


# **Exhibit H**

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# Conejo Creek Project

*Effects of Two Project Scenarios*



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## *Effects of Two Project Scenarios*

### Introduction

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The Conejo Creek project, which diverts water from Calleguas Creek for local use, has been operated by Camrosa Water District since 2002. A total of almost 65,000 acre-feet per year (AFY) has been delivered via pipeline for agricultural irrigation to customers of Pleasant Valley County Water District (PVCWD). Fox Canyon Groundwater Management Agency (FCGMA) storage credits were earned by PVCWD by replacing pumped groundwater with Conejo Creek water. These credits were initially transferred to Calleguas Municipal Water District. More recently, Calleguas MWD has withdrawn from the Conejo Creek project, with future credits earned by PVCWD staying with project participants.

Camrosa has the right to all Conejo Creek project water. With Calleguas no longer part of the project, a new agreement for water delivery is being negotiated between Camrosa Water District and PVCWD. One of the components of the agreement is how storage credits earned by the project will be used in the future. If the agreement is signed as currently constructed, storage credits that are earned by PVCWD for replacing groundwater pumping with Conejo Creek deliveries are proposed to be transferred to Camrosa. In turn, these credits would be used by Camrosa for groundwater pumping from two wells in the Pleasant Valley basin.

Alternatively, if there is no water delivery agreement successfully negotiated between Camrosa and PVCWD, future water diverted from the Conejo Creek project will be utilized by Camrosa within the Santa Rosa Basin. In this case, PVCWD would no longer receive project water and would have to increase future pumping to replace the Conejo Creek supply.

To provide information on the potential impact of each scenario (credits transferred to Camrosa for pumping or Camrosa's direct use of the diverted water), several aspects of the Conejo Creek project were analyzed for impact. These included:

- Analysis of the historical value of the Conejo Creek project, including benefits of replacing groundwater pumping in the Pleasant Valley basin by Conejo Creek deliveries;
- The potential effects on groundwater conditions from a new water delivery agreement compared to a no-agreement scenario where water is used directly for Camrosa's customers;
- The value of diverted Conejo Creek water during drought periods when other sources of supply are reduced.

These analyses are then summarized and discussed in terms of effects on the groundwater resources of the Pleasant Valley basin.

## Historical Value of Conejo Creek Project

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As a management strategy to protect the Upper Aquifer of the Oxnard Plain basin from further seawater intrusion, pumping in the Oxnard Plain and Pleasant Valley basins was shifted from the Upper Aquifer to the Lower Aquifer over the past several decades<sup>1</sup>. However, the increased pumping in the Lower Aquifer lowered groundwater elevations in the aquifer and caused seawater to also intrude the Lower Aquifer.

The shift in pumping to the Lower Aquifer is illustrated in Figure 1, where the proportion of total basin pumping changed from 40% to 60% in the Lower Aquifer from 1985 to 2006. This change in pumping patterns caused Lower Aquifer groundwater elevations to drop at the coastline. However, this shift in pumping patterns was partially mitigated in the Pleasant Valley basin by surface deliveries from two sources that replaced groundwater pumping:

- The Pleasant Valley Pipeline, operated by United Water Conservation District and serving PVCWD, increased deliveries of Santa Clara River water following the construction of the Freeman Diversion in 1991;
- The Conejo Creek project, operated by Camrosa Water District, began supplying diverted Conejo Creek water to PVCWD in 2002.

The effects of these two delivery systems are illustrated in Figure 2, which displays both semi-annual pumping amounts and a 4-year moving average of annual pumping. Although there was a significant reduction in pumping following the end of the 1987-1991 drought, a portion of that reduction was caused by the increased deliveries to PVCWD in the Pleasant Valley Pipeline. Another significant drop in pumping occurred in the early to mid 2000s when the Conejo Creek water was first delivered to PVCWD.

The decreased pumping in the Pleasant Valley basin also had a favorable effect on groundwater elevations. Several hydrographs constructed near the location of PVCWD's wells illustrate this. The locations of the wells used for the hydrographs, along with the locations of PVCWD's wells, are shown in Figure 3.

