Pleasant Valley Basin Groundwater Sustainability Plan 2021 Annual Report: Covering Water Year 2020

Prepared for:

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 Pleasant Valley Basin (PVB) within its jurisdictional boundaries, in coordination with the other two GSAs in the basin, has prepared this second annual report for the Pleasant Valley Basin 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 PVB. The GSP for the PVB 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 PVB GSP ends in water year 2015. The first annual report provided an update on conditions in the Subbasin from water year 2016 through water year 2019. This annual report provides an update on the groundwater conditions in the PVB for water year 2020 (October 1, 2019 through September 30, 2020).

Since 2015, the PVB experienced two critical water years, 2016 and 2018, in which precipitation was below 50% of the long-term average precipitation, and two above normal water years, 2017 and 2019, in which precipitation was greater than the average precipitation. Water year 2020 was a below normal water year, in which precipitation was 81% of the long-term average precipitation. The volume of precipitation received in the PVB and surrounding watershed influenced, direct recharge to the PVB, the availability of surface water in the Conejo creek, and the availability of surface water in the Santa Clara River that could be diverted and delivered to the PVB via the Pleasant Valley Pipeline (PVP). In water years 2019 and 2020, UWCD diverted approximately 552 and 1,725 acre-feet (AF) of Santa Clara River water for delivery to agricultural users in the PVB and adjacent Oxnard Subbasin via the PVP. Of this, approximately 243 AF was delivered to the PVB in water year 2019 and 759 AF was delivered to the PVB in water year 2020.

Between spring 2019 and spring 2020, groundwater elevations rose by approximately 3 feet and in the age-equivalent stratigraphic unit of the Oxnard aquifer and by approximately 20 feet in the age-equivalent stratigraphic unit of the Mugu aquifer. Groundwater elevations measured in the Older Alluvium in spring 2020 were similar to groundwater elevations measured in spring of 2015. Groundwater elevation changes between spring 2019 and spring 2020 varied in the Fox Canyon aquifer in the PVB. In western PVB, near the boundary with the Oxnard Subbasin, groundwater elevations locally declined by a maximum of approximately 2 feet and increased by a maximum of approximately 7 feet. Groundwater elevations in the Fox Canyon aquifer in western PVB vary by water year type and were approximately 10 to 30 feet higher in 2020 than 2015.

Calculations of change in storage in the PVB are constrained by the aerial coverage of wells screened solely within individual stratigraphic units in the PVB, with insufficient data in the older alluvium and limited data in the Fox Canyon aquifer. As a result of the aerial coverage of groundwater measurements, calculations of change in storage in the PVB are limited to approximately 14% of the total aerial extent of the Basin. Observed changes in groundwater elevations were small within the area used to estimate the change in storage for the PVB. Consequently, the estimated volume of groundwater in storage in the Fox Canyon aquifer in the PVB effectively remained constant between water year 2016 and 2020.

Data gaps identified in the GSP remain in this annual report. Some of the critical data gaps include the aerial coverage of aquifer-specific groundwater elevation measurements available for preparing spring and fall contour maps and the groundwater production reporting period, which requires reporting of groundwater extractions on the calendar year, rather than water year, basis. Progress has been made on switching to a water year reporting system, and spatial data gaps are being filled as results from newly installed nested groundwater monitoring wells are

collected. The data gaps identified in the GSP will continue to be addressed as implementation of the GSP progresses.

FCGMA has undertaken several steps toward implementing the GSP, with implementation planning occurring concurrently with the GSP development process and throughout the past year. Through DWR's Technical Support Services (TSS) program a new nested groundwater well cluster was installed near the Arroyo Las Posas to better delineate groundwater elevations in northern PVB. The FCGMA Board of Directors adopted a new extraction allocation ordinance effective October 1, 2020, which transitions to water year reporting and provides the regulatory framework to manage extractions consistent with the sustainable yield of the PVB. Additionally, FCGMA successfully conducted ongoing stakeholder discussions and meetings facilitated by DWR's Facilitation Support Services program to support implementation of the GSP. These discussions resulted in the development of a recommended suite of projects that will be modeled and evaluated as part of an overall basin optimization strategy for ongoing basin management. 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 PVB.

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1 Plan Area and Background

1.1 Background

FCGMA, the GSA for the portions of the PVB within its jurisdictional boundaries, in coordination with the other two GSAs in the basin, has prepared this annual report for the GSP in compliance with 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 PVB in December 2019 and submitted the GSP to DWR on January 13, 2020 (DWR 2020). FCGMA submitted the first annual report for the Subbasin April 1, 2020.

FCGMA is one of three Groundwater Sustainability Agencies (GSAs) in the PVB. The other two GSAs are the Camrosa Water District (CWD)–Pleasant Valley GSA and the Pleasant Valley Outlying Areas GSA (County of Ventura). This annual report applies to the entirety of the PVB. To coordinate management and reporting in the basin, FCGMA and CWD have executed a Memorandum of Understanding, and FCGMA and the County have formed a Joint Powers Authority.

1.1.1 Fox Canyon Groundwater Management Agency

FCGMA is an independent special district formed by the California Legislature in 1982 to manage and protect the aquifers within its jurisdiction for the common benefit of the public and all agricultural, and M&I users (FCGMA et al. 2007). FCGMA's boundaries include all land overlying the Fox Canyon Aquifer (FCA) and includes portions of the Oxnard Subbasin and the Las Posas Valley Basin (LPVB), the 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. 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 PVB Groundwater Sustainability Plan

The GSP for the PVB defined the conditions under which the groundwater resources of the entire PVB will be managed sustainably in the future (FCGMA 2019a). Groundwater conditions were evaluated in five hydrostratigraphic units in the PVB. These hydrostratigraphic units are similar to the five principal aquifers in the Oxnard Subbasin, which adjoins the PVB, commonly grouped into an upper and lower aquifer system. In the PVB, the older alluvium is the time equivalent stratigraphic unit to the Upper Aquifer System (UAS) in the Oxnard Subbasin. The Upper San Pedro Formation, Fox Canyon aquifer, and Grimes Canyon aquifer compose the Lower Aquifer System (LAS) in the PVB. The primary sustainability goal for the PVB adopted in the GSP, is "to maintain a sufficient volume of groundwater in storage in the older alluvium and the Lower Aquifer System so that there is no net decline in groundwater elevation or storage over wet and dry climatic cycles." (FCGMA 2019a). Additionally, "groundwater levels in the PVB should be maintained at elevations that are high enough to not inhibit the ability of the Oxnard Subbasin to prevent net landward migration of the saline water impact front" in the Oxnard Subbasin after 2040 (FCGMA 2019a). These goals were established based on both historical and potential future undesirable results to the groundwater resources of the PVB 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 PVB was found not to experience direct impacts from seawater intrusion or depletion of interconnected surface water.

The GSP established minimum threshold groundwater elevations, defined for the PVB, as groundwater levels that: allow declines during periods of future drought to be offset by recovery during future periods of above-average rainfall (FCGMA 2019a). These groundwater elevations were also found to limit seawater intrusion in the Oxnard Subbasin (FCGMA 2019a). In addition to minimum threshold groundwater elevations, the GSP also established measurable objective groundwater elevations. Measurable objective groundwater elevations were defined as "the groundwater levels throughout the PVB at which there is neither seawater flow into, nor freshwater flow out of the Upper Aquifer System or Lower Aquifer System in the Oxnard Subbasin" (FCGMA 2019a). Minimum threshold and measurable objective groundwater elevations were established at nine representative monitoring points (or "key wells") in the PVB (FCGMA 2019a).

The GSP documented conditions throughout the PVB through the fall of 2015. The first annual report evaluated progress toward sustainability based on a review of groundwater elevation data, groundwater extraction data, surface water supply used, or surface water supply available for use, total water used, and change in groundwater storage between the fall of 2015 and the end of water year 2020[3]. This annual report documents the conditions in the PVB and the progress toward sustainability for water year 2020.

1.2 Plan Area

The PVB (DWR Groundwater Basin 4-006) is bounded to the north by the Springville fault zone and Somis Gap, to the east by the ASRVB (DWR Bulletin 118 Groundwater Basin 4-007) and Conejo Mountain, to the southeast by the Santa Monica Mountains, and to the west and southwest by the Oxnard Subbasin of the Santa Clara River Valley Groundwater Basin (DWR Groundwater Basin 4-04.02; Figure 1-1, Vicinity Map for the Pleasant Valley Basin).

[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.

On the west and southwest, the PVB is in hydrogeologic communication with the Oxnard Subbasin. The boundary between the PVB and Oxnard Subbasin is defined by a facies change between the predominantly coarser-grained sand and gravel deposits that compose the Upper Aquifer System in the Oxnard Subbasin and the finer-grained clay and silt-rich deposits of the Upper Aquifer System in the PVB. To the north, in the Camarillo Hills area, the Springville Fault Zone is believed to form a groundwater flow barrier at depth between the aquifers in the LPVB and the PVB, based on historical hydraulic head differences of up to 60 feet across the fault zone (DWR 1975). However, shallow alluvial deposits in the vicinity of Arroyo Las Posas and the Somis Gap are in hydraulic communication with the LPVB (CMWD 2017). The eastern boundary of the PVB is formed by a constriction in Arroyo Santa Rosa Valley (SWRCB 1956; DWR 2003). The southern boundary of the PVB is delineated by the contact between the alluvial deposits and surface exposures of bedrock in the Santa Monica Mountains (DWR 2003).

1.2.1 Climate

The climate of Pleasant Valley is typical of coastal Southern California, with average daily temperatures ranging generally from 43°F to 80°F in summer and from 41°F to 74°F in winter (FCGMA 2019a). Typically, the majority of the precipitation in the Ventura County region falls between November and April. Precipitation is measured at several stations in the PVB (Figure 1-2; Precipitation and Stream Gauges in the Pleasant Valley Basin). Water year precipitation, measured at Stations 003 and 259, in the central PVB is highly variable, ranging from 4.5 inches in 1990 to 34.9 inches in 1998 (Figure 1-3; Pleasant Valley Basin Historical Water Year Precipitation). On average, the PVB received approximately 13.5 inches of precipitation per water year between 1957 and 2020.

The GSP for the PVB included precipitation through the 2015 water year (FCGMA 2019a). Since 2015, the PVB has experienced two above normal[4] water years (2017 and 2019), two critical water years (2016 and 2018), and one below normal water year (2020). The average precipitation between 2016 and 2020 was 11.4 inches, which is less than the long-term mean precipitation in the PVB. Overall, the PVB has continued to experience drier than average conditions since 2015.

1.2.2 Surface Water and Drainage Features

The dominant surface water bodies in Pleasant Valley are the Arroyo Las Posas, Calleguas Creek, and Conejo Creek, which drain watersheds that extend beyond the boundaries of the PVB (Figure 1-2). There is only one active streamflow gauging station in the PVB. This station, maintained by the Ventura County Watershed Protection District, is located on Calleguas Creek near California State University Channel Islands, downstream of the confluence of Arroyo Las Posas and Conejo Creeks. Streamflow measured at this gauge for the past 10 water years is presented in Table 1-1 and shown on Figure 1-4.

Historical flow in Calleguas Creek has been tied to the water year type (Section 1.2.1) with the highest average daily flows between 2010 and 2020 occurring in 2010 and 2011, which were an above normal and a wet water year, respectively (Table 1-1; FCGMA 2020a). However, average daily flows in water year 2020 measured at gauge 805 were 42.7 cfs, which is higher than the flows measured in water year 2019, which had higher rainfall than water year 2020 (Table 2-1). The increase in average daily flows in water year 2020, a below normal water year, compared

[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.

to water year 2019, an above normal water year, was influenced by storm flows measured in March 2020 that exceeded spring flow events measured in 2019 (Figure 1-4).

Table 1-1. Streamflow on Calleguas Creek for Water Years 2010 through 2020

Water Year	Average Daily Flow (cfs) at Gauge 805
2010	52.5
2011	67.1
2012	19.1
2013	12.9
2014	9.2
2015	9.1
2016	6.9
2017	44.9
2018	11.4
2019	35.2
2020	42.7

Note: cfs = cubic feet per second

1.3 Annual Report Organization

This is the second Annual Report prepared since the GSP for the PVB was submitted to DWR. This report is organized according to the GSP Emergency Regulations. Chapter 1 provides the background information on the GSP, the PVB, and the Fox Canyon Groundwater Management Agency. Chapter 2 provides information on the groundwater conditions in the PVB 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 PVB since water year 2019. Comparison of water year 2020 conditions to water year 2019 conditions characterizes the impact that water year type, groundwater production, surface and recycled water availability, and surface water spreading in water year 2020 have had on groundwater conditions in the PVB. Data from water years 2016 through 2018 are provided as context. These data were discussed in detail in the first annual report (FCGMA 2020a).

2.1 Groundwater Elevations

Groundwater elevation contour maps for the older alluvium (Oxnard and Mugu equivalents), and the Fox Canyon aquifer are presented in Figures 2-1 through 2-6. These maps show the seasonal high and low groundwater elevations for the fall of 2019 and spring of 2020. Spring groundwater elevations were defined as any groundwater elevation measured within a six-week window between February 23 and April 4 of each year. This six-week window expands on the four-week window used when generating groundwater elevation contour maps for the first Annual Report covering water years 2016 through 2019. This expansion was necessary to incorporate a similar spatial coverage of groundwater elevation measurements for comparison of groundwater contours, and corresponding changes in groundwater in storage, between water years 2016, 2017, 2018, 2019, and 2020. Fall groundwater elevations were defined as any groundwater elevation measured between September 30 and October 31 of each year. The four-week window is similar to the measurement window used to contour groundwater elevations in the first Annual Report for the PVB covering water years 2016 through 2019. The GSP recommended collecting groundwater elevations within a two-week window in the future (FCGMA 2019a). FCGMA is in 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, and vertical gradients between aquifers. It is important to note, however, that production wells in the PVB 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 PVB and adjoining Oxnard Subbasin 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 a separate management area in the PVB (FCGMA 2019a). By using wells screened only within an individual aquifer, the lateral extent of the pumping depression is not well characterized.

