Certification

This GSP annual report was prepared in accordance with generally accepted professional hydrogeologic principles and practices. This annual report makes no other warranties, either expressed or implied as to the professional advice or data included in it. This annual report has not been prepared for use by parties or projects other than those named or described herein. It may not contain sufficient information for other parties or purposes.

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Executive Summary

[Exec summary here.]

1. Introduction

The Piru Subbasin (the Basin) is managed with the adjacent Fillmore Subbasin by the Fillmore and Piru Basins Groundwater Sustainability Agency (the Agency). Following the submittal of the Piru Subbasin Groundwater Sustainability Plan (GSP) on January 31, 2020, the Agency is required to submit an annual report for the preceding Water Year (October 1 through September 30) to DWR by April 1 (23 C.C.R 356.2). These annual reports provide a summary of hydrologic conditions and water use in the Basin (Figure 1) using observed data from monitoring networks and/or estimated using best available methods. This annual report provides a brief summary of Basin water use and changes in groundwater storage during the period from October 1, 2020 to September 30, 2021, and provides context for Basin conditions relative to the sustainable management criteria developed for the Basin. This report has been prepared in accordance with the requirements for annual reports as identified in the Sustainable Groundwater Management Act (SGMA). More detailed analysis and discussion of long-term hydrologic trends will be included in the periodic evaluation of the GSP the Agency is required to perform at least every five years (23 C.C.R 356.2).

For additional clarification or more detailed information on the basin plan area or conditions, please refer to the Piru Subbasin GSP. As acknowledged by the Department of Water Resources, it is important to note that there are still some data gaps and missing information as the Agency continues to gather information for better analysis and decisions.

2. Groundwater Elevations

Groundwater elevation contour maps for the spring and fall of 2021 are shown in Figure 2 and Figure 3, respectively. These maps depict the seasonal high (spring) and low (fall) water level elevations in the Basin. Spring and fall water level elevations are defined as observations within a four week period centered on April 1st or October 1st. If a well has multiple observations within this period, then the value collected nearest to April 1st or October 1st is used. The Basin is conceptualized as a single aquifer, and therefore subsetting water level data by well screen depth was not required.

Observed spring groundwater elevations (Figure 2) ranged from 504.84 to 649.18 ft above mean sea level (amsl), with an average elevation of 552.07 ft amsl. Fall groundwater elevations (Figure 3) ranged from 495.39 to 623.05 ft amsl, with an average elevation of 537.79 ft amsl. Flow is generally

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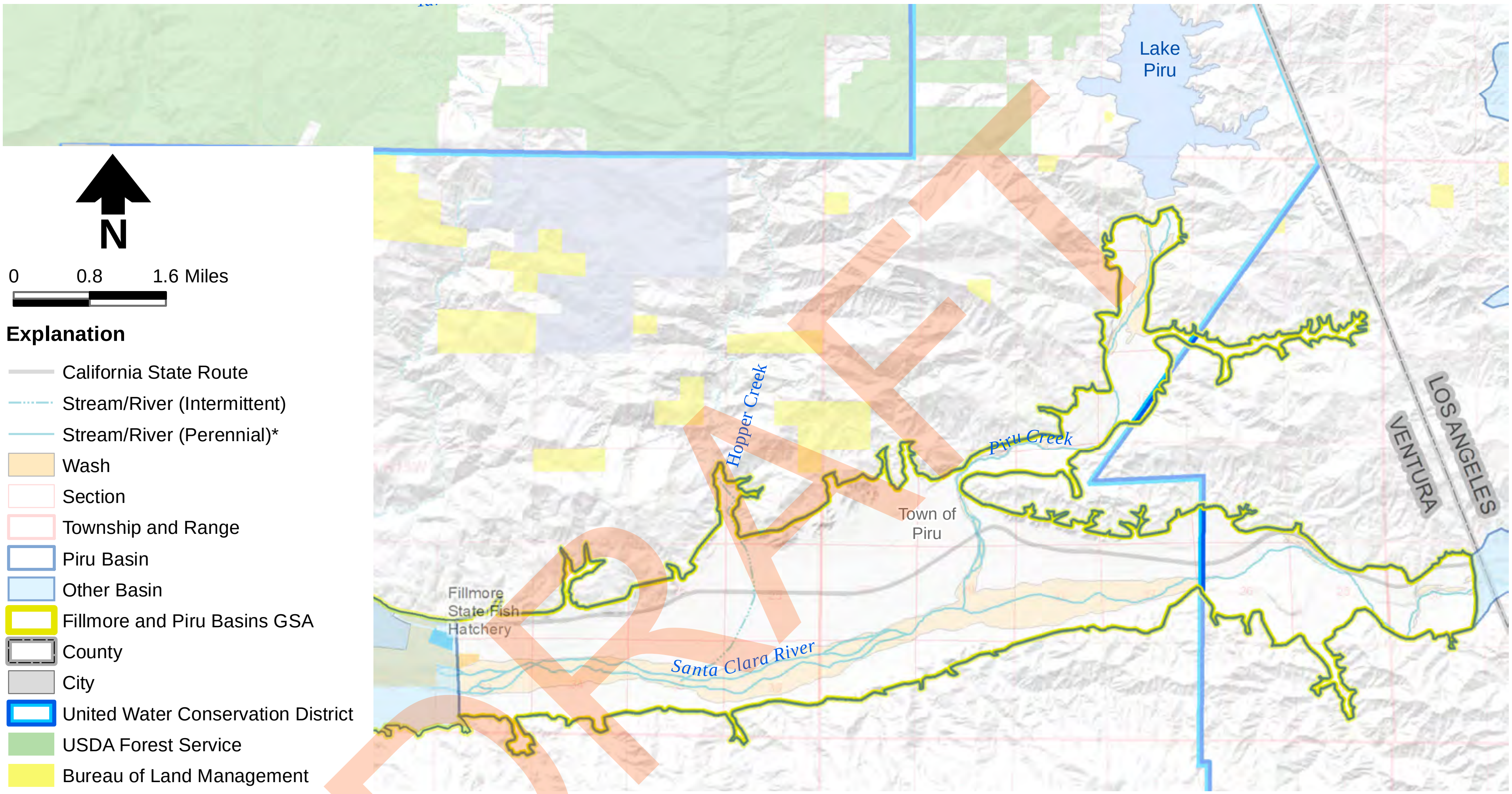

Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet | Projection: Lambert Conformal Conic | Datum: North American 1983

Basemap: USGS The National Map: 3D Elevation Program. USGS Earth Resources Observation & Science (EROS) Center: GMTED2010. Data refreshed March, 2021.

Notes:
* Perennial streams (designated by the U.S. Geological Survey [USGS] National Hydrography Dataset [NHD]) exhibit interrupted perennial (i.e., intermittent to ephemeral) conditions in the Santa Clara River Valley (Hanson et al., 2003; SFEI, 2011; Beller et al., 2016; United, 2017).
1. CDFW: California Department of Fish and Wildlife
2. USDA: United States Department of Agriculture

