Annual Report

Oxnard Subbasin Groundwater Sustainability Plan 2024 Annual Report: Covering Water Year 2023

MARCH 2024

Prepared for:

FOX CANYON GROUNDWATER MANAGEMENT AGENCY
800 South Victoria Avenue
Ventura, California 93009-1610
Contact: Farai Kaseke, Ph. D, PMP, CSM

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024
Contact: Trevor Jones, Ph. D
Jill Weinberger, Ph. D, P.G.

Trevor Jones, Ph. D
Senior Hydrogeologist

PROFESSIONAL GEOLOGIST
JILL L. WEINBERGER
No. 8940 Exp. 10/31/25
PG
STATE OF CALIFORNIA

Jill Weinberger, Ph. D, P.G.
Principal Hydrogeologist

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Executive Summary

The Fox Canyon Groundwater Management Agency (FCGMA), the Groundwater Sustainability Agency (GSA) for the portion of the Oxnard Subbasin (Subbasin) within its jurisdictional boundaries, in coordination with the other two GSAs in the Subbasin, has prepared this fifth annual report for the Oxnard Subbasin Groundwater Sustainability Plan (GSP) in compliance with the 2014 Sustainable Groundwater Management Act (SGMA) (California Water Code, Section 10720 et seq.). This annual report covers the entire Subbasin. The GSP for the Oxnard Subbasin was submitted to the Department of Water Resources (DWR) on January 13, 2020 and approved by DWR on November 18, 2021. SGMA regulations require that an annual report be submitted to the DWR by April 1 of each year following the adoption of the GSP. This annual report provides an update on the groundwater conditions for water year 2023 (October 1, 2022 through September 30, 2023).

Water year 2022 was a wet water year, in which precipitation was approximately 160% of the historical average precipitation within the Subbasin. In response to the wetter-than-average precipitation received, groundwater elevations measured in spring 2023 were higher than those measured in spring 2022 at the majority of representative monitoring points, or key wells, in the Oxnard, Mugu, Hueneme, Fox Canyon, and Grimes Canyon aquifers. Similarly, spring 2023 groundwater elevations were higher than spring 2015 conditions in the majority of the key wells in the Subbasin. Notably, the area north of Port Hueneme was an exception, with spring 2023 groundwater elevations in the Fox Canyon aquifer lower than they were in spring 2015.

In the Upper Aquifer System (UAS), the higher groundwater elevations across the Subbasin in spring 2023 resulted in a net increase in groundwater storage of approximately 4,100 acre-feet (AF). In the Lower Aquifer System (LAS), there was a net increase in groundwater storage of approximately 2,600 AF between spring 2022 and 2023, which is the largest increase in storage estimated in the LAS since 2015. Since 2015, groundwater in storage in the UAS has increased by a cumulative volume of approximately 8,800 AF. This increase in storage largely reflects groundwater elevation changes in the Forebay Management Area that have resulted from UWCD's recharge operations. Since 2015, groundwater storage in the LAS has increased by approximately 2,500 AF.

Implementation of the GSP has begun to fill data gaps identified in the GSP. Some of the critical data gaps include the timing and number of groundwater elevation measurements available for preparing spring and fall contour maps, and the availability of data on surface water diversions from agencies reporting to FCGMA. Spatial data gaps are being filled with groundwater elevation measurements collected from nested groundwater monitoring wells located adjacent to Revolon Slough, within the Oxnard Pumping Depression Management Area. The data gaps identified in the GSP will continue to be addressed as implementation of the GSP progresses.

FCGMA has undertaken several steps toward implementing the GSP. FCGMA is administering grant funds for projects that increase water supply in the Subbasin and is currently in the process of designing and constructing new dedicated monitoring wells that were funded as a component of DWR's Sustainable Groundwater Management Grant Program's SGMA Implementation Round 1 funding opportunity. Additionally, FCGMA has developed a formal process and criteria for evaluating projects in the Subbasin and is continuing to coordinate with partner agencies to identify funding opportunities and integrate new projects into the GSP.

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1 Background and Plan Area

1.1 Background

FCGMA, the GSA for the portion of the Subbasin within its jurisdictional boundaries, in coordination with the other two GSAs in the Subbasin, has prepared this annual report for the Oxnard Subbasin GSP in compliance with SGMA (California Water Code, Section 10720 et seq.). SGMA requires that an annual report be submitted to DWR by April 1 of each year following the adoption of the GSP. FCGMA adopted a GSP for the Oxnard Subbasin in December 2019 and submitted the GSP to DWR on January 13, 2020 for the entire Subbasin. DWR approved the GSP on November 18, 2021. This is the fifth annual report for the Subbasin since the GSP was submitted.

FCGMA is one of three Groundwater Sustainability Agencies (GSAs) in the Subbasin. The other two GSAs are the Camrosa Water District (CWD)–Oxnard GSA and the Oxnard Outlying Areas GSA (County of Ventura). This annual report applies to the entirety of the Subbasin, including those portions of the Subbasin that lie outside FCGMA's boundary. To coordinate management and reporting in the Subbasin, FCGMA and CWD have executed a Memorandum of Understanding, and FCGMA and the County have formed a Joint Powers Authority.

1.1.1 Fox Canyon Groundwater Management Agency

FCGMA is an independent special district formed by the California Legislature in 1982 to manage and protect the aquifers within its jurisdiction for the common benefit of the public and all agricultural and M&I users (FCGMA et al. 2007). FCGMA's boundaries include all land overlying the Fox Canyon aquifer (FCA). The FCA underlies a majority of the Oxnard Subbasin (DWR Basin No. 4-004.02), the Las Posas Valley Basin (LPVB) (DWR Basin No. 4-008), the Pleasant Valley Basin (PVB) (DWR Basin No. 4-006), and a portion of the Arroyo Santa Rosa Valley Basin (ASRVB) (DWR Basin No. 4-007).

FCGMA is governed by a Board of Directors (Board) with five members who represent: (1) the County of Ventura (County), (2) the United Water Conservation District (UWCD), (3) seven mutual water companies and water districts within the Agency[1], (4) five incorporated cities which are all or a portion of each is within the FCGMA jurisdictional area[2], and (5) a farmer representative. The Board members representing the County, UWCD, the mutual water companies and water districts, and the incorporated cities are appointed by their respective organizations or groups. The representative for the farmers is appointed by the other four seated Board members from a list of candidates jointly supplied by the Ventura County Farm Bureau and the Ventura County Agricultural Association. An alternate Board member is selected by each appointing agency or group in the same manner as the regular member and acts in place of the regular member in case of absence or inability to act. All members and alternates serve for a 2-year term of office, or until the member or alternate is no longer an eligible official of the member agency. Information regarding current FCGMA Board representatives can be found on the FCGMA website.

[1] The seven mutual water companies and water districts are: Alta Mutual Water Company, Pleasant Valley County Water District (PVCWD), Berylwood Mutual Water Company, Calleguas Municipal Water District (CMWD), CWD, Zone Mutual Water Company, and Del Norte Mutual Water Company.

[2] The five incorporated cities which are all or in part within the FCGMA jurisdictional area are: Ventura, Oxnard, Camarillo, Port Hueneme, and Moorpark.

1.1.2 Oxnard Subbasin Groundwater Sustainability Plan

The GSP for the Oxnard Subbasin defined the conditions under which the groundwater resources of the entire Oxnard Subbasin will be managed sustainably in the future (FCGMA 2019a), with periodic evaluation of GSP to assess changing conditions (California Water Code, Section 10728.2). Groundwater conditions were evaluated in five primary aquifers in the Subbasin. These aquifers are commonly grouped into an upper and lower aquifer system. The Oxnard and Mugu aquifers compose the Upper Aquifer System (UAS), and the Hueneme, Fox Canyon, and Grimes Canyon aquifers compose the Lower Aquifer System (LAS). The primary sustainability goal for the Oxnard Subbasin, set forth in the GSP, is "to increase groundwater elevations inland of the Pacific coast in the aquifers that compose the Upper Aquifer System and the Lower Aquifer System to elevations that will prevent the long-term, or climatic cycle net (net), landward migration of the 2015 saline water impact front; prevent net seawater intrusion in the UAS; and prevent net seawater intrusion in the LAS." (FCGMA 2019a). This goal was established based on both historical and potential future undesirable results to the groundwater resources of the Subbasin from six sustainability indicators: chronic lowering of groundwater levels, reduction of groundwater storage, seawater intrusion, degraded water quality, land subsidence, and depletions of interconnected surface water.

The GSP established minimum threshold groundwater elevations, defined for the Oxnard Subbasin, as groundwater levels that: (1) limit seawater intrusion, and (2) allow declines in groundwater elevations during periods of future drought to be offset by recoveries during future periods of above-average rainfall (FCGMA 2019a). The GSP also established measurable objective groundwater elevations, which were defined as "the groundwater levels throughout the Subbasin at which there is neither seawater flow into, nor freshwater flow out of the UAS or LAS." (FCGMA 2019a). Minimum threshold and measurable objective groundwater elevations were established at 34 representative monitoring points (or "key wells") in the Oxnard Subbasin (Table 2-1). Collectively, these wells are screened in each of the five primary aquifers and are located in four of the five management areas established for the Subbasin (FCGMA 2019a).

The GSP documented conditions throughout the Oxnard Subbasin through the fall of 2015. Previous annual reports evaluated progress toward sustainability based on a review of groundwater elevation data, groundwater extraction data, surface water supply used, or surface water supply available for use, total water used, and change in groundwater storage between the fall of 2015 and the end of water year 2022[3]. This annual report documents the conditions in the Oxnard Subbasin and the progress toward sustainability for water year 2023.

1.2 Plan Area

The Oxnard Subbasin of the Santa Clara River Valley Groundwater Basin (DWR Bulletin 118 Groundwater Basin 4-004.02) is a coastal alluvial groundwater subbasin, underlying the Oxnard Plain in Ventura County, California (Figure 1-1). The Oxnard Subbasin is in hydrologic communication, to varying degrees, with the LPVB and PVB to the east, the Mound and Santa Paula Groundwater Subbasins of the Santa Clara River Valley Basin to the north, and with the Pacific Ocean to the west and southwest (FCGMA 2019a). The contact between permeable alluvium and semi-permeable rocks of the Santa Monica Mountains defines the southeastern boundary of the Oxnard Subbasin, and the Oak Ridge and McGrath faults form the northern boundary of the Oxnard Subbasin (DWR 2018). A facies change between the predominantly coarser-grained sand and gravel deposits that compose the UAS to the west

[3] A water year begins on October 1 and ends on September 30 of the following year. The convention for naming the water year is to name the water year based on the year in which it ends. For example, the 2023 water year begins on October 1, 2022, and ends on September 30, 2023.

and the finer-grained clay and silt-rich deposits of the UAS to the east defines the boundary between the Oxnard Subbasin and PVB. The boundary between the Las Posas Valley Basin to the northeast and Oxnard Subbasin to the southwest is a jurisdictional boundary that follows parcel lines (DWR 2018).

The Oxnard Subbasin is divided into five management areas in anticipation of future management strategies and to reflect the current understanding of the hydrogeologic characteristics of the Subbasin (FCGMA 2019a). These management areas are the Forebay Management Area, the West Oxnard Plain Management Area, the Oxnard Pumping Depression Management Area, the Saline Intrusion Management Area, and the East Oxnard Plain Management Area (Figure 1-2). These management areas are separated by hydrogeologic and water quality characteristics (FCGMA 2019a).

1.2.1 Climate

The climate of the Oxnard Subbasin is typical of coastal Southern California, with average daily temperatures ranging generally from 50°F to 78°F in summer and from 40°F to 75°F in the winter (FCGMA 2019a). The majority of the precipitation in the Ventura County region falls between November and April. Precipitation is measured at several stations in the Oxnard Subbasin (Figure 1-3). Water year precipitation, measured at Station 168, in the northwestern portion of the Subbasin is highly variable, ranging from 2.8 inches in 2021 to 38.1 inches in 1998 (Figure 1-4). Between water year 1957 and 2023, the mean water precipitation in the Subbasin was approximately 14.1 inches. The Subbasin received approximately 23.4 inches of precipitation in water year 2023, which is approximately 160% of the 1957 to 2023 mean annual precipitation measured at Station 168 (Figure 1-4). The 2023 water year was the wettest water year on record since 2005. Since 2015, average annual water year precipitation has been approximately 15% lower than the mean annual water year precipitation measured between 1957 and 2015.

The GSP characterized water year types[4] for the Oxnard Subbasin for precipitation measured between 1957 and 2015 (FCGMA 2019a). Since 2015, the Subbasin experienced one wet water year (2023), two above normal water years (2017 and 2019), two below normal water years (2020 and 2022), and three critical water years (2016, 2018, and 2021).

1.2.2 Surface Water Bodies and Gauging Stations

The Santa Clara River, Revolon Slough, and Calleguas Creek are the predominant surface water bodies in the Oxnard Subbasin (FCGMA 2019a). All three surface water bodies drain watersheds that extend beyond the boundaries of the Subbasin. Neither the Revolon Slough nor Calleguas Creek are in direct contact with the primary aquifers in the Subbasin. These surface water bodies are separated from the underlying groundwater aquifers by extensive clay layers. In contrast, flow in the Santa Clara River, which generally parallels the northern boundary of the Subbasin, infiltrates into sediments overlying the Forebay Management Area (Figure 1-2) and is a critical source of recharge to the primary groundwater aquifers in the Subbasin. In addition to recharge provided by flow in the river channel, UWCD, under permit, diverts surface water from the Santa Clara River at the Freeman Diversion and discharges the diverted Santa Clara River flows to infiltration basins overlying the Forebay Management Area (Figure

[4] Water years have been classified into five types based on their relationship to the mean water year precipitation. The five types are: critical, dry, below normal, above normal, and wet. Critical water years are < 50% of the mean annual precipitation. Dry water years are ≥ 50% and <75% of the mean annual precipitation. Below normal water years are ≥ 75% and <100% of the mean annual precipitation. Above normal water years are ≥ 100% and <150% of the mean annual precipitation. Wet water years are ≥ 150% of the mean annual precipitation.

1-2). West of the Forebay Management Area, the Santa Clara River channel overlies a confining clay layer and does not communicate directly with the confined aquifers of the UAS and the LAS.

Streamflow on the Santa Clara River has been measured at gauge 723, maintained by the Ventura County Public Works Agency - Watershed Protection District (VCWPD), between water years 2010 and 2023 (Table 1-1; Figure 1-3). Average daily flows for water years 2018 through 2020 were not available during preparation of the water year 2024 Annual Report. In addition, flow on the Revolon Slough has been measured at VCWPD gauge 776 (Table 1-1; Figure 1-4). Average daily flows measured at gauge 776 for water year 2023 were not available during preparation of the 2024 Annual Report.

Table 1-1. Cumulative Daily Average Flows at VCWPD Gauges 723 and 776 in the Oxnard Subbasin

Water Year	Average Flow (cfs) at Gauge 723	Average Flow (cfs) at Gauge 776
2010	102.5	12.6
2011	167.5	19.3
2012	13.0	10.1
2013	0.6	11.2
2014	40.3	6.1
2015	5.0	7.0
2016	97.5	5.5
2017	1,049.5	5.7
2018	-Data Not Available-	12.2
2019	-Data Not Available-	9.0
2020	-Data Not Available-	11.9
2021	0.0*	-Data Not Available-
2022	9.03*	9.21*
2023	782.7*	-Data Not Available-

Notes: cfs = cubic feet per second
*VCWPD notes that these data are preliminary and subject to revision

1.3 Annual Report Organization

This is the fifth Annual Report prepared since the GSP for the Oxnard Subbasin was submitted to DWR. This report is organized according to the GSP Emergency Regulations. Chapter 1 provides the background information regarding the GSP, the Oxnard Subbasin, and the Fox Canyon Groundwater Management Agency. Chapter 2 provides information on the groundwater conditions in the Subbasin since 2015, including groundwater elevations, groundwater extractions, surface water supply, total water availability, and change in groundwater storage. Chapter 3 provides an update on the GSP implementation process.

2 Groundwater Conditions

This chapter presents the change in groundwater conditions in the Subbasin from water year 2022. Comparison of water year 2023 conditions to water year 2022 conditions characterizes the impact that water year type, groundwater production, surface and recycled water availability, and surface water spreading in water year 2023 have had on groundwater conditions in the Subbasin. Data from water years 2016 through 2021 are discussed in in the first four annual reports (FCGMA 2020a, FCGMA 2021, FCGMA 2022, FCGMA 2023).

2.1 Groundwater Elevations

2.1.1 Groundwater Elevation Contour Maps

Groundwater elevation contour maps for each aquifer in the Oxnard Subbasin are presented in Figures 2-1 through 2-10: the Oxnard aquifer in Figures 2-1 and 2-2, the Mugu aquifer in Figures 2-3 and 2-4, the Hueneme aquifer in Figures 2-5 and 2-6, the FCA in Figures 2-7 and 2-8, and the Grimes Canyon aquifer in Figures 2-9 and 2-10. These maps show the seasonal low (fall 2022) and high (spring 2023) groundwater elevations. Spring groundwater elevations were defined as any groundwater elevation measured within a four-week window between March 2 to March 31 of each year. Fall groundwater elevations were defined as any groundwater elevation measured between October 2 and October 31 of each year.

The groundwater elevation contour maps are based on the groundwater elevations measured at wells screened solely within an individual aquifer. The intent of using groundwater elevations from wells screened within a single aquifer is to accurately represent groundwater flow directions within an aquifer, as well as vertical gradients between aquifers. It is important to note, however, that throughout the Oxnard Subbasin, production wells are typically screened across multiple aquifers. Therefore, using wells only screened within an individual aquifer limits the spatial coverage for each contour map. This limitation is particularly apparent in an area of high groundwater production in the Oxnard Subbasin and adjoining PVB that extends south from Highway 101 (FCGMA 2019a). This area was identified as being impacted by groundwater production based on groundwater elevations measured in wells screened in multiple aquifers and was identified in the GSP as the Oxnard Pumping Depression Management Area (FCGMA 2019a). By using wells screened only within an individual aquifer, the lateral extent of the pumping depression is not well characterized.

In 2019, DWR installed a nested monitoring well cluster through its Technical Support Services (TSS) program. The nested well cluster, which has two separate completions, is located adjacent to the Revolon Slough within the Pumping Depression Management Area. The shallow well cluster, which was completed on November 22, 2019, contains three monitoring wells individually screened in the Oxnard, Mugu, and Hueneme aquifers. The deep well cluster, which was completed on March 19, 2020, contains three monitoring wells individually screened within the Fox Canyon-Upper, Fox Canyon-Basal, and Grimes Canyon aquifers. Groundwater elevations measured at the shallow and deep well clusters were used to help constrain groundwater conditions in the Oxnard Pumping Depression Management Area.

2.1.1.1 Oxnard Aquifer

Seasonal low groundwater elevation changes varied geographically in the Oxnard aquifer between fall 2021 and fall 2022. In the Forebay Management Area, fall 2022 groundwater elevations were approximately 7 feet lower than fall 2022 at well 02N22W14G06S to approximately 1 foot higher than fall 2021 at well 02N22W12G03S. In fall 2022, groundwater elevations in the Forebay Management Area ranged from approximately -32 feet (ft.) mean sea level (msl) to approximately 36 ft. msl (at wells 02N22W23B08S and 02N21W12A02S, respectively; Figure 2-1). Downgradient of the Forebay Management Area, within the Oxnard Pumping Depression Management Area, fall 2022 groundwater elevations ranged from approximately -26 ft. msl to approximately -5 ft. msl (measured at wells 01N21W19C01S and 01N21W16P07S, respectively; Figure 2-1). Groundwater elevation changes between fall 2022 and 2021 ranged from approximately 3 feet lower than fall 2021 (measured at well 01N21W07H01S) to approximately 2 feet higher than fall 2021 (measured at well 01N21W19C01S) in the Oxnard Pumping Depression Management Area. In the Saline Intrusion Management Area, fall 2022 groundwater elevations ranged from approximately -23 ft. msl to approximately -11 ft. msl (measured at wells 01N21W31A08S and 01S2108L04S; Figure 2-1). Groundwater elevation changes between fall 2022 and 2021 in the Saline Intrusion Management Area ranged from declines of approximately 2.5 feet to increases of approximately 1 foot (measured at wells 01N22W27C03S and 01N22W26J04S, respectively).

Fall 2022 groundwater elevations in the Oxnard aquifer were generally lower than fall 2015. Over this period in the Forebay Management Area, the fall groundwater elevations declined by approximately 3 to 5 feet (measured at wells 02N22W23H06S and 02N22W14G07S, respectively). Within the Oxnard Pumping Depression Management Area, the fall 2022 groundwater elevations ranged from approximately 2 feet lower to 6 feet higher than fall 2015 (measured at wells 01N21W19C01S and 01N21W19L12S, respectively). Along the coast, fall groundwater elevations between 2022 and 2015 were less variable than the inland portions of the Subbasin and ranged from 2 feet lower than 2015 (measured at well 02N22W20M05S) to approximately 5 feet higher than 2015 (measured at well 01N21W26J04S).

Spring groundwater elevations generally increased in the Oxnard aquifer between 2022 and 2023. Over this period in the Forebay Management Area, groundwater elevations increased by approximately 0.2 to 93 feet (measured at wells 02N22W16R02 and 02N22W12J02S, respectively), with the exception of well 02N22W15L01S, where the spring 2023 groundwater elevation was approximately 2 feet lower than 2022. Groundwater elevations ranged from approximately -17 ft. msl to 122 ft. msl (Figure 2-2) (as measured at wells 02N22W15L01S and 02N21W12A01S, respectively). In the Oxnard Pumping Depression Management Area, the spring 2023 groundwater elevations were approximately 2 to 6 feet higher than spring 2022 (measured at wells 01N21W07H01S and 01N21W19L12, respectively) and ranged from approximately -22 ft. msl to approximately 4 ft. msl (Figure 2-2) (as measured at wells 01N21W06L04S and 01N21W16P07S, respectively). Along the coastline, within the Saline Intrusion Management Area, spring 2023 groundwater elevations were approximately 0.2 to 4 feet higher than spring 2022 (measured at wells 01N22W20M05S and 01N21W31A09S, respectively) and ranged from approximately -12 ft. msl to -0.5 ft. msl (Figure 2-2) (as measured at wells 01N22W26J04S and 01N22W27R05S, respectively).

Spring 2023 groundwater elevations were generally higher than spring 2015 in the Forebay and Oxnard Pumping Depression Management Areas. Over this period in the Forebay Management Area, groundwater elevations increased by approximately 9 to 99 feet (measured at wells 02N22W15R02S and 02NW2212J02S, respectively). The exception to this general trend in the Forebay Management Area is near Oak Ridge fault, where the spring 2023 groundwater elevations were approximately 3 to 42 feet lower than 2015 (measured at wells 02N22W16R02S and

02N22W11Q01S, respectively). In the Oxnard Pumping Depression Management Area, spring 2023 groundwater elevations were approximately 5 to 15 feet higher than spring 2015, except at well 01N21W06L04S, where the spring 2023 groundwater elevation was approximately 7 feet lower than 2015.

Along the coast, within the Saline Intrusion Management Area, groundwater elevation changes between spring 2015 and 2023 varied geographically. In the southern portion of the management area, near Point Mugu, groundwater elevation changes ranged from declines of approximately 0.4 feet (at well 01S21W08L04S) to increases of approximately 7 feet (at well 01N21W31A09S). Farther north, near Port Hueneme, groundwater elevation changes between spring 2015 and 2022 ranged from declines of approximately 3 feet (measured at well 01N22W20M05S) to increases of approximately 1 foot (measured at well 01N22W27C03S).