At FCGMA's request, DWR installed a nested monitoring well cluster in the Oxnard Subbasin, in close proximity to the PVB, that uses two separate completions through its TSS program. The nested wells cluster is located adjacent to the Revolon Slough within the Pumping Depression Management Area. The shallow well cluster, which was completed on November 22, 2019, contains three monitoring wells individually screened in the Oxnard, Mugu, and Hueneme aquifers. The Oxnard and Mugu aquifers are age-equivalent to the Older Alluvium in the PVB and the Hueneme aquifer is age-equivalent to the Upper San Pedro aquifer in the PVB. The deep well cluster, which was completed on March 19, 2020, contains three monitoring wells individually screened within the Fox Canyon-Upper, Fox Canyon-Basal, and Grimes Canyon aquifers. FCGMA anticipates that groundwater elevations measured at the

shallow and deep well clusters will be available to incorporate into the water year2021 Annual Report for the Oxnard Subbasin.

In addition to the nested well cluster in the Pumping Depression Management Area, DWR installed a second nested monitoring well cluster located in the northwestern portion of the PVB, adjacent to the Arroyo Las Posas (Figures 2-1 through 2-9). Like the monitoring well cluster installed within the pumping depression management area, the new PVB monitoring well was constructed using two separate well completions. The first well completion contains two monitoring wells, one of which is screened within the Older Alluvium (in the-equivalent stratigraphic units of the Mugu in the Oxnard Subbasin) and the second of which is screened in the Upper San Pedro Formation (age-equivalent to the Hueneme aquifer in the Oxnard Subbasin). The second completion contains three monitoring wells individually screened in the Older Alluvium (in the age-equivalent stratigraphic unit as the Oxnard aquifer in the adjacent Oxnard Subbasin), Fox Canyon-Upper aquifer, and Fox Canyon-Basal aquifer. Construction of the two separate well completions was completed in September 2019. FCGMA anticipates that groundwater elevations measured at these wells will be available to incorporate into the 2022 Annual Report for the PVB.

2.1.1 Groundwater Elevation Contour Maps

2.1.1.1 Older Alluvium (Oxnard and Mugu Aquifers)

There are only four wells screened solely within the Older Alluvium in the PVB. Three of these wells were measured in fall 2019 and spring 2020: 02N21W34G04S, 02N21W34G05S, and 01N21W03K01S (Figures 2-1 and 2-2). Groundwater elevations have been measured each fall and spring at wells 02N21W34G04S and 02N21W34G05S since 2015. Groundwater elevations were measured at well 01N21W03K01S, which is located near the intersection of Pleasant Valley Road and California State Route 34, in the fall of 2019 and spring of 2020, but were not measured between the fall of 2015 and spring of 2019.

Wells 02N21W34G04S and 02N21W34G05S are part of a nested well cluster in the western PVB, with well 02N21W34G04S screened in the age equivalent stratigraphic unit to the Mugu aquifer in the Oxnard Subbasin and well 02N21W34G05S screened in the age equivalent stratigraphic unit to the Oxnard aquifer in the Oxnard Subbasin. Groundwater elevations increased at well 02N21W34G05 by approximately 4 feet between spring 2019 and spring 2020 and declined at well 02N21W34G04 by approximately 4 feet between spring 2019 and spring 2020. The spring groundwater elevation in well 02N21W34G04S was approximately 10 feet higher than it was in the spring of 2015. The spring groundwater elevation in well 02N21W34G05S was approximately 5 feet lower than spring 2015.

The fall groundwater elevation in wells 02N21W34G04S was approximately 10 feet higher in 2019 than in 2018. In well 02N21W34G05S the fall groundwater elevation was approximately 5 feet higher in 2019 than it was in 2018. Since 2015, fall groundwater elevations at 02N21W34G04S have rebounded approximately 24 feet, while groundwater elevations at 02N21W34G05S have declined approximately 15 feet.

2.1.1.2 Fox Canyon Aquifer

Groundwater elevation changes in PVB varied by geographic location within the Fox Canyon aquifer between spring 2019 and spring 2020. In western PVB, groundwater elevations measured in wells 01N21W03C01S and 01N21W09C04S were higher in spring 2019 than they were in 2020. The groundwater elevation at well 01N21W03C01S was 7 feet higher, and the groundwater elevation at well 01N21W09C04S was 4 feet higher.

North and northeast of these wells, the groundwater elevation at well 02N21W34G02S declined by approximately 2 feet between the spring of 2019 and the spring of 2020. Along the foothills of the Camarillo Hills, and within the Springville Fault Zone, groundwater elevations measured at well 02N20W19M05S increased by approximately 1 foot between the spring of 2019 and the spring of 2020. Since 2015, spring groundwater elevations in western PVB have risen by as much as 30 feet (see well 01N21W09C04S), while groundwater elevations along the Camarillo foothills (measured at well 02N20W19M05S) have declined by approximately 30 feet (Figure 2-6).

Fall groundwater elevations in western PVB either changed by less than 1-foot (see well 02N21W33R02S) or increased by up to 10 feet (see well 02N21W34G03S) feet between 2018 and 2019. Along the boundary between PVB and the Oxnard Subbasin, fall groundwater elevations have declined by approximately 20 feet since 2015.

In northern PVB, between fall 2018 and 2019, groundwater elevations measured at well 02N20W29B02S declined by approximately 1 foot (Figure 2-5). Since 2015, groundwater elevations at well 02N20W29B02S have declined by approximately 18 feet.

2.1.2 Groundwater Elevation Hydrographs

Groundwater elevation hydrographs for each of the key wells identified in the GSP are presented in Figures 2-7 through 2-9. These key wells are the designated representative monitoring sites for the PVB (FCGMA 2019a). The fall 2019 and spring 2020 water levels measured at each representative monitoring site are presented in Table 2-1, which also provides a comparison of fall and spring water levels to: (i) water year 2019 conditions, (ii) the established minimum threshold groundwater elevations, (iii) the established measurable objective groundwater elevations, and (iv) the interim milestones for dry climate conditions. The dry climate interim milestone is used for comparison in this annual report because the precipitation measured in the Subbasin between water years 2016 and 2020 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 in the PVB have five years to reach this first interim milestone.

In the spring of 2019, the groundwater elevation in well 02N21W34G04S was approximately half a foot below the minimum threshold for this well. In contrast, the groundwater elevation in well 02N21W34G05S was approximately 27 feet below the minimum threshold (Table 2-1; FCGMA 2019a). Groundwater elevations in both wells were above the 2025 interim milestone for dry climate conditions identified in the GSP (Table 2-1; FCGMA 2019a).

Spring groundwater elevations in the representative monitoring wells in western PVB were approximately 18 to 26 feet below the minimum thresholds in wells 01N21W03C01SS, 02N21W34G02S, and 02N21W34G03S (Table 2-1). Spring groundwater elevations have varied with water year type in these wells but were higher in 2020 than they were in 2015 (Figure 2-9). Spring groundwater elevations at wells 01N21W03C01S, 02N21W34G02S, and 02N21W34G03S are higher than the 2025 interim milestone groundwater elevation for dry climate conditions (Table 2-1).

Groundwater elevations in well 02N20W19M05S increased by approximately one foot between spring 2019 and spring 2020. While groundwater elevations at 02N20W19M05S are currently lower than spring 2015 conditions, the groundwater elevation in this well remains over 100 feet higher than the minimum threshold for the well (Table 2-1; Figure 2-9)

Table 2-1. Water Year 2020 Groundwater Elevations, Minimum Thresholds, Measurable Objectives, and Interim Milestones for Representative Monitoring Wells in the PVB

Well Number	Aquifer	Fall Groundwater Conditions		Spring Groundwater Conditions		Minimum Threshold (ft MSL)	Measurable Objective (ft MSL)	2025 Interim Milestone Dry Climate (ft MSL)
		2019 Groundwater Elevation (ft MSL)	Change from 2018 to 2019 (ft)[a]	2020 Groundwater Elevation (ft MSL)	Change from 2019 to 2020 (ft)[a]			
02N21W34G05S	Older Alluvium (Oxnard)	-13.17	5.79	4.68	3.37	32	40	0
01N21W03K01S	Older Alluvium (Mugu)	-92.98		-44.98		-53	5	-73
02N21W34G04S	Older Alluvium (Mugu)	-66.45	12.34	-48.44	-4.31	-48	5	-72
01N21W01N21W03C01SS	Fox	-115.42		-74.22	7.40	-48	0	-100
02N20W02N20W19M05SS	Fox	1.57		5.67	1.30	-135	65	-
02N21W02N21W34G02SS	Fox	-102.16	8.86	-71.56	-2.26	-53	0	-101
02N21W02N21W34G03SS	Fox	-102.44	9.05	-71.52	-0.57	-53	0	-104
01N21W02P01S	Multiple	-83.92		NM		-43	5	-80
01N21W04K01S	Multiple	-119.58		-61.23	0.80	-48	0	-112

Notes: NM = *Not Measured*

[a]Data in this column shows the difference between water year 2019 and water year 2020groundwater elevations measured at each representative monitoring site. Positive (+) values indicate that seasonal high or low groundwater elevations have increased from water year 2019 conditions. Groundwater elevation increases from 2019 conditions are presented in blue font. Negative (-) values indicate that seasonal high or low groundwater elevations have decreased from water year 2019 conditions. Groundwater elevation declines from 2019 conditions are presented in red font with a red-filled cell. Blank cells indicate that water levels were not measured in either the current, or previous, fall and spring measurement window.

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 2-10 and 2-11 follow the historical precedent and are for calendar years rather than water years[5] (Table 2-2). It should be noted that extractions reported for 2020 are preliminary and expected to change. Additional extraction reporting is anticipated.

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

Table 2-2. Calendar Year Groundwater Extractions in the Pleasant Valley Basin by Aquifer System and Water Use Sector

Calendar Year	Upper Aquifer System (Acre-Feet)			Lower Aquifer System (Acre-Feet)				Wells Screened in both the UAS and LAS (Acre-Feet)				Wells in Unassigned Aquifer Systems (Acre-Feet)			Total (Acre-Feet)
	AG	*Dom*	*Sub-Total*	*AG*	*Dom*	*M&I*	*Sub-Total*	*AG*	*Dom*	*M&I*	*Sub- Total*	*AG*	*Dom*	*Sub-Total*	
2016	93	4	97	4,077	2	2,852	6,931	7,268	42	1,625	8,935	-	<1	0	15,963
2017	82	5	87	3,392	2	2,548	5,942	7,668	10	2,008	9,686	-	<1	0	15,715
2018	154	4	158	3,139	2	2,602	5,743	5,180	35	1,707	6,922	510	<1	510	13,333
2019[a]	91	5	96	2,433	2	2,120	4,544	3,314	26	1,607	4,948	876	<1	876	10,473
2020[b]	76	4	79	1,623	2	2,422	4,046	1,947	27	1,253	3,227	777	0	777	8,130

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

[a] Groundwater extractions for 2019 were updated from the 2020 Annual Report upon receipt of additional data.

[b] Preliminary results are expected to change. Additional extraction data is expected. Groundwater production is from January 1, 2020 through September 30, 2020

[5] Groundwater Extractions for 2020 are reported during the period from January 1, 2020 through September 30, 2020.

The available data characterizing groundwater extractions between 2016 and 2019 suggest that total groundwater production from the PVB has decreased since 2016. Groundwater production from the LAS decreased by approximately 2,400 AFY between 2016 and 2019 as a result of a reduction in agricultural and M&I extractions (Table 2-2). Agricultural extractions from wells screened within the UAS and LAS declined by approximately 4,000 AFY between 2016 and 2019 (Table 2-2). It should be noted that lower extraction data for pumping reported in Calendar Year 2020 is partially the result of a change in reporting period (see footnote).

2.3 Surface Water Supply

The primary surface water supplies to the PVB are from the Santa Clara River, via the UWCD Freeman Diversion and the Pleasant Valley Pipeline, and Conejo Creek, via a diversion operated by CWD. Within the PVB, CWD supplies surface water to the Pleasant Valley County Water District (PVCWD), and also distributes a portion of its diversions to other agricultural water users[6] (FCGMA 2019a). Surface water deliveries to the PVB for water years 2016 through 2020 are reported in Table 2-3.

Data characterizing Conejo Creek surface water supplied by CWD to the PVB was not available at the time of the last Annual Report. Because this data regarding Conejo Creek water supplies within the PVB were not available, surface water supplies represented in the 2020 Annual Report under-represented. CWD provided historical surface water supply data through calendar year 2020 to support preparation of this water year 2020 Annual Report for the PVB (Table 2-3). To convert these data to water year deliveries, 25% of the surface water deliveries by CWD from a given calendar year was assigned to the following water year, and the 75% of the calendar year surface water deliveries by CWD 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.

Table 2-3. Summary of Surface Water Deliveries to the Pleasant Valley Basin

Water Year	CWD		PVCWD	United Water Conservation District		Total (acre-feet)
				PVP (Pleasant Valley Basin) (acre-feet)		
	Conejo Creek for M&I (acre-feet)	*Conejo Creek for Agriculture (acre-feet)*	*Conejo Creek Flows Delivered to PVCWD for Agriculture (acre-feet)*	*Diversions of Santa Clara River Water Used for Agriculture (PVP)*	*Recharged Spreading Water Pumped and Used for Agriculture (Saticoy Wells)*[a]	
2016	740	2,804	816	0	0	4,361
2017	802	3,207	1,394	0	0	5,404
2018	777	3,107	1,456	0	0	5,341
2019	598	2,389	2,196	243	0	5,426
2020	541	2,099	1,815	759	0	5,214

Notes: CWD = Camrosa Water District, PVCWD = Pleasant Valley County Water District; PVP = Pleasant Valley Pipeline

[a]PVP deliveries of recharged spreading water used for agriculture in the PVB was incorrectly reported for water years 2016 through 2019 in the 2020 Annual Report. This data has been corrected and updated in Table 2-3. A description of the error in the 2020 Annual Report is provided in Appendix A.

