Mound Basin Annual Report
Water Year 2022

MoundBasin
GROUNDWATER SUSTAINABILITY AGENCY

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Mound Basin Annual Report Water Year 2022

Prepared for

MoundBasin
GROUNDWATER SUSTAINABILITY AGENCY

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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 Mound Basin Groundwater Sustainability Agency (MBGSA) adopted its Groundwater Sustainability Plan (GSP) on November 18, 2021, and this is the second Annual Report in compliance with the California Code of Regulations §356.2. The GSP reported data through water year 2019 and the first Annual Report reported data collected during water years 2020 and 2021; therefore, this second annual report document reports data collected during water year 2022 (i.e., October 1, 2021, through September 30, 2022).

The water year type for 2022 was classified as "near average", based on precipitation data. Basin-wide groundwater levels remained generally stable in 2022 in comparison to recent water years. The groundwater quality also remained generally stable for the 2022 water year.

Groundwater is extracted from two principal aquifers (Mugu and Hueneme) in the Mound Basin for agricultural, municipal, and industrial uses. Extraction rates for the 2022 water year were generally lower than reported for the historical and current periods (1986-2019) in the GSP. The change in storage for each principal aquifer was estimated for water year 2022. The Mugu and Hueneme storage for water year 2022 increased by 37 acre feet (AF) and 720 AF, respectively. The change in storage for the entire Basin was estimated to increase by 4,650 AF for water year 2022.

Total water use within the Basin for agricultural, municipal, and industrial demands is sourced from groundwater extractions, imported surface water, and imported groundwater. Imported water volumes decreased in the 2022 water year due to a decrease in municipal and industrial water use. An important factor in the sustainable management of the Mound Basin is that most of the water demands are met using water imported from adjacent basins. Volumes for total water use for water year 2022 were 13,543 AF per year (AF/yr).

The GSP implementation is evaluated through comparing monitoring data to the Sustainable Management Criteria (SMC) for each applicable sustainability indicator: chronic lowering of groundwater levels, reduction of groundwater storage, seawater intrusion, degraded water quality, and land subsidence. The groundwater levels measured in water year 2022 were compared to the SMC established for the chronic lowering of groundwater levels sustainability indicator, and none of the groundwater level measurements exceeded the minimum thresholds for any of the monitoring wells. All analyzed water quality data are meeting the measurable objectives for the degraded water quality sustainability indicator in water year 2022, with the exception of well 02N23W15J02S exceeding the minimum threshold for total dissolved solids. Chloride isocontours were evaluated for the seawater intrusion sustainability indicator and the measurable objective was met for water year 2022. The land subsidence sustainability indicator is also meeting the measurable objectives.

GSP implementation activities completed during the reporting period included:

- Submittal of the First Annual Report;
- Submittal of Fall and Spring groundwater levels to DWR;
- Implementation of the Seawater Intrusion Monitoring Wells Project: a clustered monitoring well via DWR Technical Support Services in the Coastal Area of the Basin to monitor for seawater intrusion (i.e., "Site A" depicted on Figures 3.1 and 3.2); and
- Implementation of the Interim Shallow Groundwater Data Collection Project – shallow groundwater monitoring was initiated.

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Acronyms and Abbreviations

AF	acre-foot/acre-feet
AF/yr	acre-feet per year
Alta MWC	Alta Mutual Water Company
Basin	Mound Basin
bgs	below ground surface
DDW	Department of Drinking Water, State of California
DMS	Data Management System
DWR	Department of Water Resources, State of California
FICO	Farmers Irrigation Company
ft	foot/feet
ft/yr	feet per year
GIS	geographic information system
GPS	Ground Positioning System
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
InSAR	interferometric synthetic aperture radar
LAS	Lower Aquifer System
M&I	Municipal and Industrial
MBAWG	Mound Basin Agricultural Water Group
MBGSA	Mound Basin Groundwater Sustainability Agency
MCL	maximum contaminant level
MCLR	maximum contaminant level range
mg/L	milligrams per liter
msl	above mean sea level
MWD	Municipal Water District
RWQCB	Regional Water Quality Control Board
RWQCB-LA	Regional Water Quality Control Board, Los Angeles region
SGMA	Sustainable Groundwater Management Act
SMC	Sustainable Management Criteria
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
UAS	Upper Aquifer System
United	United Water Conservation District
UWCD	United Water Conservation District
Ventura Water	The City of Ventura's water and wastewater department
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 second Annual Report for the Mound Basin (Department of Water Resources Basin No. 4-004.03, the Basin), fulfilling the requirements by the Sustainable Groundwater Management Act (SGMA) Groundwater Sustainability Plan (GSP) Regulations §356.2. The Mound Basin GSP was adopted on November 18, 2021, by the Mound Basin Groundwater Sustainability Agency (MBGSA) and was uploaded to the Department of Water Resources GSP online portal on December 31, 2021. This Annual Report presents data and information for water year 2022 (i.e., October 1, 2021, through September 30, 2022). To track the progress of the GSP implementation, the data updates are compared against the Sustainable Management Criteria (SMC) established in the adopted GSP (MBGSA, 2021). This report also provides updates to the status of GSP implementation, including projects and management actions described in the adopted GSP.

1.1 Background

The Mound Basin is a medium-priority groundwater subbasin in western Ventura County along the Pacific coastline, including the City of Ventura (officially San Buenaventura) (Figure 1.1). The Basin is within the Santa Clara River Valley watershed and includes the Santa Clara River estuary and floodplain at the southwestern corner of the Basin boundary, where the river discharges into the Pacific Ocean (Figure 1.1). Adjacent basins are Oxnard Subbasin (No. 4-004.02) to the south, Santa Paula Subbasin (No. 4-004.04) to the east, and Lower Ventura River Subbasin (4-003.02) to the west (Figure 1.1). MBGSA is the exclusive Groundwater Sustainability Agency (GSA) for Mound Basin.

Groundwater supplies municipal and industrial (M&I) and agricultural beneficial uses within the Mound Basin and is sourced from imports from adjacent basins (Oxnard and Santa Paula Basins) and local extractions from within the Basin. Surface water and groundwater is also imported from the Ventura River Watershed to the north. There are no active domestic well users within the Basin; drinking water is exclusively provided by the City of Ventura (i.e., Ventura Water). There are approximately 25 active extraction wells within the Basin which supply M&I and agricultural beneficial uses.

Four water-bearing Hydrostratigraphic Units (HSUs) have been identified within the Mound Basin (United, 2018), and two of them are identified as principal aquifers: the Mugu Aquifer and the Hueneme Aquifer. Extraction wells within the basin extract water from the principal Mugu and Hueneme Aquifers and a very minor amount from the Fox Canyon Aquifer. The other HSUs (Shallow Alluvial Deposits and Fox Canyon Aquifer) are not considered principal aquifers and are therefore not managed because the Shallow Alluvial Deposits aquifer does not meet the SGMA definition of a principal aquifer to “store, transmit, and yield significant or economic quantities of groundwater…”, and the Fox Canyon Aquifer does not have material groundwater extractions. The Shallow Alluvial Deposits are hydraulically disconnected from the principal aquifers and have no groundwater extraction. Owing to the lack of material hydraulic connection between principal aquifers and the Shallow Alluvial Deposits and surface water, the GSP deemed the depletions of interconnected surface water sustainability indicator inapplicable to the Basin. The GSP concluded that the five other sustainability indicators are applicable to the Basin.

2.0 Groundwater Conditions [§356.2(b)]

United Water Conservation District (UWCD, or United) and other local agencies have been collecting groundwater elevation and groundwater quality data from wells in Mound Basin and adjacent basins since the 1920s. United maintains a comprehensive, up-to-date database of groundwater elevations in Mound Basin, incorporating data collected by others, including the Ventura County Watershed Protection District (VCWPD) and the City of Ventura that supplement the data collected by United. All the above-described data have been incorporated into the MBGSA Data Management System (DMS), which is described in the GSP (MBGSA, 2021).

This section describes data updates to precipitation and water year types for the Basin, groundwater elevations, groundwater quality, groundwater extraction, surface water supplies, total water use, and the change in storage for the principal aquifers in the Basin and the Basin as a whole.

2.1 Precipitation and Water Year Types

Precipitation data were provided by the Ventura County Public Works Agency from gages 066E (Downtown Ventura), 167 (Hall Canyon), and 222A (County Government Center), and were updated for water year 2022 (Figure 2.1). Total precipitation for water year 2022 was 11.82 inches, compared to the average of 15.46 inches at gage 222A for 1986-2019 (MBGSA, 2021). Most infiltration of precipitation recharges the Shallow Alluvial Deposits, although some infiltration of precipitation occurs at the outcrops of the Hueneme and Fox Canyon aquifers in the foothills in the northern part of Mound Basin. Precipitation on the valley floor contributes to recharge to the Shallow Alluvial Deposits, or runoff, and does not add volume to the principal aquifers.

The water year type for 2022 was classified as “near average” using the alternative water year type classification system developed by MBGSA, as described in the GSP (Figure 2.2) (MBGSA, 2021). Although water year 2022 precipitation is classified as “near average”, it is worth noting that the bulk of the precipitation was received during the month of December and the remainder of the water year experienced significantly below average precipitation.

2.2 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 elevations were updated through water year 2022 using the available data for the wells in the monitoring network for each principal aquifer (Mugu and Hueneme), which are provided by Ventura County and United (Figures 2.3 and 2.4).

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

Groundwater elevation contours were delineated for water year 2022 seasonal lows and highs in each principal aquifer. The United numerical groundwater model output (United, 2021) and supplemental monitoring well data outside of the Basin were used to assist the interpretation of the gradient and flow directions near the edges of the Basin.

As discussed in the GSP (MBGSA, 2021), Mound Basin is structurally complex. The regional groundwater flow pattern is from east-northeast to the southwest, generally towards the Pacific Ocean; however, localized flow patterns exist in the vicinity of extraction wells depending on their activity and flow directions are observed toward the south and east in some cases during the reporting period. Available historical information indicates that Mound Basin receives groundwater underflow from both the Santa Paula Basin to the east and the Oxnard Forebay/Oxnard Plain to the south (United, 2018). However, this Annual Report shows areas of groundwater underflow out of Mound Basin to the Oxnard Forebay/Oxnard Plain during the reporting period, which is based on observed groundwater levels inside and outside of the Basin.

Mugu Aquifer

Groundwater levels measured for the water year 2022 fall-low season (October of 2021) were used as the basis for interpolating the contours shown on Figure 2.5 and indicate flow directions generally formed a radial pattern toward well 02N22W19M04S. The interpolated contours based on groundwater level measurements for the 2022 spring-high season (April of 2022) are generally consistent with the 2022 fall-low (October of 2021) contours, with levels approximately 5 feet higher, and flow directions remained toward well 02N22W19M04S (Figure 2.6).

Hueneme Aquifer

Groundwater levels measured for the water year 2022 fall-low season (October of 2021) were used as the basis for interpolating the contours shown on Figure 2.7 and indicated flow directions were generally toward wells 02N22W20E01S and 02N22W17Q05S; however, there were also localized flow patterns toward groundwater depressions at wells 02N22W13K04S and 02N22W10N03S – these wells are both active irrigation wells. The steep gradient indicated by the closely spaced contours near well 02N22W10N03S are inferred based on model results. There are also anomalous data points for wells 02N22W09L03S/L04S and 02N22W17M02S which are not contoured, and their discrepancies are likely due to changes in pumping status, screen depth, and/or geologic structure. The interpolated contours based on groundwater level measurements for the 2022 spring-high season (April of 2022) are generally consistent with the 2022 fall-low (October of 2021) contours, with levels approximately 5-15 ft higher than the fall-low season (Figure 2.8). Anomalous data are noted at wells 02N22W09L03S/L04S and 02N22W17M02S.

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

Groundwater elevation hydrographs for the monitoring network for each principal aquifer (Mugu and Hueneme) along with the water year types are shown on Figures 2.9 and 2.10. Water year 2022 groundwater levels were similar to those during the prior water year.

2.3 Groundwater Quality

Figures 2.11 and 2.12 show the locations for the monitoring network for groundwater quality data for the Mugu and Hueneme aquifers, respectively. Maps of average concentrations of the key indicator constituents for the 2022 water year in the Mugu and Hueneme aquifers are shown on Figures 2.13 through 2.20 and discussed in further detail below.

Mugu Aquifer

Total dissolved solids (TDS), sulfate, chloride, nitrate, and boron were analyzed for water year 2022 in the 3 monitoring wells screened in the Mugu Aquifer (including well 02N22W08G01S with a screen interval extending below the Mugu Aquifer; however, this well not analyzed for chloride for water year 2022). These 3 wells are located along the west-southwest to east-northeast axis of the Basin (Figures 2.13 through 2.16).

The average TDS concentration in water year 2022 in wells screened in the Mugu Aquifer ranged from 890 to 2,082 milligrams per liter (mg/L) (Figure 2.13). The highest TDS concentration was in well 02N22W08G01S and is not considered representative of Mugu Aquifer groundwater quality. The range of maximum TDS concentrations measured in the remaining two wells is 890 mg/L for well 02N22W07M02S and 935 mg/L for well 02N23W15J02S (Figure 2.13).

The average sulfate concentration in the 2022 water year in wells screened in the Mugu Aquifer in Mound Basin ranged from 296 to 1,046 mg/L (Figure 2.14). Similar to TDS, the highest sulfate concentration was in well 02N22W08G01S and is not considered representative of Mugu Aquifer groundwater quality. The range of maximum sulfate concentrations in the remaining two wells is 296 to 345 mg/L (Figure 2.14).

The average chloride concentration in the 2022 water year in wells screened in the Mugu Aquifer in Mound Basin ranged from 46 to 53 mg/L (Figure 2.15). Chloride was not analyzed in well 02N22W08G01.

The average nitrate concentration in the 2022 water year in wells screened in the Mugu Aquifer in Mound Basin is non-detect for wells 02N22W07M02S and 02N23W15J02S (Figure 2.16). Similar to TDS and sulfate, the highest nitrate concentration was in well 02N22W08G01S and is not considered representative of Mugu Aquifer groundwater quality.

The average boron concentration in the 2022 water year in wells screened in the Mugu Aquifer in Mound Basin was 0.5 mg/L in wells 02N22W07M02S and 02N23W15J02S. There is not sampling result for well 02N22W08G01.

Hueneme Aquifer

TDS, sulfate, chloride, nitrate, and boron were analyzed in the 2022 water year at five wells screened in the Hueneme Aquifer (including well 02N23W08F01S with a screen interval extending above the Hueneme Aquifer; however, this well was not analyzed for chloride for water year 2022). Three of these sampled wells for water year 2022 are located along the west-southwest to east-northeast axis of the Basin, and the remaining two (the 02N22W09L03/04 cluster) are located in the southeast quadrant of the Basin (Figures 2.17 through 2.20). Two of the seven monitoring wells were not sampled during water year 2022, 02N23W13K03S and 02N23W13F02S. Well 02N23W13K03S has historically exhibited anomalous results and is considered unrepresentative of the Hueneme Aquifer's quality.

It is noted that wells 02N22W08F01S, 02N22W13K03S, and 02N22W09L04S have historically exhibited anomalously high concentrations of TDS, sulfate, chloride and are not considered representative of Hueneme Aquifer water quality. In addition, wells 02N22W13K03S and 02N22W09L04S have historically exhibited anomalously high concentrations of nitrate suggesting influence of shallow groundwater, possibly through a compromised well seal or well casing.

The average TDS concentration in the 2022 water year in wells screened in the Hueneme Aquifer in Mound Basin ranged from 1,065 to 6,525 mg/L (Figure 2.17). The highest TDS concentration was in well 02N22W09L04S and is not considered representative of Hueneme Aquifer groundwater quality and is not considered in the average TDS range. Excluding the wells known with anomalously high concentrations, the range of average TDS is 1,065 to 1,356 mg/L (Figure 2.17).

The average sulfate concentration in the 2022 water year in wells screened in the Hueneme Aquifer in Mound Basin ranged from 382 to 3,310 mg/L (Figure 2.18). The highest sulfate concentration was in well 02N22W09L04S and is not considered representative of Hueneme Aquifer groundwater quality. Excluding the wells known with anomalously high concentrations, the range of average sulfate is 382 to 590 mg/L (Figure 2.18).

The average chloride concentration in the 2022 water year in wells screened in the Hueneme Aquifer in Mound Basin ranged from 67 to 135 mg/L (Figure 2.19). The highest chloride concentration was in well 02N22W09L04S and is not considered representative of Hueneme Aquifer groundwater quality. Excluding the wells known with anomalously high concentrations, the range of average chloride is 67 to 88 mg/L (Figure 2.19). Well 02N22W08F01S was not analyzed for chloride for water year 2022.

The average nitrate concentration in the 2022 water year in wells screened in the Hueneme Aquifer in Mound Basin ranged from less than the laboratory detection limit (0.4 mg/L) to 85.3 mg/L (Figure 2.20). The highest nitrate concentration was in well 02N22W09L04S and is not considered representative of Hueneme Aquifer groundwater quality. Excluding the wells known with anomalously high concentrations, the average nitrate does not exceed the laboratory detection limit of 0.4 mg/L (Figure 2.20). Nitrate concentrations were below the detection limit at four out of seven wells in the Hueneme Aquifer in Mound Basin.

The average boron concentration in the 2022 water year in wells screened in the Hueneme Aquifer in Mound Basin ranged from less than the laboratory detection limit (0.1 mg/L) to 1.2 mg/L.

2.4 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 extraction data was provided by United, which requires reporting of groundwater extraction volumes on a semi-annual basis pursuant to its Water Code powers. The City of Ventura reports its monthly groundwater extractions for its wells in Mound Basin (currently 02N22W08G01S/Mound#1 and 02N22W08F01S/Victoria#2) to MBGSA.

The semi-annual groundwater extraction volumes are reported to UWCD for the periods January-June and July-December. MBGSA used the semi-annual reporting to estimate extractions for water year 2022 according to the following methodology. First, the semi-annual volumes were converted to monthly volumes using methods derived from the United numerical groundwater model input process, which uses precipitation data to determine the monthly pumping for each extraction well (United, 2018; 2021). The available semi-annual data ends in June 2022, so data for July, August, and September 2022 (to complete the 2022 water year) were estimated based on prior trends for the summer season, which have very similar precipitation amounts. The estimated groundwater extraction from the United data was supplemented with the extraction data provided by the City of Ventura to calculate the total extraction for water year 2022. The estimated data for the missing months are updated for prior water years in each subsequent Annual Report (see Appendix A). Groundwater extraction due to native vegetation[1] was estimated for water year 2022 based on the numerical model (MBGSA, 2021; United, 2018; 2021) evapotranspiration results for the baseline projection (2022-2096) for similar water year types; for water year 2022, the average ET for a near average water year type was used (755 AF).

The estimated extraction volumes for water year 2022 are summarized by water use sector in Table 2.1. Agricultural and M&I groundwater use accounted for 53% and 47%, respectively, of total extraction due to pumping for water year 2022. The volumes extracted from each well in the principal aquifers for water year 2022 are shown on Figure 2.21.

[1] Note the native vegetation extraction term includes the invasive species Arundo.

2.5 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.

The City of Ventura (Ventura Water) purchases surface water from the Casitas Municipal Water District (CMWD). Surface water is imported to Mound Basin via pipeline and volumes are metered monthly. Total volumes for imported surface water for water year 2022 is 1,028 AF/yr. The surface water use within the Mound Basin portion of the overall Ventura Water service area was estimated as described in Section 2.6 and is shown on Table 2.2 and Figure 2.22.

2.6 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.

Total water use to meet agricultural and M&I demand within Mound Basin is sourced from groundwater extractions, imported surface water, and imported groundwater. Ventura Water (City of Ventura) purchases surface water from Casitas Municipal Water District (Lake Casitas) and imports groundwater from the Santa Paula, Oxnard, and Upper Ventura River Basins, and this water is used for M&I purposes. Alta Mutual Water Company (Alta) imports groundwater from the Santa Paula and Oxnard Basins, and Farmers Irrigation Company (FICO) imports groundwater from the Santa Paula Basin, both using water for agricultural purposes. Groundwater extracted from the Mound Basin is used for agricultural and M&I purposes.

Estimation of the total water use within the Mound Basin is complicated by the fact that the Mound Basin is only a portion of the Alta, FICO, and Ventura Water service areas. This annual report uses the simplifying assumptions described in GSP Section 3.1.1.3 for Alta and FICO. Estimation of water use within the Mound Basin portion of the overall Ventura Water service area and the breakdown of the associated Ventura Water supply sources that met the demands required additional analysis beyond that presented in the GSP. The estimation approach is as follows:

1. Calculate the total water supplies from all Ventura Water sources for entire Ventura Water service area.

2. Multiply the total Ventura Water supplies by the fraction of Ventura Water service area located within in the Mound Basin (64%) (See Figure 1.1).