Fillmore and Piru Basins Groundwater Sustainability Agency

PIRU BASIN GROUNDWATER SUSTAINABILITY PLAN

Jurisdictions Map

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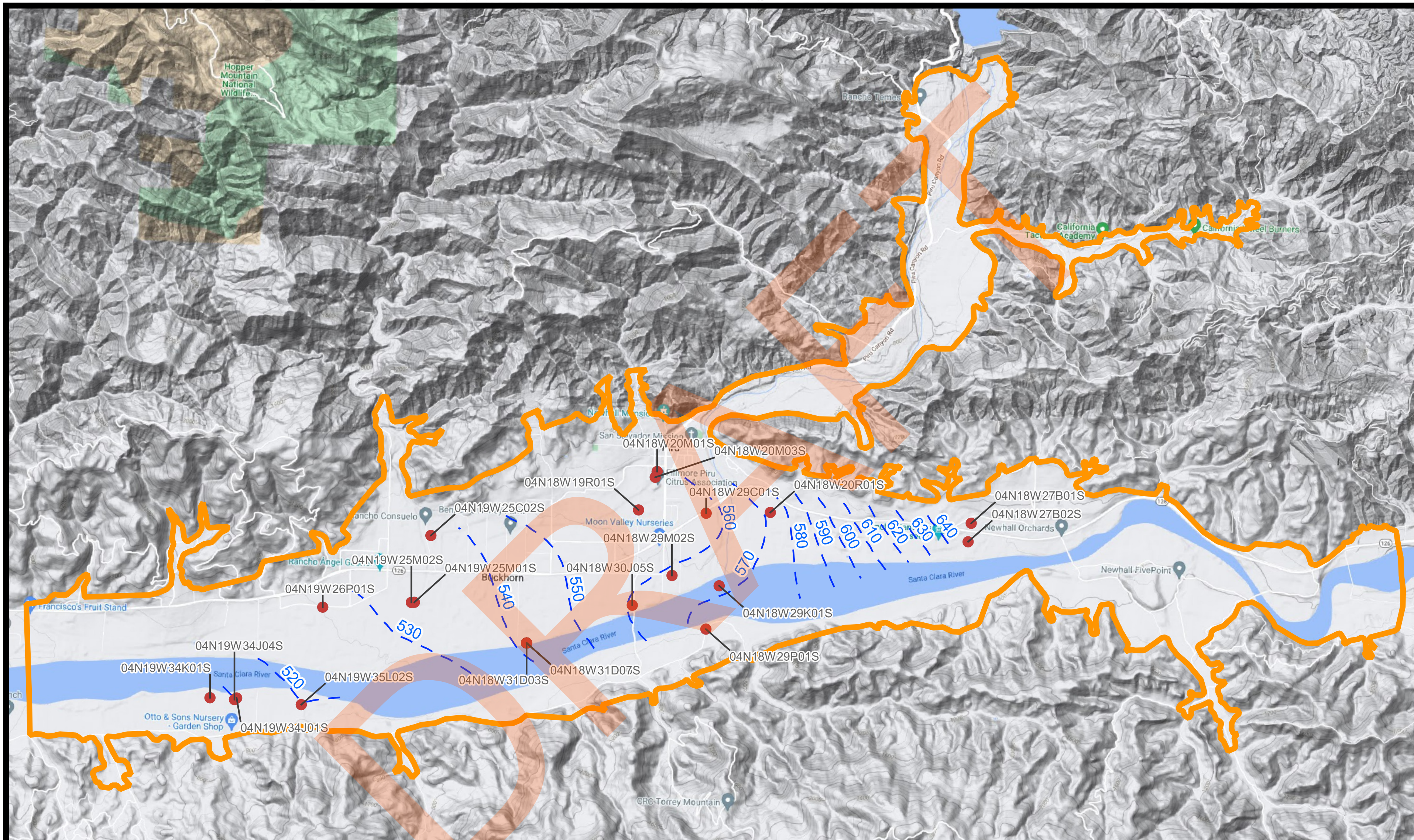
Figure 2.1-2



Explanation

- Monitoring Well
- Water Level Contour (ft amsl)
- Groundwater Basin Boundary

0 2,500 5,000 ft

N

Piru Subbasin Annual Report
Groundwater Elevations
Spring 2021

Figure 2

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engineering hydrology geoscience

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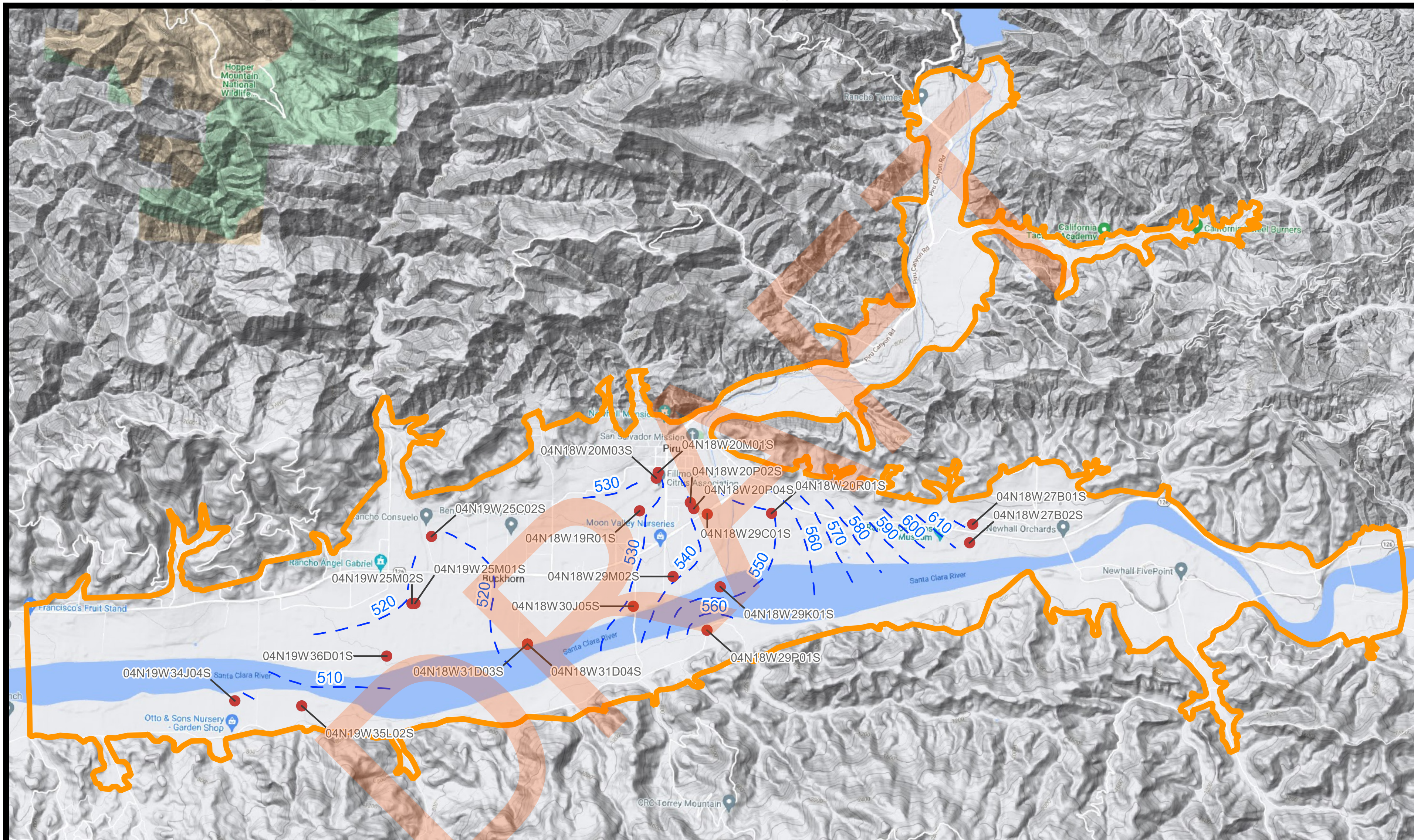

