Oxnard Subbasin Groundwater Sustainability Plan 2020 Annual Report: Covering Water Years 2016 through 2019

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Fox Canyon Groundwater Management Agency

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Executive Summary

The Fox Canyon Groundwater Management Agency (FCGMA), the Groundwater Sustainability Agency (GSA) for the portions of the Oxnard Subbasin (Subbasin) within its jurisdictional boundaries, in coordination with the other two GSAs in the Subbasin, has prepared this first 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. SGMA regulations require that an annual report be submitted to the Department of Water Resources (DWR) by April 1 of each year following the adoption of the GSP. The data presented in the Oxnard Subbasin GSP ends in water year 2015. This annual report provides an update on the groundwater conditions for water years 2016 through 2019 (October 1, 2015 through September 30, 2019).

Since 2015, the Oxnard Subbasin experienced two critical water years, 2016 and 2018, in which precipitation was below 50% of the long-term average precipitation for the Subbasin, and two above normal water years, 2017 and 2019, in which precipitation was greater than the average precipitation. The volume of precipitation received in the Subbasin and surrounding watershed influenced both direct recharge to the Subbasin and the availability of surface water in the Santa Clara River that could be diverted and used to recharge the groundwater aquifers. In general, groundwater elevations the Subbasin responded to the water year precipitation, with spring water levels rising during the above normal water years and falling during the critical water years. Spring groundwater elevations in 2019 were lower than spring 2015 groundwater elevations in parts of the Oxnard, Mugu, and Fox Canyon aquifers, consistent with the overall lower than average precipitation received since 2015.

The calculated change in groundwater storage in each aquifer reflects the observed change in groundwater elevation. Groundwater in storage increased in 2017 and 2019 in each aquifer in the Subbasin, and decreased in 2016 and 2018 in each aquifer. Overall, the estimated volume of groundwater in storage in the Oxnard Subbasin has increased by approximately 4,000 acre-feet since 2015, despite the drier than average climate conditions. This increase in storage occurred, in part, because of the addition of 21,380 acre-feet of diverted surface water used to recharge the groundwater aquifers between June and September 2019.

Data gaps identified in the GSP remain in this annual report. Some of the critical data gaps include the timing and number of groundwater elevation measurements available for creating spring and fall contour maps, the availability of data on surface water diversions from agencies reporting to FCGMA, and the current timeframe for reporting groundwater production, which facilitates reporting groundwater production on a calendar year, rather than on a water year basis. These data gaps will be closed as implementation of the GSP progresses.

FCGMA has already undertaken several steps toward implementing the GSP, with implementation planning occurring concurrently with the GSP development process. Through DWR's Technical Support Services (TSS) program, a new nested groundwater well cluster was installed near the Revolon Slough to better delineate groundwater elevations in individual aquifers in the pumping depression management area. Additionally, FCGMA successfully requested stakeholder facilitation services through DWR's Facilitation Support Services program to support implementation of the GSP. The FCGMA Board of Directors continues to prioritize stakeholder feedback in the implementation phase of the GSP because of the vital role stakeholders play in ensuring the long-term sustainable use of groundwater resources in the Oxnard Subbasin.

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1 Background and Plan Area

1.1 Background

The Fox Canyon Groundwater Management Agency (FCGMA), the Groundwater Sustainability Agency (GSA) for the portions of the Oxnard Subbasin (Subbasin) within its jurisdictional boundaries, in coordination with the other two GSAs in the Subbasin, has prepared this first 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.). SGMA requires that an annual report be submitted to the Department of Water Resources (DWR) by April 1 of each year following the adoption of the GSP. FCGMA adopted a GSP for the Oxnard Subbasin in December 2019, and submitted the GSP to DWR on January 13, 2020 (DWR 2020) for the entire Subbasin.

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 jurisdictional boundary. To coordinate management and reporting in the Subbasin, FCGMA and CWD have executed an MOU, and FCGMA and the County have formed a JPA.

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) and includes portions of the Oxnard Subbasin and the Las Posas Valley Basin (LPVB), the Pleasant Valley Basin (PVB), and the Arroyo Santa Rosa Valley Basin (ASRVB).

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 (FCGMA 2020). 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 (FCGMA 2020).

[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 within the FCGMA jurisdictional area are: Ventura, Oxnard, Camarillo, Port Hueneme, and Moorpark.

1.1.2 Oxnard Subbasin Groundwater Sustainability Plan

On December 13, 2019, the FCGMA Board held a public hearing and adopted a GSP for the Oxnard Subbasin. The purpose of the GSP was to define the conditions under which the groundwater resources of the entire Oxnard Subbasin will be managed sustainably in the future (FCGMA 2019a). 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 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 area currently impacted by seawater intrusion; prevent net seawater intrusion in the Upper Aquifer System; and prevent net seawater intrusion in the Lower Aquifer System." (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 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. This annual report evaluates 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 since the fall of 2015, through the end of water year 2019[3].

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 Groundwater Basin Vicinity Map for the Oxnard Subbasin). 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

[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 2019 water year begins on October 1, 2018, and ends on September 30, 2019.

and gravel deposits that compose the Upper Aquifer System to the west and the finer-grained clay and silt-rich deposits of the Upper Aquifer System 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).

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 1-2; Precipitation and Stream Gauges in the Oxnard Subbasin). Water year precipitation, measured at Station 168, in the northwestern portion of the Subbasin is highly variable, ranging from 3.7 inches in 1990 to 38.1 inches in 1998 (Figure 1-3; Oxnard Subbasin Historical Water Year Precipitation). On average, the Subbasin received approximately 14.1 inches of precipitation per water year between 1957 and 2019.

The GSP for the Oxnard Subbasin included precipitation through the 2015 water year (FCGMA 2019a). Since 2015, the Subbasin has experienced two above normal[4] water years (2017 and 2019), and two critical water years (2016 and 2018). The average precipitation during this period was 12.0 inches, which is less than the long-term mean precipitation in the Subbasin. Overall, the Subbasin has continued to experience drier than average conditions since 2015.

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 Oxnard Forebay 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, the United Water Conservation District, 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 Oxnard Forebay (Figure 1-2). West of the Oxnard Forebay, 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.

Two stream gauges recorded average daily flows in the Oxnard Subbasin since 2015 (Table 1-1; Figure 1-4). These gauges are: gauge 723 on the Santa Clara River, near Victoria Avenue, and gauge 776 on the Revolon Slough, at Pleasant Valley Road. Neither gauge has a complete record since 2015, with data missing from gauge 723 for water years 2017, 2018, and 2019, and data missing from gauge 776 for water years 2017 and 2018[5]. The average flow at gauge 723 in 2016 was 97.5 cubic feet per second (cfs) (Table 1-1). This average flow is higher

[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.

[5] Note that missing data is separate from data indicating no flow at the gauge. Periods of missing data are times during which the gauge did not record data.

than the average flow for 2012 through 2015, which were also critical, or below average water years (Table 1-1; Figure 1-3). The difference between 2016 and the preceding water years is primarily based on a single storm event on January 6, 2016 that reached an average daily flow of 12,400 cfs (Figure 1-4). In contrast, the highest flow event recorded in the previous four water years was 972 cfs, on April 13, 2012 (Figure 1-4).

The flow at gauge 776 on the Revolon Slough has been decreasing with time (Table 1-1; Figure 1-4). The flow in water year 2016 was the lowest average daily flow recorded for a water year at this gauge since 2010. The flow increased in 2019, which was an above normal water year, and was similar to that recorded in water year 2012 (Table 1).

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	0.0	6.1
2015	5.0	7.0
2016	97.5	5.5
2017	-No Data-	-No Data-
2018	-No Data-	-No Data-
2019	-No Data-	9.0

Notes: cfs = cubic feet per second

1.3 Annual Report Organization

This is the first 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 available, 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 since 2015. The 2015 water year was the last year of data presented in the Oxnard Subbasin GSP (FCGMA 2019a).

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 2-35: the Oxnard aquifer in Figures 2-1 through 2-7, the Mugu aquifer in Figures 2-8 through 2-14, the Hueneme aquifer in Figures 2-15 through 2-21, the Fox Canyon aquifer in Figures 2-22 through 2-28, and the Grimes Canyon aquifer in Figures 2-29 through 2-35.. These maps show the seasonal high and low groundwater elevations between the spring of 2016 and the spring of 2019. As discussed in section 1.2.1, water years 2016 and 2018 were critical water years in the Subbasin, and water years 2017 and 2019 were above normal water years. Spring groundwater elevations were defined as any groundwater elevation measured within a four-week window between March 2 and March 29 of each year. Fall groundwater elevations were defined as any groundwater elevation measured between October 2 and October 29 of each year. The GSP recommended collecting groundwater elevations within a two-week window in the future (FCGMA 2019a). FCGMA has begun the process of prioritizing recommendations made in the GSP, and evaluating the timeframe and feasibility of implementing these recommendations.

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 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. DWR is installing a nested monitoring well cluster for FCGMA through its TSS program adjacent to the Revolon Slough within the Pumping Depression Management Area to better characterize the lateral extent of the pumping depression by aquifer in the Oxnard Subbasin.

2.1.1.1 Oxnard Aquifer

Spring groundwater elevations in the western part of the Subbasin, adjacent to the Pacific Ocean, declined between 2016 and 2018 (Figures 2-1, 2-3, and 2-5). In 2019, spring groundwater elevations recovered by approximately 1 to 5 feet, but were still lower than they were in the spring of 2015 (Figure 2-7; FCGMA 2019a). Groundwater elevations throughout the rest of the Oxnard aquifer behaved similarly, generally declining on the order of 10 feet between the spring of 2016 and the spring of 2018, and recovering by a similar amount in the spring of 2019.

In general, seasonal low groundwater elevations in the Oxnard aquifer declined approximately 5 to 10 feet throughout the Subbasin between the fall of 2016 and the fall of 2018 (Figures 2-2, 2-4, and 2-6). Fall groundwater

elevations in the Forebay and central parts of the Oxnard Subbasin are poorly constrained in 2016 and 2018, thus limiting the assessment of Subbasin-wide trends in fall groundwater elevations.

2.1.1.2 Mugu Aquifer

Groundwater elevations in wells screened in the Mugu aquifer in the Forebay responded to water year precipitation and availability of Santa Clara River water for recharge (Section 2.3). Groundwater elevations in the Forebay averaged approximately 29 feet below mean sea level (- 29 ft MSL) in the spring of 2016, -18 feet MSL in the spring of 2017, -36 ft MSL in the spring of 2018 and -12 ft MSL in the spring of 2019 (Figures 2-8, 2-10, 2-12, and 2-14). After declining in 2016, 2017, and 2018, groundwater elevations in the Forebay recovered in 2019, and were similar to groundwater elevations measured in the spring of 2015. Groundwater elevations in the southwestern part of the Oxnard Subbasin declined in 2016, recovered in 2017, declined in 2018, and recovered again in 2019, in response to the water year (Section 1.2.1) and artificial recharge (Section 2.3). The only area of the Subbasin in which groundwater elevations did not recover in the spring of 2019 is the area near Port Hueneme. Spring groundwater elevations in the Mugu aquifer near Port Hueneme remained two to five feet lower in 2019 than they were in 2016, and five to seven feet lower than they were in the spring of 2015 (Figures 2-8 and 2-14).

Seasonal low groundwater elevations measured in the Forebay were approximately 10 feet lower in the fall of 2016 than they were in the fall of 2015 (Figure 2-9). Groundwater elevations recovered in the fall of 2017 and were similar to those measured in the fall of 2015, however, the lack of available surface water recharge in water year 2018 resulted in seasonal low groundwater elevations in the Forebay that were four to eight feet lower than they were in the fall of 2016 (Figures 2-9, 2-11, and 2-13). Fall groundwater elevations near Port Hueneme were stable in water years 2016 through 2018. The lowest observed groundwater elevations in the Mugu aquifer were consistently found in the southwestern part of the Subbasin.

2.1.1.3 Hueneme Aquifer

Groundwater elevations in wells screened in the Hueneme aquifer responded to water year precipitation and availability of Santa Clara River water for recharge (Figures 2-15 through 2-21; Sections 1.2.1 and 2.3). Throughout the Subbasin, groundwater elevations rose in the spring of 2017, declined in the spring of 2018 and recovered in the spring of 2019 to elevations that were higher than those measured in the spring of 2017 (Figures 2-15, 2-17, 2-19, and 2-21).. The recovery in groundwater elevations observed between the spring of 2016 and the spring of 2019 was highest in the Forebay, where groundwater elevation measured in well 02N22W12N03 was approximately 65 feet higher in the spring of 2019 than the spring of 2016. Adjacent to the coast, groundwater elevations in the spring of 2019 were similar to the groundwater elevations in the spring of 2016. This similarity reflects the influence of the Pacific Ocean which dampens coastal groundwater elevation fluctuations (FCGMA 2019a).

Similar to the spring groundwater elevations, trends in the seasonal low groundwater elevations in the Hueneme aquifer tended to follow water year type (Figures 2-16, 2-18, and 2-20). This is particularly apparent in well 01N22W16D04 where the fall 2017 groundwater elevation was approximately 22 feet higher than the fall 2018 groundwater elevation and 36 feet higher than the fall 2016 groundwater elevation. The 2017 water year was an above normal year, whereas the 2016 and 2018 water years were critical water years (Section 1.2.1).

2.1.1.4 Fox Canyon Aquifer

Spring groundwater elevation trends in the Fox Canyon aquifer were coincident with the water year type. Spring groundwater elevations rose between 2016 and 2017, declined between 2017 and 2018, and rose again between 2018 and 2019 (Figures 2-22, 2-24, 2-26, and 2-28). By the spring of 2019 groundwater elevations in the Fox Canyon aquifer were 10 to 20 feet higher in the southwestern part of the Subbasin than they were in the spring of 2016, and 20 to 30 feet higher in the pumping depression management area (Figures 2-22 and 2-28). As discussed in Section 2.1, it should be noted that there are only four wells screened solely in the Fox Canyon aquifer in the Pumping Depression Management Area. In contrast, fifteen wells are screened solely within the Fox Canyon aquifer in the Saline Intrusion Management Area (located to the west of the Pumping Depression Management Area). To better constrain groundwater elevations and change in storage in the Pumping Depression Management Area, an area of known groundwater production, a new nested monitoring well cluster is currently being installed adjacent to Revolon Slough (Figure 2-22). Overall, spring 2019 groundwater elevations in the Fox Canyon aquifer adjacent to the coast and in the Forebay were similar to or lower than spring groundwater elevations at the coast and in the Forebay in 2015. Groundwater elevations in the Pumping Depression Management Area, where known, and the nested well clusters west of Highway 1 were 10 to 30 feet higher in the spring of 2019 than they were in the spring of 2015.

Trends in seasonal low groundwater elevation in the Fox Canyon aquifer vary with geographic location in the Oxnard Subbasin (Figures 2-23, 2-25, and 2-27). In the northern coastal area of the Subbasin, fall groundwater elevation trends followed the water year type (See wells 01C02 and 20J04 on Figures 2-23, 2-25, and 2-27). In the Forebay, fall groundwater elevations declined in 2016, 2017 and 2018 (Figures 2-23, 2-25, and 2-27). In the southwestern part of the Subbasin, fall groundwater elevations increased each year between 2016 and 2018 (Figures 2-23, 2-25, and 2-27).

2.1.1.5 Grimes Canyon Aquifer

There are only six wells screened solely in the Grimes Canyon aquifer, all of which are located in the southwestern part of the subbasin (Figures 2-29 through 2-35). Higher groundwater elevations were measured in the spring of water years 2017 and 2019 than in the spring of 2016 and 2018 in these wells (Figures 2-29, 2-31, 2-33, and 2-35). Overall, the groundwater elevation in the Grimes Canyon aquifer was approximately 20 to 30 feet higher inland of the coast in the spring of 2019 than it was in the spring of 2016. Coastal groundwater elevations, which are influenced by proximity to the Pacific Ocean, were approximately 4 to 7 feet higher in the spring of 2019 than they were in the spring of 2016. Seasonal low groundwater elevations in the Grimes Canyon aquifer followed the same trends as the seasonal high groundwater elevations.

Fall groundwater elevations in the Grimes Canyon aquifer rose in wells 01N22W36K05, 01N21W32Q02, 01N21W32Q03, and 01S21W08L03 each fall between 2016 and 2018 (Figures 2-30, 2-32, and 2-34). Water levels in wells 01N22W35E01 and 01N22W28G01 were higher in the fall of 2017 than they were in the fall of 2018. Fall 2016 groundwater elevations were similar to fall 2018 groundwater elevations in wells 01N22W35E01 and 01N22W28G01.

2.1.2 Groundwater Elevation Hydrographs

Groundwater elevation hydrographs for each of the key wells identified in the GSP are presented in Figures 2-36 through 2-40. These key wells are the designated representative monitoring sites for the Subbasin (FCGMA 2019a). In the fall of 2018, the groundwater elevations in the representative wells screened in the Oxnard aquifer, where measured, were approximately 11 to 47 feet below the minimum thresholds (Table 2-1). In the spring of 2019,

groundwater elevations in the representative wells screened in the Oxnard aquifer were approximately 9 to 22 feet below the minimum threshold for each well (Table 2-1; Figure 2-36). All of the fall groundwater elevations, and all but one (well 01N21W32Q06) of the spring groundwater elevations are also below the interim milestone for a dry climate condition described in the GSP (Table 2-1; FCGMA 2019a). The dry climate interim milestone is used for comparison in this annual report because the precipitation measured in the Subbasin between water years 2016 and 2019 is below average. However, it should also be noted that the first interim milestone is set for 2025, not 2020, and the groundwater elevations in the representative wells screened in the Oxnard aquifer have five years to reach this first interim milestone.

Table 2-1. Water Year 2019 Groundwater Elevations, Minimum Thresholds, Measurable Objectives, and Interim Milestones for Representative Monitoring Wells in the Oxnard Subbasin

Well Number	Aquifer	Fall 2018 Groundwater Elevation (ft MSL)	Spring 2019 Groundwater Elevation (ft MSL)	Minimum Threshold (ft MSL)	Measurable Objective (ft MSL)	2025 Interim Milestone Dry Climate (ft MSL)
01N21W32Q06S	Oxnard	-22.46	-10.96	2	17	-12
01N22W20J08S	Oxnard	-19.1	-14.77	7	17	-6
01N22W26J04S	Oxnard	NM[a]	-17.26	2	17	-15
01N22W27C03S	Oxnard	NM[a]	-13.89	7	17	-8
01N23W01C05S	Oxnard	-3.85	-2.3	7	17	2
02N22W36E06S	Oxnard	-35.26	NM[a]	12	37	-9
01N21W32Q05S	Mugu	-101.82	-50.21	2	17	-63
01N21W32Q07S	Mugu	-69.14	-34.57	2	17	-41
01N22W20J07S	Mugu	-20.96	-15.09	7	17	-8
01N22W26J03S	Mugu	NM[a]	NM	2	17	1
01N22W27C02S	Mugu	NM[a]	-18.68	7	17	-13
02N21W07L06S	Mugu	NM[a]	50.08	27	62	10
02N22W23B07S	Mugu	-48.7	-15.91	17	47	-14
02N22W36E05S	Mugu	NM[a]	NM[a]	12	37	-9
01N22W20J05S	Hueneme	-35.88	-25.91	2	17	-18
01N23W01C03S	Hueneme	-39.19	-29.56	7	22	-19
01N23W01C04S	Hueneme	-37.32	-25.95	7	22	-16
02N22W23B04S	Hueneme	-106.37	-69.21	-3	17	-63
02N22W23B05S	Hueneme	-81.45	-60.84	-3	17	-56
02N22W23B06S	Hueneme	-49.16	-20.56	17	47	-18
02N22W36E03S	Hueneme	NM	NM	12	37	3
02N22W36E04S	Hueneme	NM	NM	12	37	-11
01N21W32Q04S	Fox Canyon	-109.49	-54.33	-23	2	-74
01N22W20J04S	Fox Canyon	-46.15	-33.18	2	17	-25
01N22W26K03S	Fox Canyon	-96.74	-45.49	-18	2	-54
01N23W01C02S	Fox Canyon	-42.75	-36.73	7	22	-22
02N21W07L04S	Fox Canyon	-34.93	20.63	17	42	-3
02N22W23B03S	Fox Canyon	-100.27	-69.29	-3	17	-62
01N21W32Q02S	Grimes Canyon	-107.56	-49.47	-23	2	-73
01N21W32Q03S	Grimes Canyon	-118.80	-64.81	-23	2	-80
01N21W07J02S	Multiple	-135.74	-68.32	-38	2	-92
01N21W21H02S	Multiple	-137.04	NM	-68	-8	-111

Table 2-1. Water Year 2019 Groundwater Elevations, Minimum Thresholds, Measurable Objectives, and Interim Milestones for Representative Monitoring Wells in the Oxnard Subbasin

Well Number	Aquifer	Fall 2018 Groundwater Elevation (ft MSL)	Spring 2019 Groundwater Elevation (ft MSL)	Minimum Threshold (ft MSL)	Measurable Objective (ft MSL)	2025 Interim Milestone Dry Climate (ft MSL)
02N21W07L03S	Multiple	-33.23	4.76	17	37	-3
02N21W07L05S	Multiple	-11.9	68.21	27	57	18

Notes: NM = Not Measured

In the fall of 2018, groundwater elevations in the representative monitoring wells screened in the Mugu aquifer, where measured, were approximately 28 to 104 feet below the minimum threshold groundwater elevations. In the spring of 2019, groundwater elevations in the representative monitoring wells screened in the Mugu aquifer were approximately 22 to 52 feet lower than the minimum threshold groundwater elevation (Table 2-1; Figure 2-37). In wells 01N21W32Q05S, 01N21W32Q07S, and 02N21W07L06S, the spring 2019-groundwater elevations were higher than the 2025 interim milestone for a dry climate (Table 2-1).

Where measured, fall 2018 groundwater elevations in the representative monitoring wells screened in the Hueneme aquifer were approximately 38 to 104 feet below the minimum threshold groundwater elevation. In the spring of 2019, groundwater elevations in the representative monitoring wells screened in the Hueneme aquifer were approximately 28 to 66 feet lower than the minimum threshold groundwater elevation, and three to eleven feet lower than the 2025 interim milestone groundwater elevation for a dry climate (Table 2-1; Figure 2-38).

In the fall of 2018, groundwater elevations in the representative monitoring wells screened in the Fox Canyon aquifer were approximately 48 to 97 feet lower than the minimum threshold groundwater elevations. Groundwater elevations in the representative monitoring wells screened in the Fox Canyon aquifer were approximately 30 to 65 feet lower than the minimum threshold groundwater elevations at all wells except well 02N21W07L04S in the spring of 2019 (Table 2-1; Figure 2-39). At this well, located in the Forebay, the spring 2019 groundwater elevation was three feet higher than the minimum threshold groundwater elevation (Figure 2-39). Spring 2019 groundwater elevations were higher than the 2025 interim milestone groundwater elevation for a dry climate in wells 01N21W32Q04, 01N22W26K03, and 02N21W07L04 but remained seven to 14 feet below the 2025 interim milestone for a dry climate in wells 01N22W20J04, 01N23W01C02, and 02N22W23B03. (Table 2-1).

Groundwater elevations measured at wells 01N21W32Q02 and 01N21W32Q03 in the Grimes Canyon aquifer were approximately 85 to 96 feet lower than the minimum threshold groundwater elevation in the fall of 2018 (Table 2-1). In the spring of 2019, groundwater elevations in these wells were approximately 26 to 42 feet lower than the minimum threshold groundwater elevations (Table 2-1; Figure 2-40). The spring 2019 groundwater elevations were approximately 15 to 24 feet higher than the 2025 interim milestone groundwater elevation for a dry climate (Table 2-1).

2.2 Groundwater Extraction

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 cannot be reported on a water year basis. Therefore, the groundwater extractions reported in Table 2-2 and shown on Figures 2-41 through 2-46 follow the historical precedent and are for calendar years 2016, 2017 and 2018. Table 2-2 includes the extractions reported for the first half of calendar year 2019 (Table 2-2; Figures 2-41 through 2-46).

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

Calendar Year	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*	
2016	16,045	166	12,654	28,865	31,801	24	10,655	42,480	6,863	5	125	6,993	78,342[a]
2017	16,167	91	14,826	31,084	29,204	27	8,612	37,843	7,722	4	165	7,891	76,818
2018[b]	14,746	70	17,040	31,857	26,191	24	6,596	32,811	7,489	2	184	7,675	72,343
2019[c]	4,693	26	8,465	13,184	8,228	10	2,934	11,172	2,869	1	71	2,941	27,297

Notes: AG = Agriculture ; Dom = domestic; M&I = Municipal and Industrial

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

[b] Groundwater extraction reporting for 2018 is preliminary and expected to change. Additional extraction reporting is anticipated.

[c] Partial year results reported. Groundwater production is through June for domestic and M&I extractions, and through July 2019 for agricultural extractions.

It should be noted that groundwater extraction reporting for 2018 and the first half of 2019 are preliminary and expected to change. Additional extraction reporting is anticipated. Based on the available data, between calendar years 2016 and 2018, groundwater production in the UAS increased by approximately 3,000 acre-feet, primarily in response to an increase in M&I pumping (Table 2-2). Over the same time period, groundwater production from the LAS decreased by approximately 10,000 acre-feet (Table 2-2). This decrease occurred in both the agricultural and M&I sectors. It should be noted, however, that a number of agricultural operators have not year reported their 2018 groundwater usage. Groundwater production from wells screened in both the UAS and LAS, and wells with unknown or unassigned screen intervals, increased by approximately 600 acre-feet between calendar years 2016 and 2018 (Table 2-2). Based on the available data, the total groundwater production in the Subbasin decreased by approximately 6,000 acre-feet between calendar years 2016 and 2018 (Table 2-2).

2.3 Surface Water Supply

The primary source of surface water in the Oxnard Subbasin is the Santa Clara River. The United Water Conservation District (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. Additionally, diverted surface water is used to recharge groundwater aquifers in the Oxnard Subbasin via the UWCD spreading basins located in the Oxnard Forebay. In addition to diversions from the Santa Clara River, a portion of the surface water diverted from Conejo Creek by CWD is supplied to the Pleasant Valley County Water District (PVCWD) for agricultural irrigation in the Oxnard Subbasin[6]. Surface water deliveries to the Oxnard Subbasin for water years 2016 through 2019 are reported in Table 2-3.

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

Water Year	PVCWD	United Water Conservation District			TOTAL (acre-Feet)
	Conejo Creek Flows Delivered to PVCWD for Agriculture (acre-feet)	*PTP (Oxnard Subbasin Only) (acre-feet)*	*Diversions of Santa Clara River Water Used in Oxnard Subbasin (acre-feet)*	*Recharge to UWCD Spreading Basins (acre-feet)*	
		Total PTP Surface Water	*Total PVP Water for Agriculture*		
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

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

[6] 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).

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, and imported water, and recycled water used in the Subbasin. The total water use is reported in Table 2-4 by water year. In order to convert the reported groundwater production from calendar year to water year, 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. FCGMA is in the process of switching reporting periods to the water year. When FCGMA groundwater extraction reporting is shifted to a water year schedule, this approximation will no longer be necessary.

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

Water Year	Groundwater [a] (acre-feet)			Surface Water (acre-feet)				Imported Water (acre-feet)	Recycled Water [b] (acre-feet)	TOTAL (acre-feet)
	Ag	*Dom*	*M&I*	*Ag*	*Dom*	*M&I*	*Recharge*	*M&I*	*Ag*	
2016	55,025	195	23,741	1,038	0	0	2,209	11,313	136	93,657
2017	53,479	141	23,562	1,774	0	0	10,297	10,740	1,135	101,128
2018[c]	49,593	103	23,766	1,854	0	0	3,126	12,171	2,194	92,807
2019[d]	27,896	61	17,425	4,163	0	0	36,768	9,998	NR	96,311

Notes: NR – not reported

a) Groundwater production by water year is estimated from groundwater production by calendar year.

b) Recycled water is from reported GREAT program deliveries to SSF, DRIS-2, and DAVIS

c) Groundwater extraction reporting for 2018 is preliminary and expected to change. Additional extraction reporting is anticipated. Groundwater production is through June for domestic and M&I extractions, and through July 2019 for agricultural extractions.

2.5 Change in Groundwater Storage

Change in storage estimates were calculated for each of the principal aquifers in the Subbasin by comparing seasonal high groundwater elevations between 2015 and 2019. Annual change in storage was calculated for four water years by comparing groundwater elevations between: (1) spring 2015 and spring 2016, (2) spring 2016 and spring 2017, (3) spring 2017 and spring 2018, and (4) spring 2018 and spring 2019. Change in storage for each principal aquifer was calculated using the change in groundwater elevation for each period and the aquifer storage properties defined by the Ventura Regional Groundwater Flow numerical model (UWCD, 2018).

Change in groundwater elevations was calculated by mapping the spring 2015 through spring 2019 groundwater elevation contours onto a uniform grid that covered the areal extent of the Subbasin. Each grid was assigned a groundwater elevation equal to half the elevation of the up-gradient and down-gradient contours. This way the seasonal high groundwater elevation in each grid cell could be subtracted from the previous seasonal high groundwater elevation in the same cell to generate a gridded map of groundwater elevation change on the same scale as the grid used in the Ventura Regional Groundwater Flow numerical model. Change in storage was subsequently calculated for each grid cell using the aquifer properties defined for each grid cell in the model and the change in elevation between sequential spring groundwater measurements (FCGMA 2019b).

Groundwater elevations were not measured over the same areal extent in each aquifer during the spring of each water year. The data coverage between consecutive water years and the common area between all the years for each aquifer is shown as the area within the black line on Figures 2-47 through 2-67. Change in storage was calculated for the area of overlapping data for all water years reported in Table 2-5.

2.5.1 Oxnard Aquifer

Change in storage trends in the Oxnard aquifer follow the trends in precipitation and surface water availability in the Subbasin (Figures 2-47 through 2-50). Groundwater elevation declines, between the spring of 2015 and 2016, and the spring of 2017 and 2018, resulted in decreasing storage throughout the majority of the Oxnard aquifer (Figures 2-47 and 2-49). Increased precipitation and surface water availability in water years 2017 and 2019 resulted in higher groundwater elevations, and a positive change in storage in the Oxnard aquifer throughout the majority of the Subbasin (Figures 2-48 and 2-50).

2.5.2 Mugu Aquifer

Change in storage in the Mugu aquifer was only calculated in the central part of the Subbasin because groundwater elevations in the Mugu aquifer were not measured each spring in the Forebay or in the north coastal area. As was observed in the Oxnard aquifer, groundwater storage change trends in the Mugu aquifer follow the trends in precipitation and surface water availability in the Subbasin (Figures 2-50 through 2-54). Throughout the majority of the area measured, groundwater storage in the Mugu aquifer decreased between water years 2015 and 2016, and water years 2017 and 2018 (Figures 2-51 and 2-53). Between water years 2016 and 2017, and water years 2018 and 2019, storage in the Mugu aquifer increased (Figures 2-52 and 2-54).

2.5.3 Hueneme Aquifer

Groundwater elevation data coverage in the Hueneme aquifer in water years 2016 through 2019 limited the overall area of the aquifer in which change in groundwater storage could be calculated (Figures 2-55 through 2-58). Groundwater storage in the area of the Hueneme aquifer for which data was available, decreased between water years 2015 and 2016, and 2017 and 2018 (Figures 2-55 and 2-57). Between water years 2016 and 2017, and 2018 and 2019 groundwater in storage increased in the portion of the Hueneme aquifer for which data was available (Figures 2-56 and 2-58).

2.5.4 Fox Canyon Aquifer

Change in groundwater storage in the Fox Canyon aquifer was calculated for the majority of the area of the Oxnard Subbasin (Figures 2-59 through 2-63). Between water years 2015 and 2016, groundwater in storage in the Fox Canyon aquifer decreased in the western and central parts of the subbasin. Groundwater in storage increased south of the Oxnard Forebay, adjacent to the boundary with the Las Posas Valley Basin (Figure 2-59). Overall, storage decreased in the Fox Canyon aquifer between water years 2015 and 2016. Between water years 2016 and 2017, groundwater in storage increased or remained the same in the Fox Canyon aquifer throughout much of the Subbasin. South of the Oxnard Forebay and adjacent to the Las Posas Valley Basin, groundwater in storage decreased between water years 2016 and 2017. Change in storage in the area south of the Forebay and adjacent to the Las Posas Valley Basin is strongly influenced by the location of available groundwater elevation data. In 2015, groundwater elevations were not measured in wells 02N21W20A01 or 02N21W29L04, but they were measured in well 02N21W17F05 (FCGMA 2019a and FCGMA 2019b). In the spring of 2016, groundwater elevations were measured in wells 02N21W20A01 and 02N21W29L04, but they were not measured in well 02N21W17F05 (Figure 2-22). In the spring of 2017 groundwater elevations were measured in all three wells (Figure 2-24). The location of groundwater elevation measurements influences the contouring of the data, which in turn is used to generate the change in storage maps. Therefore, the change in storage calculated for the area south of the Forebay and west of the Las Posas Valley Basin boundary in water years 2016 and 2017 is likely an artifact of the available data, and may not represent the physical influences of spreading, recharge, or groundwater production in this area.

Between water years 2017 and 2018, groundwater in storage decreased throughout the majority of the Fox Canyon aquifer in the Subbasin (Figure 2-61). Between water years 2018 and 2019 groundwater in storage increased throughout the majority of the Fox Canyon aquifer in the Subbasin (Figure 2-62).

2.5.5 Grimes Canyon Aquifer

The Grimes Canyon aquifer is limited to the southern and eastern parts of the Oxnard Subbasin (Turner 1975). In addition to the limited aerial extent of the Grimes Canyon aquifer, groundwater elevation data coverage in the Grimes Canyon aquifer in water years 2016 through 2019 limited the overall area of the aquifer in which change in groundwater storage could be calculated (Figures 2-63 through 2-66). Groundwater storage in the area of the Grimes Canyon aquifer, for which data was available, decreased between water years 2015 and 2016, and 2017 and 2018 (Figures 2-63 and 2-65). Between water years 2016 and 2017, and 2018 and 2019 groundwater in storage increase in the portion of the Grimes Canyon aquifer for which data was available (Figures 2-64 and 2-66).

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 2-67 and 2-68). In the two critical water years, 2016 and 2018, the groundwater in storage decreased in all aquifers in the Subbasin (Table 2-5a). In the two above normal water years, the groundwater in storage increased in all aquifers in the Subbasin (Table 2-5a). Total change in storage in the UAS is driven primarily by the calculated change in storage in the Oxnard aquifer, for which several groundwater elevation measurements were available, and change in storage could be calculated over the majority of the Subbasin. Change in storage in the UAS is generally an order of magnitude (or 10 times) larger than the change in storage in the LAS. However, it should be noted that the change in storage volumes reported in Tables 2-5a and 2-5b are an approximate change in storage over the areas of the aquifers in which groundwater elevations were measured.

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 covered the entire lateral extent of each aquifer in the Subbasin. Therefore, the results of the long-term change in storage calculations presented in the GSP cannot be directly compared to the change in storage calculations conducted for this GSP annual update. In general, however, the trends shown in the GSP and annual update agree. On average, the model calculated annual change in storage in the UAS is approximately 10 times the change in storage in the LAS between 1985 and 2015.

Additionally, the change in storage reported for this annual update 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 salt water. 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 2019.

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	-9,686	-198	**-9,884**	-34	-121	-13	**-168**	**-10,053**
2017	Above Normal	5,365	155	**5,520**	61	524	17	**601**	**6,121**
2018	Critical	-10,173	-209	**-10,382**	-73	-603	-2	**-678**	**-11,061**
2019	Above Normal	17,638	257	**17,895**	130	923	3	**1,056**	**18,951**

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	-9,884	-168	**-10,053**
2017	Above Normal	-4,365	433	**-3,932**
2018	Critical	-14,747	-245	**-14,993**
2019	Above Normal	3,147	811	**3,958**

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3 GSP Implementation Progress

The GSP for the Oxnard Subbasin was submitted to DWR in January 2020. This is the first annual report to be prepared since the GSP was submitted. The GSP implementation progress reported in this report covers work begun during development of the GSP as well as work that has been conducted over the three months since the GSP was submitted.

During development of the GSP, FCGMA identified critical areas in which aquifer specific water levels were lacking. One of these areas is the Oxnard Pumping Depression Management Area, adjacent to the boundary between the Oxnard Subbasin and the PVB. This is an area of known groundwater production, with wells in the area typically screened in multiple aquifers in the LAS. DWR, through the Technical Support Services Program, has installed a nested monitoring well to monitor the Oxnard, Mugu and Hueneme aquifers and is in the process of installing a second nested monitoring well to monitor the Fox Canyon and Grimes Canyon aquifers in the Oxnard Subbasin Pumping Depression Management Area (Figure 2-22). These nested monitoring wells were installed specifically to address the spatial data gap identified in the GSP. Groundwater elevation data from these wells will be incorporated into future annual reports, to better represent groundwater conditions in the Oxnard Subbasin and adjacent PVB.

The GSP identified several areas in which additional work needed to be conducted over the next 20 years. These areas include filling spatial and temporal data gaps, conducting basin optimization studies, developing project feasibility studies, updating the numerical groundwater model, and revising the existing data management system. Since submittal of the GSP, FCGMA has begun to develop a post-GSP work-plan that will guide the implementation of the GSP and help ensure that the Oxnard Subbasin is managed sustainably within the next 20 years. Critical to the success of this effort is stakeholder feedback. FCGMA successfully requested stakeholder facilitation services through DWR's Facilitation Support Services program to support implementation of the GSP. The FCGMA Board of Directors continues to prioritize stakeholder feedback in the implementation phase of the GSP, because of the vital role stakeholders play in ensuring the long-term sustainable use of groundwater resources in the Oxnard Subbasin

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4 References

DWR (California Department of Water Resources). 2018. *California's Groundwater, Bulletin 118*. 2018 Groundwater Basin Boundaries – 4-004.02 Santa Clara River Valley- Oxnard. Published https://water.ca.gov/SearchResults?sort=asc&search=B118%20Basin%20Boundary%20Description%202016&primaryFilters=&secondaryFilters=&tab=documents. Accessed February 17,2020.

DWR (California Department of Water Resources). 2020. DWR SGMA Portal Website: All submitted GSPs. https://sgma.water.ca.gov/portal/gsp/all. Accessed February 17, 2020.

FCGMA (Fox Canyon Groundwater Management Agency). 2019a. Groundwater Sustainability Plan for the Oxnard Subbasin.

FCGMA (Fox Canyon Groundwater Management Agency). 2019b. Groundwater Sustainability Plan for the Las Posas Valley Basin – Appendix K.

Turner, J.M. 1975. "Aquifer Delineation in the Oxnard–Calleguas Area, Ventura County." In *Compilation of Technical Information Records for the Ventura County Cooperative Investigation: Volume I,* 1–45. Prepared by the Ventura County Public Works Agency Flood Control and Drainage Department for the California Department of Water Resources.

