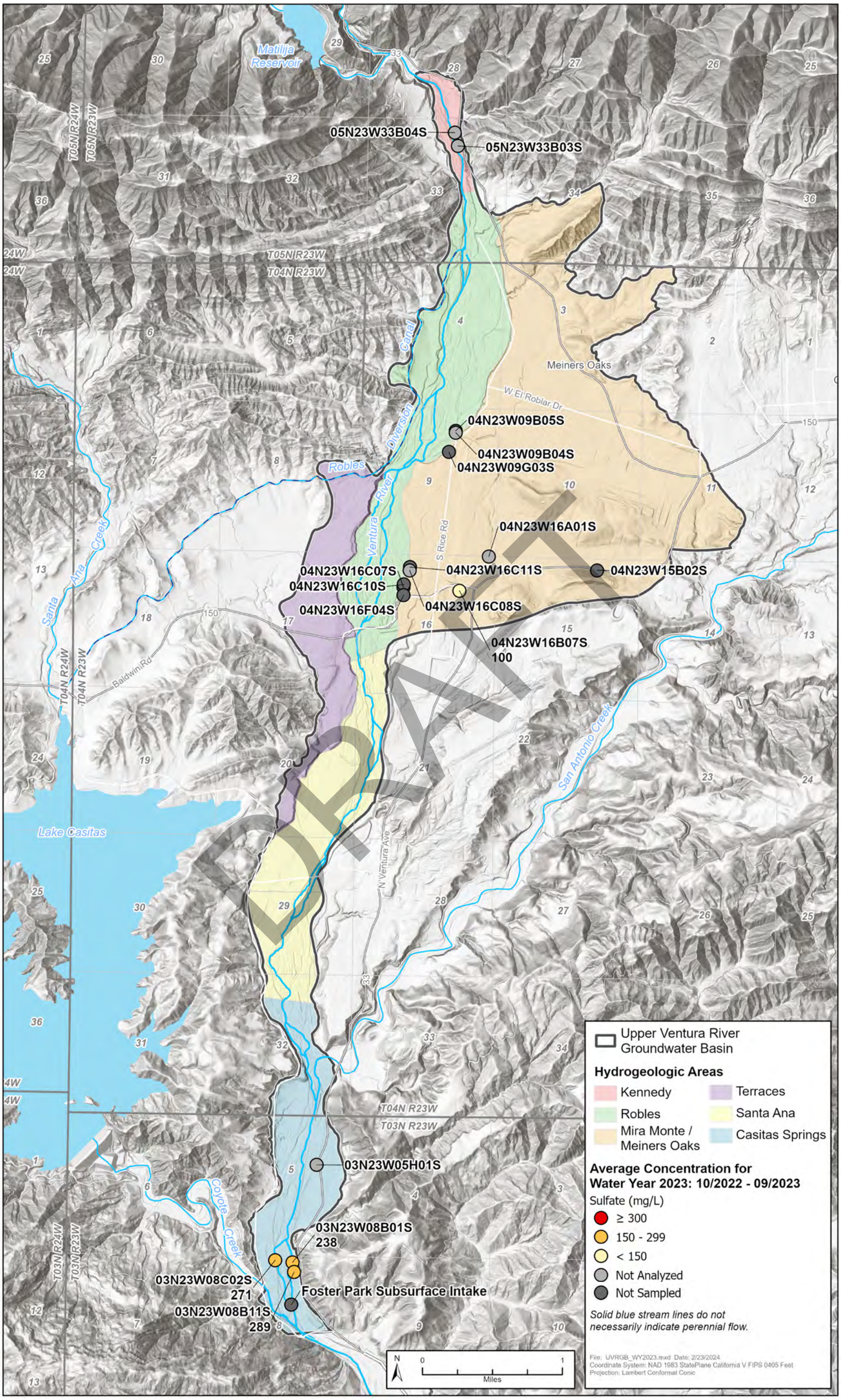


Figure 2.9 Average Sulfate Concentration in UVRGB, Water Year 2023.

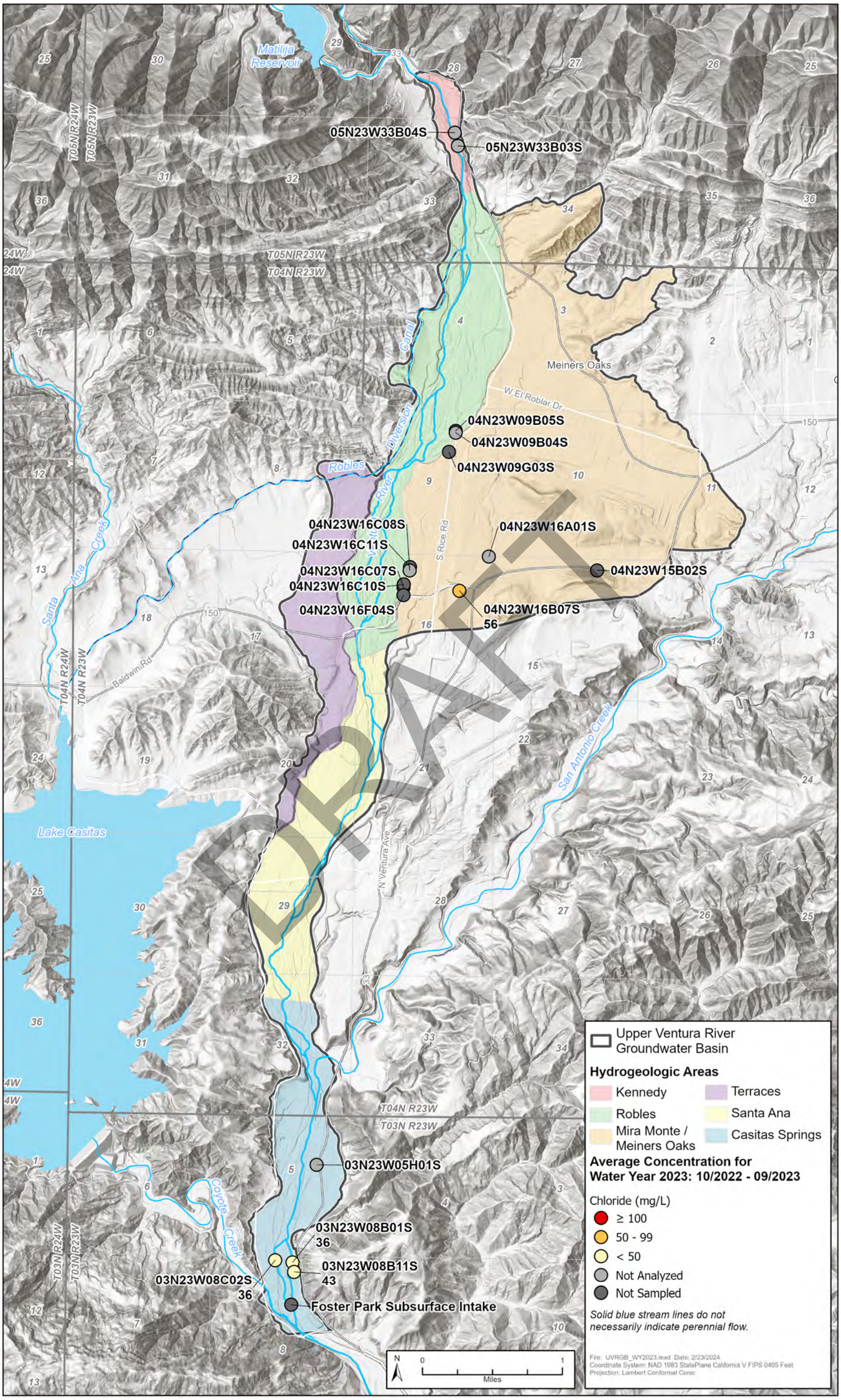


Figure 2.10 Average Chloride Concentration in UVRGB, Water Year 2023.