Explanation

Monitoring Well — Water Level Contour (ft amsl) — Groundwater Basin Boundary

0 2,500 5,000 ft

N

Piru Subbasin Annual Report
Groundwater Elevation Contours
Fall 2021

Figure 3

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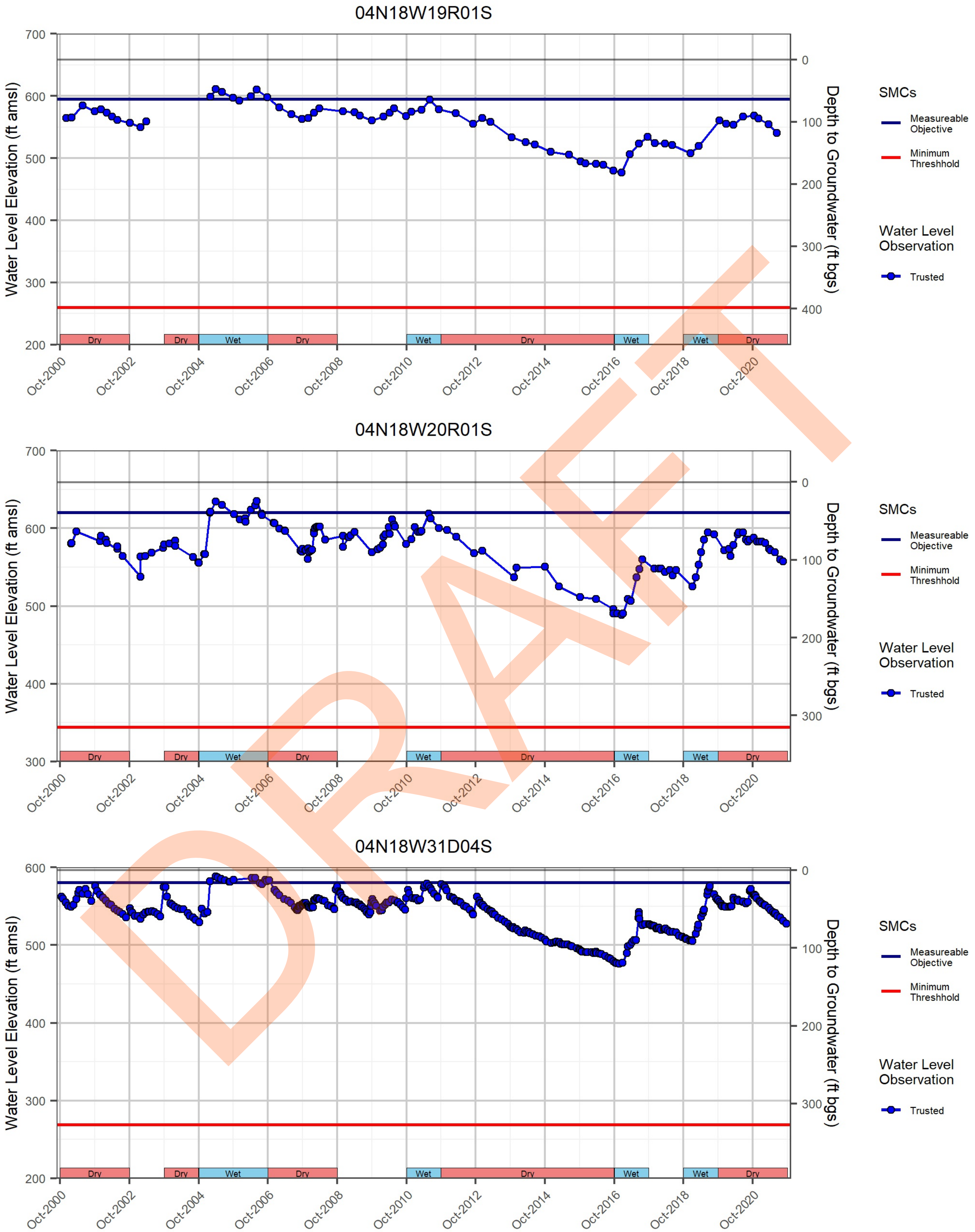
from east to west, but is influenced by recharge along the margins of the valley and drawdown in the vicinity of high-capacity irrigation wells. Observed groundwater elevation changes from October 2020 to October 2021 ranged from -10.45 to +14.02 ft with an average change of -34.6 ft.

Hydrographs for representative monitoring points (RMPs) in the Basin are shown in Figure 4. All groundwater monitoring wells in the Basin showed a decline in groundwater levels over the water year, ranging from -2.55 to -47.25 ft amsl. Excluding well 04N19W36D01S (located approximately 1 mile west-southwest of Cavin), groundwater levels at RMPs are generally near their respective measureable objectives. Water level declines observed at well 04N19W36D01S have been steady since October 2020, with a decline of approximately 35 ft over WY 2021. If the current trend continues water levels in well 04N19W36D01S are projected to drop below the minimum threshold of 496 ft amsl in the summer of 2022.

3. Groundwater Extractions

Groundwater pumpers that produce groundwater from the Basin pay United Water Conservation District (UWCD) an extraction fee based on the number of acre-ft they pump. Prior to 2022, this was reported on a 6-month basis (reporting to UWCD twice per calendar year). Period 1 covered January through June and period 2 covered July through December of each year. A description of the historical groundwater extraction monitoring in the Basin is provided in Section 3.5.1.4 of the Piru Subbasin GSP. In order to better comply with SGMA reporting requirements, pumping will be reported to the Agency on a quarterly (3-month) basis from 2022 onwards.

Groundwater pumpers are required to self-report groundwater extractions by well to UWCD using of three methods: domestic multiplier, electrical meter (based on Southern Californa Edison efficiency testing), or water flow meter. For non-reporters, an estimate from historical usage is entered in the groundwater production database for accounting and basin volume calculation purposes. For wells with water meters, reporting typically involves filing out a form and submitting an accompanying photograph of the digital totalizer reading. The extent to which “smart meters” or automated (advanced) metering infrastructure (AMI) technology is used by individual well owners to quantify their groundwater production is unknown in the Piru Basin. There is not currently a mechanism by which well owners can automatically report groundwater production from their water meters to UWCD or the Agency. De minimis domestic pumping can be reported to UWCD using a multiplier of 0.2 AF per person per 6-month period with a minimum of 0.5 AF (e.g., if there are 1 or 2 people reporting domestic usage on a well, then 0.5 AF minimum is assessed). De minimis pumpers (extractors) that have a meter on their well discharge have the option of calculating their usage based on the meter reading which may show less than 0.5 AF usage, and are billed based on actual usage.



Notes:
1. See Figure 2 for well locations

Piru Subbasin Annual Report
Representative Monitoring Points Hydrographs

Figure 4a

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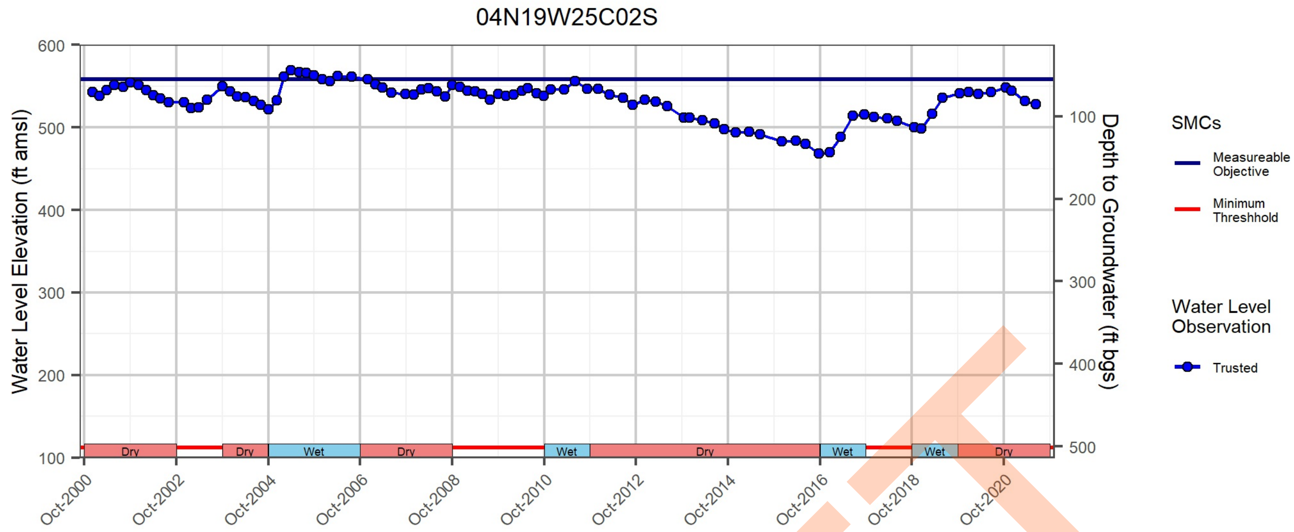