2.1.1.2 Mugu Aquifer

Groundwater elevations decreased across the majority of the Mugu aquifer between fall 2021 and fall 2022. In the Forebay Management Area, fall 2022 groundwater elevations were approximately 6 to 7 feet lower (measured at 02N22W14G04S and 02N22W23B07S, respectively) than fall 2021 and ranged from -31 ft. msl to -38 ft. msl (measured at well 02N22W14G04S and 02N22W23B07S, respectively; Figure 2-3). Along the coast, near Port Hueneme, fall 2022 groundwater elevations were approximately 2 to 3 feet lower than 2021 and ranged from approximately -16 ft. msl to -12 ft. msl (measured at wells 01N22W20J07S and 01N22W29D04S, respectively; Figure 2-3). In the southwestern part of the Subbasin, near Point Mugu, groundwater elevations declined by a maximum of approximately 5 feet (measured at well 01S21W32Q07S) and ranged from a low of approximately -86 ft. msl (measured at well 01S21W31A07S) to a high of approximately -31 ft. msl (measured at well 01N22W35E04S; Figure 2-3).

Seasonal low groundwater elevation changes between fall 2015 and 2022 varied geographically within the Mugu aquifer. Within the Forebay Management Area, fall 2022 groundwater elevations were approximately 1 to 7 feet lower than fall 2015 (measured at 02N22W14G04S and 02N22W23B07S, respectively). In the Oxnard Pumping Depression Management Area, fall 2022 groundwater elevations ranged from approximately 1 foot lower than 2015 to approximately 1 foot higher than fall 2015 (measured at wells 01N21W21N01S and 01N21W19L11S, respectively). Farther south, in the Saline Intrusion Management Area near Point Mugu, fall 2022 groundwater elevations were approximately 0.5 to 11 feet higher than fall 2015 (measured at wells 01N21W32Q07S and 01N22W35E04, respectively). Near Port Hueneme, fall 2022 groundwater elevations were approximately 1.5 feet lower than fall 2015.

Groundwater elevations generally increased in the Mugu aquifer between spring 2022 and spring 2023. Over this period in the Forebay Management Area, groundwater elevations increased by approximately 21 to 88 feet and ranged from approximately -2 ft. msl to approximately 112 ft. msl (measured at wells 02N22W23B07S and 02N21W07L06S, respectively; Figure 2-4). In the Oxnard Pumping Depression Management Area, spring 2023 groundwater elevations were approximately 5 to 33 feet higher than spring 2022 (measured at wells 01N21W20C05S and 01N21W21N01S respectively) and ranged from approximately -50 ft. msl to 14 ft. msl (measured at wells 01N21W21N01S and 01N21W20C05S, respectively; Figure 2-4). Near the coast, in the Port Hueneme area, groundwater elevations declined approximately 2 to 5 feet (as measured at 01N22W20J07S and 01N22W20M04S, respectively), with groundwater elevations ranging from approximately -7 to -12 ft. msl. Farther south, near Point Mugu, groundwater elevations ranged from a low of approximately -49 ft. msl (measured at well 01N21W32Q05S) to a high of approximately 4 ft. msl (measured at well 01N22W35E04S; Figure 2-4). The spring

2023 groundwater elevations in this part of the Subbasin were approximately 7 (measured at well 01S22W01H03S) to 14 feet higher than those measured in spring 2022 (measured at well 01N21W31A07S).

Spring 2022 groundwater elevations in the Mugu aquifer were generally higher than spring 2015. In the Forebay Management Area, groundwater levels measured were approximately 18 to 104 feet higher than spring 2015 (as measured at wells 02N22W23B07S and 02N21W07L06S). Over this same period, groundwater elevations in the Oxnard Pumping Depression Management Area increased by approximately 8 to 16 feet (as measured at wells 01N21W21N01S and 01N21W20C05S). Along the coast, near Point Mugu, spring 2022 groundwater elevations were approximately 6 to 33 feet higher than spring 2015 (as measured at wells 01N22W36K08S and 01N22W35E04S).

The only areas of the Mugu aquifer in which spring 2023 water levels were lower than spring 2015 water levels were near Port Hueneme and in the central portion of the Subbasin as measured a well 01N22W02A02S, where groundwater elevations were approximately 2 to 5 feet lower in spring 2023 than spring 2015. Spring 2023 groundwater elevations ranged from a low of approximately -11 ft. msl to a high of approximately -8 ft. msl (measured at wells 01N22W20M04S and 01N22W29D04S, respectively; Figure 2-4) in this part of the Subbasin. In the central portion of the Subbasin, the groundwater level was approximately 2 feet lower than in the spring of 2015.

2.1.1.3 Hueneme Aquifer

Groundwater elevations in the Hueneme aquifer were lower in fall 2022 than in fall 2021. In the Forebay Management Area, groundwater levels ranged from approximately -100 ft. msl to -5 ft. msl (measured at wells 02N22W23B04S and 02N22W12N03S, respectively; Figure 2-5). These groundwater elevations were approximately 7 to 20 feet lower than the corresponding fall 2021 measurements (measured at wells 02N22W22Q05S and 02N22W23B05S, respectively). Downgradient of the Forebay Management Area, within the Oxnard Pumping Depression Management Area, groundwater elevations ranged from -129 ft. msl (at well 01N21W16P05S) to -107 ft. msl (at well 02N21W31P03S) and were 4 feet lower than fall 2021 at well 01N21W16P05S to 3 feet higher than fall 2021 at well 02N21W31P03S. Within the West Oxnard Plain Management Area, groundwater elevations ranged from a low of approximately -37 ft. msl (at well 01N22W16D04S) to a high of -27 ft. msl (at well 01N22W19A01S); the groundwater elevation at these wells was 4 to 5 feet lower than fall 2021. Near Port Hueneme and within the Saline Intrusion Management Area, groundwater elevations in fall 2022 ranged from approximately -21 ft. msl to -81 ft. msl (measured at wells 01N22W29D03S and 01N22W26M03S; Figure 2-5) and were 3 to 6 feet lower than fall 2021.

Fall 2022 groundwater elevations were lower than fall 2015 groundwater elevations across the majority of the Hueneme Aquifer. Over this period in the Forebay Management Area, fall 2022 groundwater elevations were approximately 3 to 13 feet lower than fall 2015 (measured at wells 02N22W23B06S and 02N22W23B04S), with the noted exception of well 02N22W26B03S where the fall 2022 groundwater elevation was approximately 39 feet higher than fall 2015. In the West Oxnard Plain Management Area, fall groundwater elevations declined by approximately 3 to 4 feet between 2015 and 2022 (measured at wells 01N23W01C03S and 01N22W16D04S). In the Oxnard Pumping Depression Management Area, the fall groundwater elevation was measured at a single well in 2015 and 2022: 02N21W31P03S. The groundwater elevation measured at this well increased by 9 feet between fall 2022 and fall 2015. Near Port Hueneme, groundwater levels were approximately 1 to 4 ft lower (as measured at wells 01N22W29D02S and 01N22W29D03S).

Spring 2023 groundwater elevations in the Hueneme aquifer were generally higher than spring 2022. In the Forebay Management Area, spring 2023 groundwater ranged from a low of -62 ft. msl at well 02N22W23B04S to a high of 88 ft. msl at well 02N22W12N03S (Figure 2-6) and were approximately 11 to 67 feet higher than spring 2022, with the noted exception of a 10-foot groundwater elevation decline at well 02N22W26B03S. In the Oxnard Pumping Depression Management Area, spring 2023 groundwater elevations ranged from a low of approximately -81 ft. msl at 02N21W31P06S to a high of approximately -52 ft. msl at well 01N21W16P05S. Spring 2023 groundwater elevations were approximately 29 to 38 feet higher than spring 2022 in two of the three wells measured in the Oxnard Pumping Depression Management Area (wells 02N21W31P03S and 01N21W16P05S). The spring 2023 groundwater elevation at the third well, well 02N21W31P06S, was approximately 3 feet lower than spring 2022. In the West Oxnard Management Area, groundwater elevations in spring 2023 ranged from approximately -18 ft. msl (measured at well 01N22W19A01S) to -25 ft. msl (measured at well 01N23W01C03S) and were approximately 1 to 5 feet higher than spring 2022 (as measured at wells 01N22W19A01S and 01N22W16D04S), however the spring groundwater elevation was approximately 0.25- feet lower than in spring 2022 in well 01N23W01C03S. Near Port Hueneme and within the Saline Intrusion Management Area, groundwater elevations ranged from a low of approximately -36 ft. msl at well 01N22W26M03S to a high of approximately -15 ft. msl at well 01N22W29D03S (Figure 2-6). The spring 2023 groundwater elevations ranged from approximately 0.4 feet lower than spring 2022 (measured at well 01N22W29D02S) to approximately 18 feet higher than spring 2022 (measured at well 01N22W26M03S).

In the Forebay Management Area, spring 2023 groundwater elevations were 14 to 78 feet higher than spring 2015 elevations at all monitored wells except well 02N22W26B03S, at which the water level was approximately 4 feet lower than spring 2015. In the Oxnard Pumping Depression Management Area, spring 2022 groundwater elevations were approximately 9 to 31 feet higher than spring 2015 (measured at 02N21W31P06S and 02N21W31P03S).

Along the coastline and within the Saline Intrusion Management Area, spring 2023 groundwater elevations in the Hueneme aquifer were lower than spring 2015 groundwater elevations. Along the northern coastline in the West Oxnard Plain Management Area, groundwater elevations were between 0.4 and 2 feet lower than spring 2015 (measured at wells 01N23W01C04S and 01N23W01C03S, respectively). Near Port Hueneme and the Saline Intrusion Management Area, groundwater elevations were approximately 1 to 4 feet lower than 2015 (measured at wells 01N22W29D02S and 01N22W29D03S, respectively).

2.1.1.4 Fox Canyon Aquifer

Seasonal low groundwater elevations in the FCA decreased across the Subbasin between fall 2021 and 2022. In the Oxnard Pumping Depression Management Area, groundwater elevations ranged from a low of approximately -141 ft. msl at well 01N21W06J05S to a high of approximately -83 ft. msl at well 01N21W09C04S and were approximately 1 to 26 feet lower than fall 2021 (Figure 2-7) (as measured at wells 01N21W09C04S and 02N21W32E01S respectively). Along the coastline, and within the West Oxnard Plain Management Area, the groundwater elevation measured at well 01N23W01C02S was approximately -36 ft. msl, which is approximately 3 feet lower than fall 2021. Farther south, within the Saline Intrusion Management Area, groundwater elevations ranged from a low of approximately -108 ft. msl at well 01N21W31A05S to a high of approximately -27 ft. msl at well 01N22W29D01S (Figure 2-7). Groundwater elevations in this part of the Subbasin were approximately 0.2 to 13 feet lower than fall 2021 (measured at wells 01N22W26K03S and 01N21W31A05S, respectively). The one area of the Subbasin where fall 2022 groundwater elevations were higher than fall 2021 was in the northern part of the Forebay Management Area, where the groundwater elevation measured at well 02N21W07L04S (Figure 2-7) was approximately 2 feet higher than 2021.

Fall 2022 groundwater elevations in the Forebay Management Area were approximately 2 feet lower to 5 feet higher than fall 2015 groundwater elevations (as measured at wells 02N21W07L03S, and 02N21W07L04S, respectively). In the Oxnard Pumping Depression Management Area, fall 2022 groundwater elevations were approximately 21 feet lower than fall 2015 groundwater elevations at well 02N21W32E01S but were 49 feet higher than fall 2015 groundwater elevations at well 01N21W09C04S. In the Saline Intrusion Management Area, the fall 2022 groundwater elevations were 2 feet lower (as measured at well 01N22W20M01S) to 13 feet higher (as measured at well 01N22W36K06S) than fall 2015. Along the coast within the West Oxnard Plain Management Area, the fall 2022 groundwater elevations were approximately 1 foot lower than fall 2015 (as measured at well 01N23W01C02S).

Spring 2023 groundwater elevations were higher than spring 2022 across the FCA, with the exception of the northern quarter of the coastal region where a measured water level was 2 feet lower than in spring 2022. In the Forebay Management Area, spring 2023 groundwater elevations ranged from approximately -63 ft. msl (measured at well 02N22W23B03S) to approximately 50 ft. msl (measured at well 02N22W07L04S; Figure 2-8) and were approximately 9 to 60 feet higher than spring 2022 groundwater elevations. In the Oxnard Pumping Depression Management Area, spring 2023 groundwater elevations ranged from approximately -53 ft. msl to -22 ft. msl (measured at wells 01N21W16P10S and 02N21W32E01S, respectively; Figure 2-8) and were 26 to 70 feet higher than spring 2015 groundwater elevations (as measured at 01N21W09C04S and 02N21W32E01S, respectively; Figure 2-8). Within the Saline Intrusion Management Area, spring 2023 groundwater elevations ranged from approximately -68 ft. msl at well 01N21W31A05S to approximately -19 ft. msl at well 01N22W29D01S. The spring 2023 groundwater elevations were approximately 1 to 26 feet higher than spring 2022 groundwater elevations (measured at wells 01N22W29D01S and 01N22W36K07S, respectively).

Spring 2023 groundwater elevations were higher than spring 2015 except at select locations along and near the coast. Over this period, groundwater elevations in the Forebay Management Area increased by approximately 14 to 46 feet. In the Oxnard Pumping Depression Management Area, spring 2023 groundwater elevations were approximately 21 to 76 feet higher than 2015. Farther south, within the Saline Intrusion Management Area, groundwater elevation changes between spring 2015 and 2023 varied geographically. Near Point Mugu, spring 2023 groundwater elevations were approximately 3 feet lower to 26 feet higher than spring 2015 groundwater elevations (measured at wells 01N21W31A05S and 01N22W26K03S, respectively). Farther north, near Port Hueneme, spring 2023 groundwater elevations were approximately 0.5 to 2 feet lower than spring 2015 groundwater elevations (measured at wells 01N22W20M01S and 01N22W20J04S, respectively).

2.1.1.5 Grimes Canyon Aquifer

There are seven wells screened solely in the Grimes Canyon aquifer in the Oxnard Subbasin. Six of these wells are located in the southwestern part of the Subbasin, within the Saline Intrusion Management Area (Figure 2-9 and 2-10). In March 2020, DWR installed a nested monitoring well cluster through its TSS Program. The construction of this well cluster provides additional characterization of groundwater elevations in the Grimes Canyon aquifer north of the Saline Intrusion Management Area, within the Oxnard Pumping Depression Management Area (Figure 2-9 and 2-10).

Fall 2022 groundwater elevations in the Grimes Canyon aquifer ranged from approximately -125 ft. msl to approximately -39 ft. msl (measured at wells 01N21W16P08S and 01N22W28G01S, respectively; Figure 2-9). The groundwater elevation measured at well 01N21W16P08S indicates that groundwater elevations in the Grimes Canyon aquifer generally decline from Port Hueneme southeast towards Point Mugu and east into the Oxnard Pumping Depression Management Area. The fall 2022 groundwater elevations were approximately 1 to 8 feet lower than fall 2021 groundwater elevations (measured at wells 01N22W36K05S and 01N22W35E01S, respectively), with the exception of well 01N22W35E01S, where the fall 2022 groundwater elevation was approximately 10 feet higher than 2021. Compared to fall 2015, groundwater elevations were between 1 foot lower (measured at well 01N22W28G01S) and 14 feet higher (measured at well 01N22W36K05S) than fall 2015 groundwater elevations.

Spring 2023 groundwater elevations in the Grimes Canyon aquifer ranged from approximately -62 ft. msl to -33 ft. msl (measured at wells 01N21W32Q03S and 01N22W28G01S, respectively; Figure 2-10). Groundwater elevations increased in the Grimes Canyon aquifer between spring 2022 and spring 2023 at all wells except well 01N22W28G01S, where groundwater elevations decreased by 0.3 feet. The remainder of the groundwater elevations increased between 1 and 33 feet (measured at wells 01N22W35E01S and 01N21W16P08S, respectively). Spring 2023 groundwater elevations ranged from 2 feet lower (measured at well 01N22W28G01S) to 14 feet higher (measured at well 01N22W36K05S) than spring 2015 conditions.

2.1.2 Groundwater Elevation Hydrographs

Groundwater elevation hydrographs for each of the key wells identified in the GSP are presented in Figures 2-11 through 2-15. These key wells are the designated representative monitoring sites for the Subbasin (FCGMA 2019a). The fall 2022 and spring 2023 water levels measured at each of these representative monitoring sites are presented in Table 2-1, which also provides a comparison to: (i) water year 2022 and 2015 conditions, (ii) the established minimum threshold groundwater elevations, (iii) the established measurable objective groundwater elevations, and (iv) the interim milestones for dry climate conditions. The average climate interim milestone is used for comparison in this annual report because the precipitation measured in the Subbasin between water years 2016 and 2023 is similar to the long-term historical average.

Oxnard Aquifer

The fall 2022 groundwater elevations in the key wells screened in the Oxnard aquifer were approximately 9 to 22 feet below the minimum thresholds and 4 to 8 feet below the interim milestones described in the GSP for average climate conditions (Table 2-1; Figure 2-11; FCGMA, 2019a). In the spring of 2023, groundwater elevations in the representative wells screened in the Oxnard aquifer were approximately 6 to 17 feet below the minimum threshold for each well (Table 2-1; Figure 2-11). In the spring of 2023, the groundwater elevations measured at three of the six Oxnard aquifer key wells were below the 2025 interim milestones described in the GSP for average climate conditions (Table 2-1; FCGMA 2019a). The spring 2023 groundwater elevations at well 01N21W32Q06S and 01N22W26J04S were approximately 6 and 2 feet higher than the 2025 interim milestone groundwater elevation, respectively (Table 2-1). The groundwater elevation at well 02N22W36E06S was not measured in fall 2022 or spring 2023.

As described in Section 2.1.1.1 of this report, groundwater elevations in the Oxnard Aquifer generally increased between water year 2022 and 2023 (Table 2-1). While groundwater elevations generally increased over the 2023 water year, the spring 2023 groundwater elevations remained below spring 2015 at two of the five key wells screened in the Oxnard aquifer (Table 2-1).

Mugu Aquifer

In fall 2022, groundwater elevations were approximately 24 to 98 feet below the minimum threshold groundwater elevations in all representative monitoring wells screened in the Mugu aquifer (Table 2-1; Figure 2-12). In spring

2023, groundwater elevations were below the minimum threshold groundwater elevations at all but one key well, well 02N21W07L06S; the spring 2023 measurement collected at this well was approximately 85 feet higher than the minimum threshold (Table 2-1). The spring 2023 groundwater elevation measured at 01N21W32Q05S, 01N21W32Q07S, 01N22W27C02S, 02N21W07L06S, and 02N22W23B07S were approximately 2 to 104 feet above the 2025 interim milestones (Table 2-1).

The fall 2022 groundwater elevations were lower than fall 2015 in half of the key measured wells in the Mugu aquifer (Table 2-1). Spring groundwater elevations measured at the key wells in the Mugu aquifer increased between 2015 and 2022 at all key wells except well 01N22W20J07S (Table 2-1), which decreased by approximately 2 feet.

Hueneme Aquifer

In the Hueneme aquifer, fall 2022 groundwater elevations measured at the representative monitoring points were approximately 32 to 97 feet lower than the established minimum threshold groundwater elevations (Table 2-1; Figure 2-13). Groundwater elevations were 24 to 59 feet below the established minimum thresholds in spring 2023. Groundwater elevations were above the 2025 interim milestones in half of the measure representative monitoring sites in the Hueneme aquifer (Table 2-1; Figure 2-13).

Fox Canyon Aquifer

In the fall of 2022, groundwater elevations in the representative monitoring points screened in the FCA were approximately 42 to 81 feet lower than the minimum threshold groundwater elevations (Table 2-1; Figure 2-14). In spring 2023, groundwater elevations in the representative monitoring points screened in the FCA ranged from approximately 33 higher than the minimum threshold groundwater elevation to 60 feet lower than the minimum threshold groundwater elevations (Table 2-1; Figure 2-14). The groundwater elevations in wells 01N21W32Q04S, 01N22W26K03S, 02N21W07L04S, and 02N22W23B03S were above the 2025 Interim Milestone in spring 2023.

Grimes

Groundwater elevations measured at wells 01N21W32Q02 and 01N21W32Q03 in the Grimes Canyon aquifer were approximately 79 to 89 feet below than the minimum threshold groundwater elevation in fall 2022 (Table 2-1). In spring 2023, groundwater elevations in these wells were approximately 28 to 39 feet lower than the minimum threshold groundwater elevations (Table 2-1; Figure 2-15). The spring 2023 groundwater elevations were approximately 31 to 35 feet higher than the 2025 Interim Milestones (Table 2-1; Figure 2-15).

Table 2-1. Water Year 2023 Groundwater Elevations, Minimum Thresholds, Measurable Objectives, and Interim Milestones for Representative Monitoring Points in the Oxnard Subbasin

		Fall Groundwater Conditions			Spring Groundwater Conditions					
Well Number	Aquifer	2022 Groundwater Elevation (ft. msl)	Change from 2021 to 2022 (feet)[a]	Change from 2015 to 2022 (feet)[b]	2023 Groundwater Elevation (ft. msl)	Change from 2022 to 2023 (feet)[a]	Change from 2015 to 2023 (feet)[b]	Minimum Threshold (ft. msl)	Measurable Objective (ft. msl)	2025 Interim Milestone Average Climate (ft. msl)[c]
01N21W32Q06S	Oxnard	-19.28	**-1.41**	0.96	-9.23	3.03	3.50	2	17	-15
01N22W20J08S	Oxnard	-15.10	**-2.51**	**-0.91**	-10.03	0.25	**-2.44**	7	17	-7
01N22W26J04S	Oxnard	-18.69	1.28	4.62	-12.59	1.51	1.75	2	17	-15
01N22W27C03S	Oxnard	-15.31	**-2.54**	**-0.48**	-8.31	1.87	0.72	7	17	-7
01N23W01C05S	Oxnard	-1.95	0.69	**-1.03**	0.75	**-0.01**	**-0.43**	7	17	4
02N22W36E06S	Oxnard	NM	-	-	NM	-	-	12	37	-10
01N21W32Q05S	Mugu	-95.76	**-7.03**	1.98	-48.88	18.22	11.85	2	17	-78
01N21W32Q07S	Mugu	-64.59	**-5.36**	0.43	-33.66	10.26	7.55	2	17	-52
01N22W20J07S	Mugu	-16.53	**-3.16**	**-1.57**	-11.33	**-0.21**	**-2.24**	7	17	-7
01N22W26J03S	Mugu	NM	-	-	NM	-	33.13	2	17	-30
01N22W27C02S	Mugu	-23.26	**-2.92**	**-0.69**	-13.05	2.38	1.27	7	17	-15
02N21W07L06S	Mugu	NM	-	12.07	111.88	88.36	103.68	27	62	8
02N22W23B07S	Mugu	-37.98	**-6.92**	**-7.17**	-2.49	21.41	18.23	17	47	-11
02N22W36E05S	Mugu	NM	-	-	NM	-	-	12	37	-6
01N22W20J05S	Hueneme	-30.06	**-4.33**	**-2.38**	-22.23	**-0.13**	**-2.32**	2	17	-18
01N23W01C03S	Hueneme	-32.87	**-3.72**	**-2.92**	-25.09	**-0.25**	**-1.85**	7	22	-17
01N23W01C04S	Hueneme	-30.78	**-4.44**	**-4.26**	-20.42	1.28	**-0.39**	7	22	-17
02N22W23B04S	Hueneme	-99.54	**-17.32**	**-12.78**	-61.70	12.71	13.89	-3	17	-67
02N22W23B05S	Hueneme	-83.28	**-20.34**	**-7.44**	-48.28	10.85	17.25	-3	17	-60
02N22W23B06S	Hueneme	-39.12	**-9.78**	**-2.69**	-8.47	17.00	14.73	17	47	-15
02N22W36E03S	Hueneme	NM	-	-	NM	-	-	12	37	-28

Table 2-1. Water Year 2023 Groundwater Elevations, Minimum Thresholds, Measurable Objectives, and Interim Milestones for Representative Monitoring Points in the Oxnard Subbasin

Well Number	Aquifer	Fall Groundwater Conditions			Spring Groundwater Conditions			Minimum Threshold (ft. msl)	Measurable Objective (ft. msl)	2025 Interim Milestone Average Climate (ft. msl)[c]
		2022 Groundwater Elevation (ft. msl)	Change from 2021 to 2022 (feet)[a]	Change from 2015 to 2022 (feet)[b]	2023 Groundwater Elevation (ft. msl)	Change from 2022 to 2023 (feet)[a]	Change from 2015 to 2023 (feet)[b]			
02N22W36E04S	Hueneme	NM	-	-	NM	-	-	12	37	-13
01N21W32Q04S	Fox Canyon	-104.11	-8.57	1.27	-53.19	20.09	13.11	-23	2	-86
01N22W20J04S	Fox Canyon	-39.65	-4.06	-2.53	-29.92	0.55	-1.80	2	17	42
01N22W26K03S	Fox Canyon	-85.35	-0.21	-	-39.78	23.86	25.85	-18	2	-52
01N23W01C02S	Fox Canyon	-35.64	-2.91	-1.30	-31.93	-2.20	-2.62	7	22	-25
02N21W07L04S	Fox Canyon	-27.37	1.81	4.65	49.64	58.80	45.76	17	42	-12
02N22W23B03S	Fox Canyon	-80.80	-1.42	2.75	-62.76	8.92	14.24	-3	17	-67
01N21W32Q02S	Grimes Canyon	-101.76	-9.13	1.44	-51.11	31.19	13.59	-23	2	-86
01N21W32Q03S	Grimes Canyon	-112.34	-8.13	1.83	-62.39	9.27	13.17	-23	2	-93
01N21W07J02S	Multiple	NM	-	-	-54.03	33.61	42.17	-38	2	-105
01N21W21H02S	Multiple	NM	-	-	NM	-	-	-68	-8	-103
02N21W07L03S	Multiple	-26.70	-0.22	-2.11	27.79	39.01	25.95	17	37	-10
02N21W07L05S	Multiple	-0.03	1.28	1.08	109.39	83.89	87.95	27	57	11

Notes: NM = Not Measured

[a] Data in this column shows the difference between water year 2023 and water year 2022 groundwater elevations measured at each representative monitoring site. Positive (+) values indicate that seasonal high or low groundwater elevations have increased from water year 2022 conditions. Negative (-) values indicate that seasonal high or low groundwater elevations have decreased from water year 2021 conditions.