3. Satisfy the demand calculated in step no. 2 by allocating Ventura Water supplies in the following priority order:

    a. Mound Basin groundwater extracted by Ventura Water.

    b. Oxnard Basin groundwater extracted by Ventura Water (after accounting for estimated Ventura Water deliveries within the Oxnard Basin portion of the overall Ventura Water service area using an approach similar to steps nos. 1 and 2).

    c. Satisfy remaining demand using equal parts Casitas MWD surface water deliveries and Upper Ventura River Valley Basin groundwater extracted by Ventura Water. If either source did not produce enough to satisfy the remaining demand it is then satisfied with the other source.

    d. Any remaining demand is satisfied using Santa Paula Basin groundwater extracted by Ventura Water.

The total estimated water use within Mound Basin for water year 2022 was 13,543 AF/yr (see Table 2.2 and Figure 2.22). The estimated volumes supplied by the various water sources to meet these demands are broken out in Table 2.2 and Figure 2.22.

2.7 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.

Groundwater levels were used to estimate the change in storage for the Mugu and Hueneme Aquifers (principal aquifers) for water year 2022. The difference in groundwater levels between spring high measurements (for 2021-2022) were interpolated to produce a raster grid for each aquifer and water year, which was then multiplied by grids of the storativity and aquifer areas derived from the United numerical groundwater model (United, 2021). The interpolation was fixed at zero at the northern edge of the Basin, and the coastline was assumed a constant value equal to the head difference at the coast well 02N23W15J01S/J02S. Groundwater level differences from outside the basin were also used to guide the interpolation near the eastern and southern Basin boundaries. A portion of the Hueneme Aquifer to the north is unconfined, so the specific yield value was used to calculate the change in storage in that area.

The change in storage maps for both aquifers for water year 2022 are shown on Figures 2.23 and 2.24. The Mugu and Hueneme storage for 2022 increased by 37 AF and 720 AF, respectively. These change in storage values are reasonable compared to the modeled values reported in the GSP (MBGSA, 2021).

Figure 2.25 shows the water year type, groundwater use, the annual change in groundwater in storage for the entire Basin, and the cumulative change in groundwater in storage for the entire Basin, starting in 1986. The change in storage between spring high water years for the Basin was calculated using the numerical model for years 1986 to 2019 (MBGSA, 2021). The change in storage value for water years 2020 through 2022 was estimated using the storage curve approach (see Appendix K in the GSP; MBGSA, 2021) to be 4,650 AF (increase). Based on the historical model results, the change in storage for the Mugu and Hueneme Aquifers ranged 2% to 45% of the total. For the 2022 water year, the estimated change in storage for the Mugu and Hueneme aquifers was 16% of the basin total, which is within the expected range.

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 MBGSA GSP was initiated with the submittal of the GSP to DWR in December of 2021. The progress towards implementing the Mound Basin GSP is evaluated through 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 subsidence measurements. The monitoring networks are still being developed for part the Basin, regardless, all currently available data are evaluated for this Annual Report.

3.1 Chronic Lowering of Groundwater Levels

The SMC for the chronic lowering of groundwater levels sustainability indicator are evaluated using groundwater level measurements. Groundwater levels were measured in five wells in the Mugu Aquifer and thirteen wells in the Hueneme Aquifer. The historical and current groundwater levels were plotted against the minimum thresholds, measurable objectives, and interim measures along with water year types for each monitoring well (Figures 2.9 and 2.10).

The water level data is summarized in Table 3.1 and based on these results, the implementation of the plan for the chronic lowering of groundwater levels is in very good status. All minimum groundwater levels in the Mugu Aquifer are currently above their respective minimum thresholds. Currently, four monitoring wells have groundwater levels meeting their 5-year interim measures and one is meeting its measurable objective.

For the Hueneme Aquifer monitoring wells, six of the minimum groundwater levels are currently meeting their respective measurable objective, twelve monitoring wells' 2022 water year water level results are above their respective minimum thresholds, and one well was not measured (Table 3.1). The transducer in well 02N23W24G01S required servicing during water year 2022, so groundwater level data was not available for this well.

Overall, current groundwater levels are relatively low due to lingering impacts from the unusually and overall dry conditions since 2011.

3.2 Reduction of Groundwater Storage

Groundwater extractions are directly measured and recorded to determine their relation to the measurable objective and minimum threshold for the reduction of groundwater storage sustainability indicator. The minimum threshold for the reduction of groundwater storage sustainability indicator is the estimated sustainable yield of 8,200 AF/yr of the Basin. The minimum threshold applies over an averaging period, so groundwater extractions exceeding the minimum threshold in any given year do not automatically indicate undesirable results are occurring in the Basin. The measurable objective is 90% of the sustainable yield (i.e., 7,400 AF/yr). For water year 2022, the total groundwater extraction was 5,106 AF/yr, which met the measurable objective (Table 3.2).

3.3 Seawater Intrusion

Seawater intrusion is monitored using the chloride concentrations from the water quality data. The chloride data is contoured and compared to the minimum threshold isocontour, which was established for the GSP (MBGSA, 2021). Figures 3.1 and 3.2 show the chloride isocontours for the Mugu and Hueneme Aquifers, respectively. The isocontours indicate the measurable objective is reached for both the Mugu and Hueneme Aquifers.

3.4 Degraded Water Quality

Groundwater quality is monitored for water year 2022 in three monitoring wells for the Mugu Aquifer and seven monitoring wells for the Hueneme Aquifer. Data for monitoring well 02N23W13F02S (Hueneme Aquifer) were not available in water year 2022. The 2-year moving averages for concentrations of nitrate, TDS, sulfate, chloride, and boron are compared against the SMC for the degraded water quality sustainability indicator for each monitoring well in the Mugu and Hueneme Aquifers (Table 3.3). The water quality data for water year 2022 is also described in Section 2.3 above and Table 3.3 shows the average concentrations for the water year 2022 period in the Mugu and Hueneme Aquifers, against the SMC. All analytes met their respective measurable objectives for water years 2021-2022 (Table 3.3), and minimum thresholds were not exceeded for all monitoring wells for water year 2022 (Table 3.4).

3.5 Land Subsidence

Land subsidence is only monitored for the Eastern Half of Mound Basin because remote sensing data coverage (InSAR) for the Western Half was determined to be unreliable (MBGSA, 2021). As a result, groundwater levels are used as a proxy for the minimum thresholds in the Western Half of the Basin and have the same minimum threshold values as the chronic lowering of groundwater levels sustainability indicator (i.e., historical lows). For the Eastern Half of the Basin, if the InSAR measured subsidence rate exceeds the minimum threshold (0.1 ft/yr) and groundwater levels are below historical low levels, the

InSAR-indicated land surface elevation changes will be evaluated to determine whether they were caused by groundwater conditions.

Table 3.1 depicts the current results for groundwater levels or subsidence rates with respect to their minimum thresholds for the land subsidence sustainability indicator., The minimum thresholds for measured subsidence were not exceeded in the Eastern Half of the Basin in water year 2022. For the Western Half monitoring wells, identical to the chronic lowering of groundwater levels, all minimum groundwater levels for the land subsidence are currently above their respective minimum thresholds. Currently, all monitoring wells have groundwater levels meet their 5-year interim measures. The subsidence datasets for the 2022 water year provided by DWR were downloaded, mapped, and reviewed (as presented in Figure 3.3). The DWR data includes land surface elevation changes for Mound Basin based on interferometric synthetic aperture radar (InSAR) measurements. The total estimated error is 0.1 ft (MBGSA, 2021), and the measured subsidence rate did not exceed 0.1 ft/yr in the Eastern Half of Mound Basin for water year 2022.

3.6 Projects and Management Actions

3.6.1 Seawater Intrusion Monitoring Wells

Prior to GSP submittal MBGSA applied for and was approved for DWR Technical Support Services to construct a clustered monitoring well in the Coast Area of the Basin to monitor for seawater intrusion (i.e., “Site A” depicted on Figures 3.1 and 3.2). MBGSA obtained an access agreement, completed CEQA, and obtained permits for the well in 2021 and the clustered well was constructed in the spring of 2022.

3.6.2 Seawater Intrusion Contingency Plan

There was no activity on this task during the reporting period as the reporting period was prior to GSP adoption.

3.6.3 Land Subsidence Contingency Plan

There was no activity on this task during the reporting period as the reporting period was prior to GSP adoption.

3.6.4 Groundwater Quality Protection Measures

There was no activity on this task during the reporting period as the reporting period was prior to GSP adoption.

3.6.5 Interim Shallow Groundwater Data Collection and Analysis

During water year 2021, MBGSA confirmed the availability and accessibility of the shallow groundwater monitoring wells with the City of Ventura and planned for collaborative monitoring with the City of Ventura. Access agreements were obtained from the City for the monitoring activities and the shallow groundwater monitoring was initiated during water year 2022.

4.0 References

Mound Basin Groundwater Sustainability Agency (MBGSA). Groundwater Sustainability Plan. December, 2021.

United Water Conservation District (United). 2018. Ventura Regional Groundwater Flow Model and Updated Hydrogeologic Conceptual Model: Oxnard Plain, Oxnard Forebay, Pleasant Valley, West Las Posas, and Mound Basins, United Water Conservation District Open-File Report 2018-02, July.

______. 2021. Ventura Regional Groundwater Flow Model Expansion and Updated Hydrogeologic Conceptual Model: Santa Paula, Fillmore, and Piru Groundwater Basins, United Water Conservation District Open-File Report 2021-01.

Figures

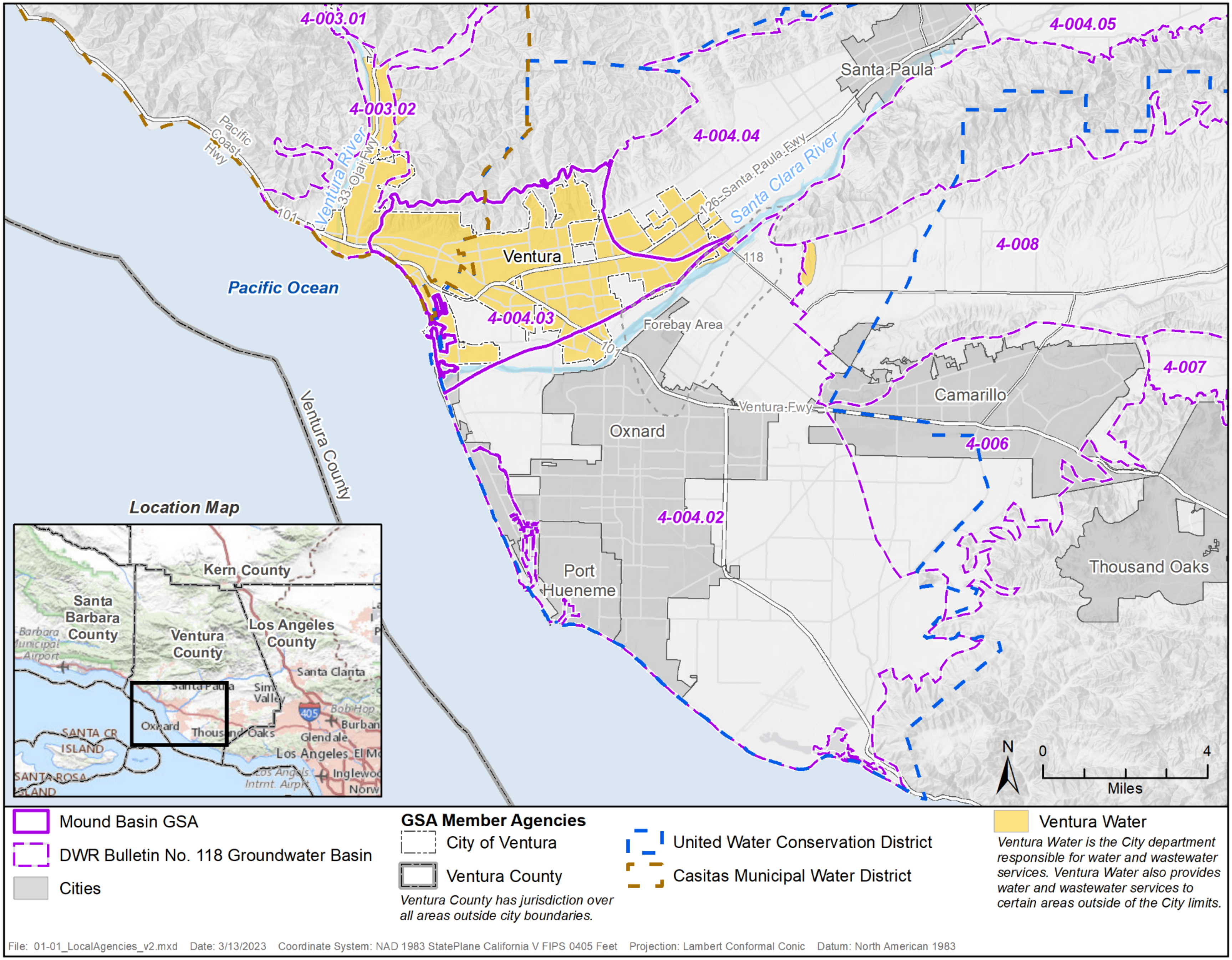


Figure 1.1 Mound Basin Groundwater Sustainability Agency Boundary Map.

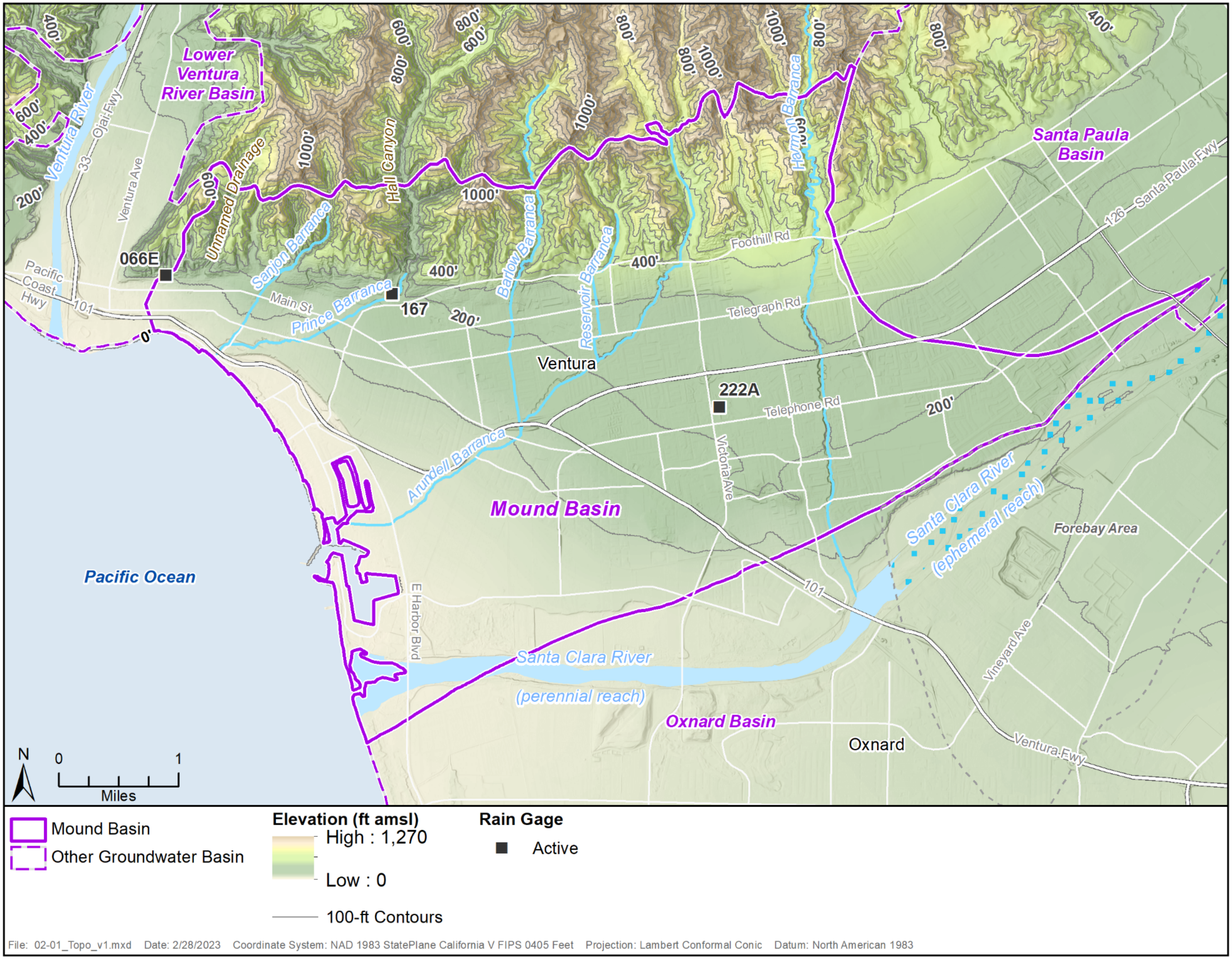
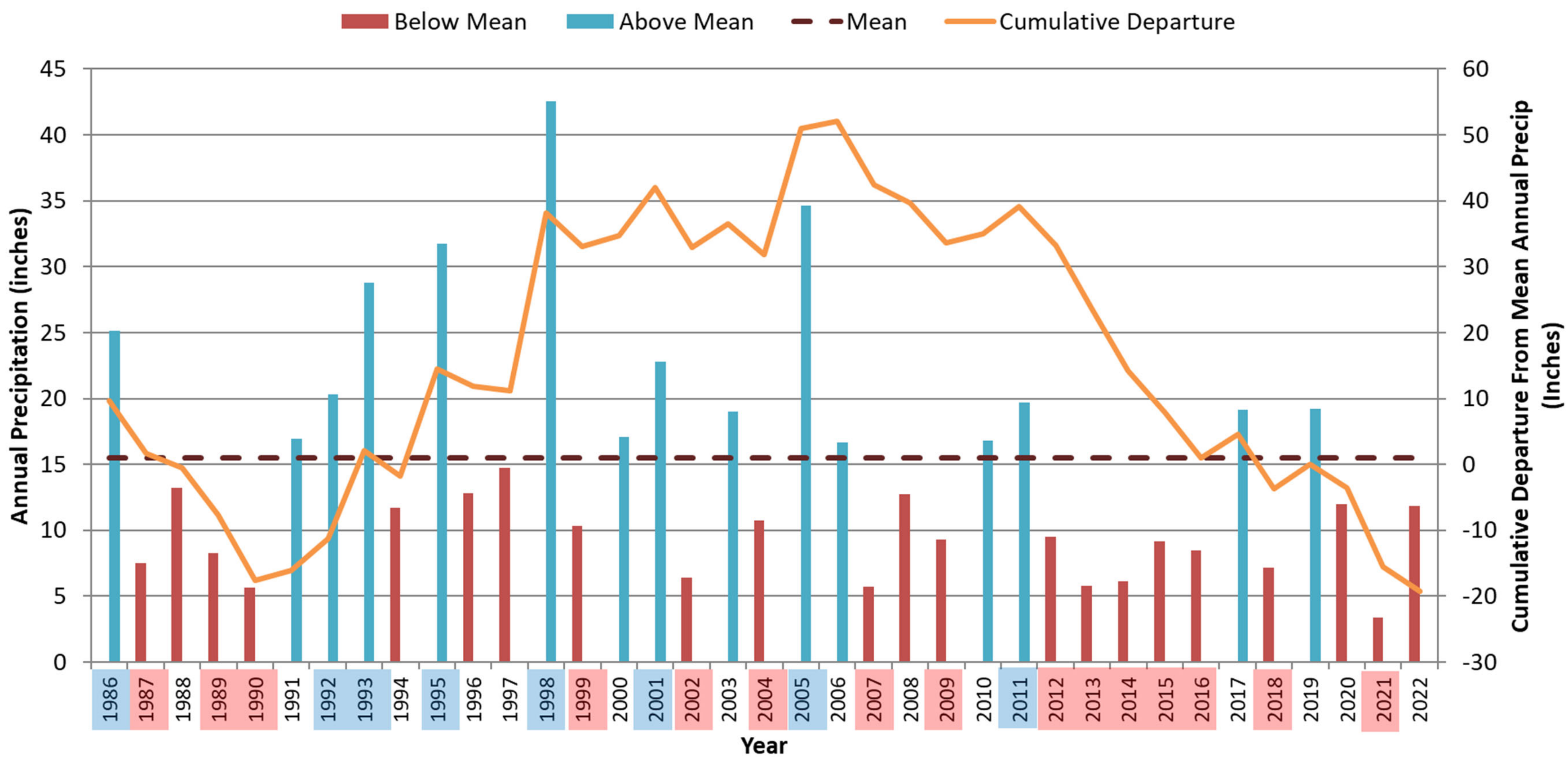


Figure 2.1 Topographic Map with Precipitation Gage Stations in Mound Basin.



Water Year Types
Wet
Dry
Near Average

Figure 2.2 Annual Precipitation and Cumulative Departure from the Mean, with Water Year Types.