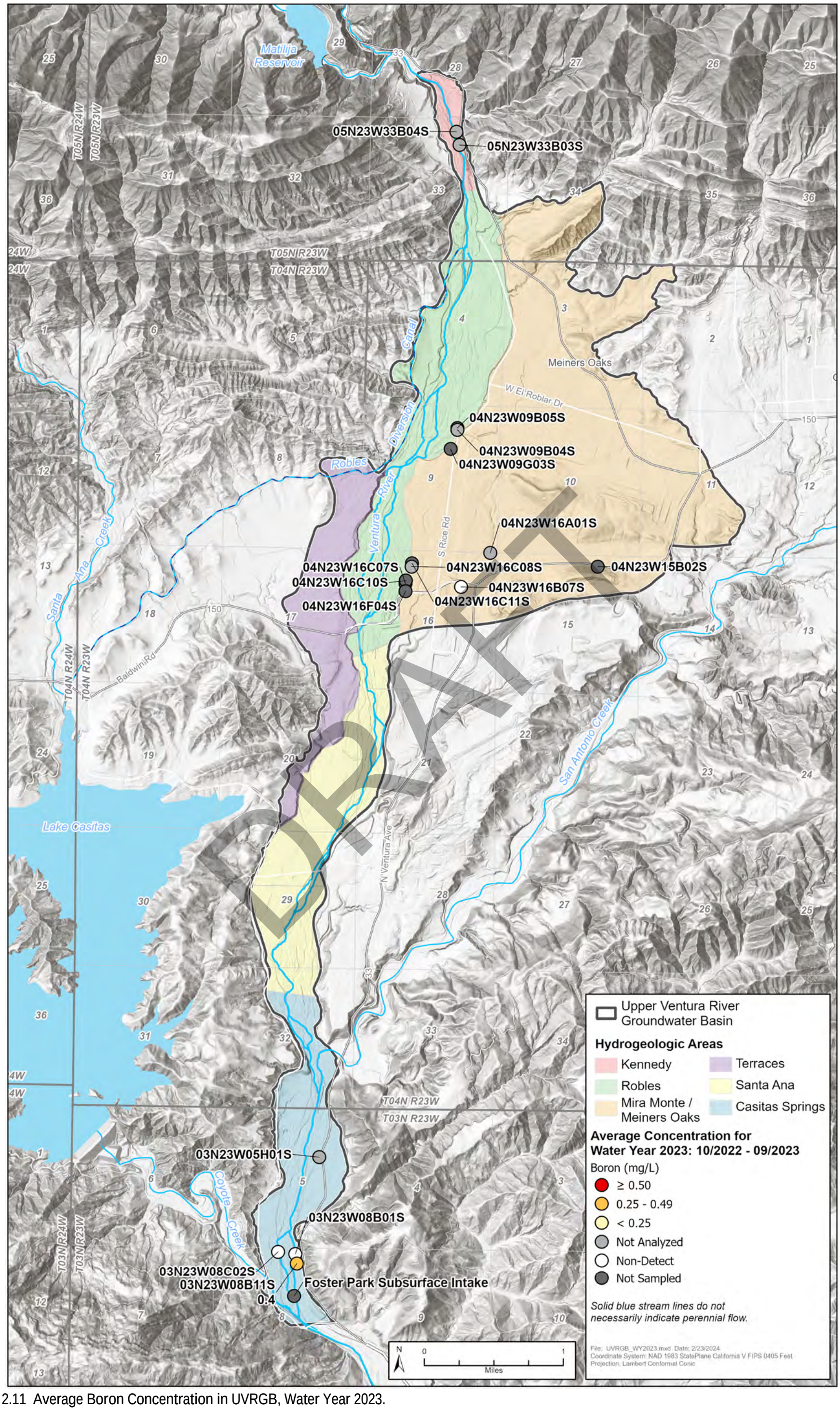


Figure 2.11 Average Boron Concentration in UVRGB, Water Year 2023.

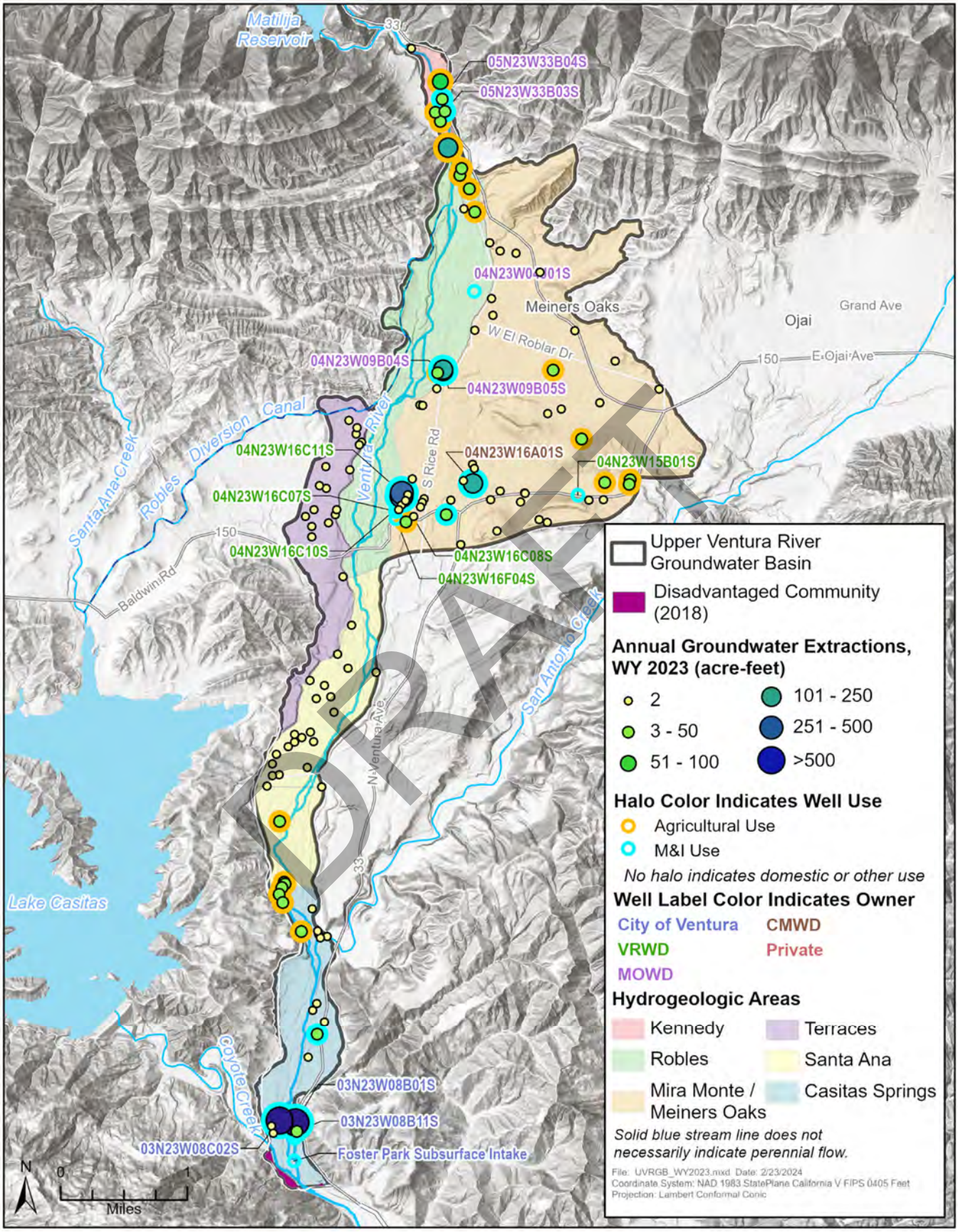


Figure 2.12 Extraction Well Rates, Water Year 2023.