[b]Data in this column shows the difference between water year 2023 and water year 2015 groundwater elevations measured at each representative monitoring site. Positive (+) values indicate that seasonal high or low groundwater elevations have increased from water year 2015 conditions. Negative (-) values indicate that seasonal high or low groundwater elevations have decreased from water year 2015 conditions.
[b]The 2025 Interim Milestone groundwater elevations were updated for this report to represent interim milestone groundwater elevations for average climate conditions. Previous annual reports for the Oxnard Subbasin used the interim milestone groundwater elevations for dry climate conditions because the 2016-2022 average annual precipitation was approximately 25% lower than the long-term average.

2.2 Groundwater Extraction

On October 23, 2019, the FCGMA Board of Directors adopted an Ordinance to Establish an Allocation System for the Oxnard and Pleasant Valley Groundwater Basins. The new allocation system went into effect on October 1, 2020, and is designed to "facilitate adoption and implementation of the groundwater sustainability plan and to ensure that the Basins are operated within their sustainable yields" (FCGMA, 2019c). To facilitate implementation and assessment of the new allocation system, FCGMA transitioned the groundwater extraction reporting period from a calendar year to a water year basis. The new reporting period went into effect on October 1, 2020, and requires local groundwater producers to report production from October 1 through March 31, and April 1 through September 30.

Historically, groundwater extractions in the FCGMA have been reported in two periods over the course of a single calendar year. Because groundwater extractions are not reported monthly, groundwater production prior to 2020 cannot be reported on a water year basis. Therefore, the groundwater extractions for 2016 through 2019 reported in Table 2-2, and shown on Figures 2-23 and 2-24, follow the historical precedent and represent calendar year extractions. Due to the transition from calendar year to water year reporting in 2020, groundwater extractions reported for 2020 represent extractions for the nine-month period from January 1, 2020, through September 30, 2020 (Table 2-2).

The water year 2023 extractions presented in Table 2-2 represent the extractions reported to FCGMA as of January 26, 2024, and do not include estimates of extractions for the non-reporting wells. Because of this, the water year 2023 extraction data is considered preliminary and will be updated in the 2025 GSP annual report for the Oxnard Subbasin. As of January 26, 2024, FCGMA had received reporting from approximately 80% of the operators in the basin. The water year 2022 extractions from these operators accounted for approximately 10% of the total extractions from the Oxnard Subbasin

The available data characterizing groundwater extractions between 2016 and 2022 indicate that groundwater extractions from the UAS increased in the Oxnard Subbasin while extractions from the LAS decreased (Table 2-2). This change in UAS and LAS extractions largely reflects a transition of M&I production to the UAS (Table 2-2). Based on the available data, the total groundwater production in the Subbasin has decreased over the 2016 to 2022 period (Table 2-2).

2.3 Surface Water Supply

The primary source of surface water in the Oxnard Subbasin is the Santa Clara River. UWCD operates the Freeman Diversion, which allows UWCD to divert surface water from the Santa Clara River for delivery to agricultural users in the Oxnard Subbasin and PVB. Diverted surface water is also used to recharge groundwater aquifers in the Oxnard Subbasin via the UWCD spreading basins located in the Forebay Management Area. In addition to diversions from the Santa Clara River, a portion of the surface water diverted from Conejo Creek by CWD is supplied to Pleasant Valley County Water District (PVCWD) for agricultural irrigation in the Oxnard Subbasin[5]. Surface water deliveries to the Oxnard Subbasin for water years 2016 through 2023 are reported in Table 2-3.

5 56% of the total CWD deliveries to PVCWD, and 56% of the total PVP surface water deliveries from UWCD, were assigned to the Oxnard Subbasin based on an analysis of the size of PVCWD's service area (FCGMA 2019a).

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Table 2-2. Groundwater Extractions in the Oxnard Subbasin by Aquifer System and Water Use Sector

Year	Extraction Reporting Complete / Estimated Percentage Complete (%)[a]	Upper Aquifer System (Acre-Feet)				Lower Aquifer System (Acre-Feet)				Wells in multiple or unassigned aquifer systems (Acre-Feet)				TOTAL (Acre-Feet)
		AG	Dom	M&I	Sub-Total	AG	Dom	M&I	Sub-Total	AG	Dom	M&I	Sub-Total	
CY 2016	Yes	16,045	166	12,654	28,865	31,801	24	10,655	42,480	6,863	5	125	6,993	78,342[b]
CY 2017	Yes	16,167	91	14,826	31,084	29,204	27	8,612	37,843	7,722	4	165	7,891	76,818
CY 2018	Yes	14,746	70	17,040	31,857	26,191	24	6,596	32,811	7,489	2	184	7,675	72,343
CY 2019	Yes	13,238	57	17,540	30,835	22,447	26	6,564	28,128	7,146	36	580	7,761	66,724
2020[c]	Yes	7,348	40	14,724	22,112	13,040	8	4,629	17,677	5,327	17	675	6,019	45,808
WY 2021	Yes	13,874	41	20,163	34,436	21,513	10	6,621	27,703	7,494	17	514	8,109	70,248
WY 2022[d]	Yes	12,564	50	18,889	31,504	23,462	14	9,402	32,878	9,074	28	721	9,823	74,205
WY 2023[e]	No/80%	7,445	31	12,710	20,186	14,925	11	11,583	26,519	4,580	13	471	5,064	51,769

Notes: CY = Calendar Year; WY = Water Year; AG = Agriculture; Dom = domestic; M&I = Municipal and Industrial

[a] Qualifier indicates whether extraction reporting is complete for the given year. “Yes” indicates no additional reporting is anticipated. “No” indicates that additional reporting is anticipated. The percentage included after the “No” qualifier represents the estimated total percentage of operators who have reported extractions as of January 26, 2024.

[b] Total pumping in 2016 includes 4 acre-feet of groundwater production from the semi-perched aquifer that were used by the M&I sector.

[c] Groundwater extraction reporting is from January 1, 2020 through September 30, 2020, due to transition to water year reporting.

[d] Groundwater extractions updated upon receipt of additional reporting.

[e] Groundwater extractions are preliminary and will be updated during preparation of the 2025 GSP Annual report based on receipt of additional reporting.

Table 2-3. Summary of Surface Water Deliveries to the Oxnard Subbasin

Water Year	PVCWD	United Water Conservation District			TOTAL (acre-Feet)
		Diversions of Santa Clara River Water			
	Conejo Creek Flows Delivered by CWD to PVCWD for Agriculture (acre-feet)	Total delivered to PTP and used in the Oxnard Subbasin (acre-feet)	Total delivered to PVP and used for agriculture in the Oxnard Subbasin (acre-feet)	Recharge to UWCD Spreading Basins (acre-feet)	
2016	1,038	0	0	2,209	3,247
2017	1,774	0	0	10,297	12,071
2018	1,854	0	0	3,126	4,980
2019	2,795	1,059	309	36,768	40,931
2020	2,310	2,494	944	28,327	34,097
2021	2,035	3,823	1,049	12,820	19,727
2022	2,392	1,905	425	11,448	16,170
2023	2,225	3,558	2,285	111,245	119,322

Notes: PVCWD = Pleasant Valley County Water District; CWD = Camrosa Water District; PTP = Pumping Trough Pipeline; PVP = Pleasant Valley Pipeline

2.4 Total Water Available

Total water available was tabulated from the groundwater extractions reported in Table 2-2, the surface water supply reported in Table 2-3, imported water, and recycled water used in the Subbasin. The total water available is reported in Table 2-4 by water year. In order to convert the reported groundwater production from calendar year to water year prior to water year 2020, 25% of the groundwater production from a given calendar year was assigned to the following water year, and the 75% of the calendar year production was assigned to the current water year. This division, while approximate, is based on the monthly split between water year and calendar year, with January through September (75% of the calendar year) belonging to the current water year, and October through December (25% of the calendar year) belonging to the following water year. Because the reported 2020 groundwater extractions covered the period from January 1 through September 30, total water year extractions for 2020 were estimated by adding 25% of the 2019 calendar year extractions to the reported 2020 water year extractions.

Similar to Table 2-2, the groundwater extractions for water year 2023 presented in Table 2-4 represent extractions reported to FCGMA as of January 26, 2024. The reported extraction volumes are preliminary and anticipated to change based on receipt of additional data.

Table 2-4. Total Water Available in the Oxnard Subbasin

Water Year	Extraction Reporting Complete / Estimated Percentage Complete (%)[a]	Groundwater[b] (acre-feet)			Surface Water (acre-feet)				Imported Water (acre-feet)	Recycled Water[c,d] (acre-feet)	TOTAL (acre-feet)
		Ag	Dom	M&I	Ag	Dom	M&I	Recharge	M&I	Ag	
2016	Yes	55,025	195	23,741	1,038	0	0	2,209	11,313	136	93,657
2017	Yes	53,479	141	23,562	1,774	0	0	10,297	10,740	1,135	101,128
2018	Yes	49,593	103	23,766	1,854	0	0	3,126	12,171	2,194	92,807
2019	Yes	44,230	13	23,786	4,163	0	0	36,768	9,998	0	119,675
2020	Yes	36,424	94	25,971	5,770	0	0	28,327	9,712	0	106,297
2021	Yes	42,881	68	27,298	6,907	0	0	12,820	10,089	1,206	101,269
2022[e]	Yes	45,101	92	29,012	4,722	0	0	11,448	8,505	1,265	100,145
2023[f]	No/80%	26,950	55	24,764	8,068	0	0	111,254	6,615	1,718	179,424

Notes: NR – not reported

[a] Qualifier indicates whether extraction reporting is complete for the given year. “Yes” indicates no additional reporting is anticipated. “No” indicates that additional reporting is anticipated. The percentage included after the “No” qualifier represents the estimated total percentage of operators who have reported extractions as of January 26, 2024.

[b] Groundwater production by water year is estimated from groundwater production by calendar year for 2016 through 2020. Water Year 2021 extractions represent reported and estimated extractions for the period from October 1, 2020 through September 30, 2021.

[c] Recycled water is from: City of Oxnard’s GREAT program reporting, PVCWD’s reported use of Camrosa Water Reclamation Facility (CWRF), and City of Camarillo’s Water Reclamation Plan (CamSan). 56% of the recycled water served by PVCWD was assigned to the Oxnard Subbasin based on an analysis of the size of PVCWD’s service area (FCGMA 2019a).

[d] Water year 2022 updated to reflect usage of CWRF and CamSan recycled water within PVCWD’s service area.

[e] Water year 2022 groundwater extractions were updated based on additional reporting received subsequent to the submittal of the 2023 GSP Annual Report.

[f] Groundwater extraction reporting for 2023 is preliminary and expected to change. Additional extraction reporting is anticipated.

2.5 Change in Groundwater Storage

Change in storage estimates were calculated for each principal aquifer in the Subbasin by comparing seasonal high groundwater elevations between 2015 and 2023. Annual and cumulative change in storage for water years 2016 through 2023 are presented in Tables 2-5a and 2-5b. The change in storage for each principal aquifer between spring 2022 and spring 2023 is shown on Figures 2-18 through 2-22. Annual and cumulative change in storage for the UAS and LAS are shown in Figures 2-23 and 2-24.

Change in groundwater in storage was calculated using a series of linear regression models that correlate measured groundwater elevations to simulated storage change values extracted from the Ventura Regional Groundwater Flow Model (UWCD, 2018). These regression models were computed using seasonal high elevations and corresponding model-calculated storage change values for water years 1986 through 2015 (FCGMA 2022).

2.5.1 Oxnard Aquifer

Groundwater in storage increased between spring 2022 and spring 2023 by approximately 3,300 AF (Table 2-5a). The majority of this increase occurred in the Oxnard Forebay and Oxnard Pumping Depression management areas, where groundwater in storage increased by an estimated 3,100 AF (Figure 2-18). Since spring 2015, groundwater in storage within the Oxnard aquifer has increased by a cumulative volume of approximately 8,800 AF (Table 2-5a).

2.5.2 Mugu Aquifer

Groundwater in storage within the Mugu aquifer increased by approximately 820 AF between spring 2022 and spring 2023 (Table 2-5a). Groundwater in storage increased across the majority of the Subbasin, except for the portion of the West Oxnard Plain Management Area north of Port Hueneme (Figure 2-19). Approximately 80% of the estimated increase in storage occurred in the Forebay Management Area, where spring 2023 groundwater elevations were approximately 21 to 88 feet higher than spring 2022 (Figure 2-19).

Since spring 2015, groundwater in storage within the Mugu aquifer has decreased by a cumulative volume of approximately 670 AF (Table 2-5a).

2.5.3 Hueneme Aquifer

The volume of groundwater in storage in the Hueneme aquifer increased by approximately 130 AF between spring 2022 and spring 2023 (Table 2-5a). Figure 2-20 illustrates that changes in groundwater in storage varied geographically within the Hueneme aquifer. In the Forebay and Oxnard Pumping Depression management areas, groundwater in storage increased by an estimated 140 AF. In the West Oxnard Plain Management Area and Saline Intrusion Management Area, groundwater in storage was estimated to have declined by approximately 10 AF (Table 2-5a).

Since 2015, groundwater in storage in the Hueneme aquifer has increased by a cumulative volume of approximately 120 AF.

2.5.4 Fox Canyon Aquifer

Between spring 2022 and spring 2023, groundwater in storage in the FCA increased by a total of approximately 2,000 AF (Table 2-5a). The largest increases in storage occurred in the Forebay and Oxnard Pumping Depression management areas, where groundwater in storage increased by approximately 1,950 AF (Figure 2-21). In the West Oxnard Plain Management Area, groundwater in storage was estimated to have decreased by approximately 110 AF (Figure 2-21).

Since the spring of 2015, groundwater in storage within the FCA has increased by approximately 2,240 AF (Table 2-5a).

2.5.5 Grimes Canyon Aquifer

The Grimes Canyon aquifer is limited to the southern and eastern parts of the Oxnard Subbasin (Turner 1975). Between spring 2022 and spring 2023, groundwater in storage in the Grimes Canyon aquifer increased by approximately 420 AF. This groundwater in storage increase was estimated using a single well, 01N21W32Q02S, located in the southeastern part of the Subbasin (Figure 2-22).

Since the spring of 2015, groundwater in storage within the Grimes Canyon aquifer has increased by approximately 180 AF (Table 2-5a).

2.5.6 Total Change in Storage in the Subbasin

The change in groundwater in storage was calculated for each aquifer in the Subbasin and summed by aquifer system (Tables 2-5a and 2-5b; Figures 2-23 and 2-24). Between spring 2022 and spring 2023, groundwater in storage increased by approximately 6,700 AF, which resulted in a cumulative increase in storage in the Subbasin since spring 2015 of approximately 11,300 AF (Table 2-5b). However, it should be noted that the change in storage volumes reported in Tables 2-5a and 2-5b are approximate and were estimated using groundwater elevations measured at wells screened only in single aquifers.

Annual and cumulative change in storage from 1985 through 2015 were reported in the GSP (FCGMA 2019a). The change in storage volumes reported in the GSP were extracted from the UWCD model and incorporated local responses to changing recharge and pumping conditions. The results presented here provide an estimate of storage change based on a subset of wells screened solely within individual aquifers across the Subbasin, and therefore do not capture local variations in storage change simulated by the UWCD model. In general, however, the trends shown in the GSP and Annual Report are in good agreement (FCGMA 2022).

Additionally, the change in storage reported for this annual report does not account for seawater intrusion that is known to occur in the Subbasin when groundwater elevations are below the minimum thresholds described in the GSP (FCGMA 2019). As groundwater elevations decline, seawater intrudes the Subbasin, which slows the decline of the groundwater elevations, but replaces fresh water in storage with saltwater. Therefore, the change in storage calculated for this annual report using groundwater elevations that are influenced by potential seawater intrusion may be an underestimate of the total change of fresh water in storage experienced by the Subbasin between water years 2016 and 2023

Table 2-5a. Annual Change in Groundwater Storage in the Oxnard Subbasin

Water Year	Water Year Type	Oxnard Subbasin							
		Oxnard Aquifer (acre-feet)	Mugu Aquifer (acre-feet)	UAS Annual (acre-feet)	Hueneme Aquifer (acre-feet)	Fox Canyon Aquifer (acre-feet)	Grimes Canyon Aquifer (acre-feet)	LAS Annual (acre-feet)	Combined Annual (acre-feet)
2016	Critical	-9,391	-480	-9,871	-277	-687	-301	-1,266	-11,136
2017	Above Normal	-1,565	170	-1,395	269	710	432	1,411	16
2018	Critical	-4,737	-401	-5,138	-310	-965	-183	-1,457	-6,596
2019	Above Normal	9,282	802	10,084	243	1,639	256	2,138	12,222
2020	Below Normal	9,704	467	10,170	159	214	-155	218	10,388
2021	Critical	6,752	-185	6,657	170	-63	-70	38	6,605
2022	Below Normal	-5,263	-520	-5,783	-272	-632	-214	-1,118	-6,901
2023	Wet	3,310	819	4,129	133	2,021	417	2,571	6,700

Table 2-5b. Cumulative Change in Groundwater Storage in the Oxnard Subbasin

Water Year	Water Year Type	Oxnard Subbasin		
		UAS Cumulative (acre-feet)	LAS Cumulative (acre-feet)	Combined Cumulative Change in Storage (acre-feet)
2016	Critical	-9,871	-1,266	-11,136
2017	Above Normal	-11,266	146	-11,120
2018	Critical	-16,404	-1,312	-17,716
2019	Above Normal	-6,319	826	-5,493
2020	Below Normal	3,851	1,044	4,895
2021	Critical	10,418	1,081	11,500
2022	Below Normal	4,635	-37	4,599
2023	Wet	8,764	2,535	11,299

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3 GSP Implementation Progress

The GSP for the Oxnard Subbasin was submitted to DWR in January 2020. This is the fifth annual report prepared since the GSP was submitted. The GSP implementation progress reported in this report covers work that began during development of the GSP as well as development of projects and management actions over the 3 years since the GSP was submitted.

Project Implementation Progress

During development of the GSP, FCGMA identified the Oxnard Pumping Depression Management Area, adjacent to the boundary between the Oxnard Subbasin and the PVB, as a critical area in which aquifer specific groundwater elevations were not available due to a lack of monitoring wells. This is an area of known groundwater production, with wells in the area typically screened in multiple aquifers in the LAS. At the FCGMA's request, DWR, under its Technical Services Support program, installed two nested monitoring well clusters to monitor water levels in the individual principal aquifers in the Oxnard Subbasin Pumping Depression Management Area based on FCGMA's design. These nested monitoring wells were installed specifically to address the spatial data gap identified in the GSP. Groundwater elevation data from these wells has been included GSP Annual Reports since 2022 to better represent groundwater conditions in the Oxnard Subbasin and adjacent PVB.

Since completing the GSP, FCGMA was awarded grant funds through DWR's Sustainable Groundwater Management Grant Program to support implementation of projects developed during the GSP and subsequent stakeholder discussions. The final contract agreement between DWR and FCGMA was signed on September 23, 2022, and FCGMA, acting as the grant administrator, has coordinated activities with the various agencies that are overseeing project component implementation. These projects support increased water supply availability in the Subbasin through expansion of existing managed aquifer recharge infrastructure, construction of a recycled water pipeline interconnection, construction of monitoring well clusters to support evaluation of the United Water Conservation District's Extraction Barrier and Brackish Water Treatment project.

In addition to administering the grant funds for these projects, FCGMA solicited bids to construct additional multi-depth and shallow monitoring wells in the Subbasin. FCGMA awarded the contract to construct these monitoring wells on February 28, 2024 and anticipates completing construction by the end of 2024. These wells will be used to fill data gaps identified in the GSP.

To support on-going stakeholder involvement and project planning, FCGMA developed a process and criteria for evaluating and prioritizing water-supply and infrastructure projects for consideration of funding and inclusion in GSP future sustainable yield projections. This effort was led by FCGMA's Operations Committee, with significant stakeholder involvement, and the FCGMA Board adopted the evaluation process and criteria on March 22, 2023. FCGMA solicited project information in September 2023 and will incorporate project information collected as part of this into the first five-year GSP evaluation.

Management Action Implementation Progress

FCGMA has made progress on several management actions since adoption of the GSP. FCGMA completed the transition from calendar year to water year reporting of groundwater extractions in 2021. Consequently, the 2022 water year is the first water year in which groundwater extractions can be directly compared to the previous water year's extractions, consistent with SGMA. This allows for a better understanding of the impacts of climate and extraction on groundwater elevations and change in groundwater storage in the Subbasin.

Third, FCGMA has continued to evaluate implementing a replenishment fee that could be used to purchase water for recharge in the Oxnard Subbasin or to help fund a voluntary temporary fallowing program to reduce groundwater demand. These management actions can be implemented over a shorter time period than large capital projects and, while not sufficient on their own to achieve sustainability, play an important role in progressing toward sustainable use of the groundwater resources in the Oxnard Subbasin.

Fourth, to reduce seawater intrusion to the Oxnard Subbasin, the FCGMA Board adopted Resolution 2023-02 *Regarding the Accrual, Extraction, and Transfer of Recycled Water Pumping Allocation* on October 25, 2023. This resolution updated FCGMA Resolution 2013-02, which provided the City of Oxnard pumping allocation credits for the delivery of recycled water to users within the Saline Intrusion Management Area and the Oxnard Pumping Depression Management Area. Resolution 2023-02 introduced new recycled water pumping allocation (RWPA) extraction criteria for the City of Oxnard. The new criteria support's ongoing delivery of recycled water to impacted areas of the Subbasin by providing the City of Oxnard increased operational flexibility to extract accrued RWPA during dry years when imported water supplies are limited.