The 2J2 well (Figure 4) is screened in the Upper Aquifer and shows the increased groundwater elevations related to the shift in pumping away from the Upper Aquifer. Three wells screened in the Lower Aquifer are shown in Figure 5 to Figure 7. These wells indicate that groundwater elevations are as high or higher today than they were prior to the shift in pumping to the Lower Aquifer. The proximity of these wells to the PVCWD's wells suggests that these groundwater elevations have remained higher because of the reduced pumping of PVCWD wells.

Thus, the effects of deliveries of Conejo Creek water to PVCWD has been to substantially reduce pumping by PVCWD and to allow groundwater elevations to rise in the Lower Aquifer despite a regional shift of pumping to the Lower Aquifer during that time.

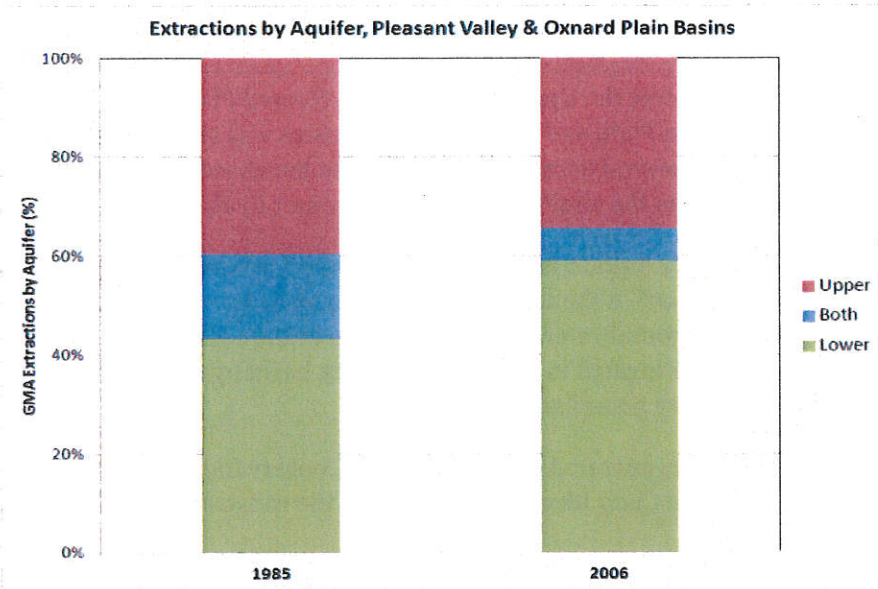


Figure 1. Proportion of pumping in the Lower Aquifer has shifted from near 40% to near 60% over the 20-year period 1985 to 2006.