6 44% of the total CWD deliveries to PVCWD, and 44% of the total PVP surface water deliveries from UWCD, were assigned to the PVB 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 PVB. The total water available is reported in Table 2-4 by water year. In order to convert the reported groundwater production from calendar year to water year, 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. Preliminary advanced metering infrastructure (AMI) data reported to FCGMA indicates that this division is reasonable for M&I and domestic groundwater extractions. AMI data from agricultural users in the Subbasin indicate that production can be highly variable, but preliminary data suggest the January through September period accounts for 70% of the total calendar year extractions, while the October through December period accounts for the remaining 30% of the total calendar year extraction. Using a 70-30% division based on this AMI data to convert from calendar year to water year results in an estimate of agricultural extractions equal to approximately 6,500 AF in water year 2020. This estimate is approximately 400 AF, or 7%, more than the water year 2020 agricultural extractions estimated using a 75-25% division

As noted in Section 2.2, 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

Additionally, CMWD did not report imported water use by sector. Therefore, the total CMWD water use reported was divided among the water use sectors based on the average reported water use, by sector, in the PVB GSP since 2010 (FCGMA 2019a). Between 2010 and 2015 99% of the imported water supplied by CMWD was provided to the M&I sector and only 1% was used for agriculture. This ratio was applied to CMWD total imports in Table 2-4.

Table 2-4. Total Water Available in the Pleasant Valley Basin

Water Year	Groundwater [a] (acre-feet)			Surface Water (acre-feet)[b]	Recycled Water (acre-feet)[c]		Imported Water[d] (acre-feet)		Total (acre-feet)
	Ag	Dom	M&I	Ag	Ag[h]	M&I	Ag	M&I	
2016	12,650	88	3,698	816	2,352	577	113	6,334	26,619
2017	11,216	24	4,536	1,394	2,300	651	153	8,275	28,548
2018	9,523	35	4,371	5,341	2,062	602	155	8,326	30,414
2019[e]	7,281	35	3,873	5,426	2,212	412	332	8,337	27,908
2020[f]	6,100	41	4,607	5,214	4,272	494	1,181	8,103	30,011

Notes:

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

[b] Recycled water supplies within the PVB updated upon receipt of recycled water deliveries by CWD within the PVB.

[c] Surface water supplies updated based on receipt of Conejo Creek deliveries by CWD and to correct the reporting error for PVP water delivered agriculture in the PVB.

[d] Imported water was divided into AG and M&I based on the ratio of AG and M&I imported water used between 2010 and 2015. 99% of the total imported water was used for M&I over that time period. Imported water supplies updated based on receipt of imported water supplied by CWD within the PVB.

[e] Water year 2019 groundwater extractions updated at part of the water year 2020 Annual Report based on receipt of additional extraction reporting.

[f] Groundwater production is preliminary and expected to charge. Additional extraction reporting is anticipated.

[g] Represents estimated water year production and total water supply using preliminary AMI data to convert groundwater extractions from calendar year to water year.

[h] Incorrectly represented as domestic supply in 2020 Annual Report.

2.5 Change in Groundwater Storage

Change in storage estimates were calculated for the Fox Canyon aquifer by comparing seasonal high groundwater elevations between 2015 and 2020. Annual change in storage was calculated for five water years by comparing seasonal high groundwater elevations between 2015 and 2020. Change in storage was calculating 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). Storage change was only calculated for the Fox Canyon aquifer in the PVB because there are only four wells screened solely within the Older Alluvium in the PVB. Of these four wells, only two were measured during the spring and fall of water years 2016 through 2019.

Change in groundwater elevation was calculated by mapping the spring 2015 through spring 2020 groundwater elevation contours onto a uniform grid that covered the areal extent of the PVB. Each grid was assigned a groundwater elevation equal to half the elevation of the up-gradient and down-gradient contours for the area within the 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 Fox Canyon 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 is shown in Figure 2-12. Change in storage calculated within the area of overlapping data for all water years is reported in Table 2-5. This common area is denoted with the black outline in Figure 2-12.

Table 2-5. Annual and Cumulative Change in Groundwater Storage in the Pleasant Valley Basin

Water Year	Water Year Type	Pleasant Valley Basin	
		Fox Canyon Aquifer Annual Change in Storage (acre-feet)	*Fox Canyon Aquifer Cumulative Change in Storage (acre-feet)*
2016	Critical	-14	-14
2017	Above Normal	3	-11
2018	Critical	-10	-22
2019	Above Normal	68	46
2020	Below Normal	0	46

Estimates of groundwater storage change in the Fox Canyon aquifer within the common area of measurement is limited by the aerial coverage of wells screened solely within the Fox Canyon aquifer in the PVB. This is most notable in the eastern portion of the PVB where groundwater elevations are constrained by a single well, 02N20W290B02, that is intermittently measured in the spring (Figure 2-21). Groundwater elevation changes in western PVB vary geographically, from slight declines near the boundary between the PVB and Oxnard Subbasin to slight increases near the Camarillo Fault. This results in small areas of groundwater storage increase and decrease within western PVB (Figure 2-12). The lack of change in groundwater in storage is related to the small area of the aquifer over which change in storage was calculated and the low specific storage value for the Fox Canyon aquifer in the PVB.

Annual and cumulative change in storage from 1985 through 2015 were reported in the GSP (FCGMA 2019a). Annual and cumulative change in storage between 2015 and 2020 are shown in Figures 2-13 and 2-14. The change in storage volumes reported in the GSP were extracted from the UWCD model and covered the entire lateral extend of the Older Alluvium, lower aquifer system, and semi-perched aquifer in the PVB. 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.

3 GSP Implementation Progress

The GSP for the PVB was submitted to DWR in January 2020. This is the second 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 development of projects and management actions over the 15 months since the GSP was submitted.

Project Implementation Progress

During development of the GSP, FCGMA identified the northern Pleasant Valley, adjacent to the boundary between the PVB and the ELPMA, as a critical area in which aquifer specific groundwater elevations were lacking. This is an area where subsurface flows between the two basins are poorly constrained. In response to FCGMA's request, DWR installed two new nested monitoring wells in this area in 2019, per FCGMA's technical specifications. Combined the new nested wells are screened in the Older Alluvium (one each in the Oxnard aquifer equivalent, and Mugu aquifer equivalent), upper San Pedro Formation (Hueneme aquifer equivalent), and the Fox Canyon aquifer (one each in the upper and basal portions). Groundwater elevation data from these wells will be incorporated into future annual reports, to better represent groundwater conditions at the boundary between the PVB and LPVB, and vertically between aquifers in the northern PVB.

In addition to northern Pleasant Valley, FCGMA also identified the Oxnard Pumping Depression Management Area, adjacent to the boundary between the PVB and the Oxnard Subbasin, as a critical area in which aquifer specific groundwater elevations were lacking. This is an area of known groundwater production, with wells in the area typically screened in multiple aquifers in the LAS. Similarly, in response to FCGMA's request, DWR installed two nested monitoring well clusters to monitor water levels in the individual principal 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 the next annual report, to better represent groundwater conditions in the PVB and the adjacent Oxnard Subbasin.

Since completing the GSP, FCGMA continued conducting stakeholder meetings and in June 2020 a facilitator provided through DWR's Facilitation Support Services program began leading the meetings. Participants in these meetings, which included stakeholders in both the PVB and the Oxnard Subbasin, identified a suite of projects that could help the basins achieve sustainability by 2040. Significant additional projects to those identified in the GSP are included. Upon additional evaluation, the projects committee of the stakeholder group recommended a subset of the projects identified for further assessment and modeling. FCGMA is working with UWCD to develop the numerical groundwater model scenarios that will be used to evaluate the potential effectiveness of the projects identified. DWR funding for the facilitator expired at the end of 2020, but FCGMA contracted with a new facilitator and continues to meet with stakeholders in the PVB and Oxnard Subbasin. 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 PVB.

Management Action Implementation Progress

FCGMA has made progress on several management actions since publication of the 2020 annual report. First, the allocation system for the Oxnard and Pleasant Valley Basins adopted by the FCGMA Board in 2019 went into effect on October 1, 2020. This allocation system is designed to "facilitate adoption and implementation of the groundwater sustainability plan and to ensure that the Basins are operated within their sustainable yields" (FCGMA, 2019c). As part of the new allocation system, FCGMA changed the reporting time periods for groundwater

production to better quantify groundwater production by water-year, rather than calendar year. Additionally, the goal under the new allocation system is to eventually transition from well-based allocations to a land-based allocations. Both sets of changes will allow for improved management of the PVB and Oxnard Subbasin, which are managed jointly by the FCGMA, and a more comprehensive understanding of the water use requirements that drive groundwater production in the two basins.

Second, in anticipation of the additional reporting associated with implementing the allocation ordinance, FCGMA is conducting an analysis of its data management system needs. The updated data management system will incorporate the new AMI data and will be structured to allow for land-based extraction assignments. Changes to the data management system will target the specific needs of the FCGMA moving toward sustainable management of the PVB and Oxnard Subbasin by 2040.

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

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

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4 References

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.

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.

FCGMA (Fox Canyon Groundwater Management Agency). 2019a. Groundwater Sustainability Plan for the Pleasant Valley Basin.

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

FCGMA (Fox Canyon Groundwater Management Agency). 2019c. Ordinance to Establish a New Pumping Allocation System for the Oxnard and Pleasant Valley Basins.

FCGMA (Fox Canyon Groundwater Management Agency). 2020a. Pleasant Valley Basin Groundwater Sustainability Plan 2020 Annual Report: Covering Water Years 2016 through 2019.

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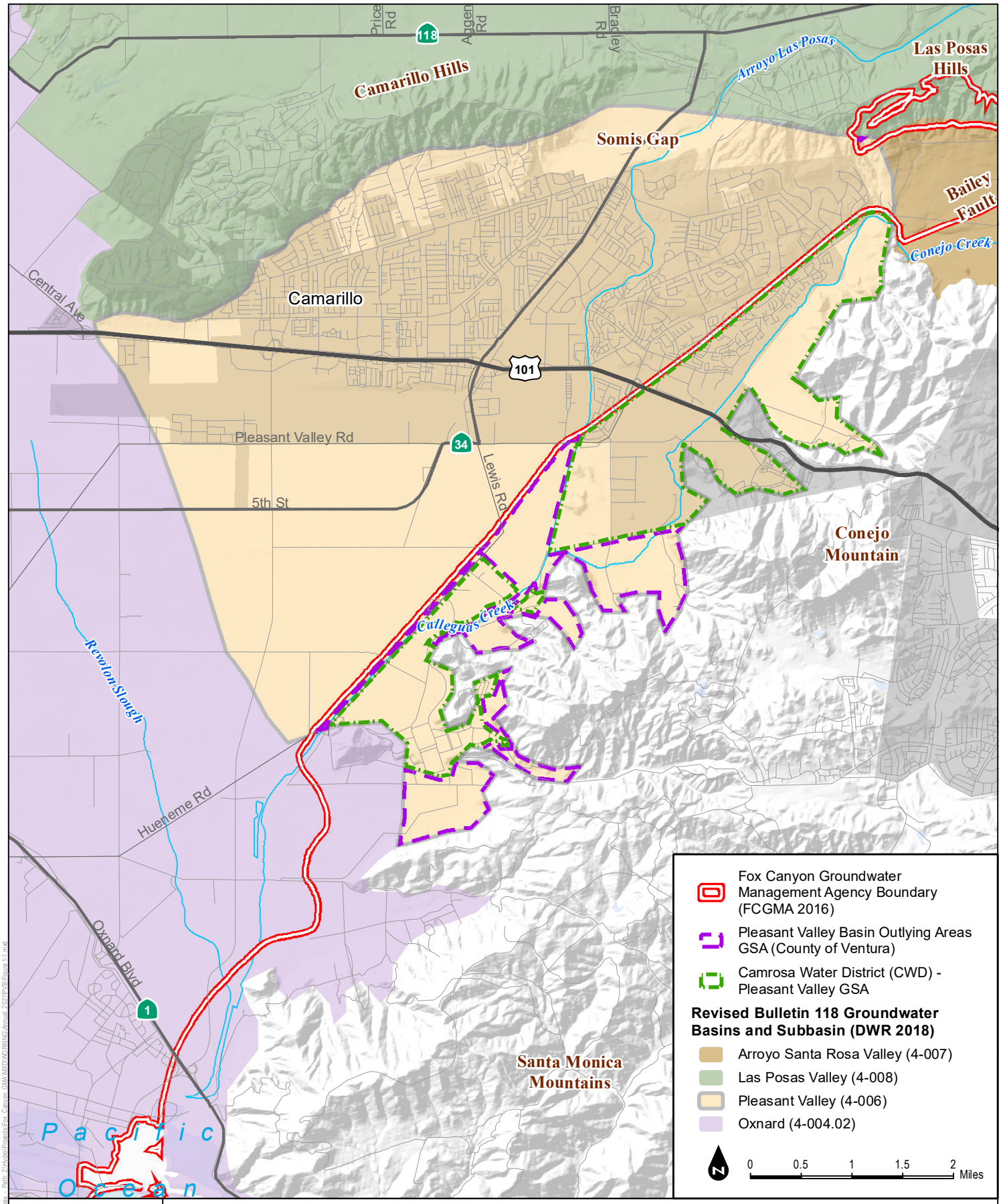
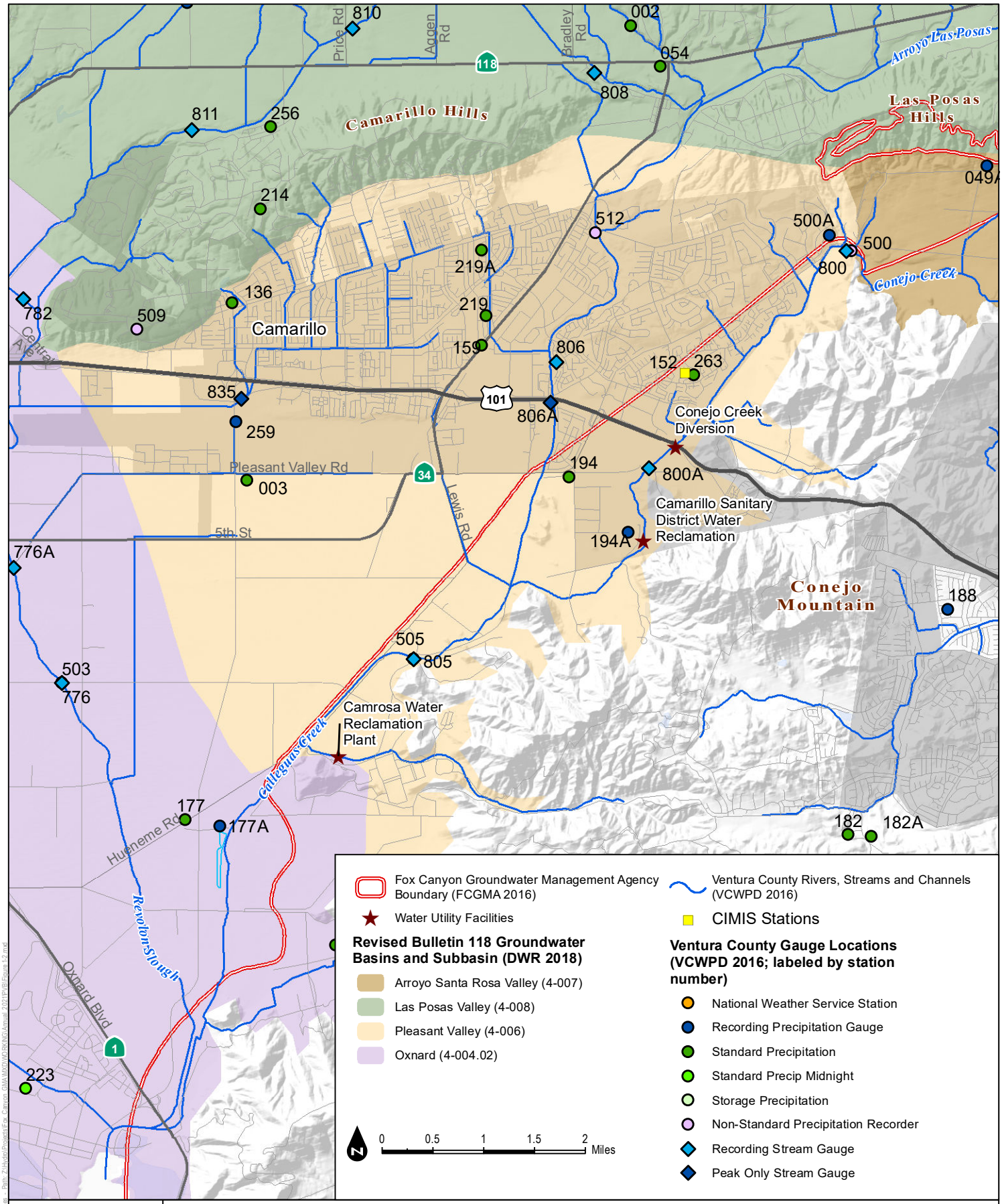