Lastly, FCGMA has begun development of the first periodic evaluation of the GSP, which is due to DWR in January 2025. This evaluation will provide an assessment of the basin setting and groundwater conditions based on new data collected since submittal of the GSP; an evaluation of the established sustainable management criteria, monitoring network, and data gaps; and a comprehensive description of GSP implementation activities in the Subbasin.

The progress made over the past year on projects and management actions applicable to the Oxnard Subbasin demonstrates FCGMA's commitment to allocating the necessary time and resources to achieve long-term sustainable management of the groundwater resources of the Oxnard Subbasin.

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4 References

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5 Figures

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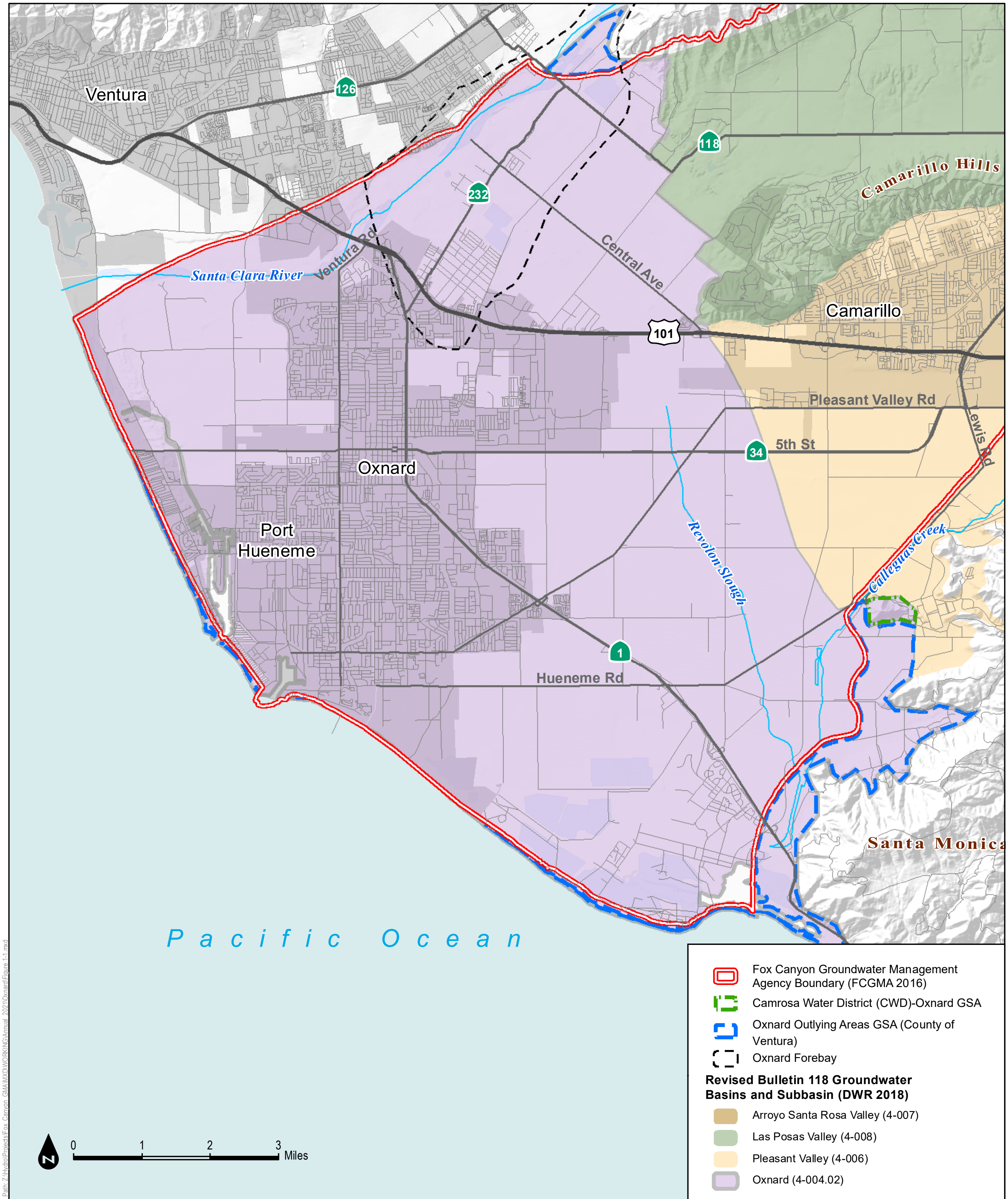

SOURCE: DWR; Santa Barbara County; FCGMA

FIGURE 1-1

Vicinity Map for the Oxnard Subbasin

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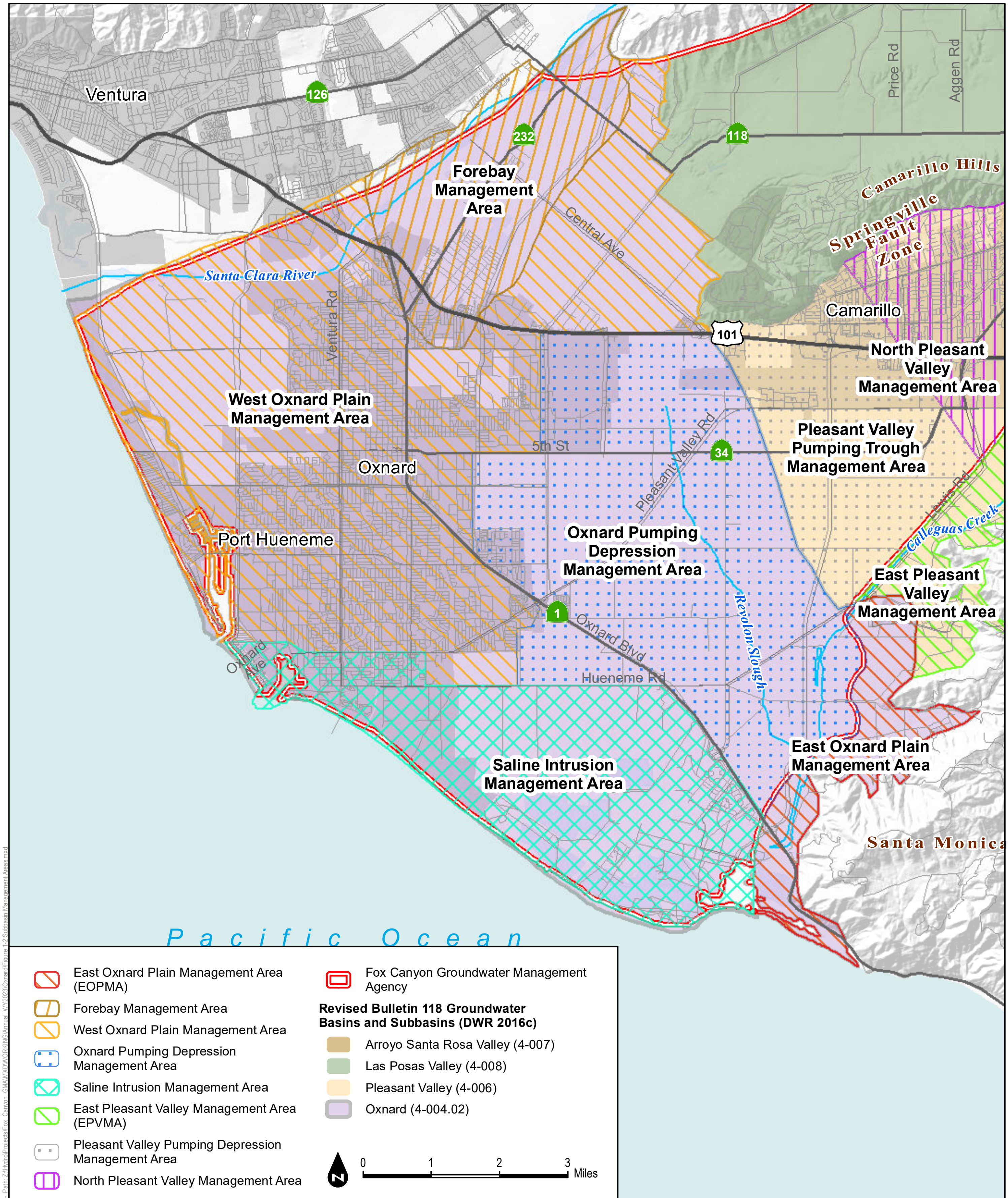

SOURCE: DWR; County of Ventura; FCGMA

FIGURE 1-2

Oxnard Subbasin Management Areas

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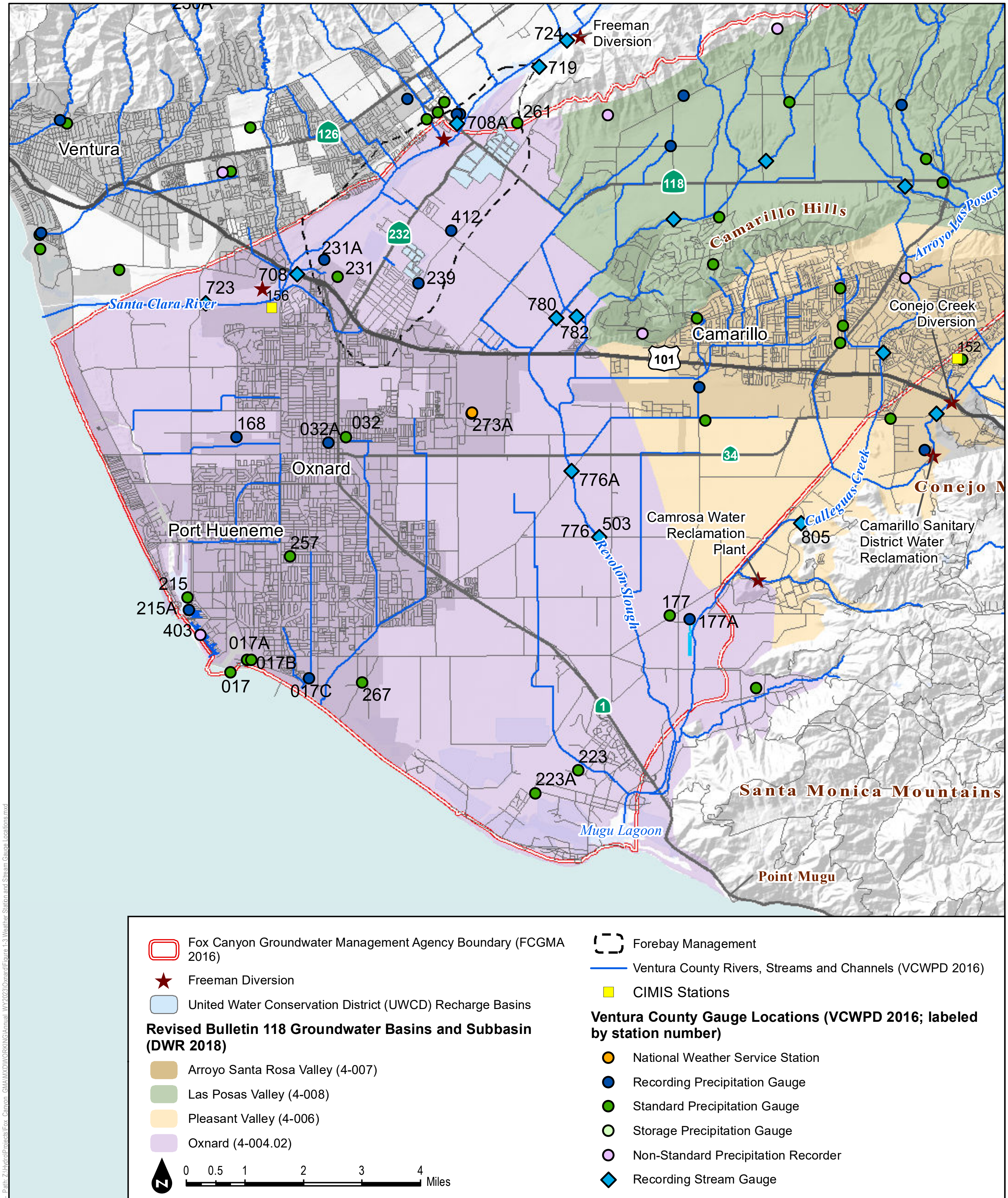

SOURCE: DWR; Santa Barbara County; VCWPD; USGS NHD

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FIGURE 1-3

Weather Station and Stream Gauge Locations

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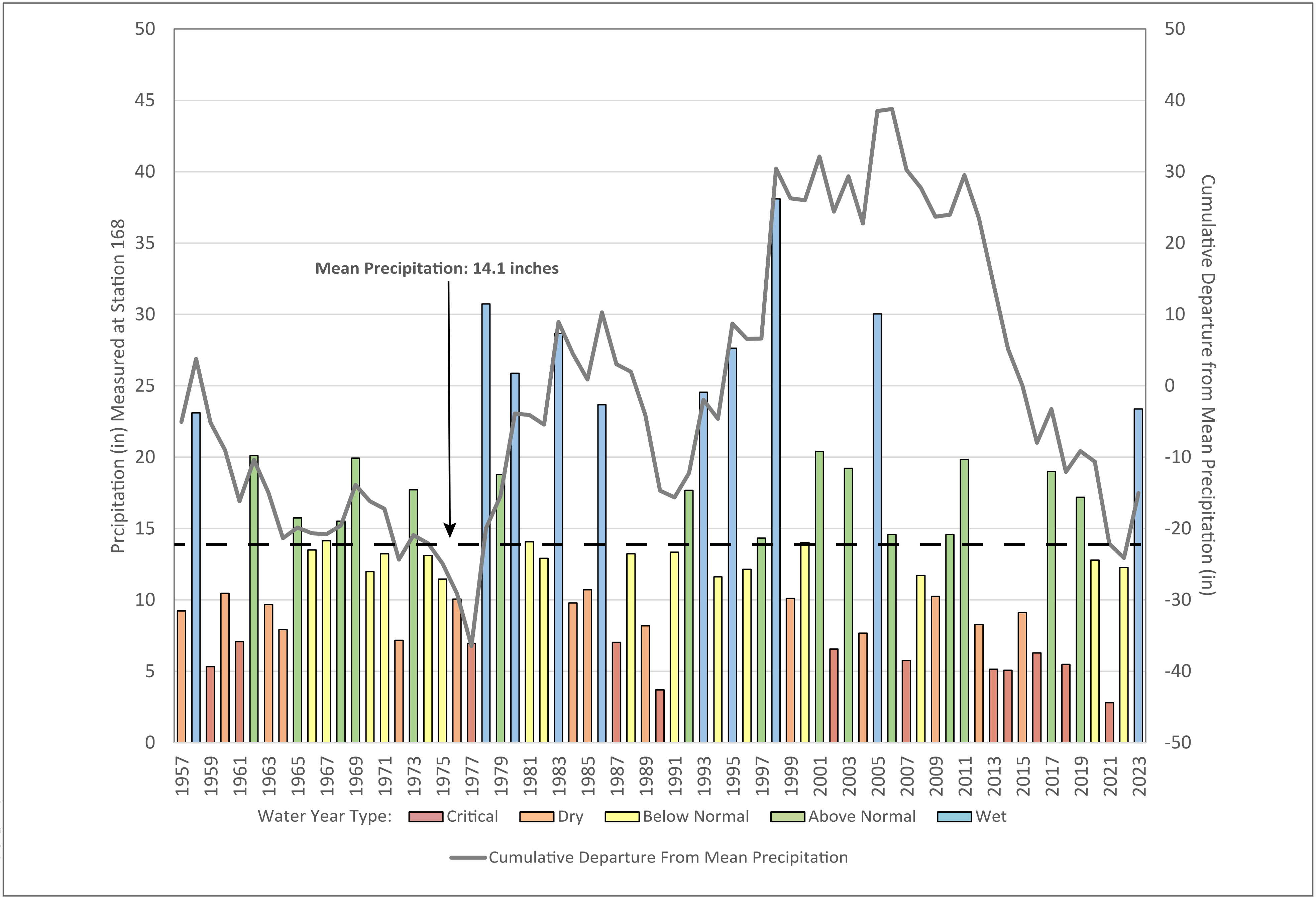

Note: Water year is from October 1 through September 30. Water year type is based on the percentage of the water year precipitation compared to the mean precipitation. Types are defined as: Wet (≥150% of mean), Above Normal (≥100% to <150% of mean), Below Normal (≥75% to <100% of mean), Dry (≥50% to <75% of average), and Critical (<50% of mean)

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FIGURE 1-4

Oxnard Subbasin Historical Water Year Precipitation

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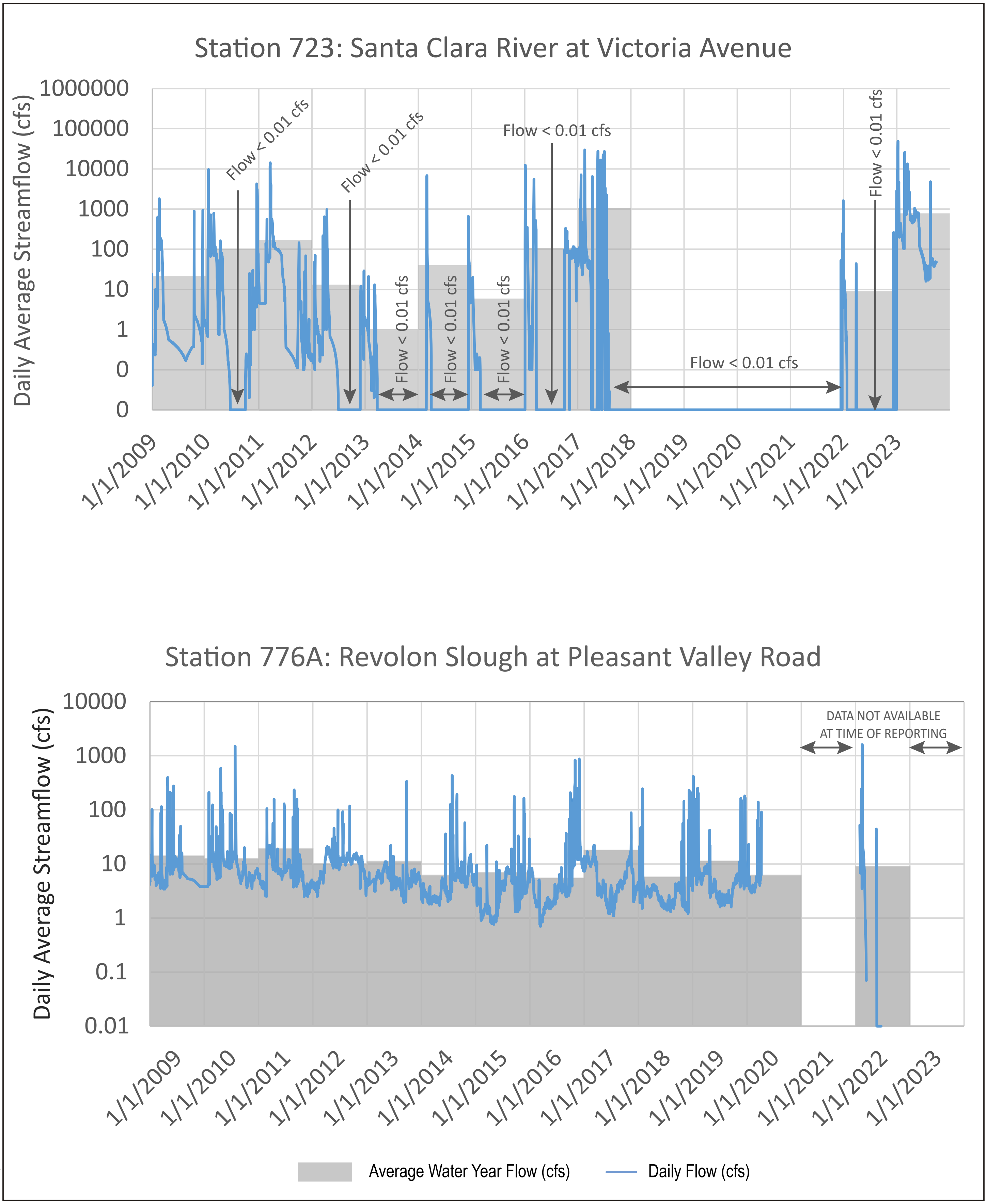

SOURCE: Ventura County Watershed Protection District (VCWPD) Hydrologic Data Server (https://www.vcwatershed.net/hydrodata/)

FIGURE 1-5

Oxnard Subbasin Stream Gauge Data

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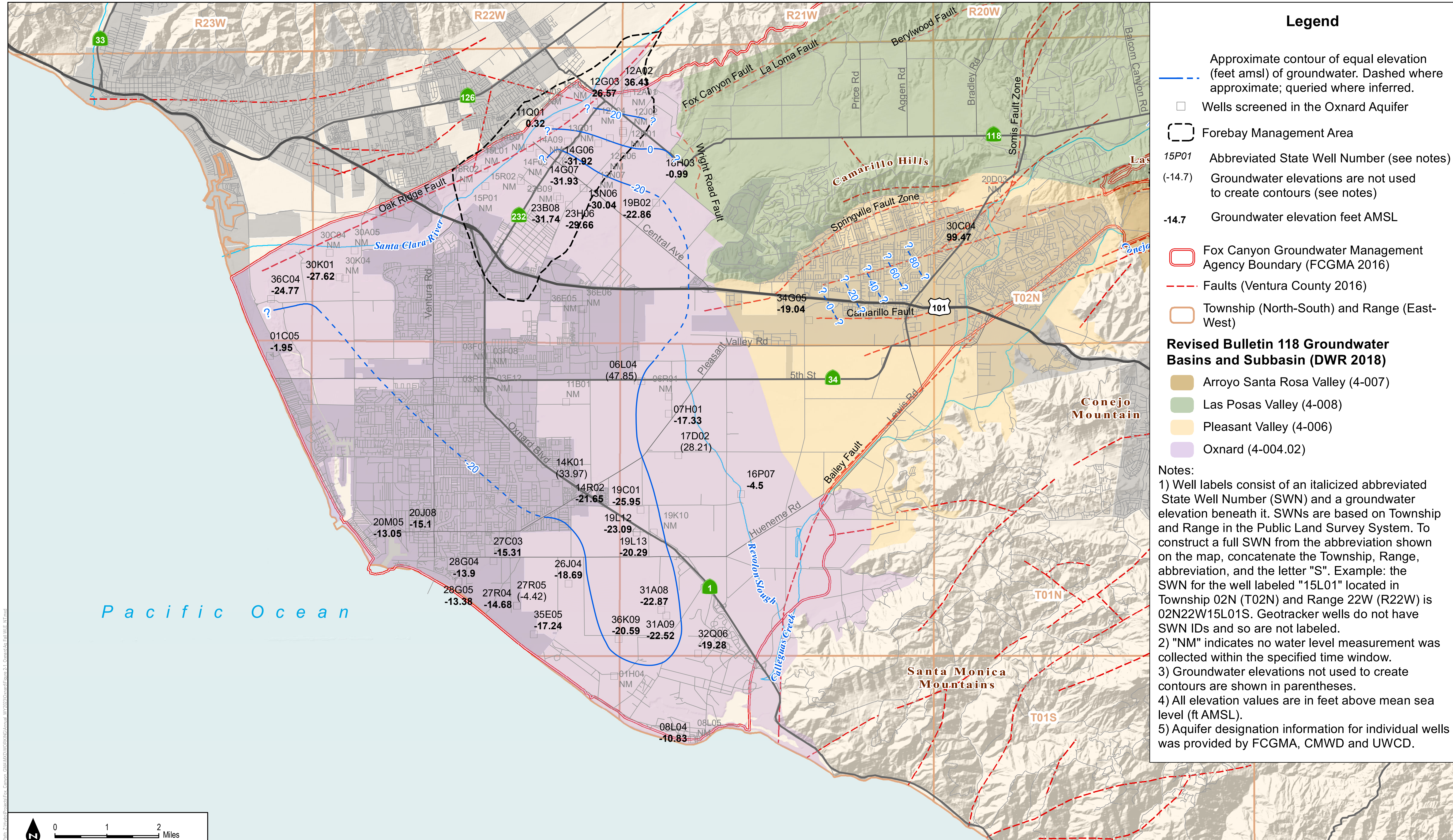