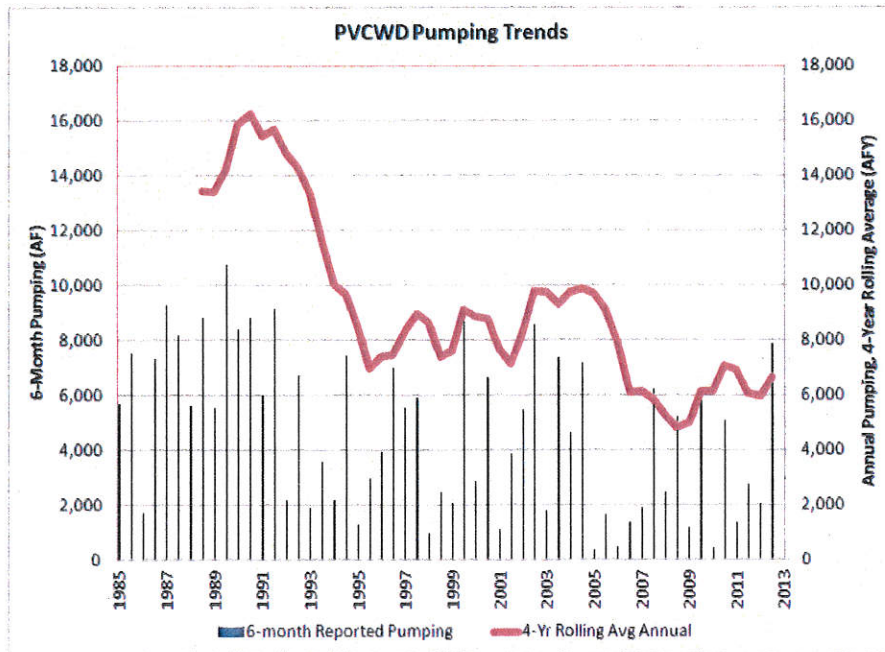


Figure 2. PVCWD pumping trends over the past 3 decades. Column graph indicates FCGMA reported semi-annual pumping for PVCWD. Line graph indicates 4-year moving average annual pumping for PVCWD. There are two large changes in pumping – one following the end of a drought period and construction of the Freeman Diversion in the early 1990s, and another following the construction of the Conejo Creek diversion in the early 2000s.

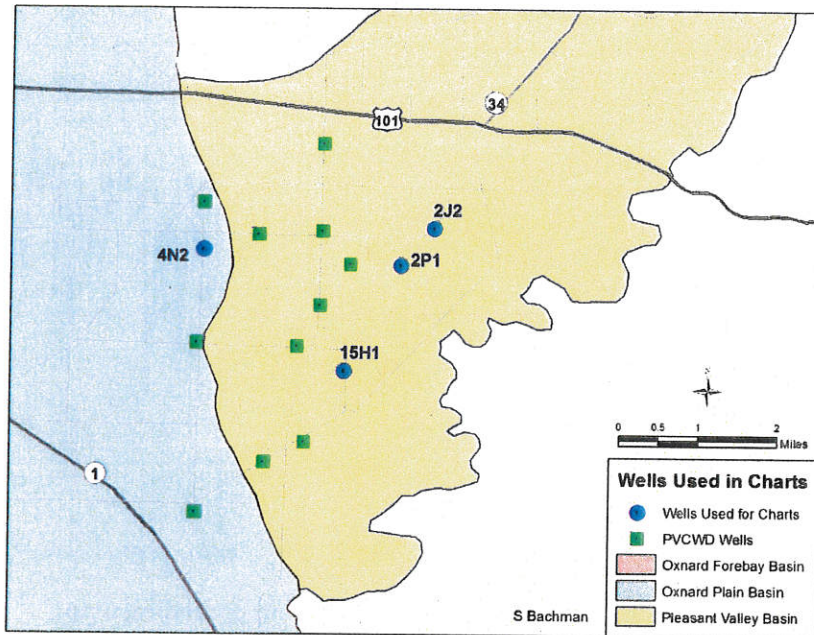


Figure 3. Location map of PVCWD's wells and wells for which hydrographs are shown in report.

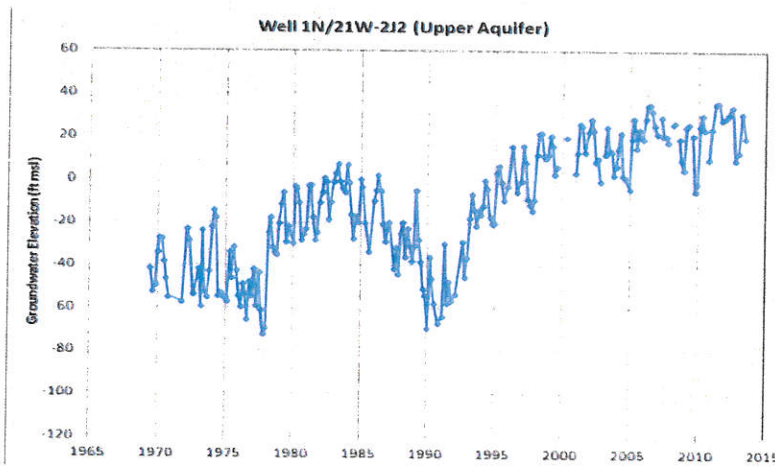


Figure 4. Hydrograph for Upper Aquifer well 2J2. Location on preceding map.