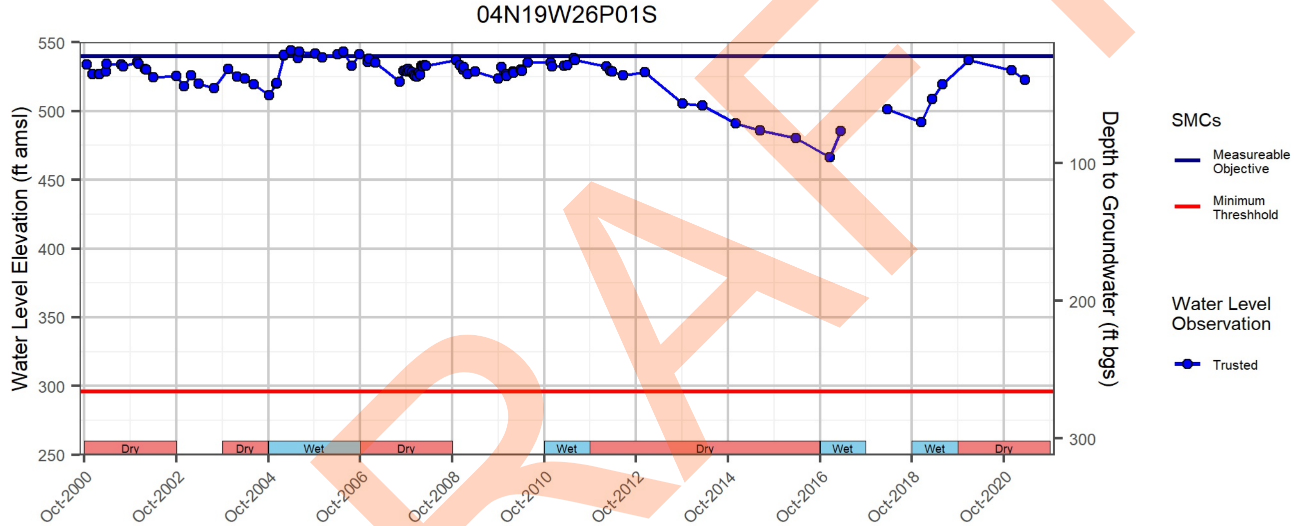

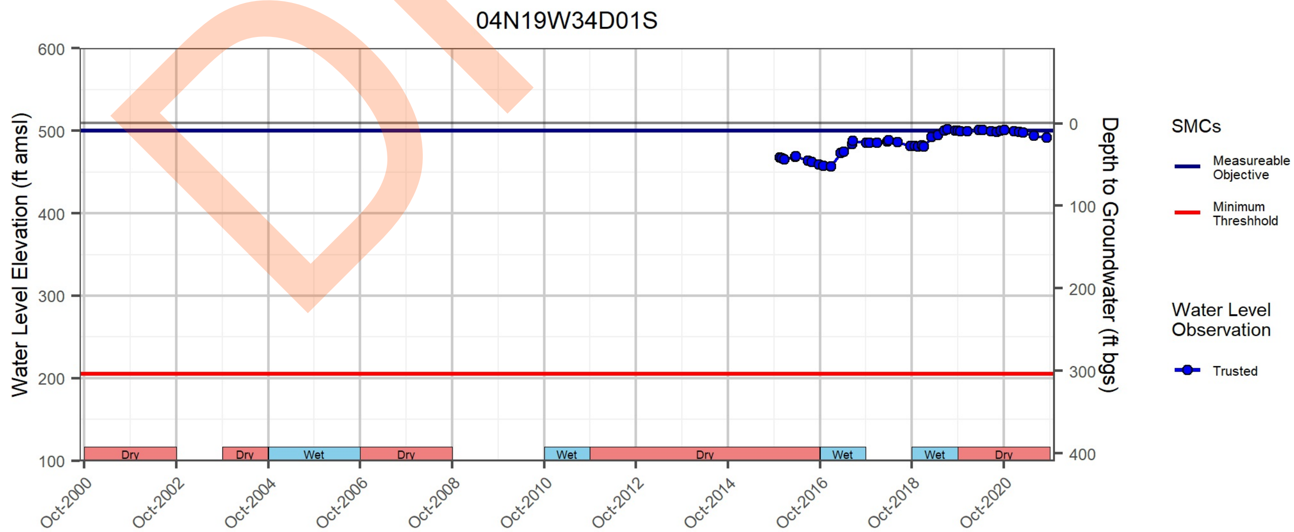

Notes:
1. See Figure 2 for well locations

Piru Subbasin Annual Report
Representative Monitoring Points Hydrographs

Figure 4b

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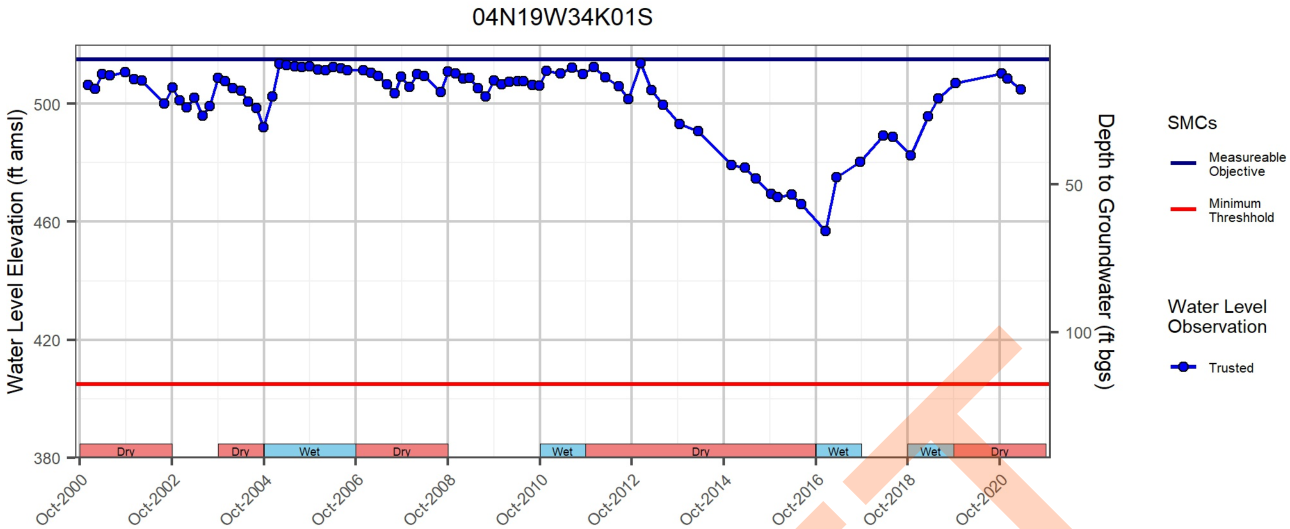

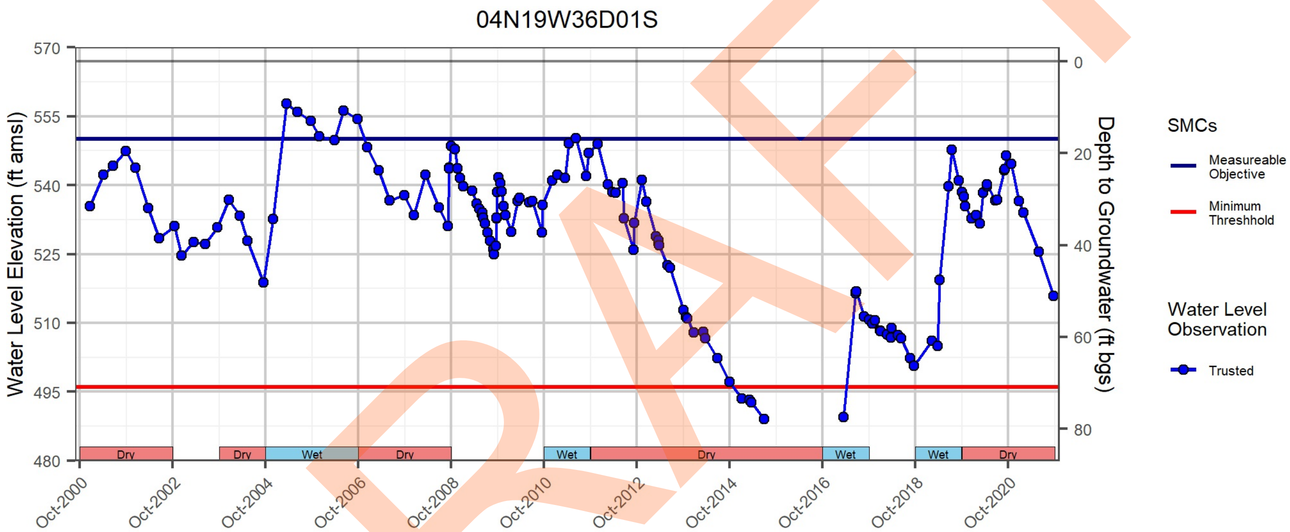

Notes:
1. See Figure 2 for well locations

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Piru Subbasin Annual Report
Representative Monitoring Points Hydrographs