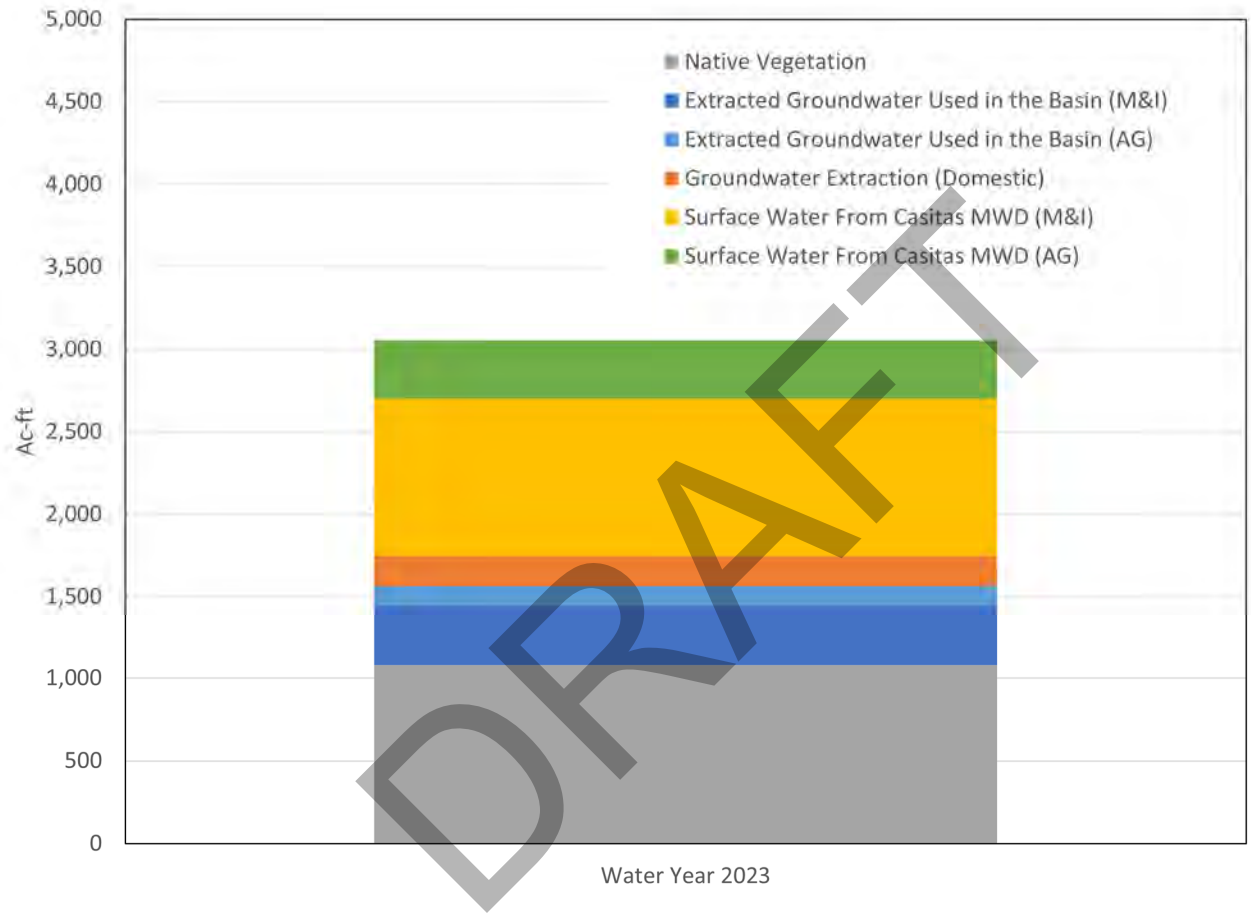


Figure 2.13 Total Water Use Within UVRGB During Water Year 2023.

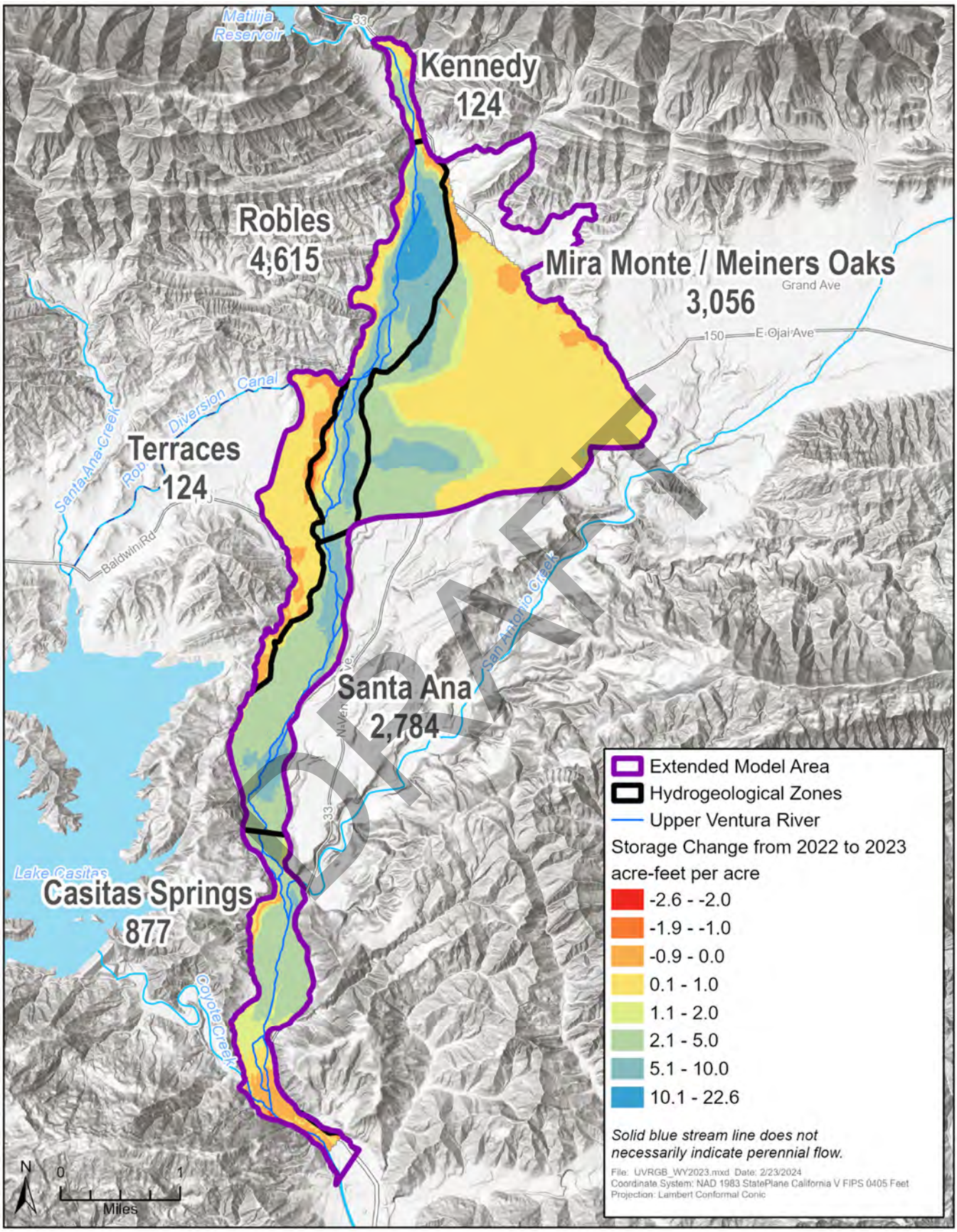


Figure 2.14 Change in Groundwater in Storage Map from Water Years 2022 to 2023.