DUDEK

SOURCE: DWR; Ventura County; FCGMA

FIGURE 1-1

Vicinity Map for the Pleasant Valley Basin



SOURCE: DWR; Ventura County; VCWPD

FIGURE 1-2

Pleasant Valley Basin Weather Station and Stream Gauge Locations

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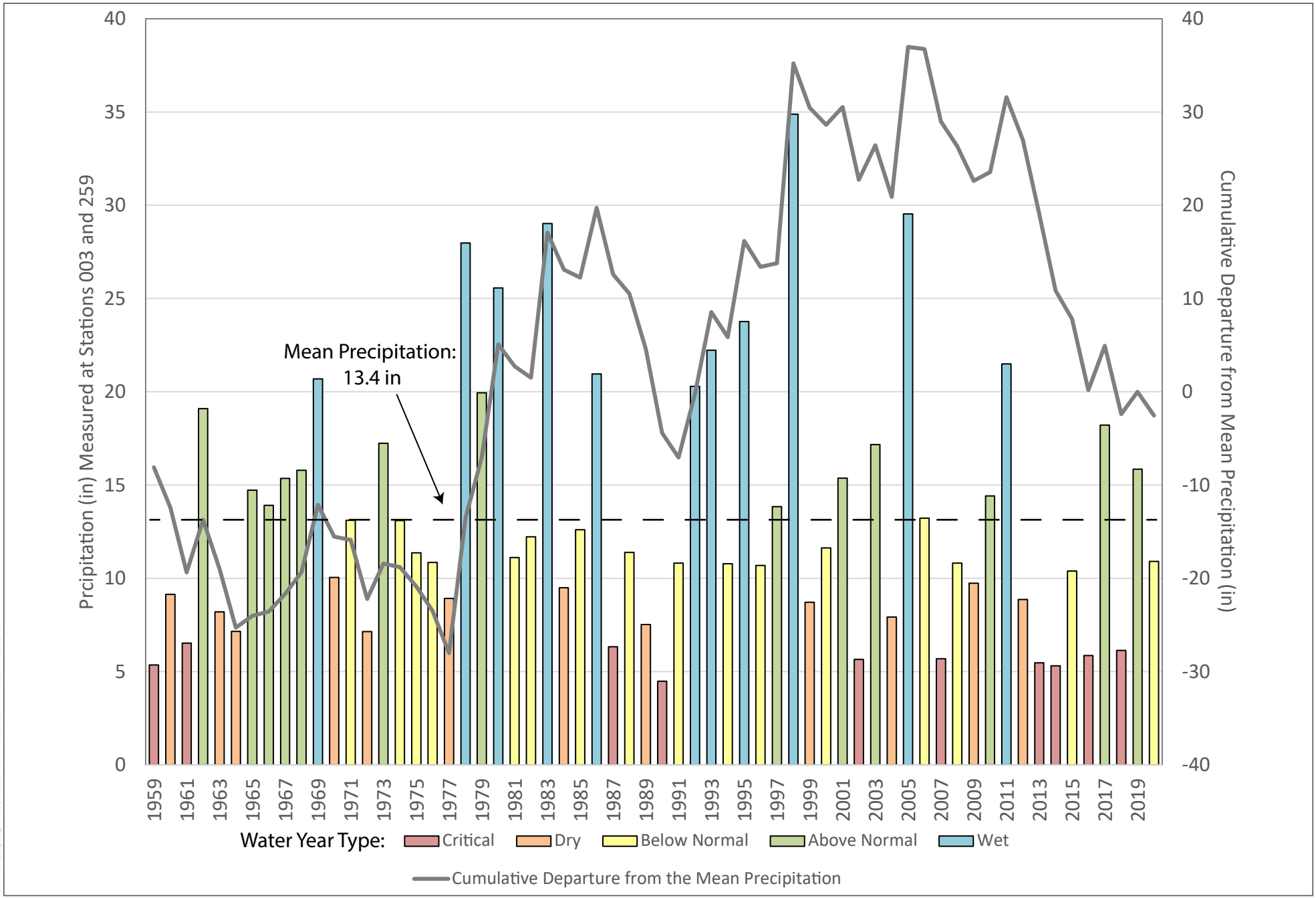
Pleasant Valley Basin Groundwater Sustainability Plan 2021 Annual Report



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

Pleasant Valley Basin Historical Water Year Precipitation

Pleasant Valley Basin Groundwater Sustainability Plan 2021 Annual Report

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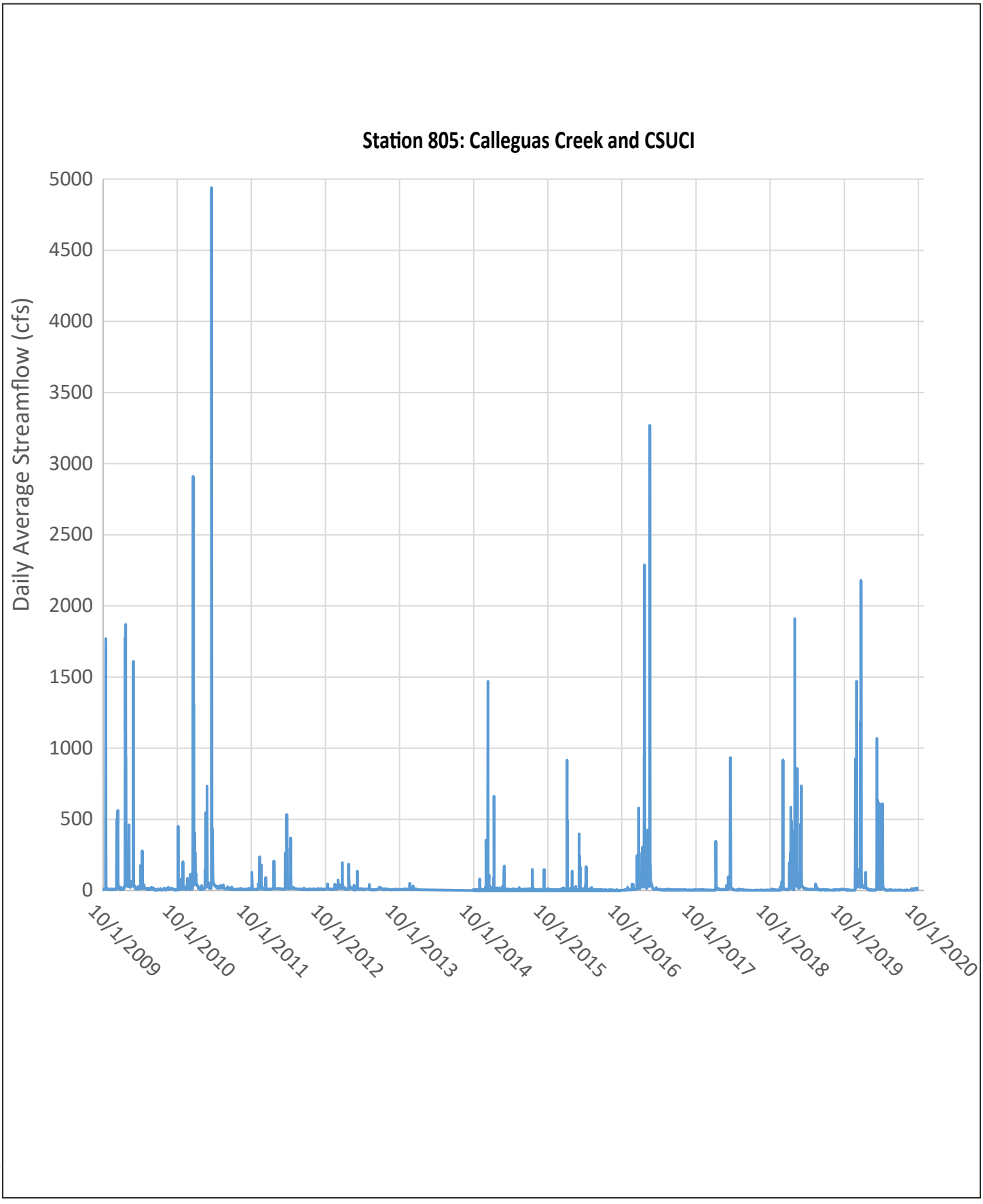
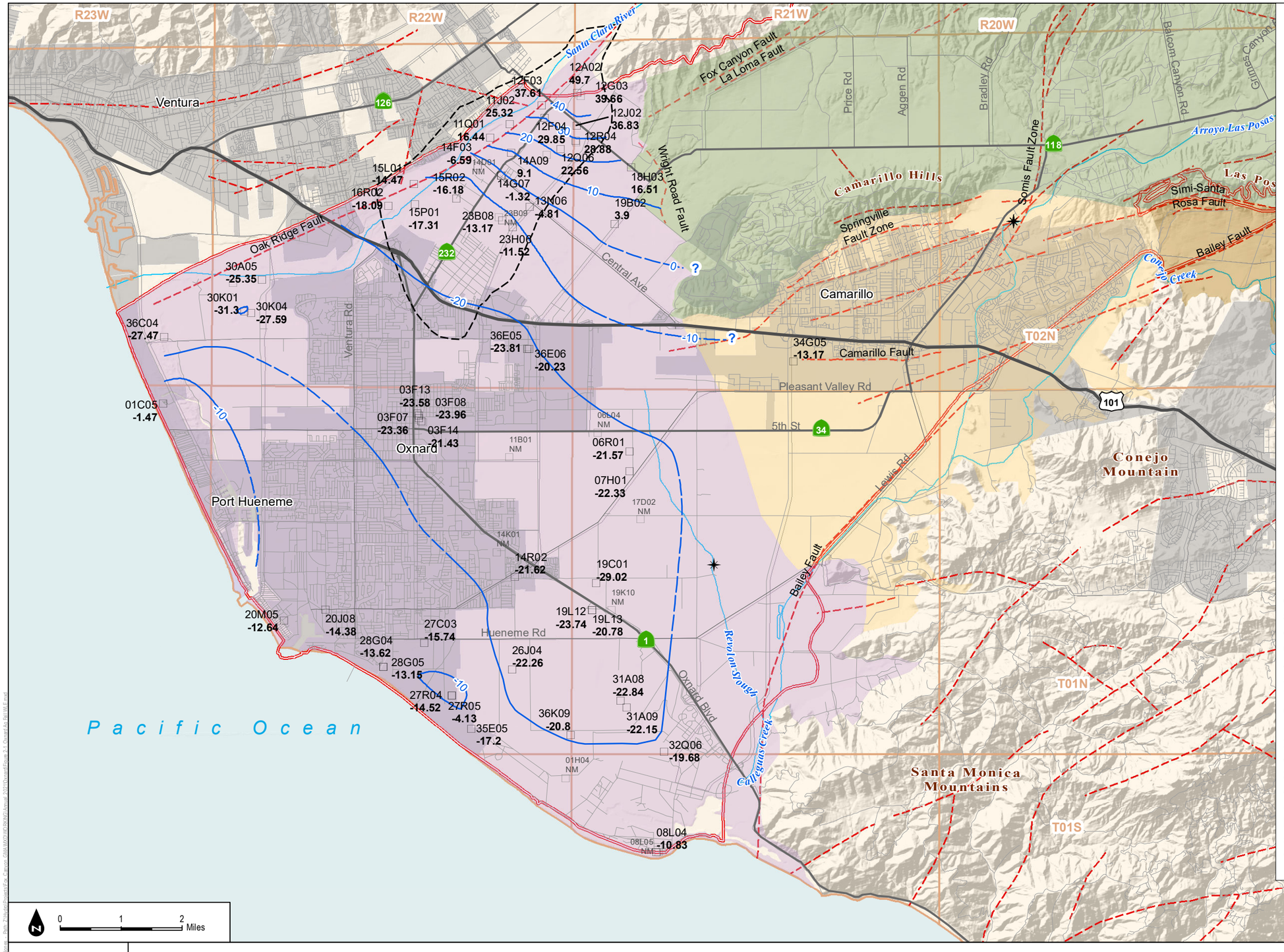