Figure 4c

Estimated groundwater extractions for WY 2021 grouped by water use sector and measurement method are shown in Table 1. Due to the timing of the 6-month measurement and billing cycle described above, reported extractions for period 2 (July - December) of 2021 were not available at the time this annual report was developed. Since this is the only annual report that will have this issue as pumping data is now collected quarterly, development of a detailed approach for filling this data gap was deemed unnecessary. Instead, a simple approach that assumed groundwater extractions for period 2 of 2021 were equal to those in period 1 of 2021 was used. Groundwater pumping within each public land survey (PLSS) section (1 mi^2) shows the spatial distribution of agricultural (Figure 5), municipal & industrial (Figure 6) and total (Figure 7) groundwater extractions within the Basin. Groundwater pumping totaled approximately 13,361 AF for agricultural beneficial uses accounted for about 97% of total groundwater extractions for WY 2021.

Table 1. Groundwater Extractions

Sector	Method	GW Extraction Volume (AF)	Accuracy (%)	Range (AF)
Agriculture	Domestic	-	± 20	0 - 0
	Electrical Efficiency	3,057	± 20	2,446 - 3,668
	Water Meter	9,847	± 5	9,355 - 10,340
Agriculture Subtotal		12,904		11,801 - 14,008
Municipal and Industrial	Domestic	21	± 20	17 - 25
	Electrical Efficiency	11	± 20	9 - 13
	Water Meter	425	± 5	404 - 447
Municipal and Industrial Subtotal		457		430 - 485
Total		**13,361**		**12,231 - 14,493**

4. Surface Water Supply

Surface water used in the Basin grouped by source and measurement method is summarized in Table 2. All surface water diversions are used benefically for agricultural irrigation. Not all diversions for WY 2021 were reported to the State Water Resources Control Board (SWRCB) at the time this report was written. Data gaps were filled by using average historical diversion records that corresponded with the same water year type as WY 2021 (Critical). Total surface water used in the Basin during WY 2021 was estimated to be 3,276 AF.

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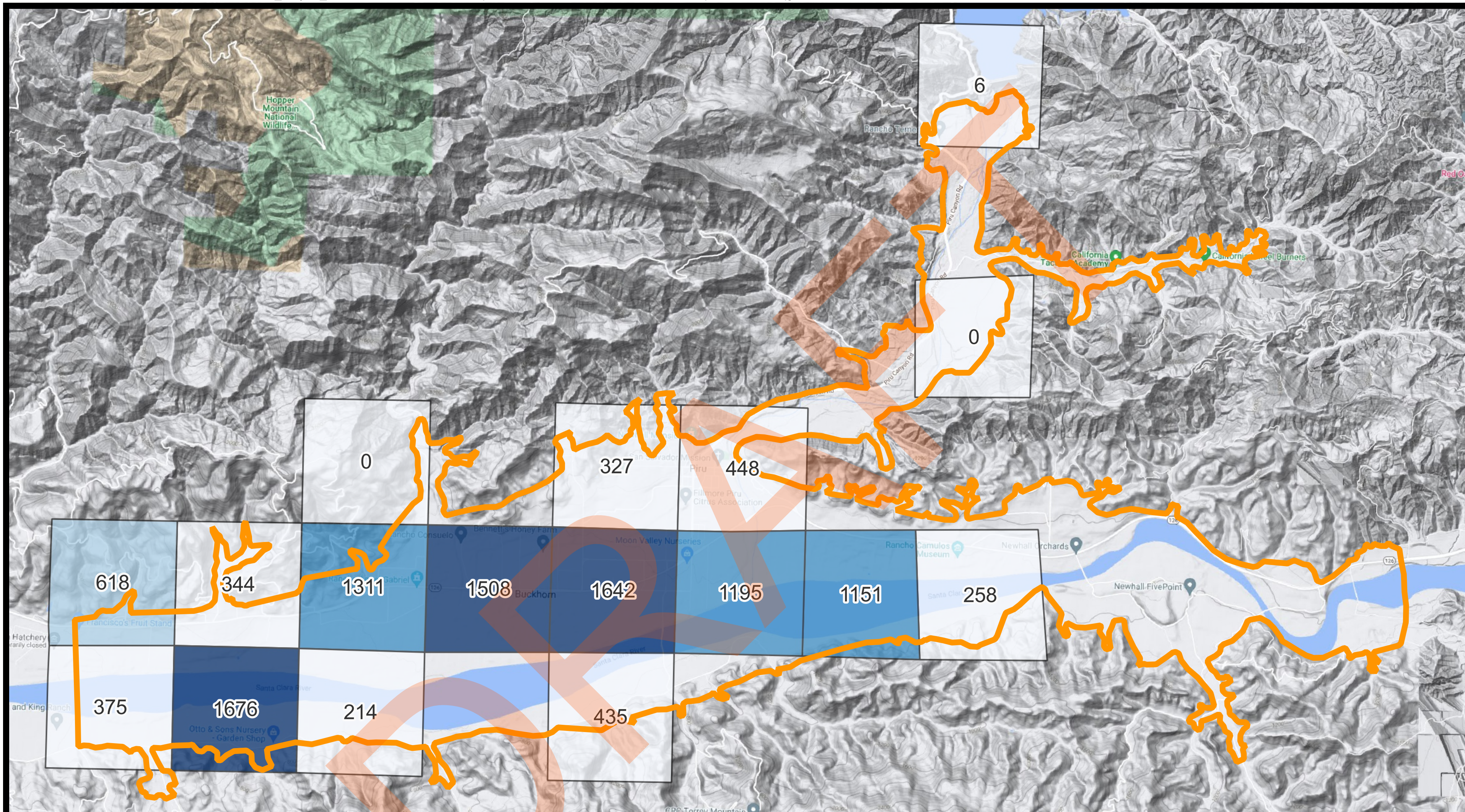

Explanation

Extraction Volume (AF)

- 0 - 500
- 500 - 1,000
- 1,000 - 1,500
- 1,500 - 2,000
- Groundwater Basin Boundary

0 2,500 5,000 ft

N

Notes:
1. Estimated extraction volumes aggregated by public land survey system section.
2. Labels indicate estimated extraction volume in acre-ft (AF).
3. Values estimated from January - July 2021 pumping records.