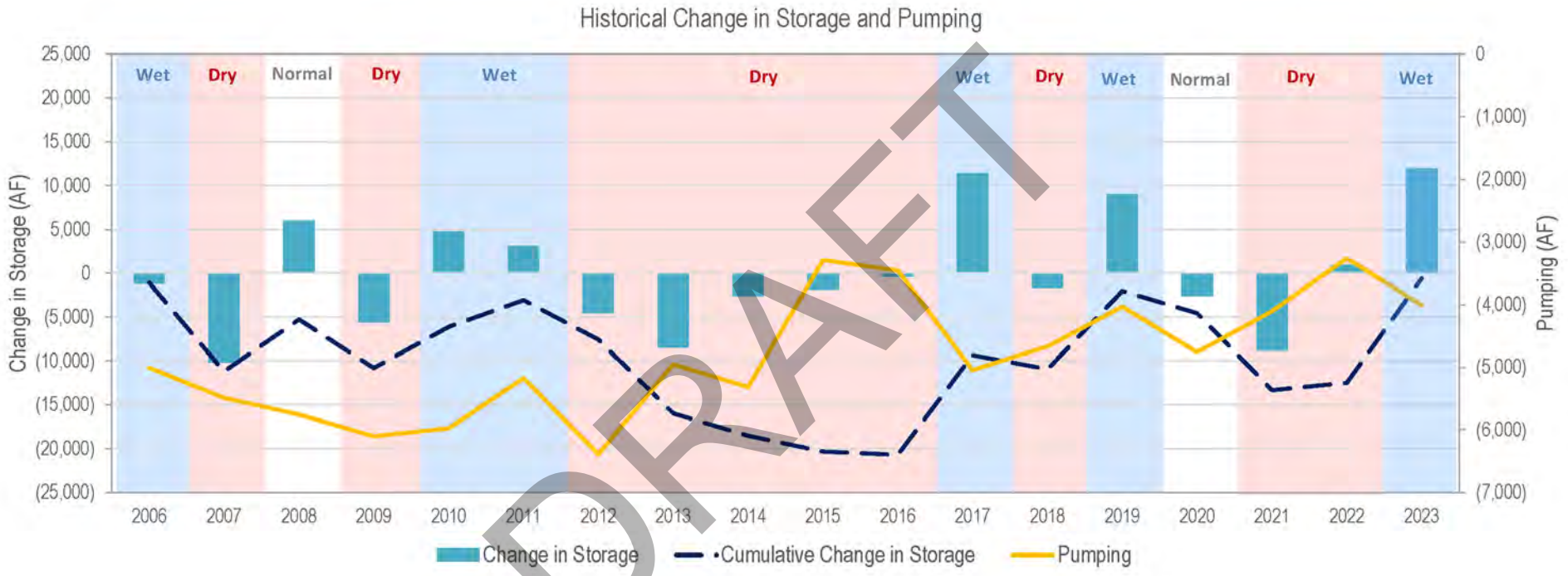
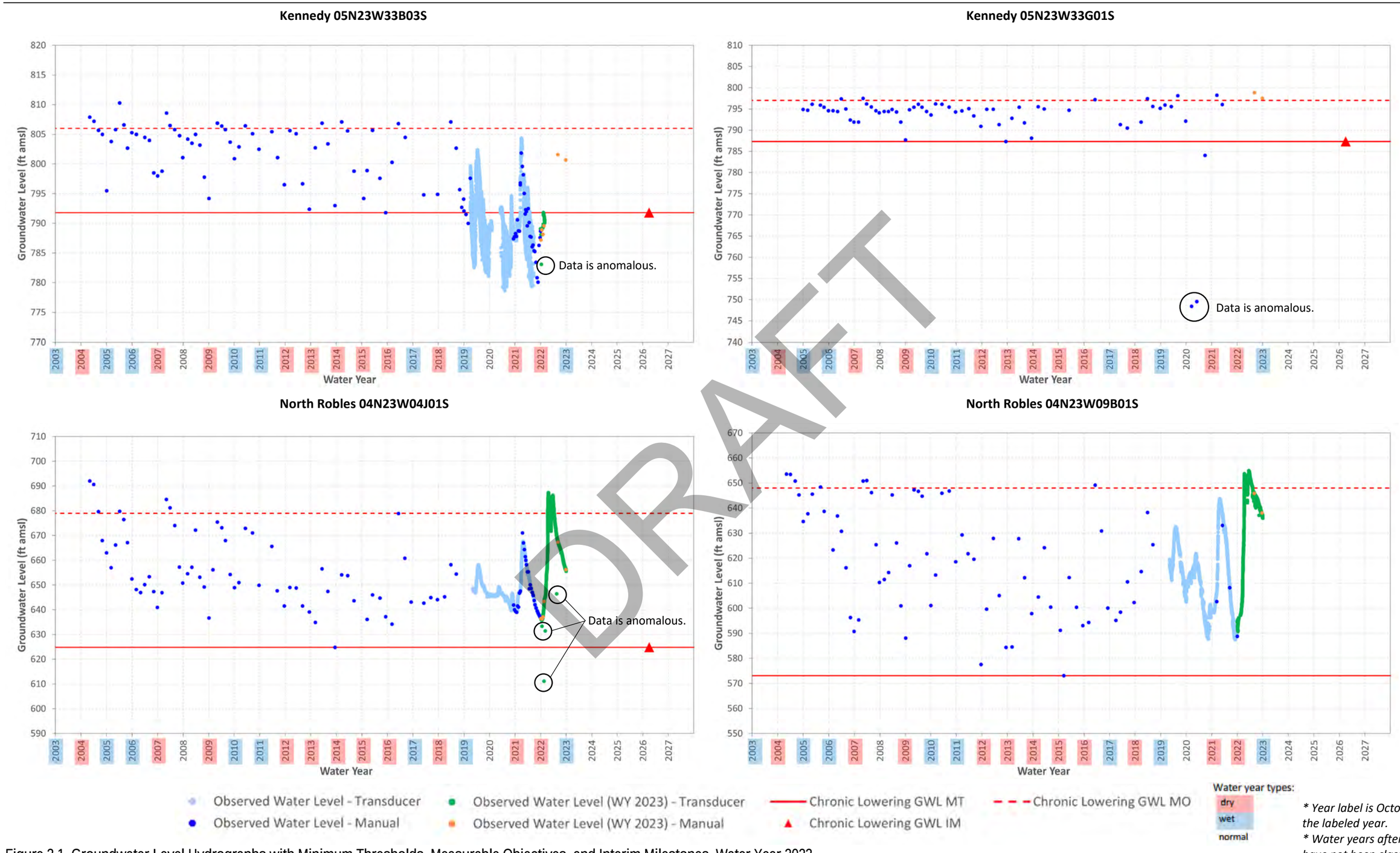


Figure 2.15 Change in Groundwater Storage with Annual Groundwater Extraction and Water Year Type.



** Year label is October 1 of the labeled year.*
** Water years after 2023 have not been classified.*

Figure 3.1 Groundwater Level Hydrographs with Minimum Thresholds, Measurable Objectives, and Interim Milestones, Water Year 2023.