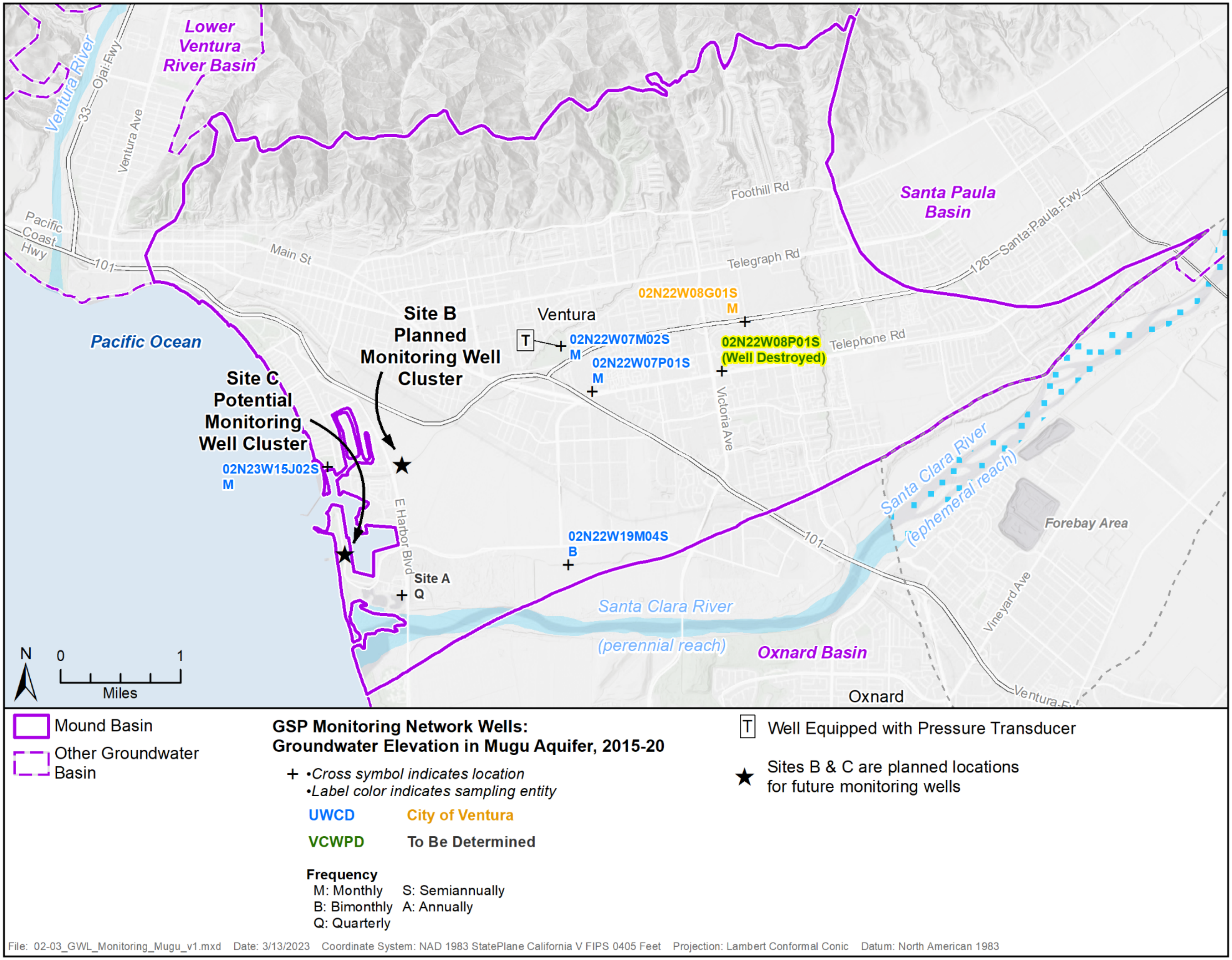
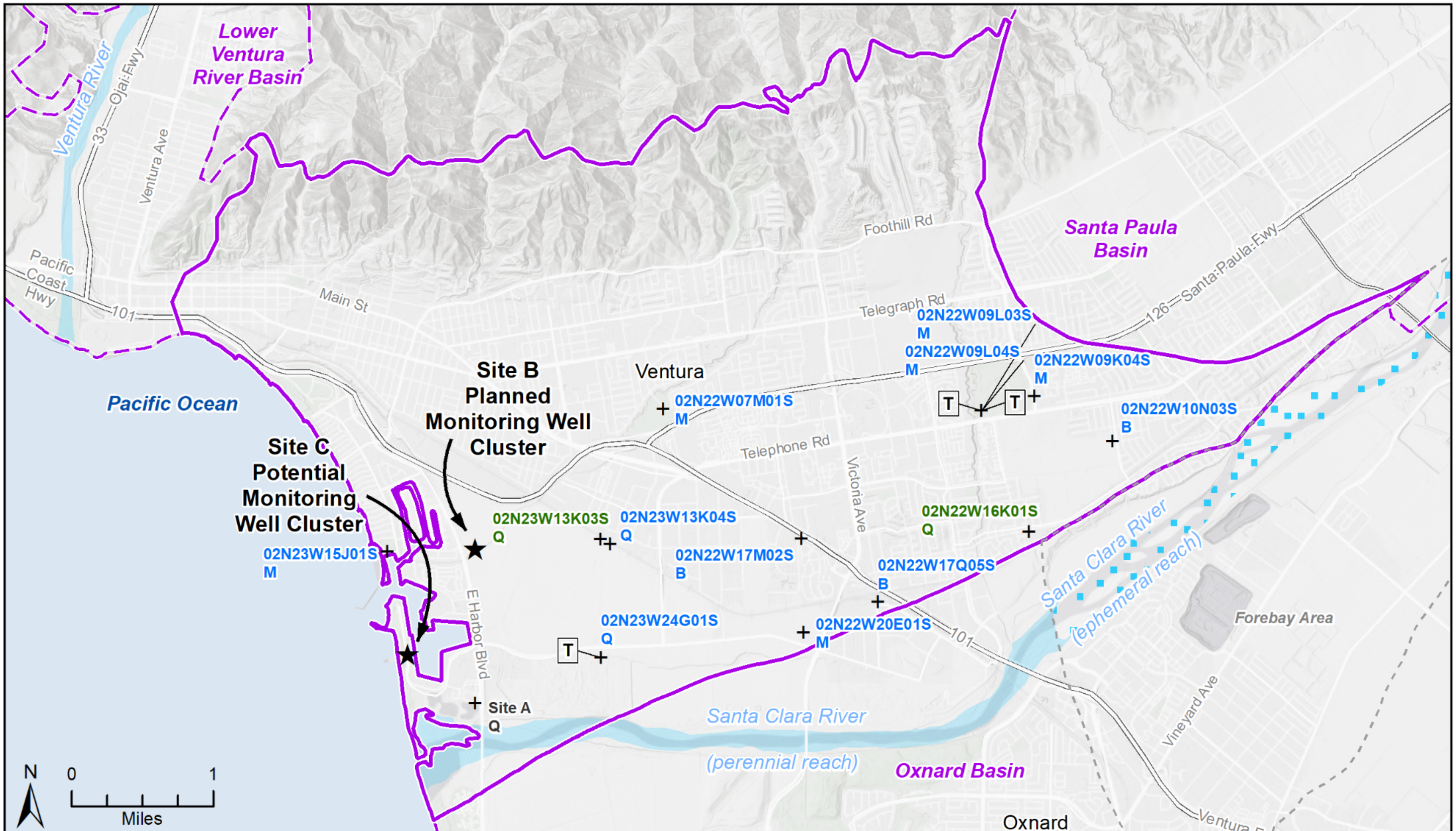


Figure 2.3 Map Showing the Groundwater Elevation Monitoring Network in the Mugu Aquifer of Mound Basin.



Mound Basin

Other Groundwater Basin

GSP Monitoring Network Wells: Groundwater Elevations in Hueneme Aquifer, 2015-20

+ •*Cross symbol indicates location*
•*Label color indicates sampling entity*

UWCD **City of Ventura**

VCWPD **To Be Determined**

Frequency
M: Monthly S: Semiannually
B: Bimonthly A: Annually
Q: Quarterly

T Well Equipped with Pressure Transducer

★ Sites B & C are planned locations for future monitoring wells

File: 02-04_GWL_Monitoring_Hueneme_v1.mxd Date: 3/13/2023 Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet Projection: Lambert Conformal Conic Datum: North American 1983

Figure 2.4 Map Showing the Groundwater Elevation Monitoring Network in the Hueneme Aquifer of Mound Basin.

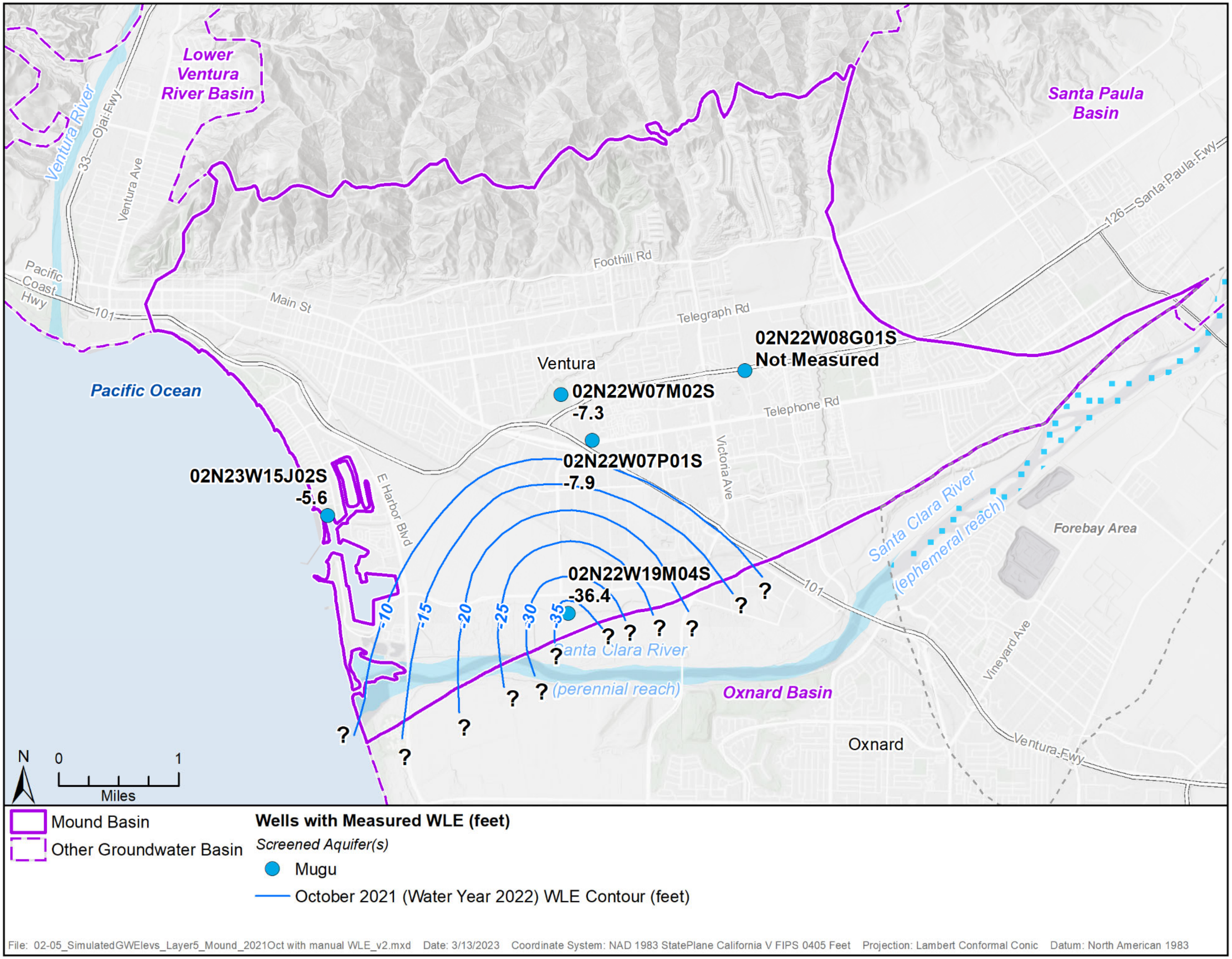


Figure 2.5 Water Level Elevation in Mugu Aquifer, October 2021 (Fall-Low Water Year 2022).

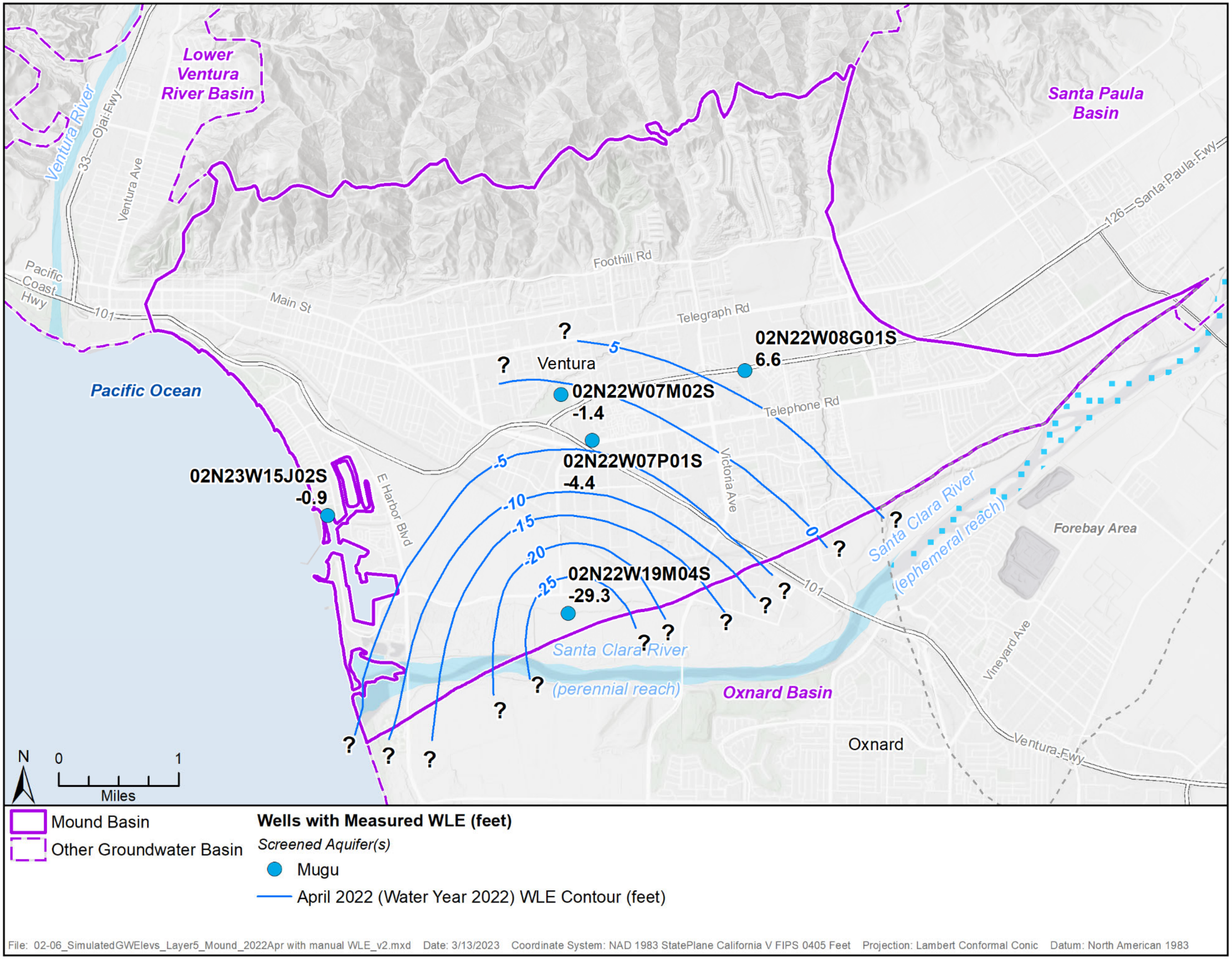


Figure 2.6 Water Level Elevation in Mugu Aquifer, April 2022 (Spring-High Water Year 2022).

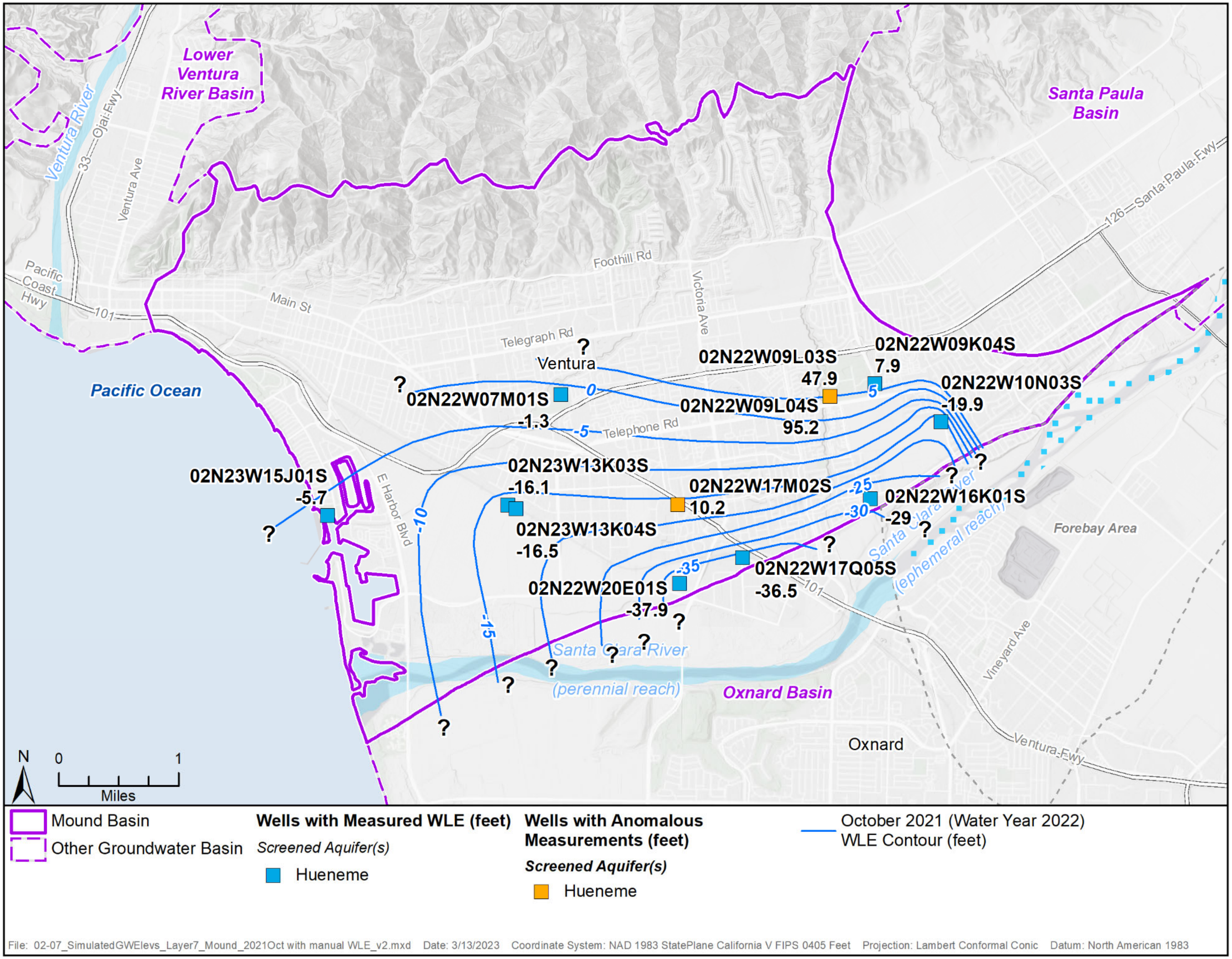


Figure 2.7 Water Level Elevation in Hueneme Aquifer, October 2021 (Fall-Low Water Year 2022).