Piru Subbasin Annual Report

Estimated Agricultural Groundwater Extractions

WY 2021

Figure 5

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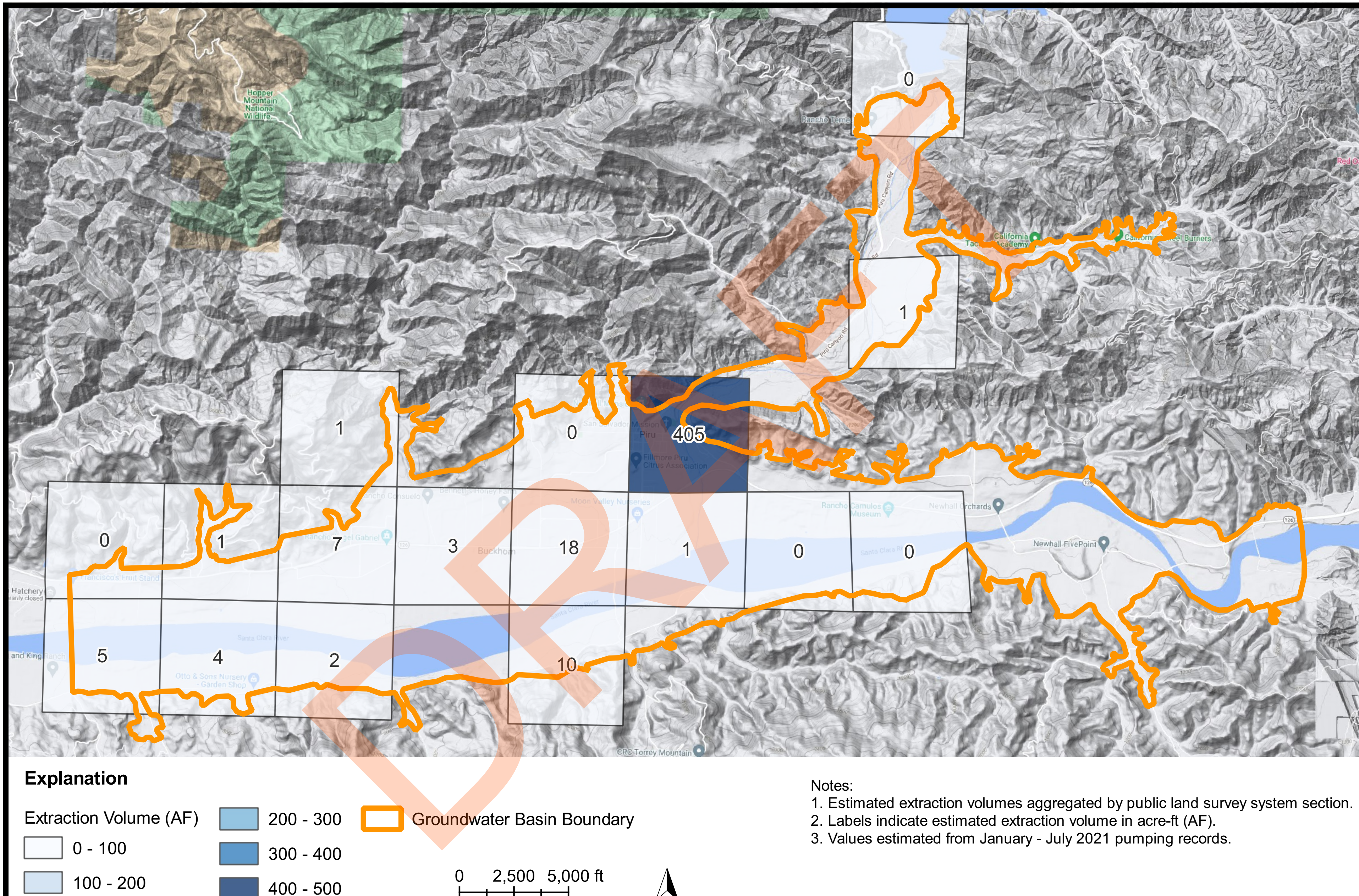

Notes:
1. Estimated extraction volumes aggregated by public land survey system section.
2. Labels indicate estimated extraction volume in acre-ft (AF).
3. Values estimated from January - July 2021 pumping records.

Piru Subbasin Annual Report
Estimated Municipal and Industiral Groundwater Extractions
WY 2021

Figure 5

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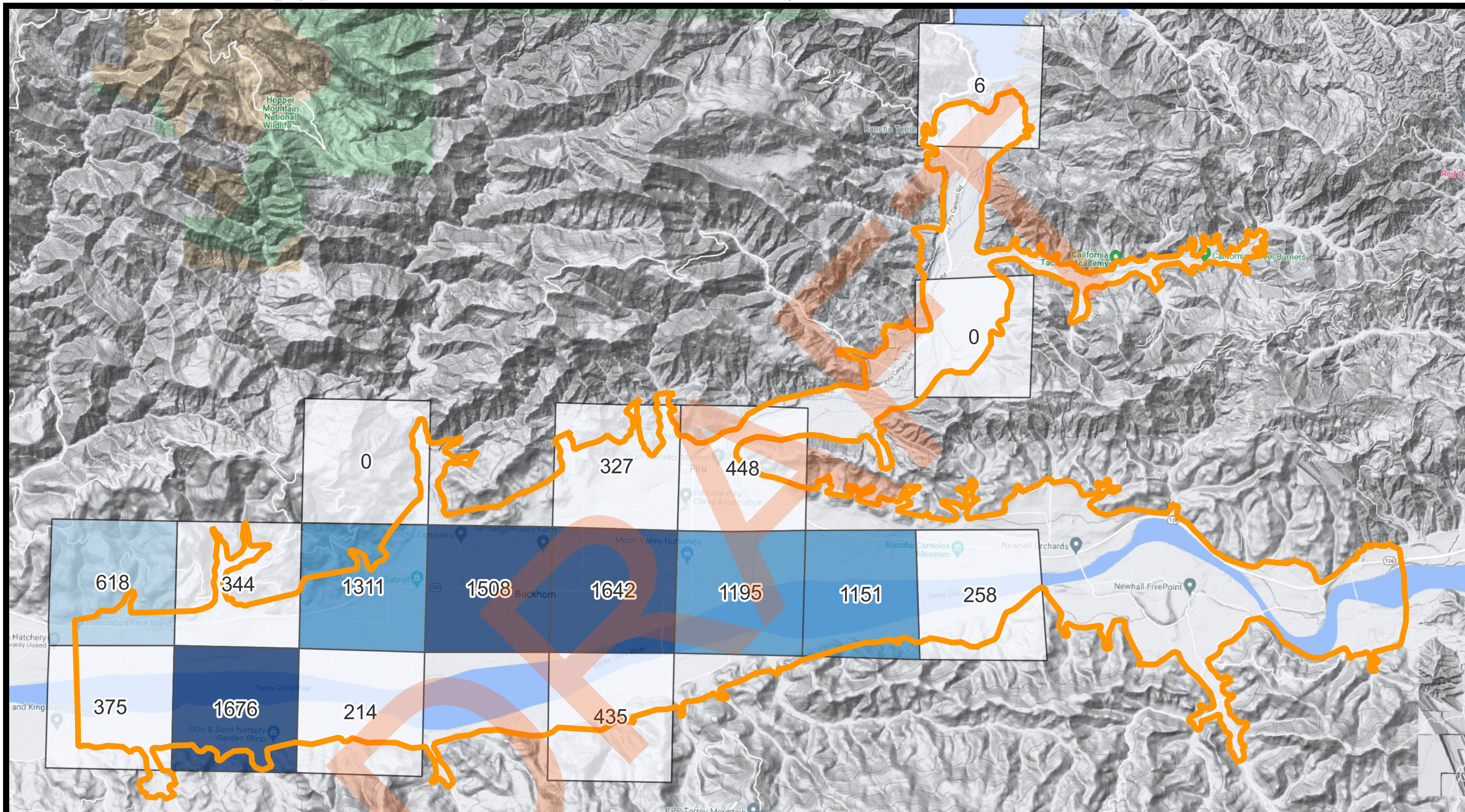

Explanation

Extraction Volume (AF)

- 0 - 500
- 500 - 1,000
- 1,000 - 1,500
- 1,500 - 2,000

Groundwater Basin Boundary

Notes:
1. Estimated extraction volumes aggregated by public land survey system section.
2. Labels indicate estimated extraction volume in acre-ft (AF).
3. Values estimated from January - July 2021 pumping records.