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SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-1

Groundwater Elevation Contours in the Oxnard Aquifer, October 2 to October 31, 2022

Oxnard Subbasin Groundwater Sustainability Plan 2024 Annual Report

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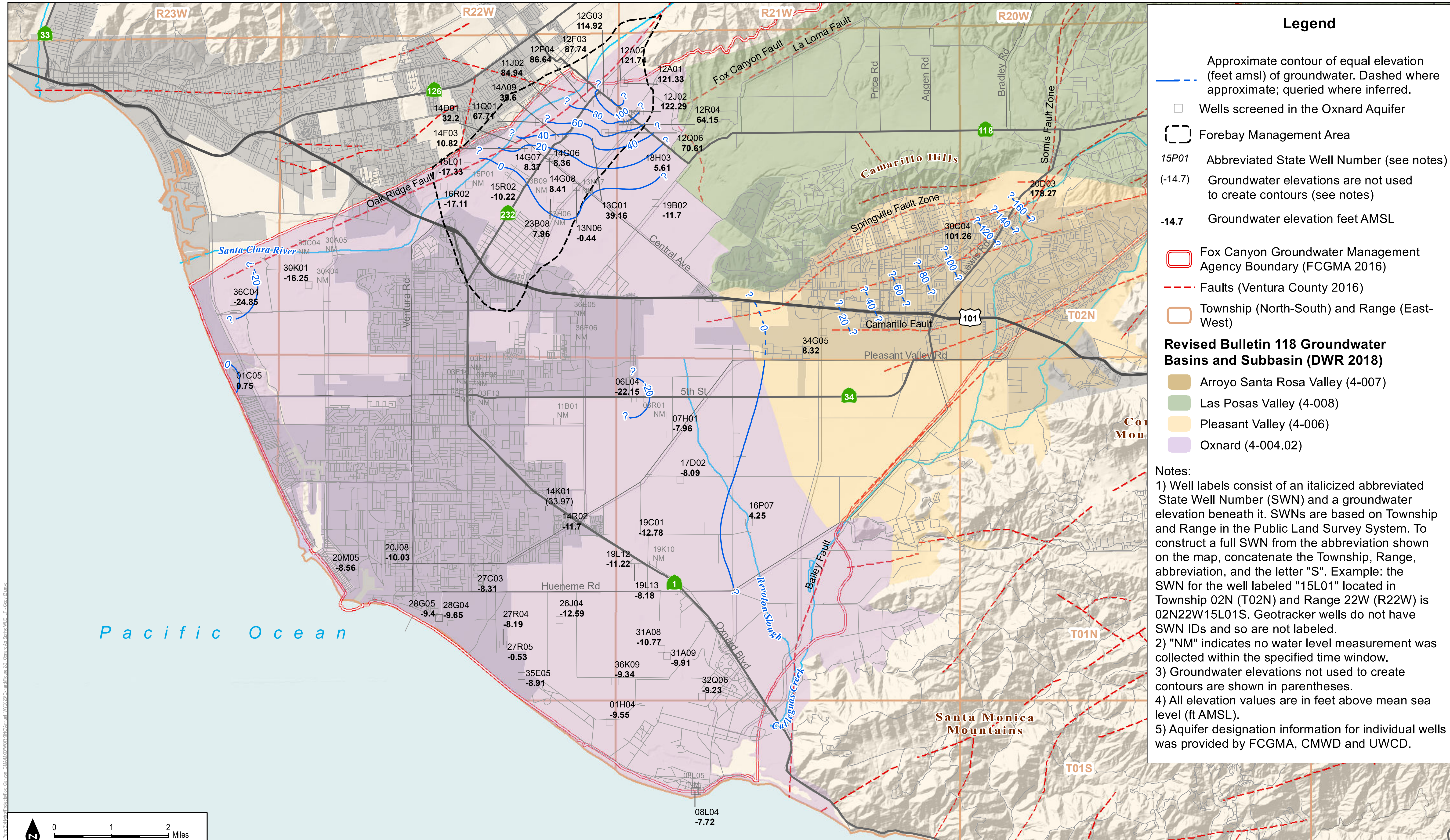

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-2

Groundwater Elevation Contours in the Oxnard Aquifer, March 2 to March 31, 2023

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Oxnard Subbasin Groundwater Sustainability Plan 2024 Annual Report

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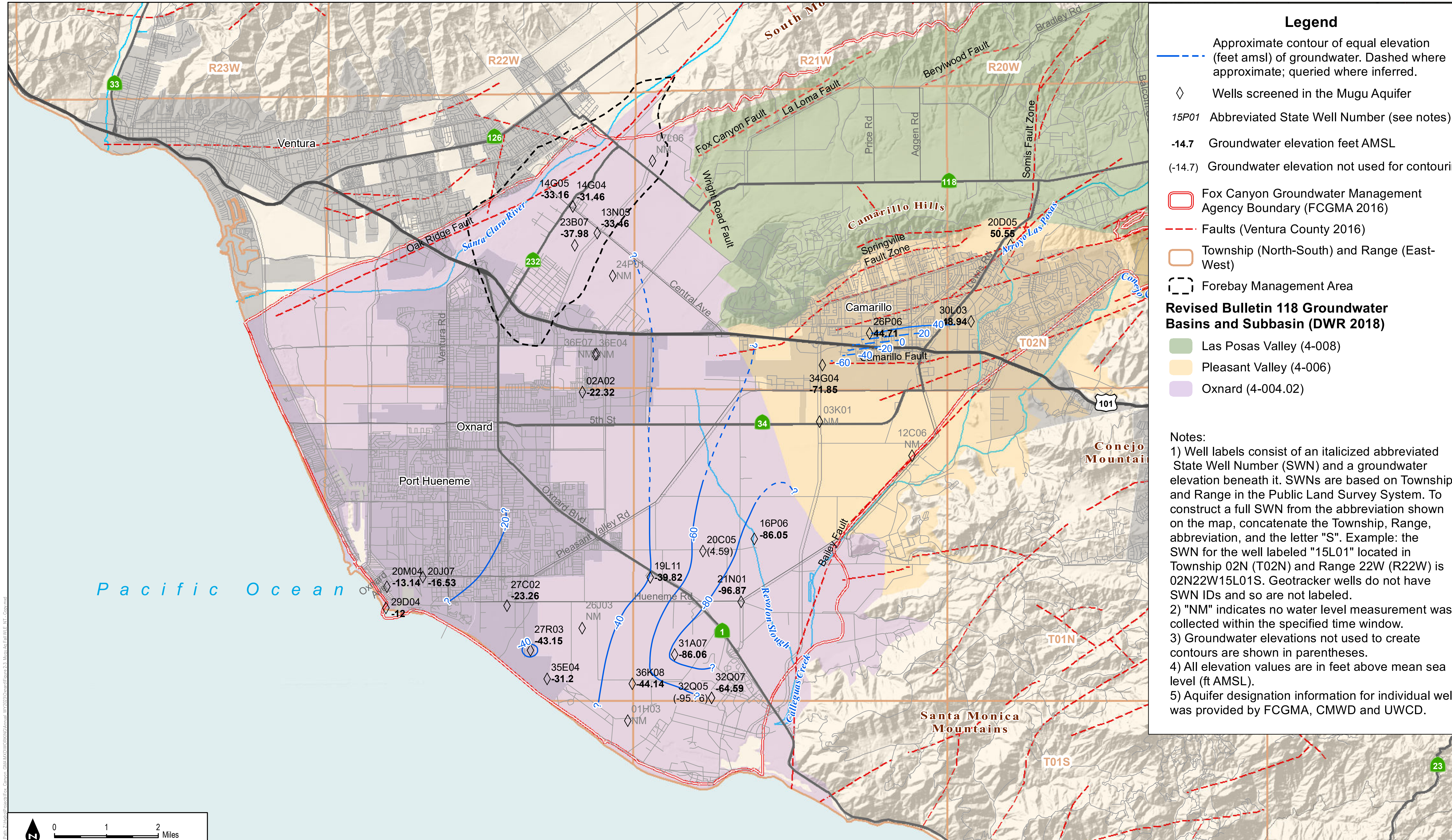

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-3

Groundwater Elevation Contours in the Mugu Aquifer, October 2 to October 31, 2022

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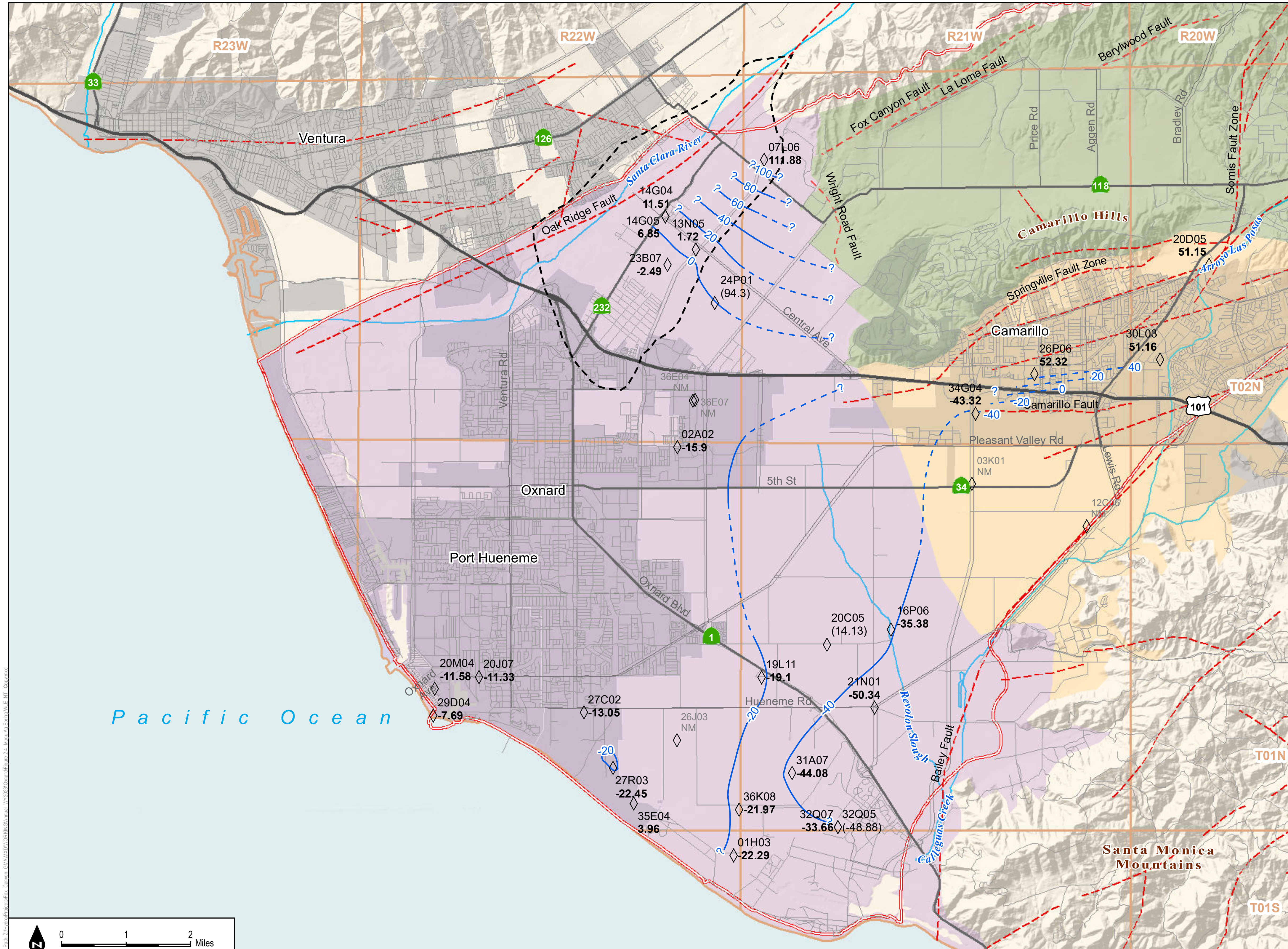

Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- ◊ Wells screened in the Mugu Aquifer
- *15P01* Abbreviated State Well Number (see notes)
- **-14.7** Groundwater elevation feet AMSL
- (-14.7) Groundwater elevation not used for contouring
- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Faults (Ventura County 2016)
- Township (North-South) and Range (East-West)
- Forebay Management Area

Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

- Las Posas Valley (4-008)
- Pleasant Valley (4-006)
- Oxnard (4-004.02)

Notes:
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and the letter "S". Example: the SWN for the well labeled "15L01" located in Township 02N (T02N) and Range 22W (R22W) is 02N22W15L01S. Geotracker wells do not have SWN IDs and so are not labeled.
2) "NM" indicates no water level measurement was collected within the specified time window.
3) Groundwater elevations not used to create contours are shown in parentheses.
4) All elevation values are in feet above mean sea level (ft AMSL).
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

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SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-4

Groundwater Elevation Contours in the Mugu Aquifer, March 2 to March 31, 2023

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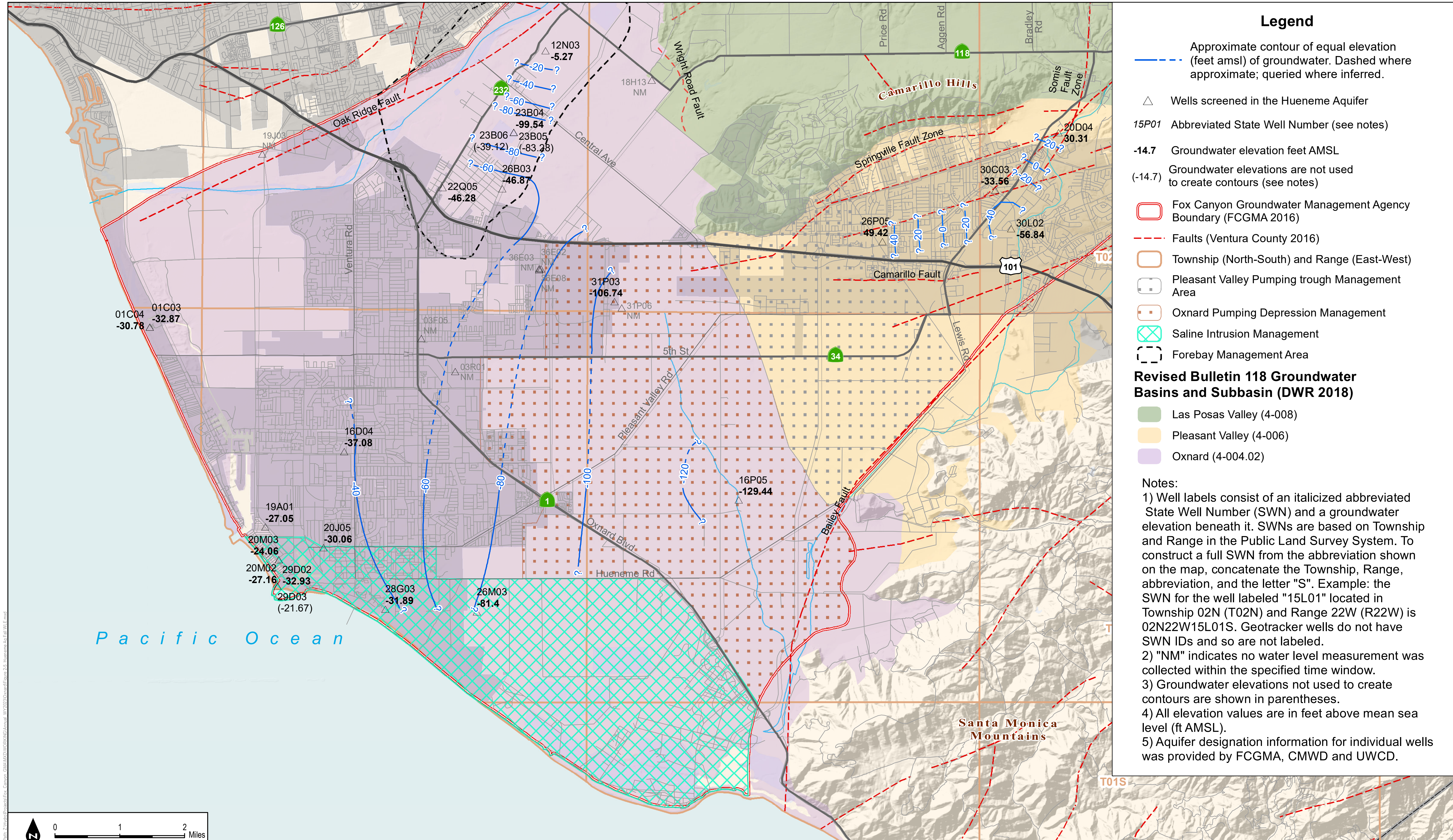

SOURCE: DWR; Ventura County; UWCD; CMWD

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FIGURE 2-5

Groundwater Elevation Contours in the Hueneme Aquifer, October 2 to October 31, 2022

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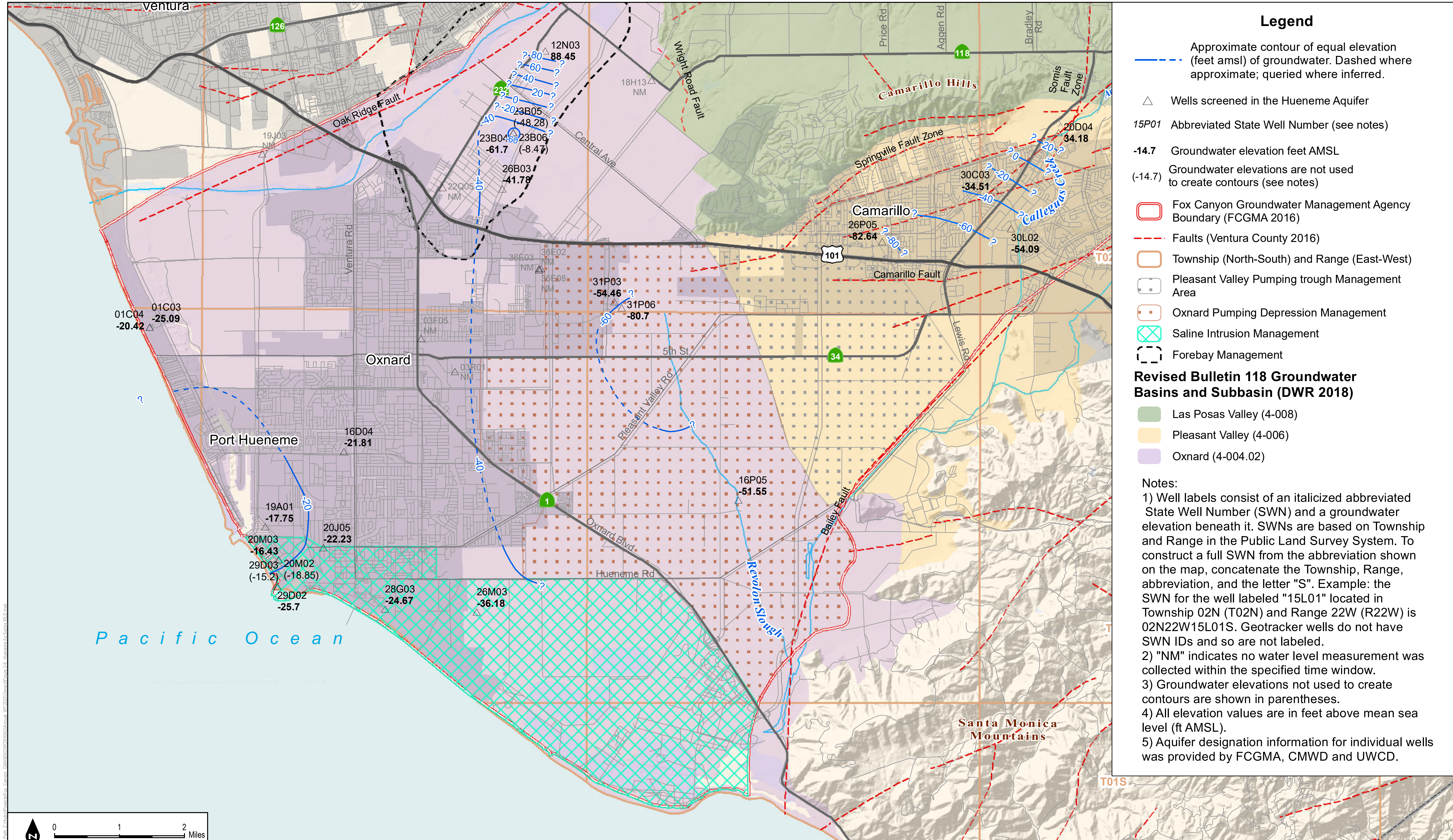

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FIGURE 2-6

Groundwater Elevation Contours in the Hueneme Aquifer, March 2 to March 31, 2023

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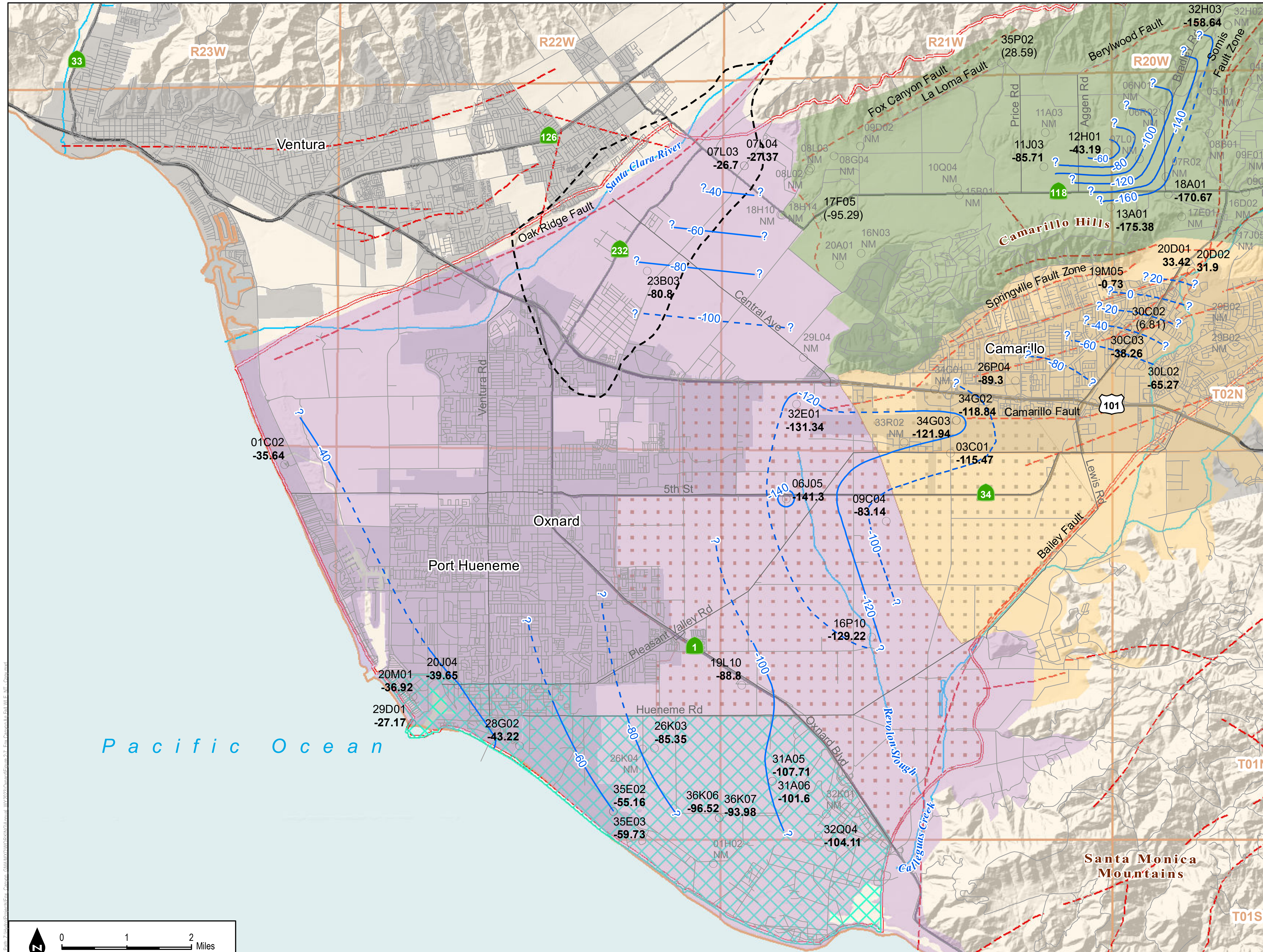

Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells Screened in the Fox Canyon Aquifer
- *15P01* Abbreviated State Well Number (see notes)
- **-14.7** Groundwater elevation feet AMSL
- (-14.7) Groundwater elevations are not used to create contours (see notes)
- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Faults (Ventura County 2016)
- Forebay Management
- Oxnard Pumping Depression Management Area
- Pleasant Valley Pumping trough Management Area
- Saline Intrusion Management
- Township (North-South) and Range (East-West)

Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

- Arroyo Santa Rosa Valley (4-007)
- Las Posas Valley (4-008)
- Pleasant Valley (4-006)
- Oxnard (4-004.02)

Notes:
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and the letter "S". Example: the SWN for the well labeled "15L01" located in Township 02N (T02N) and Range 22W (R22W) is 02N22W15L01S. Geotracker wells do not have SWN IDs and so are not labeled.
2) "NM" indicates no water level measurement was collected within the specified time window.
3) Groundwater elevations not used to create contours are shown in parentheses.
4) All elevation values are in feet above mean sea level (ft AMSL).
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

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SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-7

Groundwater Elevation Contours in the Fox Canyon Aquifer, October 2 to October 31, 2022

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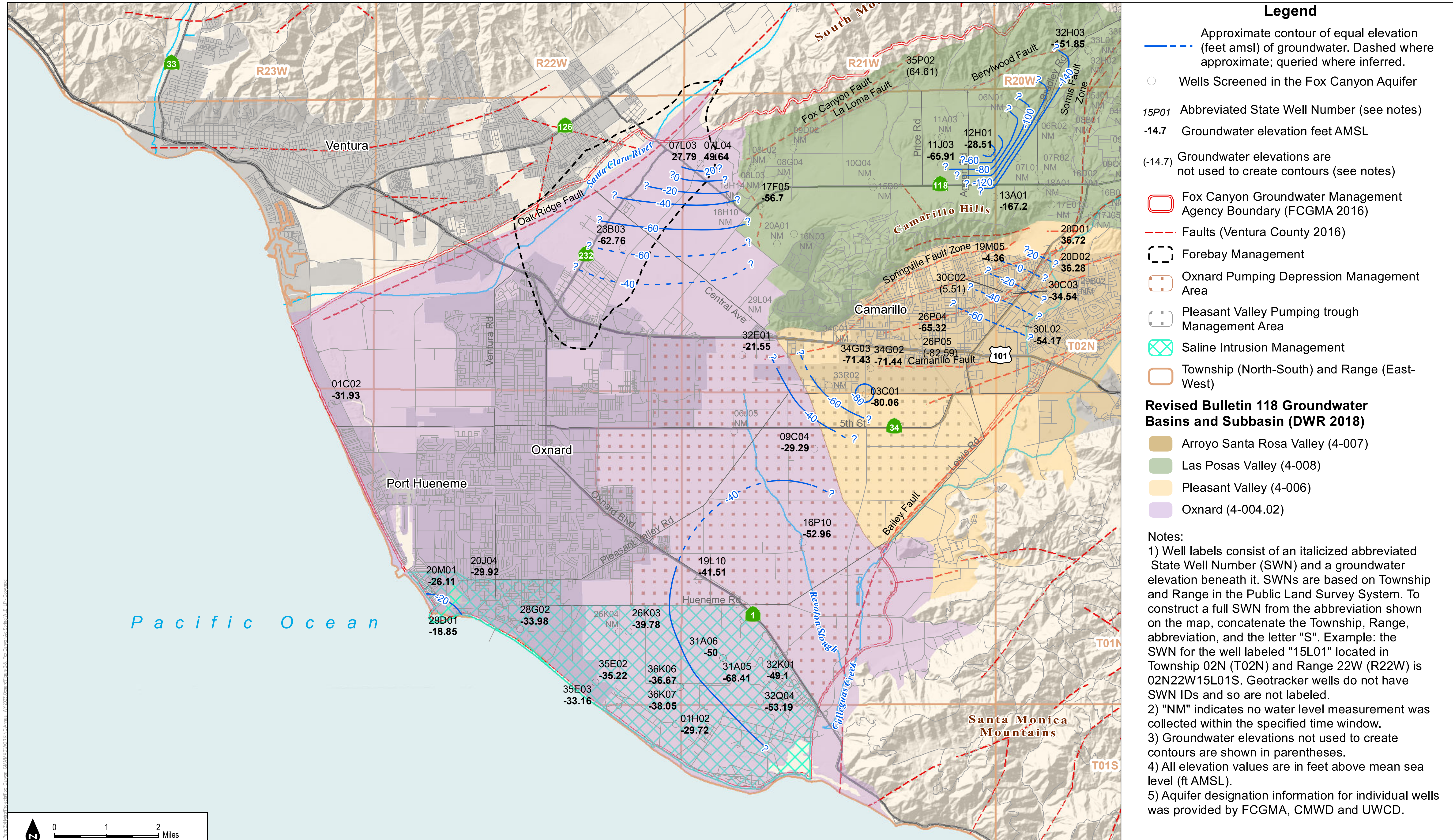

SOURCE: DWR; Ventura County; UWCD; CMWD

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FIGURE 2-8

Groundwater Elevation Contours in the Fox Canyon Aquifer, March 2 to March 31, 2023

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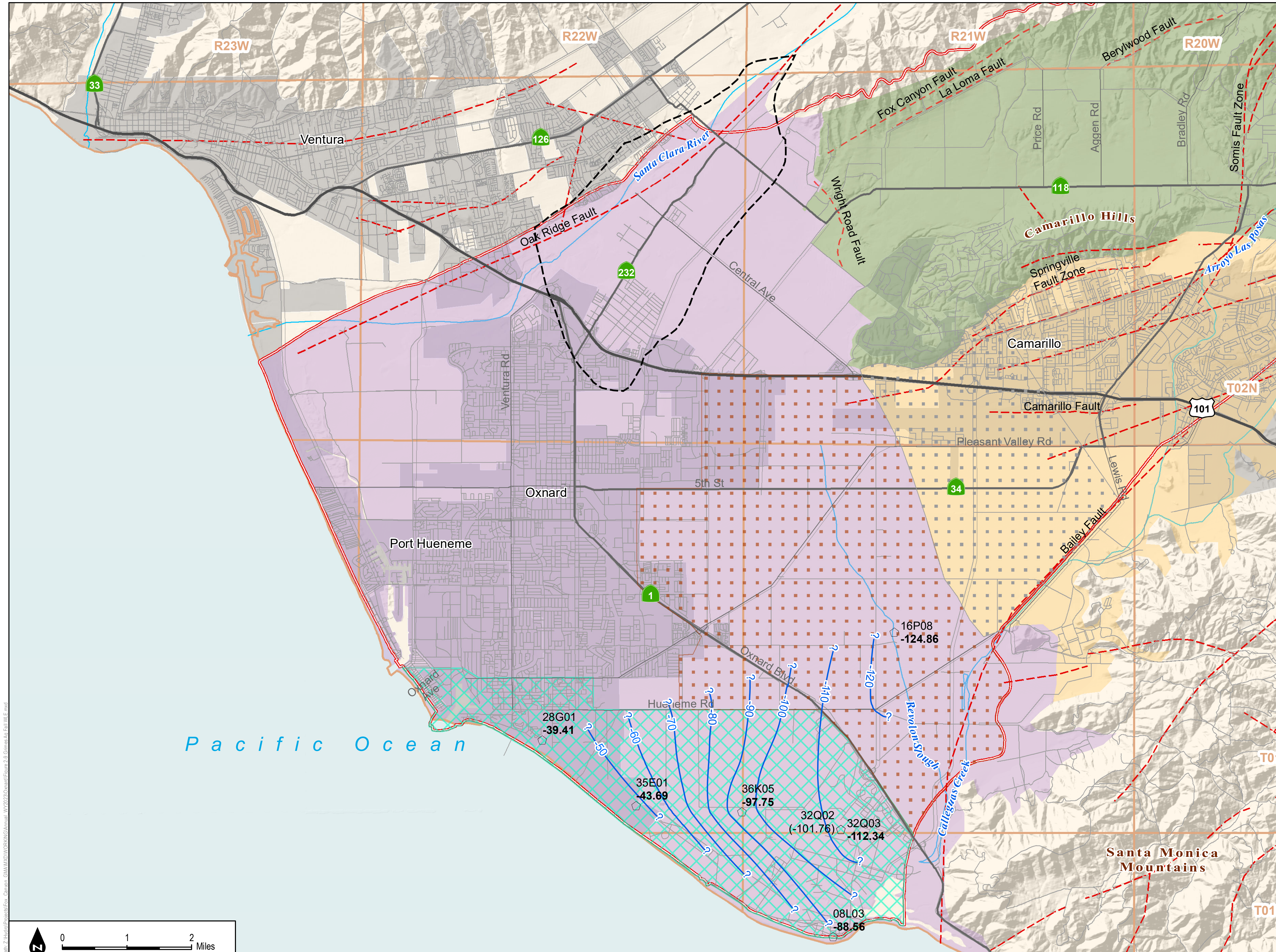

Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in Grimes Canyon Aquifer
- *15P01* Abbreviated State Well Number (see notes)
- **-14.7** Groundwater elevation feet AMSL
- (-14.7) Groundwater elevations are not used to create contours (see notes)
- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Faults (Ventura County 2016)
- Township (North-South) and Range (East-West)
- Forebay Management
- Pleasant Valley Pumping Trough Management Area
- Oxnard Pumping Depression Management Area
- Saline Intrusion Management

Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

- Las Posas Valley (4-008)
- Pleasant Valley (4-006)
- Oxnard (4-004.02)

Notes:
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and the letter "S". Example: the SWN for the well labeled "15L01" located in Township 02N (T02N) and Range 22W (R22W) is 02N22W15L01S. Geotracker wells do not have SWN IDs and so are not labeled.
2) "NM" indicates no water level measurement was collected within the specified time window.
3) Groundwater elevations not used to create contours are shown in parentheses.
4) All elevation values are in feet above mean sea level (ft AMSL).
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-9

Groundwater Elevation Contours in the Grimes Canyon Aquifer, October 2 to October 31, 2022

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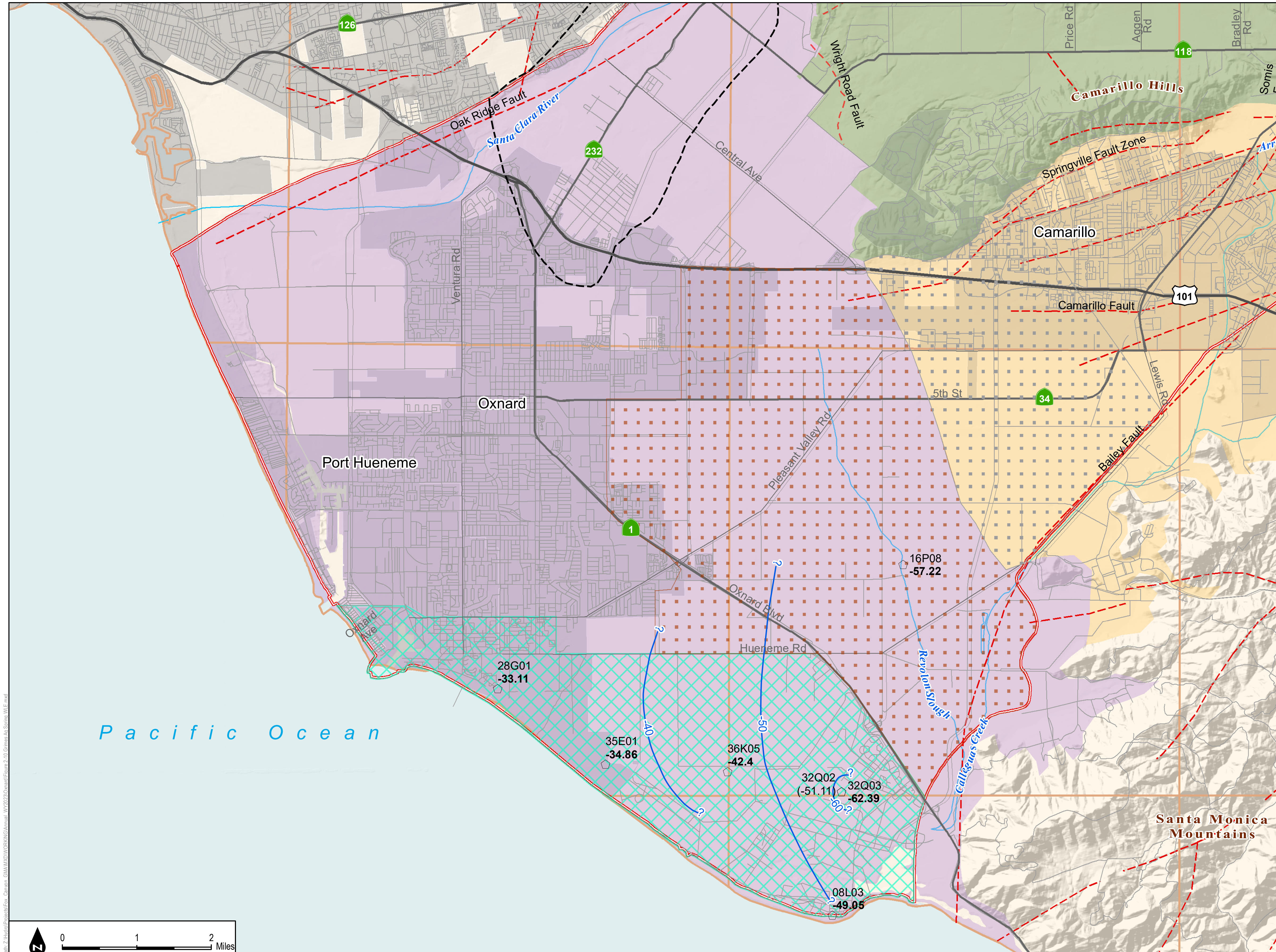

Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in Grimes Canyon Aquifer
- *15P01* Abbreviated State Well Number (see notes)
- **-14.7** Groundwater elevation feet AMSL
- (-14.7) Groundwater elevations are not used to create contours (see notes)
- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Faults (Ventura County 2016)
- Township (North-South) and Range (East-West)
- Forebay Management
- Pleasant Valley Pumping Trough Management Area
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Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

- Las Posas Valley (4-008)
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Notes:
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and the letter "S". Example: the SWN for the well labeled "15L01" located in Township 02N (T02N) and Range 22W (R22W) is 02N22W15L01S. Geotracker wells do not have SWN IDs and so are not labeled.
2) "NM" indicates no water level measurement was collected within the specified time window.
3) Groundwater elevations not used to create contours are shown in parentheses.
4) All elevation values are in feet above mean sea level (ft AMSL).
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-10

Groundwater Elevation Contours in the Grimes Canyon Aquifer, March 2 to March 31, 2023

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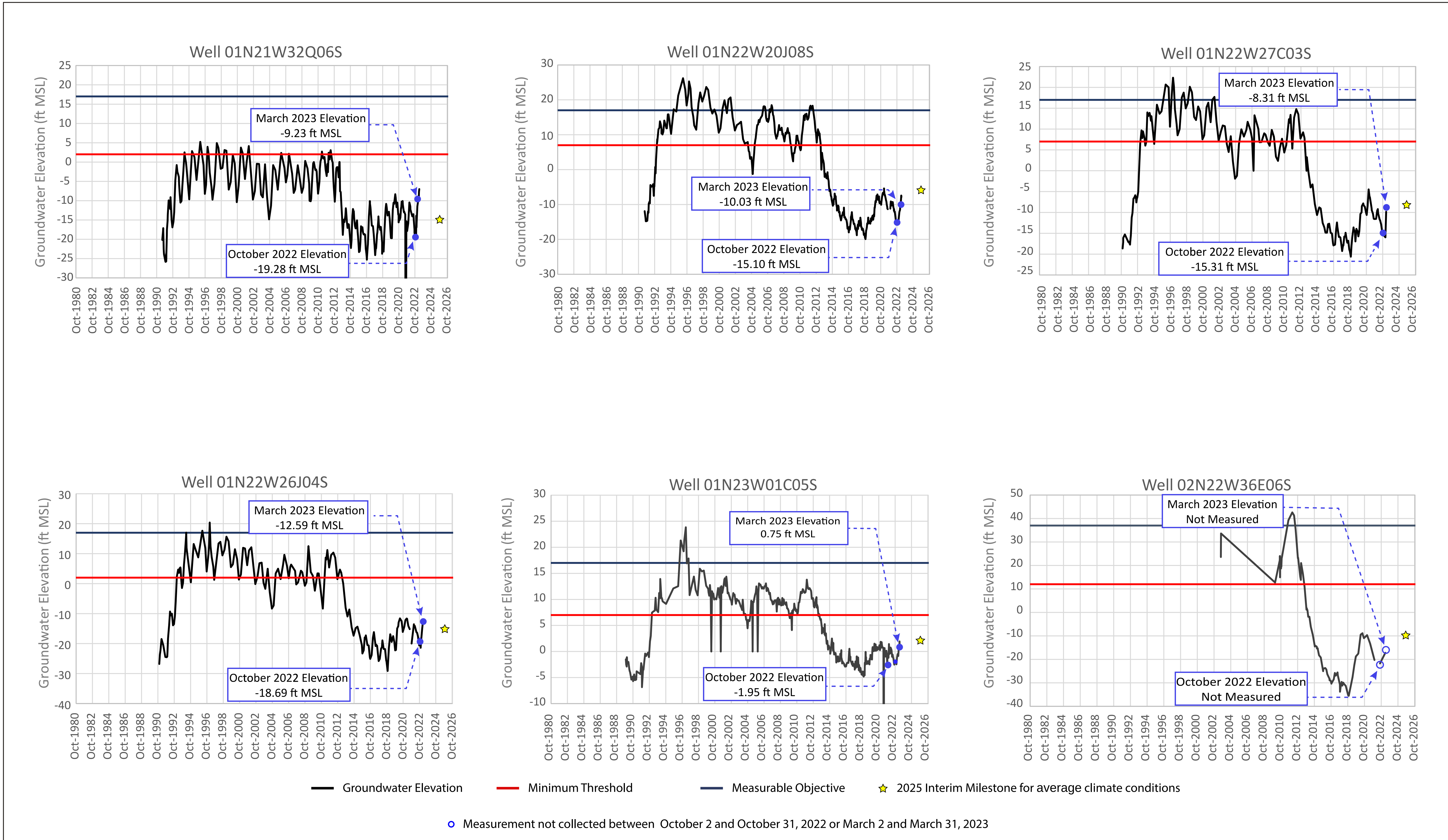

FIGURE 2-11

Groundwater Elevation Hydrographs for Representative Wells Screened in the Oxnard Aquifer

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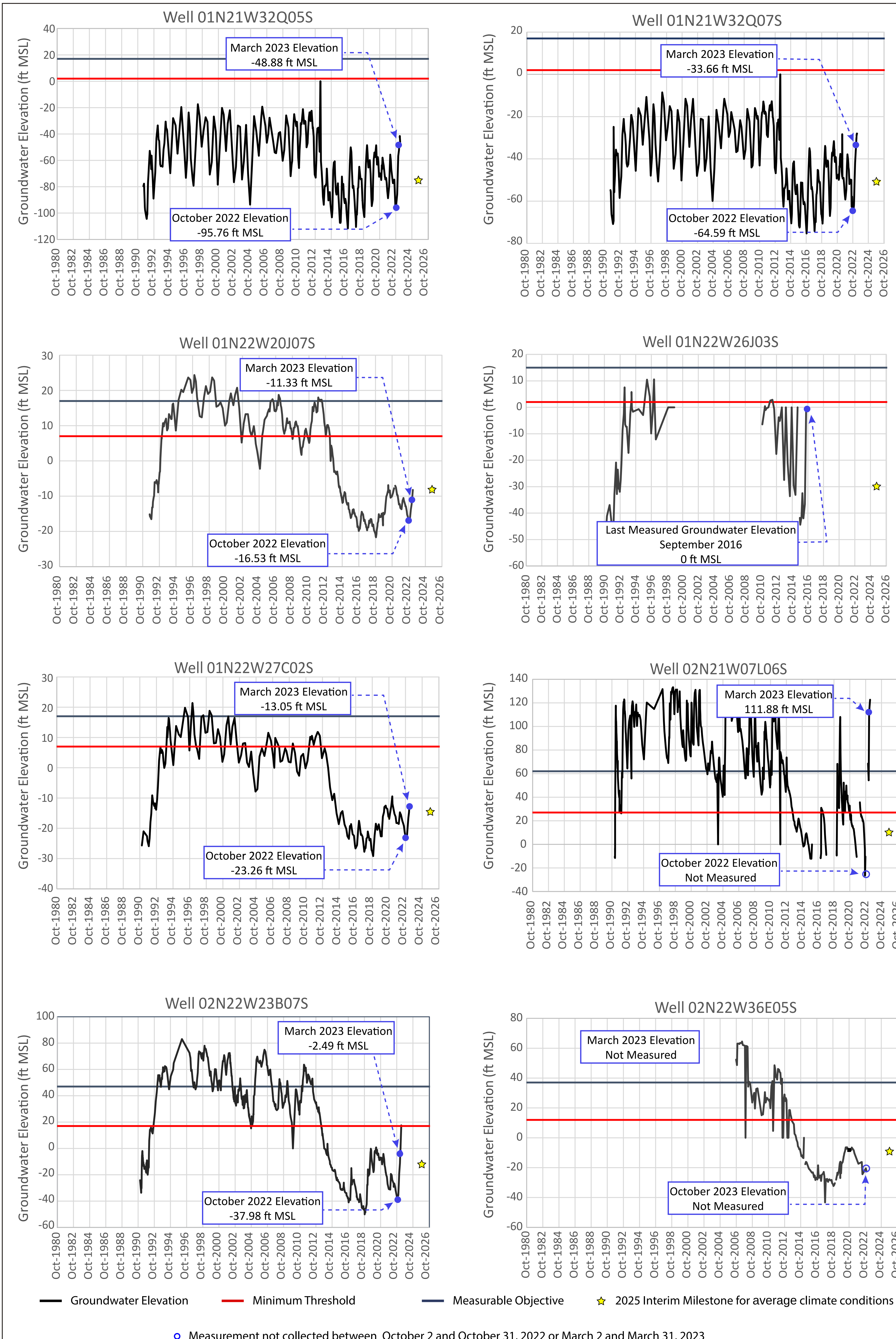

FIGURE 2-12

Groundwater Elevation Hydrographs for Representative Wells Screened in the Mugu Aquifer