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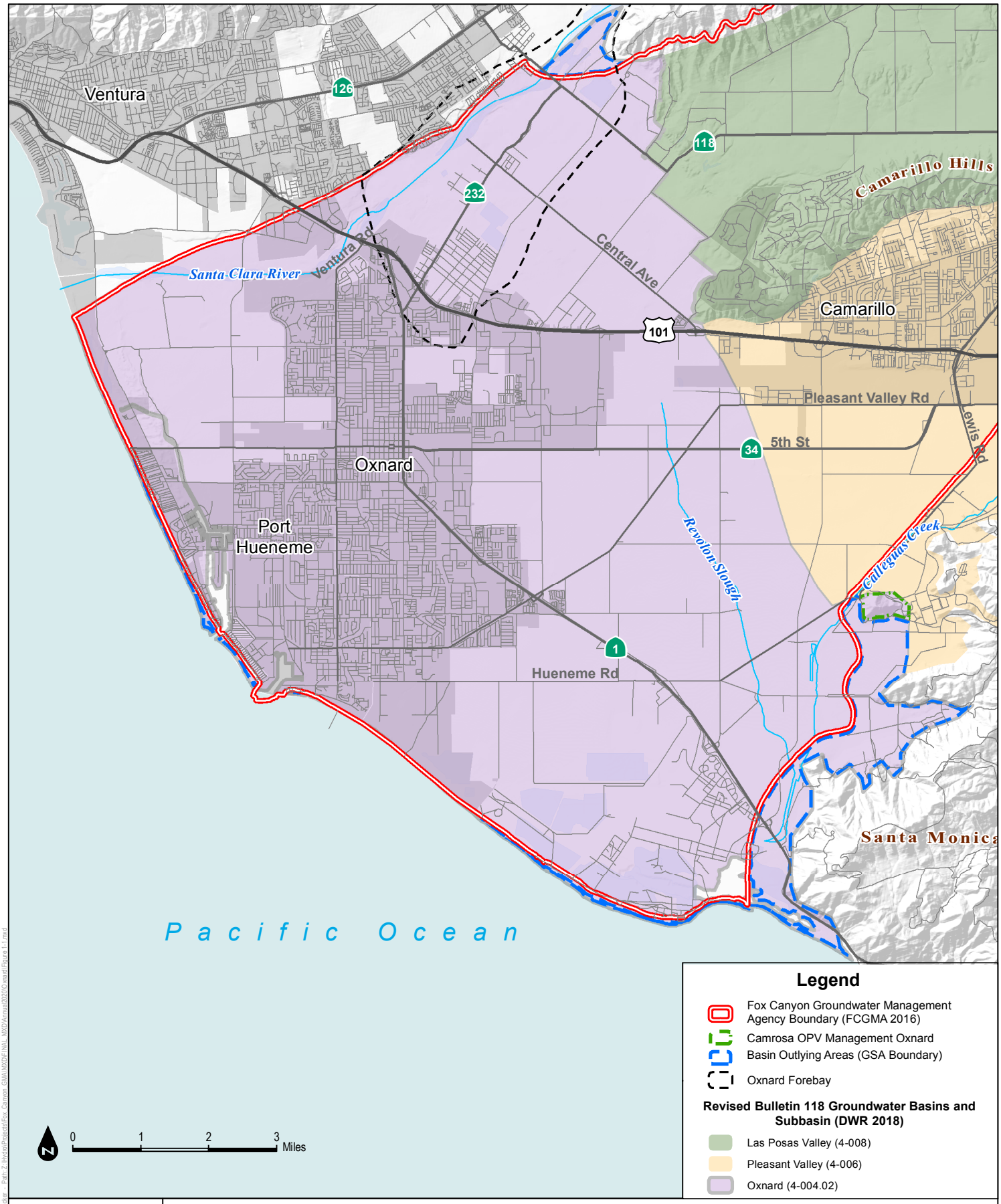

SOURCE: DWR; FCGMA

FIGURE 1-1

Vicinity Map for the Oxnard Subbasin

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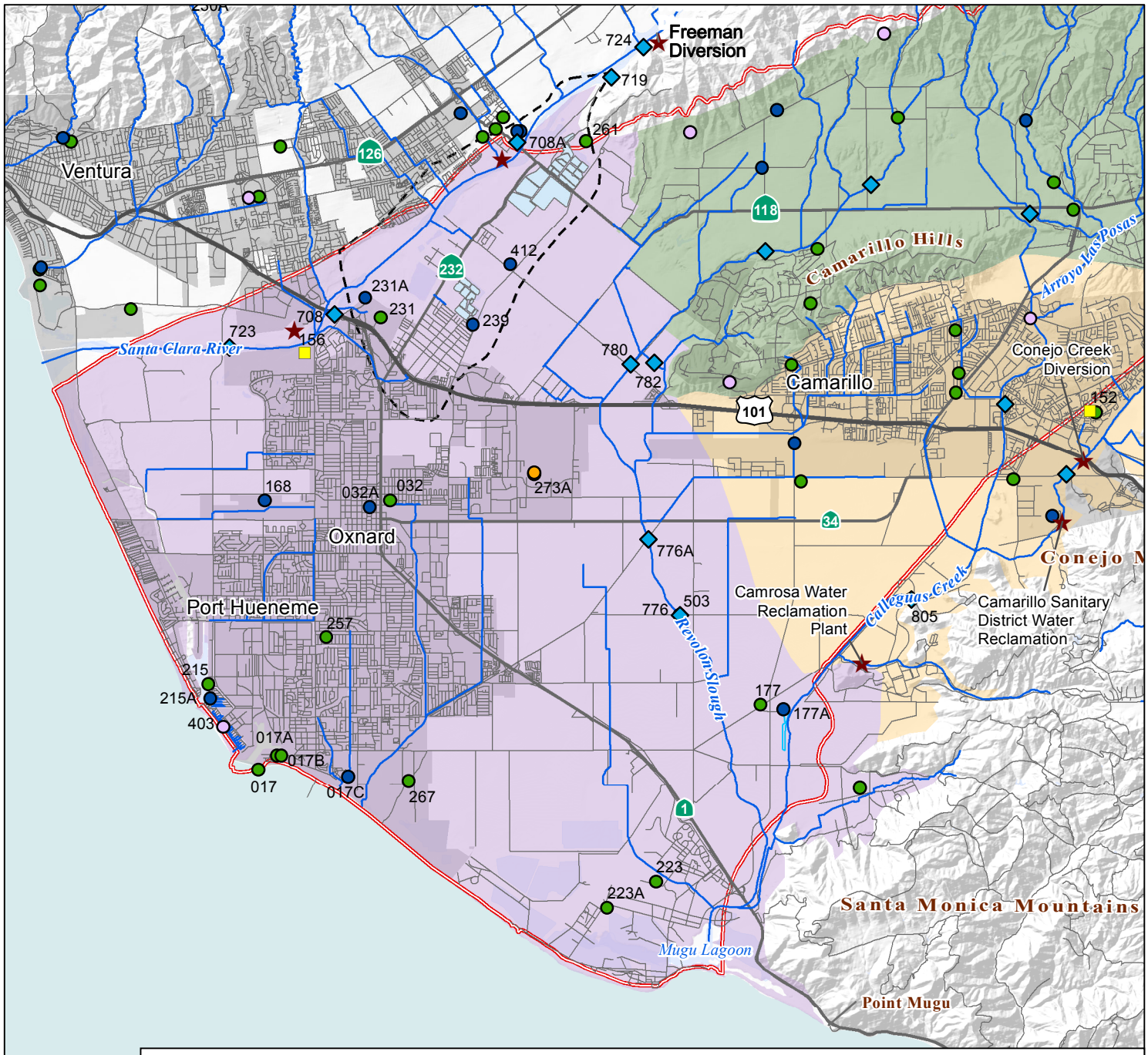

Legend

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Diversions and reclamation sites

Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

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

0 0.5 1 2 3 4 Miles

- Oxnard Forebay
- Ventura County Rivers, Streams and Channels (VCWPD 2016)
- CIMIS Stations

Ventura County Gauge Locations (VCWPD 2016; labeled by station number)

- National Weather Service Station
- Recording Precipitation Gauge
- Standard Precipitation
- Storage Precipitation
- Non-Standard Precipitation Recorder
- Recording Stream Gauge

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

FIGURE 1-2

Precipitation and Stream Gauges in the Oxnard Subbasin

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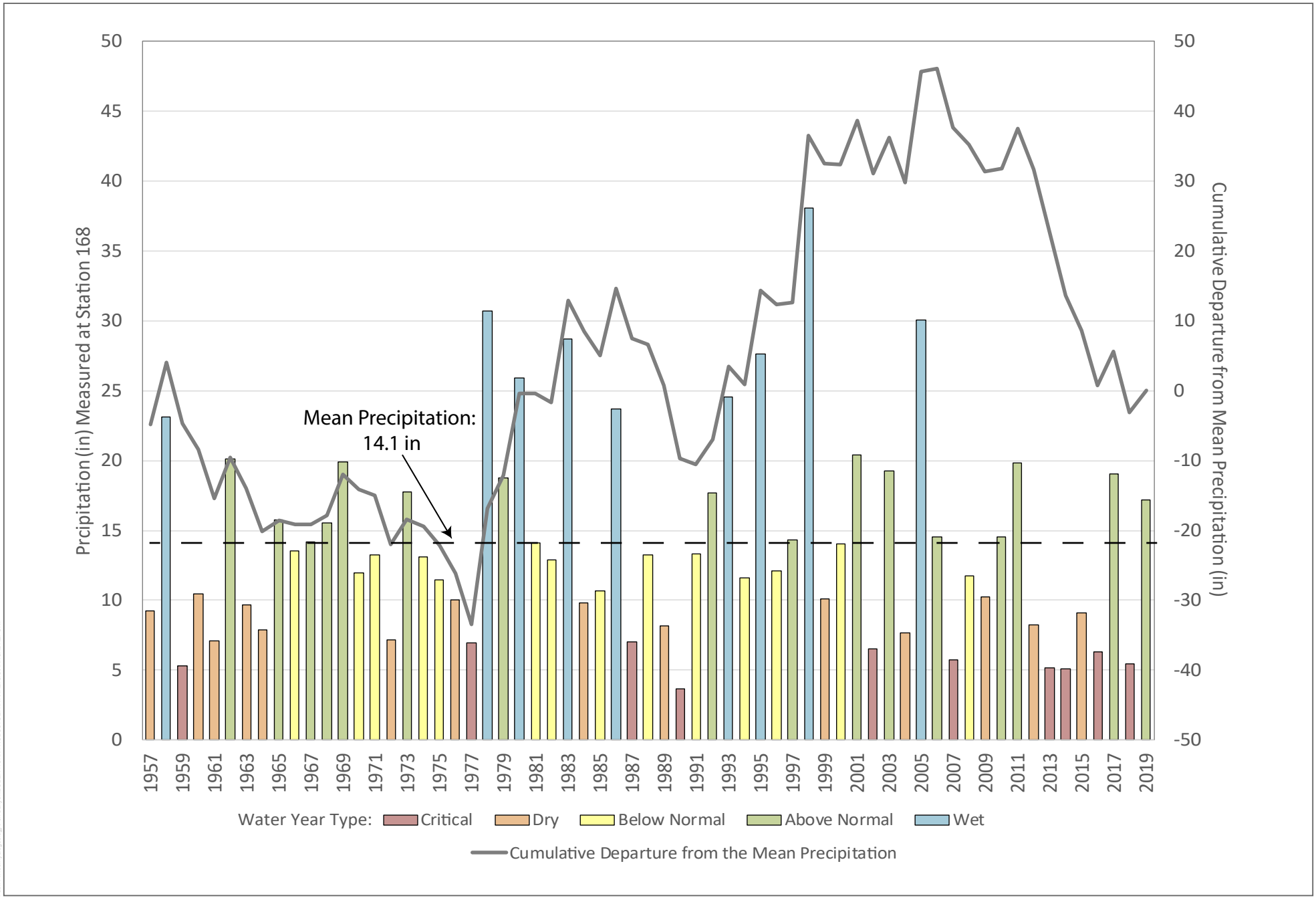
Oxnard Subbasin Groundwater Sustainability Plan 2020 Annual Report



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)

FIGURE 1-3

Oxnard Subbasin Historical Water Year Precipitation

Oxnard Subbasin Groundwater Sustainability Plan 2020 Annual Report

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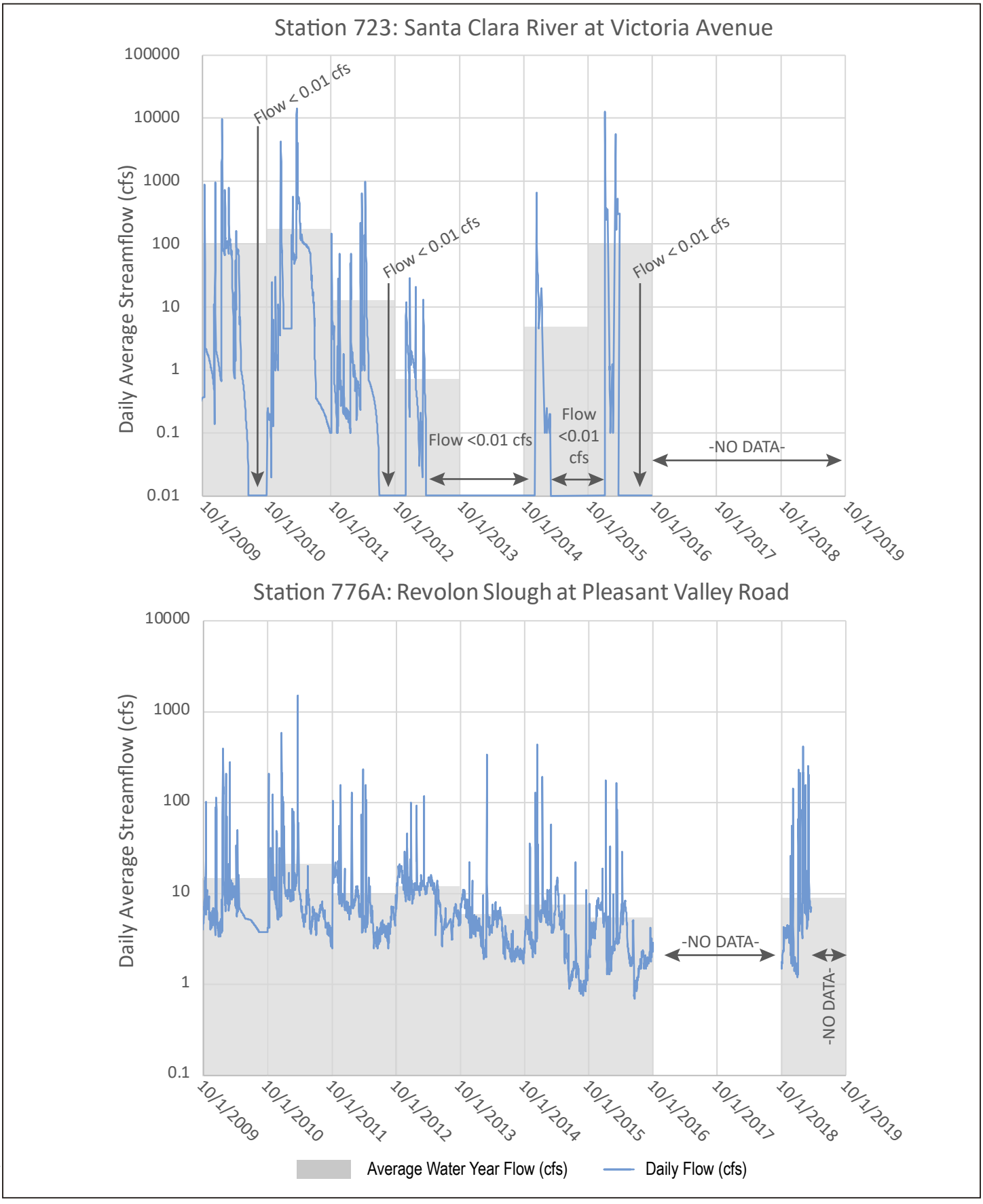
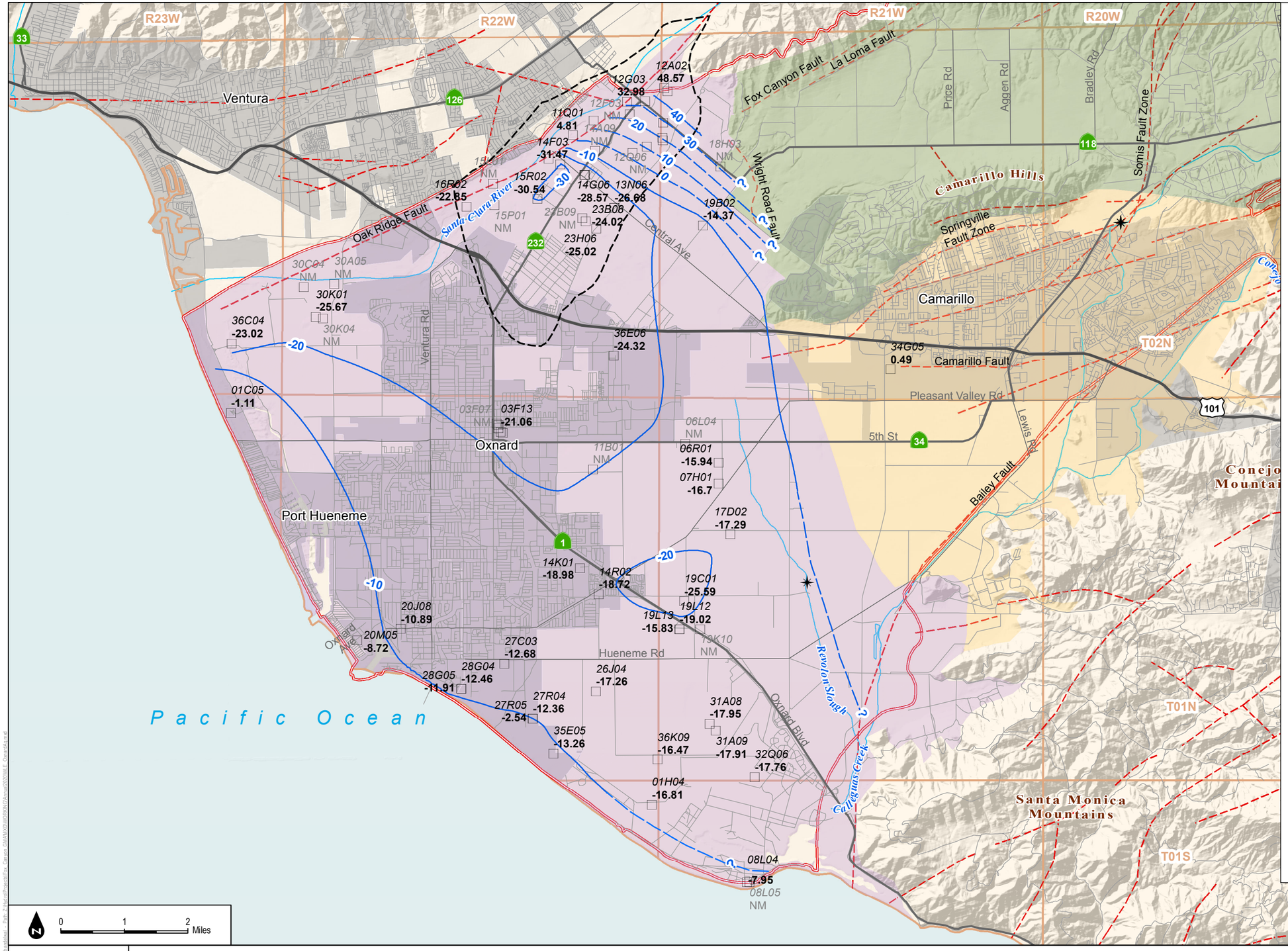


SOURCE: Ventura County Watershed Protection District (VCWPD) Hydrologic Data Server (https://www.vcwatershed.net/hydrodata/)

FIGURE 1-4

Oxnard Subbasin Stream Gauge Data



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in the Oxnard Aquifer
- New Nested Monitoring Well Cluster
- Oxnard Forebay
- *15P01* Abbreviated State Well Number (see notes)
- (-14.7) Groundwater elevations are not used to create contours (see notes)
- **-14.7** Groundwater elevation feet AMSL
- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Faults (Ventura County 2016)
- 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.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-1

Groundwater Elevation Contours in the Oxnard Aquifer, March 2-29, 2016

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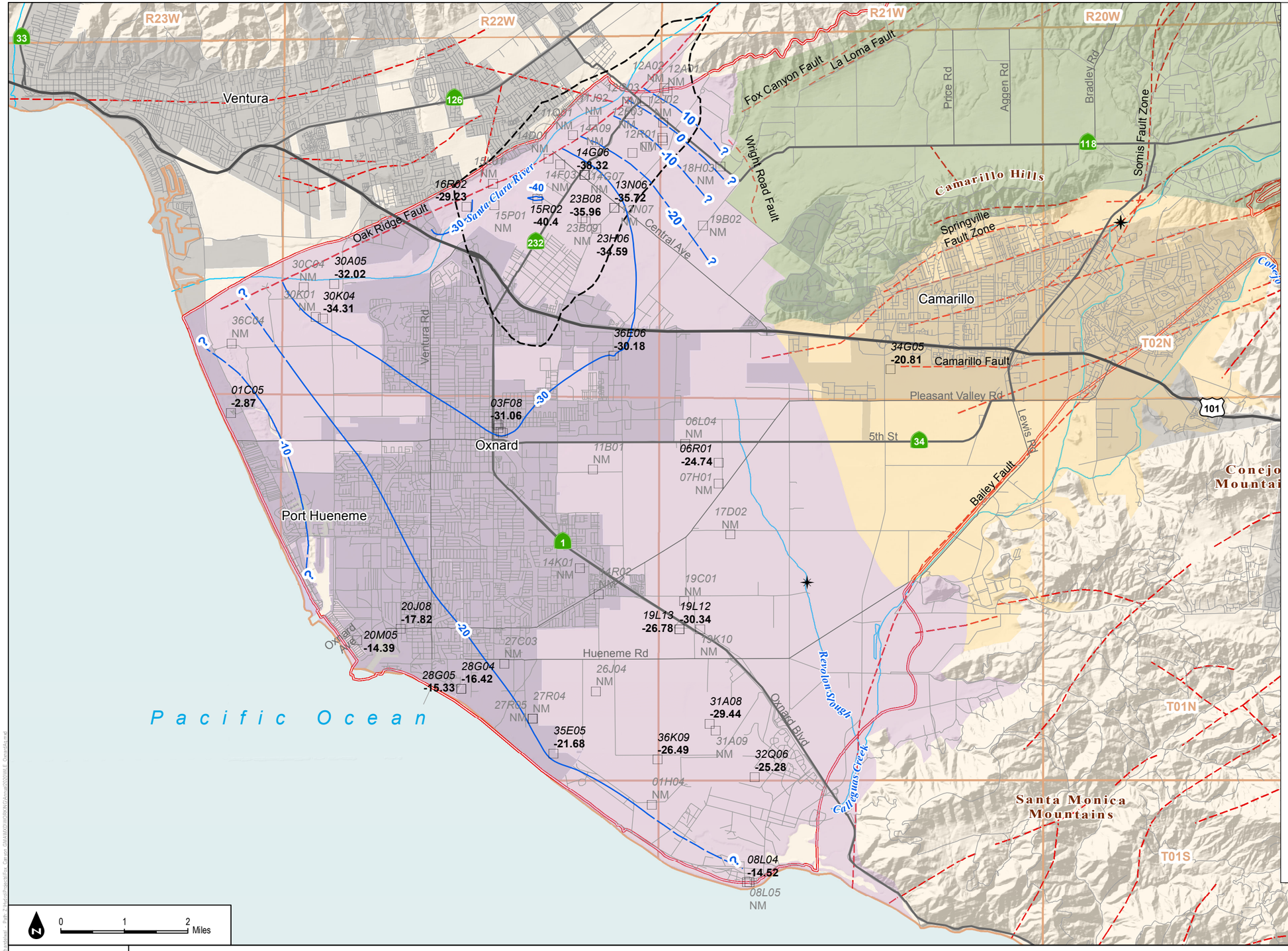

Legend

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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.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-2

Groundwater Elevation Contours in the Oxnard Aquifer, October 2-29, 2016

Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in the Oxnard Aquifer
- New Nested Monitoring Well Cluster
- Oxnard Forebay
- *15P01* Abbreviated State Well Number (see notes)
- (-14.7) Groundwater elevations are not used to create contours (see notes)
- **-14.7** Groundwater elevation feet AMSL
- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Faults (Ventura County 2016)
- 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.

0 1 2 Miles

SOURCE: DWR; Ventura County; UWCD; CMWD

DUDEK

FIGURE 2-3

Groundwater Elevation Contours in the Oxnard Aquifer, March 2-29, 2017

Oxnard Subbasin Groundwater Sustainability Plan 2020 Annual Report

Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in the Oxnard Aquifer
- New Nested Monitoring Well Cluster
- Oxnard Forebay
- *15P01* Abbreviated State Well Number (see notes)
- (-14.7) Groundwater elevations are not used to create contours (see notes)
- **-14.7** Groundwater elevation feet AMSL
- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Faults (Ventura County 2016)
- 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.

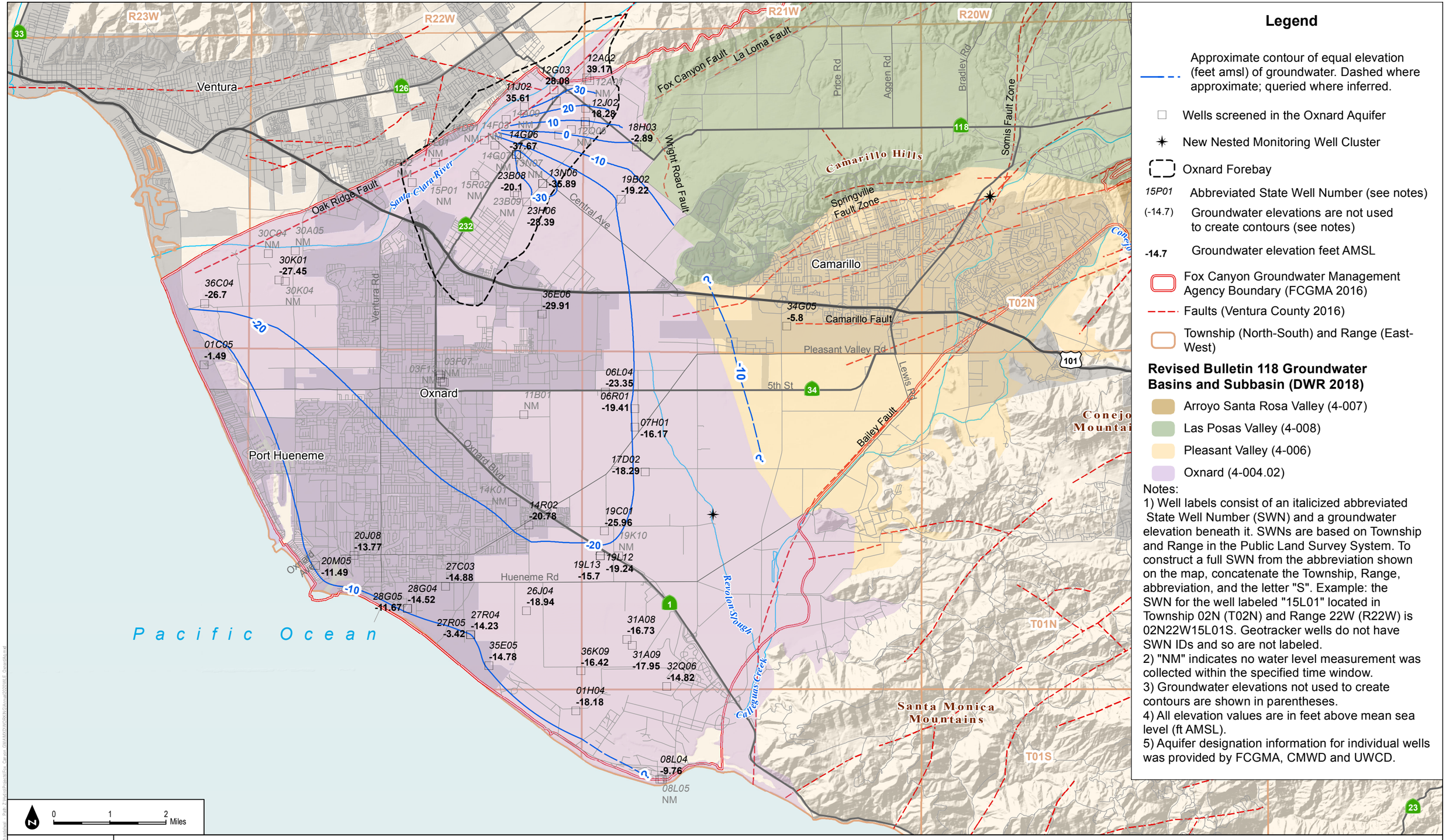
0 1 2 Miles

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-4

Groundwater Elevation Contours in the Oxnard Aquifer, October 2-29, 2017

DUDEK



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in the Oxnard Aquifer
- New Nested Monitoring Well Cluster
- Oxnard Forebay
- *15P01* Abbreviated State Well Number (see notes)
- (-14.7) Groundwater elevations are not used to create contours (see notes)
- **-14.7** Groundwater elevation feet AMSL
- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Faults (Ventura County 2016)
- 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.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-5

Groundwater Elevation Contours in the Oxnard Aquifer, March 2-29, 2018

Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in the Oxnard Aquifer
- New Nested Monitoring Well Cluster
- Oxnard Forebay
- *15P01* Abbreviated State Well Number (see notes)
- (-14.7) Groundwater elevations are not used to create contours (see notes)
- **-14.7** Groundwater elevation feet AMSL
- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Faults (Ventura County 2016)
- 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.

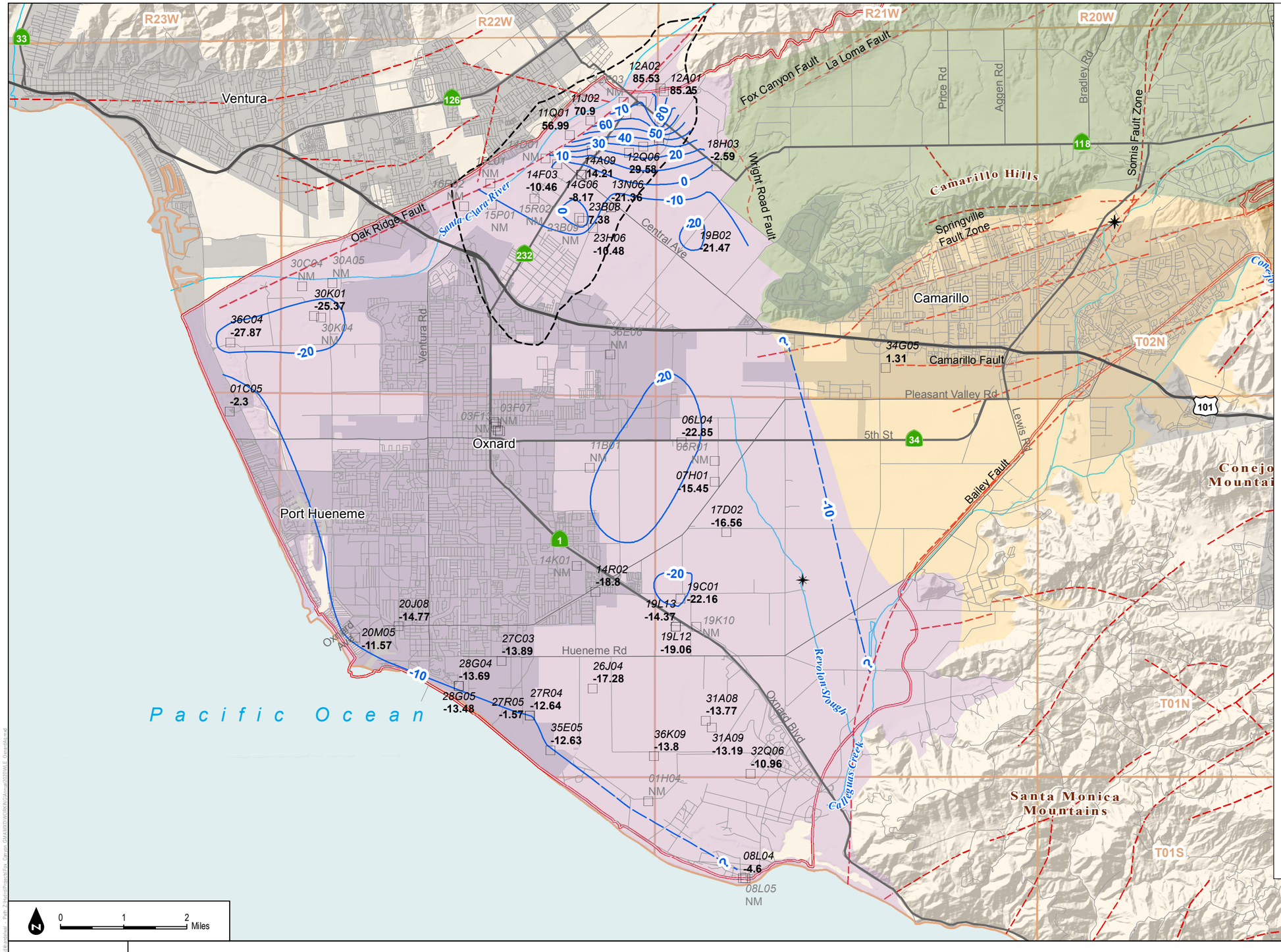
0 1 2 Miles

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-6

Groundwater Elevation Contours in the Oxnard Aquifer, October 2-29, 2018

DUDEK



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in the Oxnard Aquifer
- New Nested Monitoring Well Cluster
- Oxnard Forebay
- *15P01* Abbreviated State Well Number (see notes)
- (-14.7) Groundwater elevations are not used to create contours (see notes)
- **-14.7** Groundwater elevation feet AMSL
- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Faults (Ventura County 2016)
- 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:

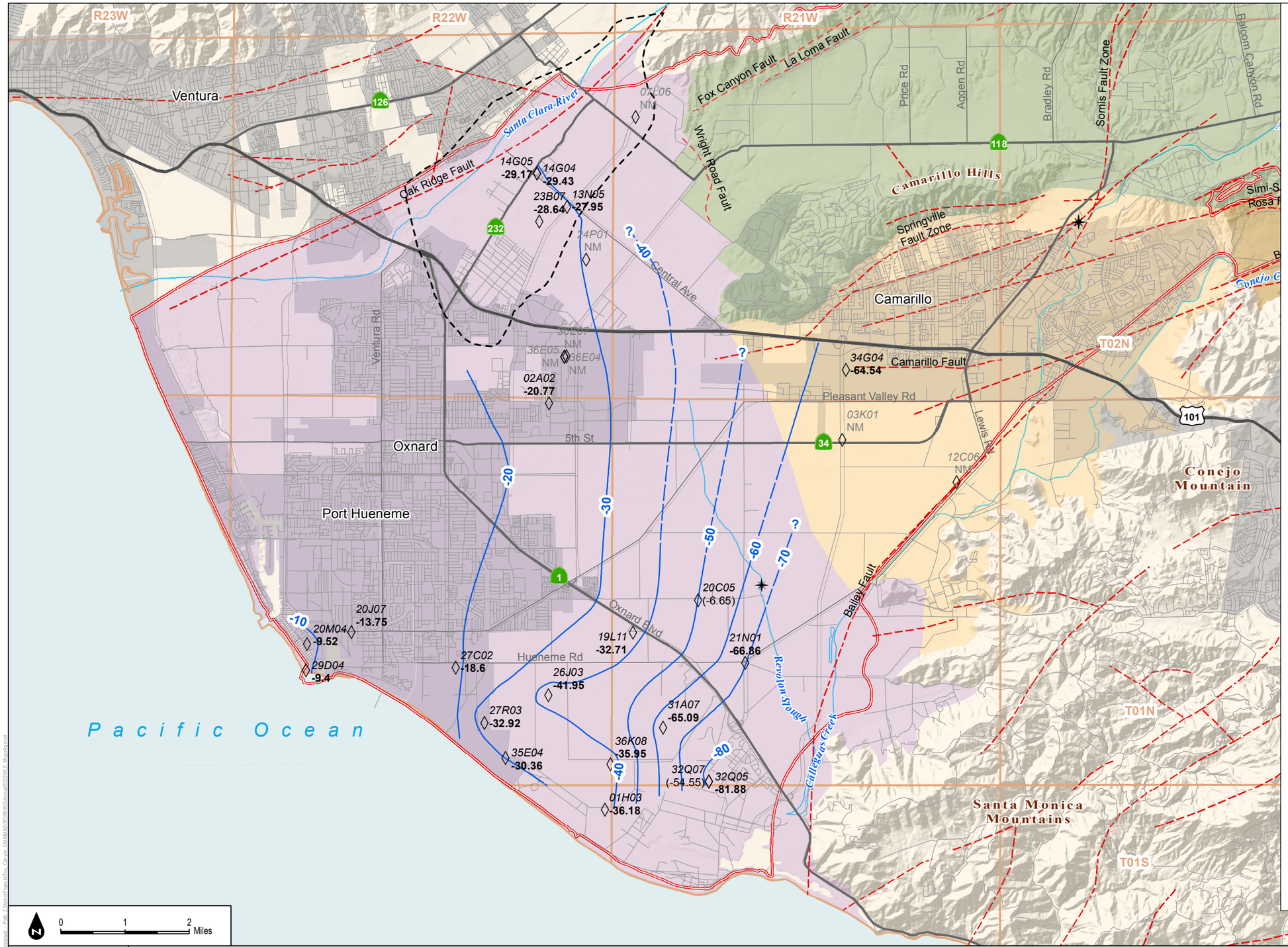
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and 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.

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-7

Groundwater Elevation Contours in the Oxnard Aquifer,March 2-29, 2019



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

◊ Wells screened in the Mugu Aquifer

✶ New Nested Monitoring Well Cluster

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)

Oxnard Forebay

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.

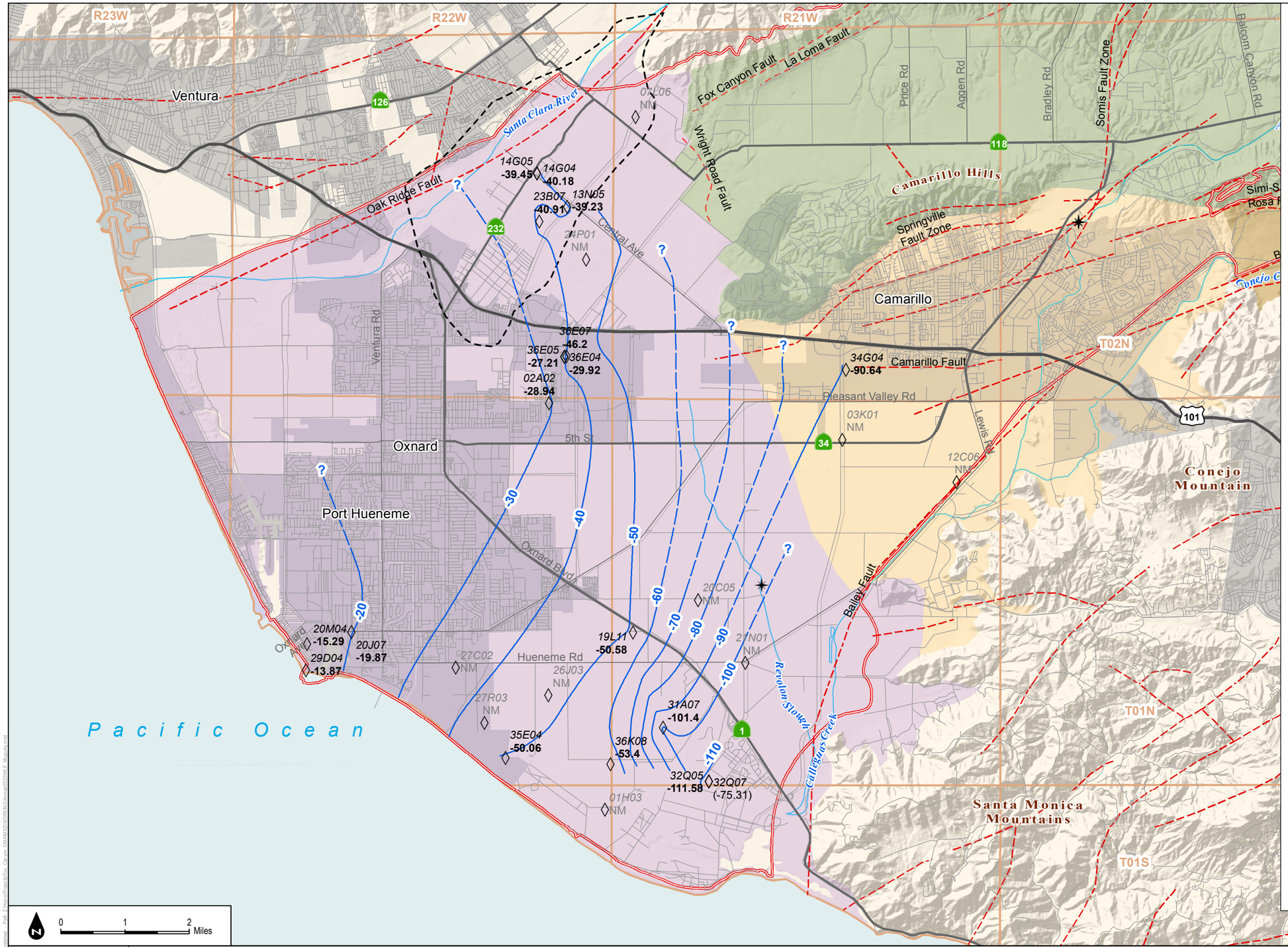
4) All elevation values are in feet above mean sea level (ft AMSL).

5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-8

Groundwater Elevation Contours in the Mugu Aquifer, March 2-29, 2016



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

Wells screened in the Mugu Aquifer

New Nested Monitoring Well Cluster

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)

Oxnard Forebay

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).