0 2,500 5,000 ft

N

Piru Subbasin Annual Report

Estimated Total Groundwater Extractions

WY 2021

Figure 5

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Table 2. Surface Water Use

Surface Water Source	Method	Annual Volume Used (AF)	Accuracy (%)	Range (AF)
Local Supplies	Estimated from previously reported diversions	1,794	± 33	1,202 - 2,386
	Water Meter	988	± 5	939 - 1,037
	Weir	494	± 5	469 - 519
Total		**3,276**		**2,610 - 3,942**

5. Total Water Use

Total water use in the Basin grouped by water use sector and measurement method is shown in Table 3. Total water volumes used in the Basin during WY 2021 was estimated to be 16,637 AF.

Table 3. Total Water Use

Sector	Method	Total Annual Volume (AF)	Accuracy (%)	Range (AF)
Agriculture	Domestic	0	± 20 %	0 - 0
	Electrical Efficiency	3,057	± 20 %	2,446 - 3,668
	Estimated from previously reported diversions	1,794	± 33 %	1,202 - 2,386
	Water Meter	10,835	± 5 %	10,294 - 11,377
	Weir	494	± 5 %	469 - 519
Agriculture Subtotal		16,180	-	14411 - 17950
Municipal and Industrial	Domestic	21	± 20 %	17 - 25
	Electrical Efficiency	11	± 20 %	9 - 13
	Water Meter	425	± 5 %	404 - 447
Municipal and Industrial Subtotal		457	-	430 - 485
Total		**16,637**		**14841 - 18435**

6. Change in Groundwater Storage

Change in groundwater storage for WY 2021 was estimated using differences in water level elevations from Fall 2020 to Fall 2021. Observed differences in water levels were interpolated to a 65x65 ft (20x20 m) grid using the universal kriging method. Volume was calculated by multiplying the area of each cell by the estimated change in water level and vertically integrated aquifer storage

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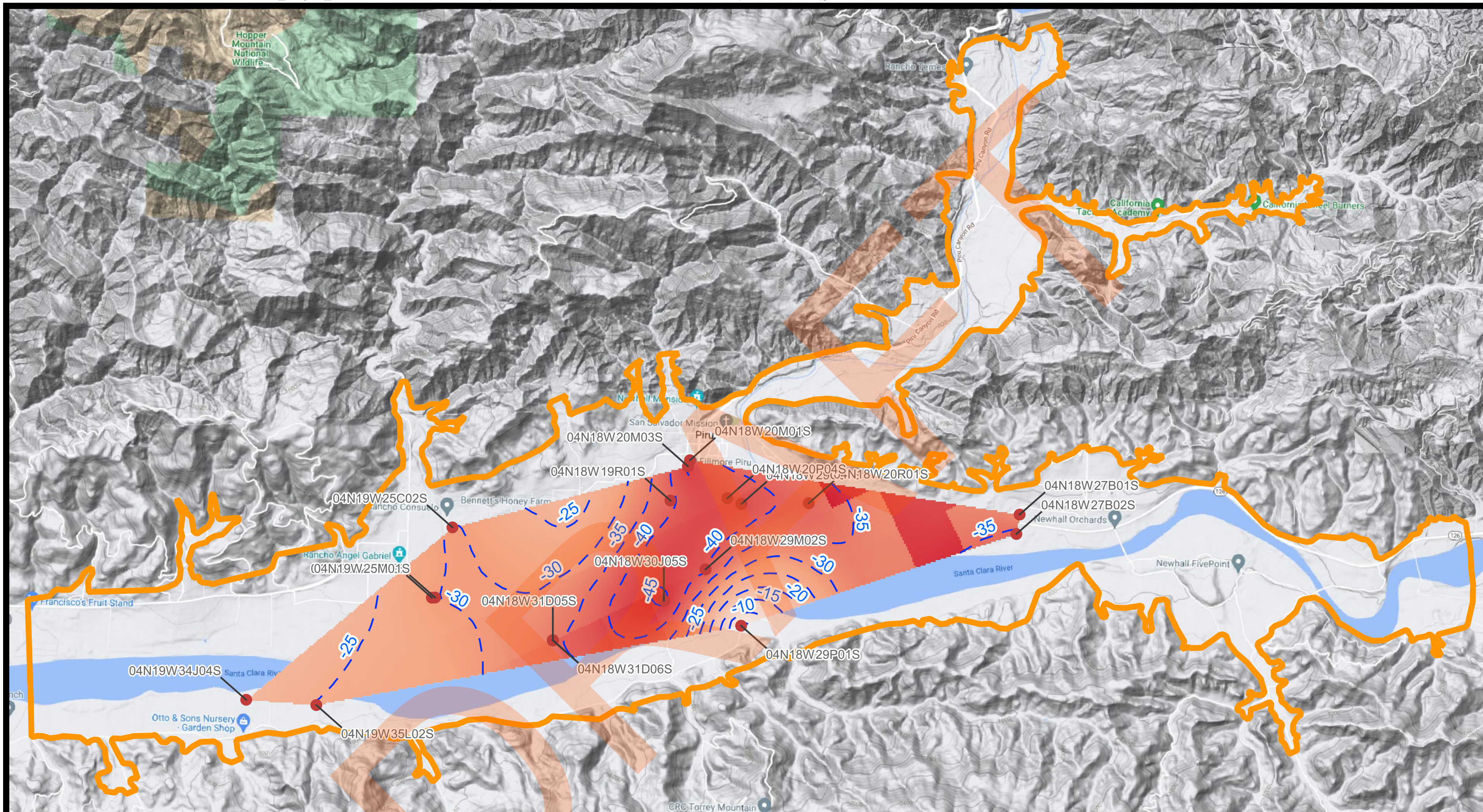

Explanation

Estimated Groundwater Storage Change (AF)

0.6

-0.6

Monitoring Well

Water Level Elevation Change Contour (ft)

Groundwater Basin Boundary

Notes:
1. Storage change estimated by interpolating changes in observed water levels to a 65 x 65 ft grid and multiplying by the vertically integrated aquifer storage coefficient for each grid cell.
2. Vertically integrated aquifer storage coefficient calculated as the thickness weighted average of aqufier storage coefficients for each model layer used in the UWCD groundwater model.
3. Estimated WY 2021 total groundwater storage change is -38,500 AF.