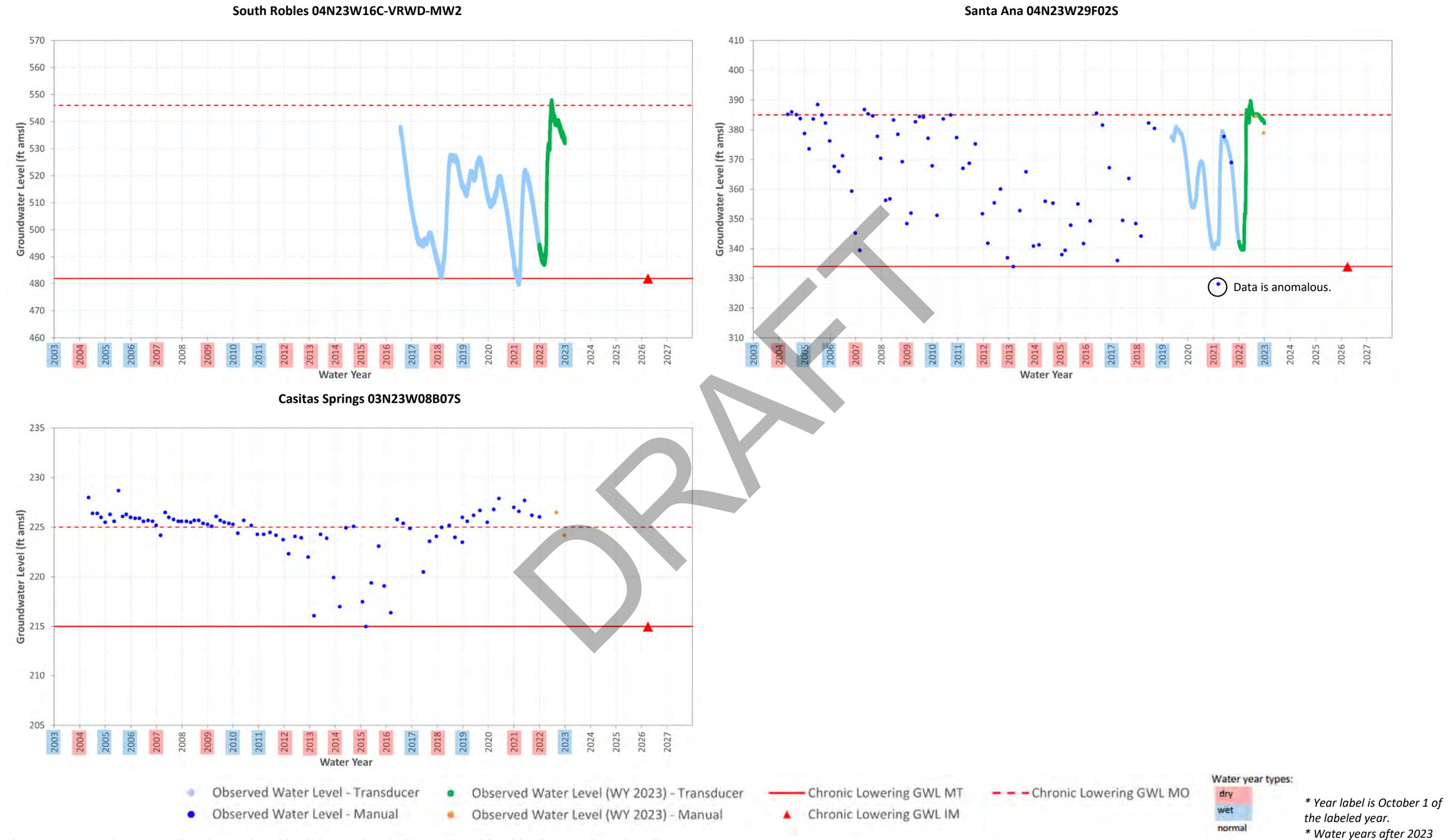


Figure 3.1 Groundwater Level Hydrographs with Minimum Thresholds, Measurable Objectives, and Interim Milestones, Water Year 2023.

** Year label is October 1 of the labeled year.*
** Water years after 2023 have not been classified.*

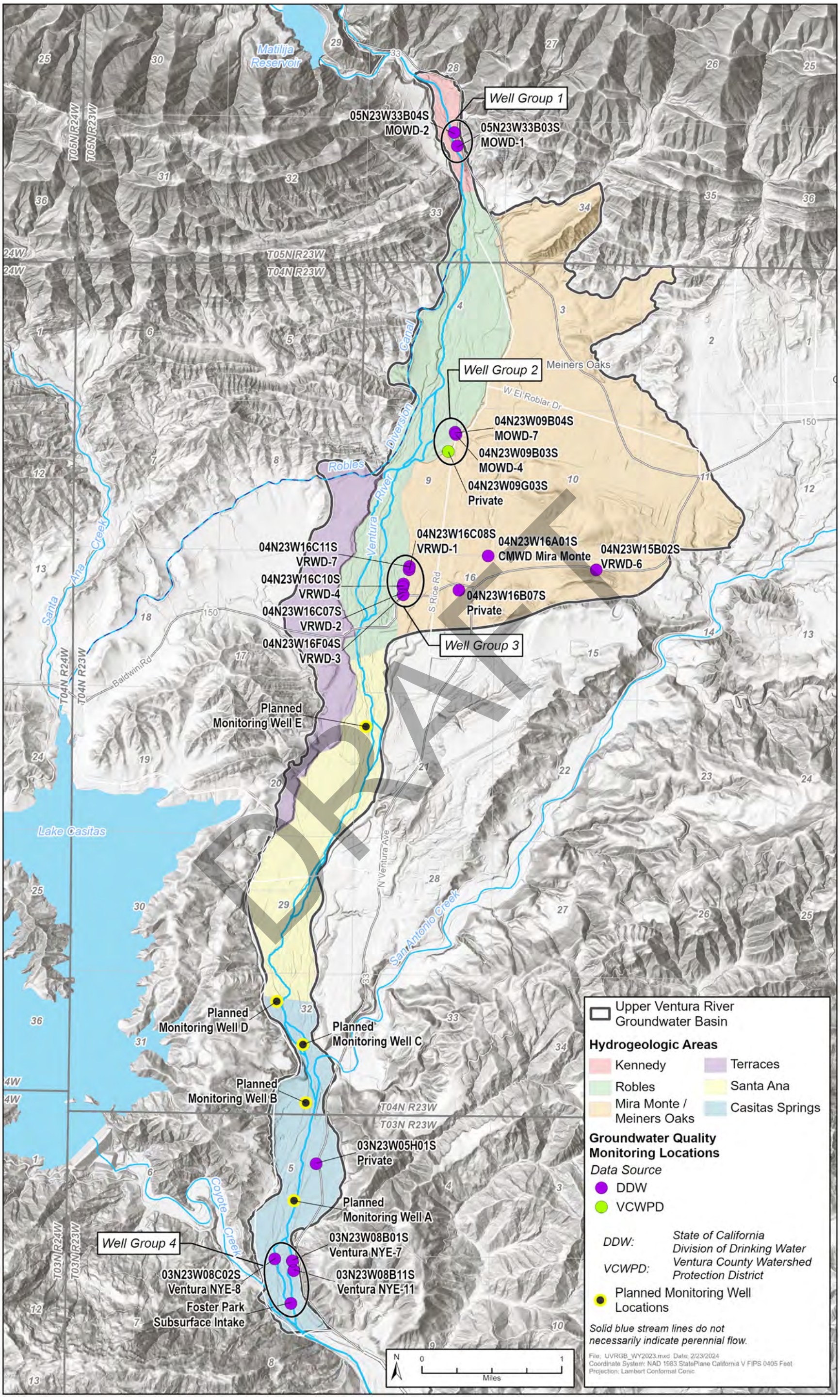


Figure 3.2 Existing and Planned Water Quality Monitoring Network.