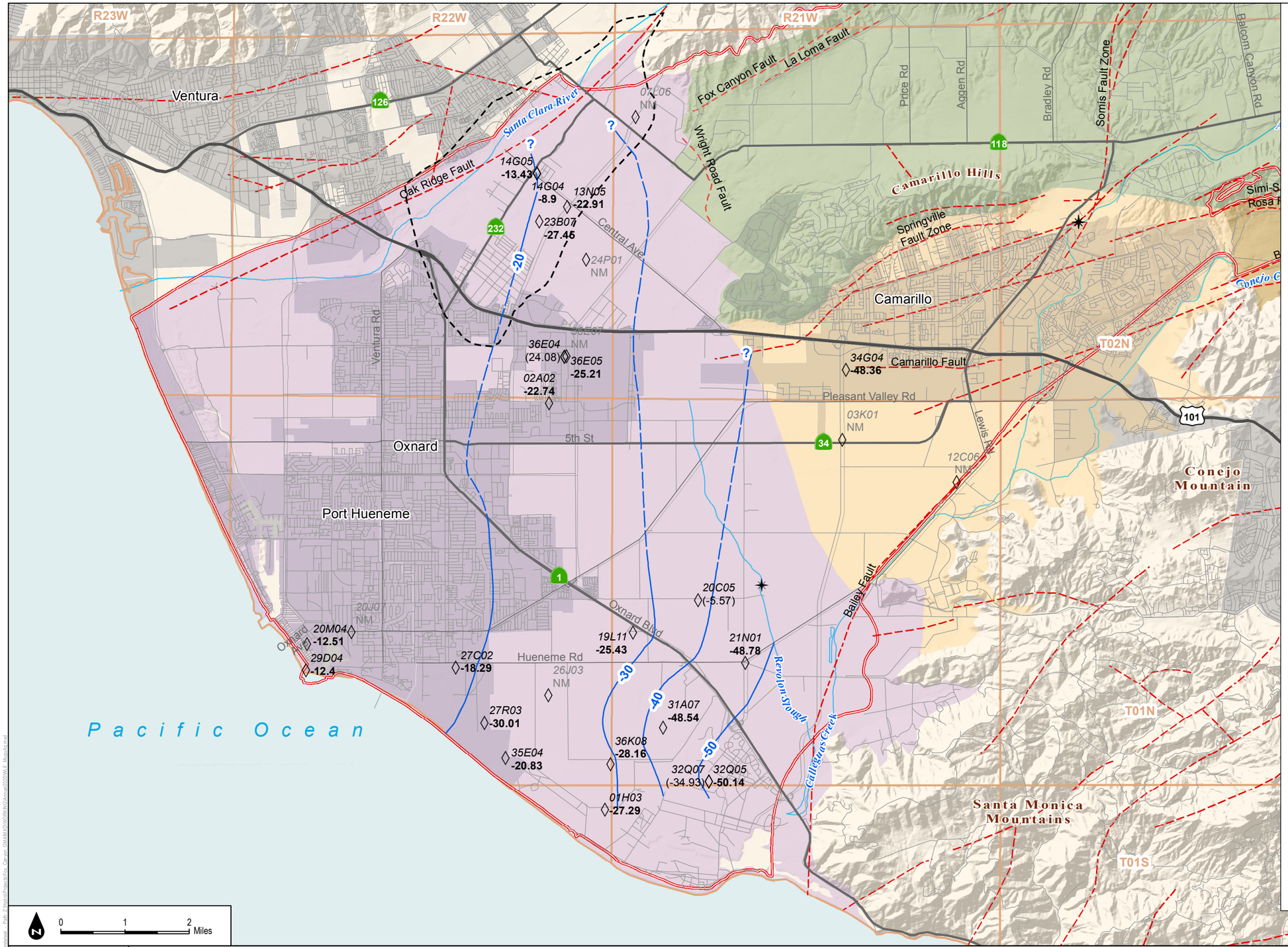
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-9

Groundwater Elevation Contours in the Mugu Aquifer, October 2-29, 2016

DUDEK



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

Wells screened in the Mugu Aquifer

New Nested Monitoring Well Cluster

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)

Oxnard Forebay

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).

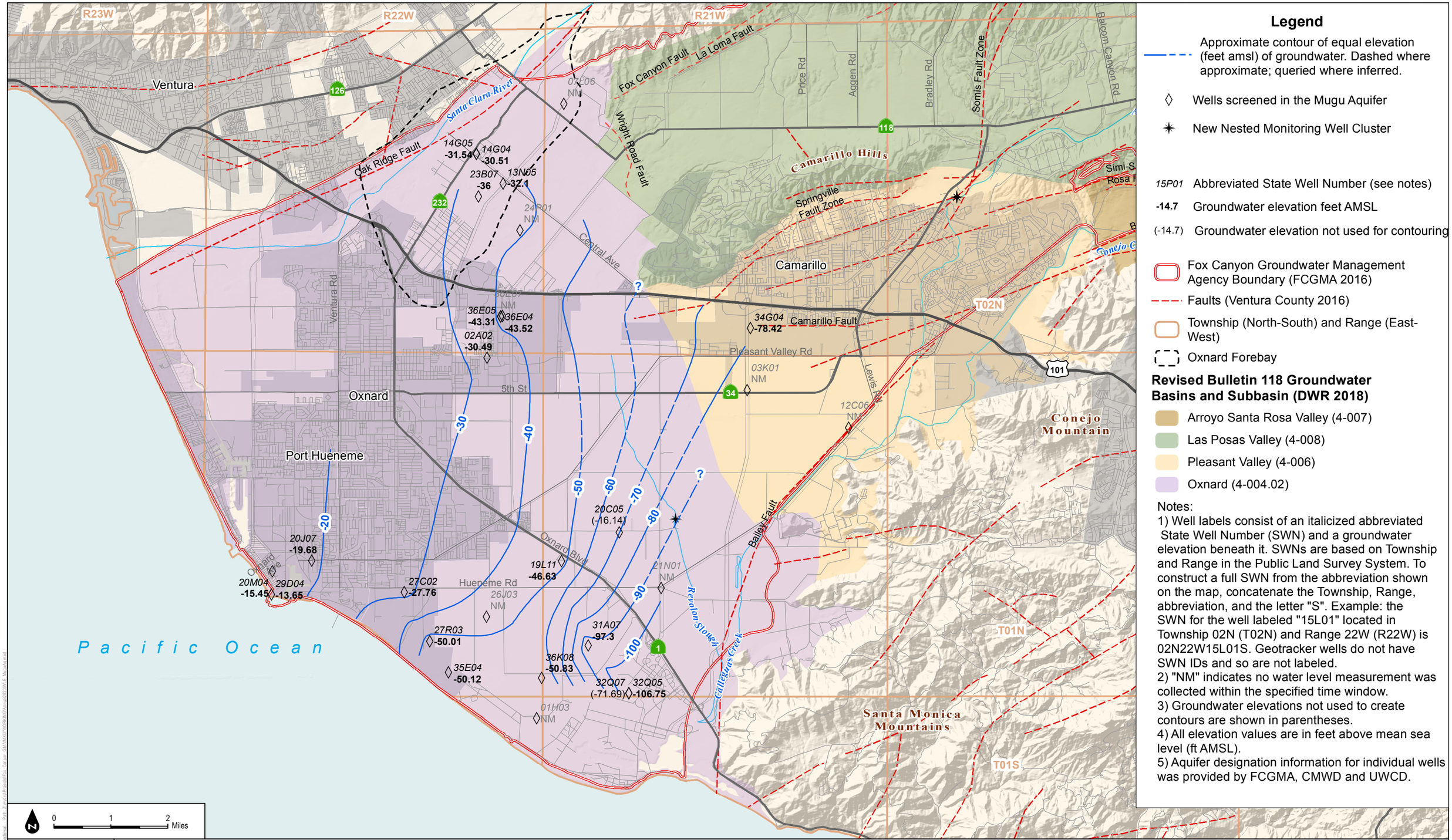
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-10

Groundwater Elevation Contours in the Mugu Aquifer, March 2-29, 2017

DUDEK



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

◊ Wells screened in the Mugu Aquifer

✶ New Nested Monitoring Well Cluster

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)

Oxnard Forebay

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).

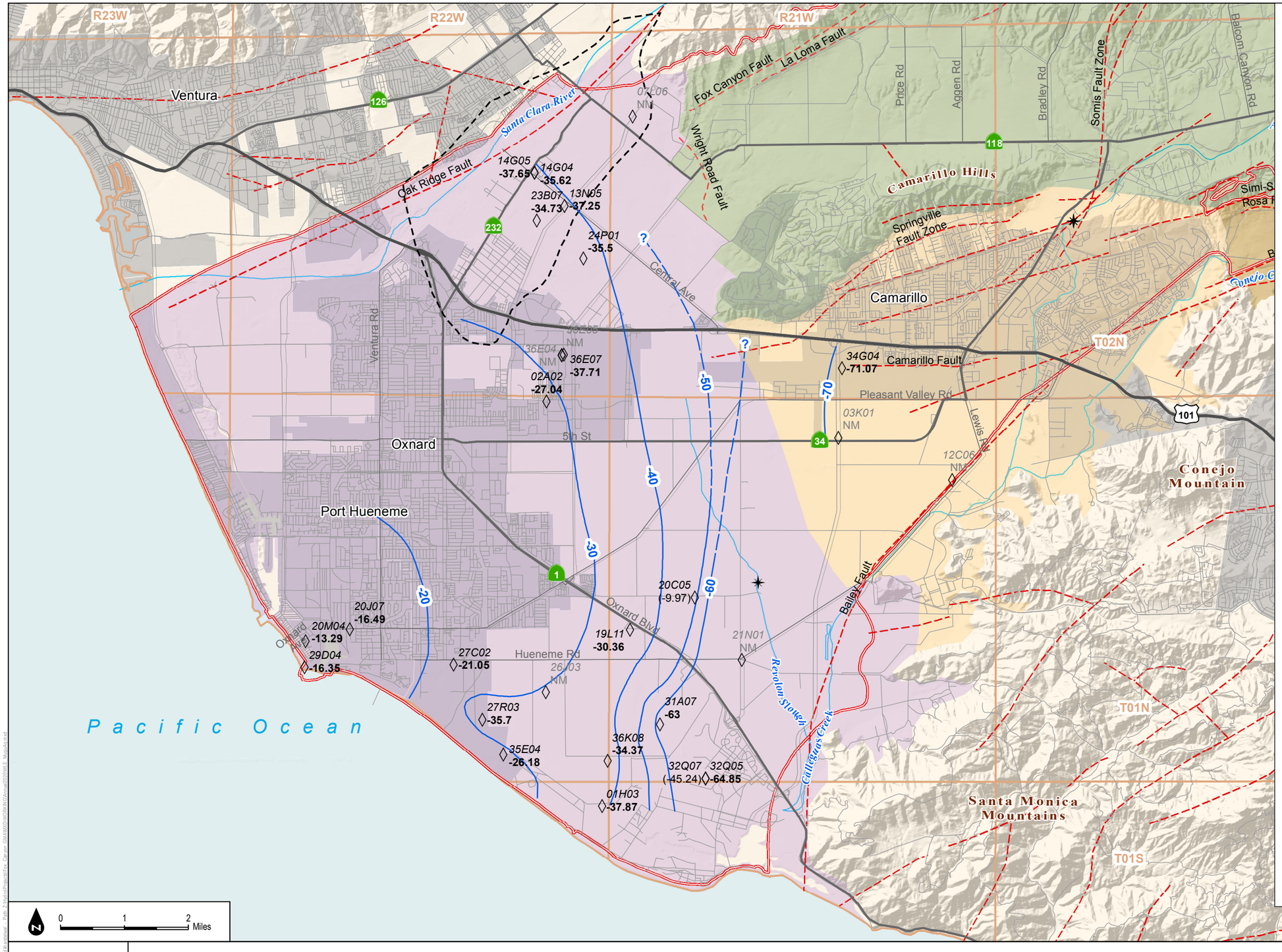
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-11

Groundwater Elevation Contours in the Mugu Aquifer, October 2-29, 2017

DUDEK



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

◊ Wells screened in the Mugu Aquifer

✶ New Nested Monitoring Well Cluster

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)

Oxnard Forebay

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:

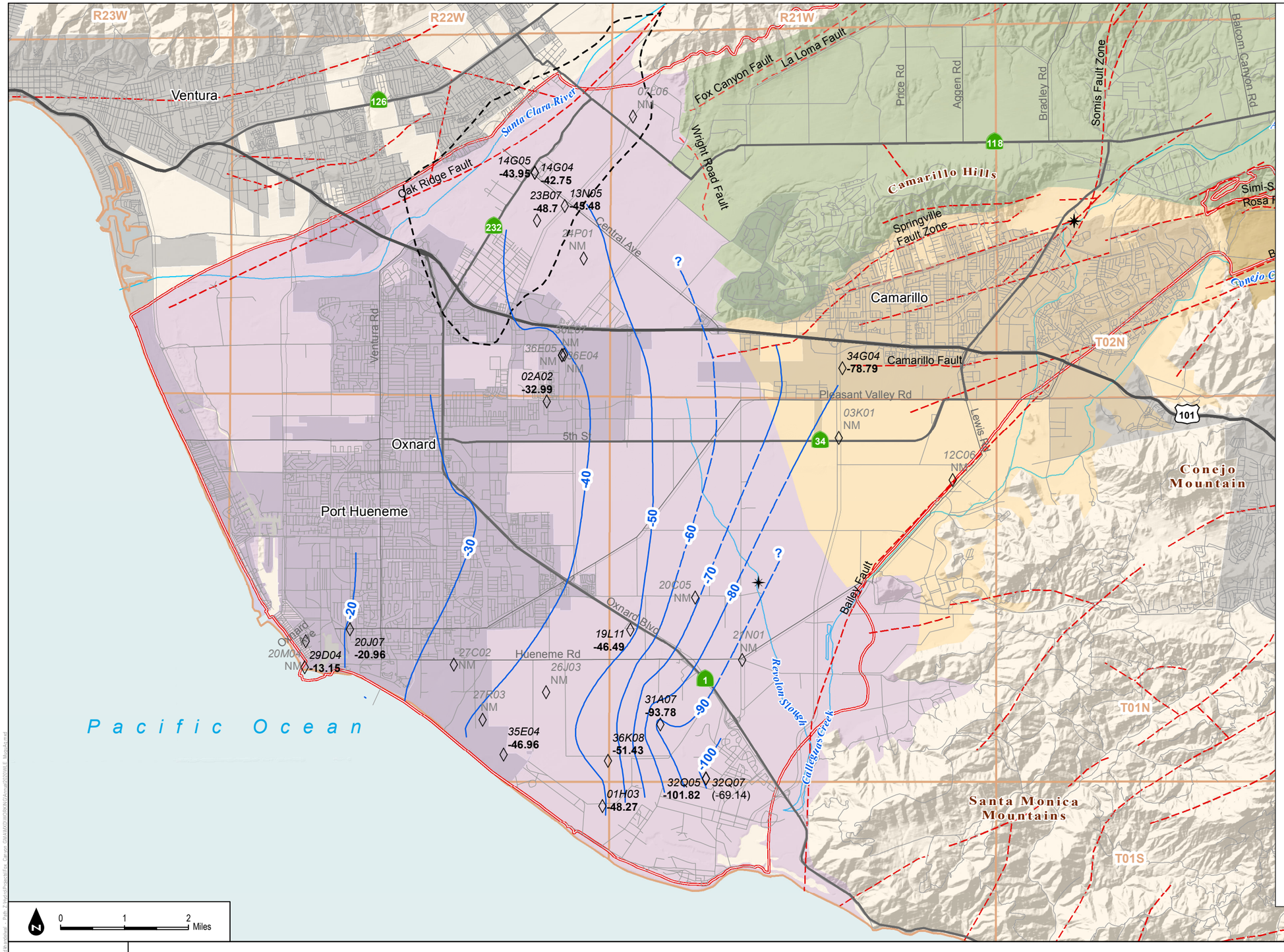
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and 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.

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-12

Groundwater Elevation Contours in the Mugu Aquifer, March 2-29, 2018



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

◊ Wells screened in the Mugu Aquifer

✶ New Nested Monitoring Well Cluster

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)

Oxnard Forebay

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).

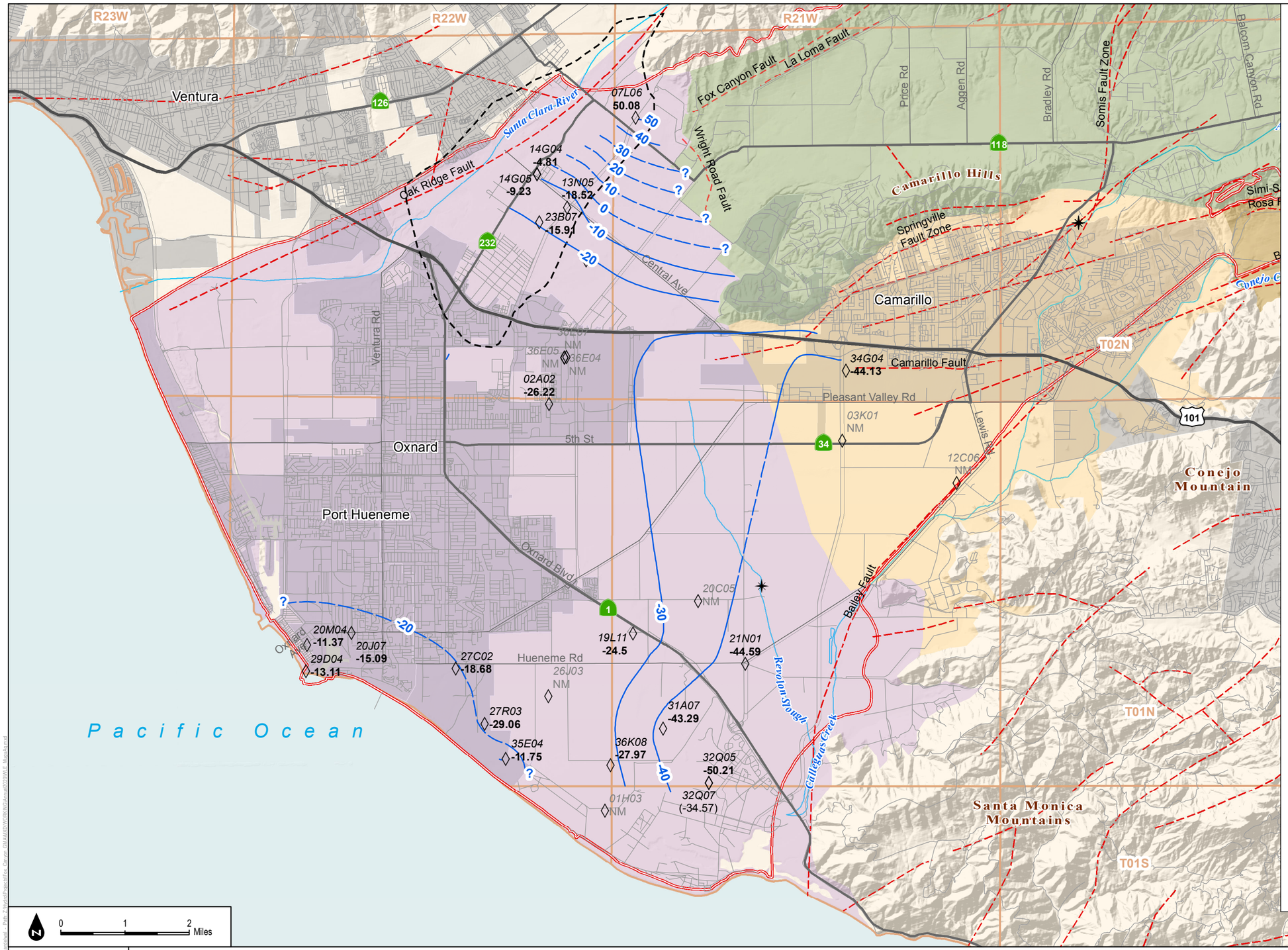
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-13

Groundwater Elevation Contours in the Mugu Aquifer, October 2-29, 2018

DUDEK



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

◊ Wells screened in the Mugu Aquifer

✶ New Nested Monitoring Well Cluster

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)

Oxnard Forebay

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).

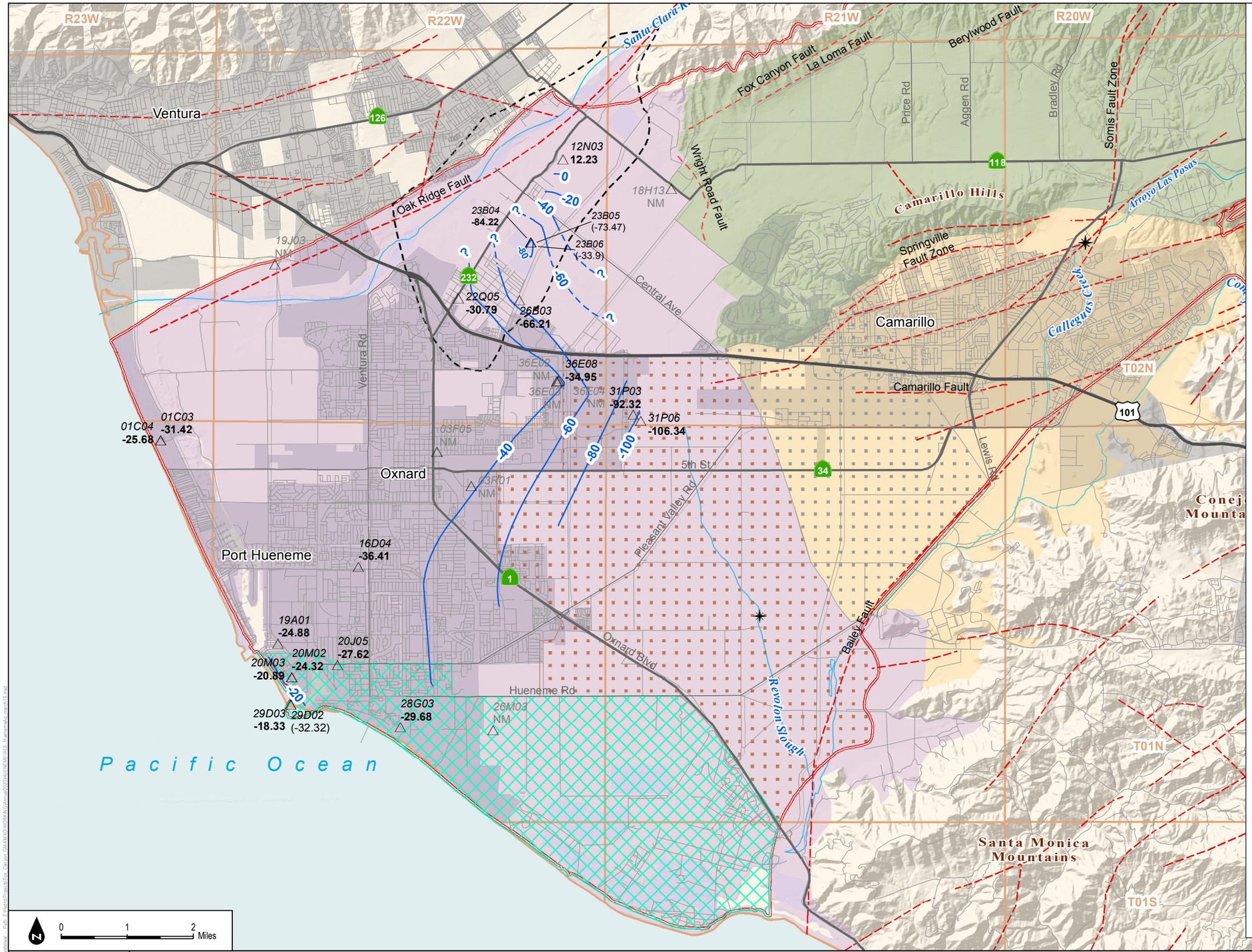
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-14

Groundwater Elevation Contours in the Mugu Aquifer, March 2-29, 2019

DUDEK



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- △ Wells screened in the Hueneme Aquifer
- ✶ New Nested Monitoring Well Cluster
- *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-
- Pleasant Valley Pumping trough Management Area
- Oxnard Pumping Depression Management
- Saline Intrusion Management
- Oxnard Forebay

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)

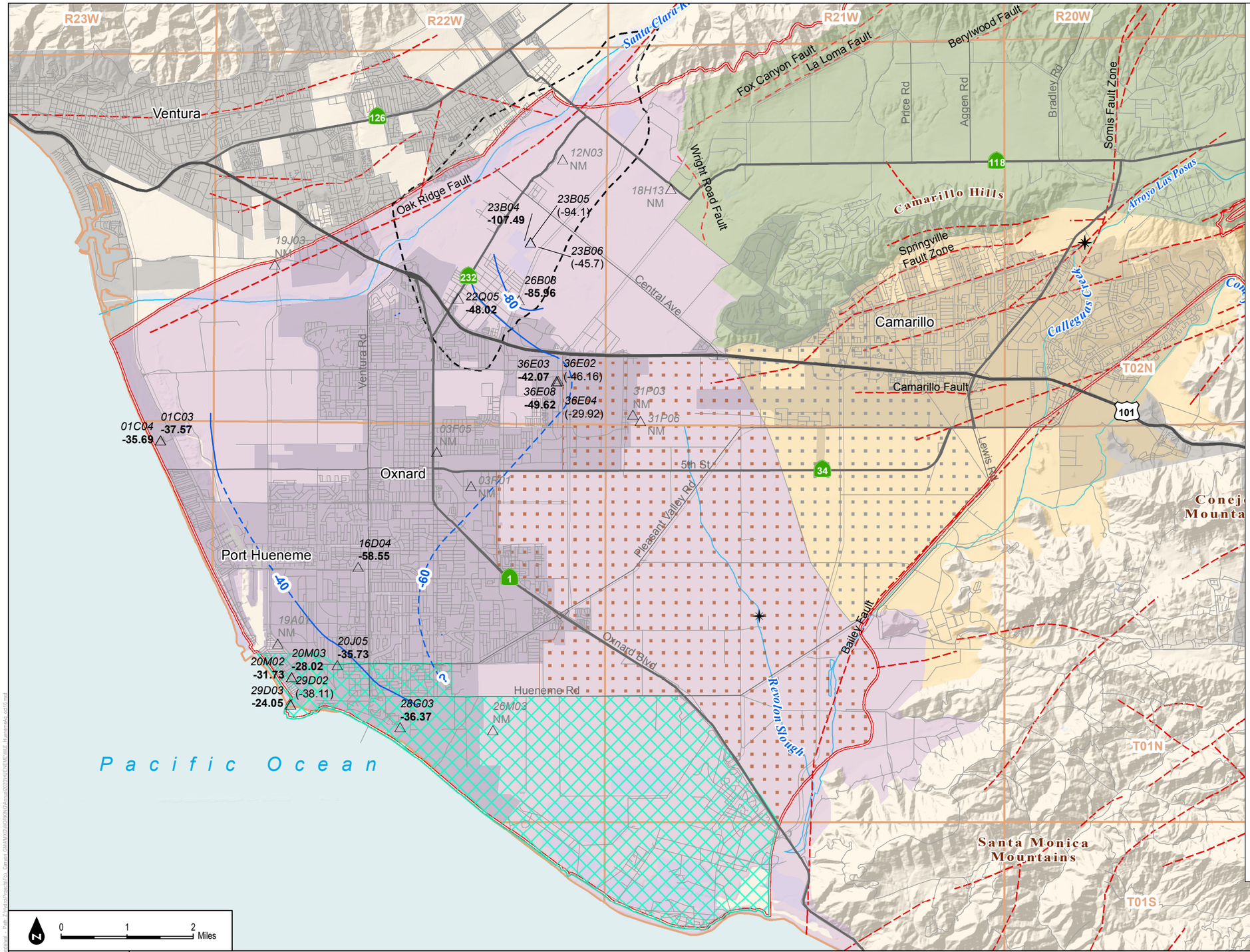
Notes:
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, 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.

SOURCE: DWR; Ventura County; UWCD; CMWD

DUDEK

FIGURE 2-15

Groundwater Elevation Contours in the Hueneme Aquifer, March 2-29, 2016



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

△ Wells screened in the Hueneme Aquifer

✶ New Nested Monitoring Well Cluster

15P01 Abbreviated State Well Number (see notes)

-14.7 Groundwater elevation feet AMSL

Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)

Faults (Ventura County 2016)

Township (North-South) and Range (East-West)

Pleasant Valley Pumping trough Management Area

Oxnard Pumping Depression Management Area

Saline Intrusion Management Area

Oxnard Forebay

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).

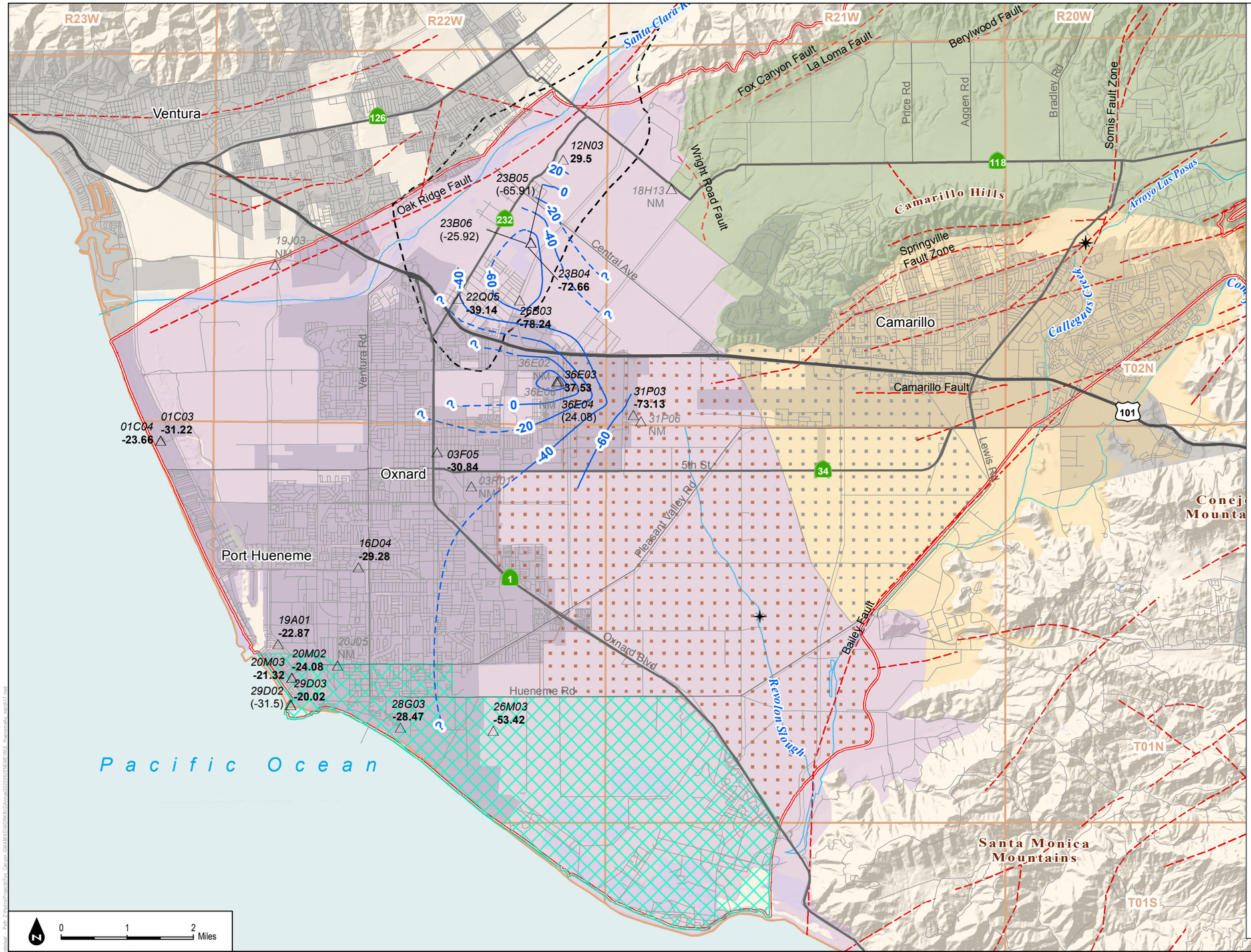
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-16

Groundwater Elevation Contours in the Hueneme Aquifer, October 2-29, 2016



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

△ Wells screened in the Hueneme Aquifer

✶ New Nested Monitoring Well Cluster

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)

Pleasant Valley Pumping trough Management Area

Oxnard Pumping Depression Management Area

Saline Intrusion Management Area

Oxnard Forebay

Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

Arroyo Santa Rosa Valley (4-007)

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Oxnard (4-004.02)

Notes:

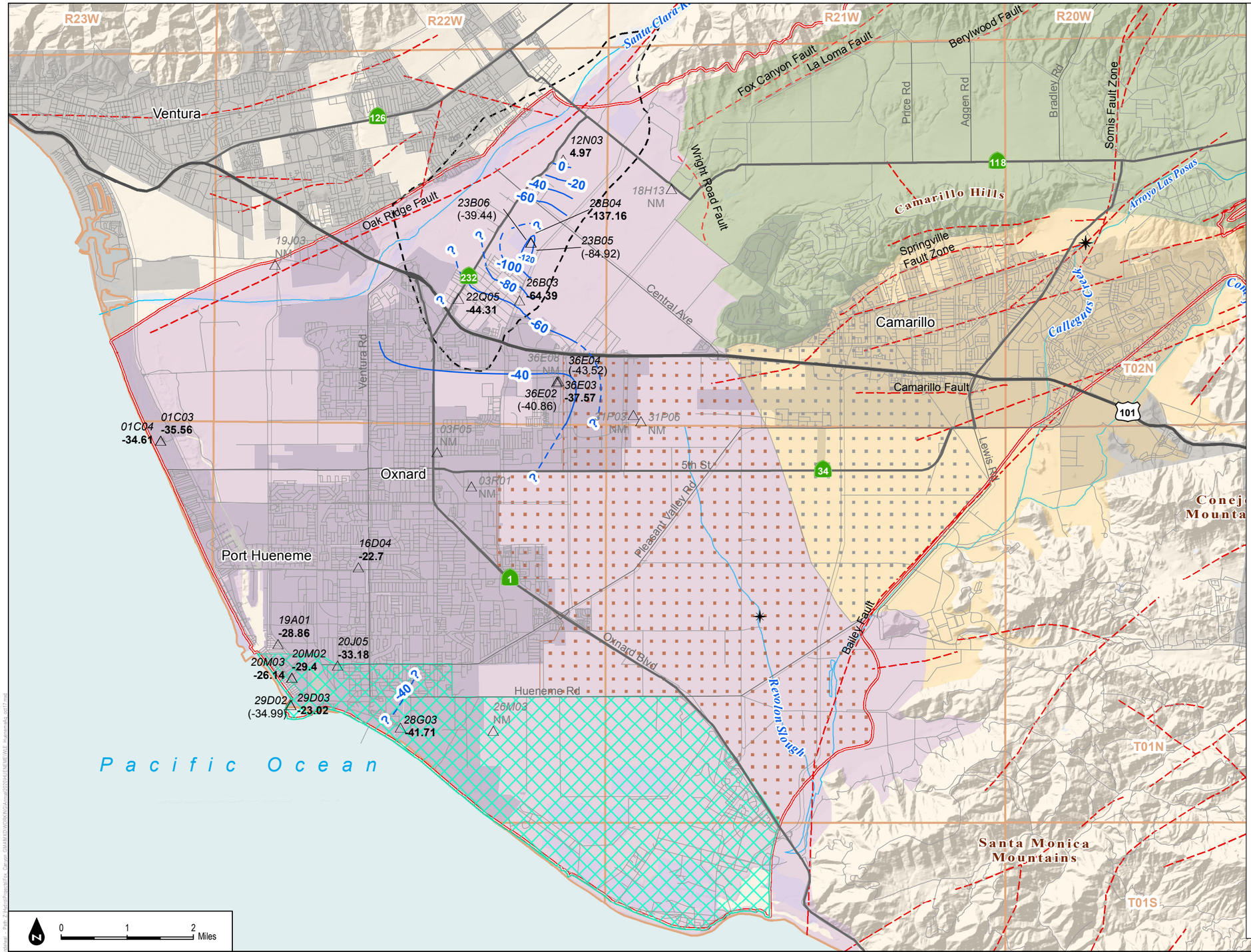
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and 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.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-17

Groundwater Elevation Contours in the Hueneme Aquifer, March2-29, 2017

DUDEK



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

△ Wells screened in the Hueneme Aquifer

✶ New Nested Monitoring Well Cluster

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)

Pleasant Valley Pumping trough Management Area

Oxnard Pumping Depression Management

Saline Intrusion Management

Oxnard Forebay

Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

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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.

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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).

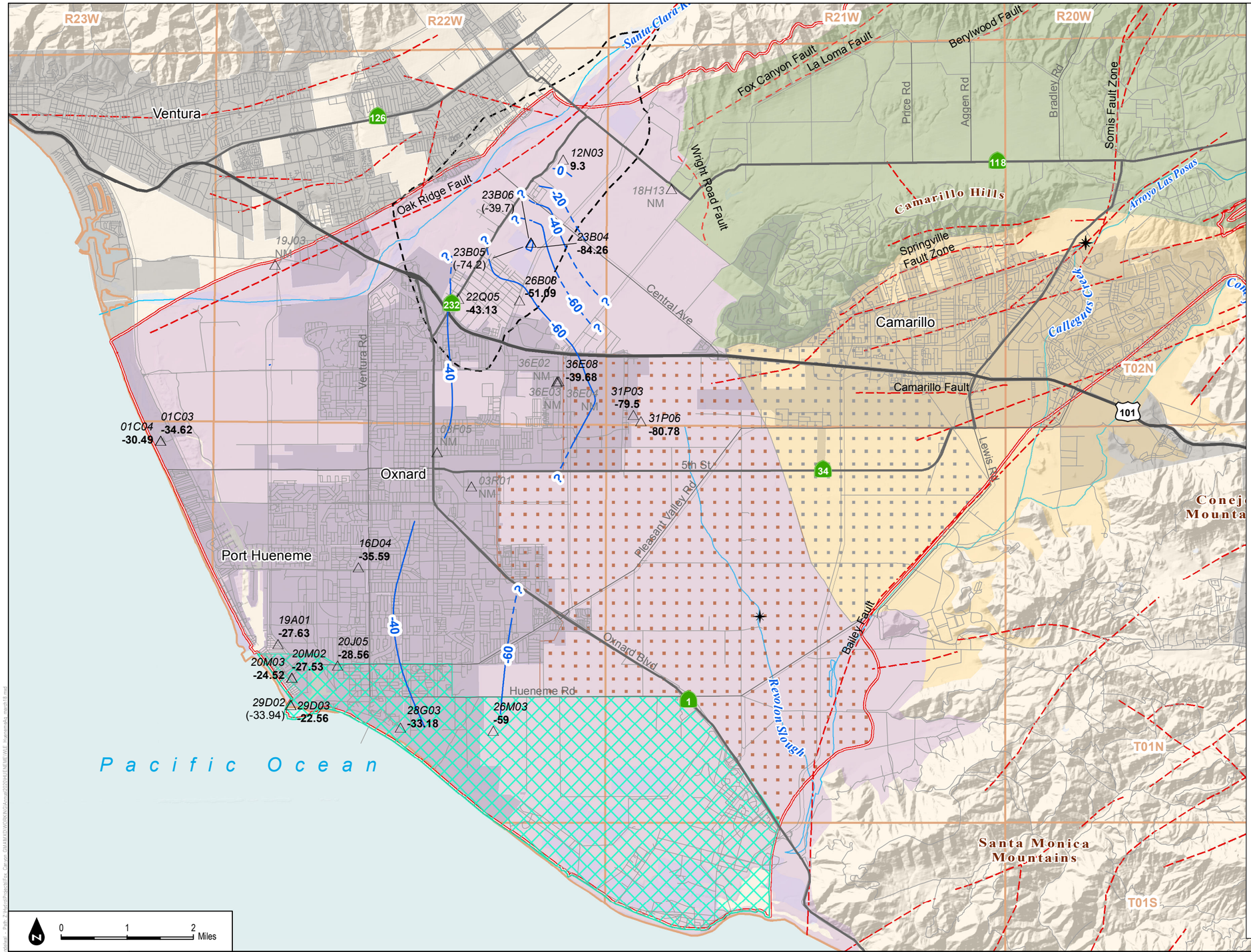
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-18

Groundwater Elevation Contours in the Hueneme Aquifer, October 2-29, 2017

DUDEK



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

△ Wells screened in the Hueneme Aquifer

✶ New Nested Monitoring Well Cluster

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)

Pleasant Valley Pumping trough Management Area

Oxnard Pumping Depression Management Area

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Oxnard Forebay

Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

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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.

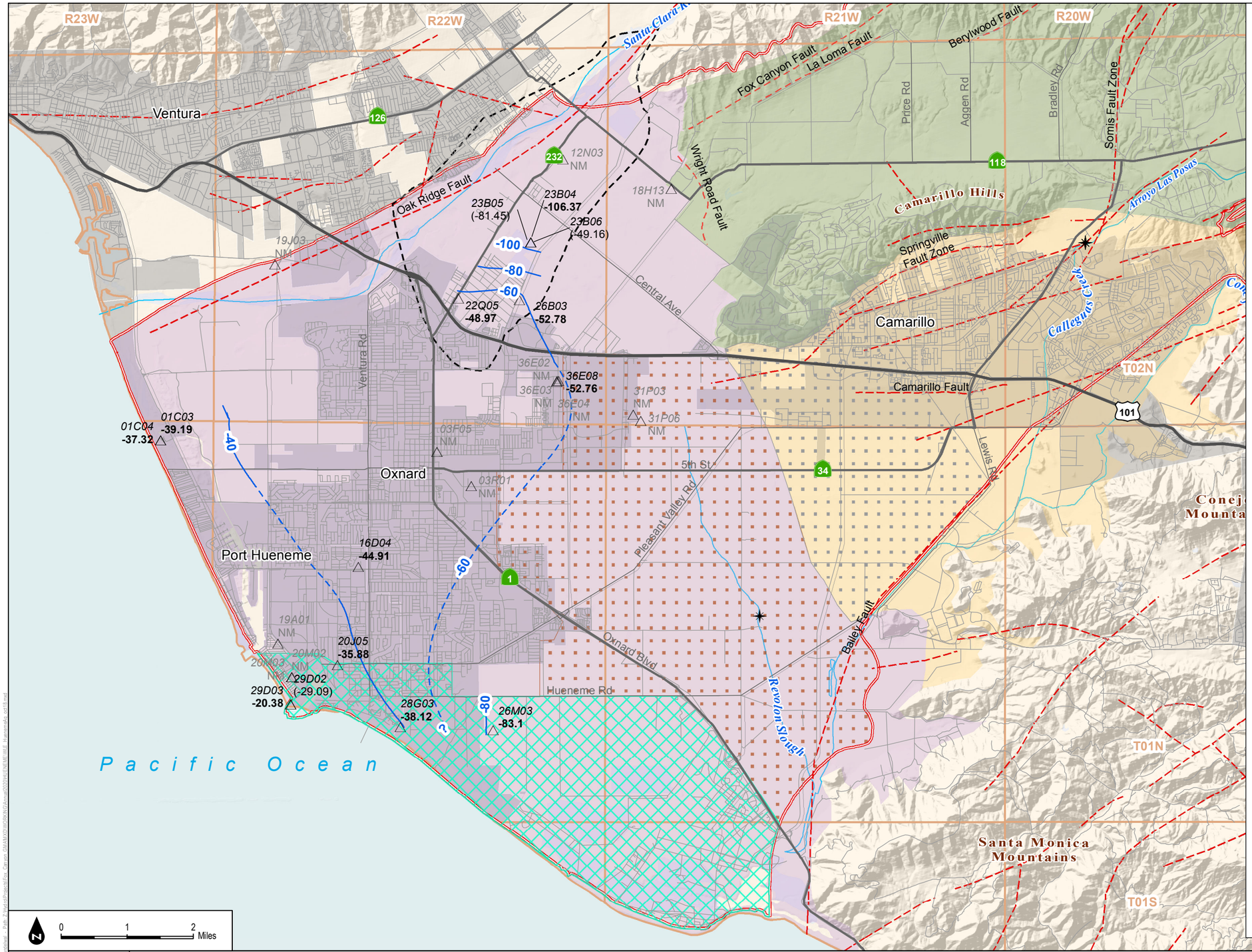
4) All elevation values are in feet above mean sea level (ft AMSL).