SOURCE: Ventura County Watershed Protection District (VCWPD) Hydrologic Data Server (https://www.vcwatershed.net/hydrodata/)

FIGURE 1-4

Pleasant Valley Basin 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
- Forebay Management Area
- *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)

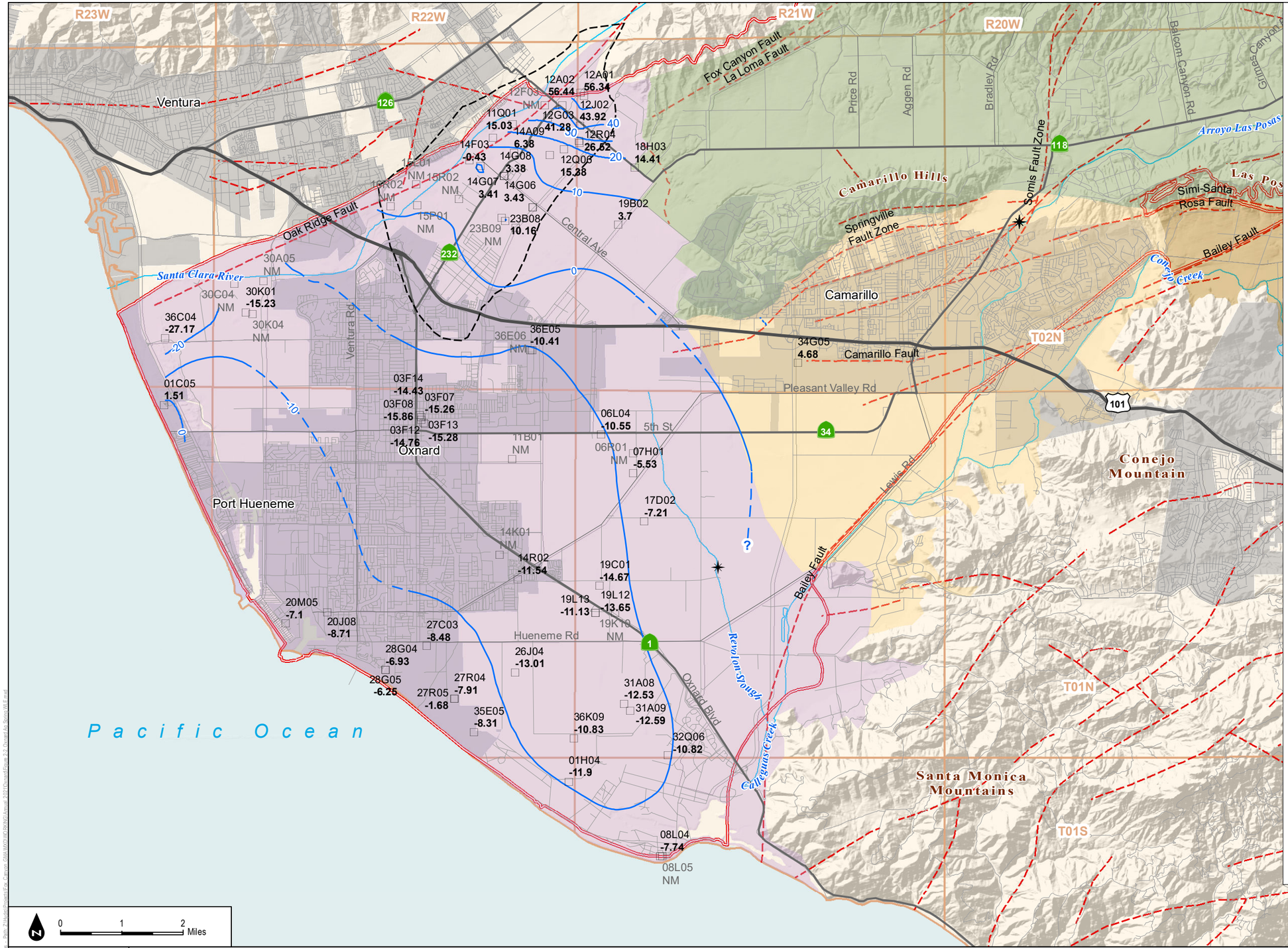
Notes:

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, September 30 to October 29, 2019



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
- Forebay Management Area
- *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).

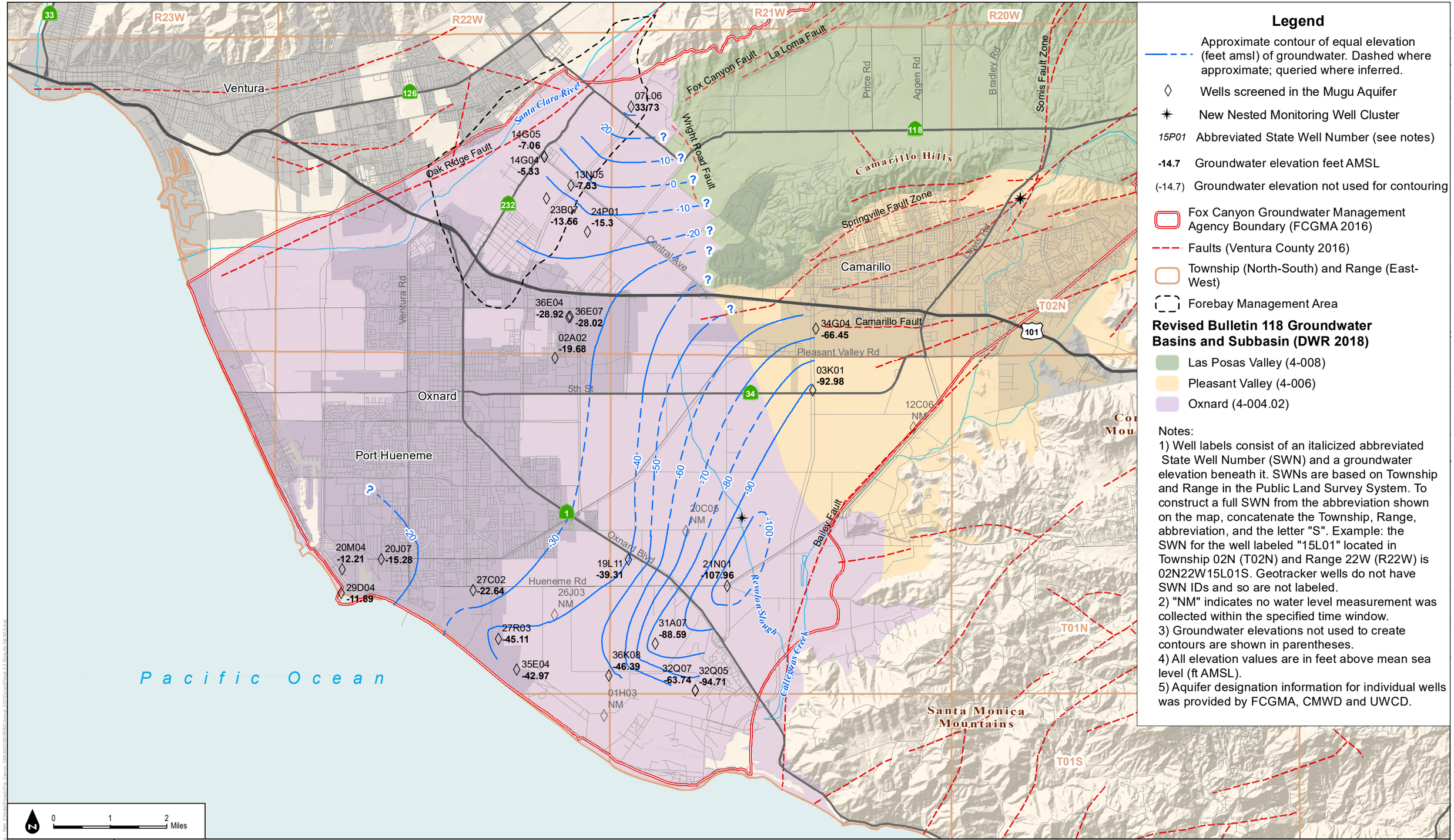
5) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-2

Groundwater Elevation Contours in the Oxnard Aquifer, February 23 to April 4, 2020



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)
- Forebay Management Area

Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

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

Notes:

1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and the letter "S". Example: the SWN for the well labeled "15L01" located in Township 02N (T02N) and Range 22W (R22W) is 02N22W15L01S. Geotracker wells do not have SWN IDs and so are not labeled.

2) "NM" indicates no water level measurement was collected within the specified time window.

3) Groundwater elevations not used to create contours are shown in parentheses.

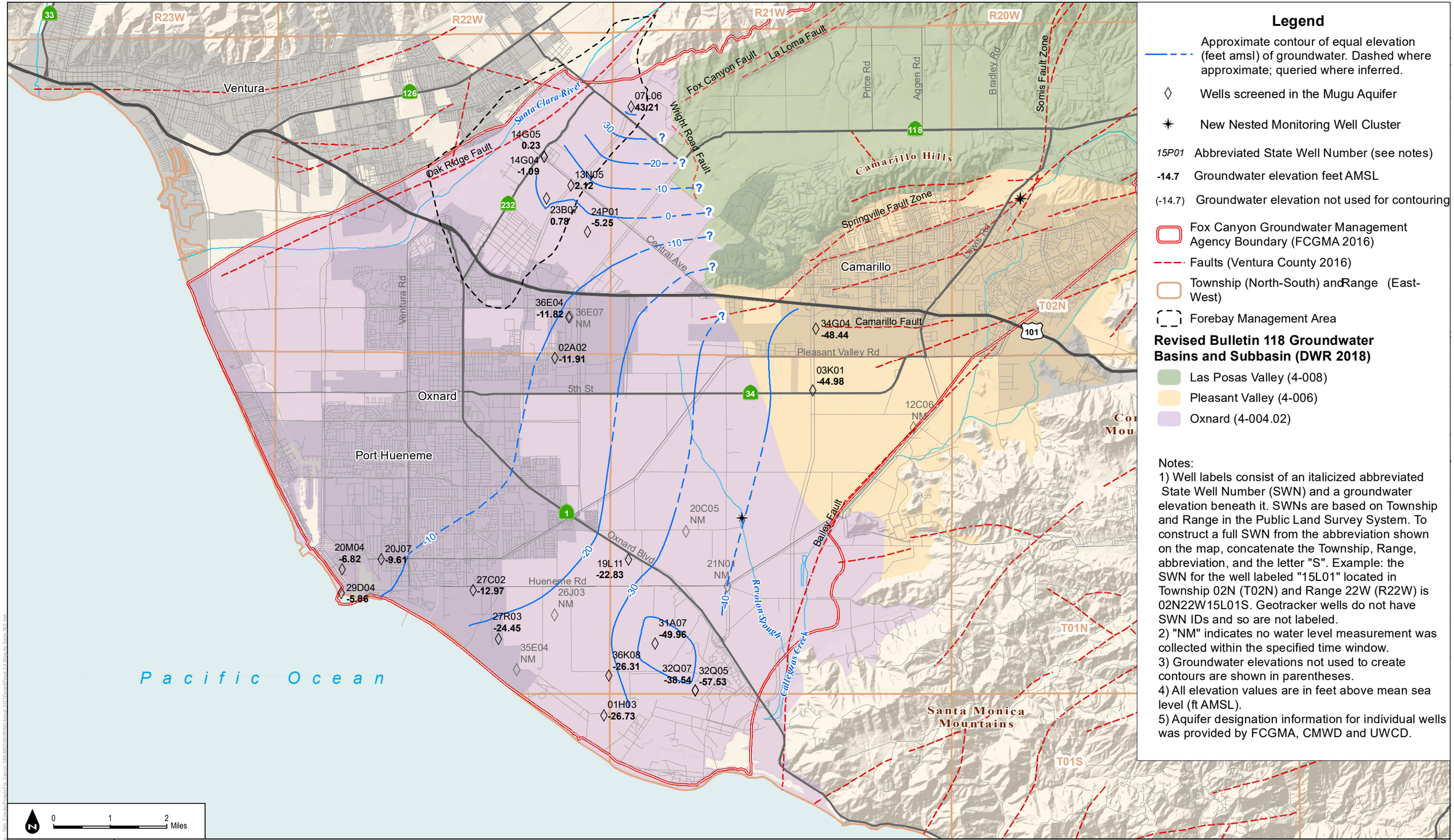
4) All elevation values are in feet above mean sea level (ft AMSL).