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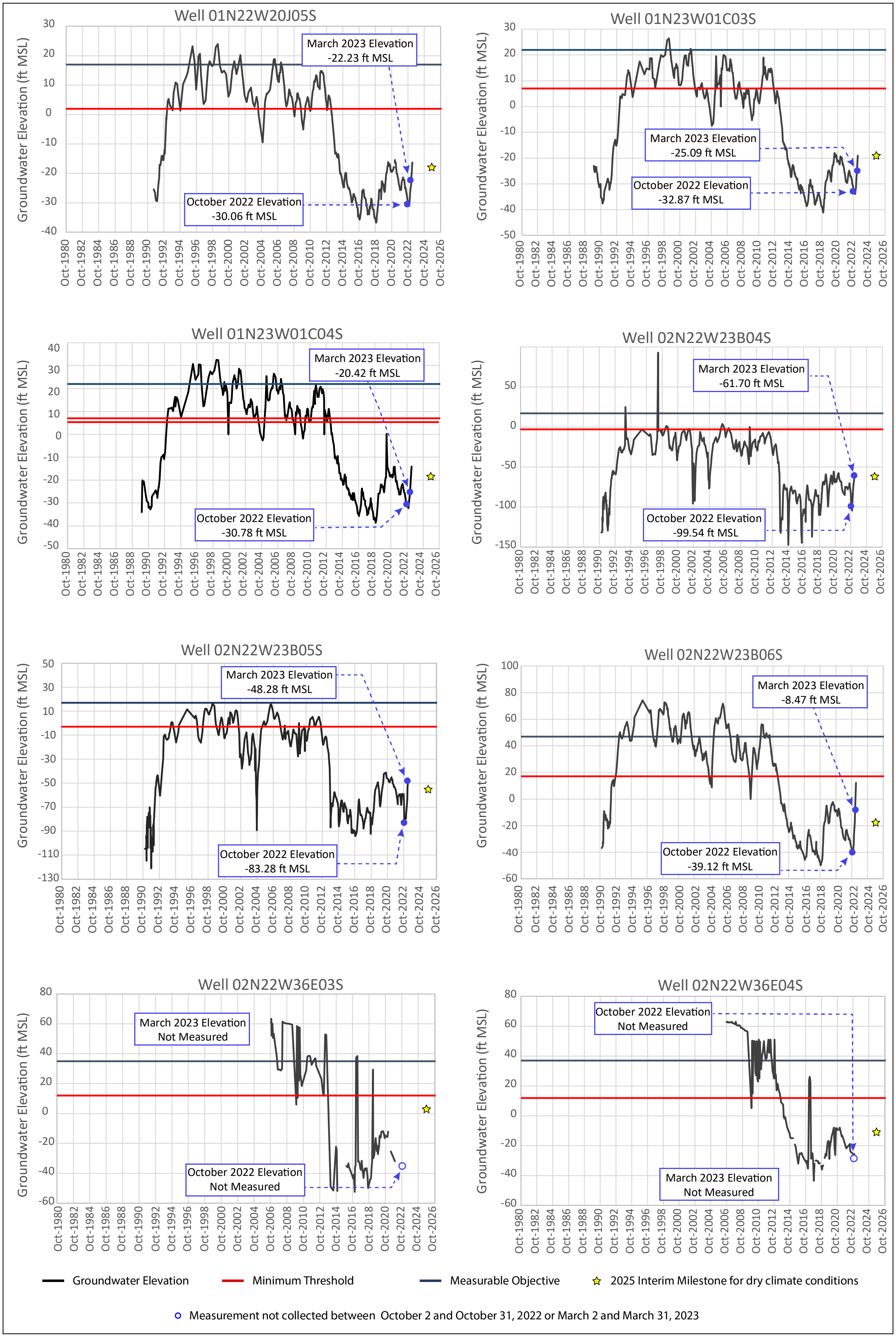

FIGURE 2-13
Groundwater Elevation Hydrographs for Representative Wells Screened in the Hueneme Aquifer

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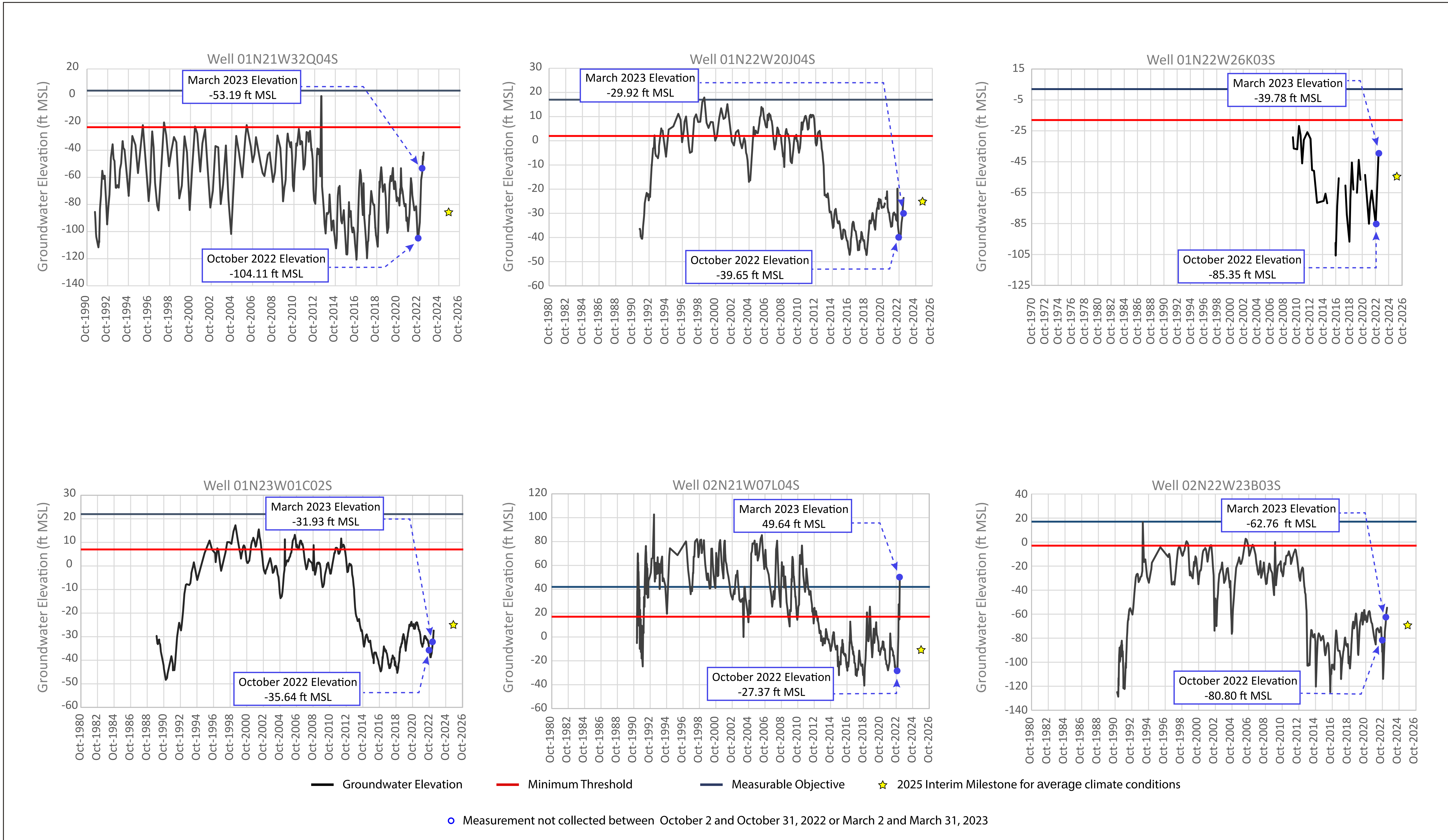

FIGURE 2-14

Groundwater Elevation Hydrographs for Representative Wells Screened in the Fox Canyon Aquifer

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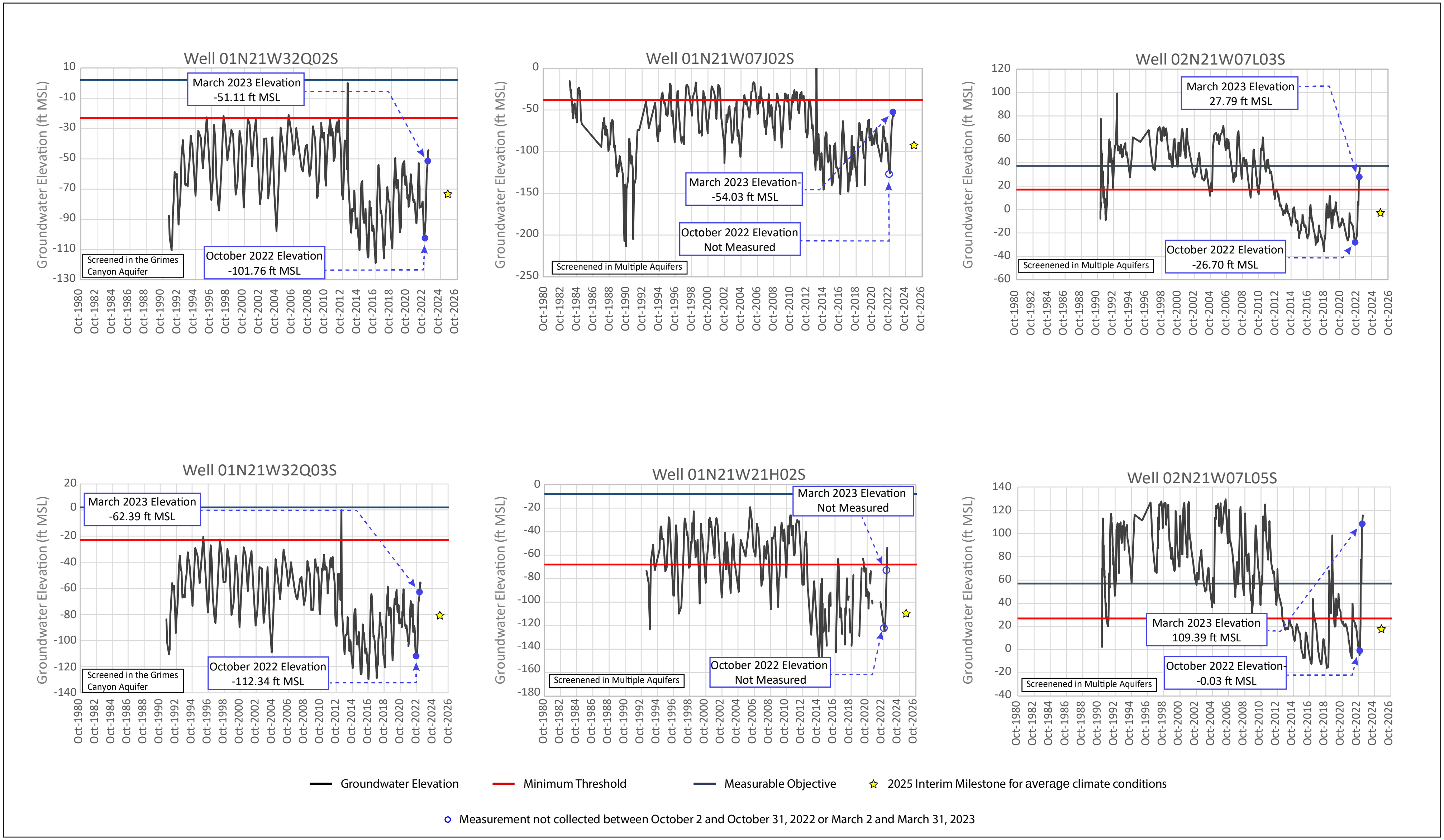

FIGURE 2-15

Groundwater Elevation Hydrographs for Representative Wells Screened in the Grimes Canyon Aquifer and Multiple Aquifers

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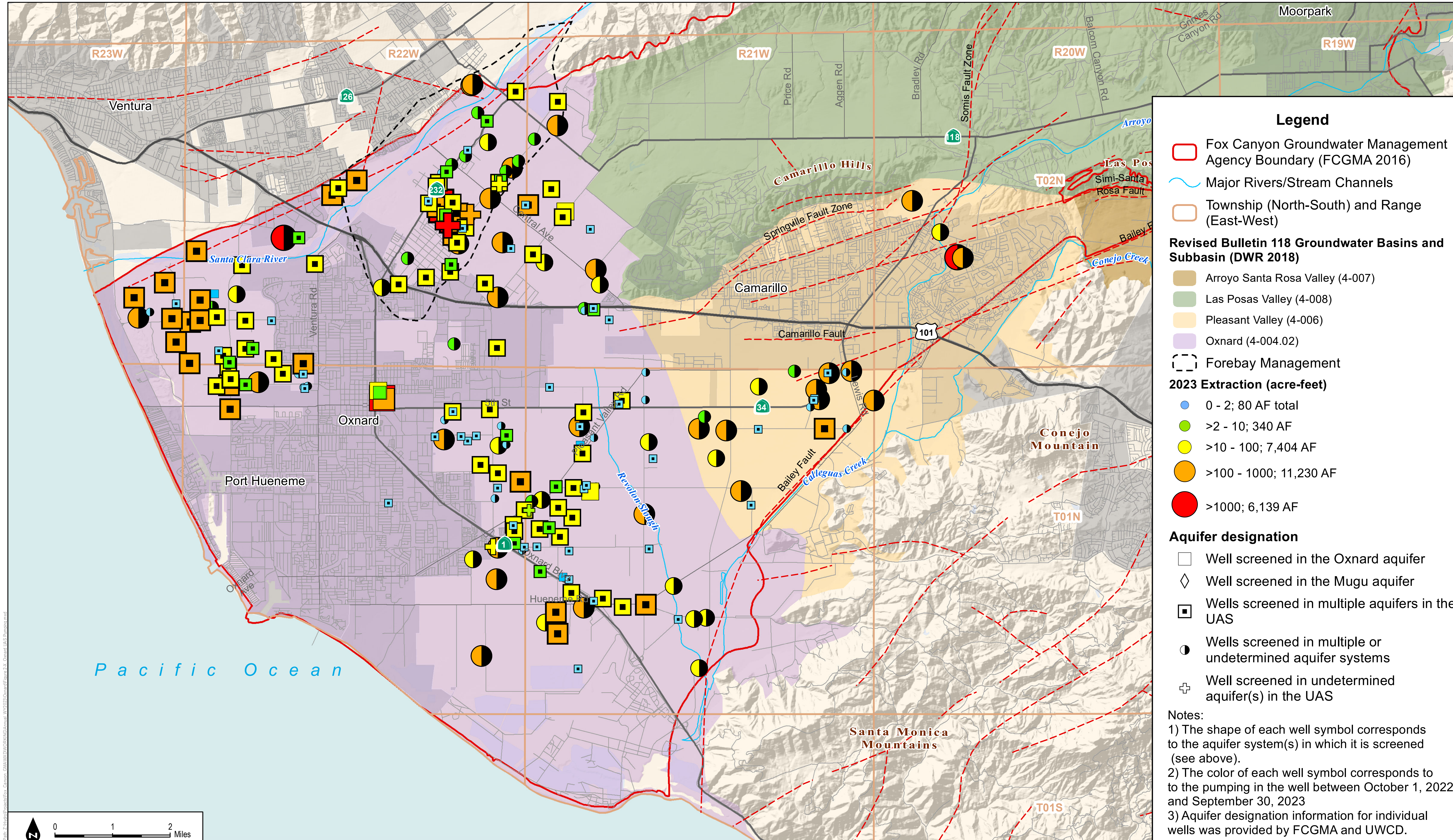

SOURCE: DWR, FCGMA, VCWPD, UWCD

DUDEK

FIGURE 2-16

Groundwater Production from the UAS between October 1, 2022 and September 30, 2023

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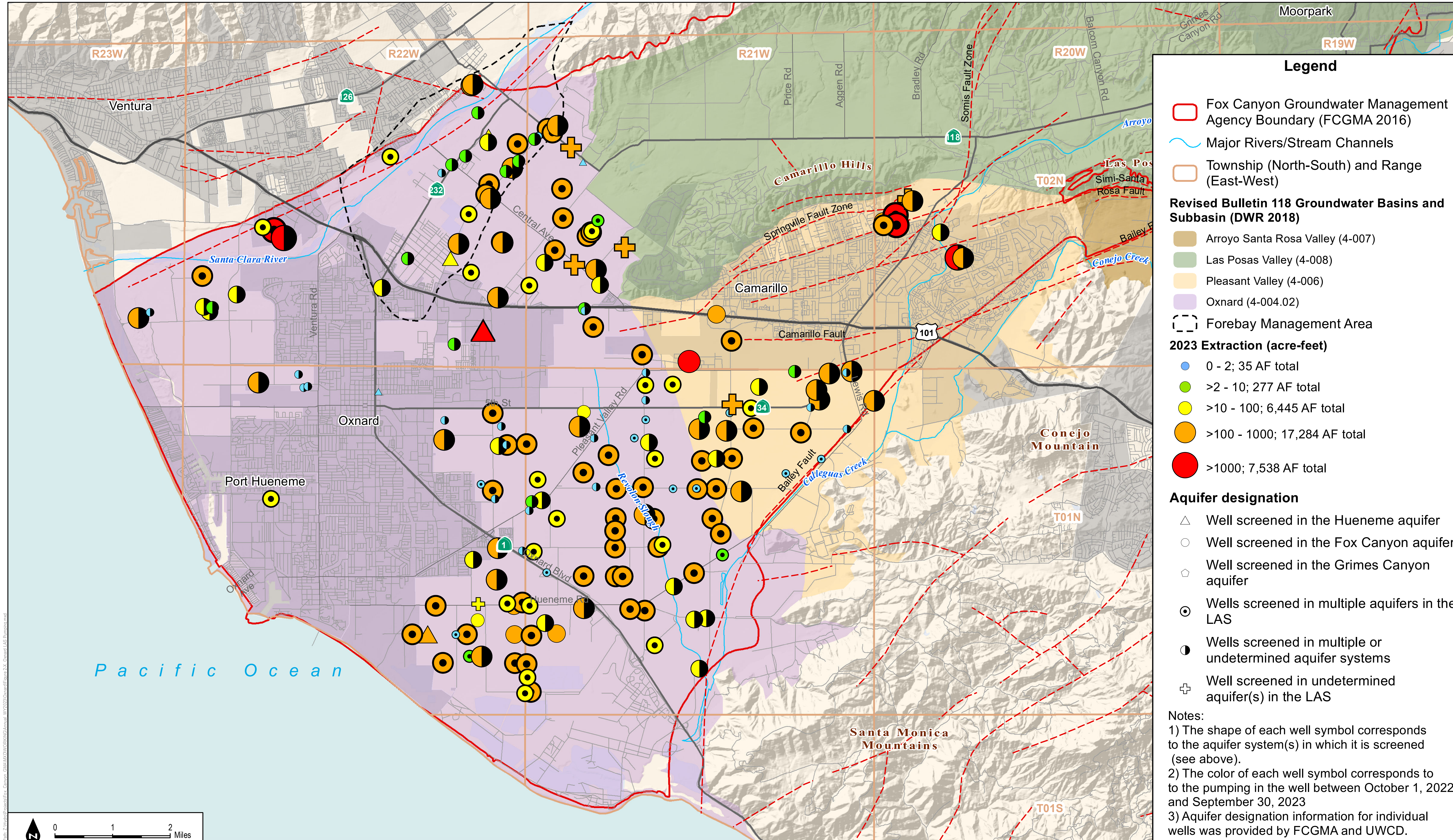

DUDEK

SOURCE: DWR, FCGMA, VCWPD, UWCD

FIGURE 2-17

Groundwater Production from the LAS between October 1, 2022 and September 30, 2023

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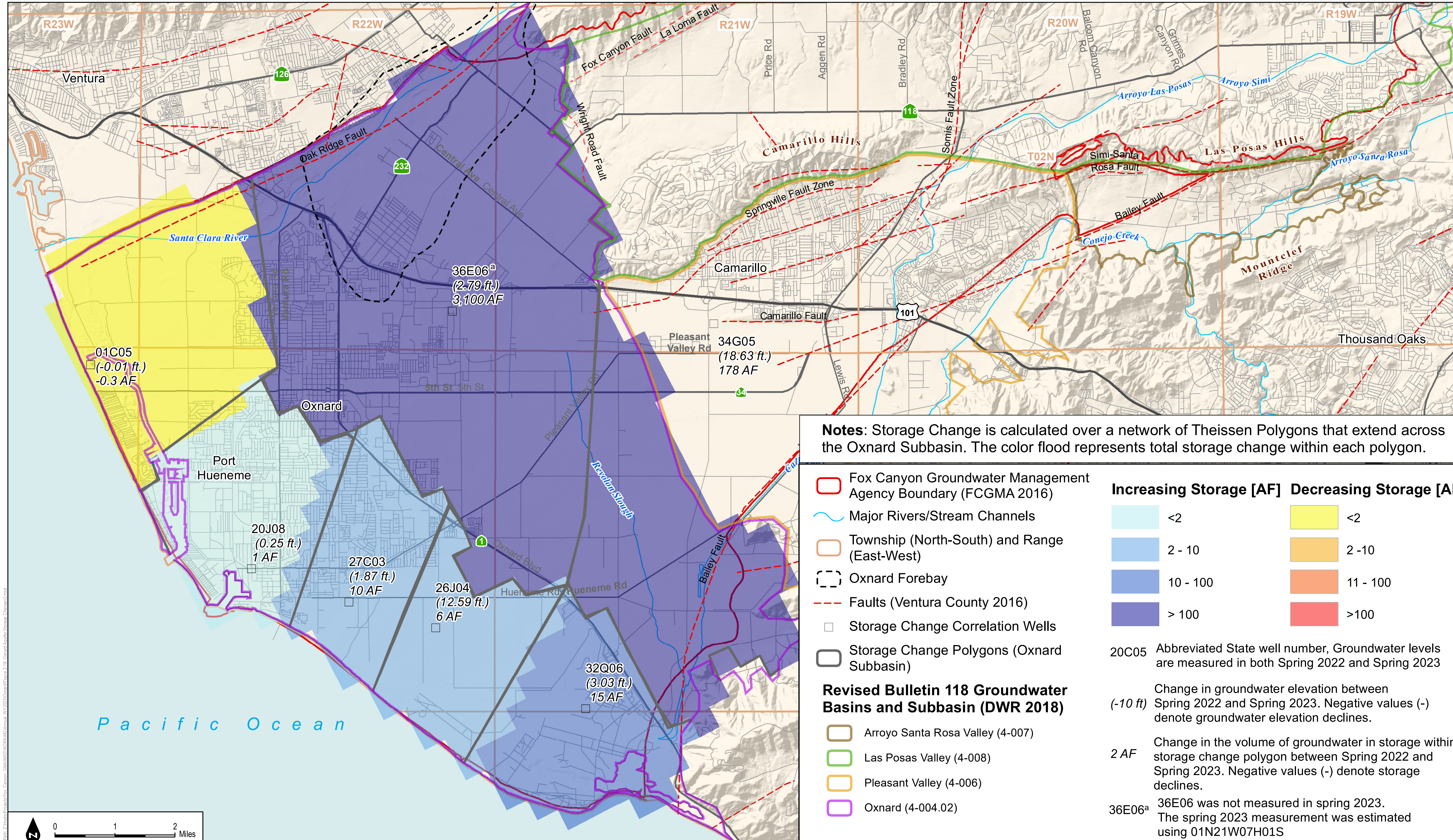

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SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-18