0 2,500 5,000 ft

N

Piru Subbasin Annual Report

Change in Groundwater Storage

WY 2021

Figure 8

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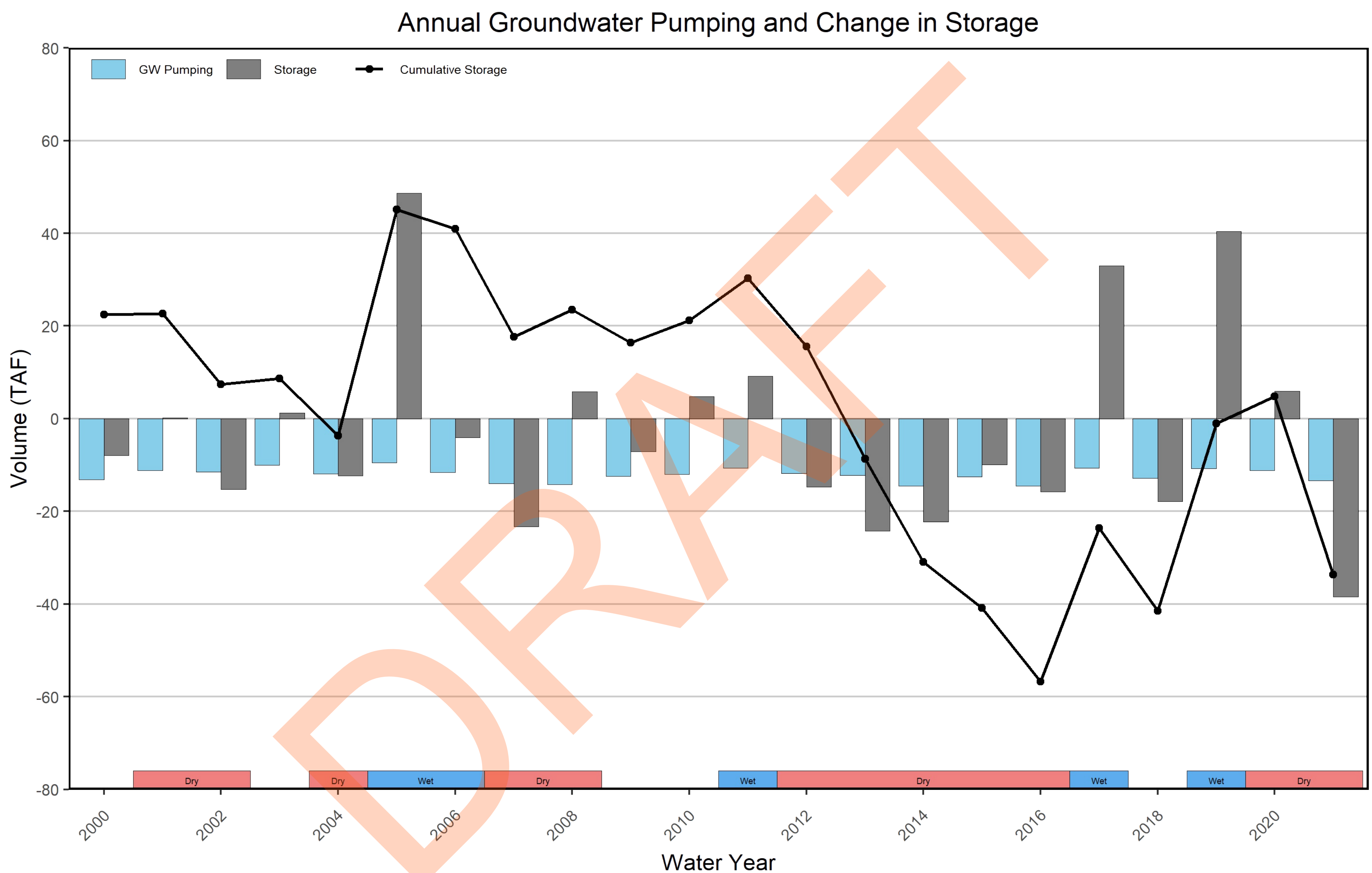

Notes:
1. Negative GW pumping values indicate extractions from groundwater aquifer.
2. Positive storage values indicate increasing groundwater levels.
3. GW pumping volume estimated for WY 2021.

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Piru Subbasin Annual Report
Groundwater Pumping and Change in Storage
WY 2000-2021

Figure 9

coefficient for each respective cell. The vertically integrated aquifer storage coefficients were calculated as the thickness weighted average of each model grid cell in the UWCD groundwater model, and ranged from 0.09 to 0.15. The total change in storage for the Basin was calculated by summing estimated change in volume for all cells. Since the interpolation area does not cover the entire basin due to the location of the monitoring wells, the total change in storage was scaled by the ratio of the interpolation area to the basin area. This assumes that water level changes in areas on the basin with no observations are similar to those with observations.

A map of the change in storage for WY 2021 with contour lines showing water level differences is shown in Figure 8. Estimated total change in storage for WY 2021 is -38,500 AF. This value is likely biased high due to the relatively small area of the Basin covered by water level observations and the assumption that water level changes are consistent for areas with no data. The northern area of the Basin wth Sespe Creek has likely not experienced the same degree of water level declines as the main portion of the valley. Figure 9 shows annual groundwater pumping and change in storage, along with cumulative storage since WY 2000. Current storage condition relative to WY 1988 is -33,700 AF. Negative change is storage is expected due to critically dry conditions for WY 2021.

7. Progress Towards GSP Implementation

The Piru Subbasin GSP provided seven Projects or Management Actions that the FPBGSA Board of Directors would implement or consider implementing to facilitate the maintenance of sustainable conditions in the basin (see Section 4 of the GSP). Below is a description of activities related to each project that occurred during WY 2021. The FPBGSA has focused its attention on Projects #1-#3 in the two month period since the GSP was submitted to DWR. The remaining Project or Management Actions (Projects #4 - #7 detailed in the GSP) have yet to be discussed by the FPBGSA Board of Directors. These projects or management actions will be considered by the Board of Directors over the next year and it is anticipated that more substantive updates will be included in future Annual Reports.

7.1 Project #1: Supporting The Cienega Springs Restoration Project as a Drought Refuge

Post submittal of the GSP to the California Department of Water Resources (DWR), staff and the consultant team for the Fillmore and Piru Basins Groundwater Sustainability Agency (FPBGSA) have had additional discussions/meetings with representatives from California Department of Fish and Wildlife (CDFW) and researchers from University of California, Santa Barbara (UCSB) to further explore how the mitigative actions proposed in the GSP might be implemented.

As stated in the GSP, *"The primary action being considered by the FPBGSA is to provide supplemental groundwater to the restoration program during multiyear droughts when the shallow groundwater levels decline to below the critical water level. The groundwater would be supplied from an existing production well (if a suitable well can be found or alternatively a newly constructed well) that is extracting water from the deeper hydrostratigraphic units (i.e., not the shallow aquifers). CDFW and the restoration management team would use the water in the manner they deem most beneficial to their restoration program."*

The discussions with CDFW to date have focused on:

- Refining the mitigative project description
- Identifying which land parcels in the restoration project area would most benefit from receiving supplemental waters during a drought
- Exploring possible existing deep groundwater wells in proximity to the site that could be used as a water source; and
- Discussing the practicality and potential benefits of including adjacent land parcels owned by The Nature Conservancy (TNC) into the mitigation plan.

Ongoing action items with respect to this management action include:

- Establish communication with TNC to determine their interest in participating in the mitigation program
- Field verification of the operational condition of potential existing wells that are candidates to supply the supplement water
- Contact well/land owners to determine their willingness to allow access to their well(s) and establish terms of an access agreement
- Preparation of a Mitigation Plan that will detail, for example:
    - Triggers for starting and stopping the delivery of the supplemental waters
    - Quantities of supplemental water to be supplied
    - Source(s) of the supplemental water
    - Parties responsible for conveyance of the supplemental water from the source to the desired land parcel
    - Responsible parties for making decisions regarding the beneficial use of the water
    - Cost reimbursal and extraction fee waiver mechanisms for use of existing wells owned by others
    - Vegetative monitoring protocols to document the success of the mitigation program.

In addition, the Mitigation Plan will estimate the cost to the FPBGSA for the implementation of the mitigative actions.

7.2 Project #2: Construction of Shallow Monitor Wells at the Cienega Springs Restoration Project Site

The FPBGSA staff and consultant team have discussed possible locations for the shallow monitor wells on the project site with CDFW personnel. Siting considerations have included access to the desired location(s), future construction/land modification plans associated with the restoration program, proximity of the monitor wells to existing or proposed groundwater extraction wells, and the need or practicality of telemetry on the wells.

Ongoing action items with respect to this management action include:

- Continued discussions with CDFW to refine the monitor well locations in relationship to the land modification plans included in the restoration plan;
- Identification of well drilling contractors and soliciting bids;
- Coordination of well drilling activities with CDFW restoration managers; and
- Establishing a funding mechanism to support the collection and analysis of water level measurements and water quality data from the monitor wells.

7.3 Project #3: Construction of Shallow Monitor Wells

The FPBGSA staff and consultant team have discussed possible locations for the shallow monitor wells. Siting considerations have included access to the desired location(s), future construction/land modification plans, proximity existing or proposed groundwater extraction wells, and the terms of the land access agreements and easements.

Ongoing action items with respect to this management action include:

- Continued discussions with land owners to refine the monitor well locations in relationship to the land modification plans (if any)
- Identification of well drilling contractors and soliciting bids
- Coordination of well drilling activities with land owners
- Establishing a funding mechanism to support the collection and analysis of water level measurements and water quality data from the monitor wells

The FPBGSA has focused its attention on Projects #1-#3 in the two month timeframe since the submittal of the GSP to DWR. The remaining Project or Management Actions (Projects #4 - #7 detailed in the GSP) have yet to be discussed by the FPBGSA Board of Directors. These projects or management actions will be considered by the Board of Directors over the next year and it is anticipated that more substantive updates will be included in future Annual Reports.

8. References

Refs