5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-19

Groundwater Elevation Contours in the Hueneme Aquifer, March 2-29, 2018



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

△ Wells screened in the Hueneme Aquifer

✶ New Nested Monitoring Well Cluster

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)

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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).

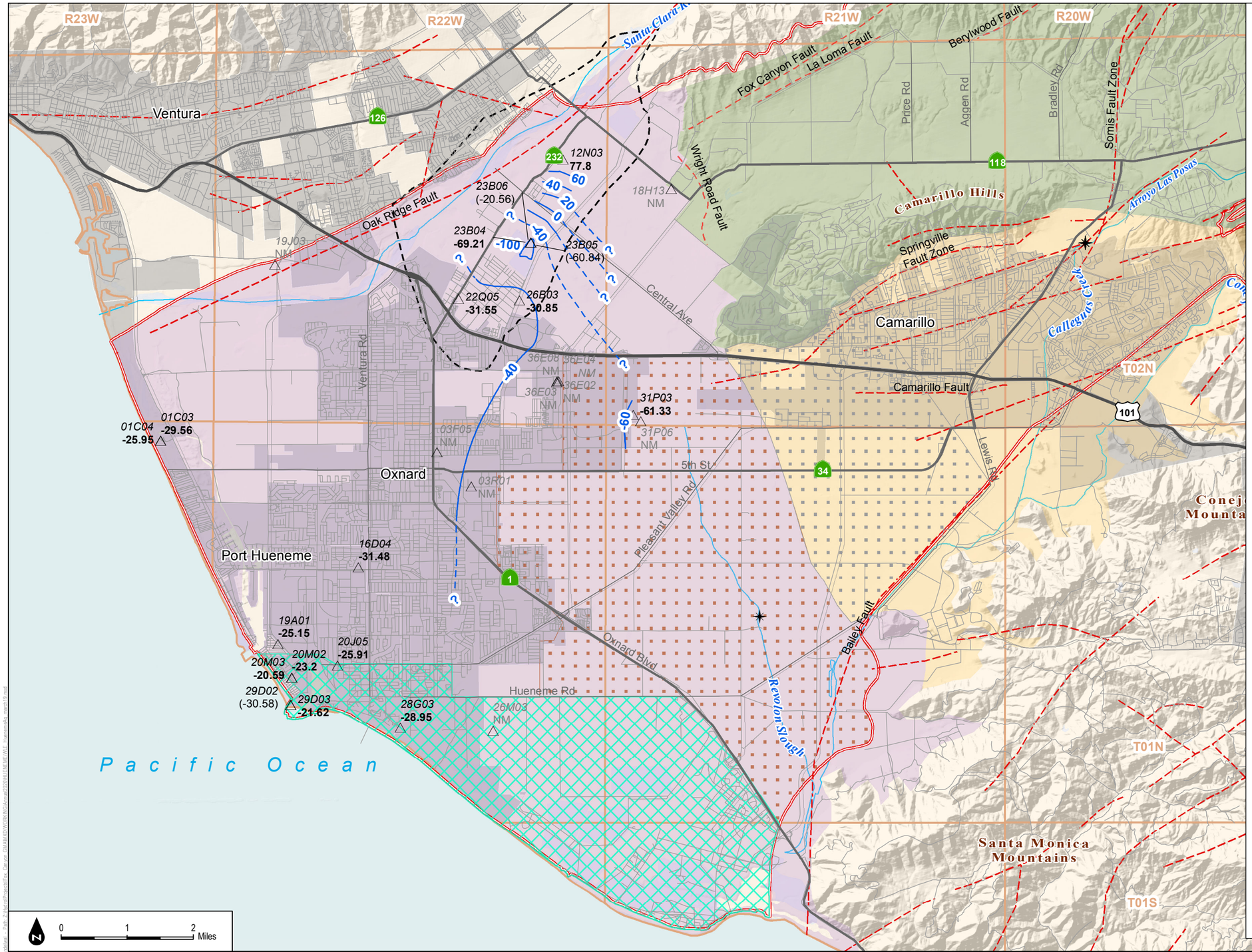
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-20

Groundwater Elevation Contours in the Hueneme Aquifer, October 2-29, 2018

DUDEK



Legend

Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.

△ Wells screened in the Hueneme Aquifer

✶ New Nested Monitoring Well Cluster

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)

Pleasant Valley Pumping trough Management Area

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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.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-21

Groundwater Elevation Contours in the Hueneme Aquifer, March 2-29, 2019

DUDEK

Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells Screened in the Fox Canyon Aquifer
- New Nested Monitoring Well Cluster
- *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)
- Oxnard Forebay
- 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)

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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.

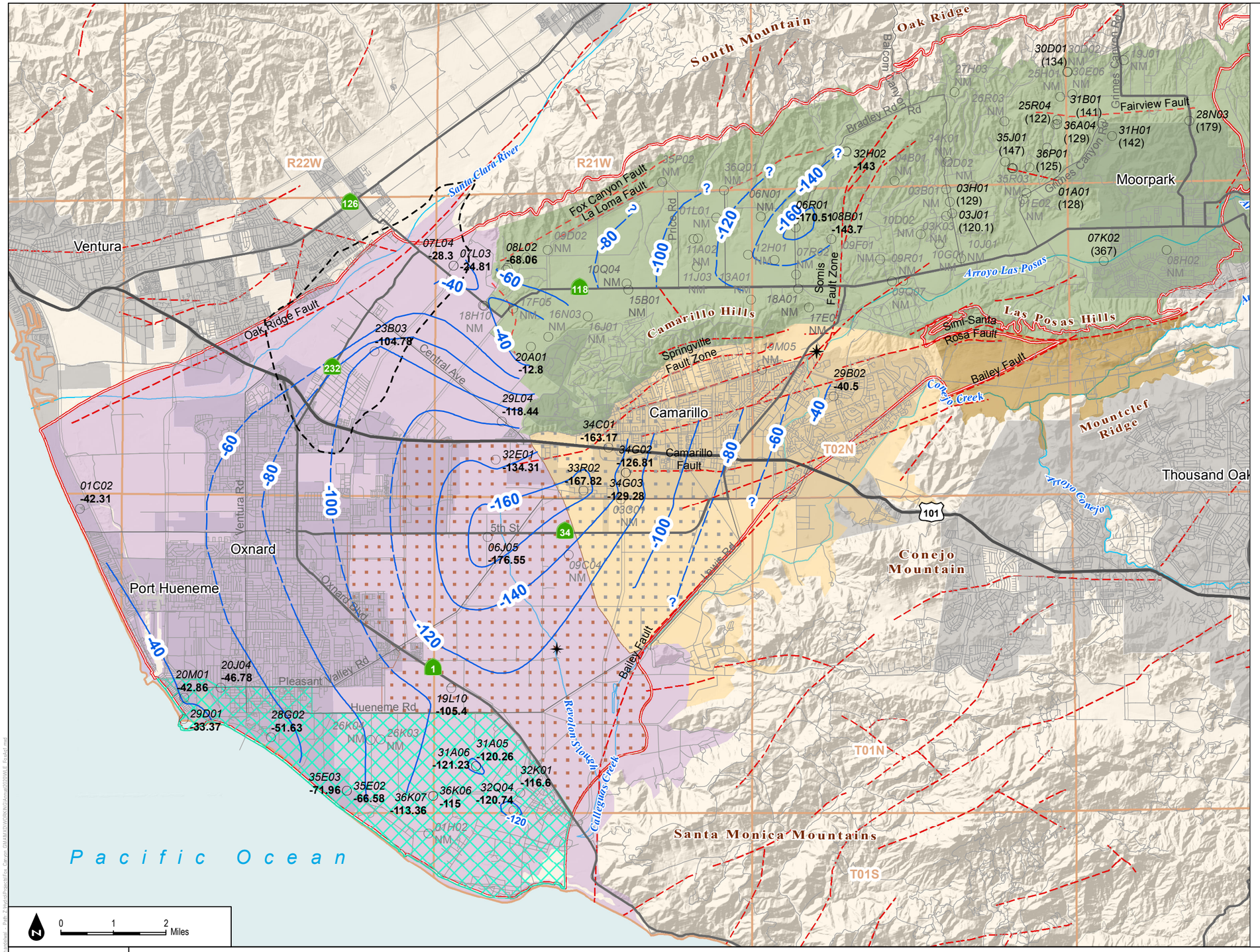
0 1 2 Miles

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-22

Groundwater Elevation Contours in the Fox Canyon Aquifer, March 2-29, 2016

DUDEK



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells Screened in the Fox Canyon Aquifer
- New Nested Monitoring Well Cluster
- *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)
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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 2-23

Groundwater Elevation Contours in the Fox Canyon Aquifer, October 2-29, 2016

Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells Screened in the Fox Canyon Aquifer
- New Nested Monitoring Well Cluster
- *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)
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Notes:

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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).
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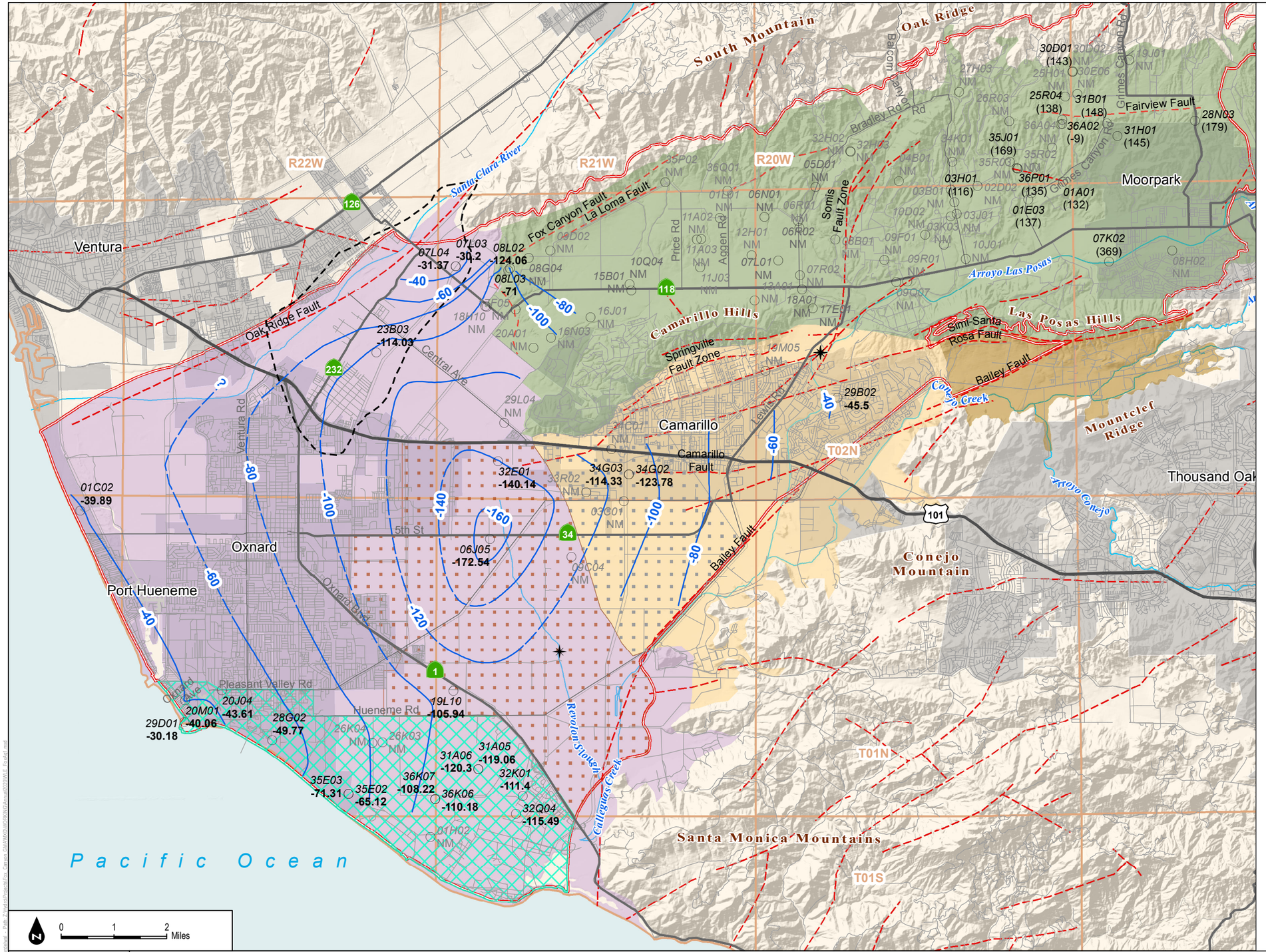
0 1 2 Miles

SOURCE: DWR; Ventura County; UWCD; CMWD

DUDEK

FIGURE 2-24

Groundwater Elevation Contours in the Fox Canyon Aquifer, March 2-29, 2017



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells Screened in the Fox Canyon Aquifer
- New Nested Monitoring Well Cluster
- *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)
- Oxnard Forebay
- Oxnard Pumping Depression Management Area
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Notes:

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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.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-25

Groundwater Elevation Contous in the Fox Canyon Aquifer, October 2-29, 2017

Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells Screened in the Fox Canyon Aquifer
- New Nested Monitoring Well Cluster
- *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)
- Oxnard Forebay
- Oxnard Pumping Depression Management Area
- Pleasant Valley Pumping trough Management Area
- Saline Intrusion Management Area
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- Pleasant Valley (4-006)
- Oxnard (4-004.02)

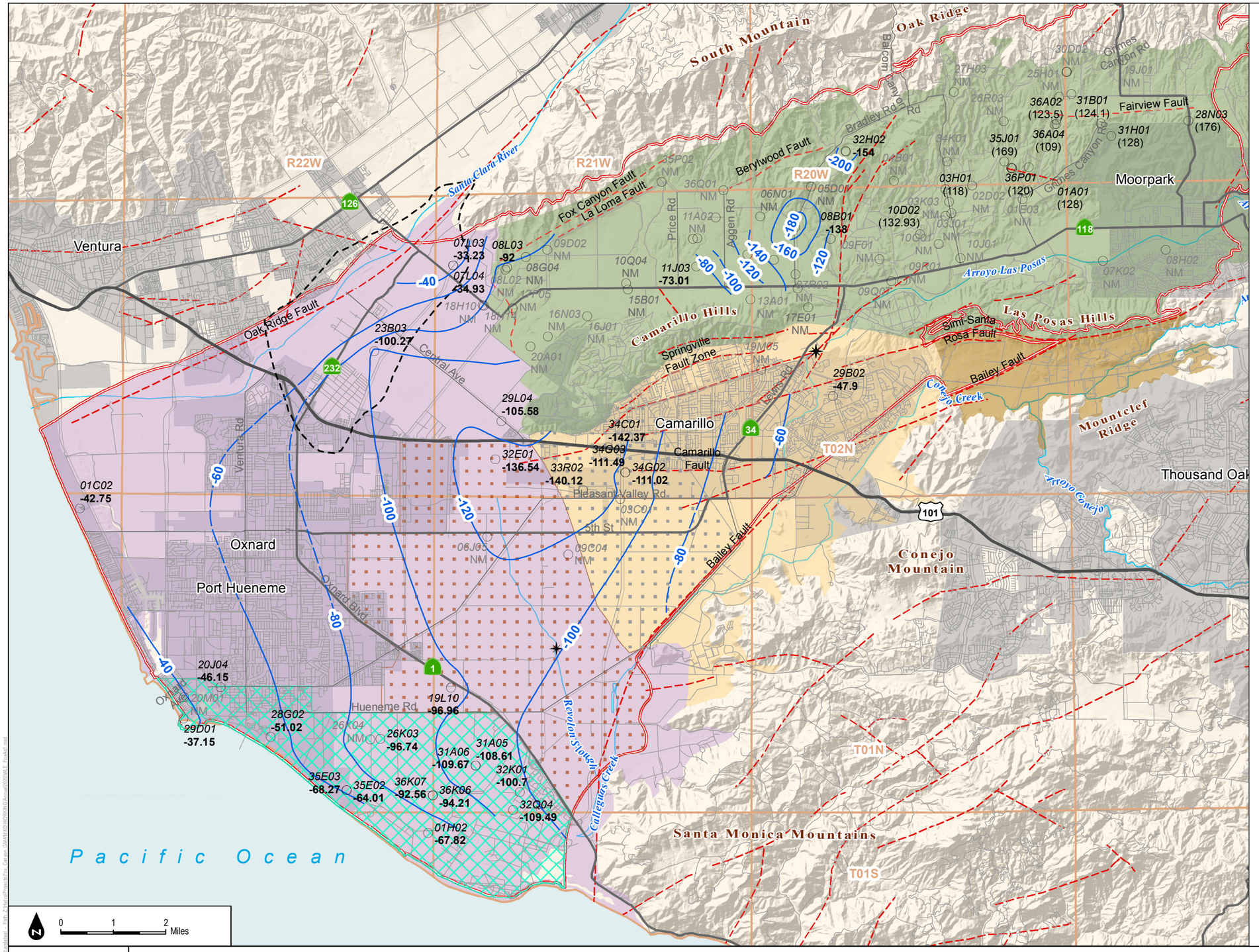
Notes:
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, 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.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-26

Groundwater Elevation Contours in the Fox Canyon Aquifer, March 2-29, 2018

DUDEK



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells Screened in the Fox Canyon Aquifer
- New Nested Monitoring Well Cluster
- 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)
- Oxnard Forebay
- Oxnard Pumping Depression Management Area
- Pleasant Valley Pumping trough Management Area
- Saline Intrusion Management
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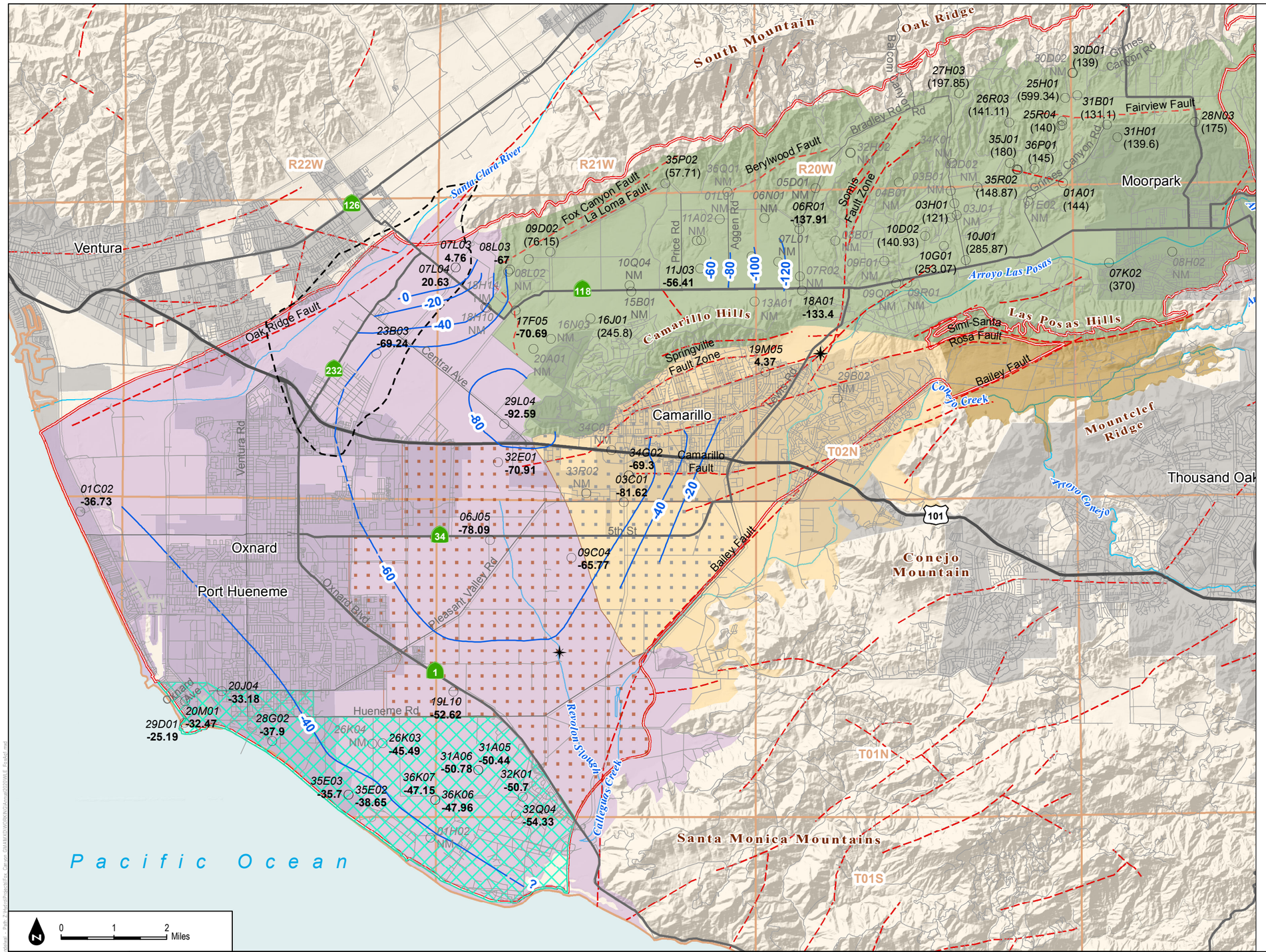
Notes:

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.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-27

Groundwater Elevation Contours in the Fox Canyon Aquifer, October 2-29, 2018



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells Screened in the Fox Canyon Aquifer
- New Nested Monitoring Well Cluster
- *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)
- Oxnard Forebay
- Oxnard Pumping Depression Management Area
- Pleasant Valley Pumping trough Management Area
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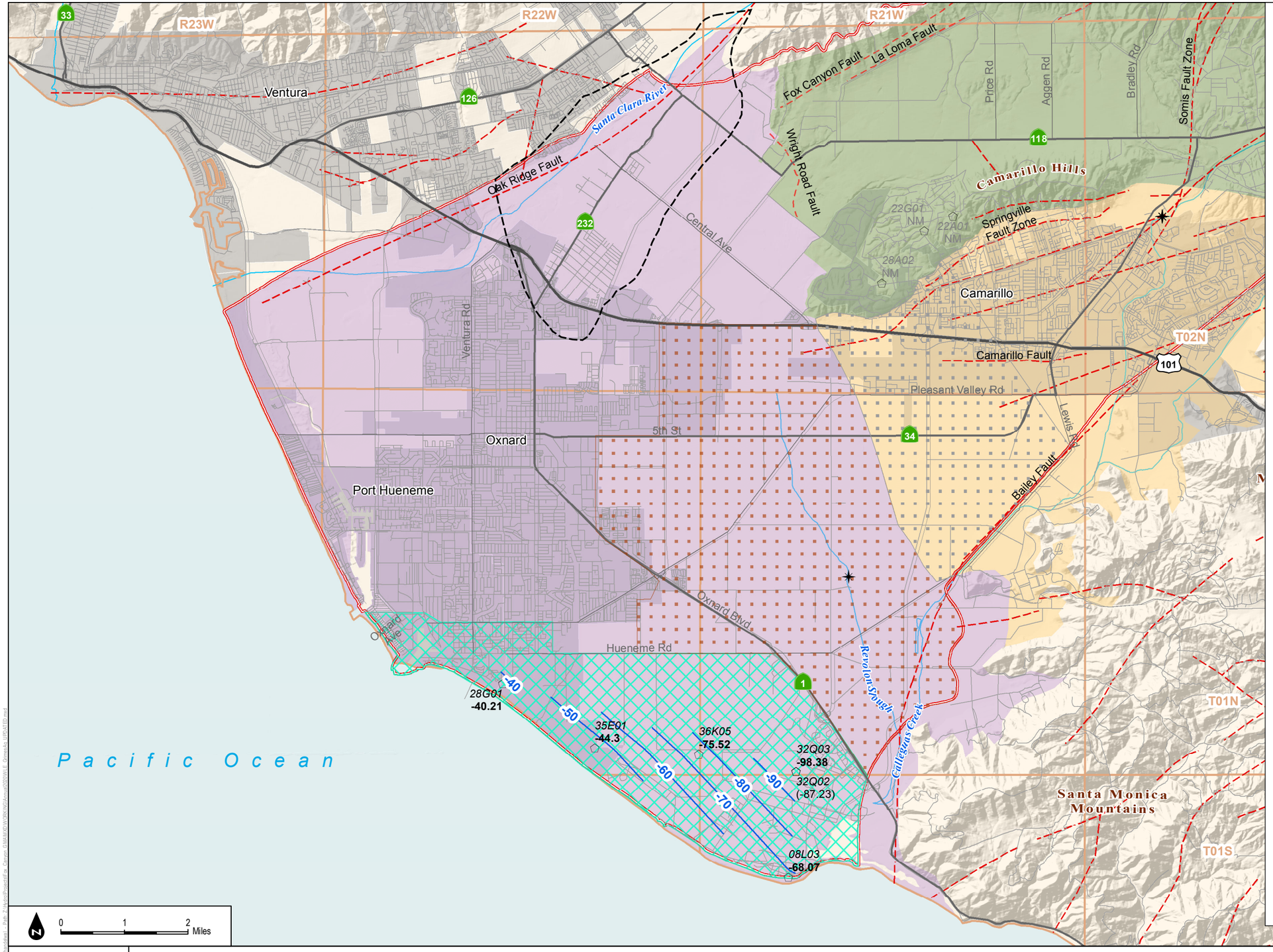
Notes:

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.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-28

Groundwater Elevation Contours in the Fox Canyon Aquifer, March 2-29, 2019



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in Grimes Canyon Aquifer
- New Nested Monitoring Well Cluster
- *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)
- Oxnard Forebay
- Pleasant Valley Pumping Trough Management Area
- Oxnard Pumping Depression Management Area
- Saline Intrusion Management Area

Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

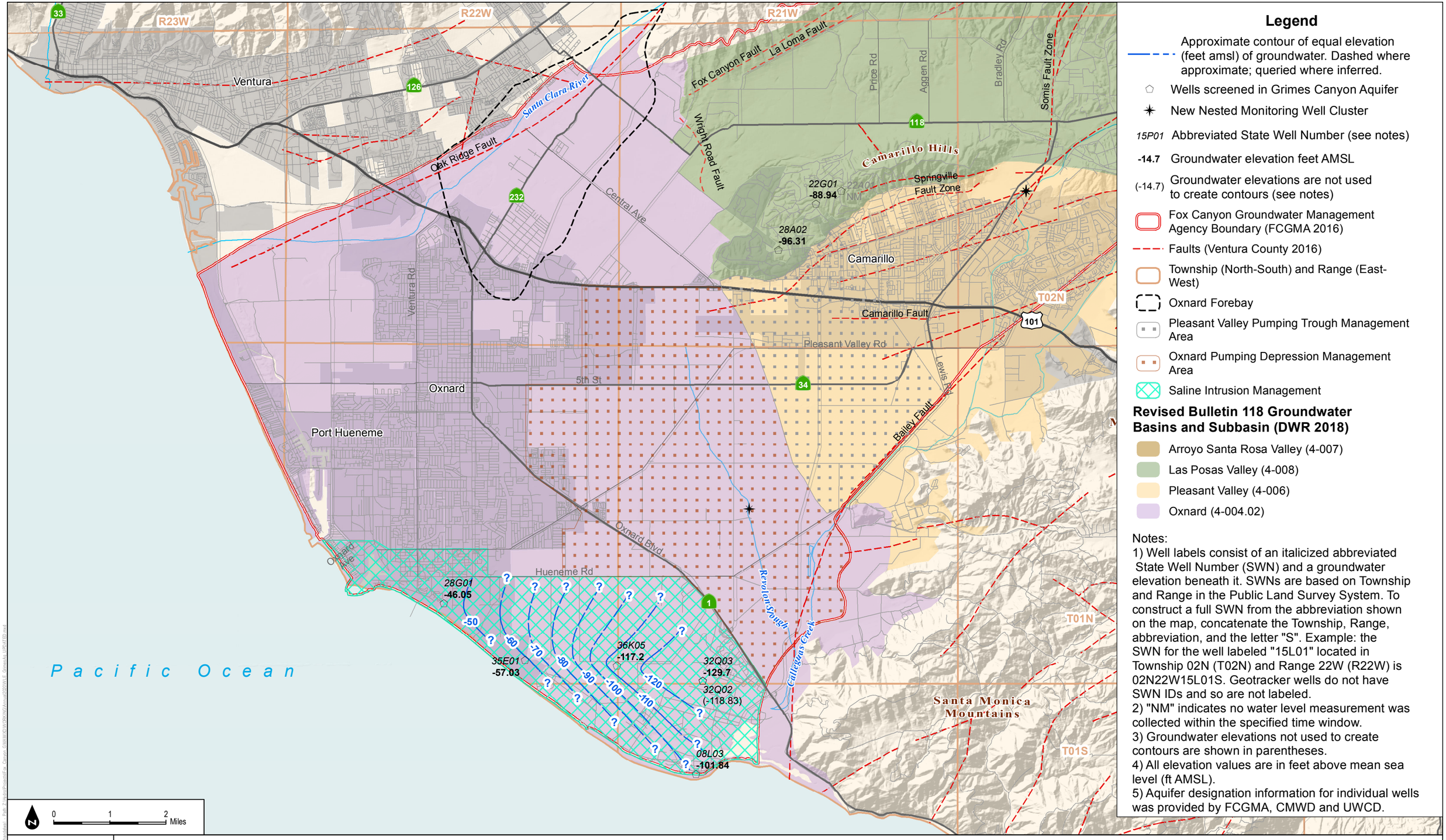
- Arroyo Santa Rosa Valley (4-007)
- Las Posas Valley (4-008)
- Pleasant Valley (4-006)
- Oxnard (4-004.02)

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.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-29

Groundwater Elevation Contours in the Grimes Canyon Aquifer, March 2-29, 2016



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in Grimes Canyon Aquifer
- New Nested Monitoring Well Cluster
- *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)
- Oxnard Forebay
- Pleasant Valley Pumping Trough Management Area
- Oxnard Pumping Depression Management Area
- Saline Intrusion Management

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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.
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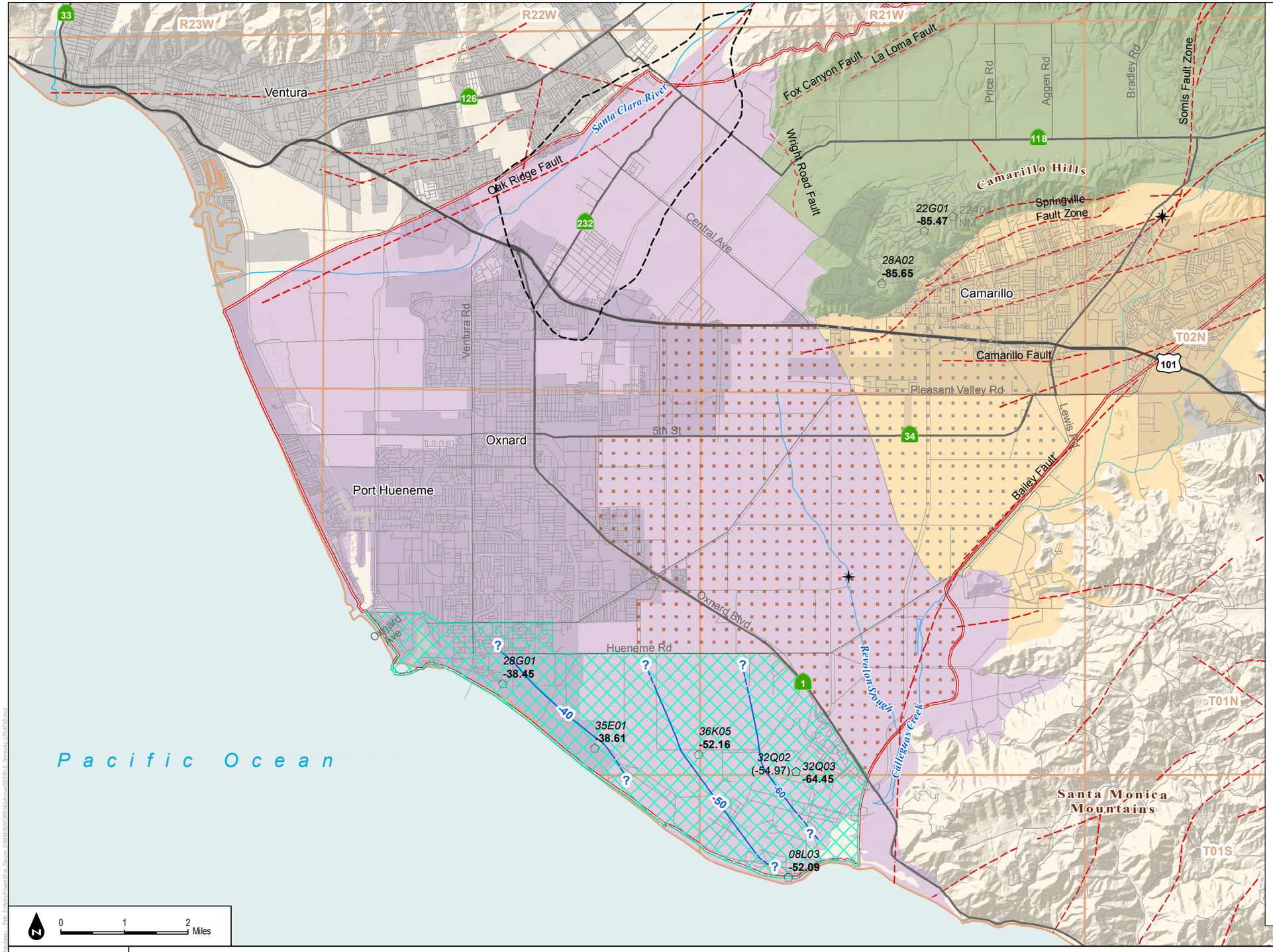
3) Groundwater elevations not used to create contours are shown in parentheses.
4) All elevation values are in feet above mean sea level (ft AMSL).
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-30

Groundwater Elevation Contours in the Grimes Canyon Aquifer, October 2-29, 2016



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in Grimes Canyon Aquifer
- New Nested Monitoring Well Cluster
- *15P01* Abbreviated State Well Number (see notes)
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- (-14.7) Groundwater elevations are not used to create contours (see notes)
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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.
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3) Groundwater elevations not used to create contours are shown in parentheses.
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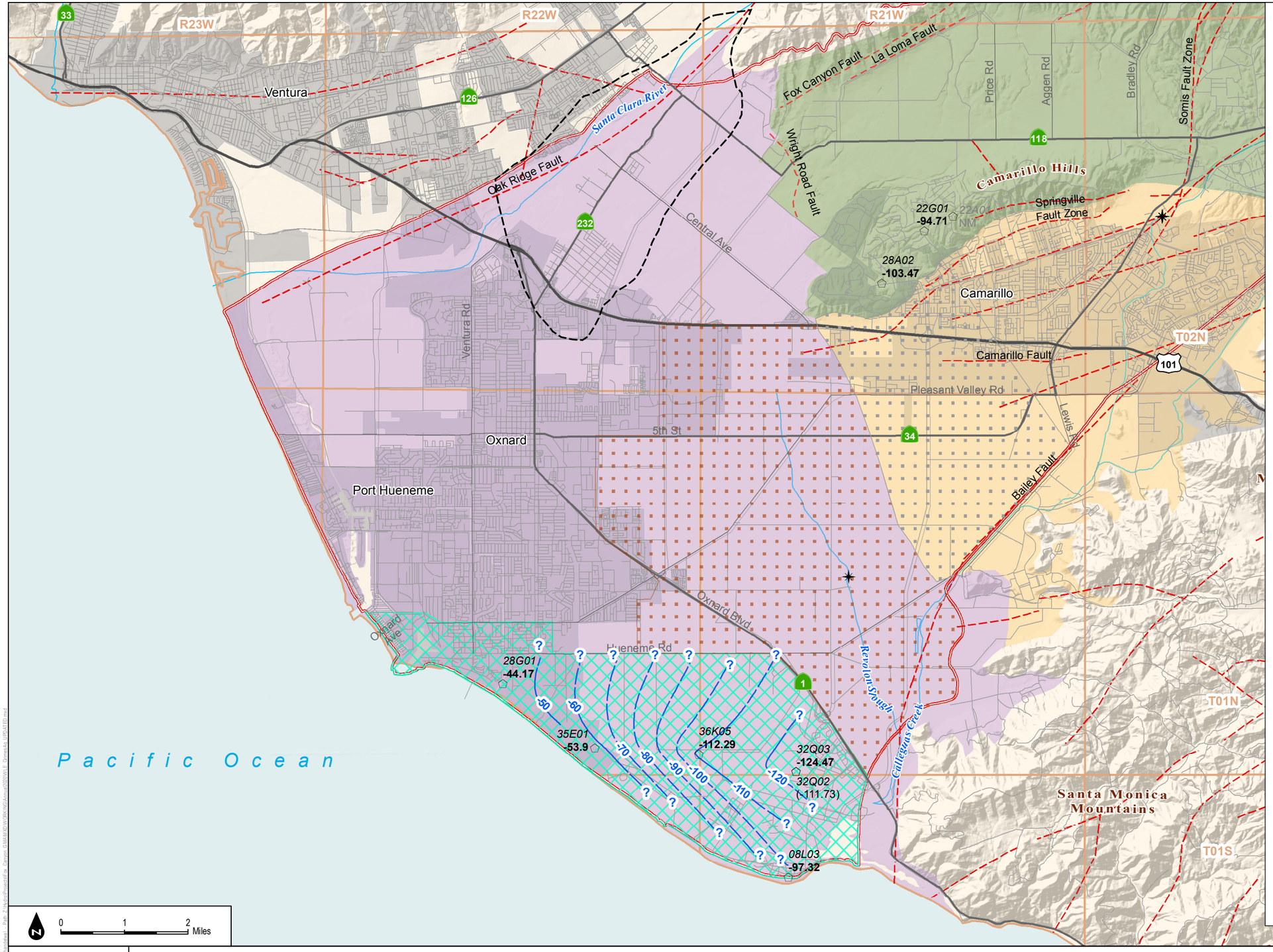
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-31