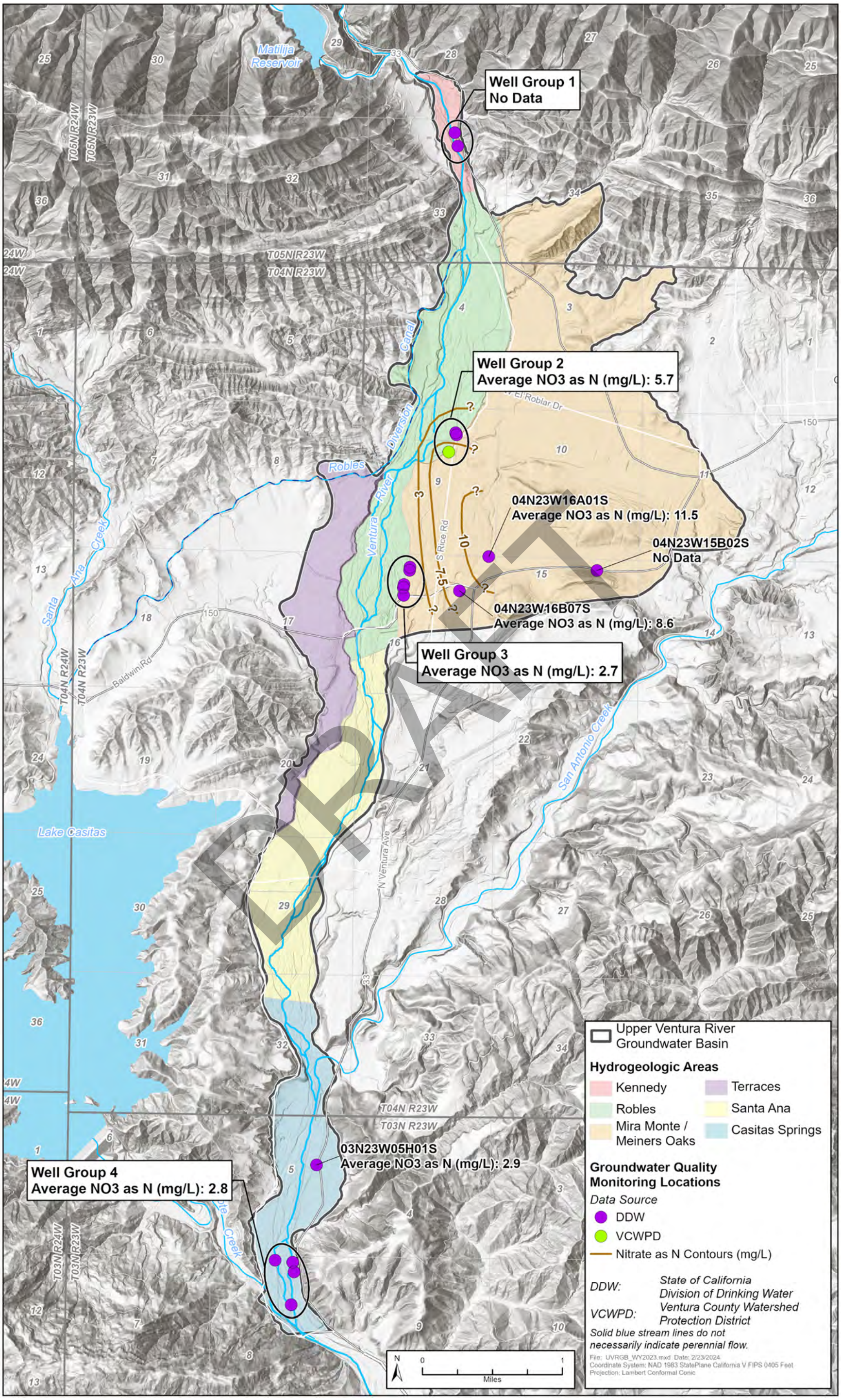


Figure 3.3 Nitrate Concentration Contours for the Degraded Water Quality Sustainability Indicator, Water Year 2023.

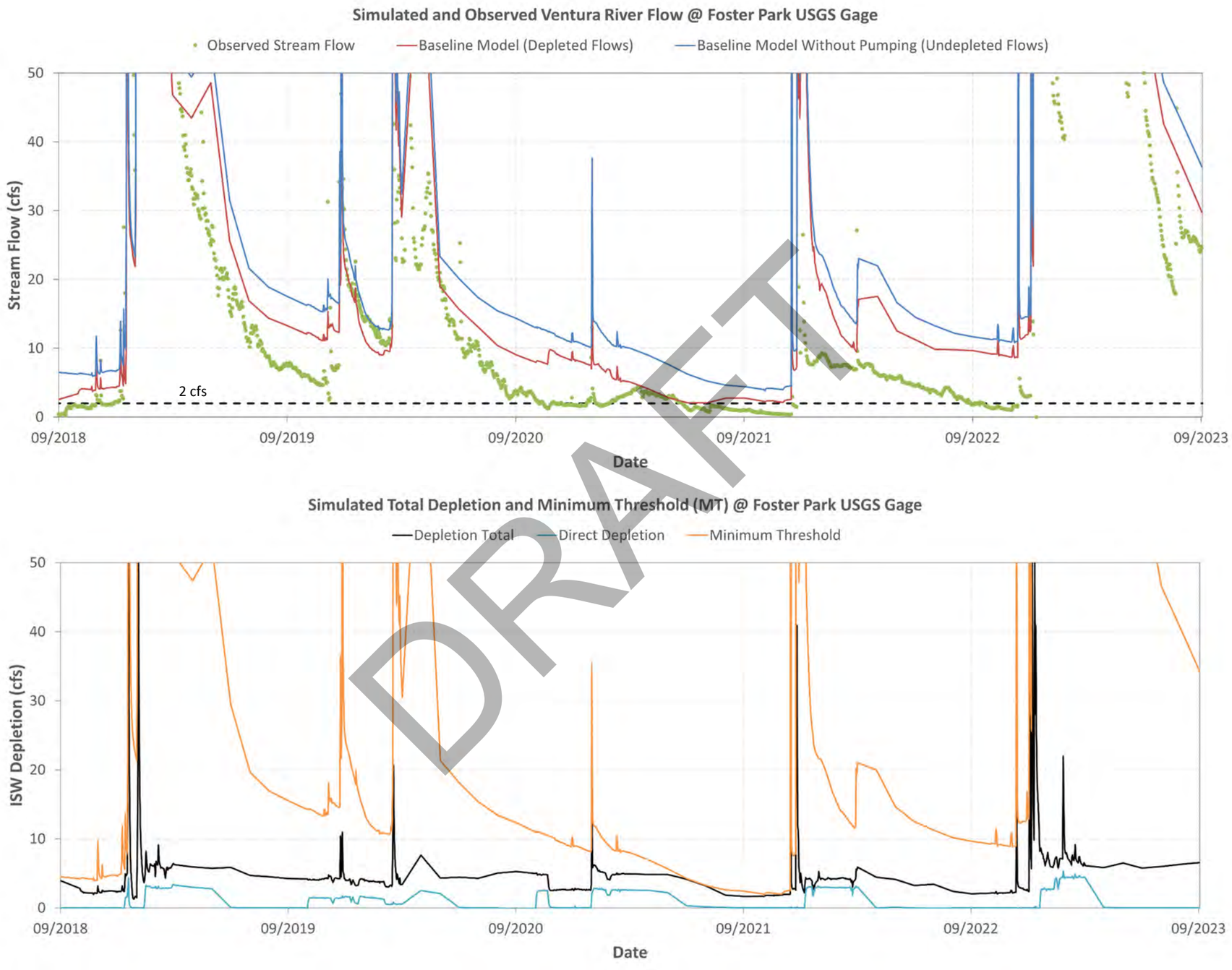


Figure 3.4 Foster Park Aquatic Habitat Area Simulated Streamflow and Depletion.

The term "depletion" refers to the direct or indirect reduction of stream flow resulting from groundwater extraction. Please see GSP Section 3.2.6 for further description of direct versus indirect reductions (depletions) of surface water.