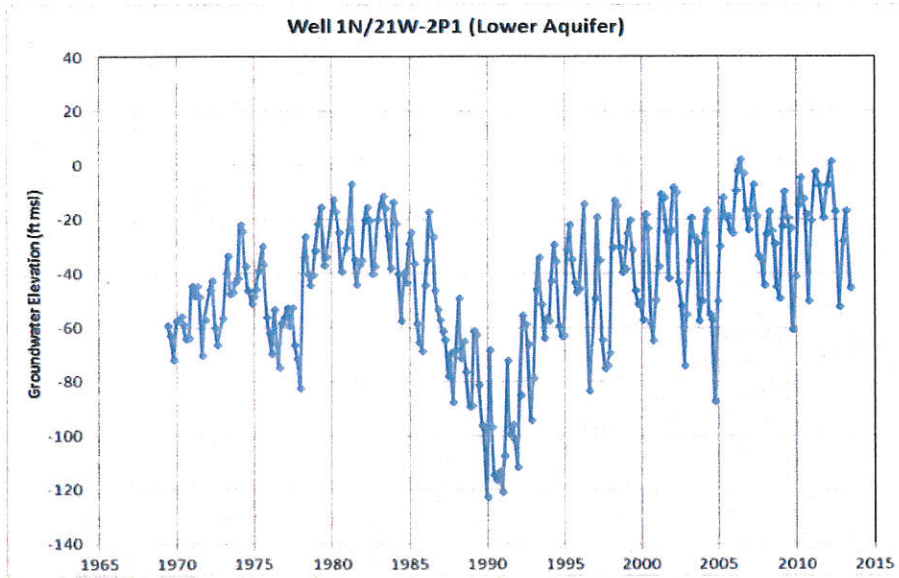


Figure 5. Hydrograph for Lower Aquifer well 2P1. Location on preceding map.

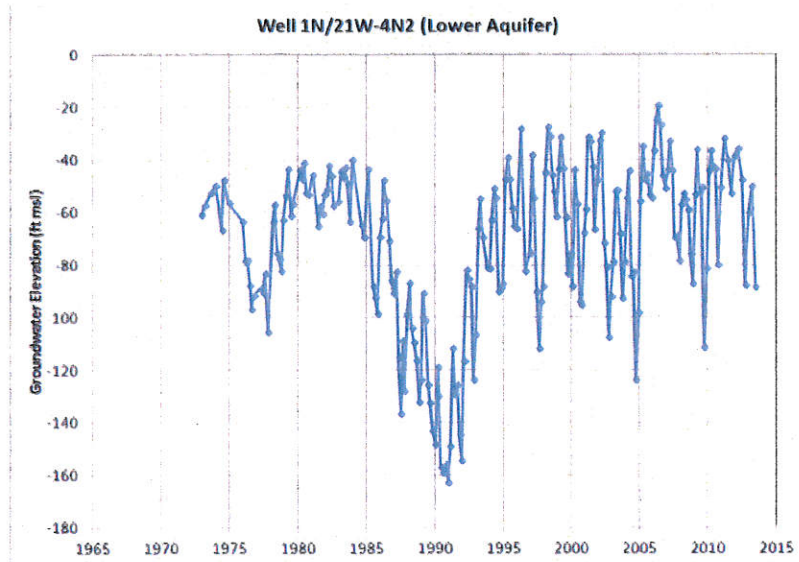


Figure 6. Hydrograph for Lower Aquifer well 4N2. Location on preceding map.