Change in Storage in the Oxnard Aquifer: Spring 2022 to Spring 2023

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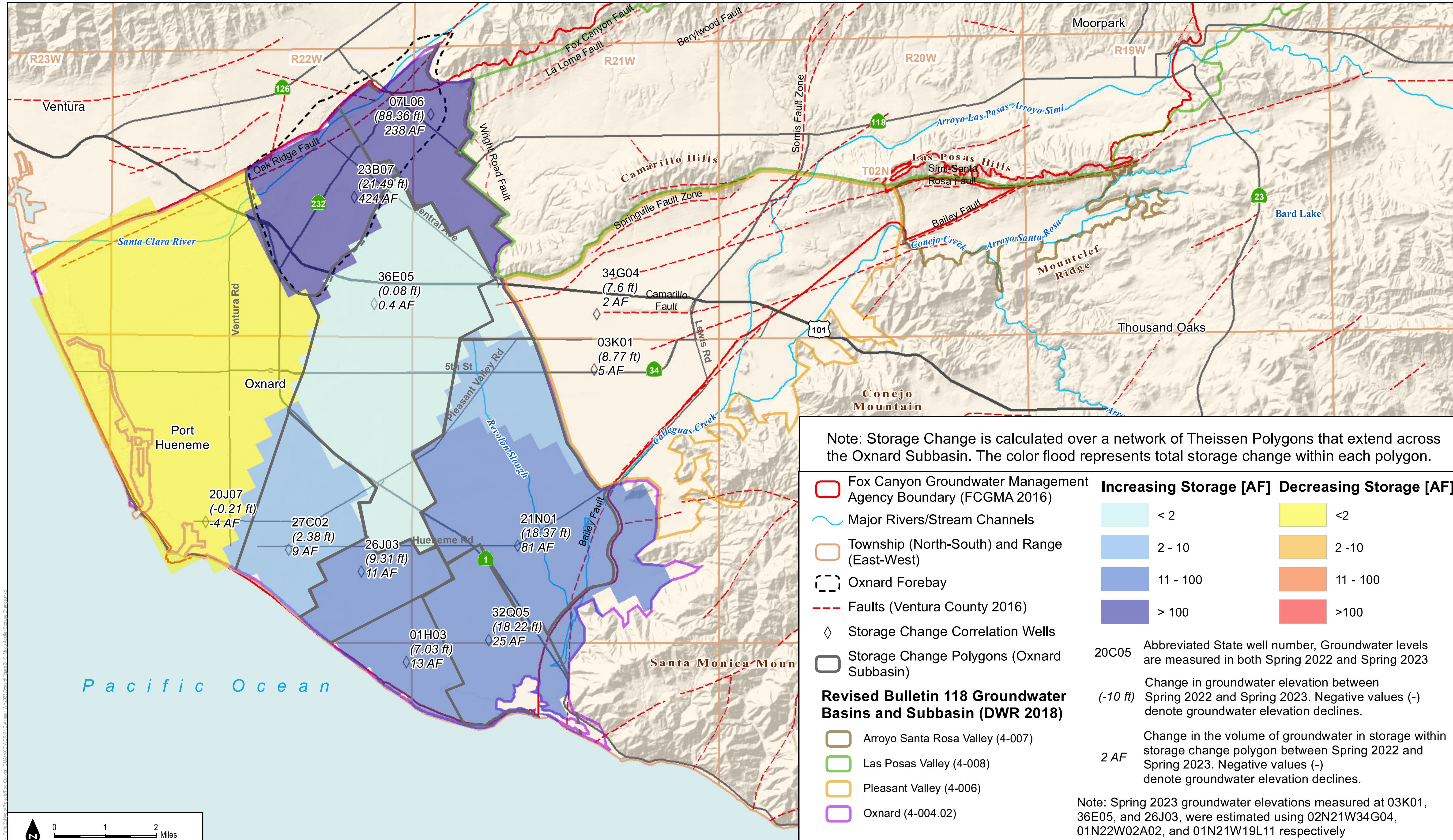

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-19

Change in Storage in the Mugu Aquifer: Spring 2022 to Spring 2023

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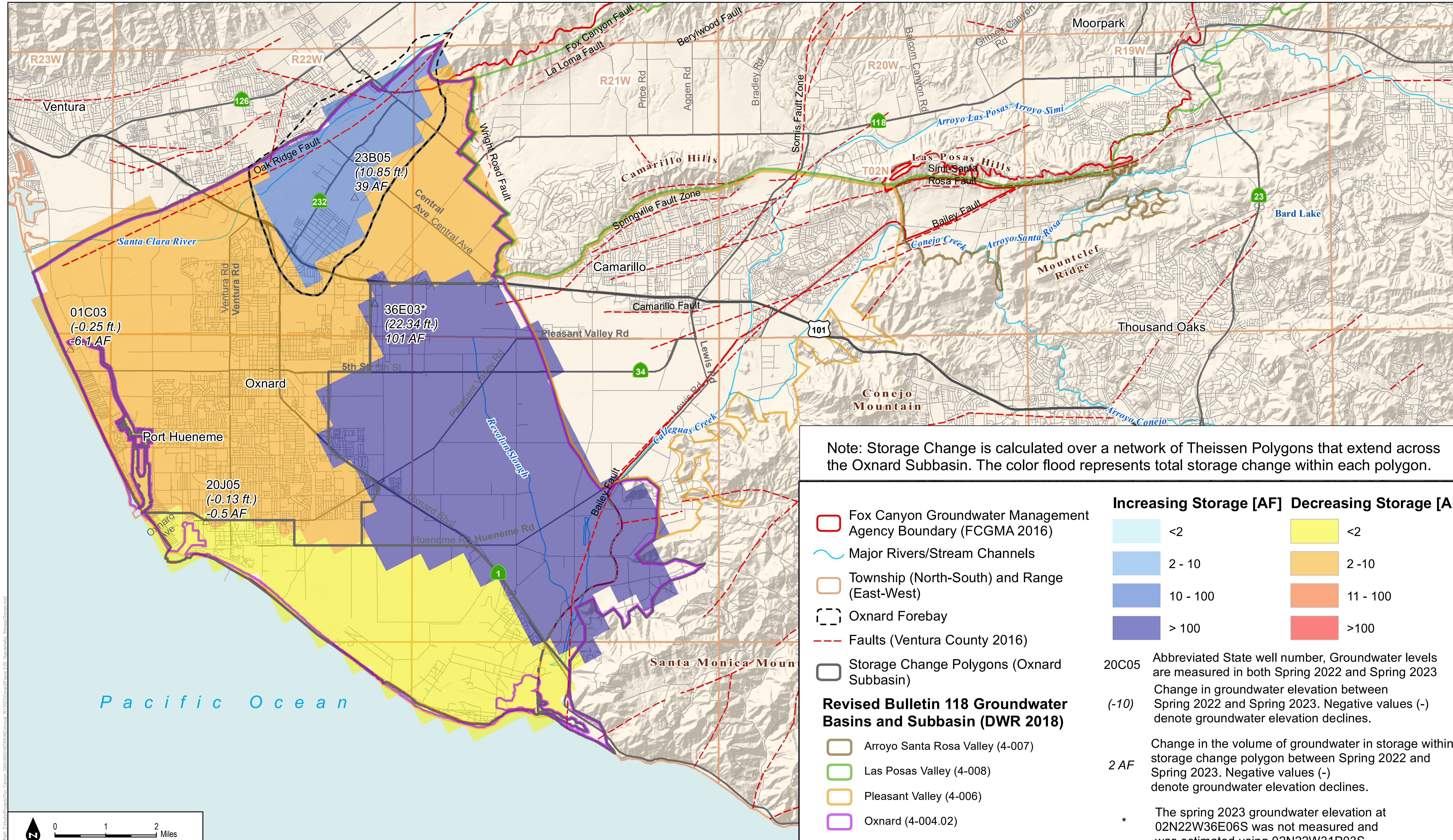

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-20

Change in Storage in the Hueneme Aquifer: Spring 2022 to Spring 2023

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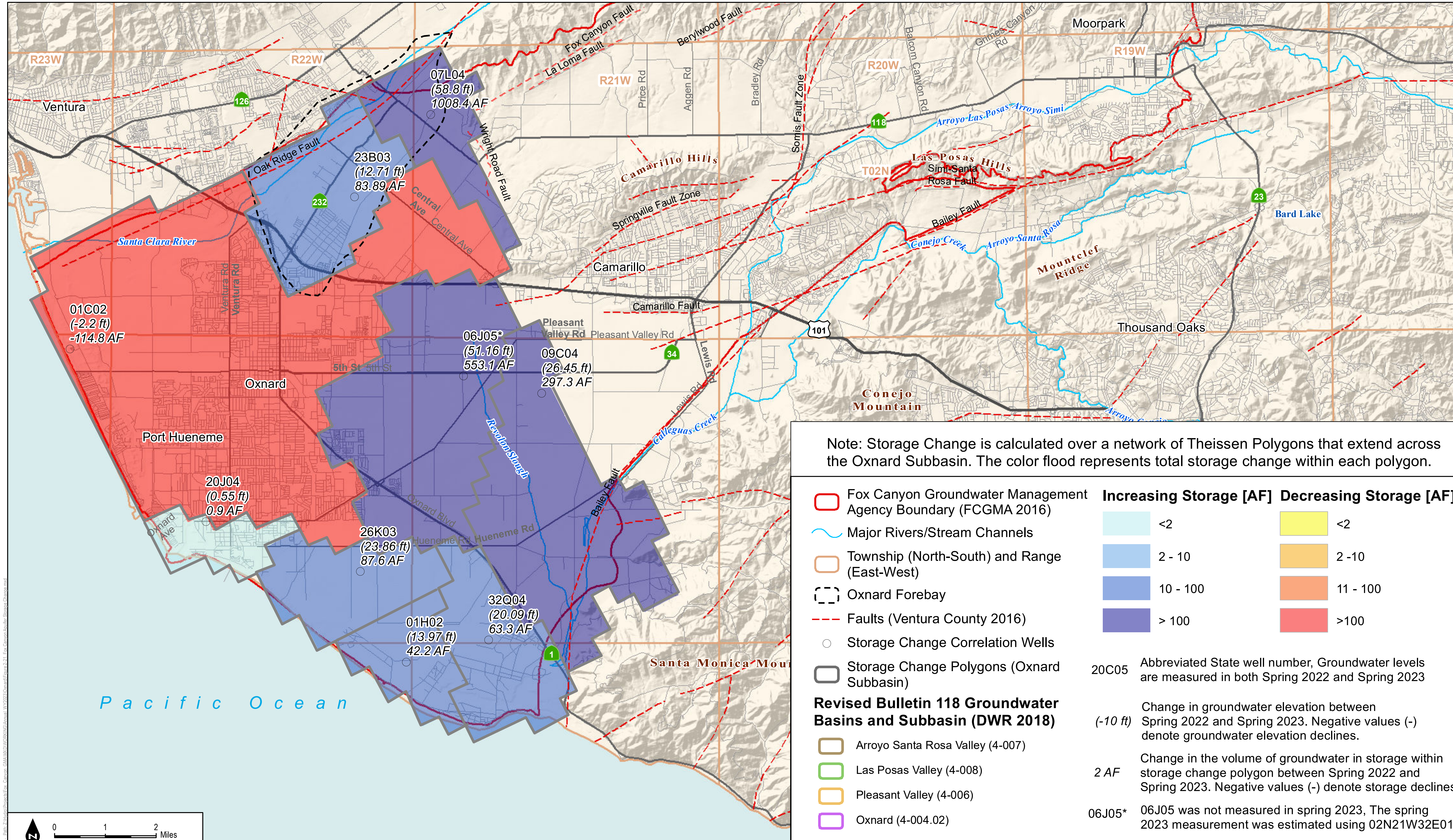

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SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-21

Change in Storage in the Fox Canyon Aquifer: Spring 2022 to Spring 2023

Oxnard Subbasin Groundwater Sustainability Plan 2024 Annual Report

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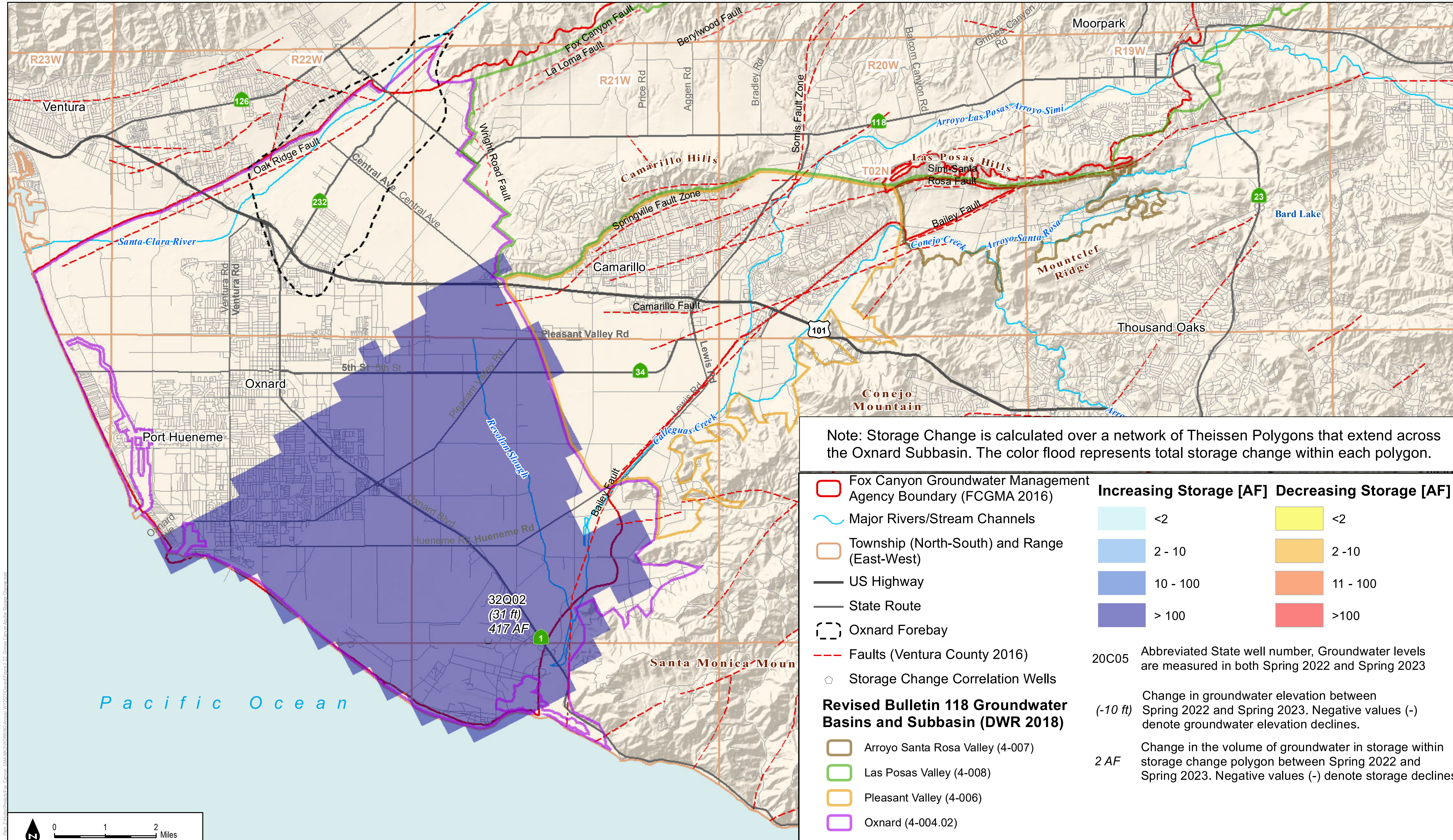

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SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-22

Change in Storage in the Grimes Canyon Aquifer: Spring 2022 to Spring 2023

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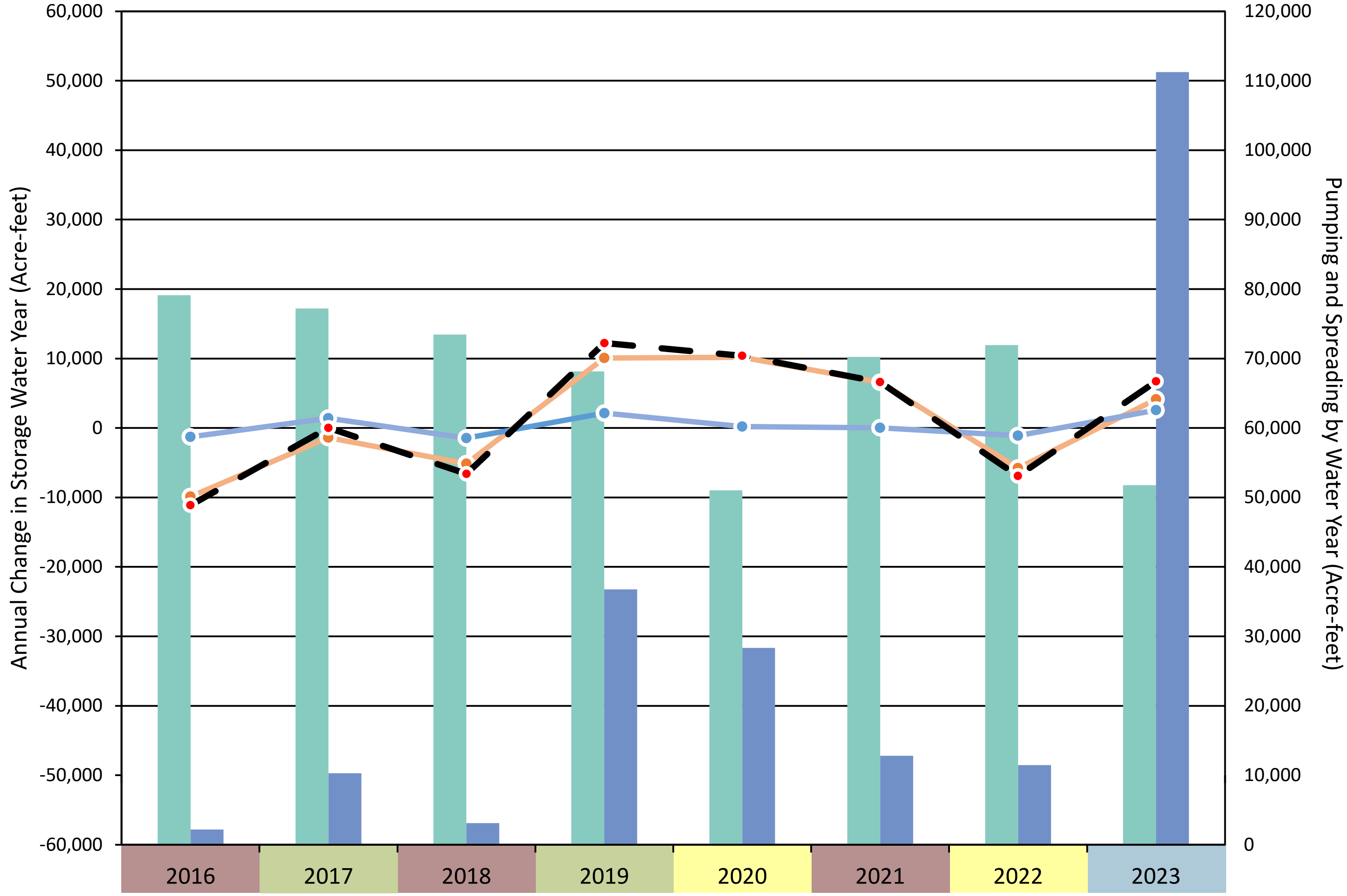

Notes:

1) Total change in storage is the sum of the change in storage from each aquifer system.

2) Water year is from October 1 through September 30 (EX: water year 2015 is from October 1, 2014 through September 30, 2015).

3) Water year type is based on the percentage of the water year precipitation compared to the 30-year precipitation average. Types are defined as Wet (≥150% of average), Above Normal (≥100% to <150% of average), Below Normal (≥75% to <100% of average), Dry (≥50% to <75% of average), and Critical (<50% of average).

4) Current water year pumping is based on the total reported operator extractions and is subject to change or revision in future annual reports.

FIGURE 2-23

Water Year Type, Groundwater Use, and Annual Change in Storage in the Oxnard Subbasin

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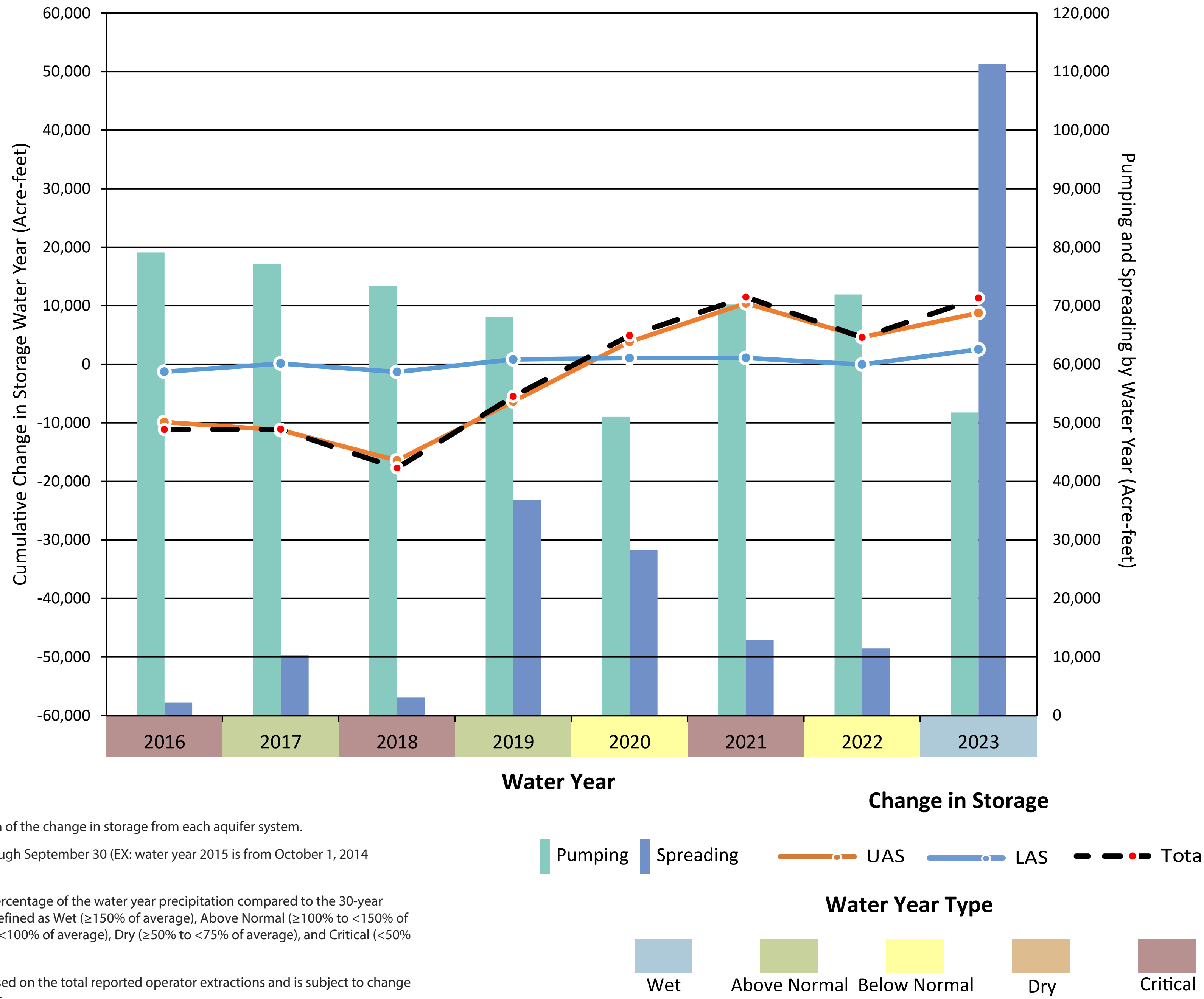

Notes:

1) Total change in storage is the sum of the change in storage from each aquifer system.

2) Water year is from October 1 through September 30 (EX: water year 2015 is from October 1, 2014 through September 30, 2015).

3) Water year type is based on the percentage of the water year precipitation compared to the 30-year precipitation average. Types are defined as Wet (≥150% of average), Above Normal (≥100% to <150% of average), Below Normal (≥75% to <100% of average), Dry (≥50% to <75% of average), and Critical (<50% of average).

4) Current water year pumping is based on the total reported operator extractions and is subject to change or revision in future annual reports.

FIGURE 2-24

Water Year Type, Groundwater Use, and Cumulative Change in Storage in the Oxnard Subbasin

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