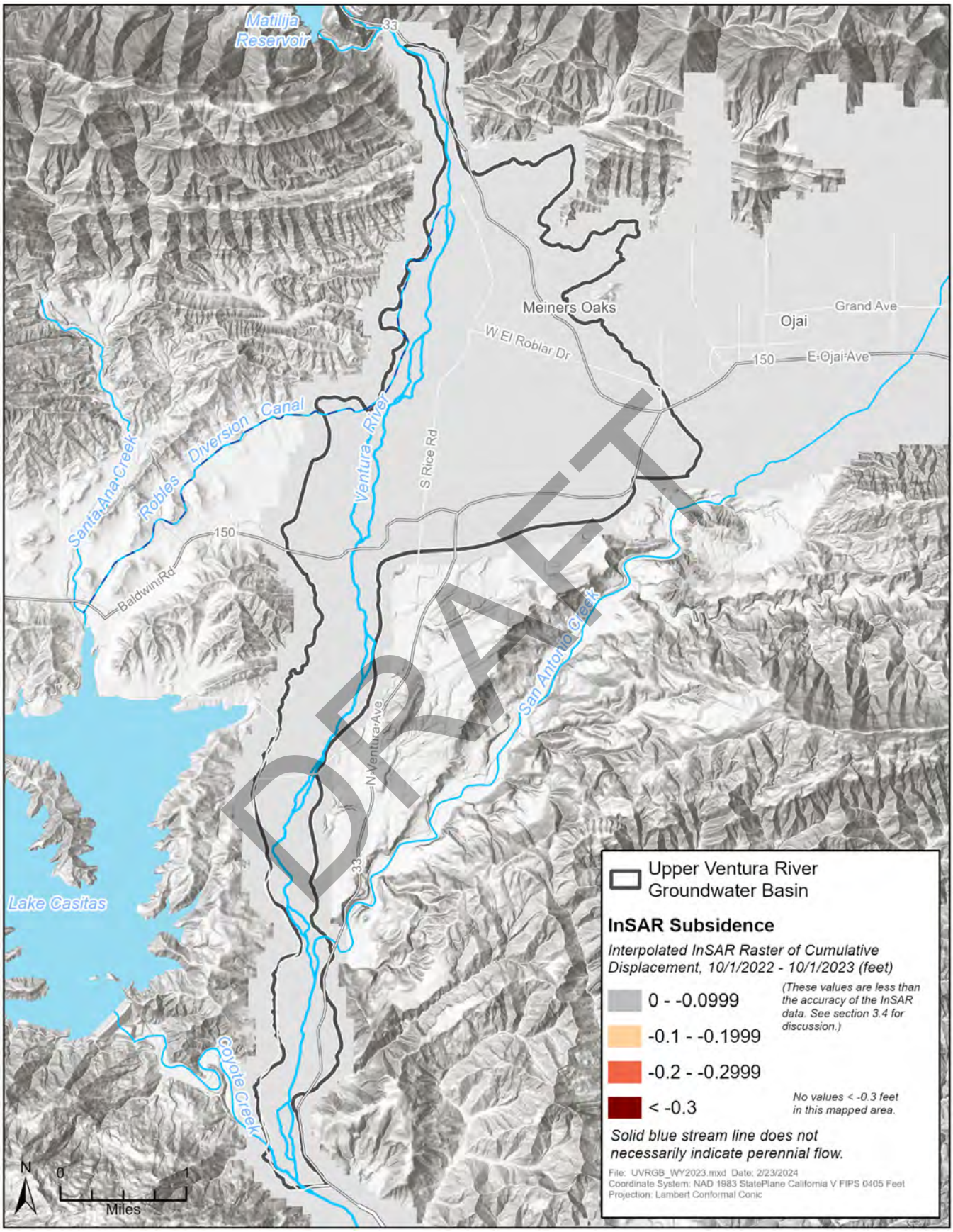


Figure 3.5 Subsidence for Upper Ventura River Groundwater Basin Between Water Year 2023.

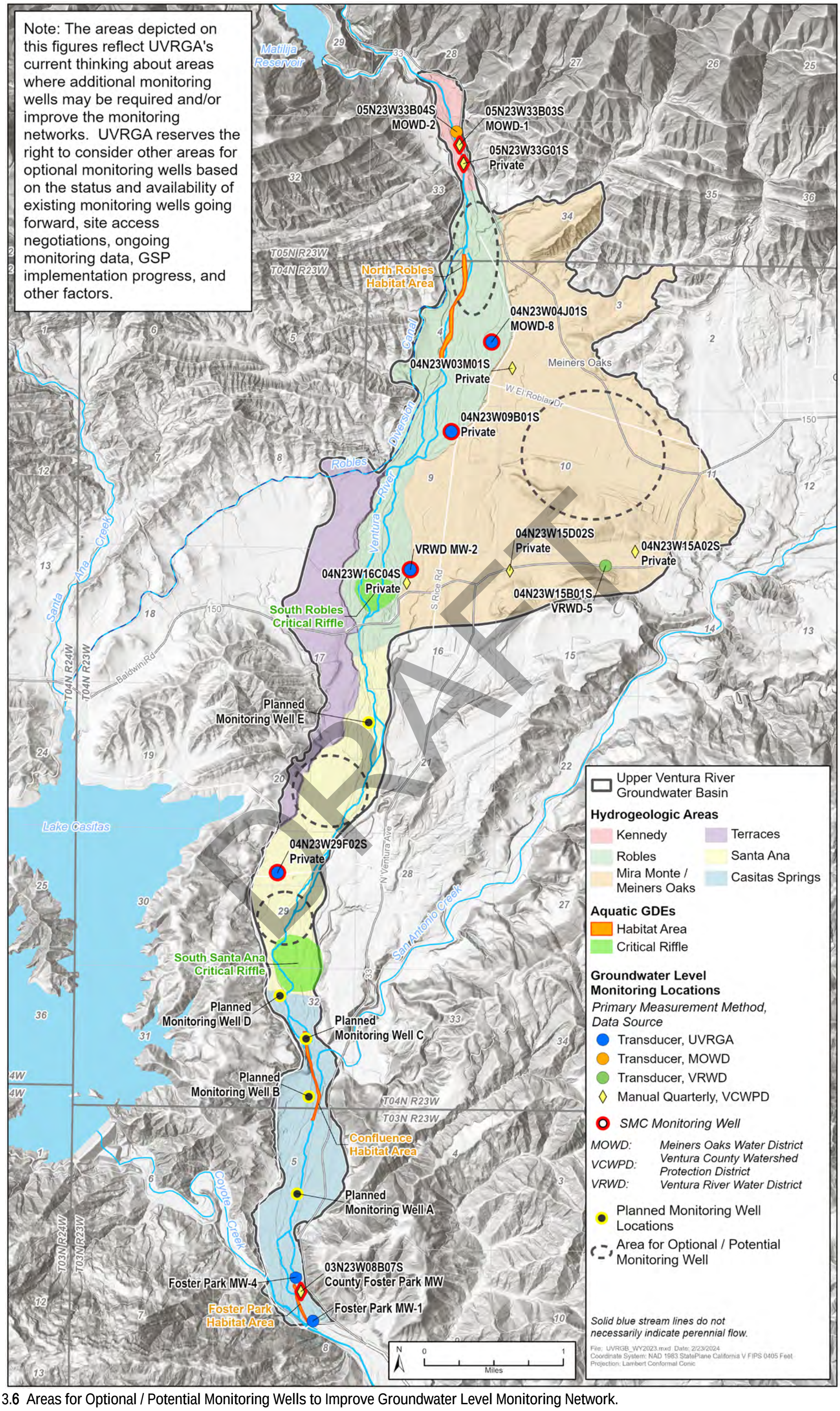


Figure 3.6 Areas for Optional / Potential Monitoring Wells to Improve Groundwater Level Monitoring Network.

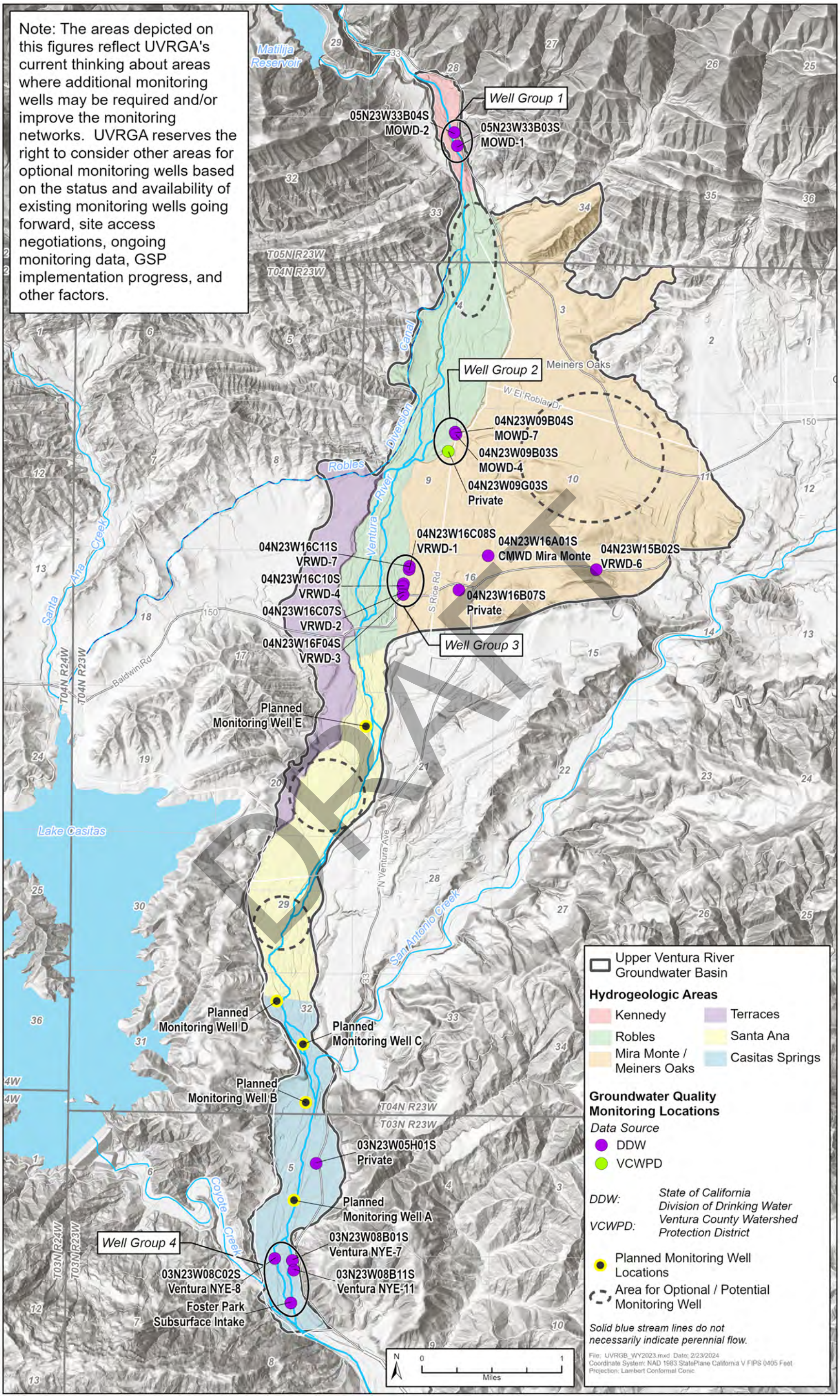


Figure 3.7 Areas for Optional / Potential Monitoring Wells to Improve Groundwater Quality Monitoring Network.