Groundwater Elevation Contours in the Grimes Canyon Aquifer, March 2-29, 2017



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in Grimes Canyon Aquifer
- New Nested Monitoring Well Cluster
- *15P01* Abbreviated State Well Number (see notes)
- **-14.7** Groundwater elevation feet AMSL
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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.
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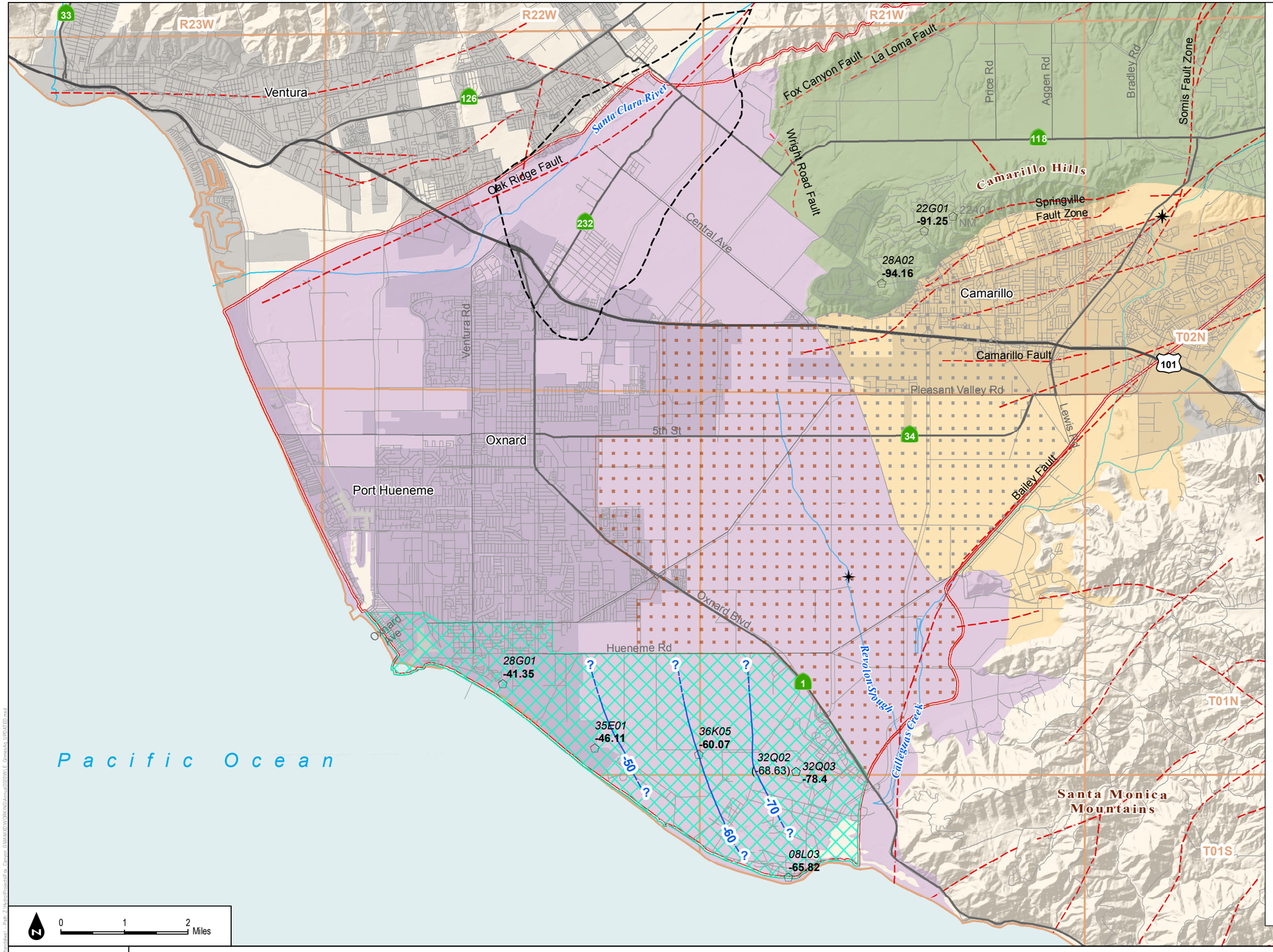
4) All elevation values are in feet above mean sea level (ft AMSL).
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-32

Groundwater Elevation Contours in the Grimes Canyon Aquifer, October 2-29, 2017



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in Grimes Canyon Aquifer
- New Nested Monitoring Well Cluster
- *15P01* Abbreviated State Well Number (see notes)
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Notes:

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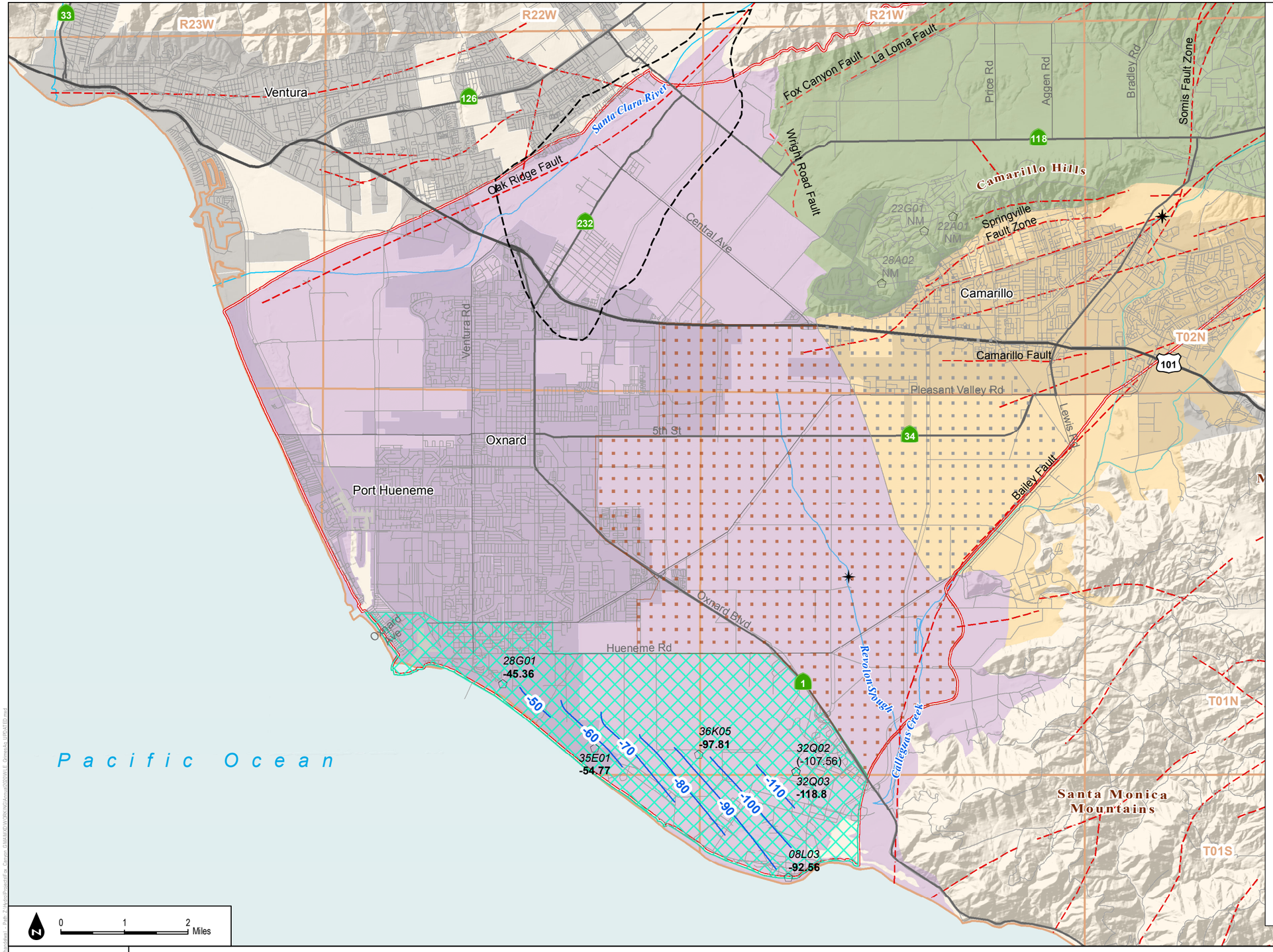
3) Groundwater elevations not used to create contours are shown in parentheses.
4) All elevation values are in feet above mean sea level (ft AMSL).
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-33

Groundwater Elevation Contours in the Grimes Canyon Aquifer, March 2-29, 2018



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in Grimes Canyon Aquifer
- New Nested Monitoring Well Cluster
- *15P01* Abbreviated State Well Number (see notes)
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4) All elevation values are in feet above mean sea level (ft AMSL).
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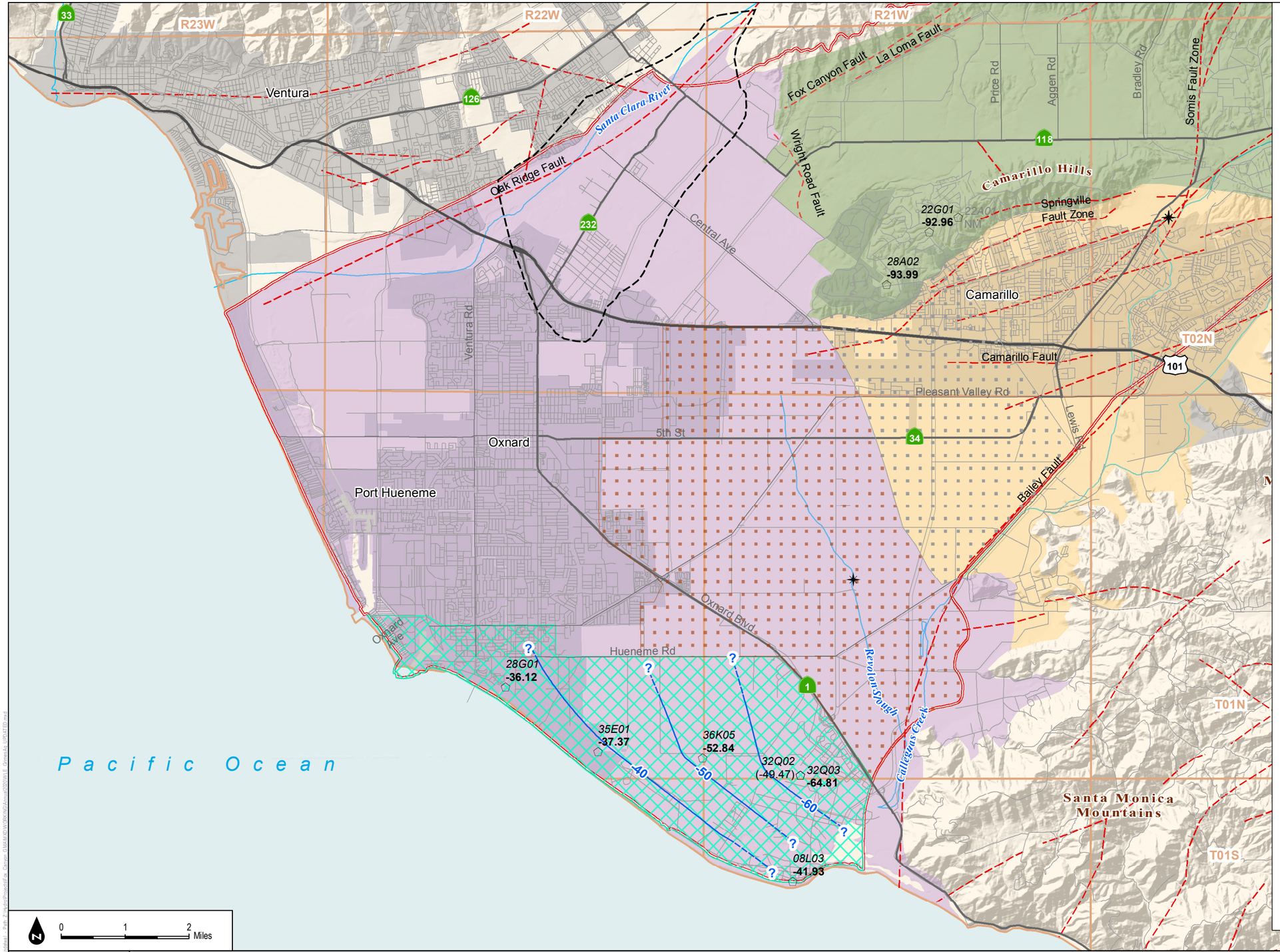
SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-34

Groundwater Elevation Contours in the Grimes Canyon Aquifer, October 2-29, 2018



Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells screened in Grimes Canyon Aquifer
- New Nested Monitoring Well Cluster
- *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)
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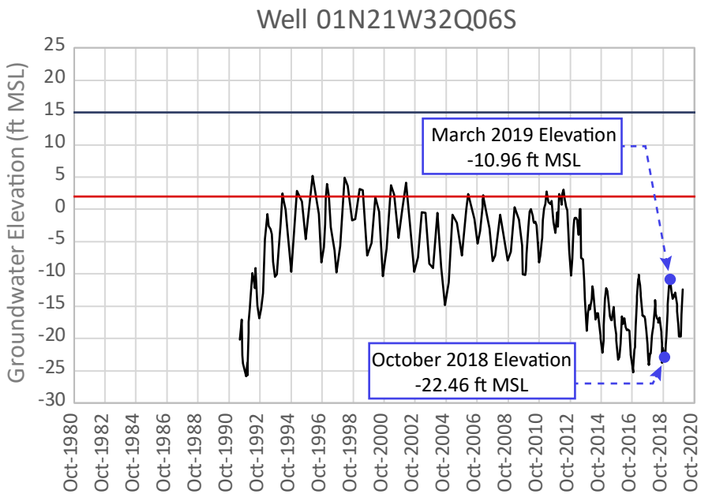
Notes:

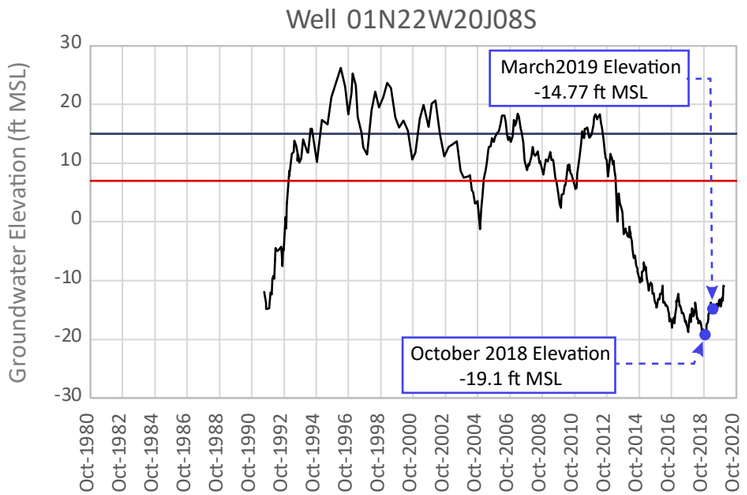
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and 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.

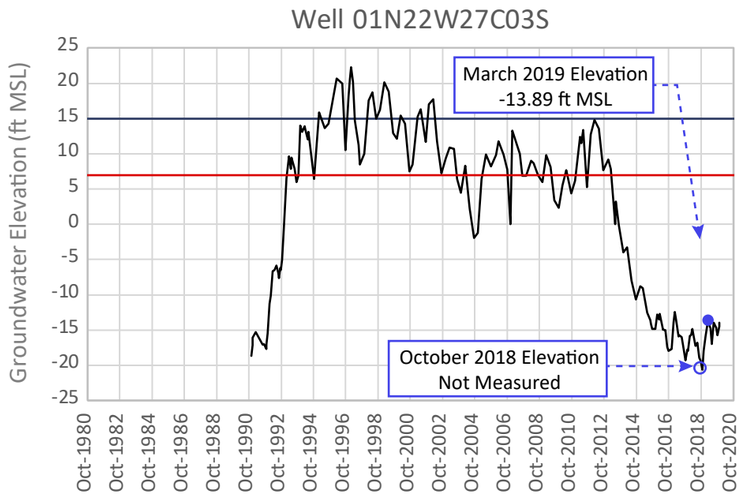
SOURCE: DWR; Ventura County; UWCD; CMWD

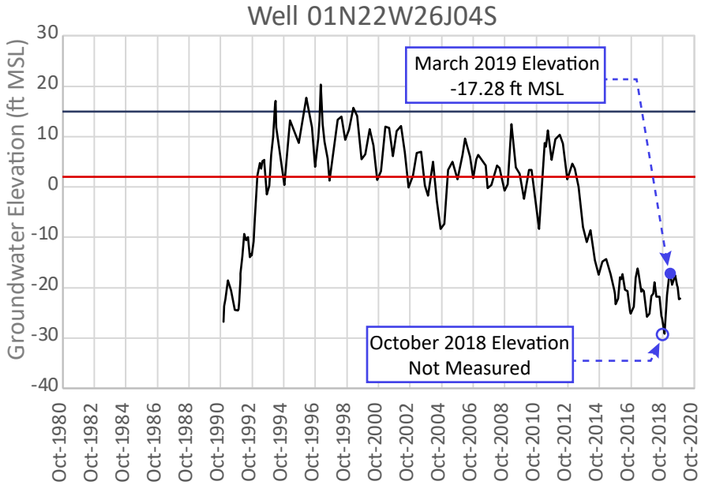
FIGURE 2-35

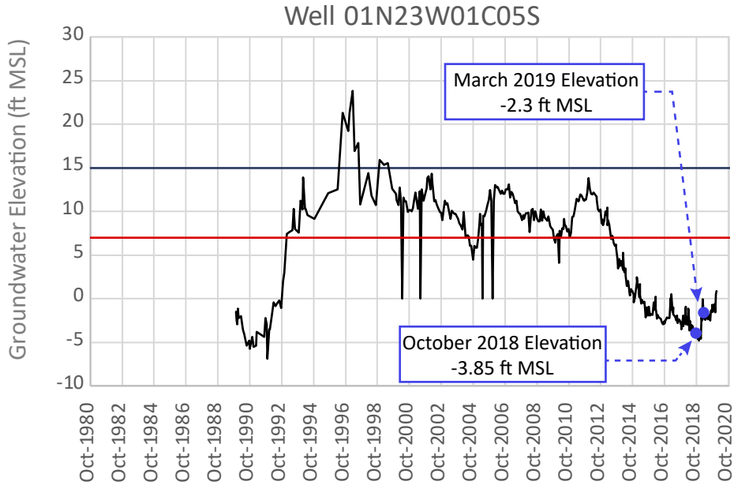
Groundwater Elevation Contours in the Grimes Canyon Aquifer, March 2-29, 2019

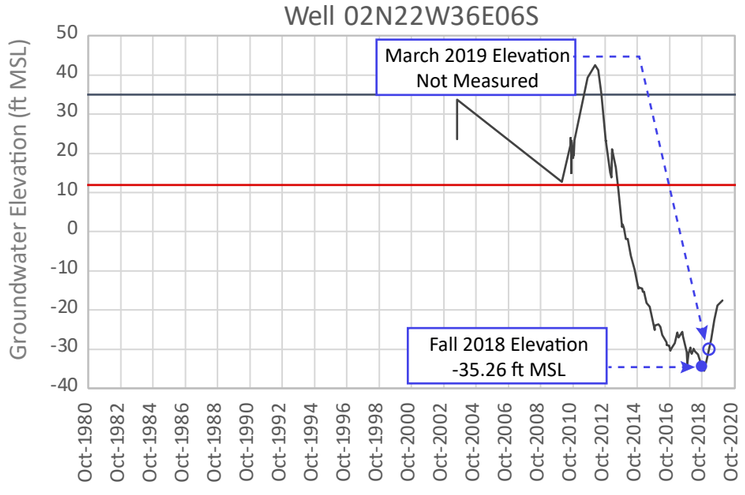








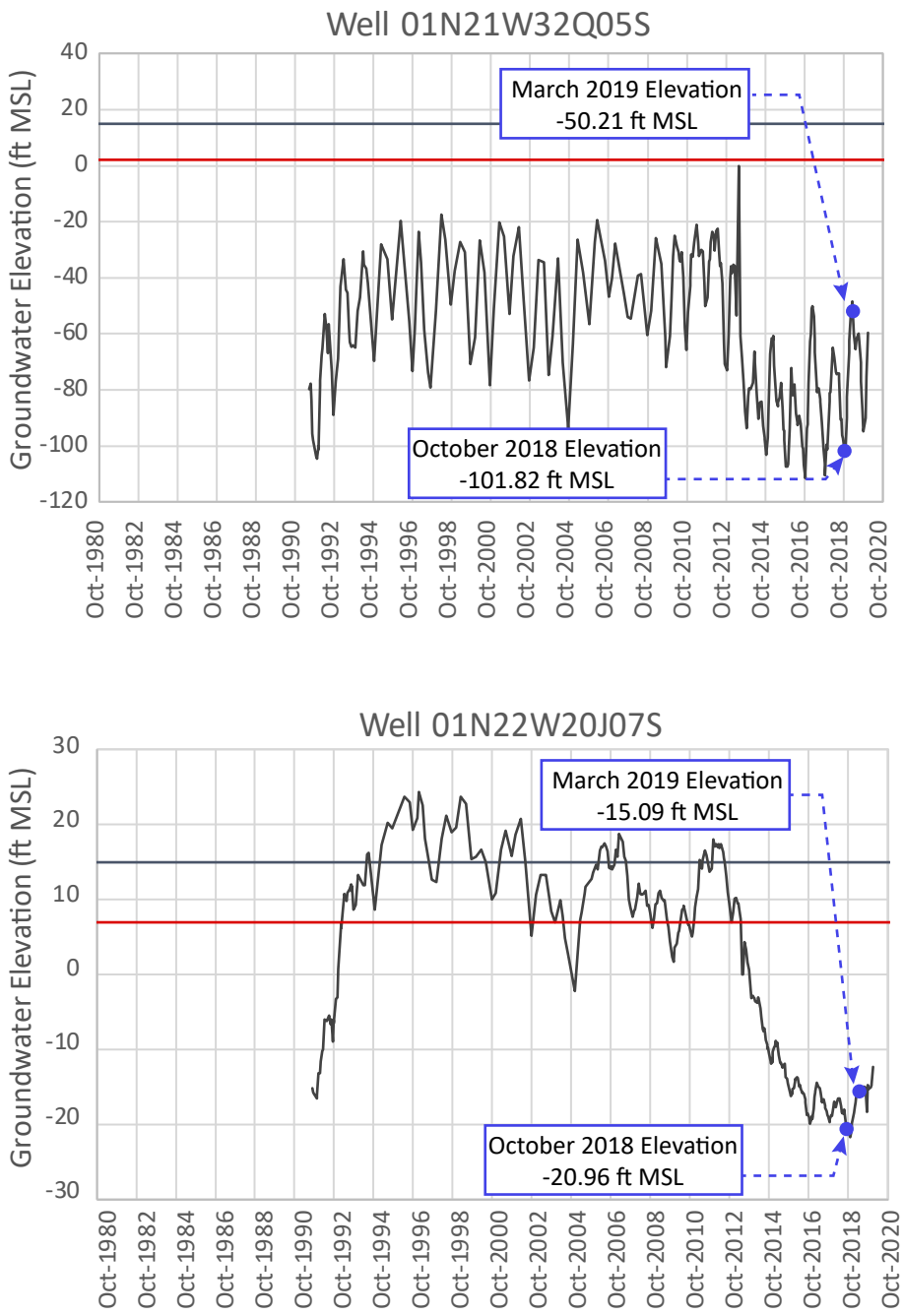


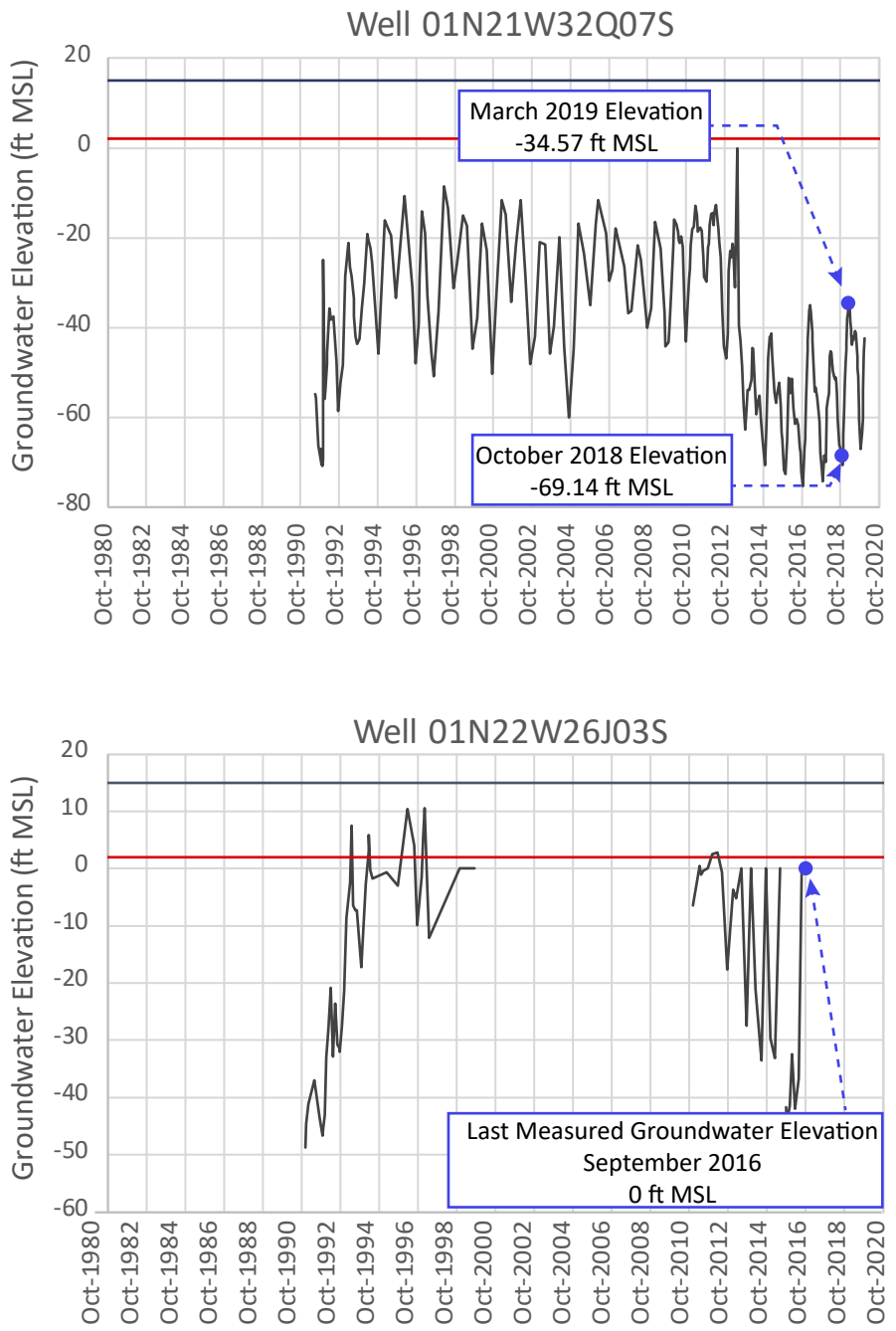


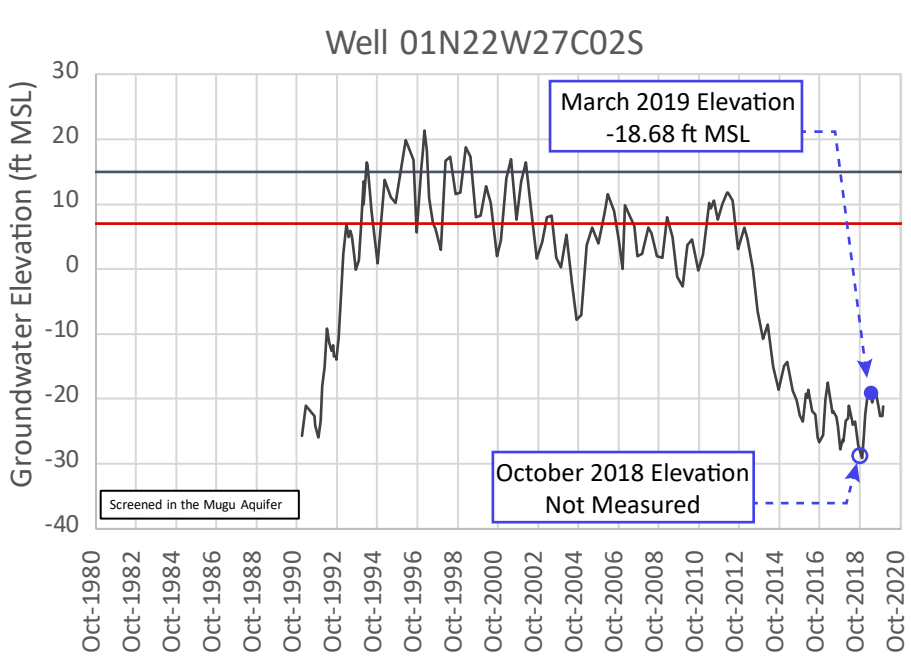
Groundwater Elevation | Minimum Threshold | Measurable Objective | Measurement not collected between October 2 and October 29, 2018 or March 2 and March 29, 2019

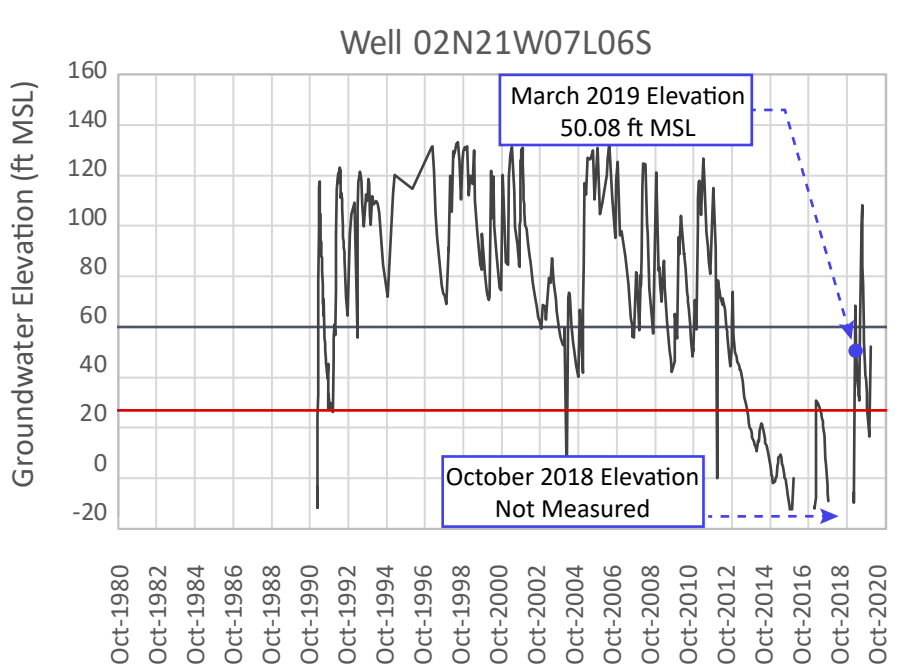
FIGURE 2-36

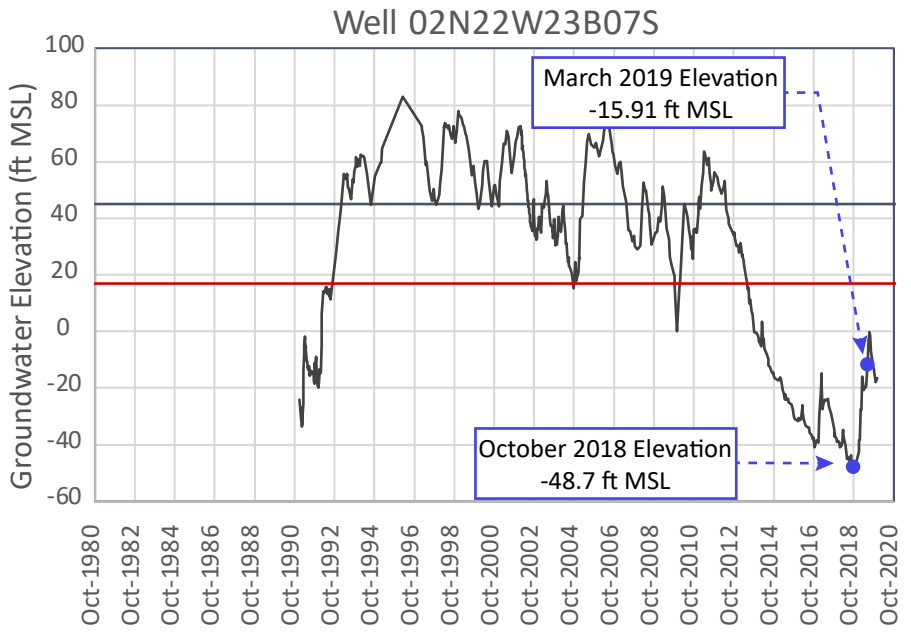
Groundwater Elevation Hydrographs for Representative Wells Screened in the Oxnard Aquifer

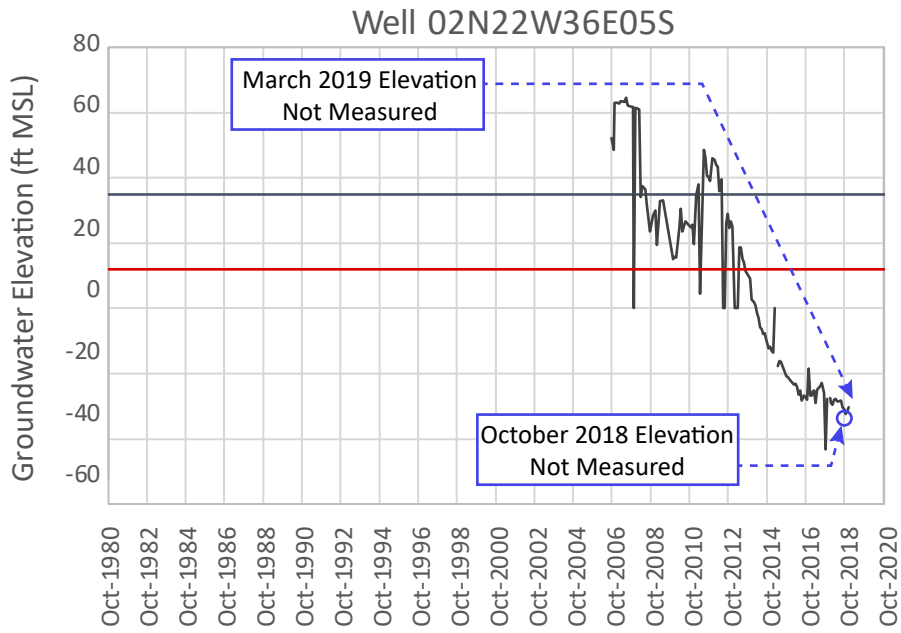










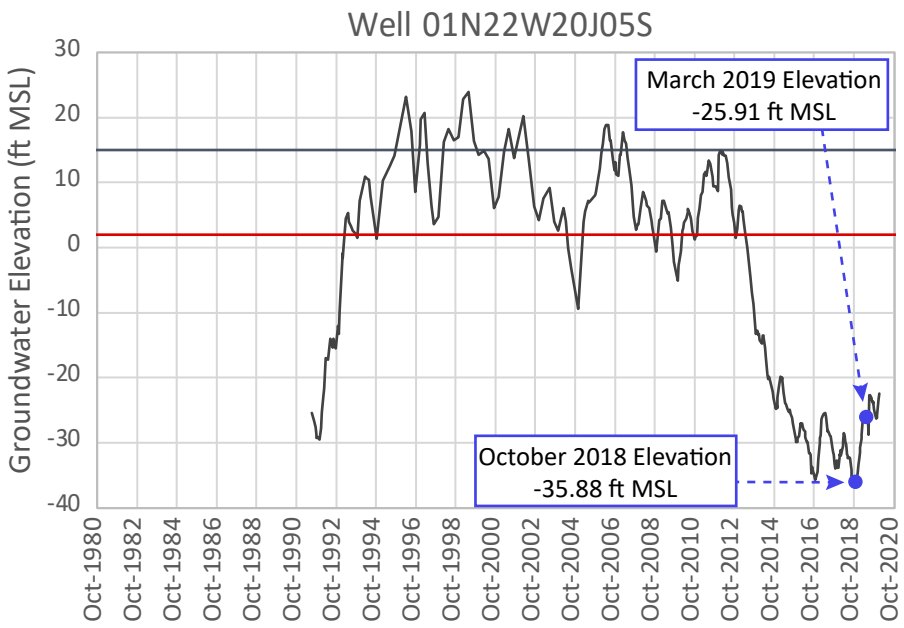


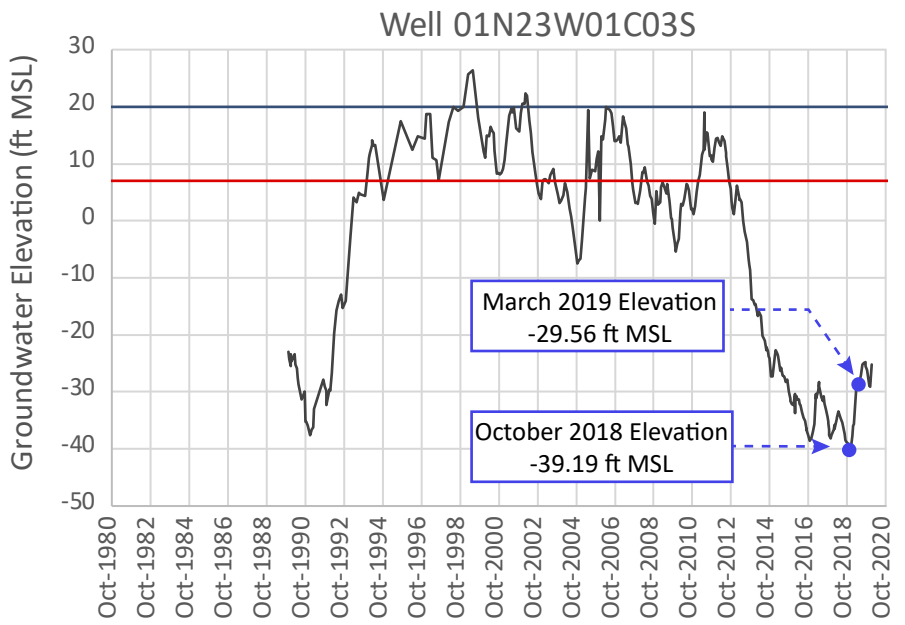
Groundwater Elevation — Minimum Threshold — Measurable Objective

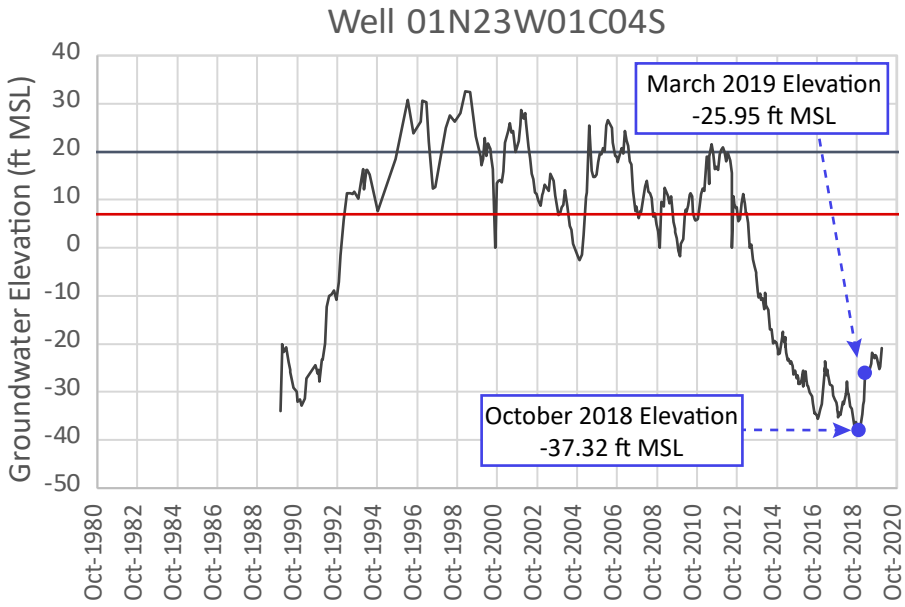
○ Measurement not collected between October 2 and October 29, 2018 or March 2 and March 29, 2019

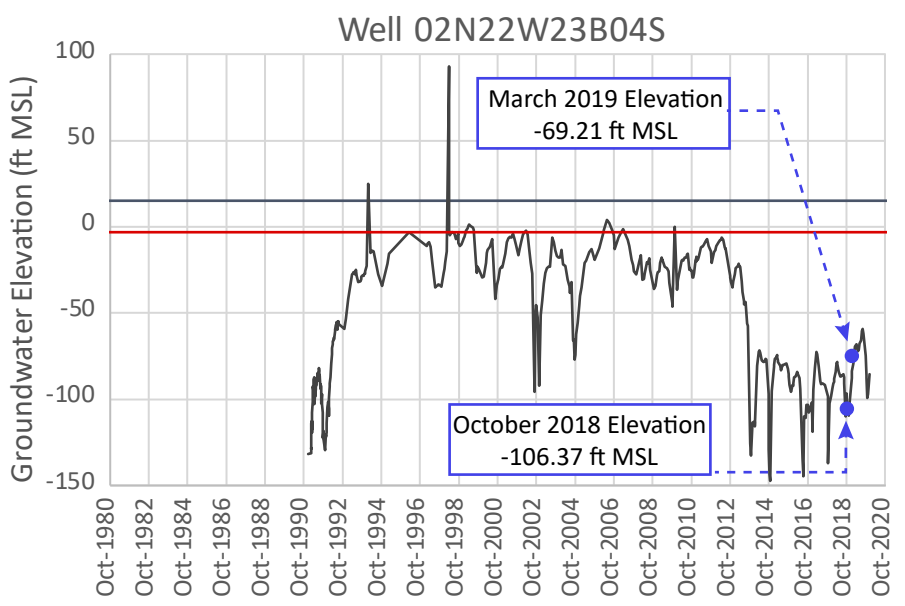
FIGURE 2-37

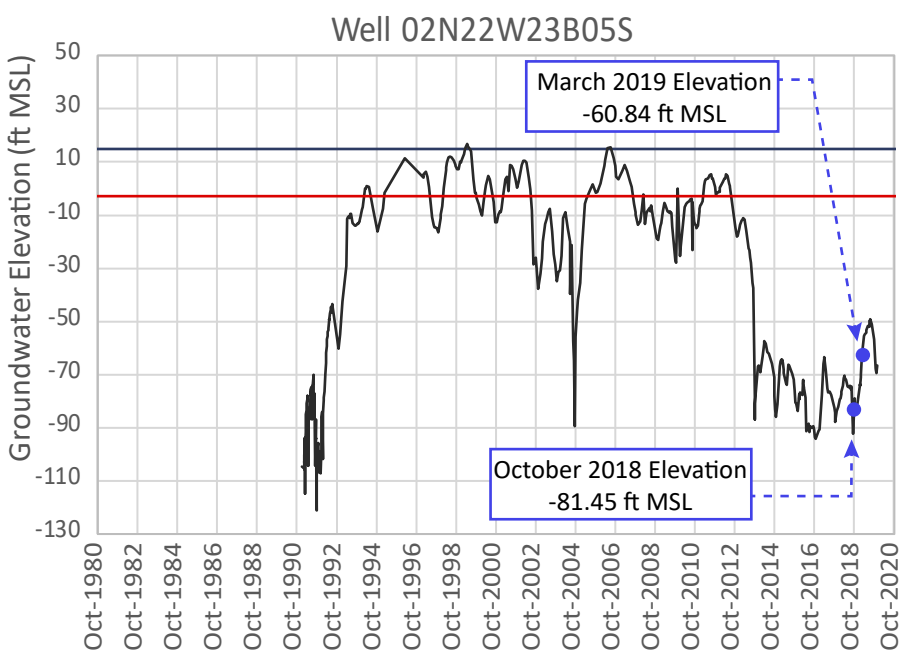
Groundwater Elevation Hydrographs for Representative Wells Screened in the Mugu Aquifer