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

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-3

Groundwater Elevation Contours in the Mugu Aquifer, September 30 to October 31, 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)
- Forebay Management Area

Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

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

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

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-4
Groundwater Elevation Contours in the Mugu Aquifer, February 23 to April 4, 2020

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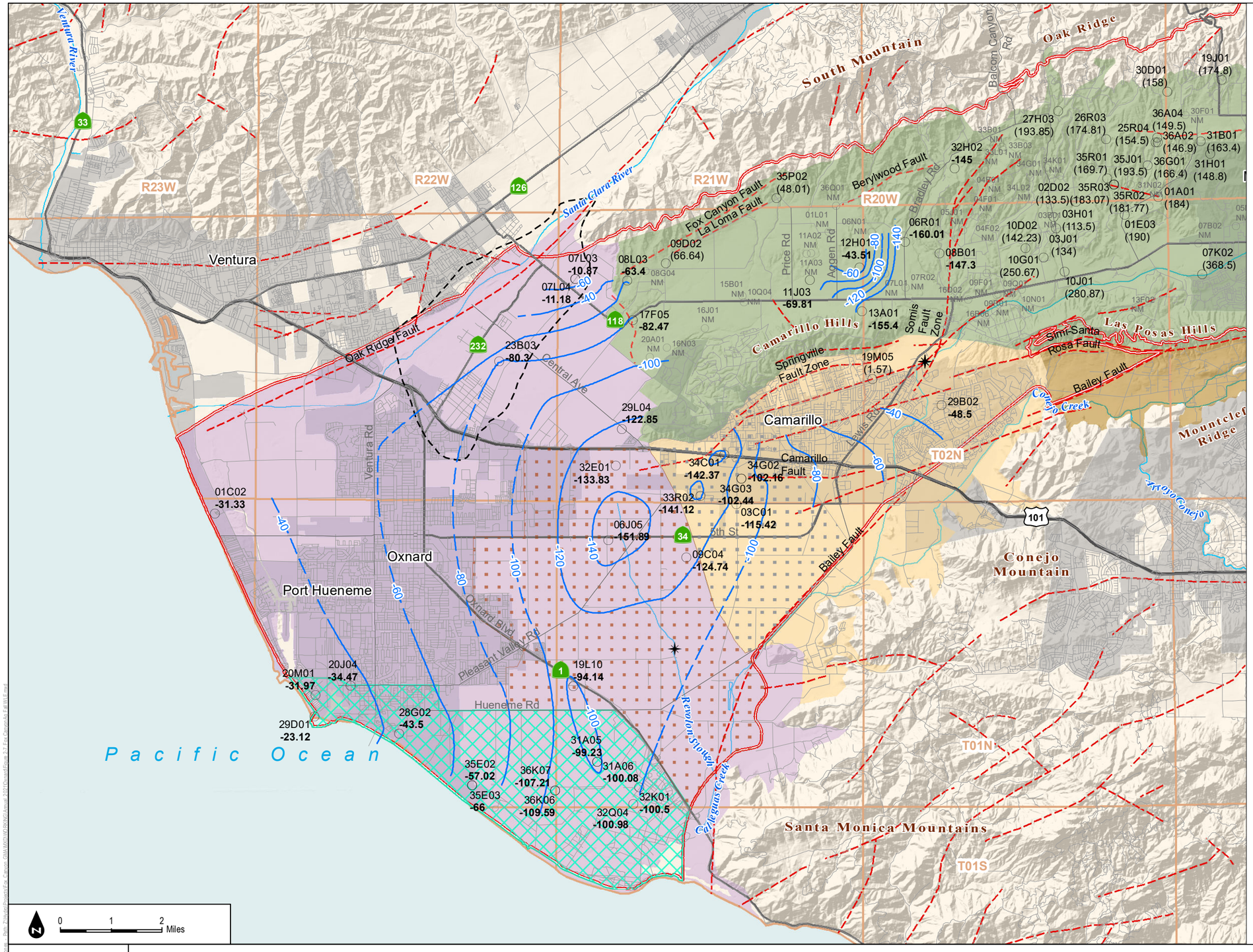


Legend

- Approximate contour of equal elevation (feet amsl) of groundwater. Dashed where approximate; queried where inferred.
- Wells Screened in the Fox Canyon Aquifer
- 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)
- Forebay Management Area
- Oxnard Pumping Depression Management Area
- Pleasant Valley Pumping trough Management Area
- Saline Intrusion Management Area
- Township (North-South) and Range (East-West)

Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

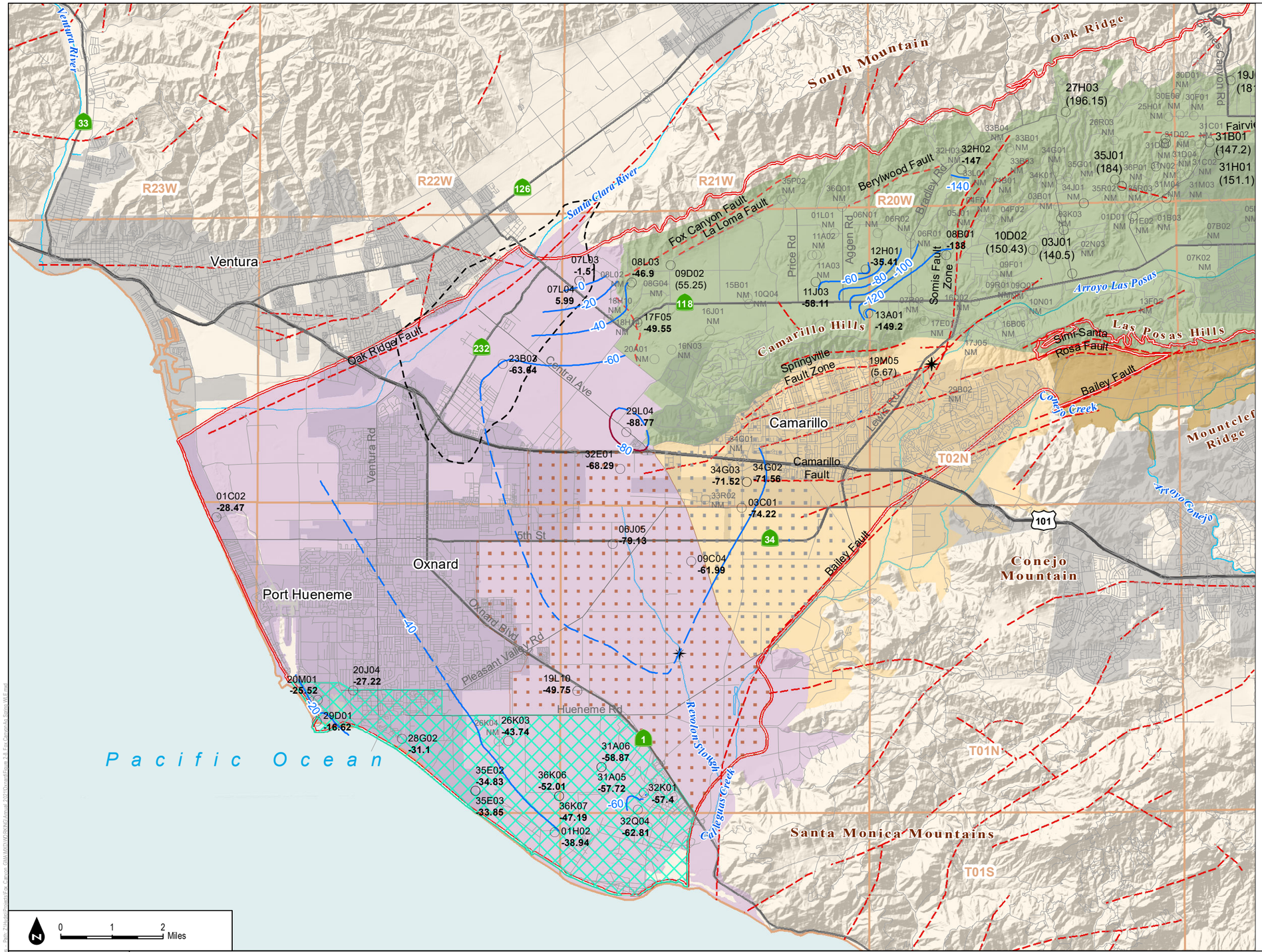
- Arroyo Santa Rosa Valley (4-007)
- Las Posas Valley (4-008)
- Pleasant Valley (4-006)
- Oxnard (4-004.02)

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 Fox Canyon Aquifer, September 30 to October 31, 2019



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)
- Forebay Management Area
- Oxnard Pumping Depression Management Area
- Pleasant Valley Pumping trough Management Area
- Saline Intrusion Management Area
- 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 2-6

Groundwater Elevation Contours in the Fox Canyon Aquifer, February 23 to April 4, 2020

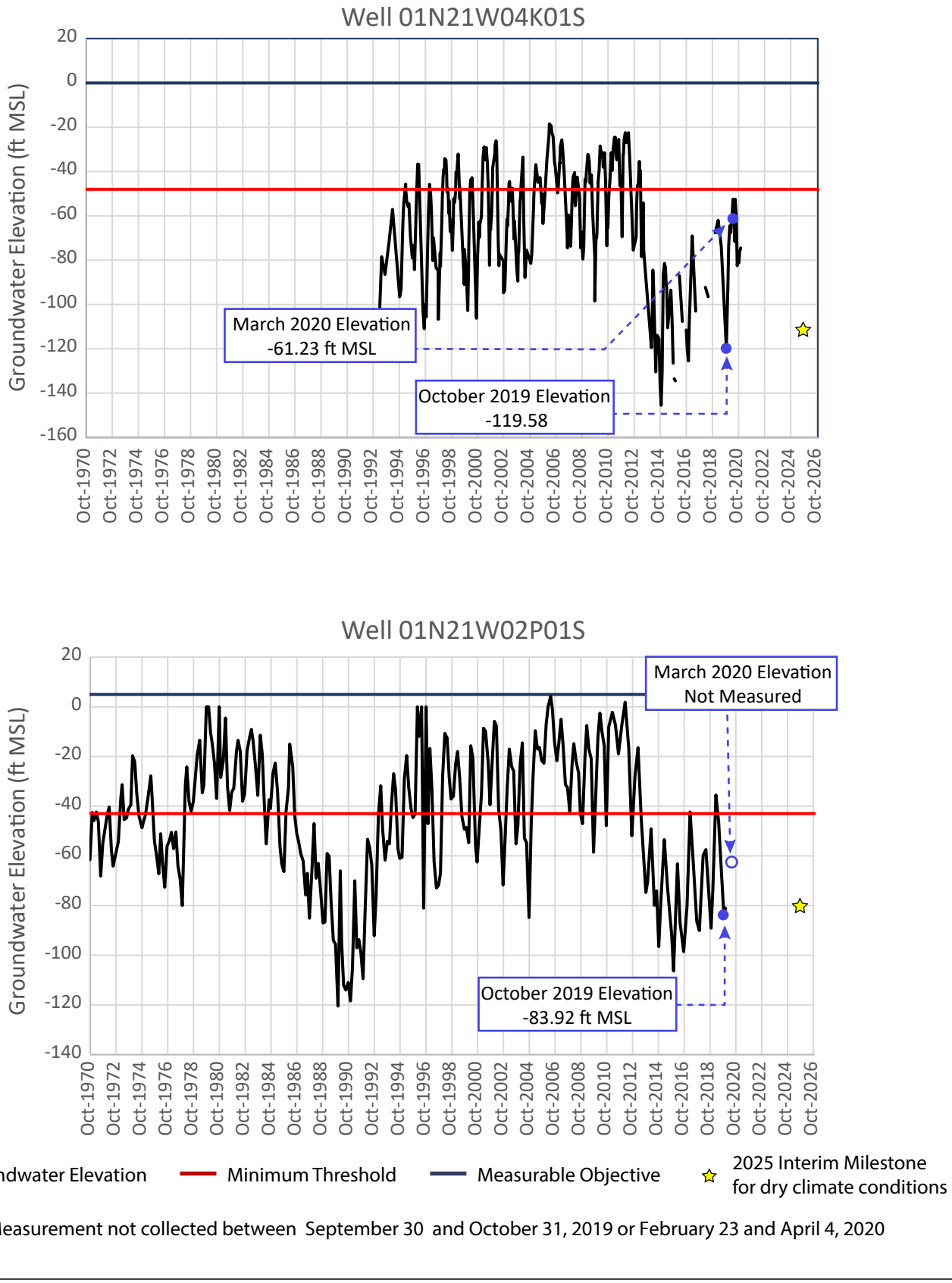


FIGURE 2-7

Groundwater Elevation Hydrographs for Representative Wells Screened in Multiple Aquifers