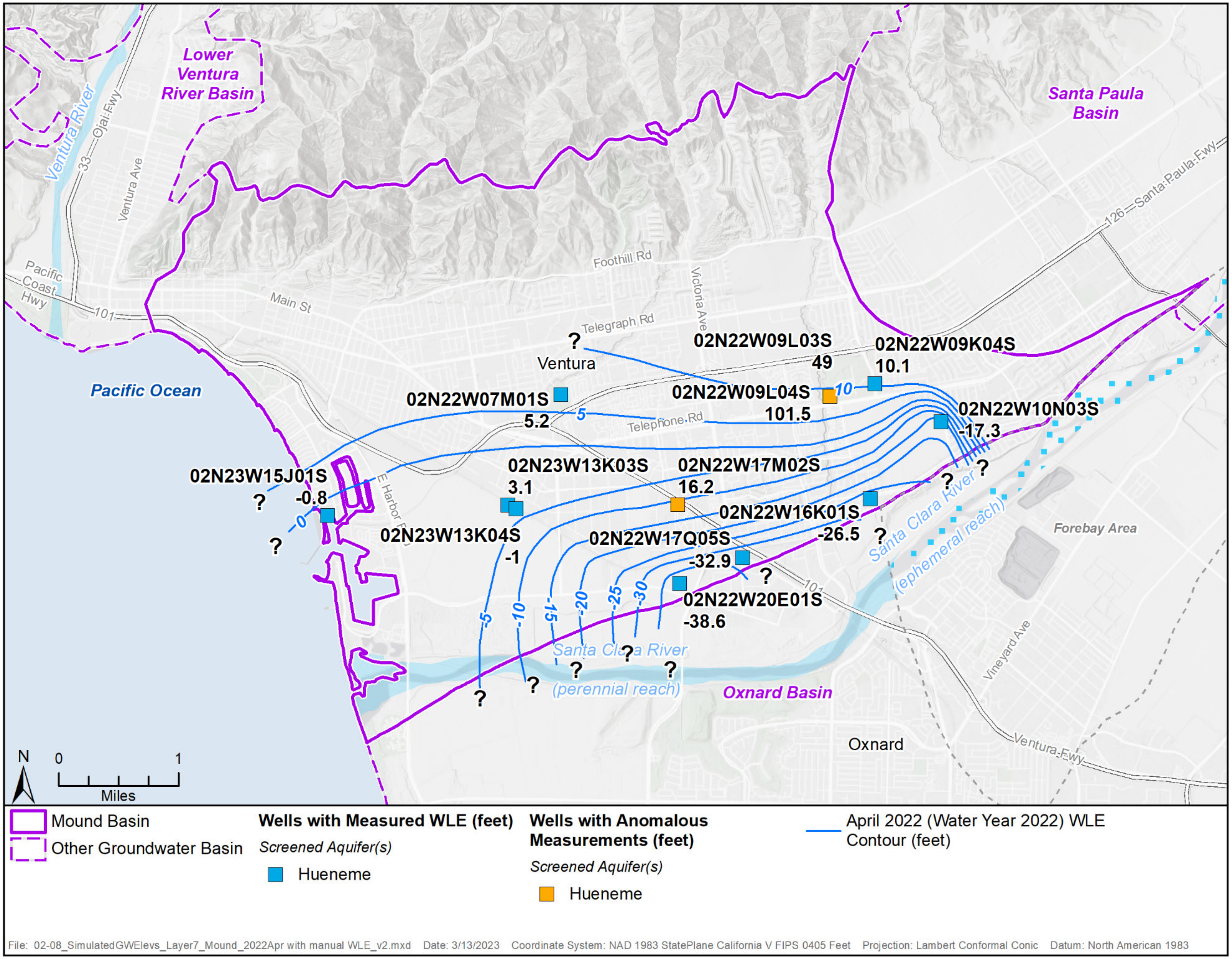


Figure 2.8 Water Level Elevation in Hueneme Aquifer, April 2022 (Spring-High Water Year 2022).

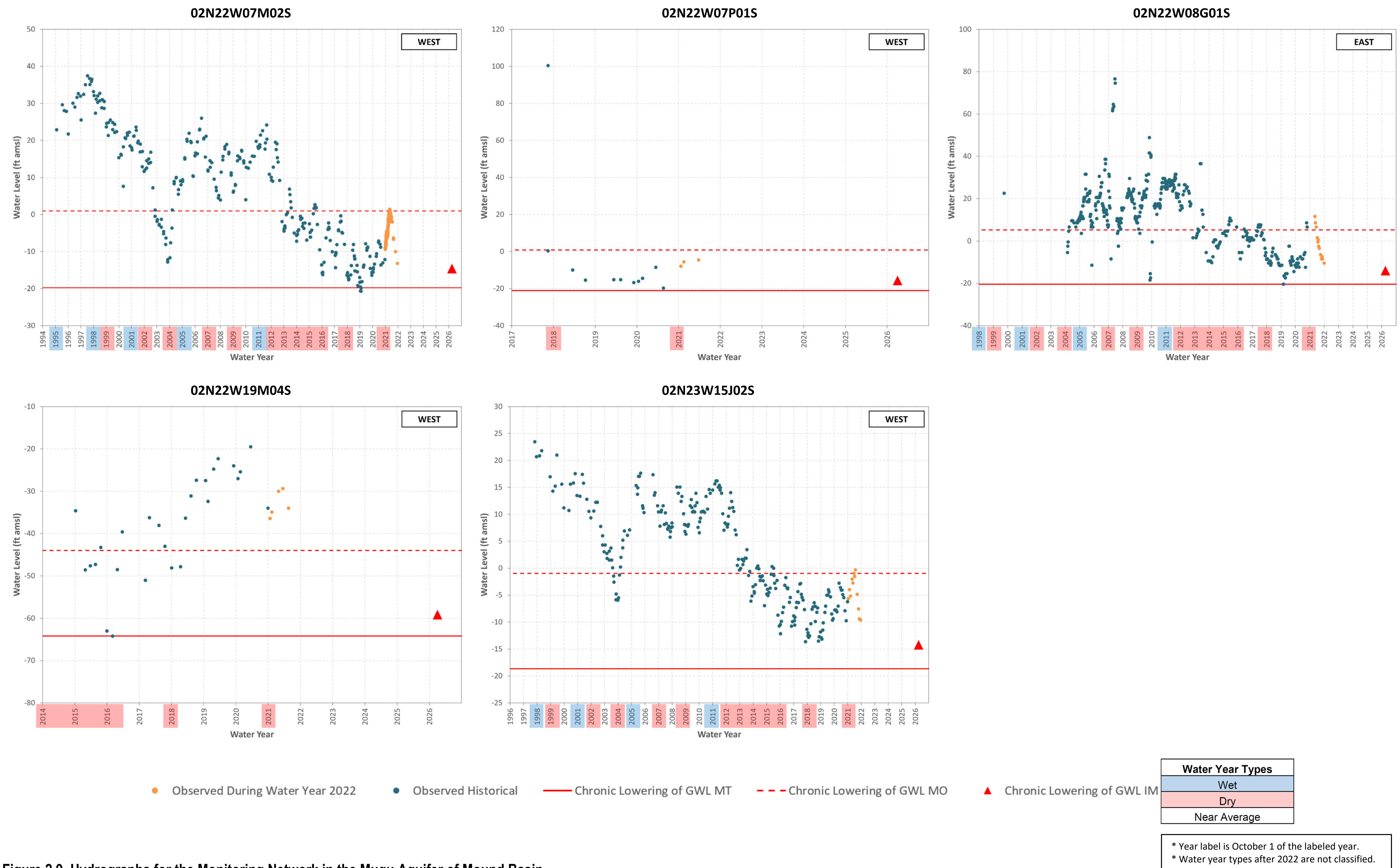


Figure 2.9 Hydrographs for the Monitoring Network in the Mugu Aquifer of Mound Basin.

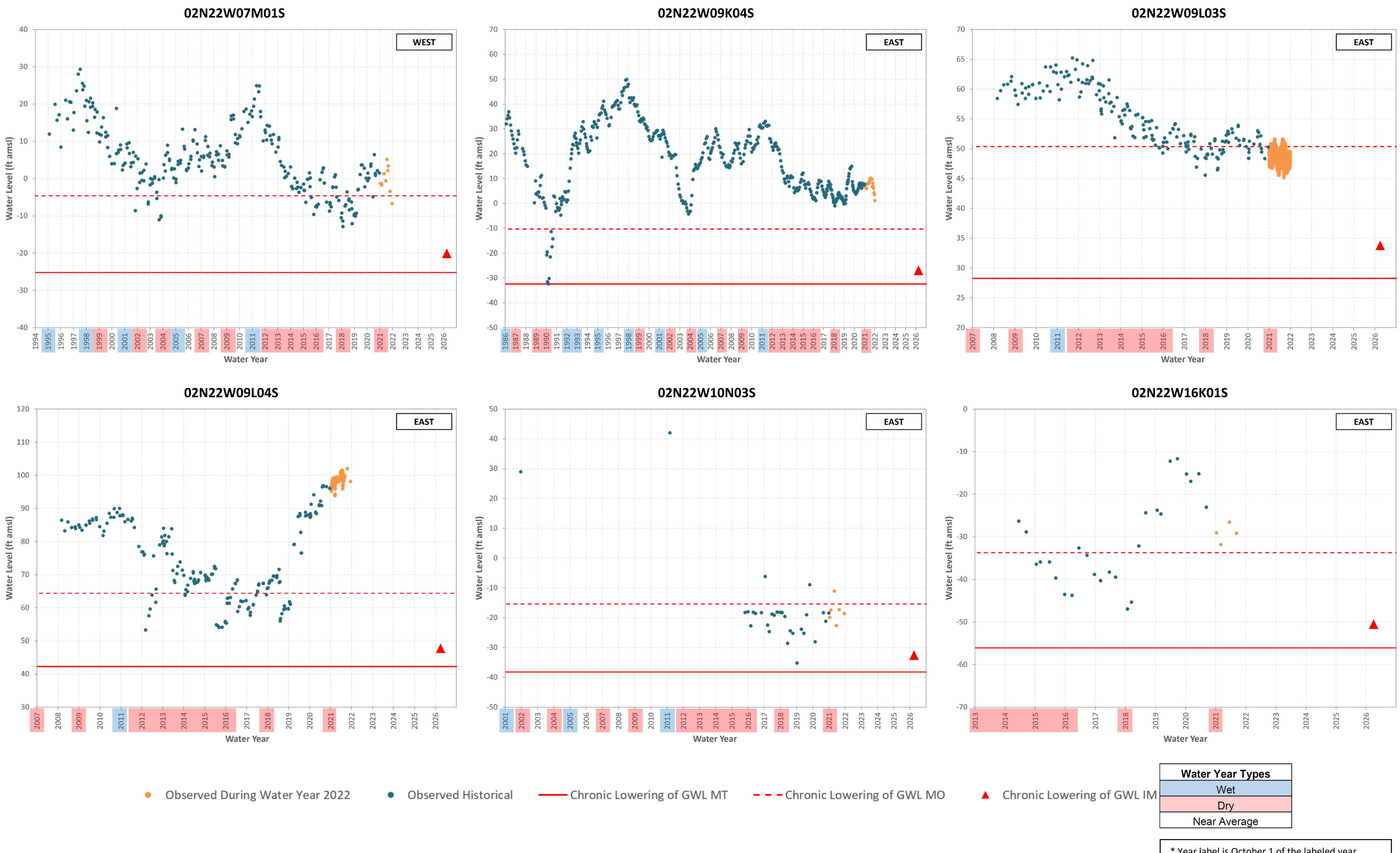


Figure 2.10 Hydrographs for the Monitoring Network in the Hueneme Aquifer of Mound Basin.

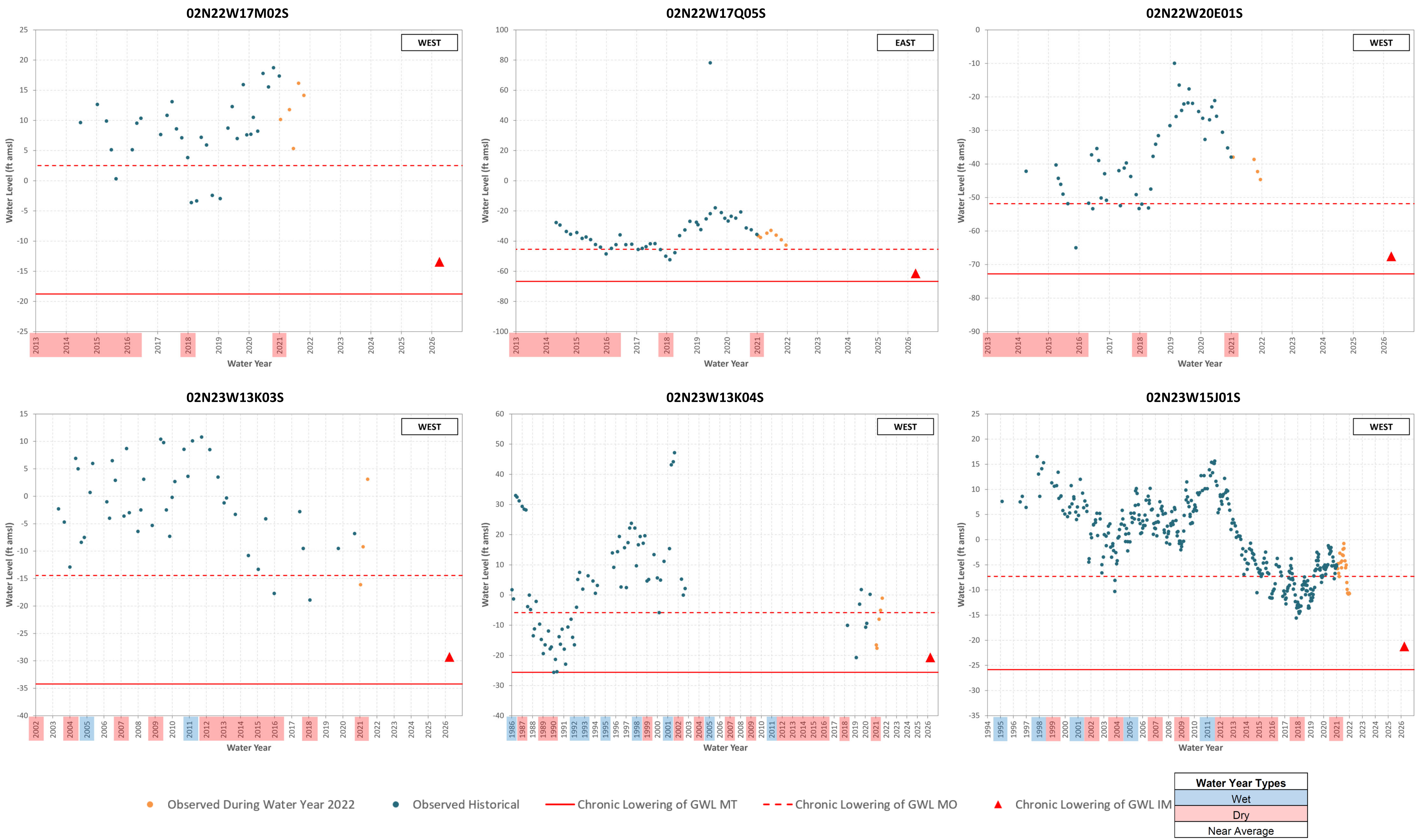
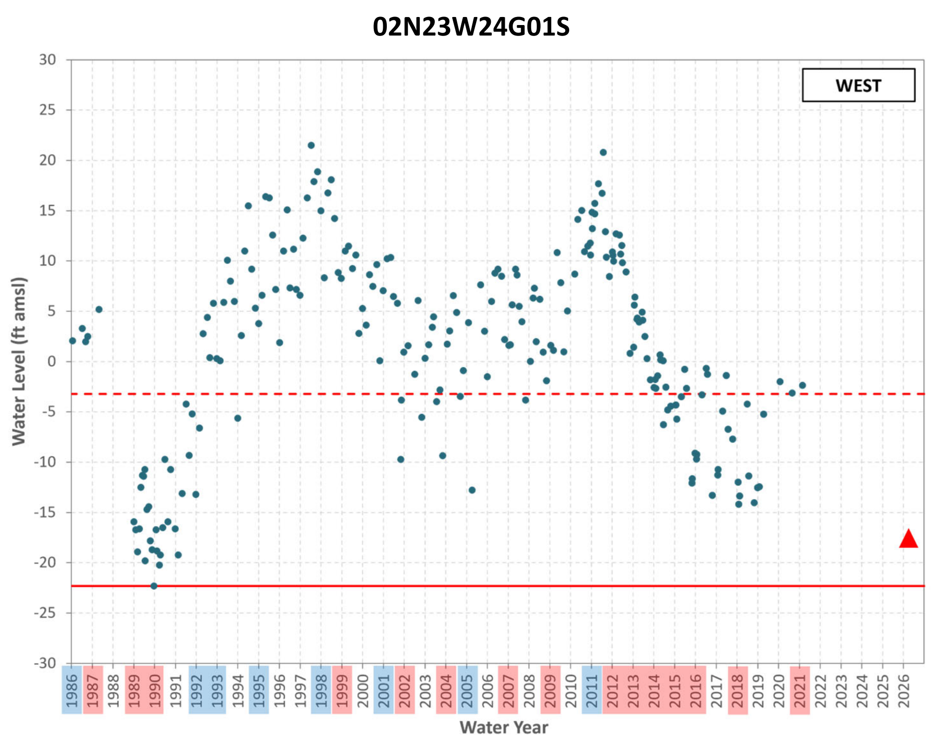


Figure 2.10 Hydrographs for the Monitoring Network in the Hueneme Aquifer of Mound Basin.



● Observed During Water Year 2022 ● Observed Historical —— Chronic Lowering of GWL MT - - - Chronic Lowering of GWL MO ▲ Chronic Lowering of GWL IM

Water Year Types
Wet
Dry
Near Average

* Year label is October 1 of the labeled year.
* Water year types after 2022 are not classified.

Figure 2.10 Hydrographs for the Monitoring Network in the Hueneme Aquifer of Mound Basin.

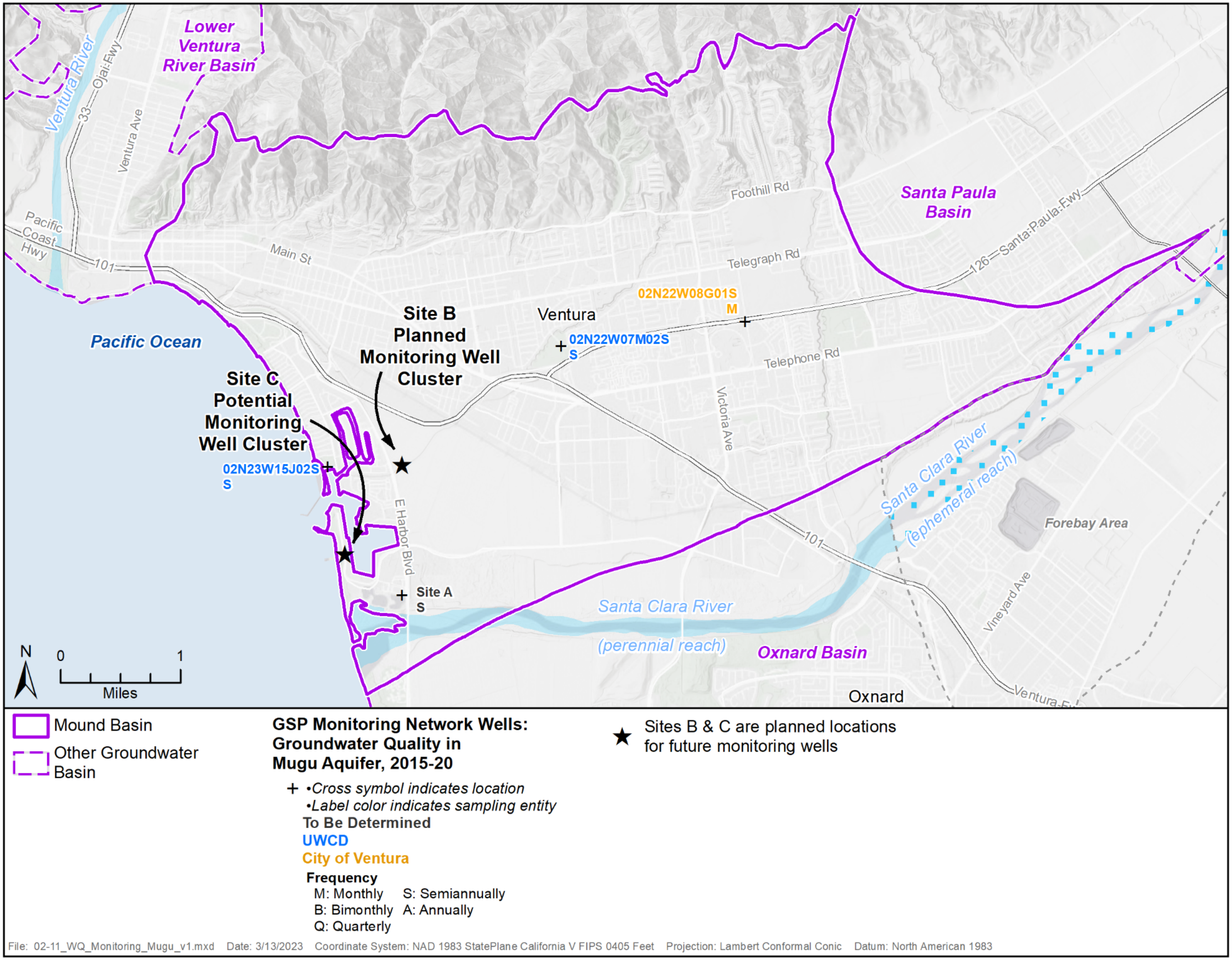


Figure 2.11 Map Showing the Groundwater Quality and Seawater Intrusion Monitoring Networks in the Mugu Aquifer of Mound Basin.