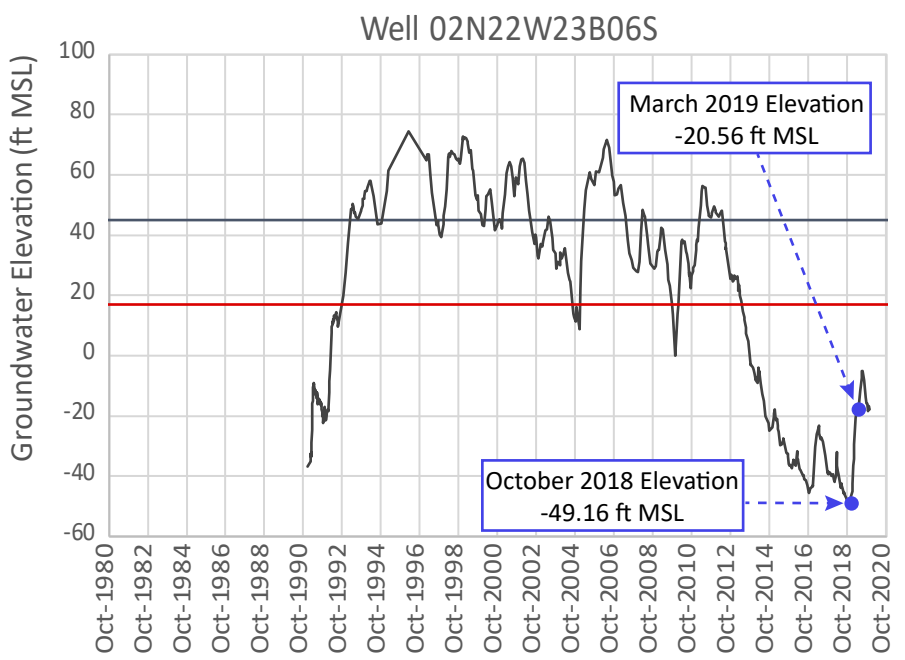


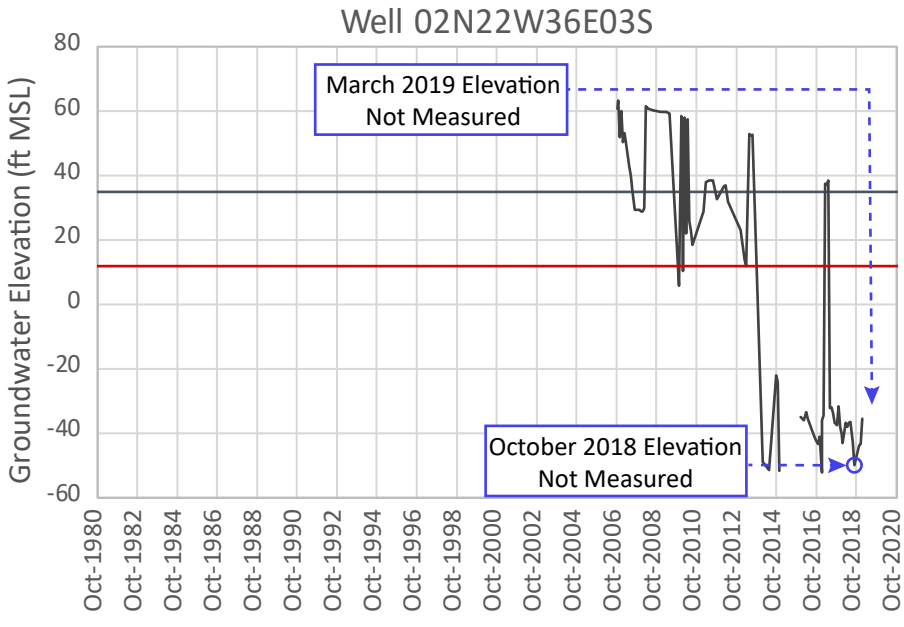


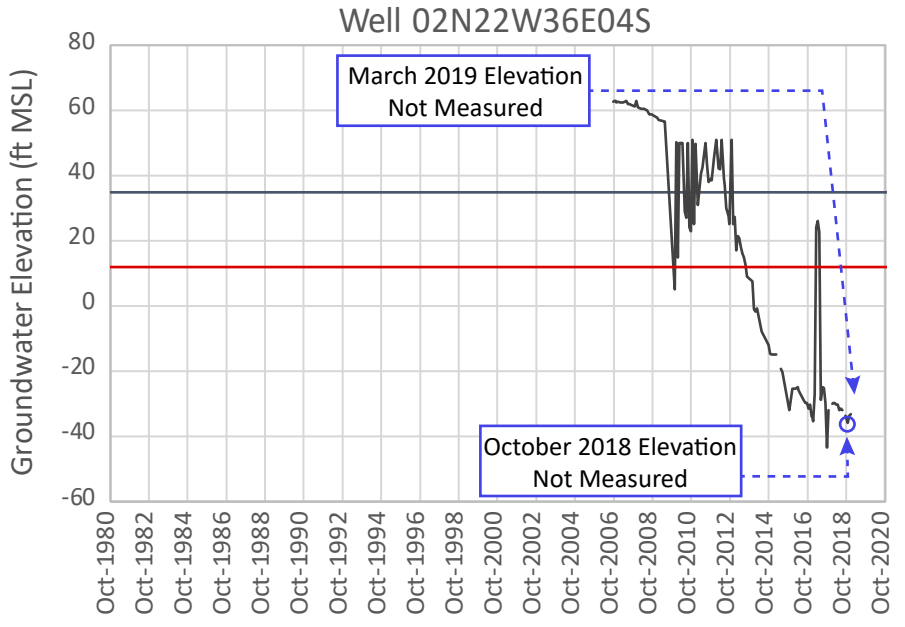










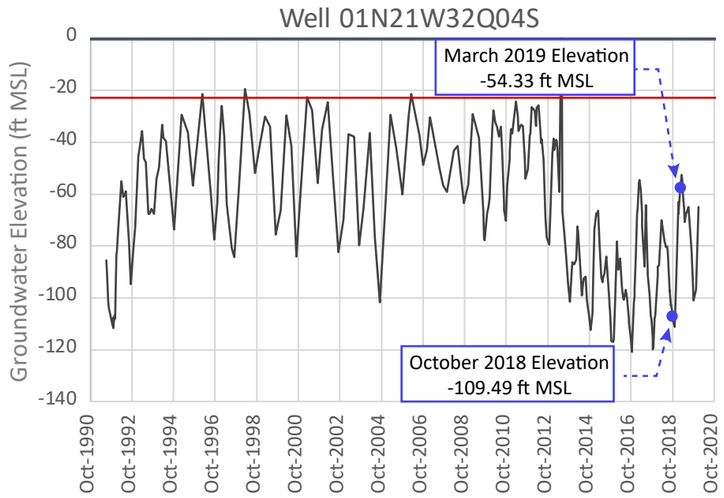


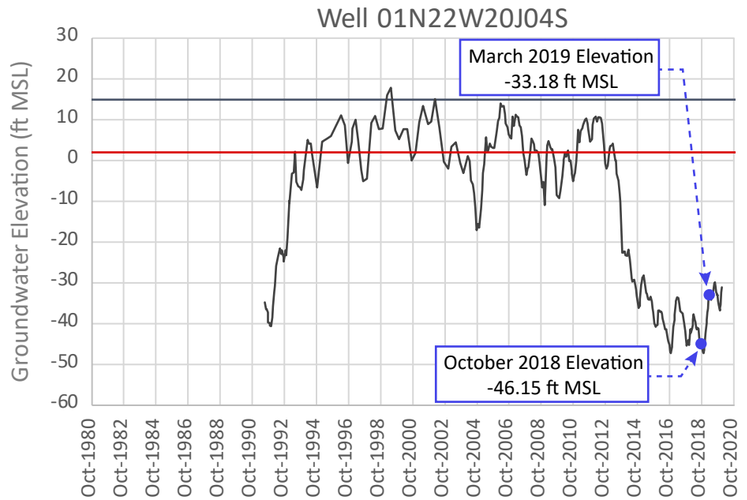
Groundwater Elevation Minimum Threshold Measurable Objective

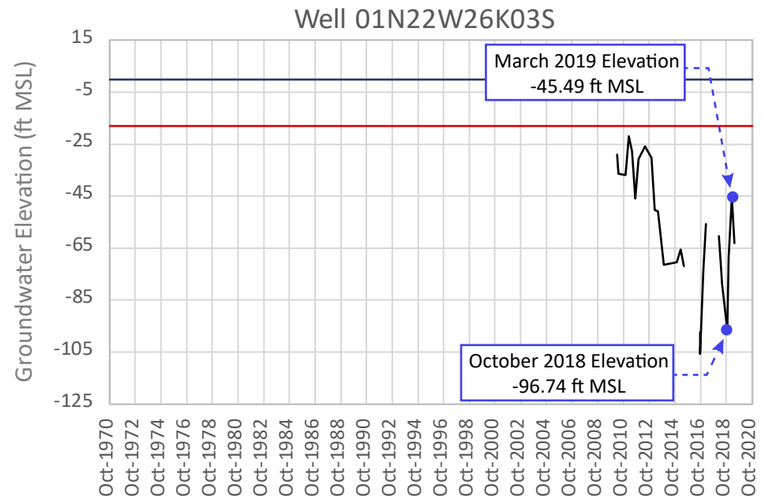
Measurement not collected between October 2 and October 29, 2018 or March 2 and March 29, 2019

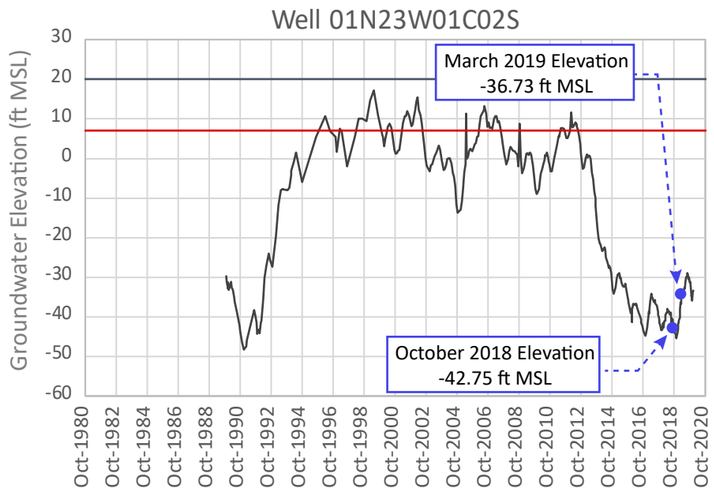
FIGURE 2-38

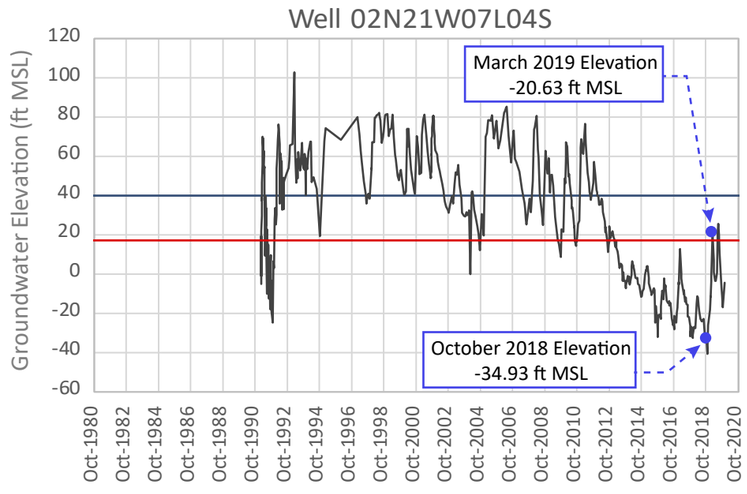
Groundwater Elevation Hydrographs for Representative Wells Screened in the Hueneme Aquifer

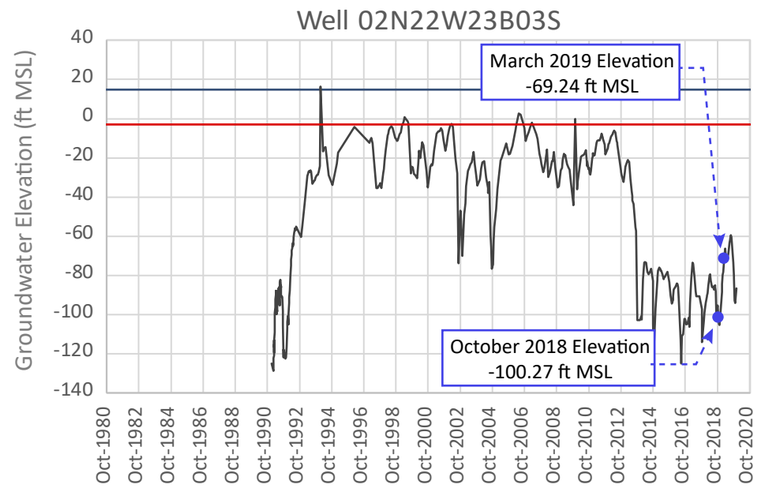








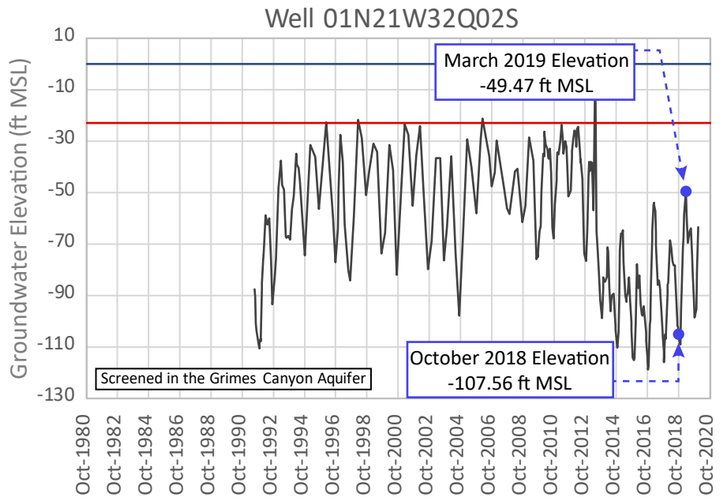


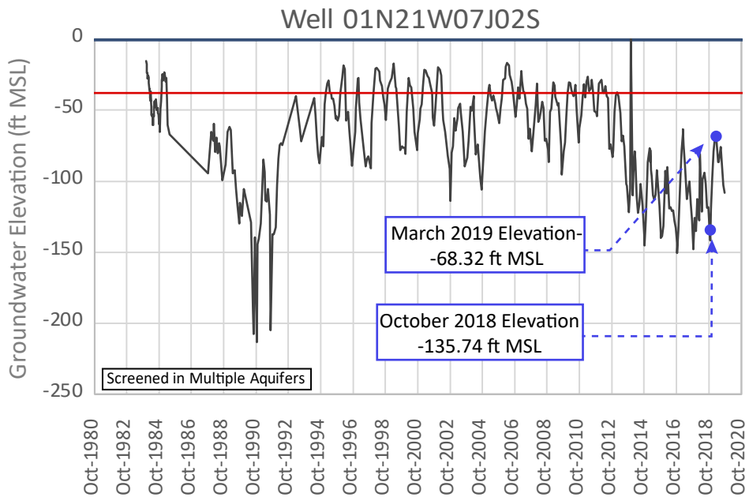


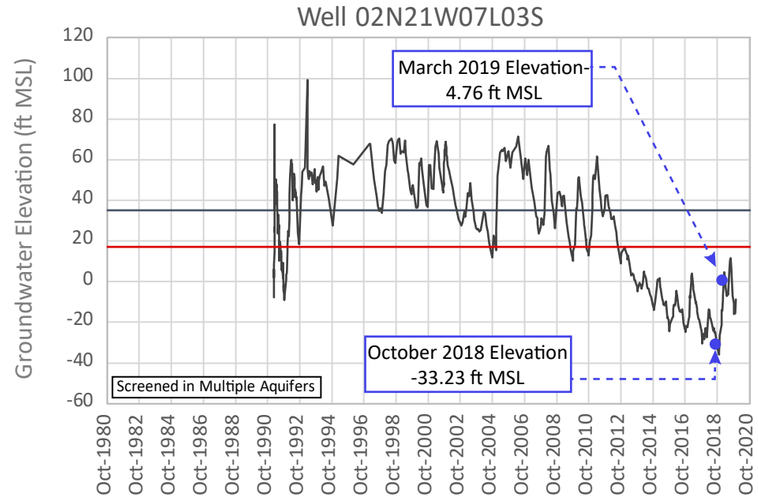
Groundwater Elevation | Minimum Threshold | Measurable Objective | Measurement not collected between October 2 and October 29, 2018 or March 2 and March 29, 2019

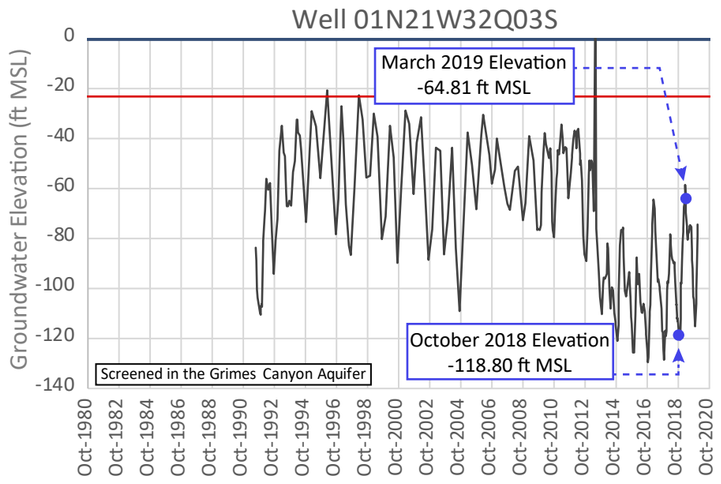
FIGURE 2-39

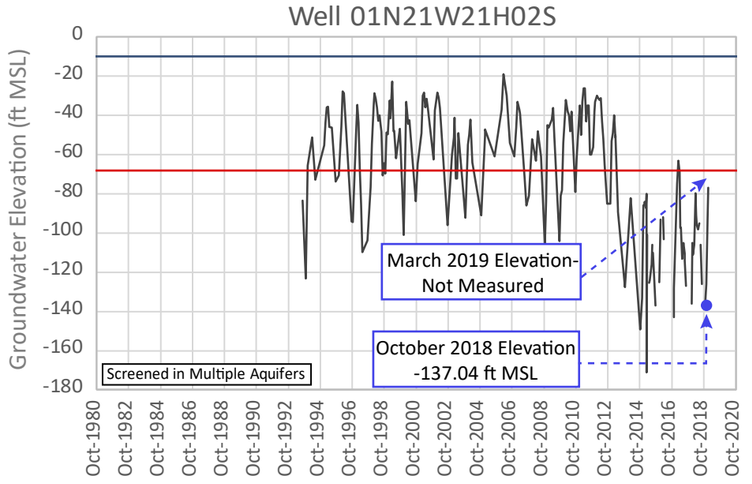
Groundwater Elevation Hydrographs for Representative Wells Screened in the Fox Canyon Aquifer

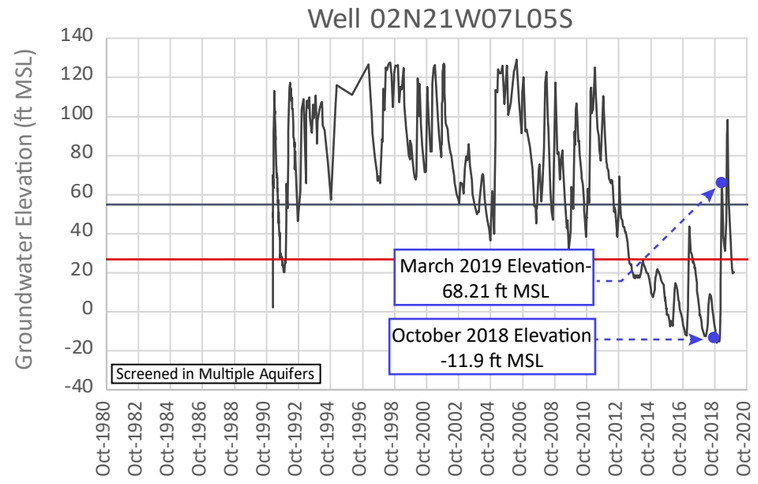








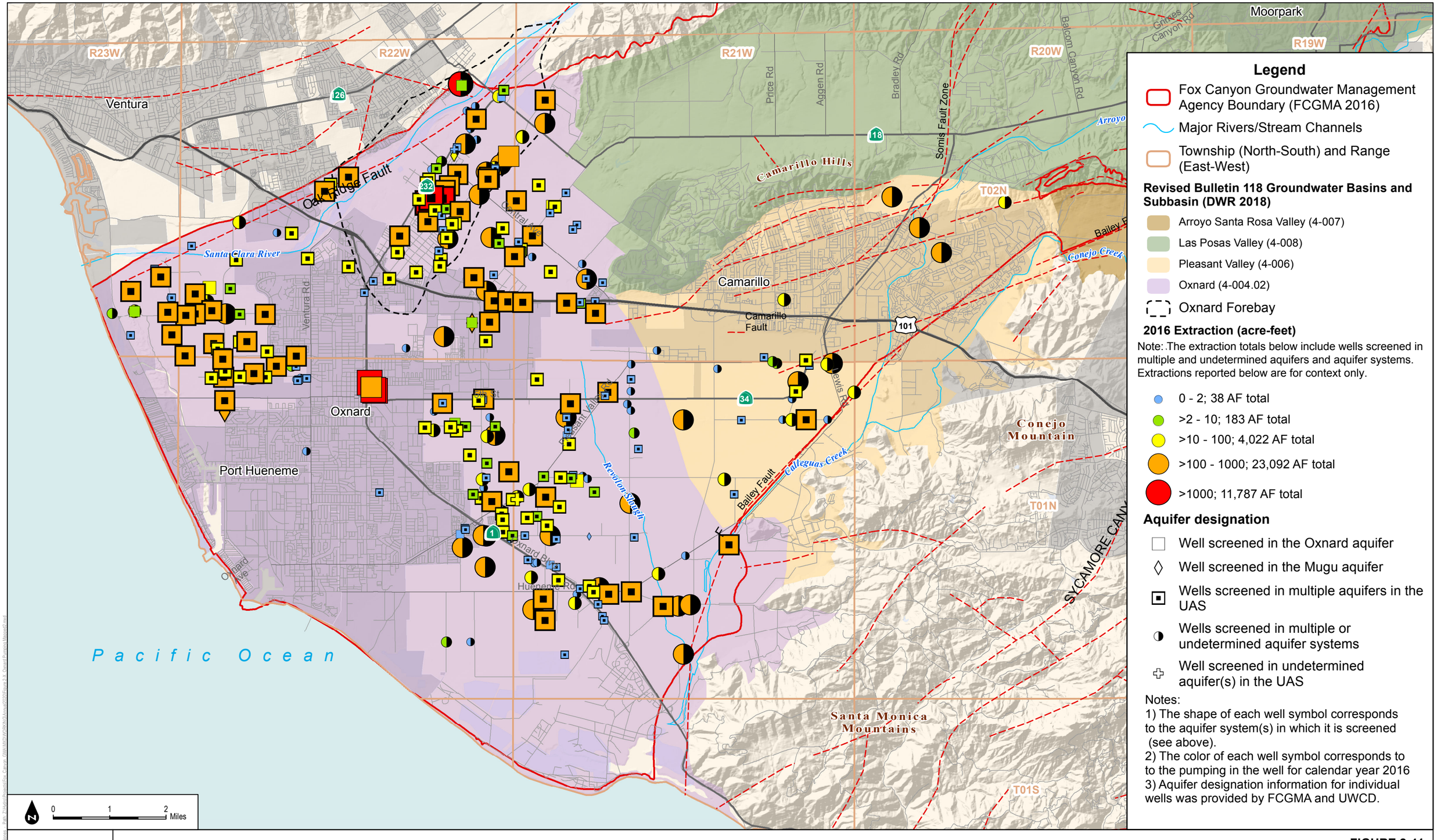




Groundwater Elevation — Minimum Threshold — Measurable Objective — ○ Measurement not collected between October 2 and October 29, 2018 or March 2 and March 29, 2019

FIGURE 2-40

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



Legend

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- 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)
- Oxnard Forebay

2016 Extraction (acre-feet)

Note: .The extraction totals below include wells screened in multiple and undetermined aquifers and aquifer systems. Extractions reported below are for context only.

- 0 - 2; 38 AF total
- >2 - 10; 183 AF total
- >10 - 100; 4,022 AF total
- >100 - 1000; 23,092 AF total
- >1000; 11,787 AF total

Aquifer designation

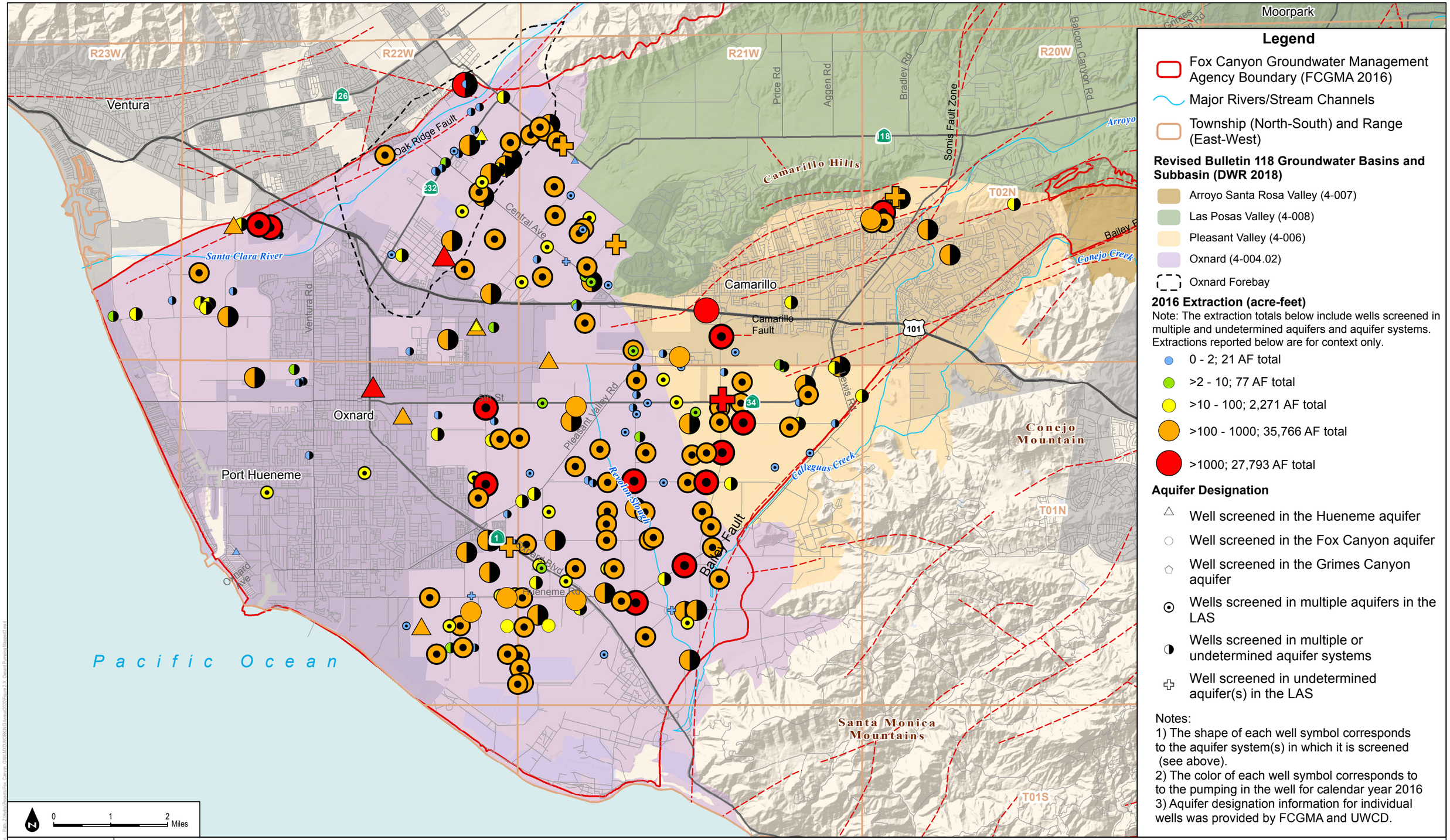
- Well screened in the Oxnard aquifer
- Well screened in the Mugu aquifer
- Wells screened in multiple aquifers in the UAS
- Wells screened in multiple or undetermined aquifer systems
- Well screened in undetermined aquifer(s) in the UAS

Notes:
1) The shape of each well symbol corresponds to the aquifer system(s) in which it is screened (see above).
2) The color of each well symbol corresponds to to the pumping in the well for calendar year 2016
3) Aquifer designation information for individual wells was provided by FCGMA and UWCD.

SOURCE: DWR, FCGMA, VCWPD, UWCD

FIGURE 2-41

Groundwater Production from the UAS in Calendar Year 2016



Legend

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- 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)
- Oxnard Forebay

2016 Extraction (acre-feet)

Note: The extraction totals below include wells screened in multiple and undetermined aquifers and aquifer systems. Extractions reported below are for context only.

- 0 - 2; 21 AF total
- >2 - 10; 77 AF total
- >10 - 100; 2,271 AF total
- >100 - 1000; 35,766 AF total
- >1000; 27,793 AF total

Aquifer Designation

- Well screened in the Hueneme aquifer
- Well screened in the Fox Canyon aquifer
- Well screened in the Grimes Canyon aquifer
- Wells screened in multiple aquifers in the LAS
- Wells screened in multiple or undetermined aquifer systems
- Well screened in undetermined aquifer(s) in the LAS

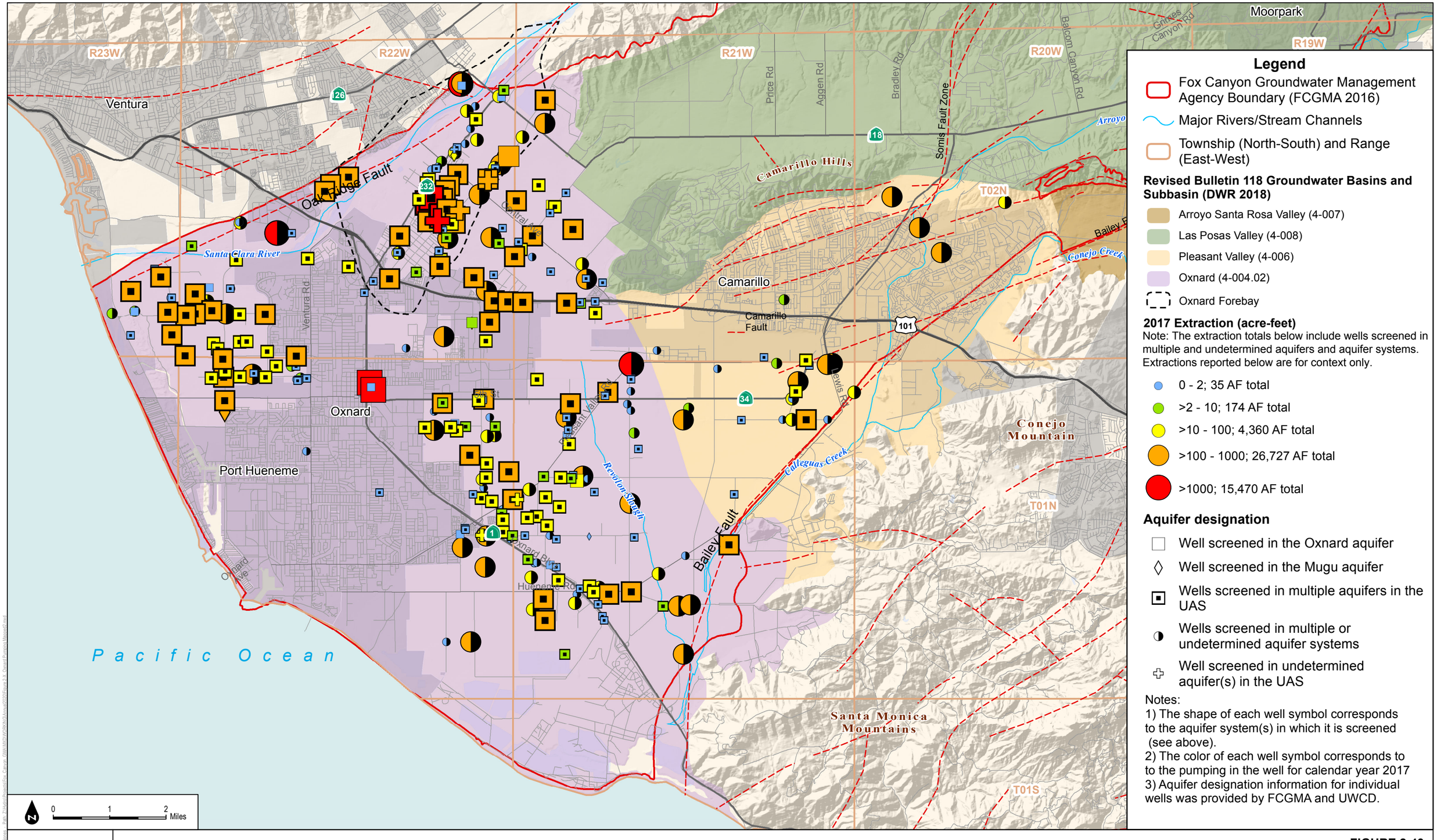
Notes:
1) The shape of each well symbol corresponds to the aquifer system(s) in which it is screened (see above).
2) The color of each well symbol corresponds to to the pumping in the well for calendar year 2016
3) Aquifer designation information for individual wells was provided by FCGMA and UWCD.

DUDEK

SOURCE: DWR, FCGMA, VCWPD, UWCD

FIGURE 2-42

Groundwater Production from the LAS in Calendar Year 2016



Legend

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- 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)
- Oxnard Forebay

2017 Extraction (acre-feet)

Note: The extraction totals below include wells screened in multiple and undetermined aquifers and aquifer systems. Extractions reported below are for context only.

- 0 - 2; 35 AF total
- >2 - 10; 174 AF total
- >10 - 100; 4,360 AF total
- >100 - 1000; 26,727 AF total
- >1000; 15,470 AF total

Aquifer designation

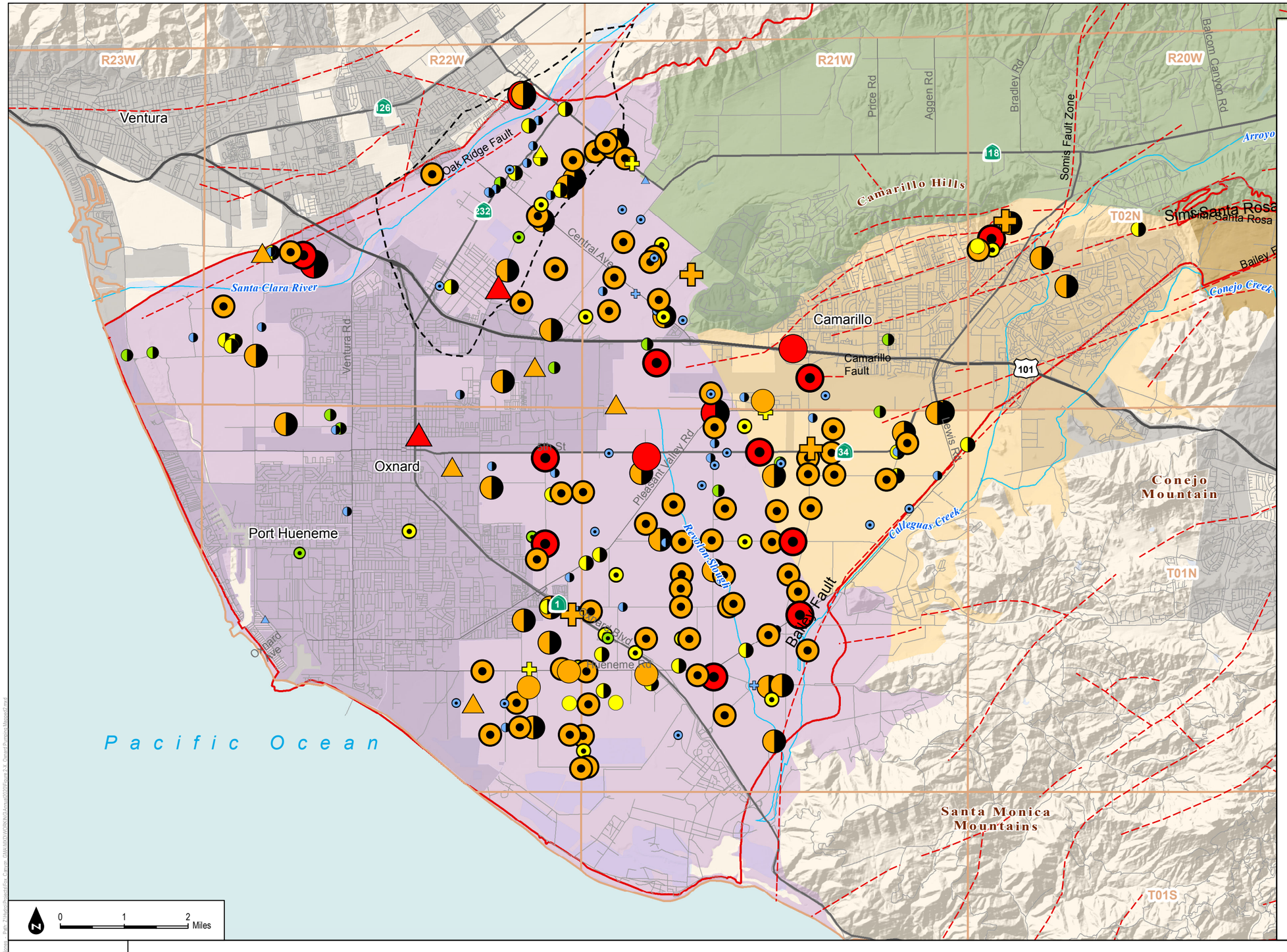
- Well screened in the Oxnard aquifer
- Well screened in the Mugu aquifer
- Wells screened in multiple aquifers in the UAS
- Wells screened in multiple or undetermined aquifer systems
- Well screened in undetermined aquifer(s) in the UAS

Notes:
1) The shape of each well symbol corresponds to the aquifer system(s) in which it is screened (see above).
2) The color of each well symbol corresponds to to the pumping in the well for calendar year 2017
3) Aquifer designation information for individual wells was provided by FCGMA and UWCD.

SOURCE: DWR, FCGMA, VCWPD, UWCD

FIGURE 2-43

Groundwater Production from the UAS in Calendar Year 2017



Legend

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- 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)

2017 Extraction (acre-feet)

Note: The extraction totals below include wells screened in multiple and undetermined aquifers and aquifer systems. Extractions reported below are for context only.