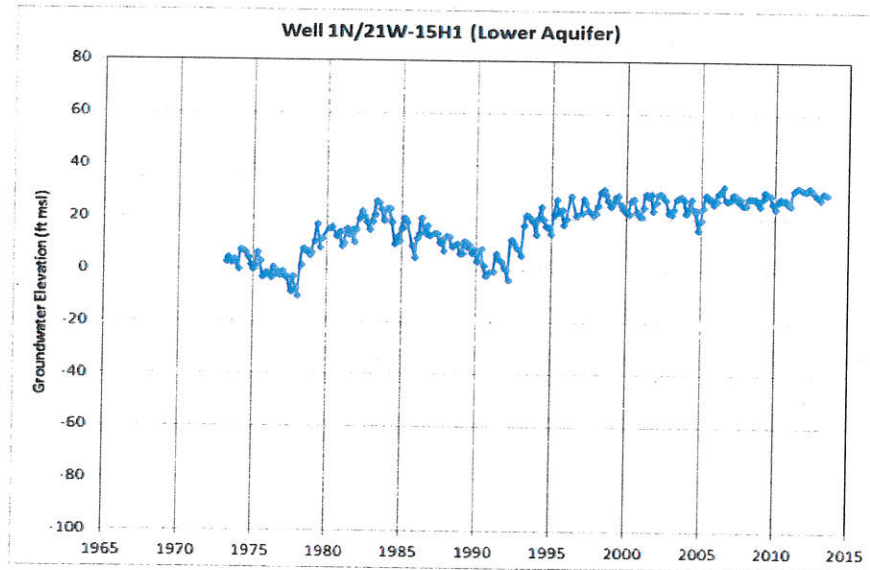


Figure 7. Hydrograph for Lower Aquifer well 15H1. Location on preceding map.

## Comparison of Conejo Creek Project Effects

As discussed in the Introduction, there are two options being considered for future use of Conejo Creek water:

- Under an agreement between Camrosa and PVCWD, Conejo Creek water would continue to be delivered to PVCWD. Credits earned by PVCWD by pumping less than their historical allocation would be transferred to Camrosa, which would pump all or a portion of these credits from the eastern portion of the Pleasant Valley basin. Camrosa will replace their current well 2N/20W-29B2 to increase production, and drill an additional well approximately  $\frac{3}{4}$  of a mile east of 29B2. The wells would pump both Camrosa's current FCGMA allocation and the additional credits. It is unlikely that all the credits generated through this program could be pumped by these two wells, so it is not likely that all the credits would be used. However, to be conservative, this analysis assumes that all the credits are pumped annually at these two wells.
- If an agreement is not reached between Camrosa and PVCWD, Conejo Creek water would instead be delivered to Camrosa's customers in the Santa Rosa basin and adjacent area. PVCWD's pumping would then increase to make up for the reduced pipeline deliveries. It is assumed that the increased pumping is spread equally among PVCWD's wells. There would be no change in Camrosa's pumping in the Pleasant Valley basin.

Regional pumping patterns were examined to determine the effect of either of the two scenarios above. There is currently a significant pumping depression in the Lower Aquifer near the Camarillo Airport<sup>2</sup>. Pumping associated with this depression has pulled poor-quality water from deeper portions of the basin, including traces of oil-field brine. In addition, this depression is inland from areas of seawater intrusion



and could exacerbate and extend the intrusion. Thus, reduction in pumping in the area beneath and adjacent to PVCWD (which overlies much of the area of the pumping depression) is critical in mitigating the pumping depression.

Pumping patterns were analyzed by grouping wells that report pumping to the FCGMA by mile-square land section, and summing the extractions in each section. In this manner, sections could be displayed with a color ramp to better visualize regional pumping patterns (e.g., Figure 8). The annual average of reported pumping during the period 2008-11 was used in the analysis.

For the scenario where a water delivery agreement is reached between Camrosa and PVCWD, pumping patterns are the same as during the 2008-11 period except for the additional pumping by Camrosa shown on Figure 8 (Conejo Creek deliveries averaged 5,133 AFY during this period). The increased pumping occurs away from both the ocean and the pumping depression, and nearer the source of storm recharge from Arroyo Las Posas in the northern portion of the Pleasant Valley basin.

Under the scenario where there is no water supply agreement, Conejo Creek project water is delivered to the Santa Rosa basin and PVCWD pumping increases to replace Conejo Creek deliveries. This increased pumping (Figure 9) significantly increases the pumping stress within PVCWD, particularly near the pumping depression near the Camarillo airport (two bright red sections near northern end of PVCWD wells). A comparison between Figure 8 and Figure 9 visually indicates the pumping impact of the no-agreement scenario in the critical areas of the Pleasant Valley basin.