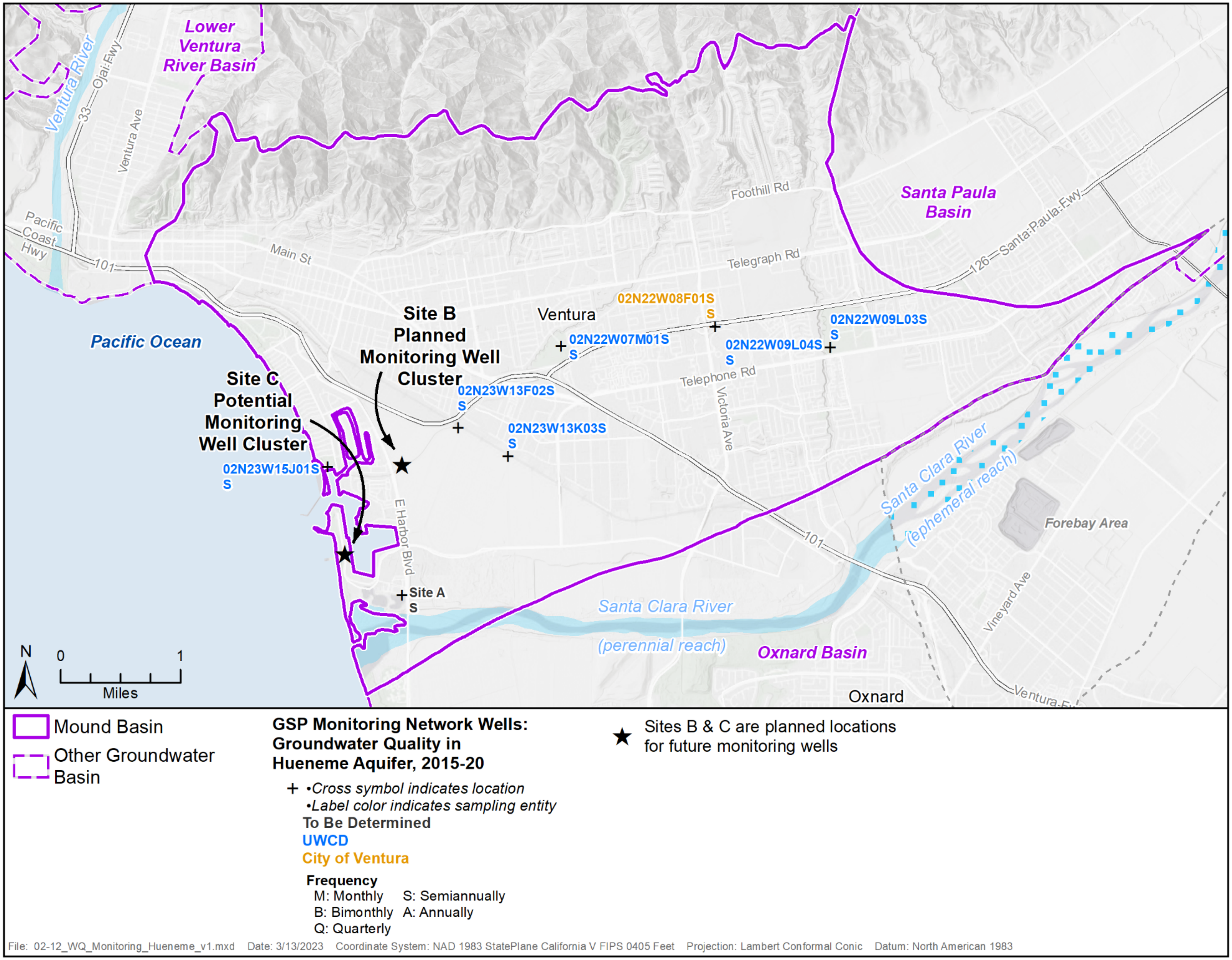


Figure 2.12 Map Showing the Groundwater Quality and Seawater Intrusion Monitoring Networks in the Hueneme Aquifer of Mound Basin.

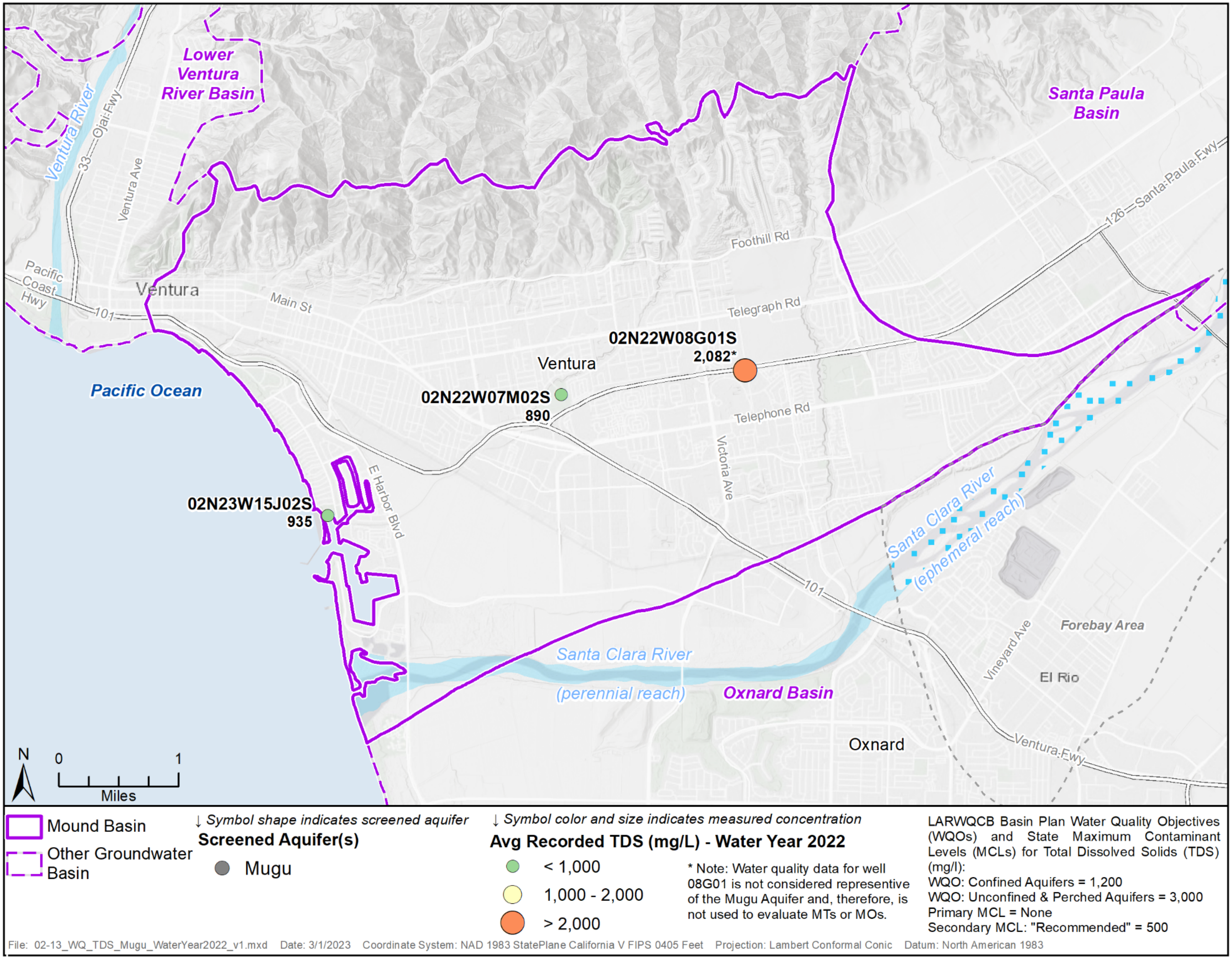


Figure 2.13 Average TDS Concentrations Detected in Mugu Aquifer During Water Year 2022.

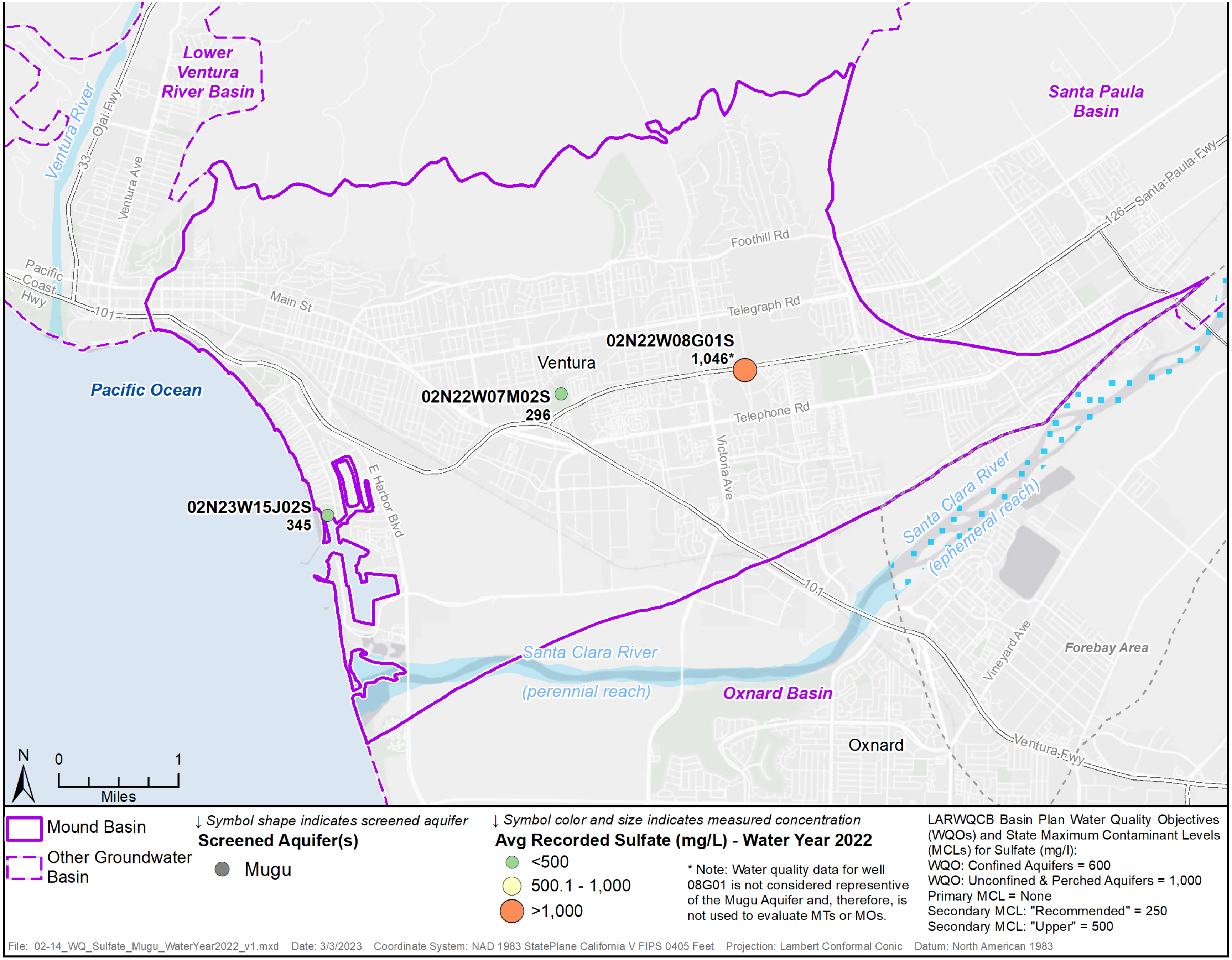


Figure 2.14 Average Sulfate Concentrations Detected in Mugu Aquifer During Water Year 2022.

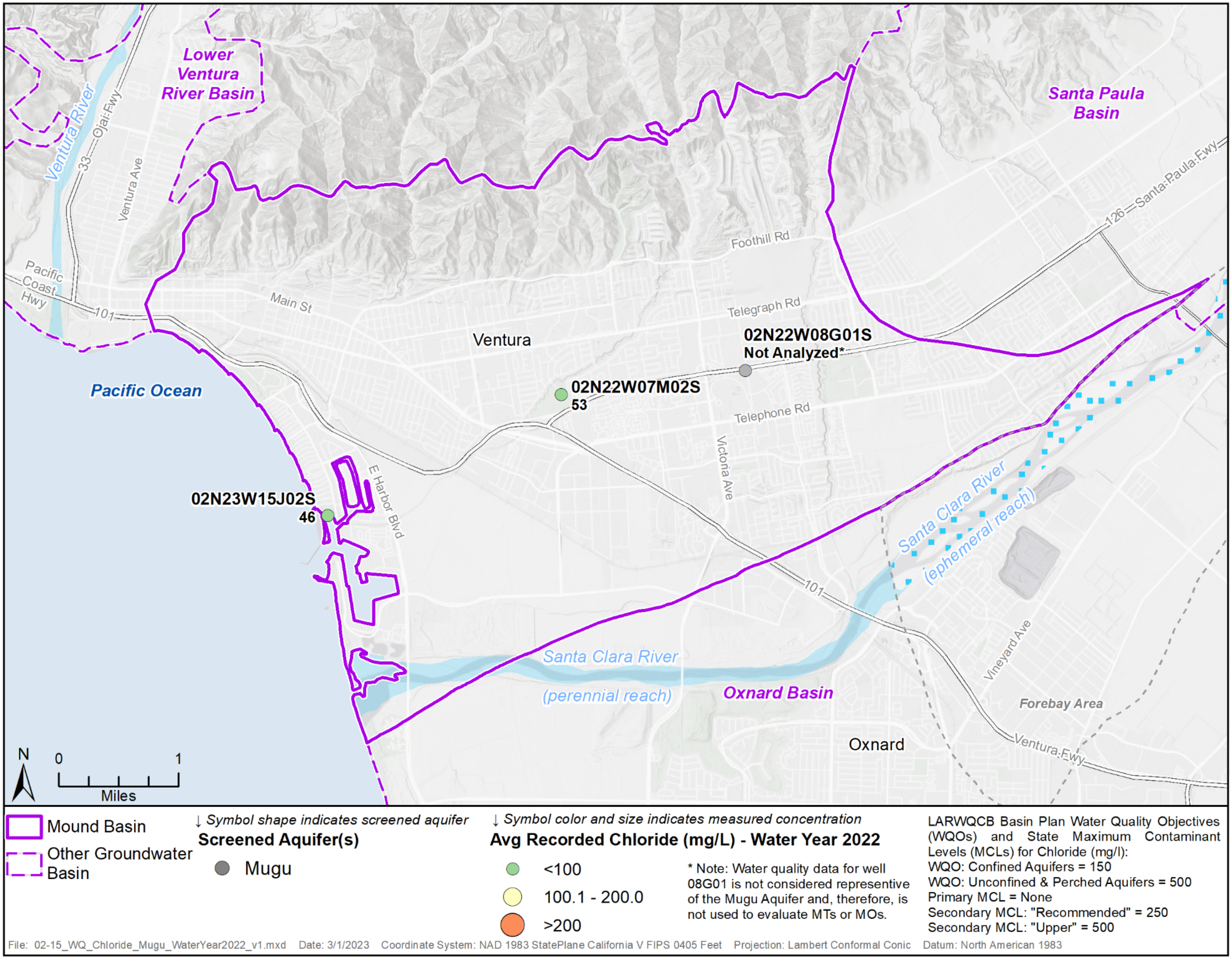


Figure 2.15 Average Chloride Concentrations Detected in Mugu Aquifer During Water Year 2022.

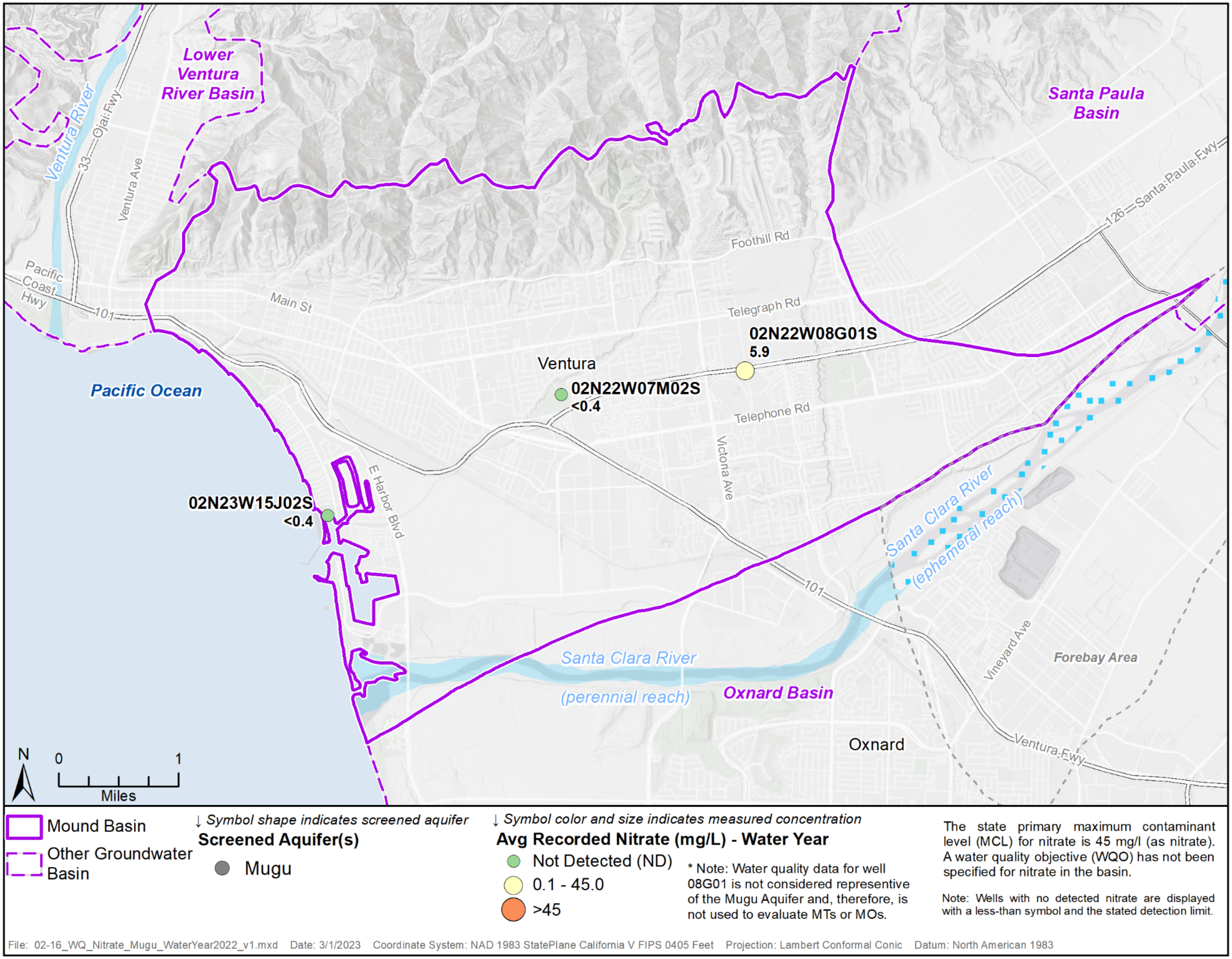


Figure 2.16 Average Nitrate Concentrations Detected in Mugu Aquifer During Water Year 2022.

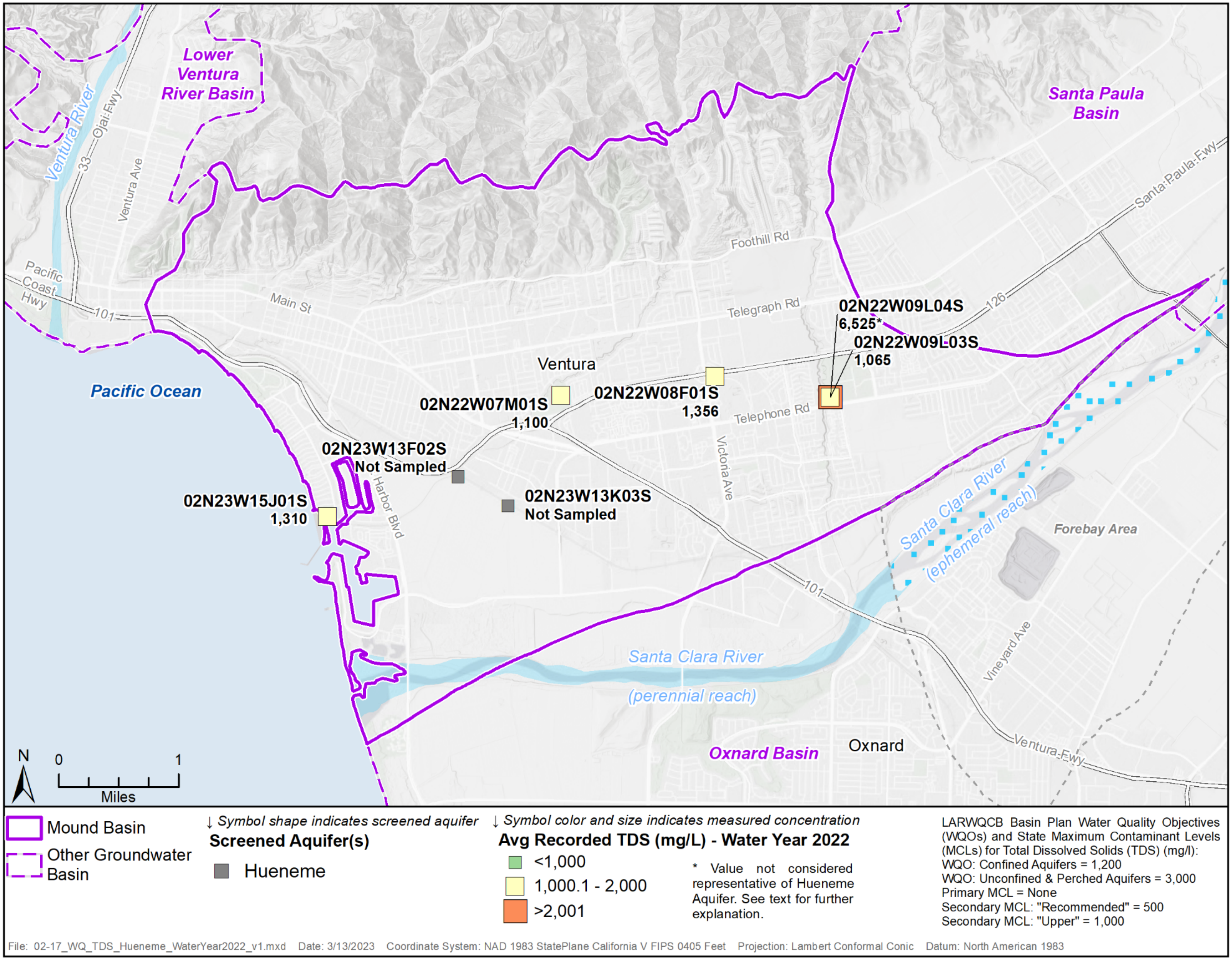


Figure 2.17 Average TDS Concentrations Detected in Hueneme Aquifer During Water Years 2022.