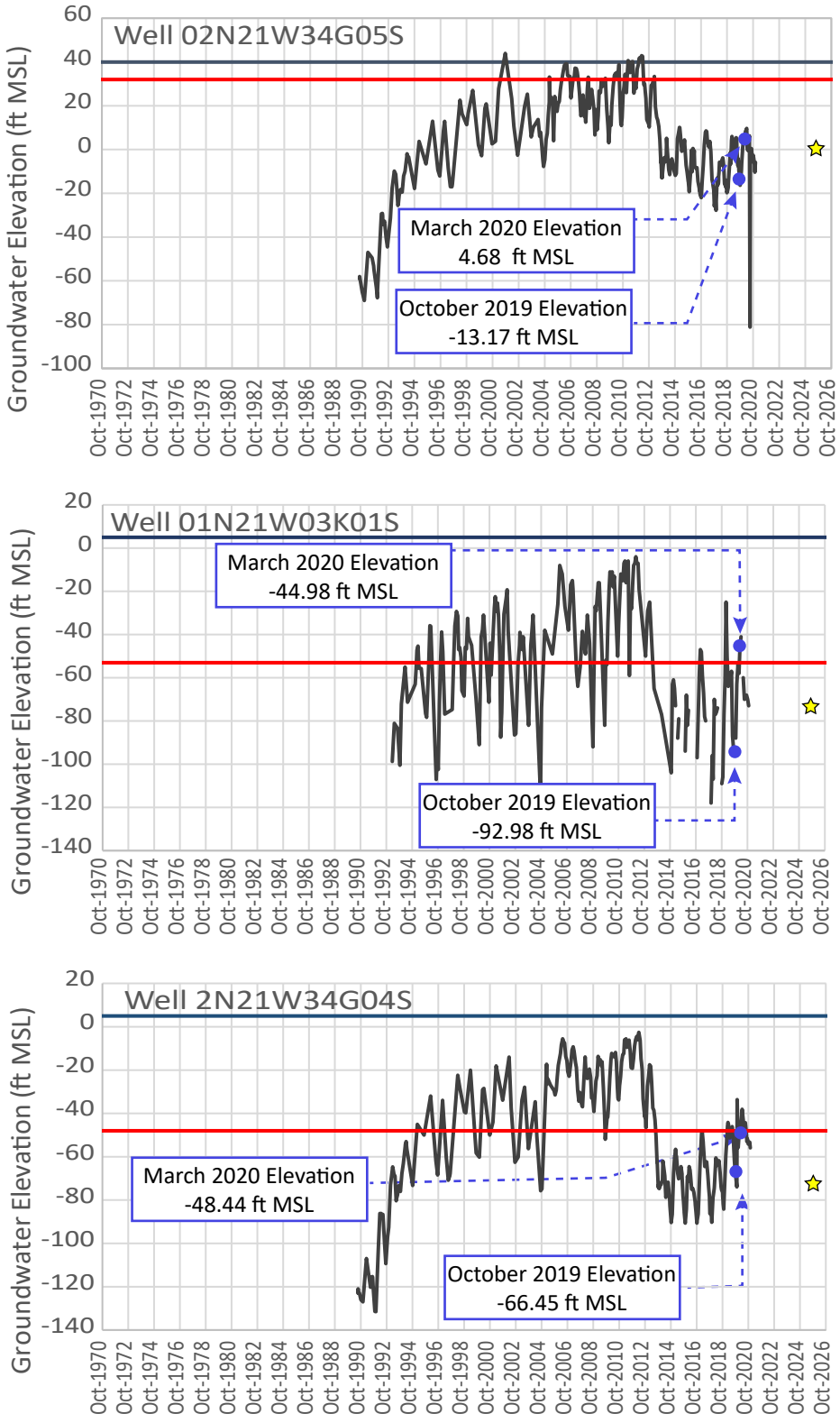
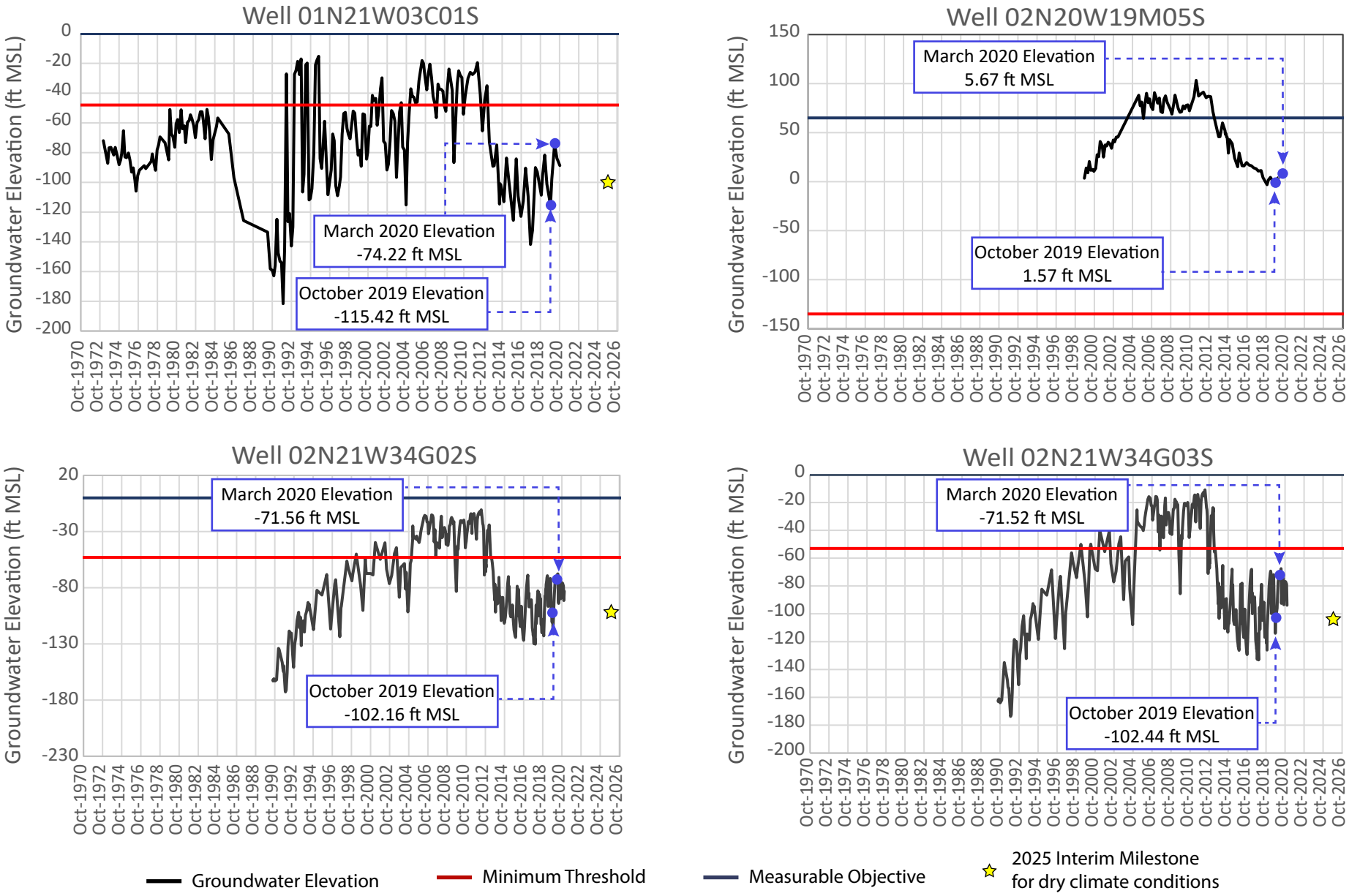


FIGURE 2-8

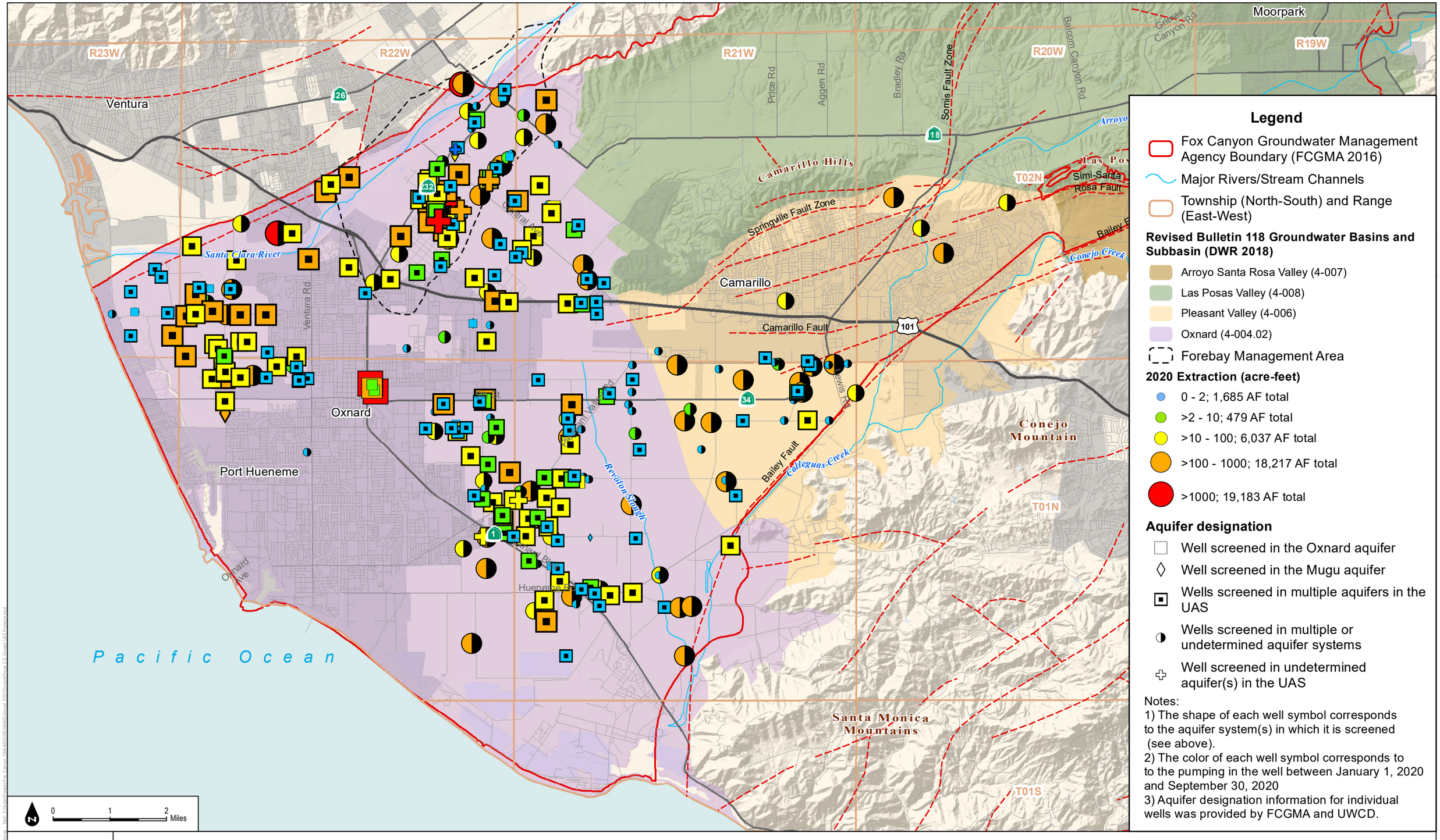
Groundwater Elevation Hydrographs for Representative Wells Screened in the Older Alluvium



Note: 2025 interim milestone groundwater elevation has not been established for 02N20W19M05S because groundwater elevations are more than 100 feet higher than the established minimim threshold groundwater elevation.

FIGURE 2-9

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



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)
- Forebay Management Area

2020 Extraction (acre-feet)

- 0 - 2; 1,685 AF total
- >2 - 10; 479 AF total
- >10 - 100; 6,037 AF total
- >100 - 1000; 18,217 AF total
- >1000; 19,183 AF total

Aquifer designation

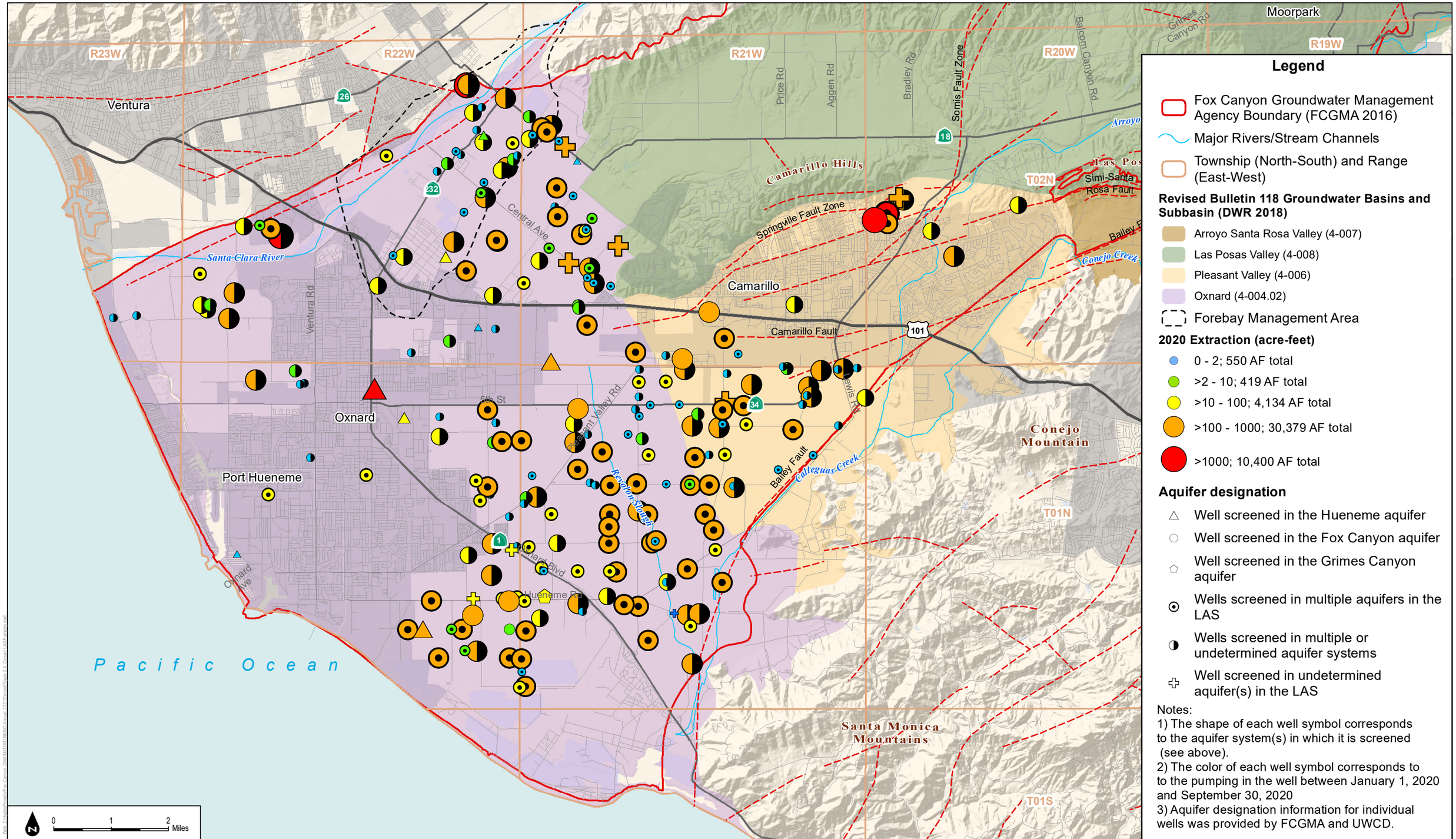
- Well screened in the Oxnard aquifer
- Well screened in the Mugu aquifer
- Wells screened in multiple aquifers in the UAS
- Wells screened in multiple or undetermined aquifer systems
- Well screened in undetermined aquifer(s) in the UAS

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 between January 1, 2020 and September 30, 2020
3) Aquifer designation information for individual wells was provided by FCGMA and UWCD.