- 0 - 2; 21 AF total
- >2 - 10; 74 AF total
- >10 - 100; 2,522 AF total
- >100 - 1000; 37,122 AF total
- >1000; 24,137 AF total

Aquifer Designation

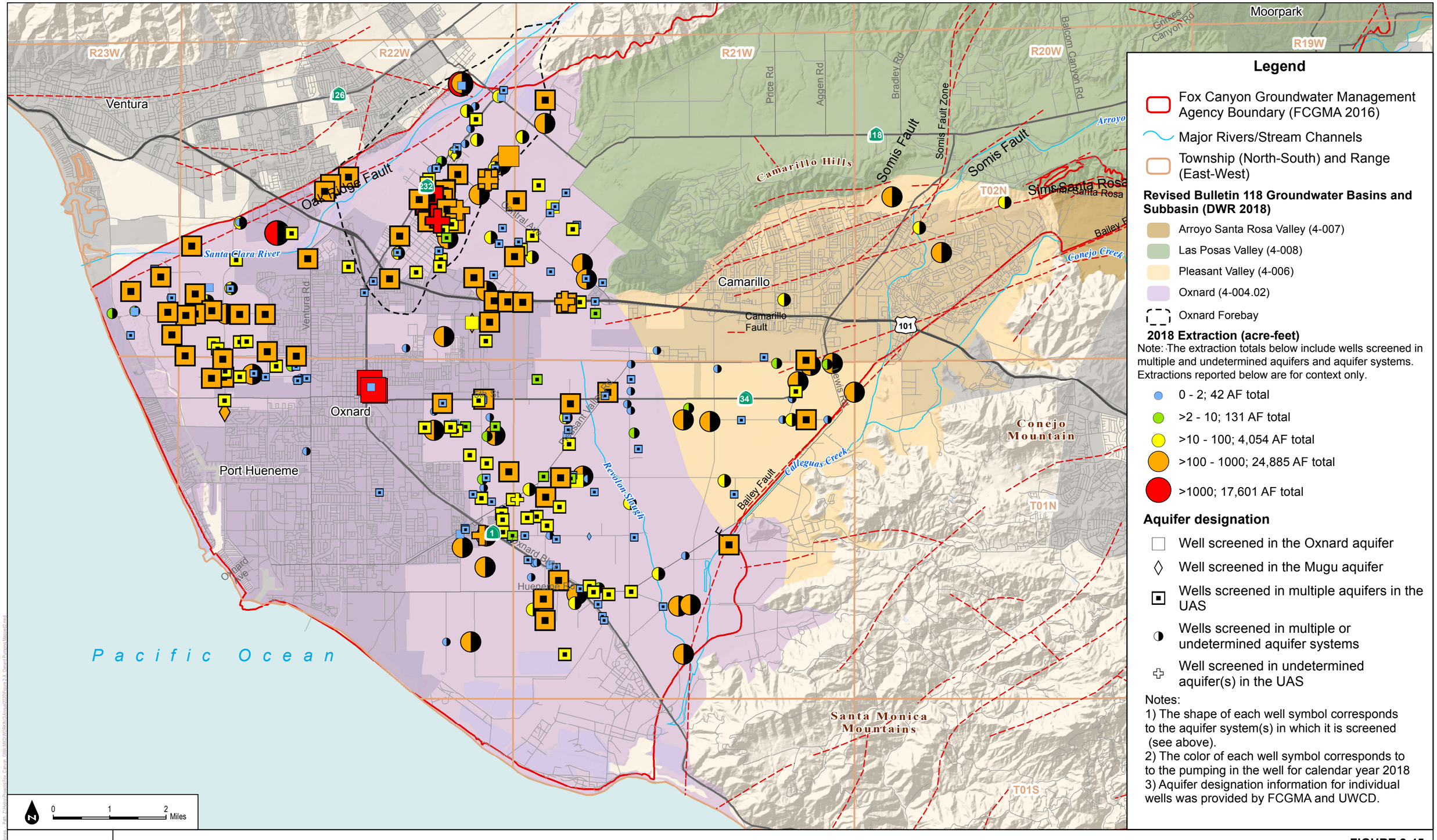
- Well screened in the Hueneme aquifer
- Well screened in the Fox Canyon aquifer
- Well screened in the Grimes Canyon aquifer
- Wells screened in multiple aquifers in the LAS
- Wells screened in multiple or undetermined aquifer systems
- Well screened in undetermined aquifer(s) in the LAS

Notes:
1) The shape of each well symbol corresponds to the aquifer system(s) in which it is screened (see above).
2) The color of each well symbol corresponds to to the pumping in the well for calendar year 2017
3) Aquifer designation information for individual wells was provided by FCGMA and UWCD.

SOURCE: DWR, FCGMA, VCWPD, UWCD

FIGURE 2-44

Groundwater Production from the LAS in Calendar Year 2017



Legend

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- 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)
- Oxnard Forebay

2018 Extraction (acre-feet)

Note: The extraction totals below include wells screened in multiple and undetermined aquifers and aquifer systems. Extractions reported below are for context only.

- 0 - 2; 42 AF total
- >2 - 10; 131 AF total
- >10 - 100; 4,054 AF total
- >100 - 1000; 24,885 AF total
- >1000; 17,601 AF total

Aquifer designation

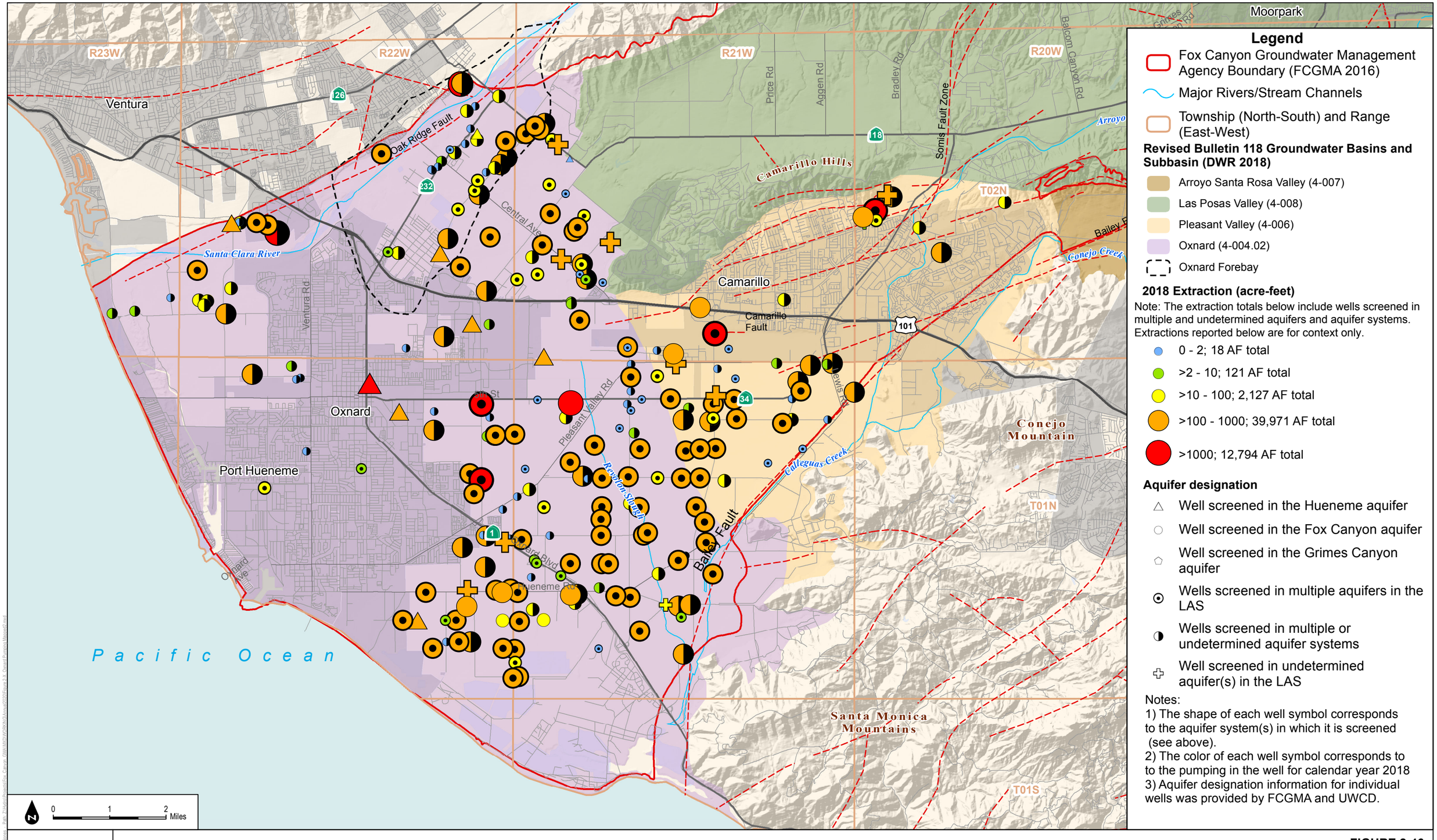
- Well screened in the Oxnard aquifer
- Well screened in the Mugu aquifer
- Wells screened in multiple aquifers in the UAS
- Wells screened in multiple or undetermined aquifer systems
- Well screened in undetermined aquifer(s) in the UAS

Notes:
1) The shape of each well symbol corresponds to the aquifer system(s) in which it is screened (see above).
2) The color of each well symbol corresponds to to the pumping in the well for calendar year 2018
3) Aquifer designation information for individual wells was provided by FCGMA and UWCD.

SOURCE: DWR, FCGMA, VCWPD, UWCD

FIGURE 2-45

Groundwater Production from the UAS in Calendar Year 2018



Legend

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- 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)
- Oxnard Forebay

2018 Extraction (acre-feet)

Note: The extraction totals below include wells screened in multiple and undetermined aquifers and aquifer systems. Extractions reported below are for context only.

- 0 - 2; 18 AF total
- >2 - 10; 121 AF total
- >10 - 100; 2,127 AF total
- >100 - 1000; 39,971 AF total
- >1000; 12,794 AF total

Aquifer designation

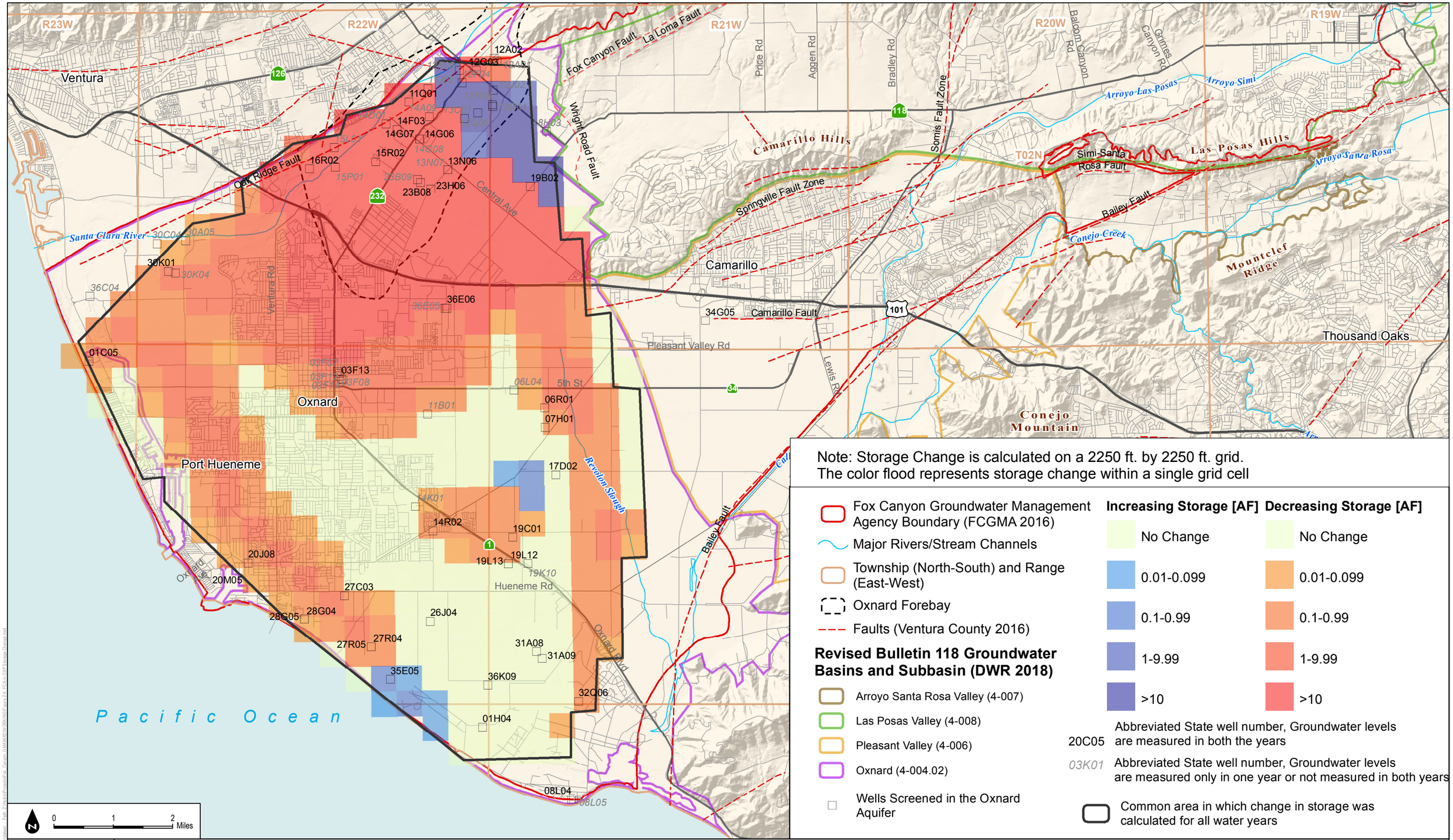
- Well screened in the Hueneme aquifer
- Well screened in the Fox Canyon aquifer
- Well screened in the Grimes Canyon aquifer
- Wells screened in multiple aquifers in the LAS
- Wells screened in multiple or undetermined aquifer systems
- Well screened in undetermined aquifer(s) in the LAS

Notes:
1) The shape of each well symbol corresponds to the aquifer system(s) in which it is screened (see above).
2) The color of each well symbol corresponds to to the pumping in the well for calendar year 2018
3) Aquifer designation information for individual wells was provided by FCGMA and UWCD.

SOURCE: DWR, FCGMA, VCWPD, UWCD

FIGURE 2-46

Groundwater Production from the LAS in Calendar Year 2018



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)
- Wells Screened in the Oxnard Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-47

Change in Storage in the Oxnard Aquifer: Spring 2015 to Spring 2016

DUDEK

Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

- Wells Screened in the Oxnard Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

0 1 2 Miles

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

DUDEK

FIGURE 2-48

Change in Storage in the Oxnard Aquifer: Spring 2016 to Spring 2017

Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

- Wells Screened in the Oxnard Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

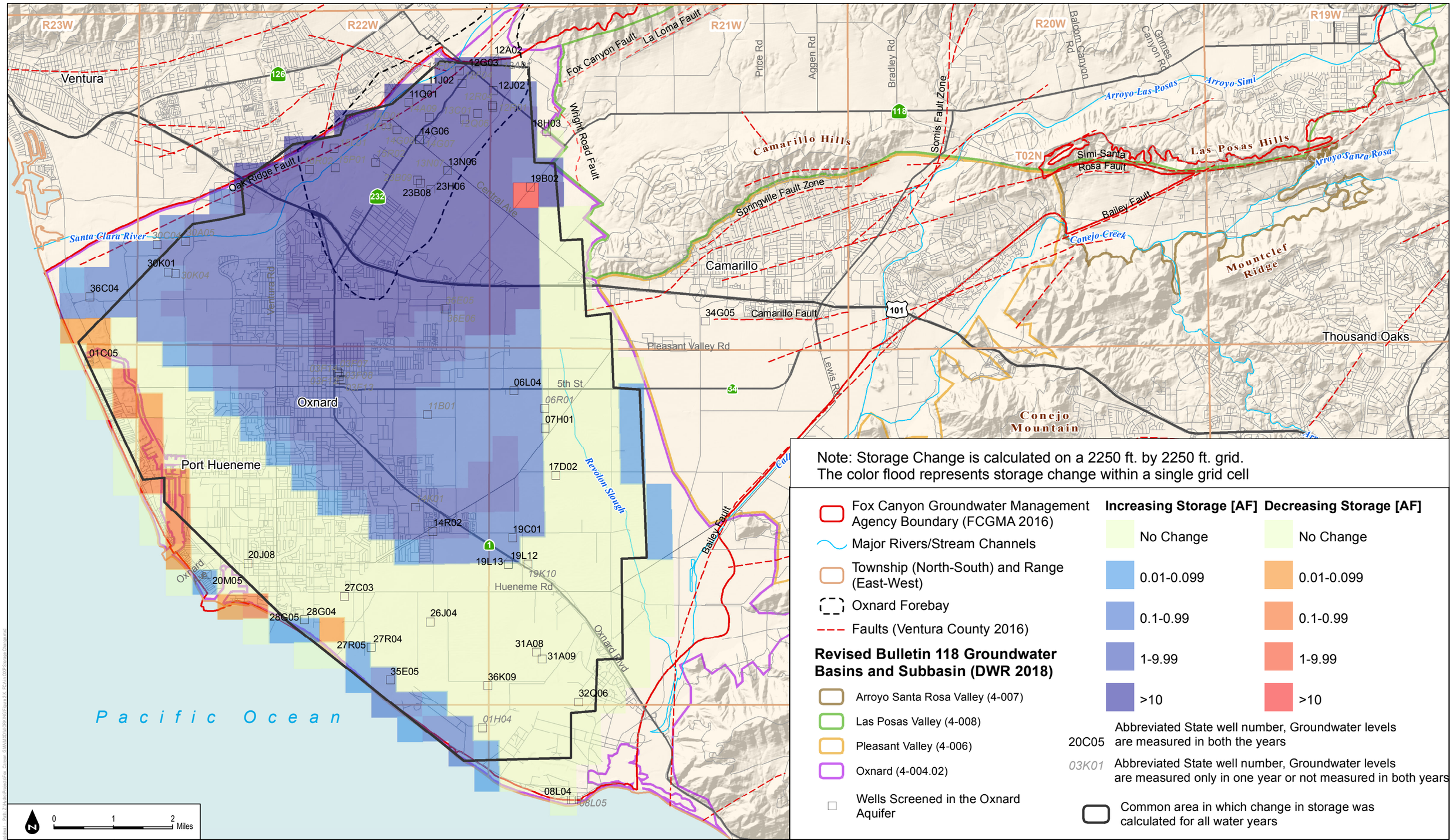
0 1 2 Miles

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

DUDEK

FIGURE 2-49

Change in Storage in the Oxnard Aquifer: Spring 2017 to Spring 2018



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

- Wells Screened in the Oxnard Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

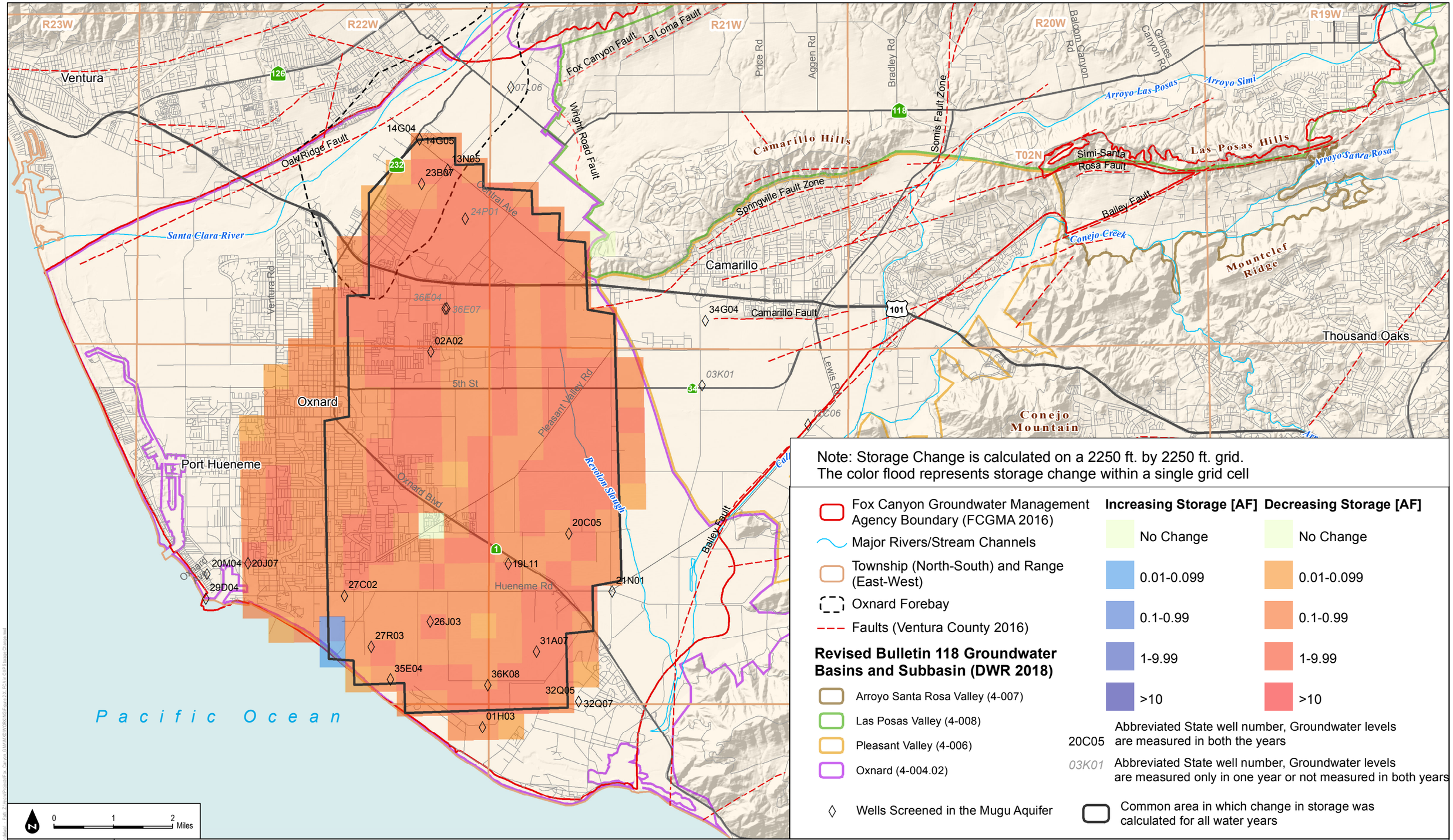
Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-50

Change in Storage in the Oxnard Aquifer: Spring 2018 to Spring 2019

DUDEK



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

◊ Wells Screened in the Mugu Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

DUDEK

FIGURE 2-51

Change in Storage in the Mugu Aquifer: Spring 2015 to Spring 2016

Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

◊ Wells Screened in the Mugu Aquifer

	Increasing Storage [AF]	**Decreasing Storage [AF]**
	No Change	No Change
	0.01-0.099	0.01-0.099
	0.1-0.99	0.1-0.99
	1-9.99	1-9.99
	>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

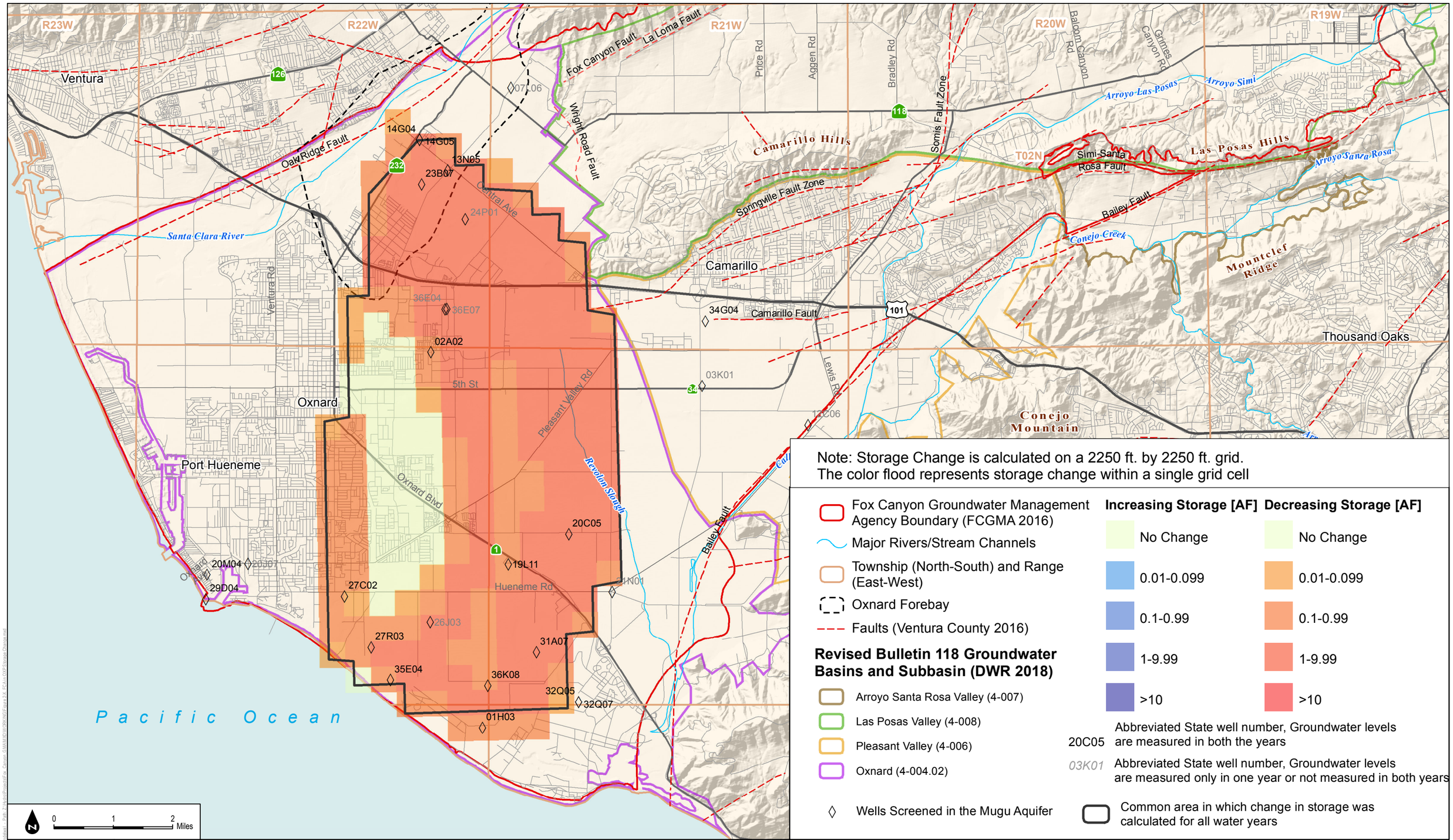
Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

DUDEK

FIGURE 2-52

Change in Storage in the Mugu Aquifer: Spring 2016 to Spring 2017



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

◊ Wells Screened in the Mugu Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

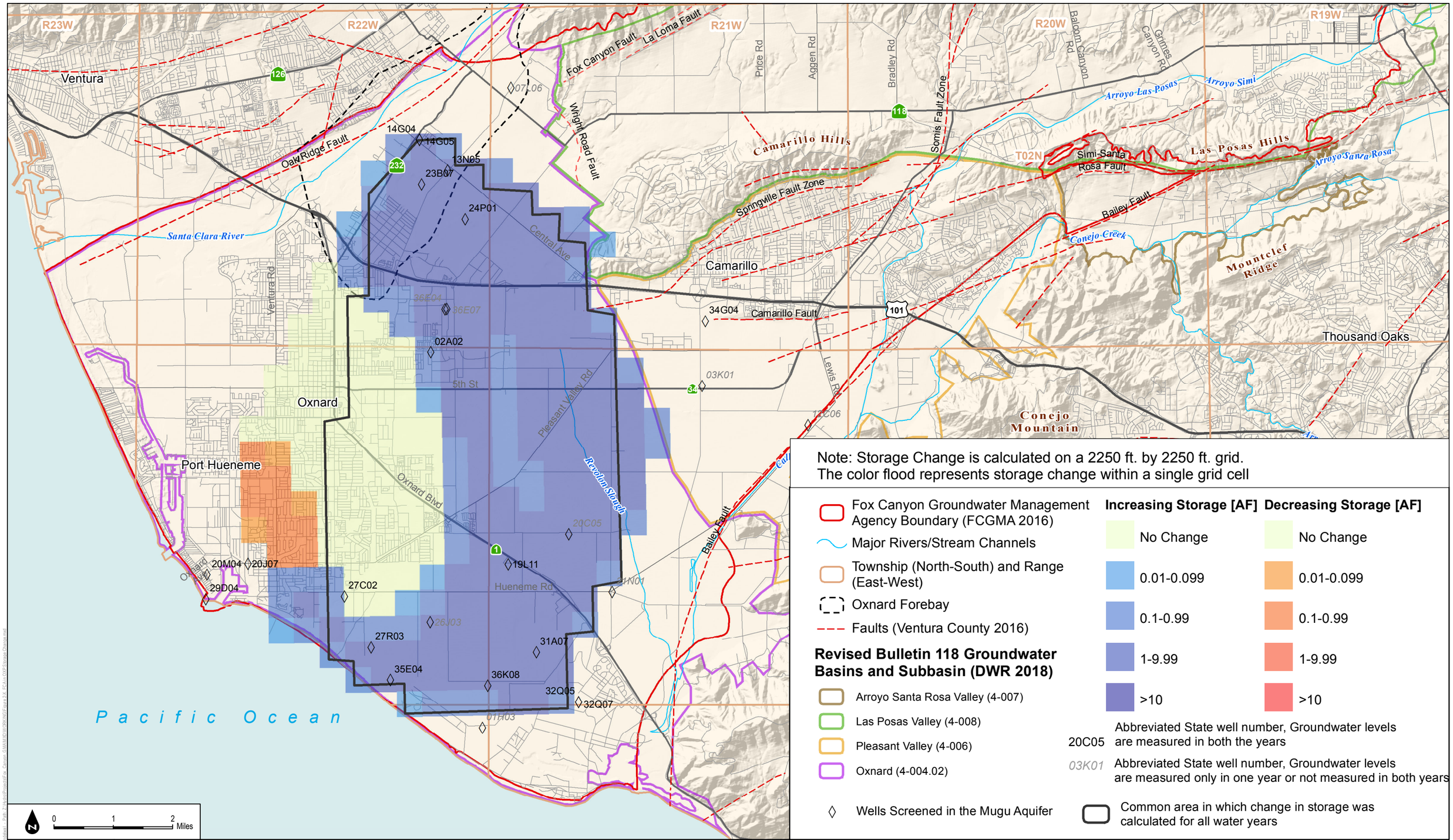
03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-53

Change in Storage in the Mugu Aquifer: Spring 2017 to Spring 2018



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

◊ Wells Screened in the Mugu Aquifer

	Increasing Storage [AF]	Decreasing Storage [AF]
	No Change	No Change
	0.01-0.099	0.01-0.099
	0.1-0.99	0.1-0.99
	1-9.99	1-9.99
	>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

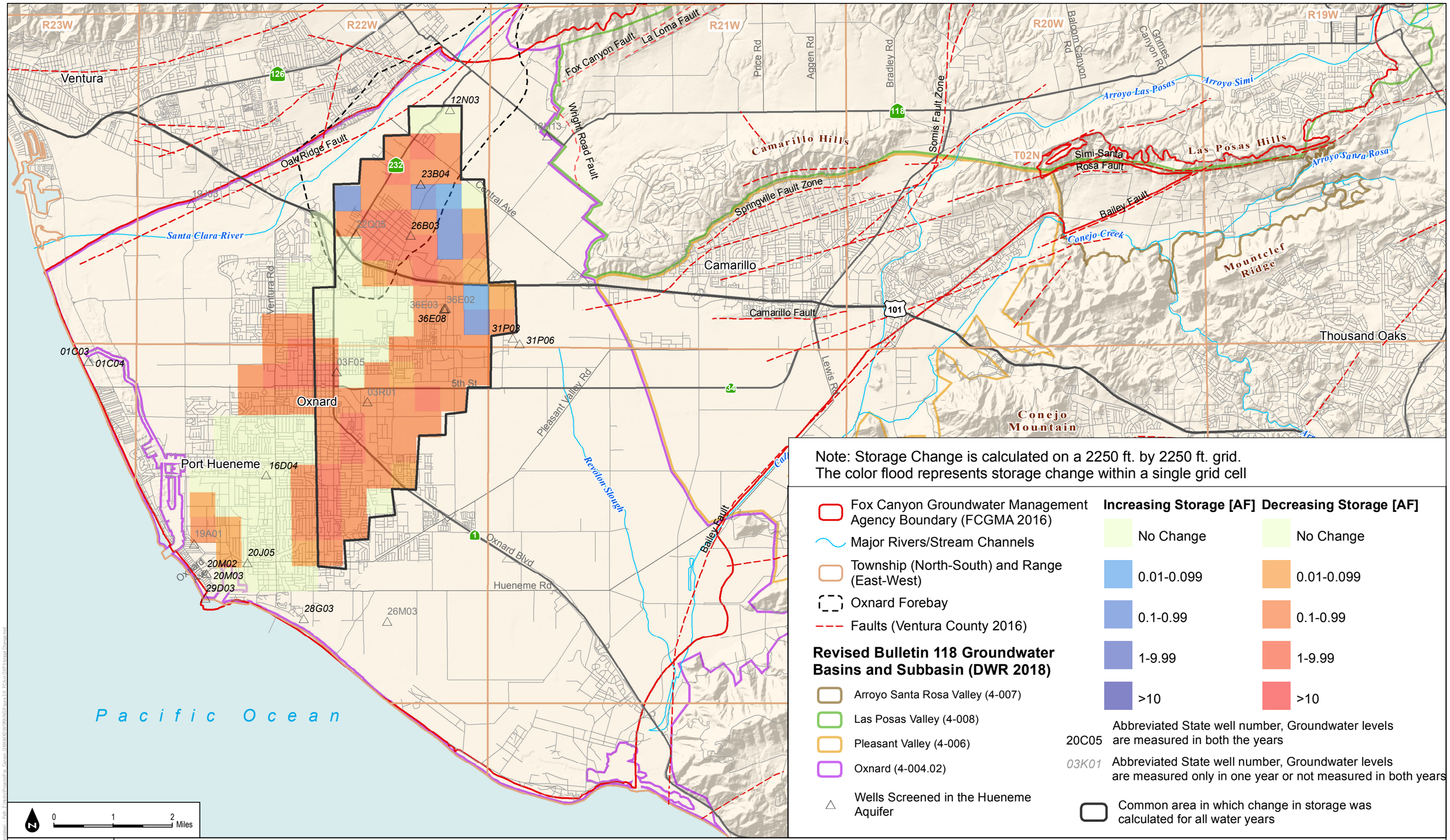
03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-54

Change in Storage in the Mugu Aquifer: Spring 2018 to Spring 2019



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

△ Wells Screened in the Hueneme Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

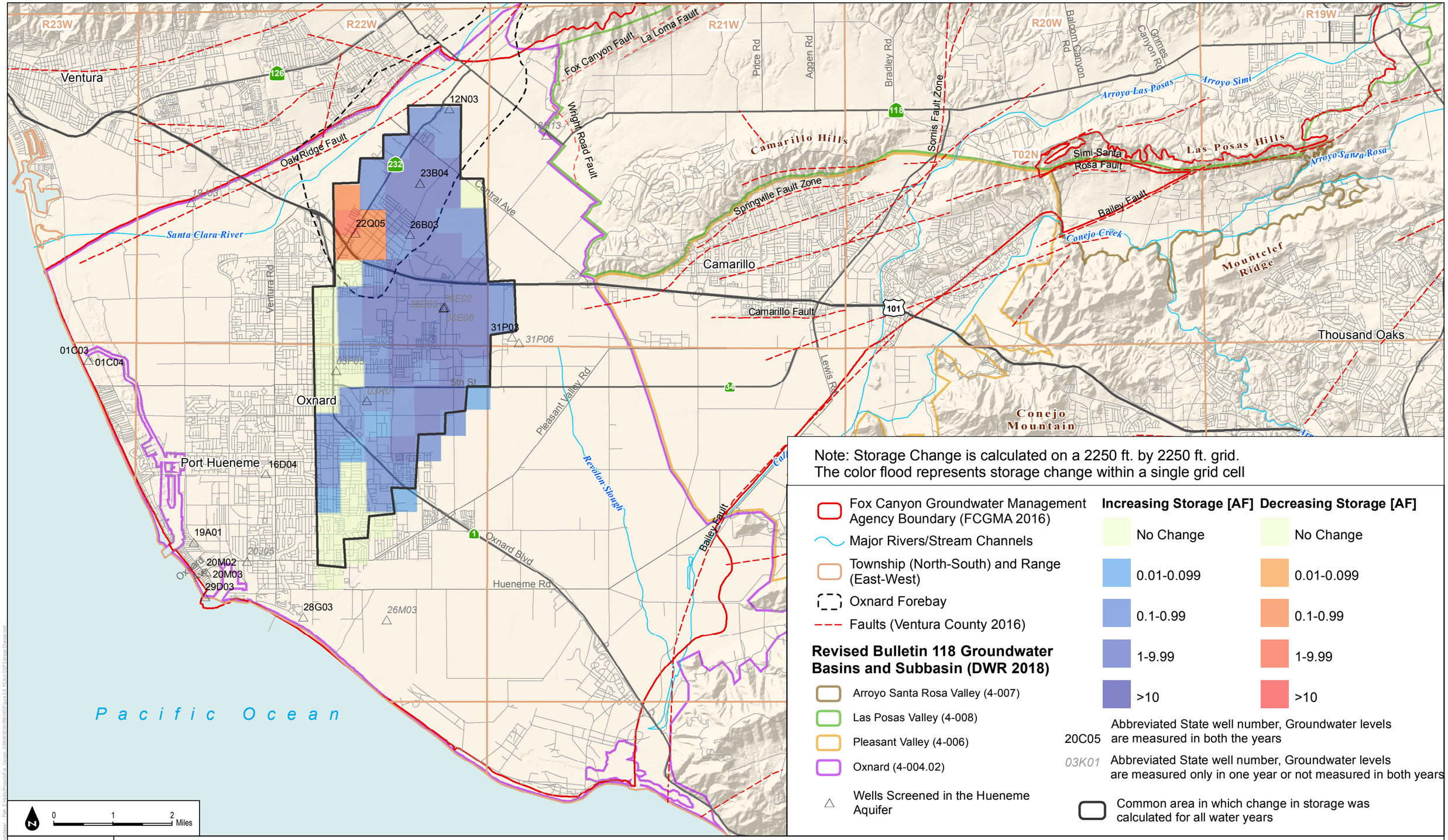
Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-55

Change in Storage in the Hueneme Aquifer: Spring 2015 to Spring 2016

DUDEK



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)
- Wells Screened in the Hueneme Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

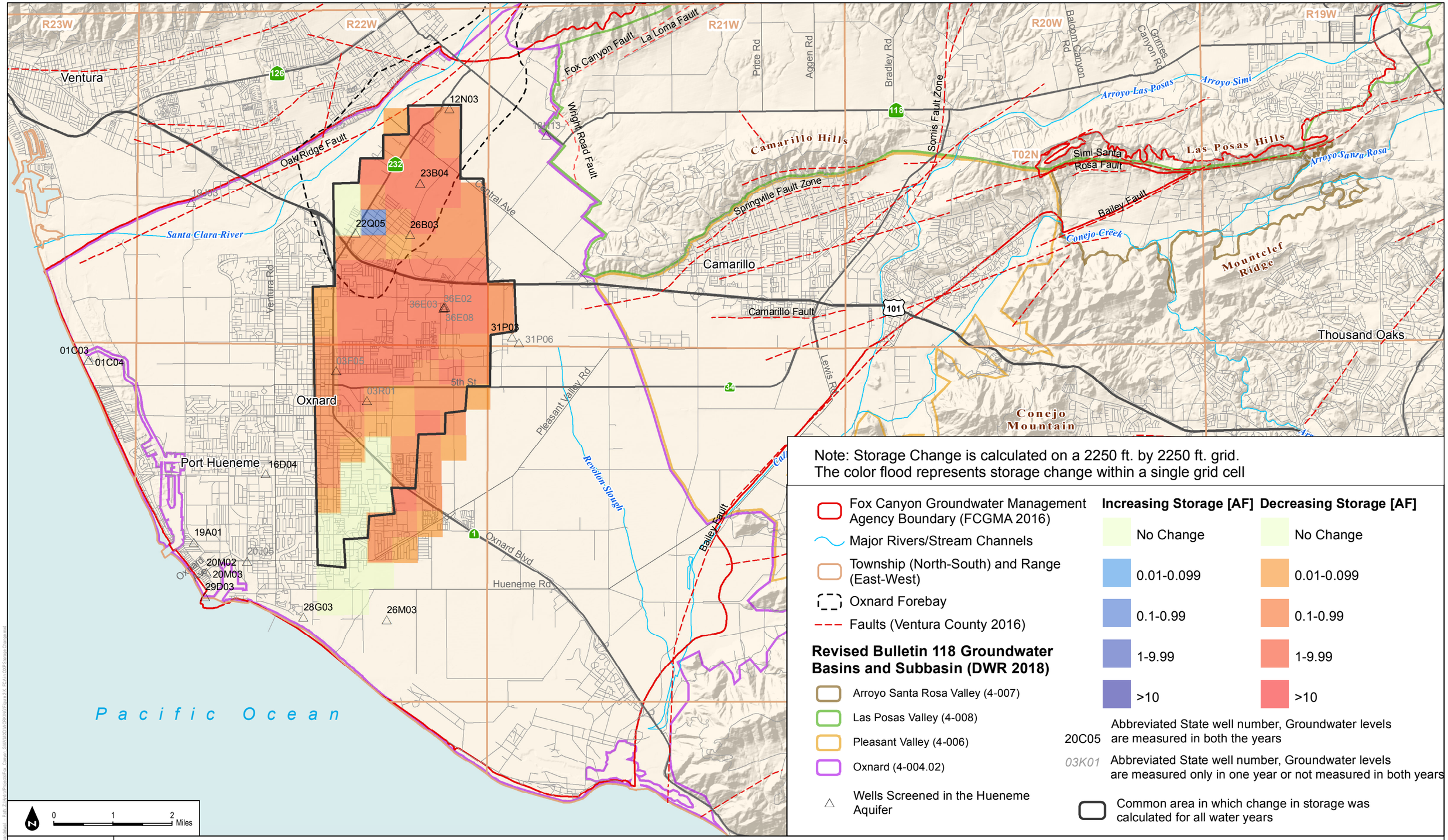
Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-56