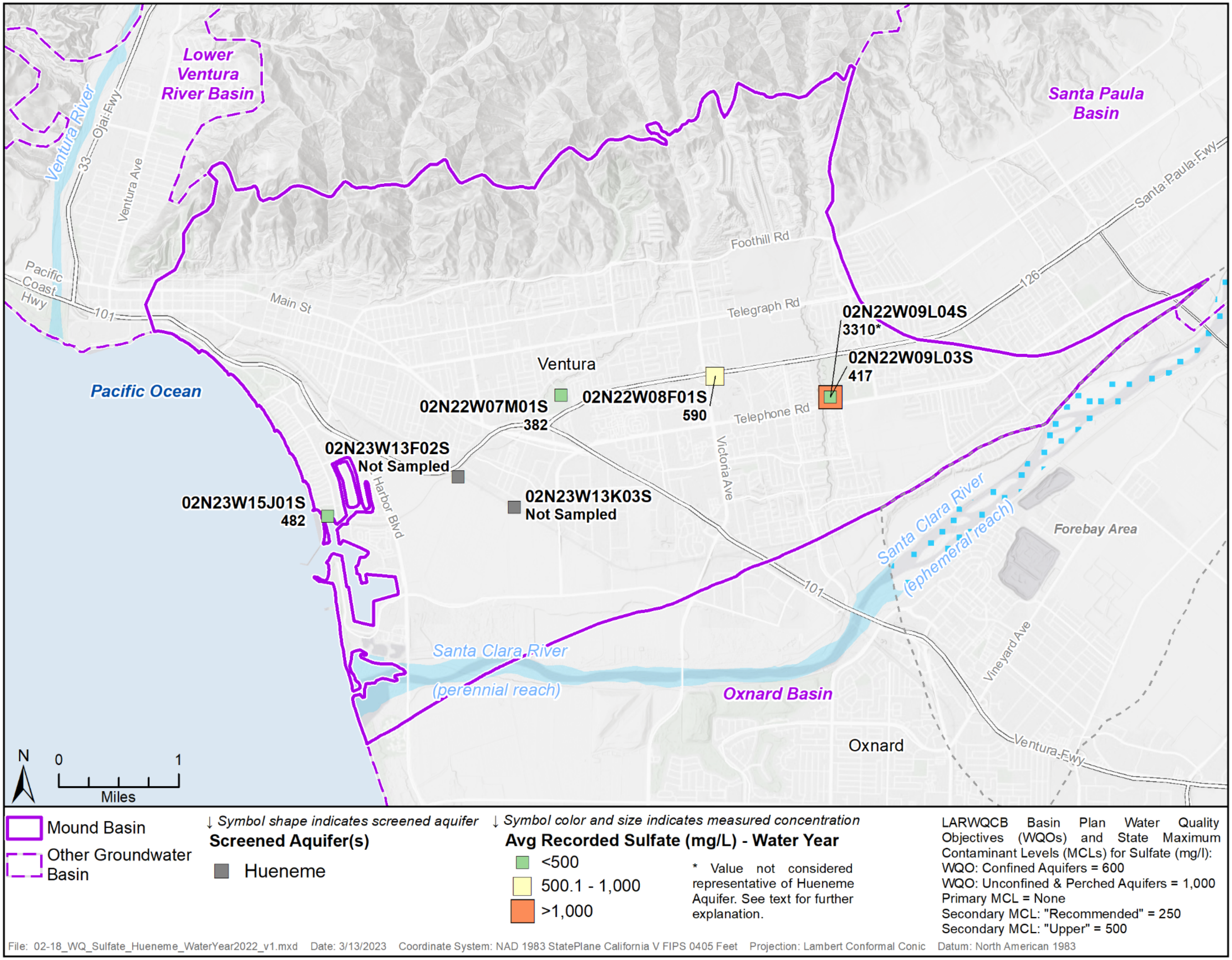


Figure 2.18 Average Sulfate Concentrations Detected in Hueneme Aquifer During Water Year 2022.

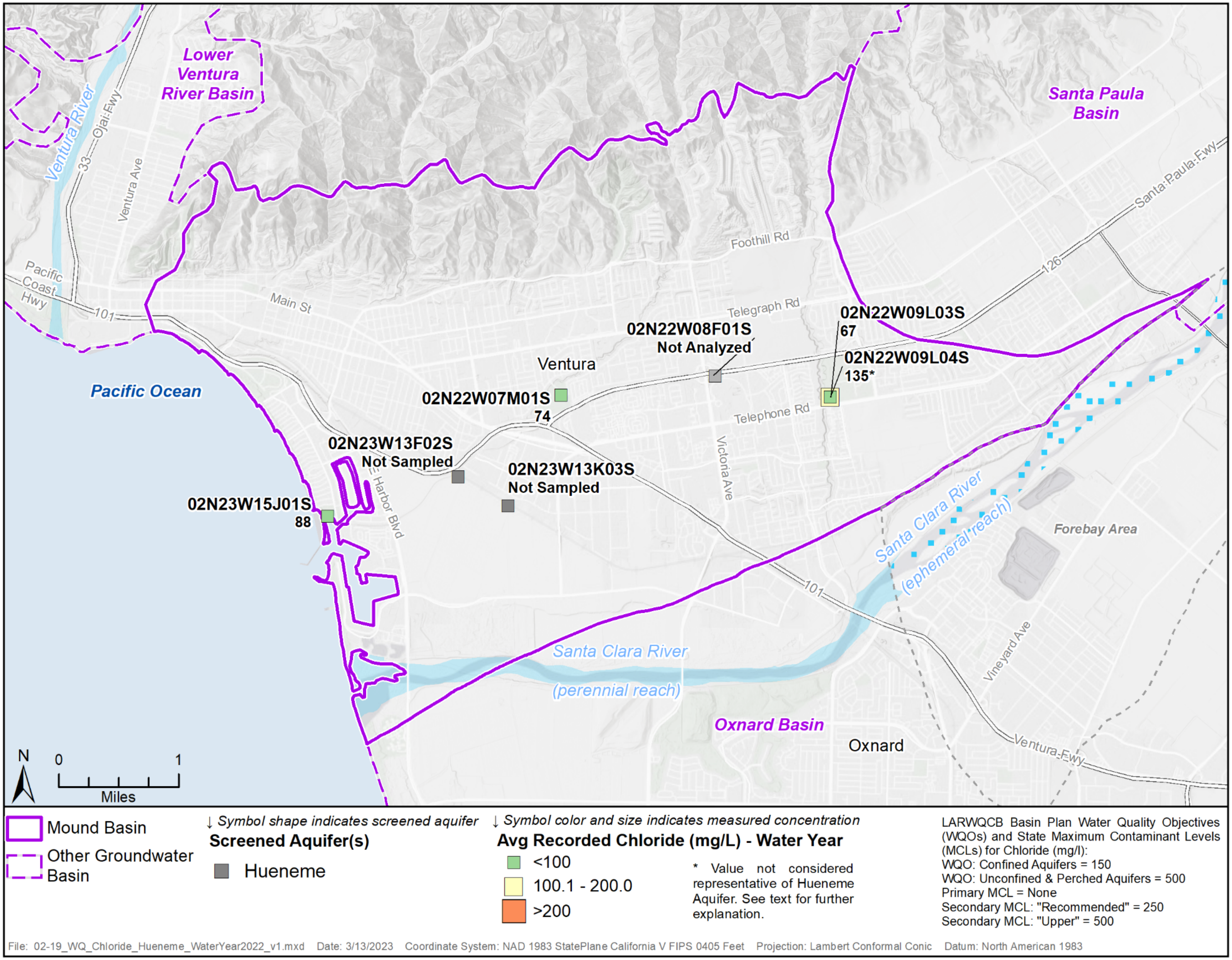


Figure 2.19 Average Chloride Concentrations Detected in Hueneme Aquifer During Water Year 2022.

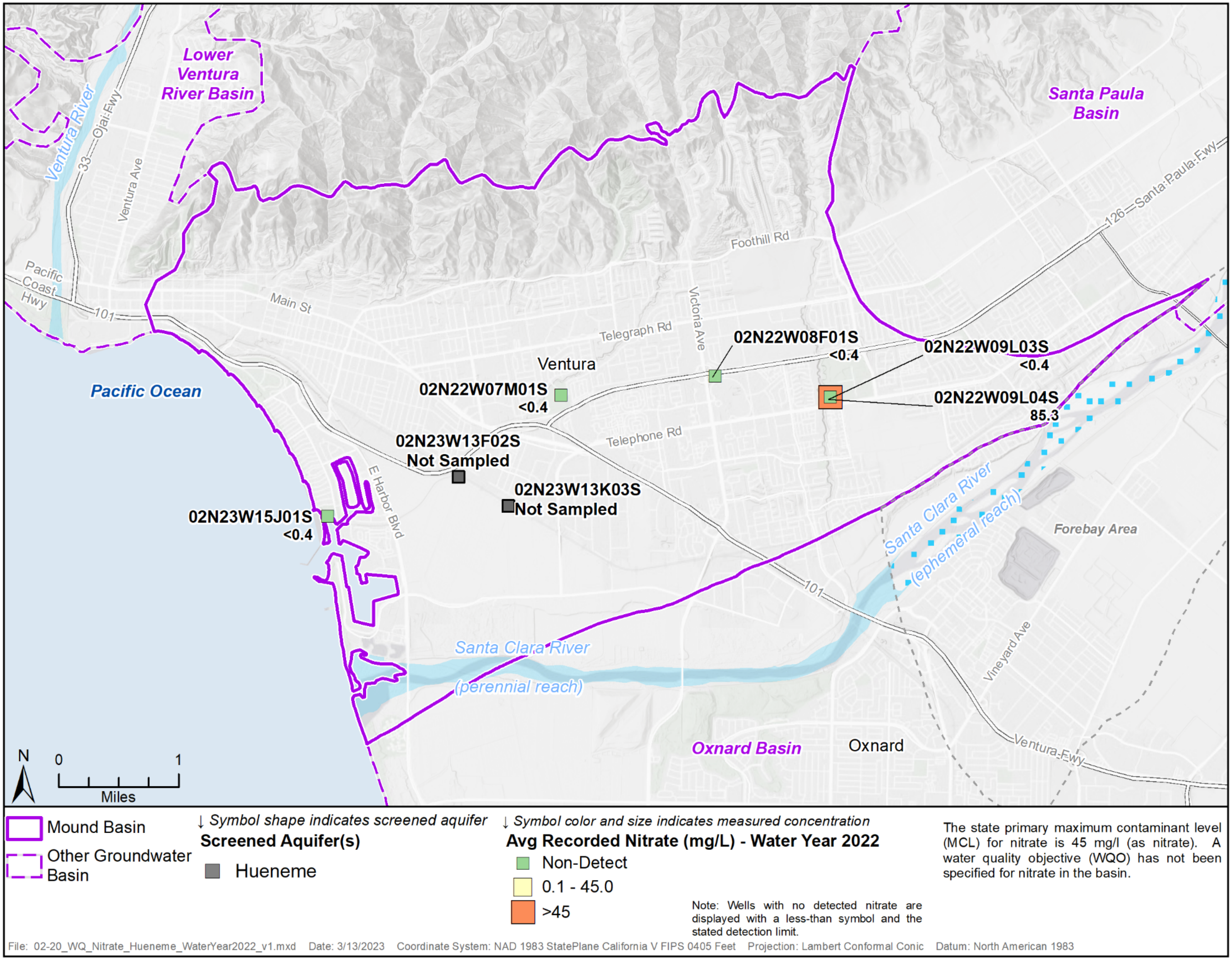


Figure 2.20 Average Nitrate Concentrations Detected in Hueneme Aquifer During Water Year 2022.

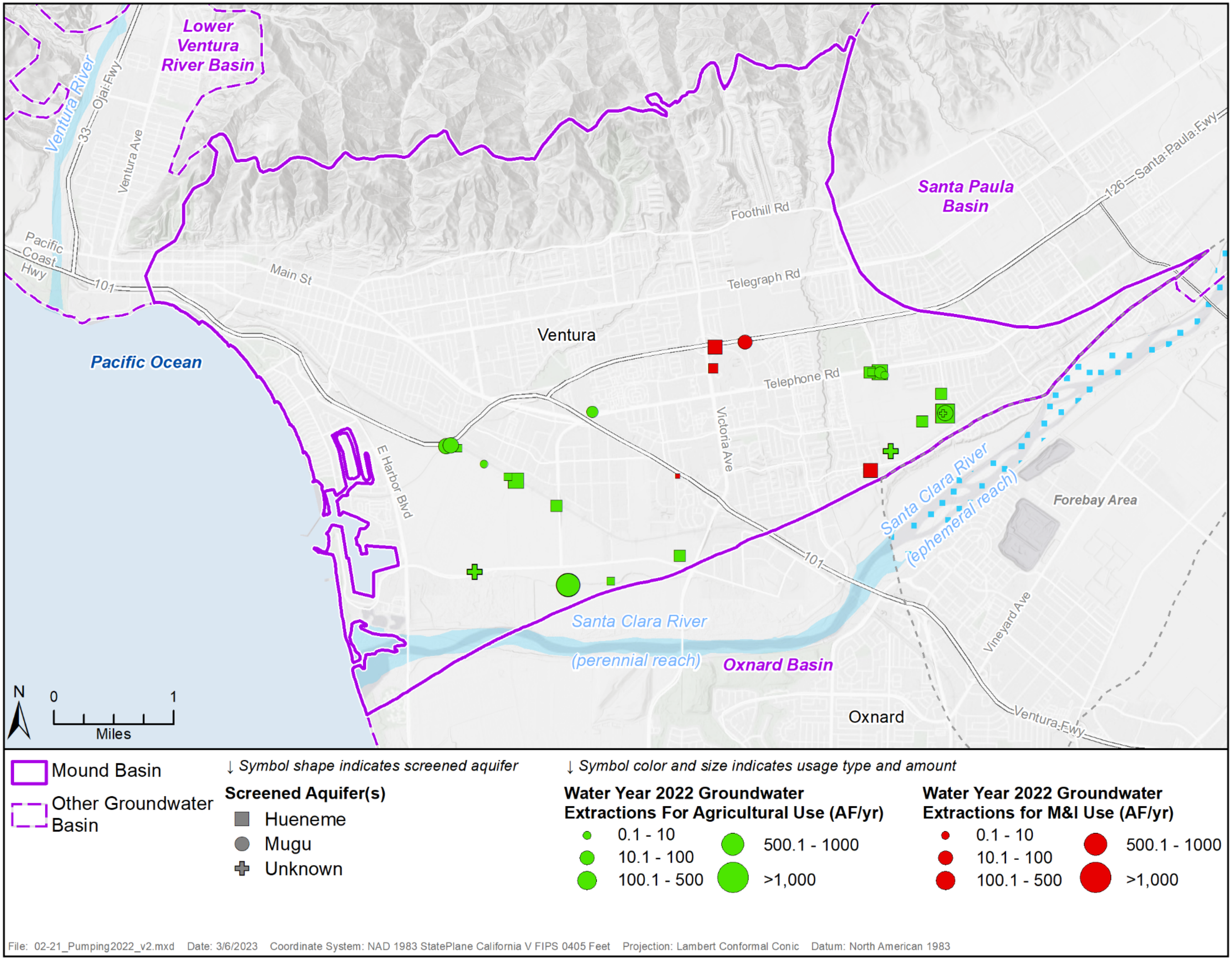


Figure 2.21 Groundwater Extraction from Mound Basin, Water Year 2022.

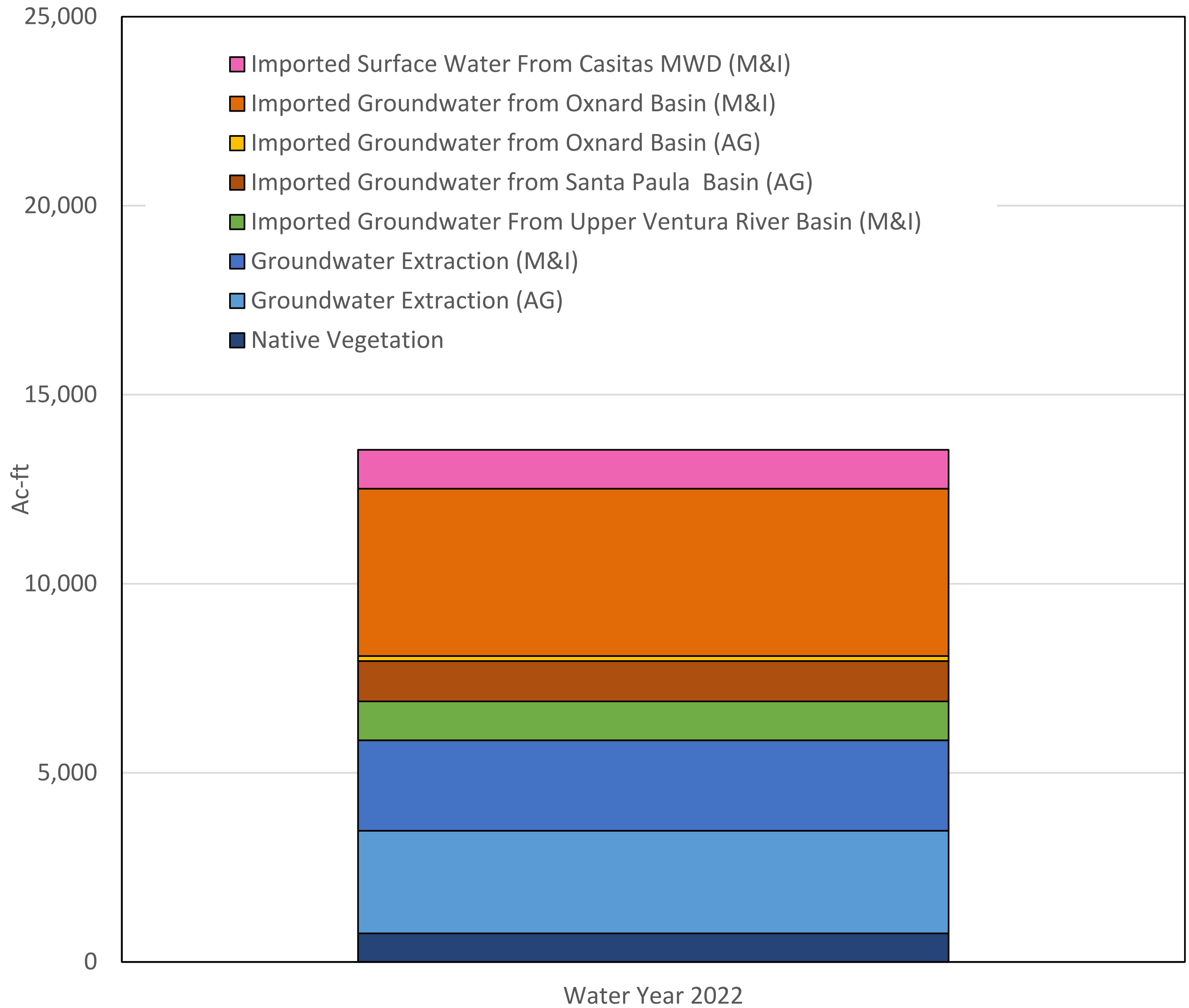


Figure 2.22 Total Water Use for Water Year 2022.