SOURCE: DWR, FCGMA, VCWPD, UWCD

FIGURE 2-10

Groundwater Production from the UAS between January 1, 2020 and September 30, 2020



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)
- Forebay Management Area

2020 Extraction (acre-feet)

- 0 - 2; 550 AF total
- >2 - 10; 419 AF total
- >10 - 100; 4,134 AF total
- >100 - 1000; 30,379 AF total
- >1000; 10,400 AF total

Aquifer designation

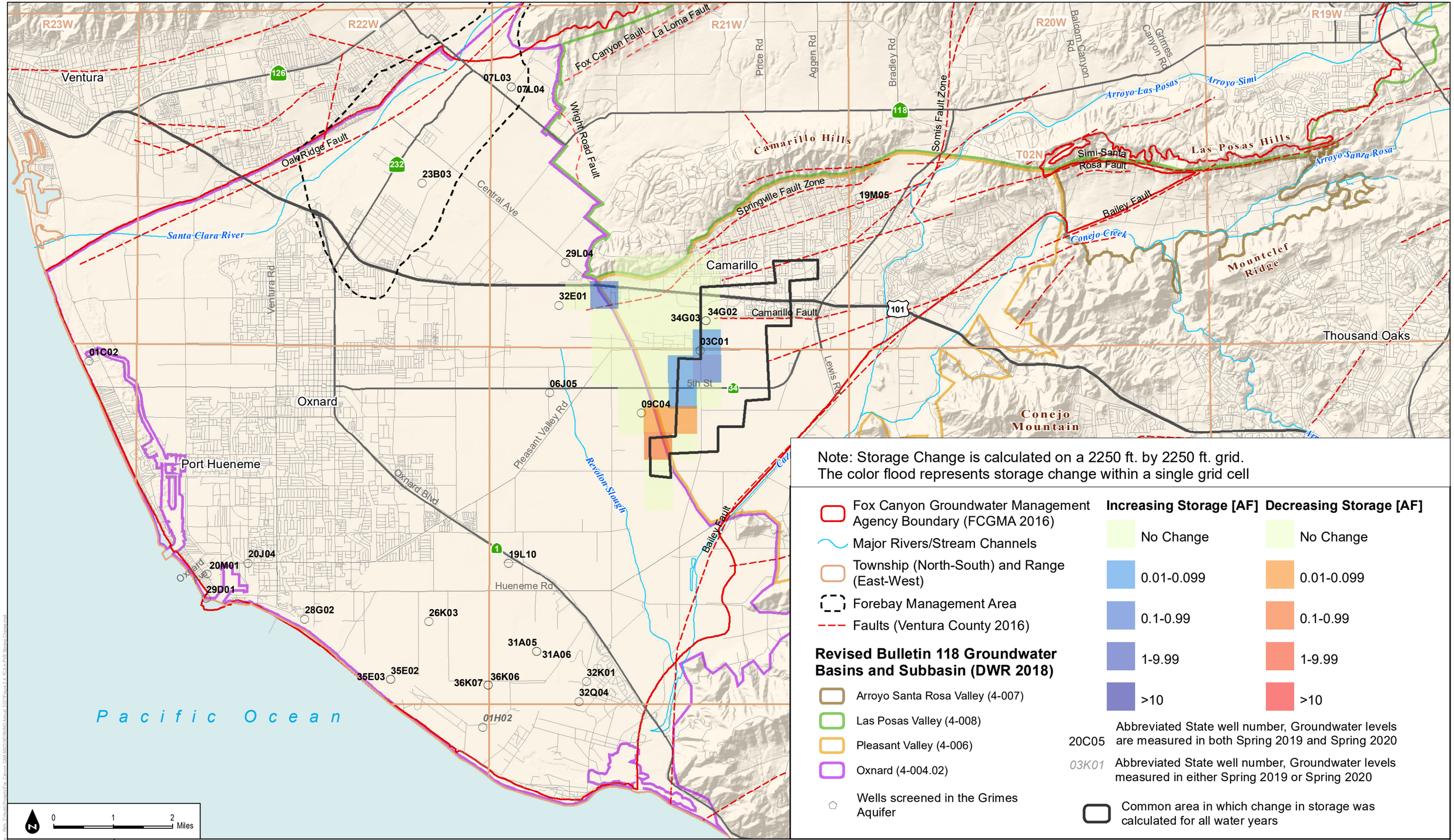
- Well screened in the Hueneme aquifer
- Well screened in the Fox Canyon aquifer
- Well screened in the Grimes Canyon aquifer
- Wells screened in multiple aquifers in the LAS
- Wells screened in multiple or undetermined aquifer systems
- Well screened in undetermined aquifer(s) in the LAS

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 between January 1, 2020 and September 30, 2020
3) Aquifer designation information for individual wells was provided by FCGMA and UWCD.

SOURCE: DWR, FCGMA, VCWPD, UWCD

FIGURE 2-11

Groundwater Production from the LAS between January 1, 2020 and September 30, 2020



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)
- Forebay Management Area
- 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 Spring 2019 and Spring 2020

03K01 Abbreviated State well number, Groundwater levels measured in either Spring 2019 or Spring 2020

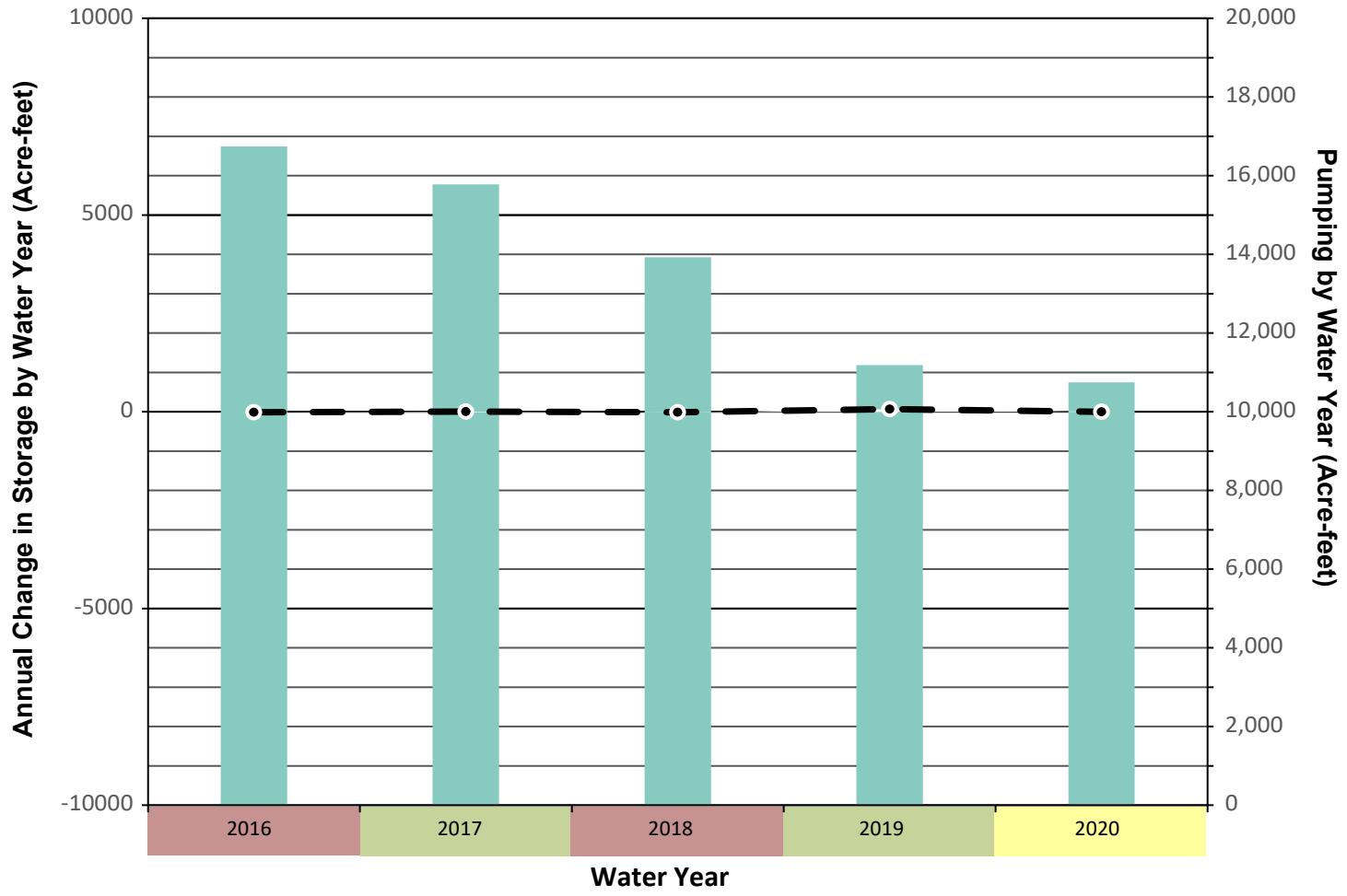
Common area in which change in storage was calculated for all water years

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-12

Change in Storage in the Fox Canyon Aquifer: Spring 2019 to Spring 2020

DUDEK



Change in Storage

Pumping — Fox Canyon aquifer

Water Year Type

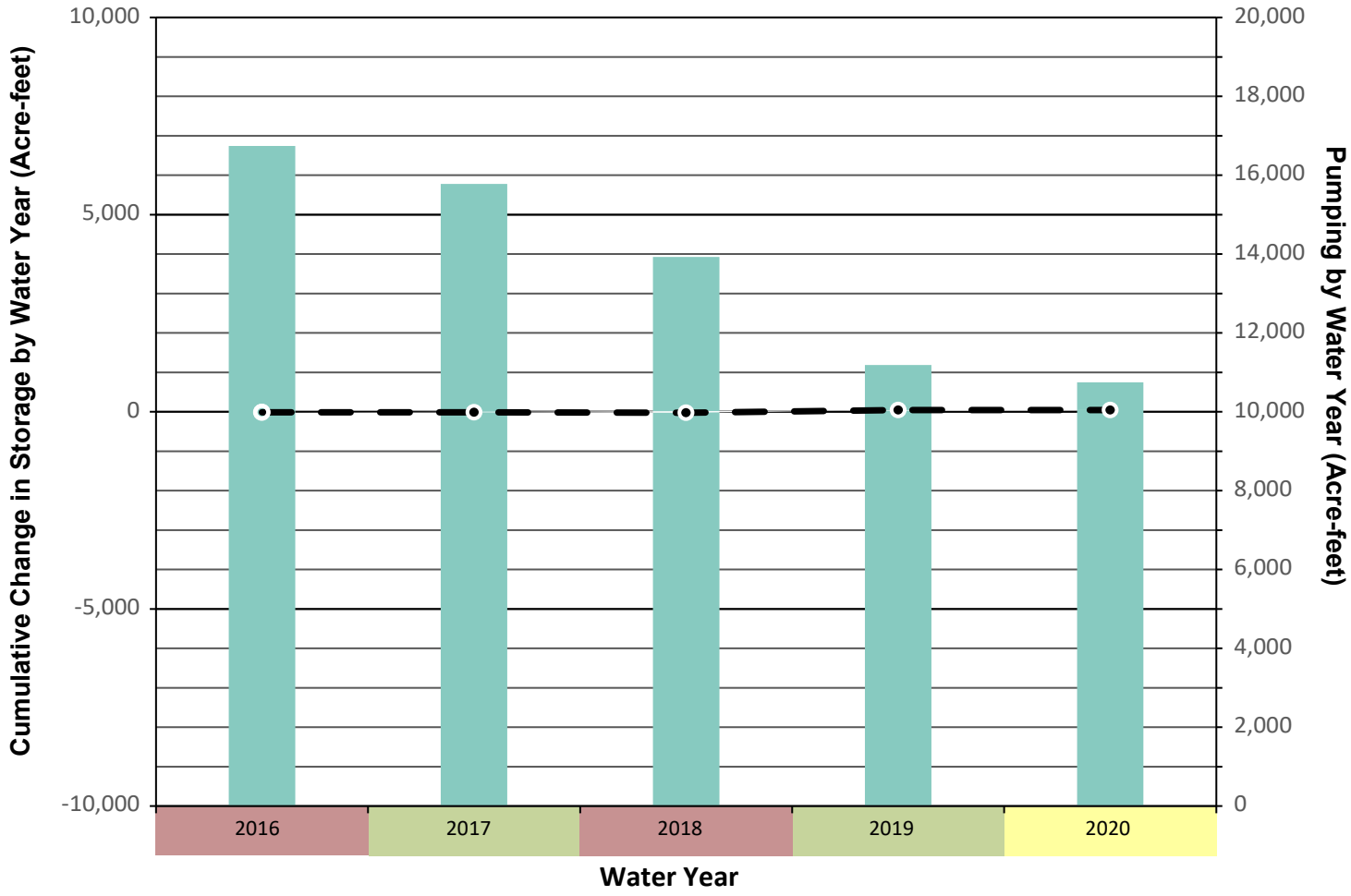
Wet | Above Normal | Below Normal | Dry | Critical

Notes:

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

FIGURE 2-13

Water Year Type, Groundwater Use, and Annual Change in Storage in the Pleasant Valley Basin



Notes:

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

FIGURE 2-14

Water Year Type, Groundwater Use, and Cumulative Change in Storage in the Pleasant Valley Basin

Appendix A: Corrections to Pleasant Valley Groundwater Sustainability Plan 2020 Annual Report

Table A: Corrections to 2020 Annual Report			
Component of the 2020 Annual Report	**Item**	**Error or comment on 2020 Annual Report Representation**	**Updated Data**
Table 2-3: Summary of Surface Water Deliveries to the PVB			
	1a	Data characterizing Conejo Creek water delivered within the PVB by Camrosa Water Distrcit (CWD) was not available during prepartion of the 2020 Annual Report for PVB. Consequently, reported surface water supplies were lower than actual surface water supplies in water years 2016 through 2019	CWD provided surface water supply data for incorporation into the 2021 annual report. Data provided by CWD tabulates deliveries through the end of calendar year 2020. Table 2-3 was updated to incorporate CWD data for water years 2016 through 2020.
	1b	Recharged spreading water pumped and used for agriculture was incorrectly reported in the 2020 Annual Report. Data for this column in Table 2-3 of the 2020 report reflected total water recharged by UWCD to the Saticoy ponds, *not* the volume of water pumped from the Saticoy Ponds and delivered for agriculture in the PVB.	Table 2-3 was updated to represent the volume of water pumped from the Saticoy recharge basin and delivered via the PVP for agriculture in the PVB

Table 2-4: Total Water Supplies in the Pleasant Valley Basin			
	2a	Recycled water supplies in Table 2-4 did not include recycled water deliveries by CWD to the PVB. CWD recycled water delivery data was not available at the time of 2020 Annual Report preparation.	CWD provided recycled water deliveries through calendar year 2020 to support preparation of the 2021 Annual Report. Recycled water supplies presented in Table 2-4 of the 2021 Annual report reflects this newly received data.
	2b	Imported water supplies for water years 2016 through 2019 incorrectly displayed CMWD water supplied by CWD to the PVB. Imported water supplies did not included additional sources of imported water supplied to the PVB by CWD.	Imported water supplies updated based on receipt of additional data by CWD for preparation of the 2021 annual report.
	2c	Recycled water supplies incorrectly designated as used by the Domestic sector.	Updated to reflect that recycled water is supplied for agricultural use, not domestic use within the PVB.