Tables

Table 2.1 Groundwater Extraction From UVRGB by Water Use Sector During Water Year 2023.[a]

Water Use Sector		Water Year 2023 AF/yr	Method of Measurement	Accuracy of Measurement
Agricultural		542	Estimated[b]	Medium
Municpal and Industrial[b]	VRWD	714	Direct[c]	High
	MOWD	280		
	CMWD	109		
	City of Ventura	2,182		
Domestic		184	Estimated[b]	Medium
Subtotal (extraction via pumping wells)		4,011		
Native Vegetation[d]		1,079	Estimated[e]	Medium
TOTAL		**5,090**		

Notes:

- Totals may not match sum of values due to rounding.

a Significant volumes of agricultural and municipal and industrial extracted groundwater is exported from the Basin. Values in this table reflect total extracted groundwater from the UVRGB.

b See Table 2.2 for volumes of extracted groundwater used within UVRGB. See text Section 2.5 and GSP Appendix H (UVRGA, 2022) for details on estimation methods.

c Based on reported values from each district and the City of Ventura.

d Note the extraction due to native vegetation includes the invasive species Arundo.

e Calculated using the numerical groundwater model – see GSP Appendix H (UVRGA, 2022) for details on estimation methods.

Table 2.2 Total Water Use Within UVRGB During Water Year 2023.

Water Year 2023					
Water Use Sector	Water Source Type		Total (AF)	Method of Measurement	Accuracy of Measurement
	Groundwater Extraction (AF)	Surface Water (direct and retail deliveries from CMWD) (AF)			
Agricultural[a]	117	388	505	Direct and Estimated[b,c]	Medium
Municipal and Industrial	369[d]	952	1,321	Direct and Estimated[b,e]	High
Domestic[a]	184	0	184	Estimated[c]	Medium
Native Vegetation[f]	1,079	Unknown[g]	1,079	Estimated[a]	Medium
TOTALS (AF)	1,749	1,340	3,089		

Notes:

- Totals may not match sum of values due to rounding.

a Estimated from numerical model inputs, procedures detailed in the GSP (see Appendix H; UVRGA, 2022).

b CMWD wholesale purchased surface water is metered, direct surface water purchases are estimated; see GSP Section 3.3.1.1 (UVRGA, 2022) for more information.

c See Section 2.5 in the text and UVRGA GSP (2022) for groundwater estimation methods.

d Significant volumes of agricultural and municipal and industrial extracted groundwater are exported from the Basin. Values in this table reflect extracted groundwater that is used within the UVRGB, see GSP Appendix H (UVRGA, 2022) for more information and Table 2.1 for total extraction volumes.

e Groundwater is based on reported values from each district and the City of Ventura, see Table 2.1 for total extraction volumes.

f Note the extraction due to native vegetation includes the invasive species Arundo.

g The modeled streamflow does not account for the surface water ET losses, see GSP Appendix H (UVRGA, 2022) for more information.

Table 3.1 Sustainable Management Criteria[a] for the Chronic Lowering of Groundwater Levels and Reduction of Groundwater Storage Sustainability Indicators.

State Well Identification Number	Well Name	Chronic Lowering of GW Levels and Reduction of GW Storage MT (ft amsl)	Chronic Lowering of GW Levels and Reduction of GW Storage MO (ft amsl)	IM 5-year (ft amsl)	IM 10-year (ft amsl)	IM 15-year (ft amsl)	IM 15-year (ft amsl)	2023 Spring GW Level (ft amsl)
05N23W33B03S	Kennedy 05N23W33B03S	792	806	792	806	806	806	801.6
05N23W33G01S	Kennedy 05N23W33G01S	787	797	787	797	797	797	798.9
04N23W04J01S	North Robles 04N23W04J01S	625	679	625	679	679	679	686.3
04N23W09B01S	North Robles 04N23W09B01S	573	648	573	648	648	648	654.4
04N23W16C-VRWD MW-2[b]	South Robles VRWD-MW-2	482	546	482	546	546	546	548
04N23W29F02S	Santa Ana 04N23W29F02S	334	385	334	385	385	385	389.8
03N23W08B07S	Casitas Springs 03N23W08B07S	215	225	215	225	225	225	226.5

Notes:
MT = minimum threshold; MO = measurable objective; IM = interim milestone

[a] The combination of minimum threshold exceedances that is deemed to cause significant and unreasonable effects in the basin for chronic lowering of groundwater levels is minimum threshold exceedances in the seven representative monitoring sites.

[b] Values for MT and 5-year IM have been updated since what was presented in the GSP (UVRGA, 2022).

Color Key:

MO met

5-year IM met

MT exceeded

Table 3.2 Water Quality Minimum Thresholds and Measurable Objectives.

Constituent	MCL (mg/L)	RWQCB WQO (mg/L)	Range of Average Historical Concentrations for Wells or Well Groups (mg/L)	MT isocontour (mg/L)[1]	MO isocontour (mg/L)[2]	Status of Sustainable Management Criteria for Water Year 2023
Percolating Groundwater Areas (Kennedy, Robles, Mira Monte/Meiners Oaks, and Santa Ana Hydrogeologic Areas)						
Nitrate (as N)	10	10	1.1 – 12.6	10	7.5	MO met
Areas with Rising Groundwater (Casitas Springs Hydrogeologic Areas)						
Nitrate (as N)	10	5 (Surface Water WQO)	1.1 – 1.4	10	3	MO met

Color Key:

MO met

MT exceeded

[1] SGMA undesirable results are considered to occur when any isocontour exceeds 10 mg/L outside of the Mira Monte / Meiners Oaks Area and encompasses an area with active domestic wells producing groundwater from the alluvial aquifer that lack an alternative drinking water source. If the minimum threshold is exceeded, UVRGA will investigate to determine if caused by pumping by a GSP project or management action.

[2] The measurable objectives are not intended to be applicable in the Meiners Oaks / Mira Monte Area because this area is known to be a source area for nitrate and is an existing area of nitrate impacts. If the measurable objective is not met, UVRGA will investigate to determine if caused by pumping by a GSP project or management action.

Table 3.3 Summary of ISW Depletion and SMC in the Foster Park Habitat Area for Water Year 2023.

Undepleted Flow (without groundwater pumping – derived from groundwater model)	Depletion Minimum Threshold and Measurable Objective	Goal	5-year Interim Milestone: Depletion in Excess of Measurable Objective	Water Year 2022 Simulated Depletion
> 2 cfs	Undepleted flow minus 2 cfs	The minimum threshold and measurable objective seek to prevent depletions of surface water flow caused by groundwater pumping that would cause surface water flow to be less than 2 cfs when surface water flow would not be less than 2 cfs without pumping.	Maximum modeled depletion rate of 10.7 cfs	Measurable Objective met
≤ 2 cfs	0 cfs	The minimum threshold and measurable objective seek to prevent depletions of surface water flow caused by groundwater pumping when surface water would already be 2 cfs or less without groundwater pumping.		Not applicable (undepleted flows are not ≤ 2 cfs)

Notes:
See Figure 3.5 for a graph depicting the minimum threshold vs. depletion.
cfs = cubic feet per second

Color Key:

MO met
5-year IM met
MT exceeded