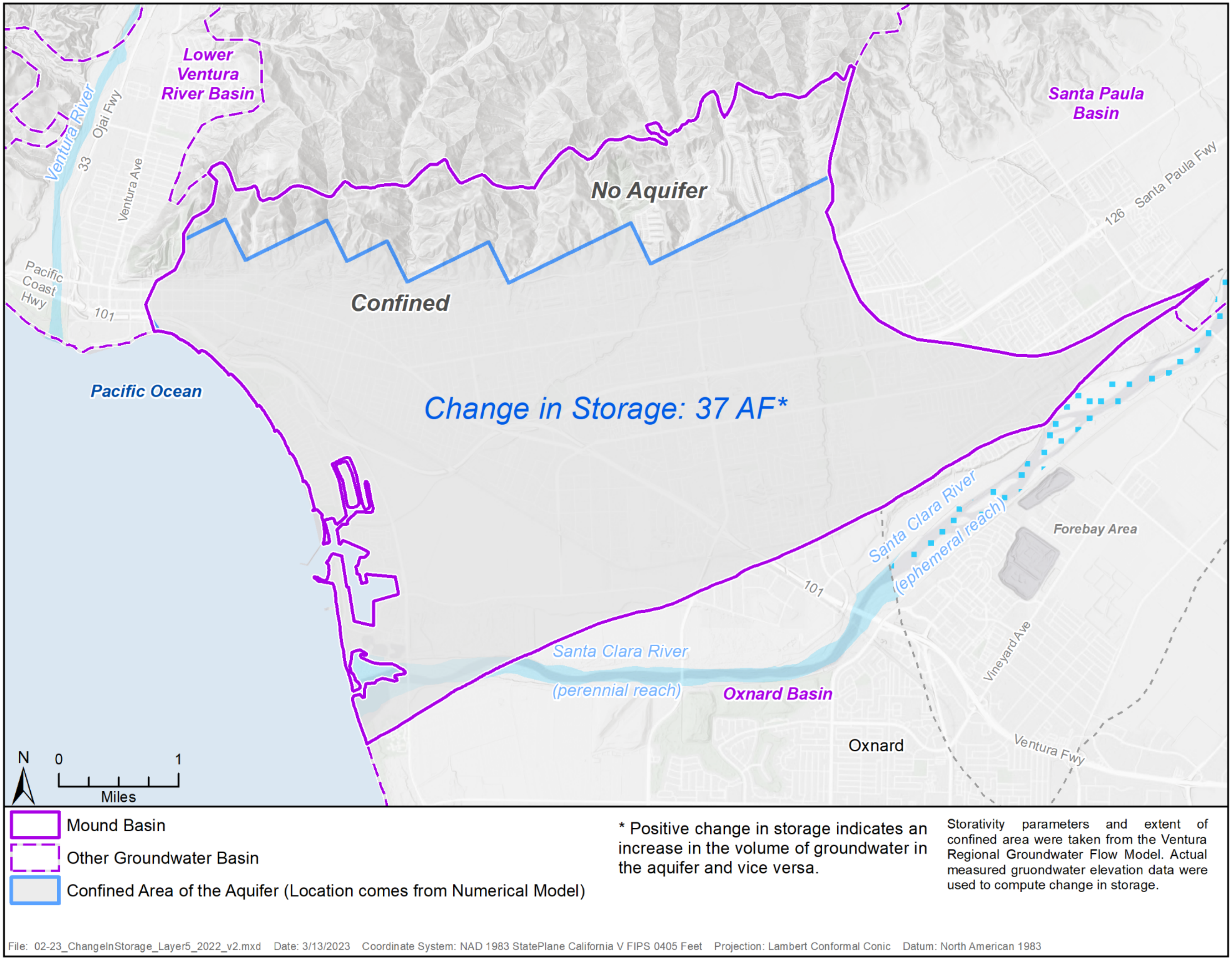


Figure 2.23 Change in Groundwater in Storage for Mugu Aquifer, Water Year 2022.

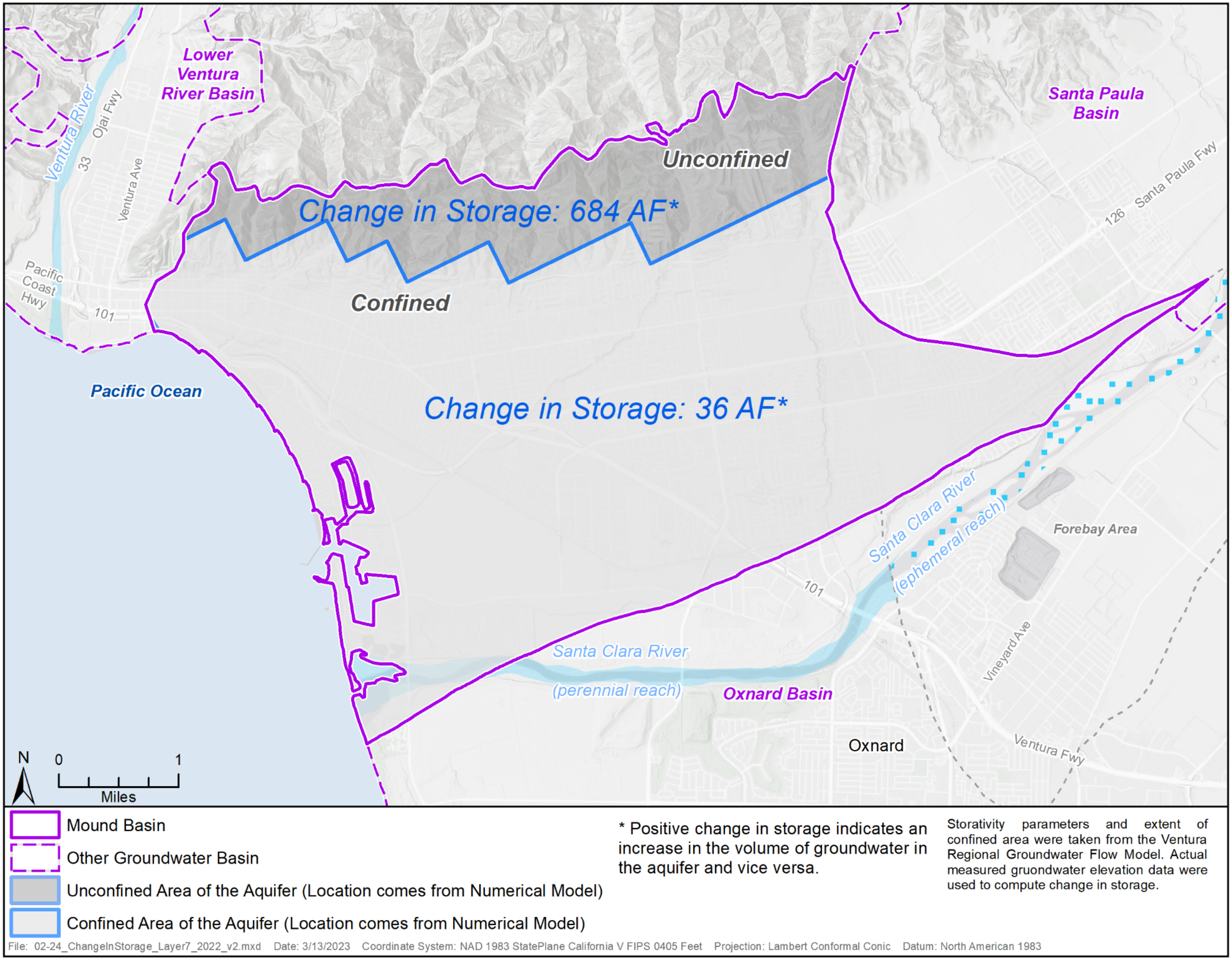
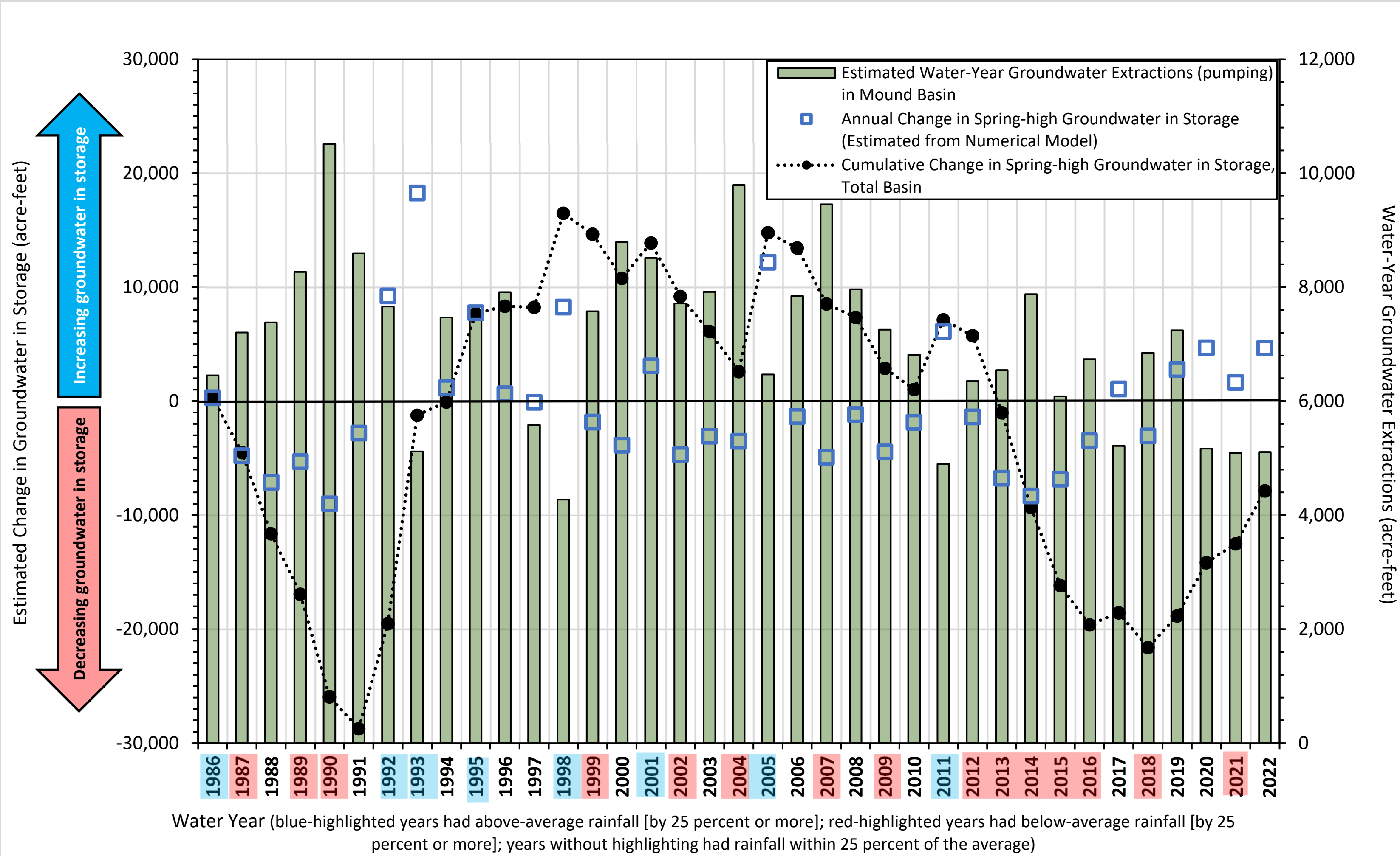


Figure 2.24 Change in Groundwater in Storage for Hueneme Aquifer, Water Year 202.



Water Year Types
Wet
Dry
Near Average

Figure 2.25 Change in Storage for Mound Basin.

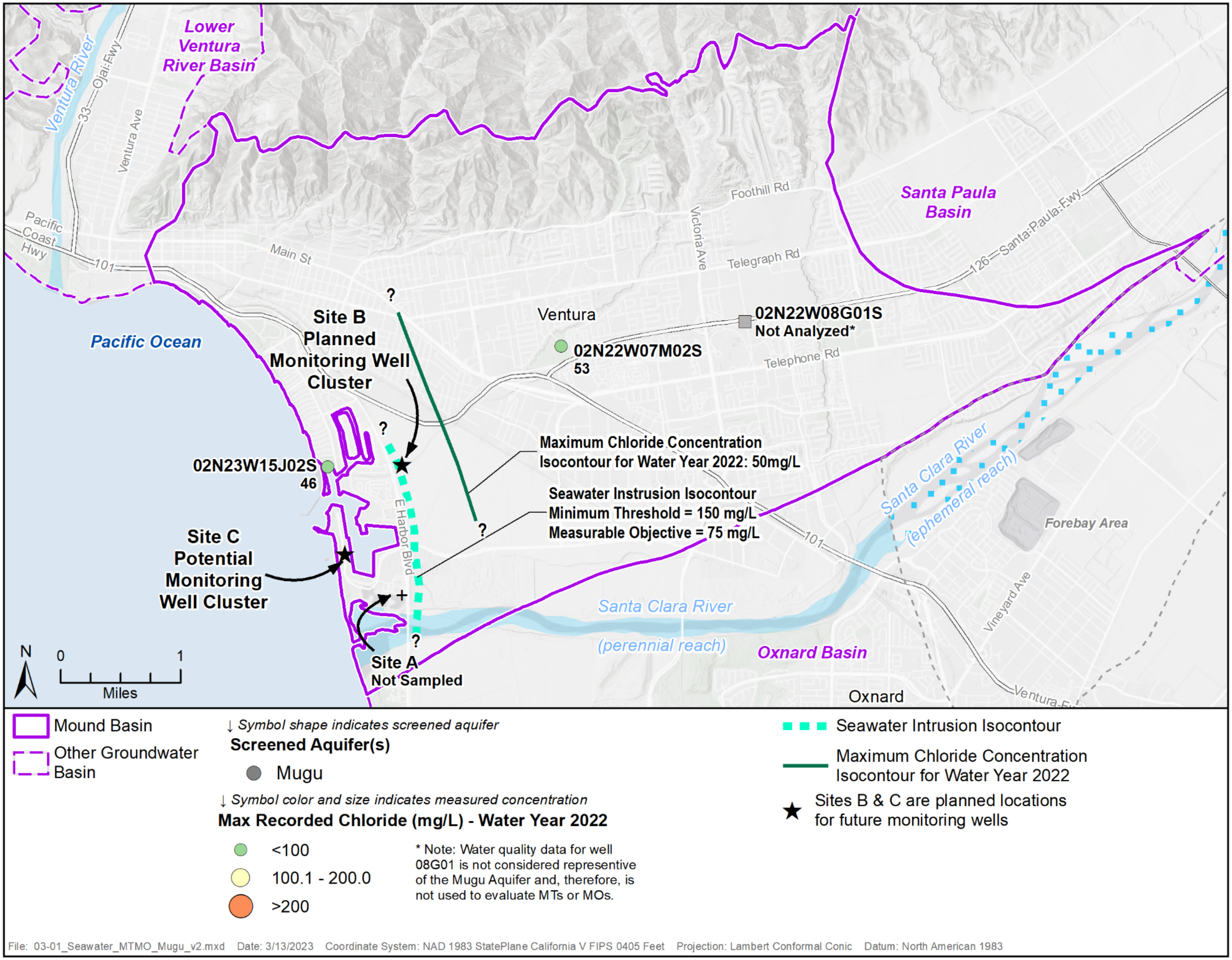


Figure 3.1 Map Showing Seawater Intrusion Minimum Threshold and Measurable Objective, Mugu Aquifer.

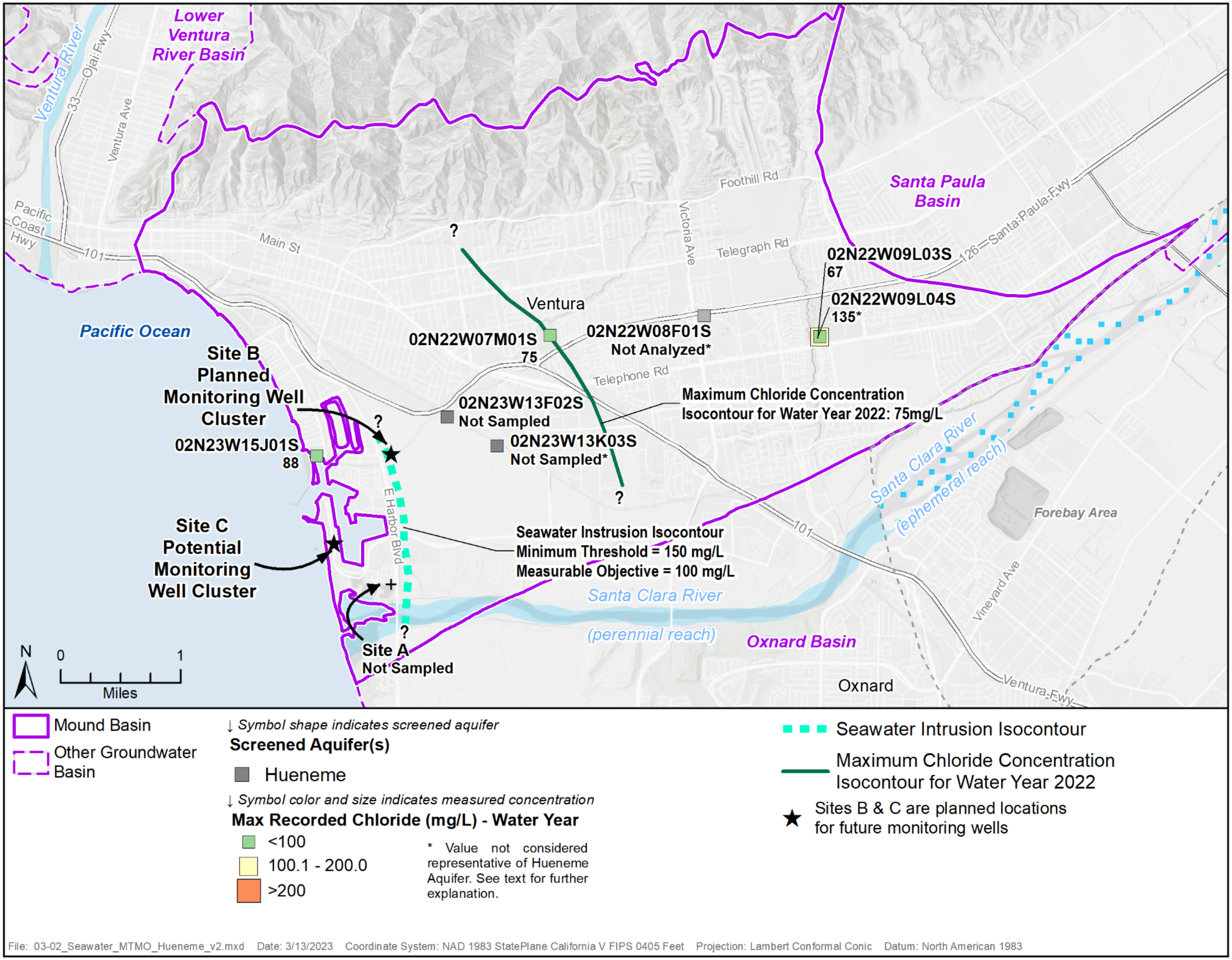
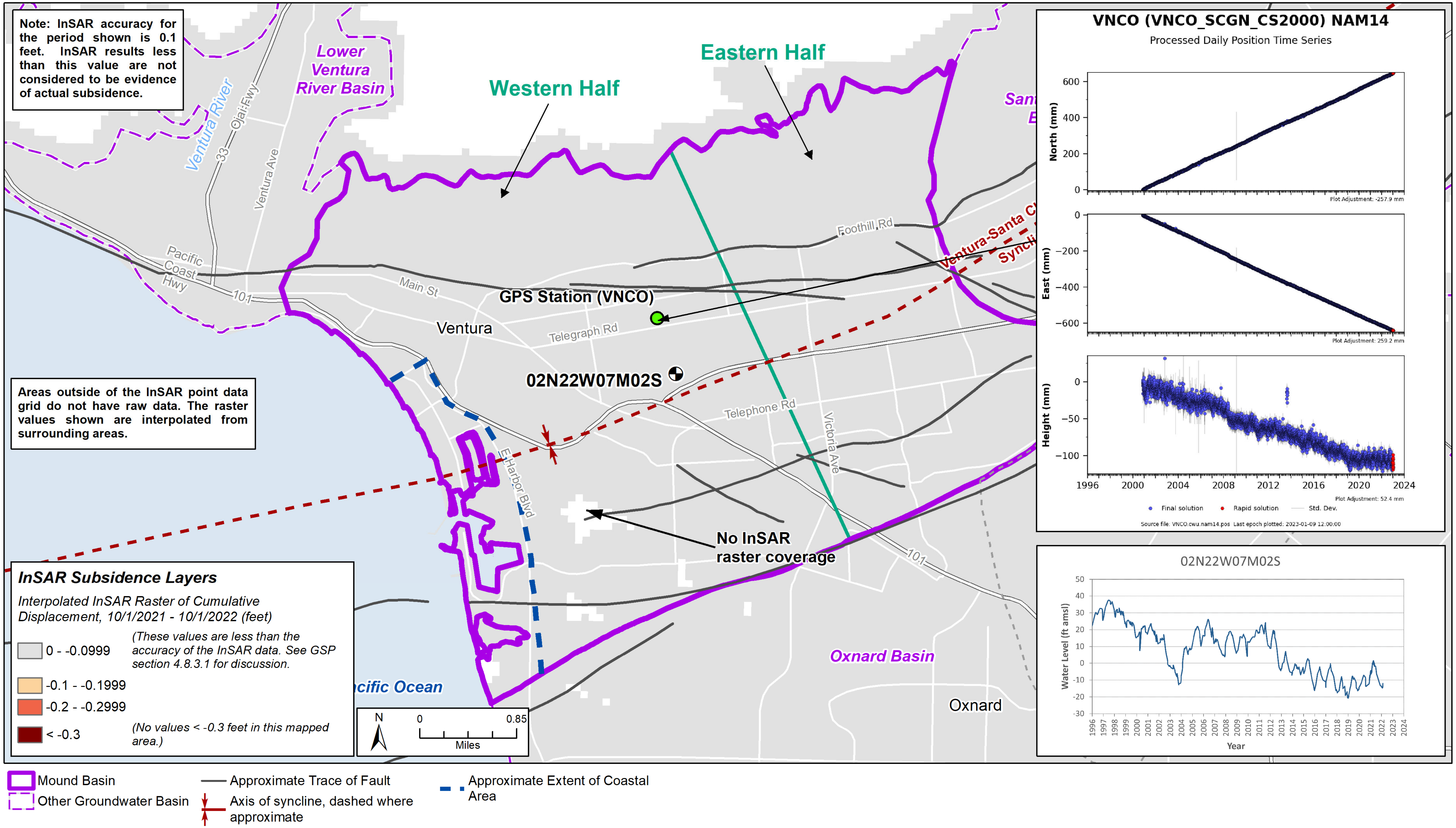


Figure 3.2 Map Showing Seawater Intrusion Minimum Threshold and Measurable Objective, Hueneme Aquifer.