Change in Storage in the Hueneme Aquifer: Spring 2016 to Spring 2017

DUDEK



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

△ Wells Screened in the Hueneme Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

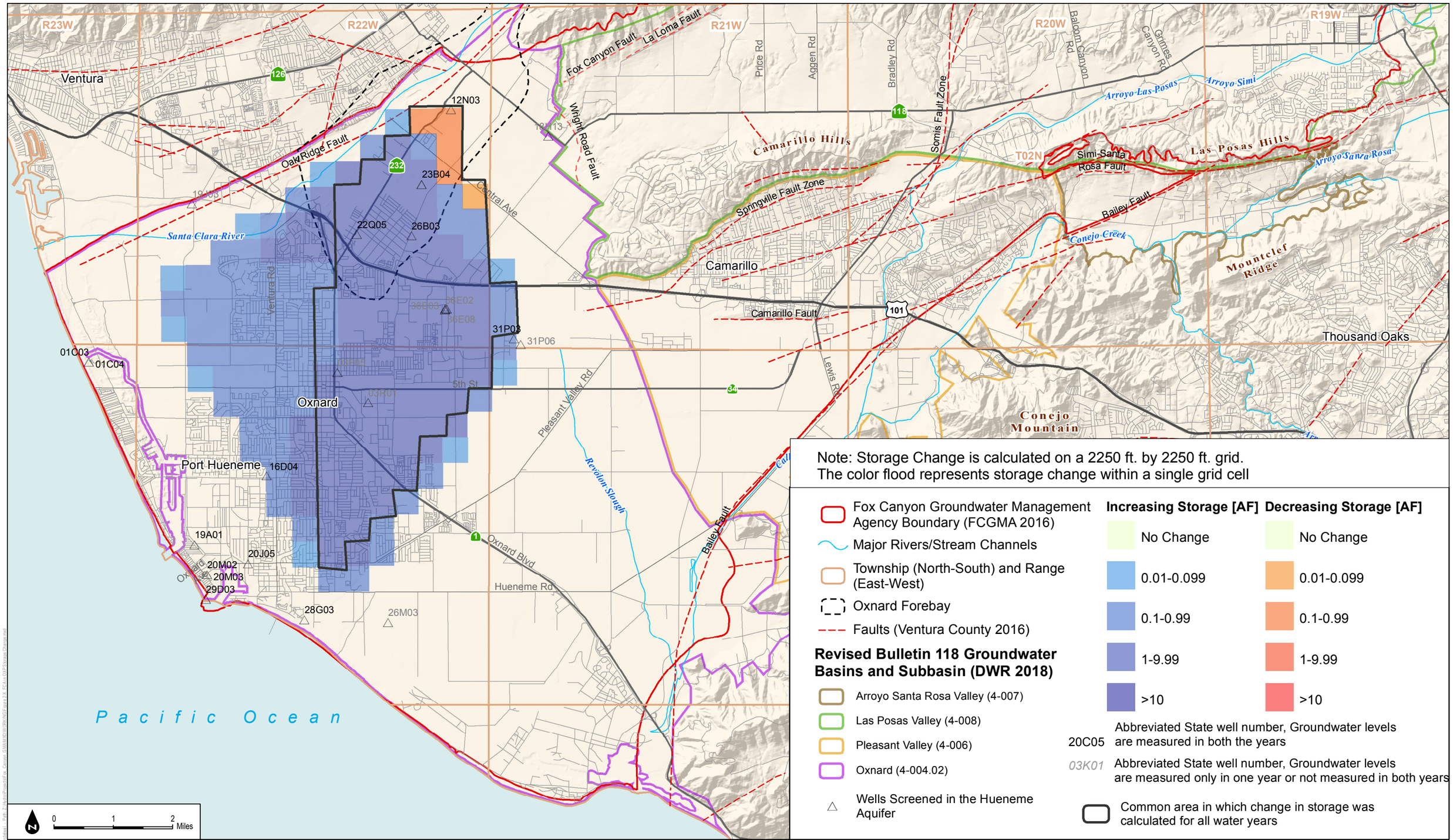
03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-57

Change in Storage in the Hueneme Aquifer: Spring 2017 to Spring 2018



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)
- Wells Screened in the Hueneme Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

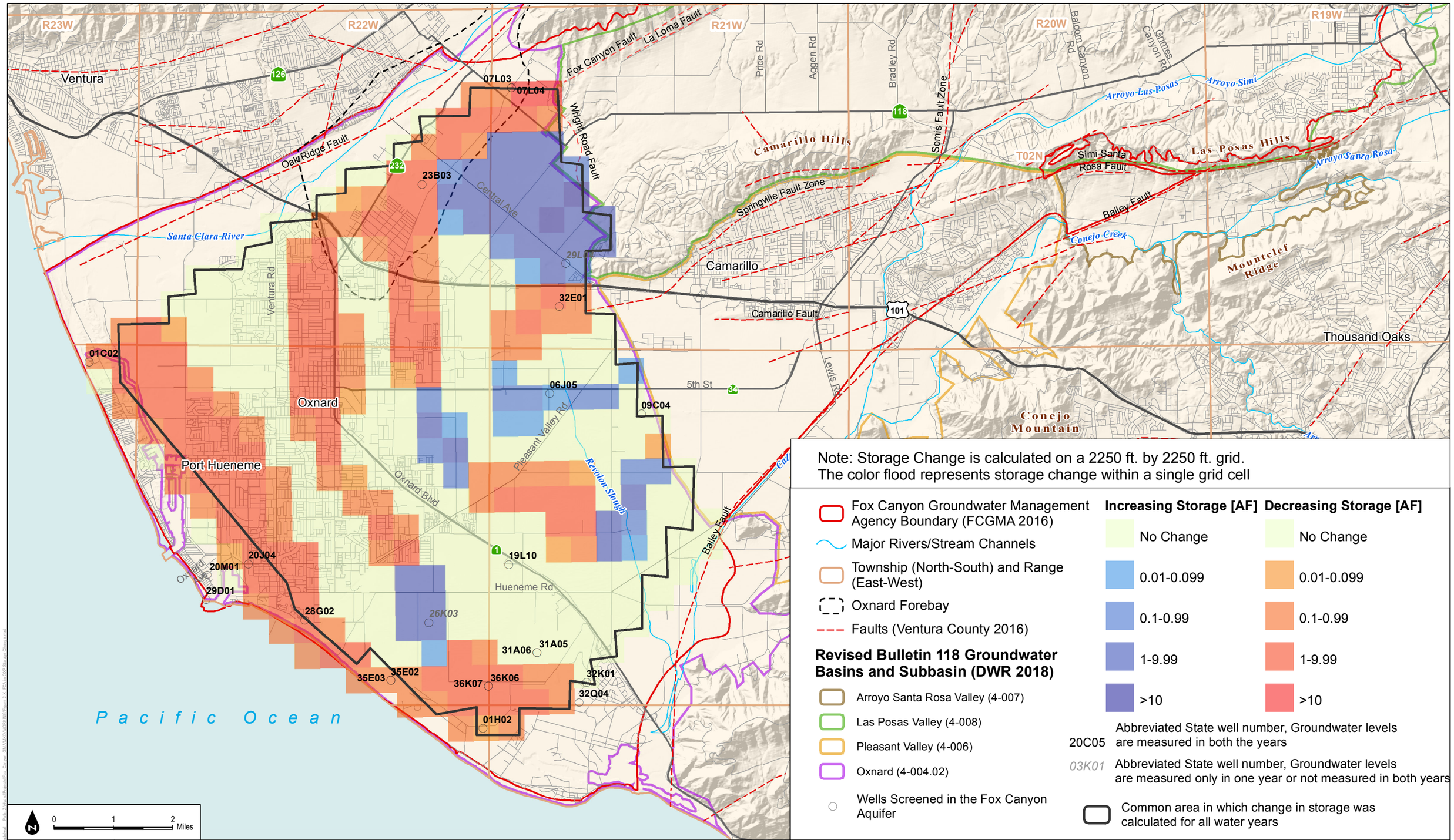
03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-58

Change in Storage in the Hueneme Aquifer: Spring 2018 to Spring 2019



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

Wells Screened in the Fox Canyon Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

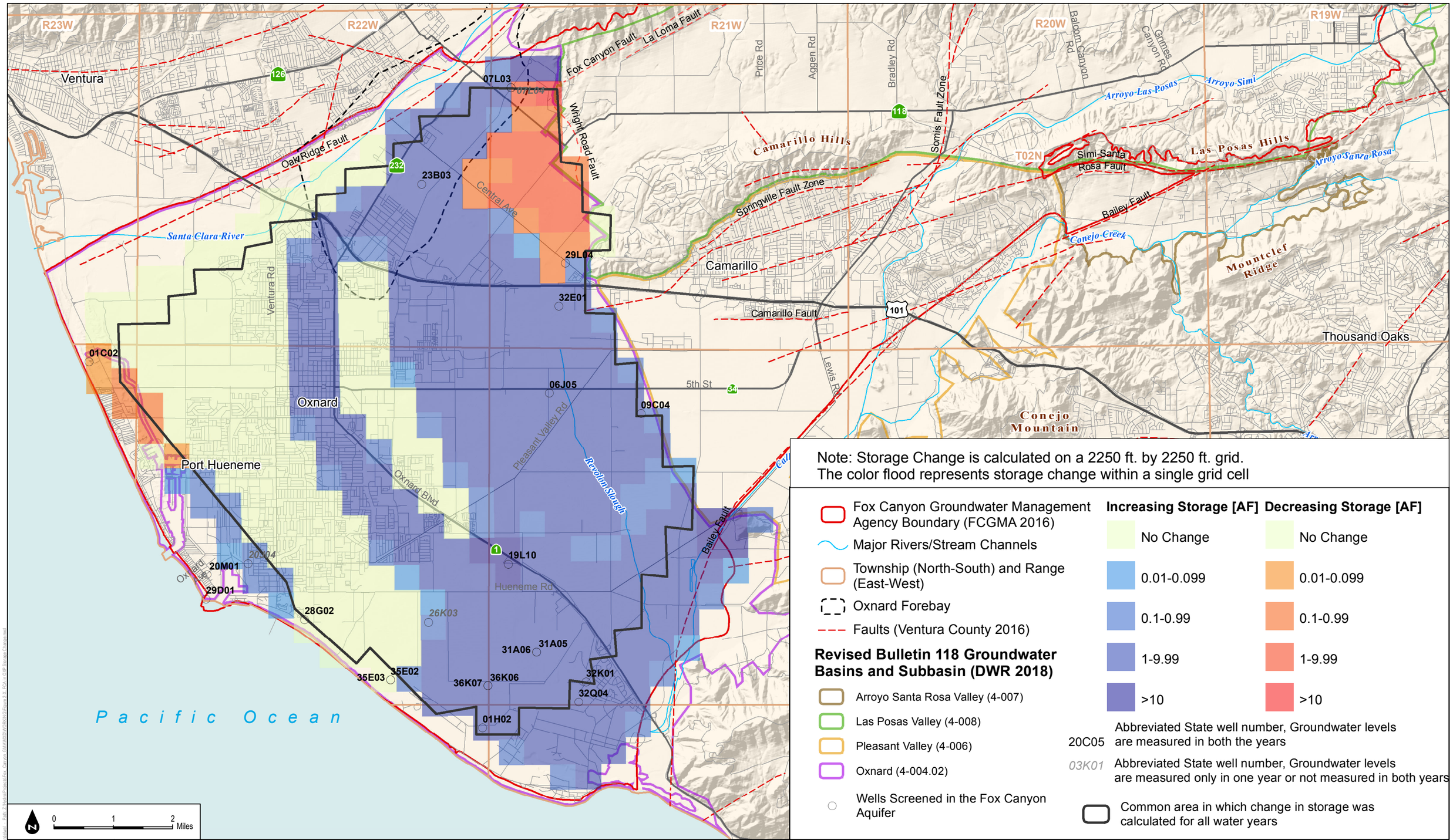
03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-59

Change in Storage in the Fox Canyon Aquifer: Spring 2015 to Spring 2016



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

- Wells Screened in the Fox Canyon Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

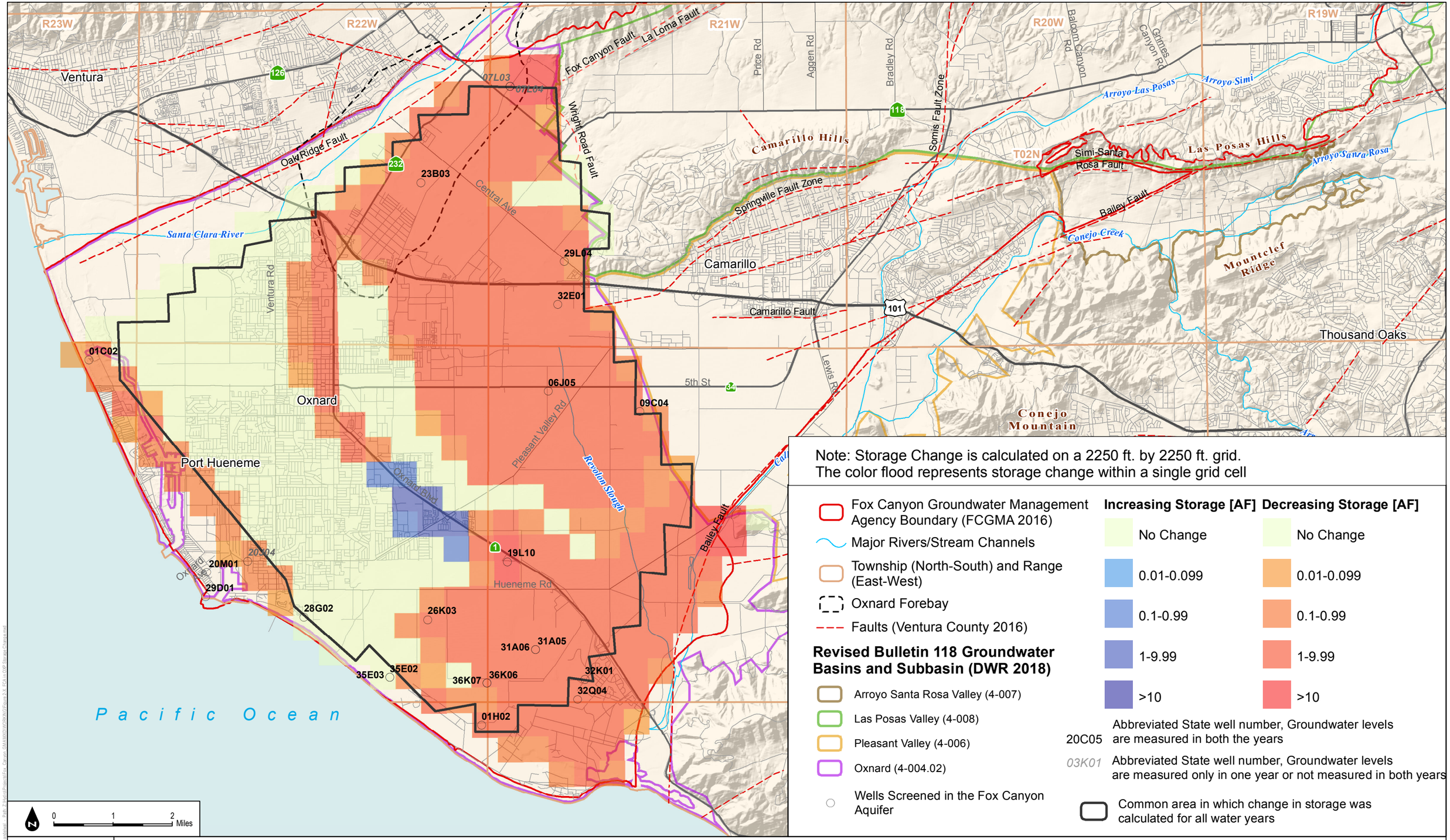
03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-60

Change in Storage in the Fox Canyon Aquifer: Spring 2016 to Spring 2017



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

- Wells Screened in the Fox Canyon Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

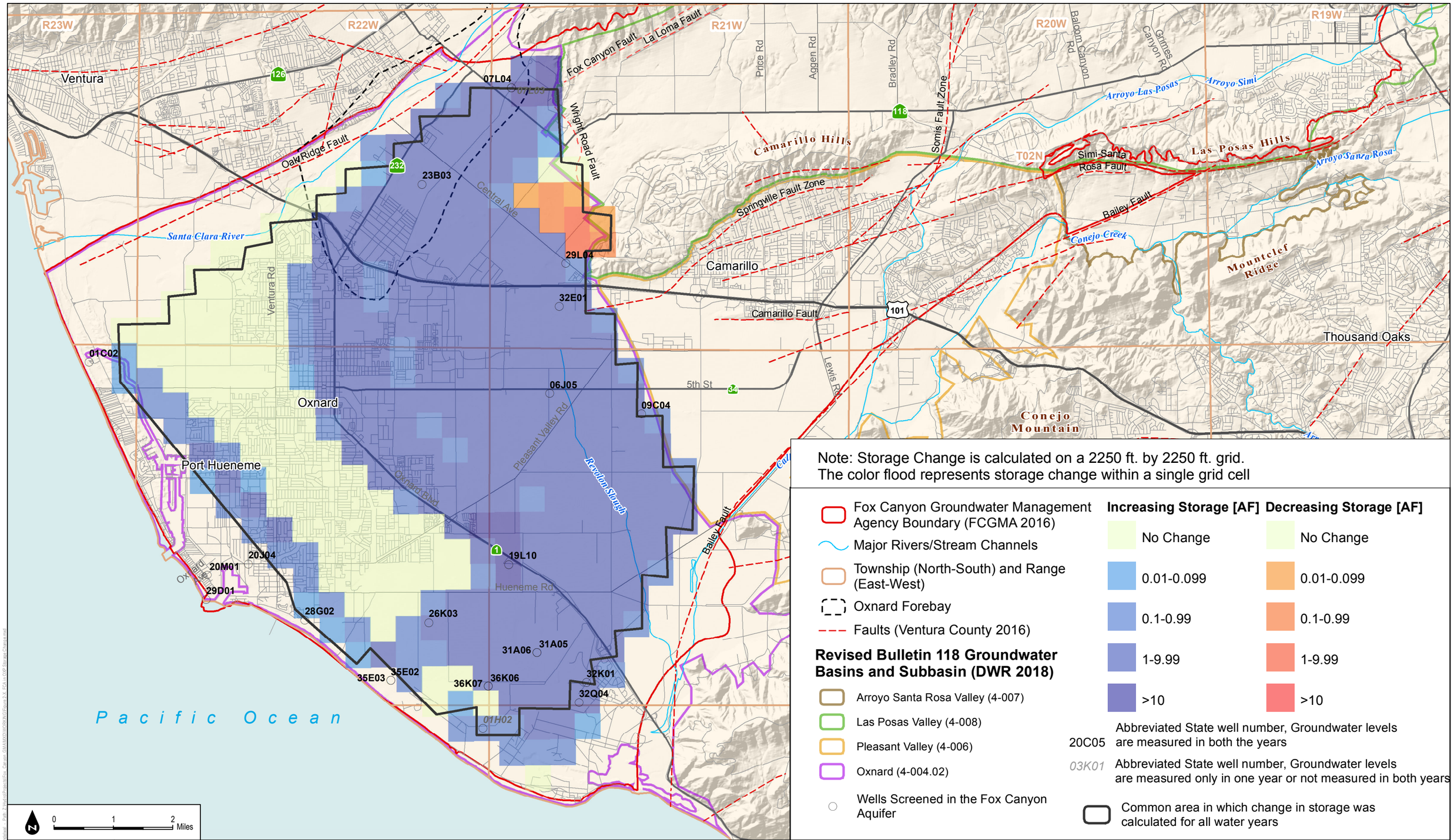
03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-61

Change in Storage in the Fox Canyon Aquifer: Spring 2017 to Spring 2018



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)
- Wells Screened in the Fox Canyon Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

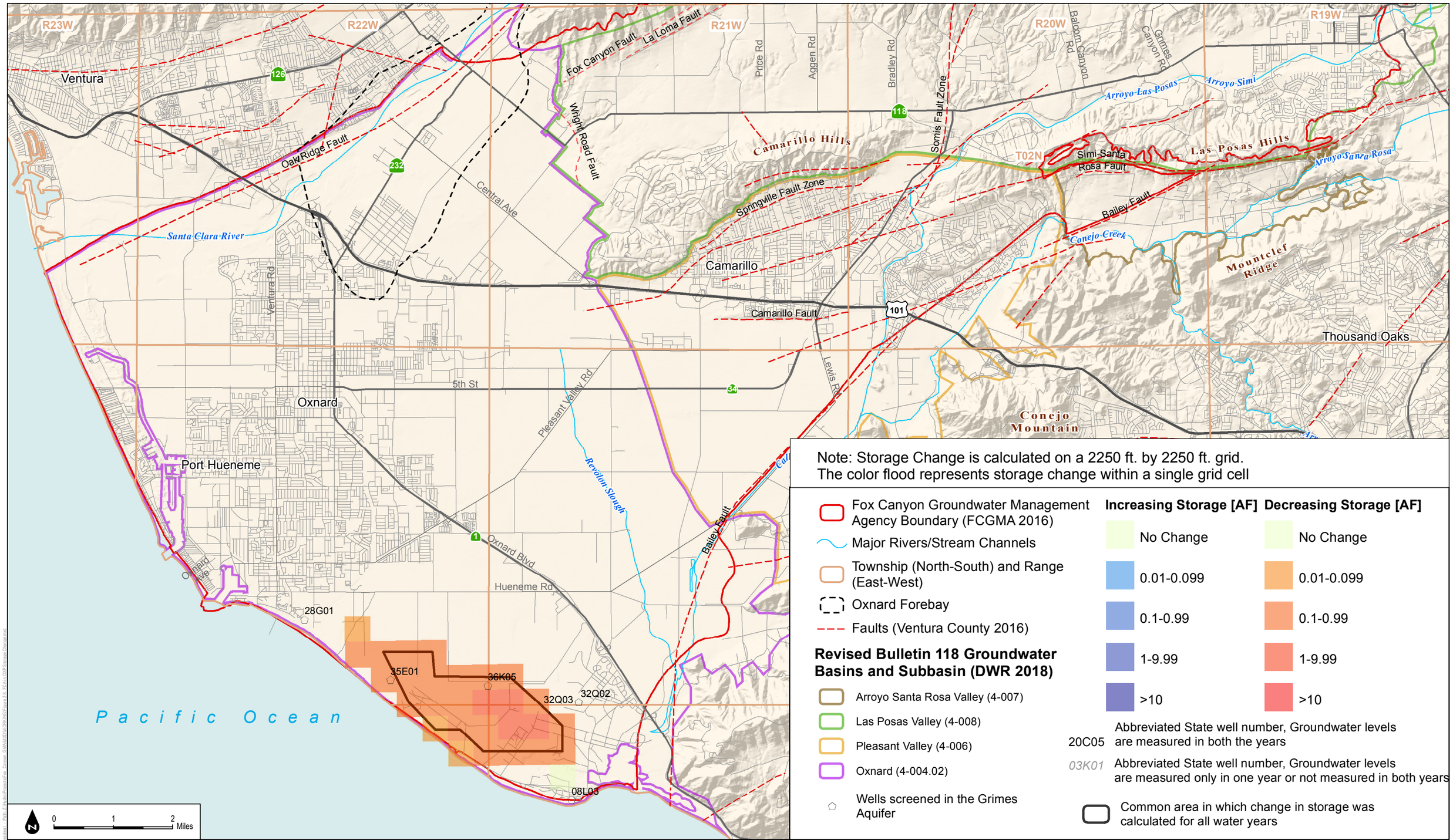
03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-62

Change in Storage in the Fox Canyon Aquifer: Spring 2018 to Spring 2019



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

- Wells screened in the Grimes Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

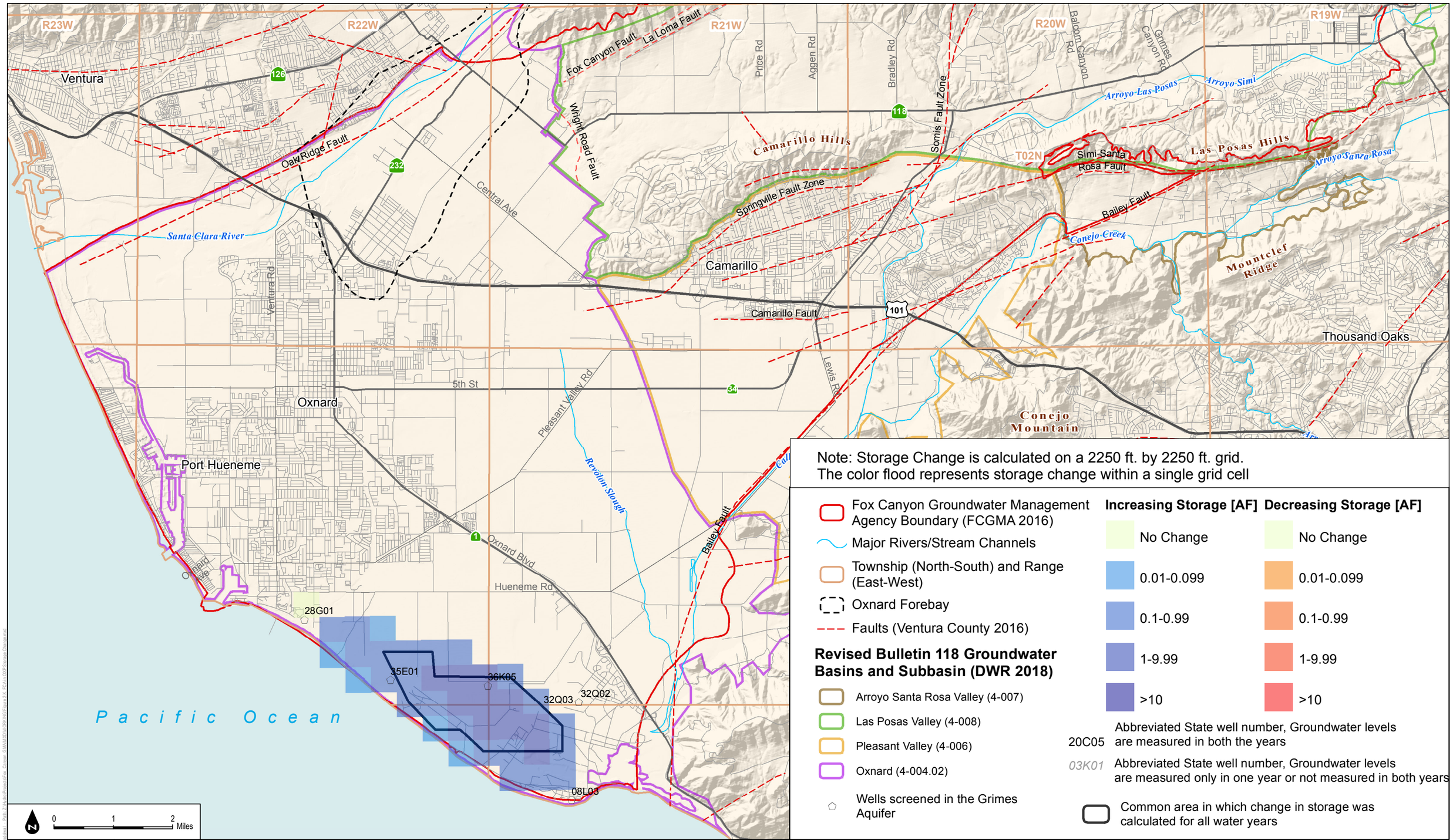
03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-63

Change in Storage in the Grimes Canyon Aquifer: Spring 2015 to Spring 2016



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

Wells screened in the Grimes Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-64

Change in Storage in the Grimes Canyon Aquifer: Spring 2016 to Spring 2017

DUDEK

Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

- Wells screened in the Grimes Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

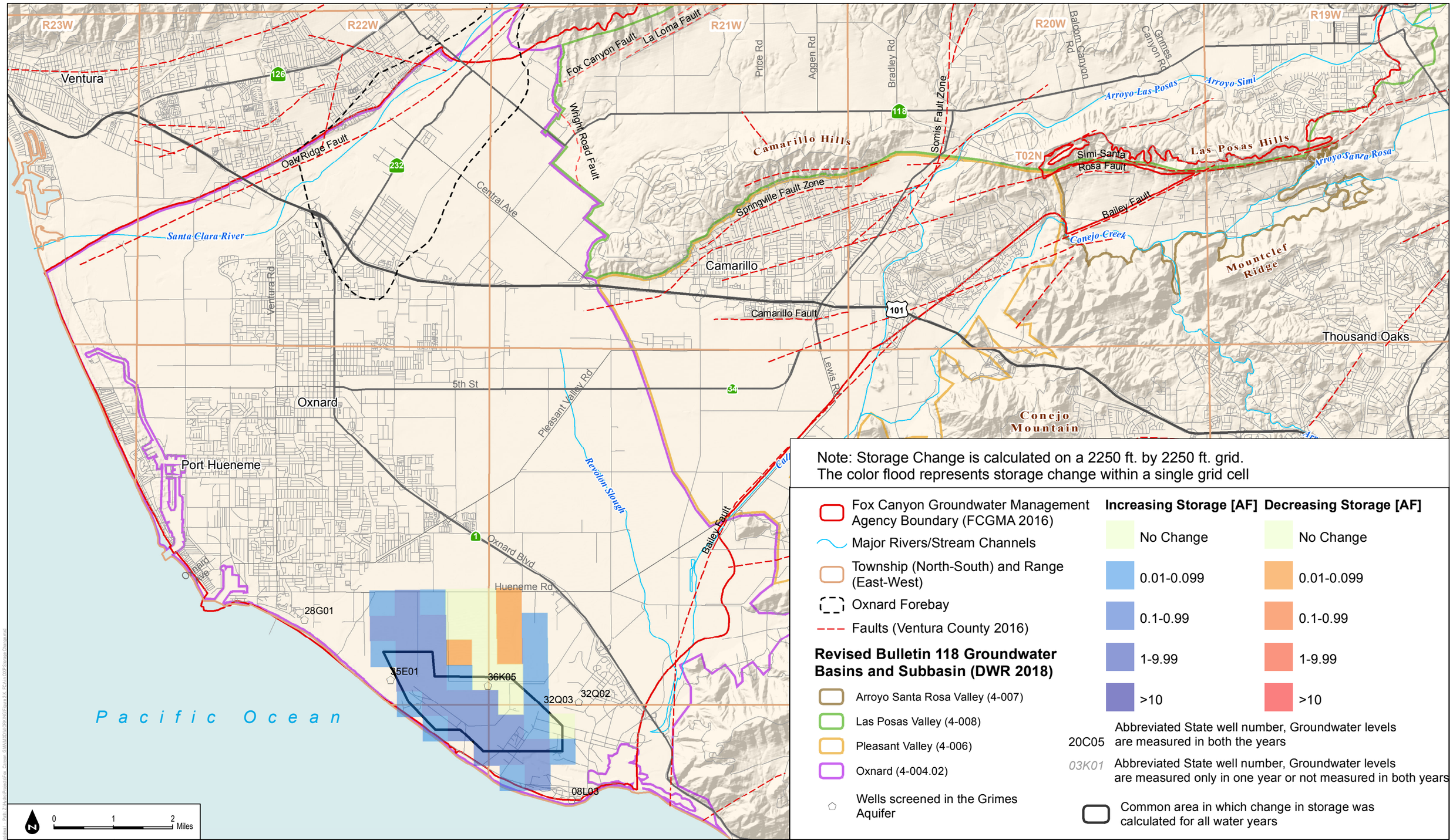
0 1 2 Miles

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

DUDEK

FIGURE 2-65

Change in Storage in the Grimes Canyon Aquifer: Spring 2017 to Spring 2018



Note: Storage Change is calculated on a 2250 ft. by 2250 ft. grid.
The color flood represents storage change within a single grid cell

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Major Rivers/Stream Channels
- Township (North-South) and Range (East-West)
- Oxnard Forebay
- Faults (Ventura County 2016)

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)

- Wells screened in the Grimes Aquifer

Increasing Storage [AF]	Decreasing Storage [AF]
No Change	No Change
0.01-0.099	0.01-0.099
0.1-0.99	0.1-0.99
1-9.99	1-9.99
>10	>10

20C05 Abbreviated State well number, Groundwater levels are measured in both the years

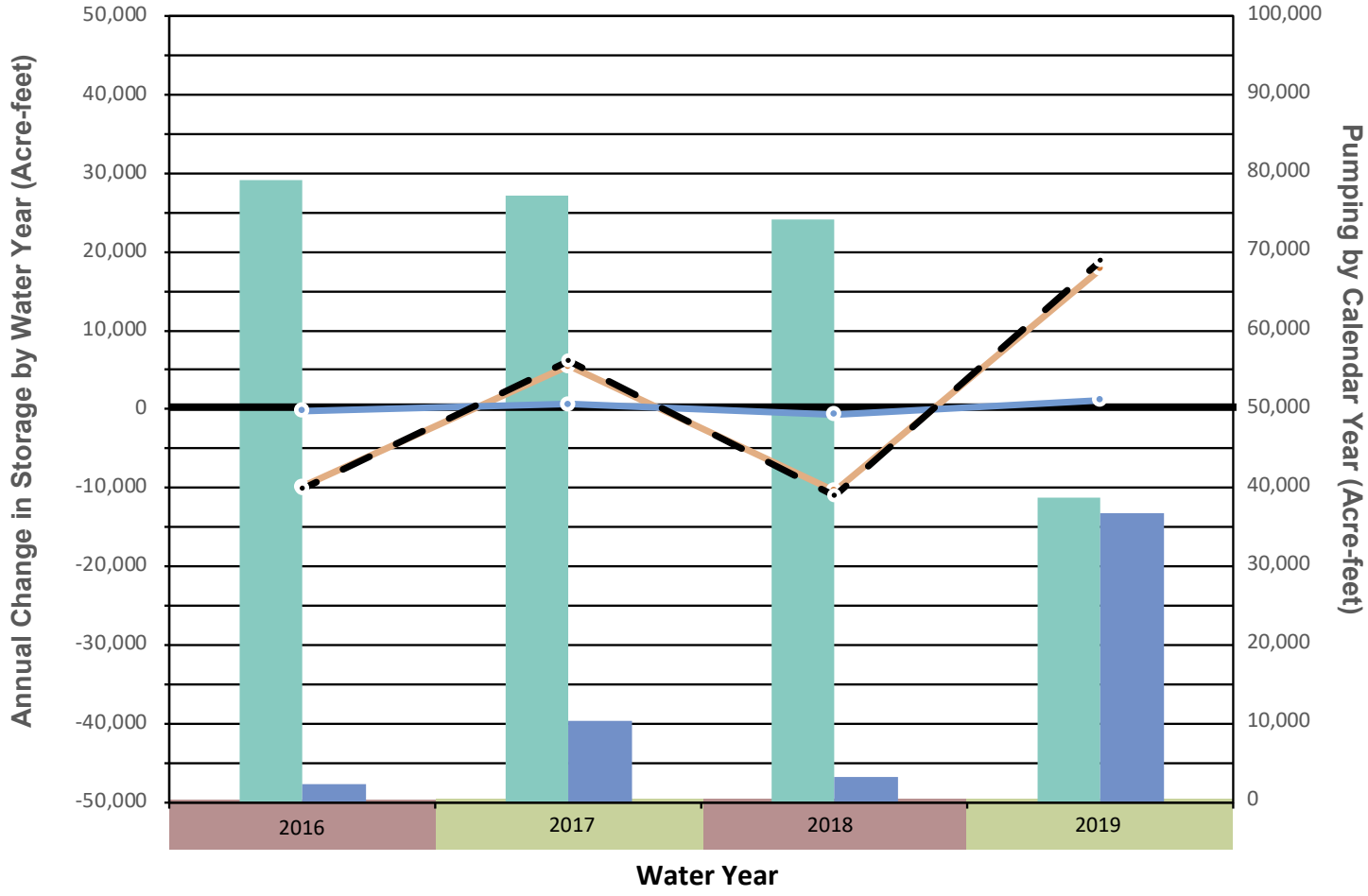
03K01 Abbreviated State well number, Groundwater levels are measured only in one year or not measured in both years

Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-66

Change in Storage in the Grimes Canyon Aquifer: Spring 2018 to Spring 2019



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 Oxctober 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).

Change in Storage

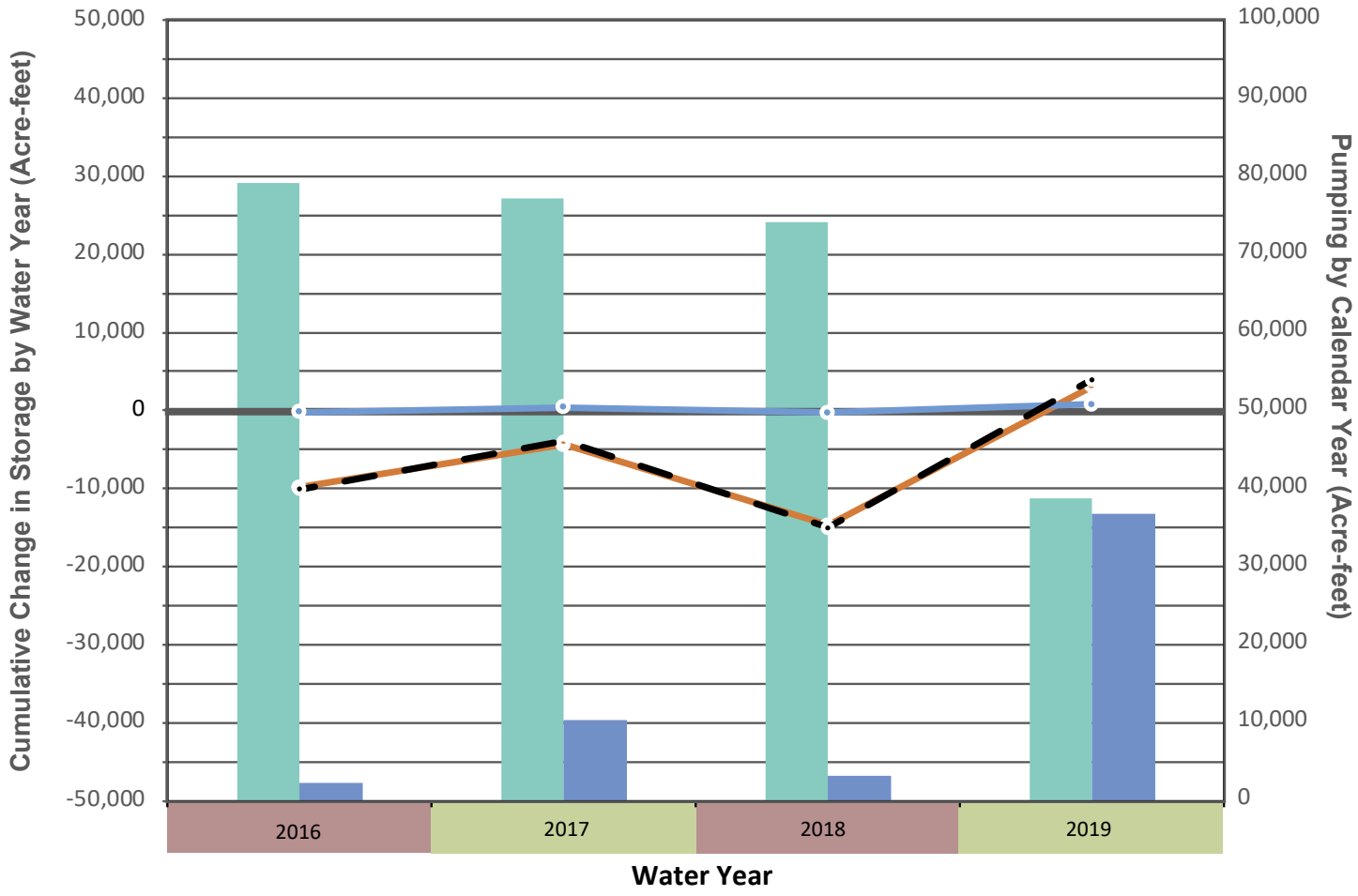
Pumping Spreading UAS LAS Total

Water Year Type

Wet Above Normal Below Normal Dry Critical

FIGURE 2-67

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



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 Oxctober 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).

Change in Storage

Pumping | Spreading | UAS | LAS | Total

Water Year Type

Wet | Above Normal | Below Normal | Dry | Critical

FIGURE 2-68

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