File: 03-03_Subsidence_2022_v2.mxd Date: 3/13/2023 Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet Projection: Lambert Conformal Conic Datum: North American 1983

Figure 3.3 Subsidence Map for Mound Basin Between Water Years 2021 and 2022.

Tables

Table 2.1 Groundwater Extraction by Water Use Sector During Water Year 2022.[a]

Water Use Sector	Water Year 2022	Method of Measurement	Accuracy of Measurement
	AF/yr		
Agricultural	2,715	Direct and Estimated[a]	Medium
Municipal and Industrial	2,391	Direct & Estimated[b]	High
Native Vegetation[c]	755	Estimated[d]	Medium
Total	**5,861**		

Notes:
- Totals may not match sum of values due to rounding.
a Water Year volumes estimated on precipitation, see text Section 2.4
b Water Year volumes for 2 non-city wells estimated based on precipitation, see text Section 2.4
c Note the extraction due to native vegetation includes the invasive species Arundo.
d Based on numerical model results for the baseline simulation, see text Section 2.4 and GSP (MBGSA, 2021)

Table 2.2 Total Water Use Within Mound Basin During Water Year 2022.

Water Year 2022									
Water Use Sector	Water Source Type					Total	Method of Measurement	Accuracy of Measurement
	Groundwater Extraction	Imported Groundwater from Upper Ventura River Basin[a]	Imported Groundwater from Oxnard Basin[b]	Imported Groundwater from Santa Paula Basin[b]	Imported Surface Water (Casitas MWD)[a]			
Agricultural	2,715	0	133[c]	1,067[c]	0	3,915	Direct and Estimated[d]	Medium
Municipal and Industrial	2,391	1,028	4,426	0	1,028	8,873	Direct and Estimated[d,e]	High
Native Vegetation[f]	755	0	0	0	0	755	Estimated[g]	Medium
TOTALS	5,861	1,028	4,559	1,067	1,028	**13,543**		

NOTES:
- Totals may not match sum of values due to rounding

a M&I supplies from Upper Ventura River Basin and Casitas MWD are assumed to be split 50%-50% for use within Mound Basin (see text Section 2.6).
b See text Section 2.6 for estimation method.
c Groundwater imported by FICO and Alta MWC, see Section 3.1.1.3 in GSP.
d Water year volumes for extraction wells estimated based on precipitation, see text Section 2.4.
e Imported M&I volumes are metered and total use is based on the fraction of Mound Basin within Ventura Water service area (see text Section 2.6)
f Note the extraction due to native vegetation includes the invasive species Arundo.
g Based on numerical model results for the baseline simulation, see text Section 2.4 and GSP (MGBSA, 2021)

Table 3.1 **Sustainable Management Criteria for the Chronic Lowering of Groundwater Levels and Land Subsidence Sustainability Indicators.**

State Well Identification	Aquifers	Frequency of Groundwater Elevation Measurement	Basin Half	Land Subsidence MT	Land Subsidence MO	Chronic Lowering of GW Levels MT	Chronic Lowering of GW Levels MO	IM 5-year	IM 10-year	IM 15-year	IM 20-year	Water Year 2022 WL Minimum	Subsidence Sustainability Indicator - Water Year 2022
Number	Monitored	2015-2020		(ft amsl)								(ft amsl)	
02N22W08G01S	Mugu	Monthly	Eastern	≥ 0.1 ft/yr*	≥ 0.1 ft/yr*	-20.39	5.21	-13.99	-7.59	-1.19	5.21	-10.39	<0.1 ft/yr*
02N22W08P01S	Mugu	Quarterly	Eastern	≥ 0.1 ft/yr*	≥ 0.1 ft/yr*	-16.11	7.93	-10.1	-4.09	1.92	7.93	Well destroyed	
02N22W07M02S	Mugu	Monthly	Western	-19.77	1	-19.77	1	-14.58	-9.38	-4.19	1	-13.15	-13.15
02N22W07P01S	Mugu	Monthly	Western	-21	0.88	-21	0.88	-15.53	-10.06	-4.59	0.88	-7.87	-7.87
02N22W19M04S	Mugu	Bimonthly	Western	-64.19	-43.98	-64.19	-43.98	-59.14	-54.08	-49.03	-43.98	-36.41	-36.41
02N23W15J02S	Mugu	Monthly	Western	-18.64	-0.96	-18.64	-0.96	-14.22	-9.8	-5.38	-0.96	-9.59	-9.59
02N22W09K04S	Hueneme	Monthly	Eastern	≥ 0.1 ft/yr*	≥ 0.1 ft/yr*	-32.41	-10.31	-26.88	-21.36	-15.83	-10.31	1.15	<0.1 ft/yr*
02N22W09L03S	Hueneme	Monthly	Eastern	≥ 0.1 ft/yr*	≥ 0.1 ft/yr*	28.27	50.37	33.8	39.32	44.85	50.37	45.16	<0.1 ft/yr*
02N22W09L04S	Hueneme	Monthly	Eastern	≥ 0.1 ft/yr*	≥ 0.1 ft/yr*	42.28	64.39	47.81	53.34	58.86	64.39	93.84	<0.1 ft/yr*
02N22W10N03S	Hueneme	Bimonthly	Eastern	≥ 0.1 ft/yr*	≥ 0.1 ft/yr*	-38.2	-15.4	-32.5	-26.8	-21.1	-15.4	-22.57	<0.1 ft/yr*
02N22W16K01S	Hueneme	Quarterly	Eastern	≥ 0.1 ft/yr*	≥ 0.1 ft/yr*	-56.09	-33.73	-50.5	-44.91	-39.32	-33.73	-31.80	<0.1 ft/yr*
02N22W17Q05S	Hueneme	Bimonthly	Eastern	≥ 0.1 ft/yr*	≥ 0.1 ft/yr*	-66.73	-45.48	-61.42	-56.11	-50.79	-45.48	-42.59	<0.1 ft/yr*
02N22W07M01S	Hueneme	Monthly	Western	-25.21	-4.59	-25.21	-4.59	-20.06	-14.9	-9.75	-4.59	-6.66	-6.66
02N22W17M02S	Hueneme	Bimonthly	Western	-18.76	2.51	-18.76	2.51	-13.44	-8.12	-2.81	2.51	5.36	5.36
02N22W20E01S	Hueneme	Monthly	Western	-72.79	-51.82	-72.79	-51.82	-67.55	-62.31	-57.07	-51.82	-44.61	-44.61
02N23W13K03S	Hueneme	Quarterly	Western	-34.23	-14.44	-34.23	-14.44	-29.28	-24.33	-19.39	-14.44	-16.09	-16.09
02N23W13K04S	Hueneme	Quarterly	Western	-25.6	-5.81	-25.6	-5.81	-20.65	-15.71	-10.76	-5.81	-17.61	-17.61
02N23W15J01S	Hueneme	Monthly	Western	-25.86	-7.3	-25.86	-7.3	-21.22	-16.58	-11.94	-7.3	-10.80	-10.80
02N23W24G01S	Hueneme	Quarterly	Western	-22.3	-3.21	-22.3	-3.21	-17.53	-12.75	-7.98	-3.21	Not measured	

Notes:

MT/MO based on land subsidence measurements in the Eastern Half of the Basin
*INSAR land surface elevation accuracy threshold is 0.1 ft/yr

Color Key:

MO met	5-year IM met	Between MT and IM	MT exceeded

Table 3.2 Sustainable Management Criteria for the Reduction of Groundwater Storage Sustainability Indicator

Water Year	Groundwater Extractions	Minimum Threshold	Measurable Objective
	AF/yr	AF/yr	AF/yr
2022	5,106	8,200	7,400

Color Key:

Measurable objective met

Minimum threshold exceeded

Table 3.3 Sustainable Management Criteria for the Degraded Water Quality Sustainability Indicator.

State Well Identification Number	Local Well Identifier	Aquifers Monitored	Frequency of Groundwater Quality Sampling 2015-2022	Measurement or Sampling Entity	Degraded WQ Nitrate MT	Degraded WQ Nitrate MO/IM[1,2]	Degraded WQ TDS MT	Degraded WQ TDS MO/IM[1,2]	Degraded WQ Sulfate MT	Degraded WQ Sulfate MO/IM[1,2]	Degraded WQ Chloride MT	Degraded WQ Chloride MO/IM[1,2]	Degraded WQ Boron MT	Degraded WQ Boron MO/IM[1,2]
02N22W08G01S	Mound #1	Mugu	Monthly	City of Ventura	Not used - water quality is anomalous									
02N22W07M02S	CP-780	Mugu	Semiannually	United	45	5	1200	1000	600	500	150	75	1	0.75
Average observed concentration for water year 2022					<0.4		890		296		53		0.5	
Two-year running average observed concentration for water years 2021-2022					<0.4		888		307		53		0.5	
02N23W15J02S	MP-660	Mugu	Semiannually	United	45	5	1200	1000	600	500	150	75	1	0.75
Average observed concentration for water year 2022					<0.4		935		345		46		0.5	
Two-year running average observed concentration for water years 2021-2022					<0.4		948		362		46		0.5	
02N22W08F01S	Victoria #2	Hueneme	Monthly	City of Ventura	Not used - water quality is anomalous									
02N22W09L03S	CWP-950	Hueneme	Semiannually	United	45	5	1400	1400	600	600	150	100	1	0.75
Average observed concentration for water year 2022					<0.4		1065		417		67		0.5	
Two-year running average observed concentration for water years 2021-2022					<0.4		1068		438		67		0.5	
02N22W09L04S	CWP-510	Hueneme	Semiannually	United	Not used - water quality is anomalous									
02N23W13F02S	---	Hueneme	Annually	United	45	5	1400	1400	600	600	150	100	1	0.75
Average observed concentration for water year 2022					NA		NA		NA		NA		NA	
Two-year running average[3] observed concentration for water years 2021-2022					<0.4		1130		387		68		0.6	
02N22W07M01S	CP-1280	Hueneme	Semiannually	United	45	5	1400	1400	600	600	150	100	1	0.75
Average observed concentration for water year 2022					<0.4		1100		382		74		0.6	
Two-year running average observed concentration for water years 2021-2022					<0.4		1098		395		74		0.7	
02N23W13K03S	---	Hueneme	Annually	VCWPD	Not used - water quality is anomalous									
02N23W15J01S	MP-1070	Hueneme	Semiannually	United	45	5	1400	1400	600	600	150	100	1	0.75
Average observed concentration for water year 2022					<0.4		1310		482		88		0.7	
Two-year running average observed concentration for water years 2021-2022					<0.4		1328		507		87		0.7	

Notes:

MO = Measurable Objective.
IM = Interim Milestone.

MT = Minimum Threshold.

SMC = sustainable management criteria.

WQ = water quality.

NA = Not available.

[1]Sustainability Goal for degraded water quality for a given constituent is considered to be met when the two-year running average concentration for at least one representative monitoring well is below the MO/IM.

[2]The degraded water quality MO and IM are equal and are met when the maximum 2-yr running average across all wells within each principal aquifer is below their respective MO/IM.

[3]Data was not available for water year 2022 for well 02N23W13F02S.

Color Key:

MO/IM met[2]
Between MT and MO/IM
MT exceeded

DRAFT

Appendix

DRAFT Appendix A
Updated Extraction Volume Estimation for Prior Reporting Period

Groundwater extraction volumes for the Mound Basin are reported semi-annually (January through June, and July through December). Each Annual Report for the Mound Basin Groundwater Sustainability Agency (MBGSA) reports pumping for the water year (October 1st through September 30th), which requires the months of July, August, and September to be estimated due to the water year extending beyond the available semi-annual reporting period. This Appendix documents the updates and comparison to the previous Annual Report water year pumping volume estimates along with the corrected figure and tables. The total monthly extraction estimated for the last 3 months of water year 2021 was approximately 20% less than what was subsequently reported (Table 1).

	2021 Annual Report Originally Estimated Total Extraction (AF)		Updated Volumes Based on Semi-Annually Reported Extraction (AF)		% Difference		
Month-Year	Total Agricultural	Total M&I	Total Agricultural	Total M&I	Total Agricultural	Total M&I	Overall Difference
Jul-21	263	171	367	168	40%	-2%	19%
Aug-21	268	171	367	168	37%	-2%	18%
Sep-21	259	171	367	168	42%	-2%	20%

Table 1. Summary comparison of previously reported and updated groundwater extraction volumes.

Figure 1 and Tables 2 through 4 show the updates to Figure 2.27, and Tables 2.1, 2.2, and 3.2 from the previous water years 2020-2021 Annual Report are provided below.

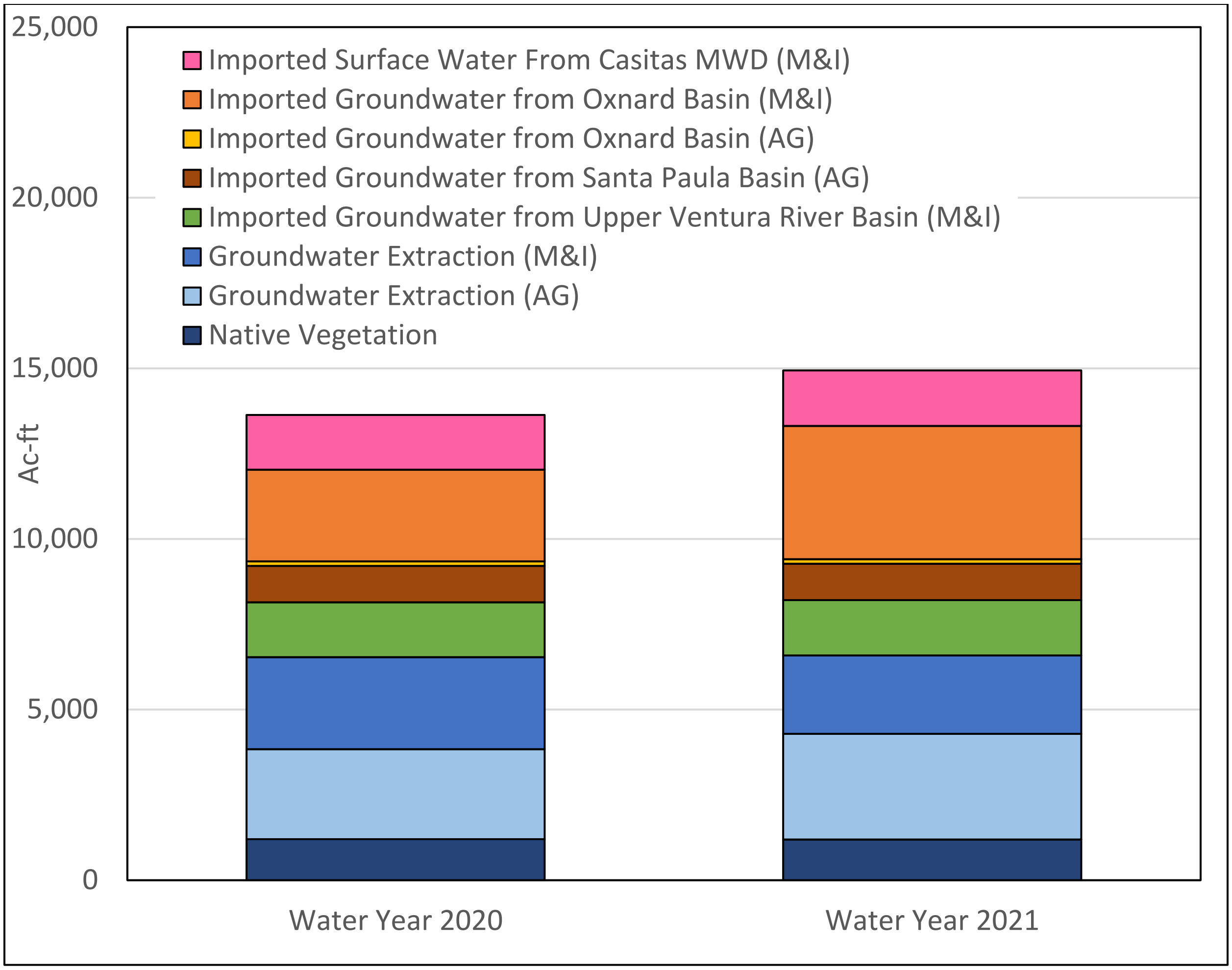


Figure 1: Updated Figure 2.27 from the water years 2020-2021 MBGSA Annual Report. Groundwater Extraction (M&I and AG) for Water Year 2021 have been updated.

Table 2.1 Groundwater Extraction by Water Use Sector for Water Years 2020 and 2021.

Water Use Sector	Water Year 2020	Water Year 2021	Method of Measurement	Accuracy of Measurement
	AF/yr	AF/yr		
Agricultural	2,639	~~2,783~~3,094	Direct and Estimated[a]	Medium
Municipal and Industrial	2,697	~~2,239~~2,298	Direct and Estimated[b]	High
Native Vegetation[c]	1,200	1,193	Estimated[d]	Medium
TOTAL	**6,536**	**~~6,215~~6,585**		

Notes:

- Totals may not match sum of values due to rounding

a Water year volumes estimated based on precipitation, see text Section 2.4
b Water year volumes for 2 non-city wells estimated based on precipitation, see text Section 2.4
c Note the extraction due to native vegetation includes the invasive species Arundo.
d Based on numerical model results for the baseline simulation, see text Section 2.4 and GSP (MGBSA, 2021)

Table 2. Updated Table 2.1 from the water years 2020-2021 MBGSA Annual Report. Previous values are shown as strikethrough text.

Water Year 2021								
Water Use Sector	Water Source Type					Total	Method of Measurement	Accuracy of Measurement
	Groundwater Extraction	Imported Groundwater from Upper Ventura River Basin[a]	Imported Groundwater from Oxnard Basin[b]	Imported Groundwater from Santa Paula Basin[b]	Imported Surface Water (Casitas MWD)[a]			
Agricultural	~~2,783~~3,094	0	133[c]	1,067[c]	0	~~3,983~~4,294	Direct and estimated[d]	Medium
Municipal and Industrial	~~2,239~~2,298	1,624	3,904	0	1,624	~~9,392~~9,450	Direct and estimated[d,e]	High
Native Vegetation[f]	1,193	0	0	0	0	1,193	Estimated[g]	Medium
TOTALS	~~6,215~~6,585	1,624	4,037	1,067	1,624	**~~14,568~~14,937**		

Notes:

- Totals may not match sum of values due to rounding

a M&I supplies from Upper Ventura River Basin and Casitas MWD are assumed to be split 50%-50% for use within Mound Basin (see text Section 2.6).

b See text Section 2.6 for estimation method.

c Groundwater imported by FICO and Alta MWC, see Section 3.1.1.3 in GSP.

d Water year volumes for extraction wells estimated based on precipitation, see text Section 2.4.

e Imported M&I volumes are metered and total use is based on the fraction of Mound Basin within Ventura Water service area (see text Section 2.6)

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

g Based on numerical model results for the baseline simulation, see text Section 2.4 and GSP (MGBSA, 2021)

Table 3. Updated Table 2.2 from the water years 2020-2021 MBGSA Annual Report. Previous values are shown as strikethrough text.

Water Year	Groundwater Extractions	Minimum Threshold	Measureable Objective
	AF/yr	AF/yr	AF/yr
2020	~~5,167~~5,336	8,200	7,400
2021	~~5,091~~5,392	8,200	7,400

Color Key:

MO met

MT exceeded

Table 4. Updated Table 3.2 from the water years 2020-2021 MBGSA Annual Report. Previous values are shown as strikethrough text. Groundwater extractions for water years 2020 and 2021 were originally misreported and updated values are shown.