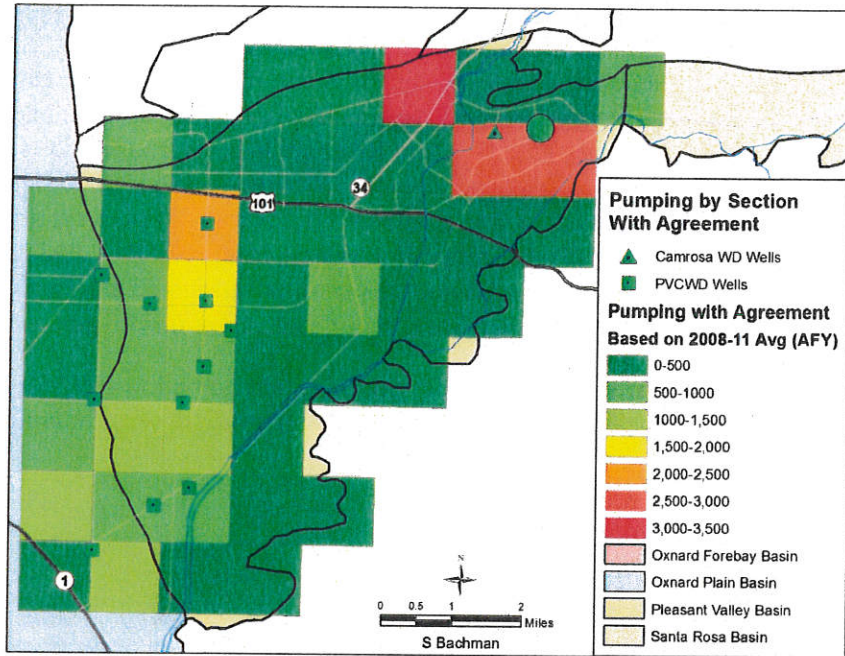


Figure 8. Pumping by section with a water supply agreement in place between Camrosa and PVCWD. Pumping patterns are the same as for the annual average of 2008-11, except for two sections in the portion of the basin where Camrosa currently has a production well – these sections are shown by the triangle representing Camrosa’s current well and a green circle representing the approximate location of an addition well that will be drilled in the future. It is assumed that all credits generated by the project will be pumped by Camrosa, but that is unlikely because of well capacity limitations.

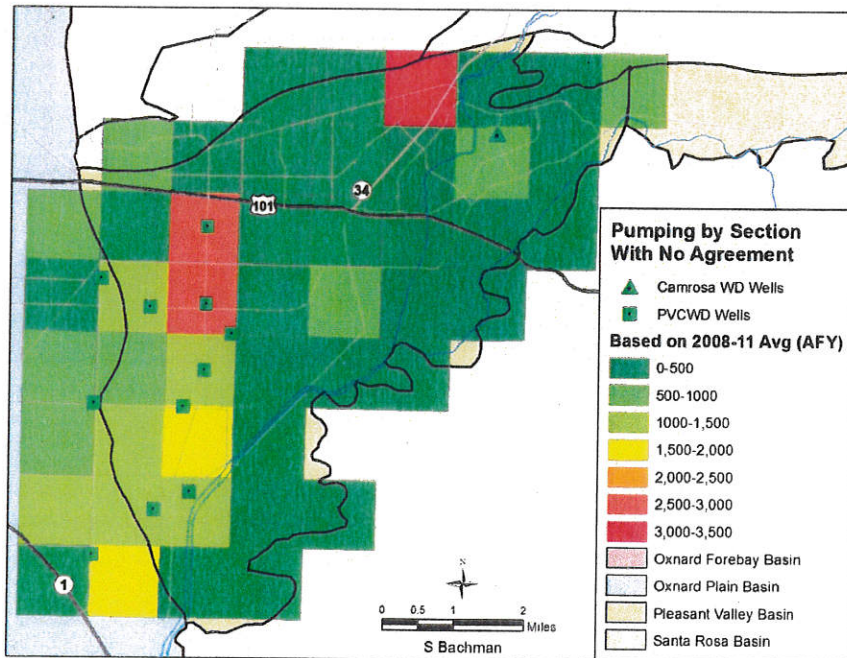
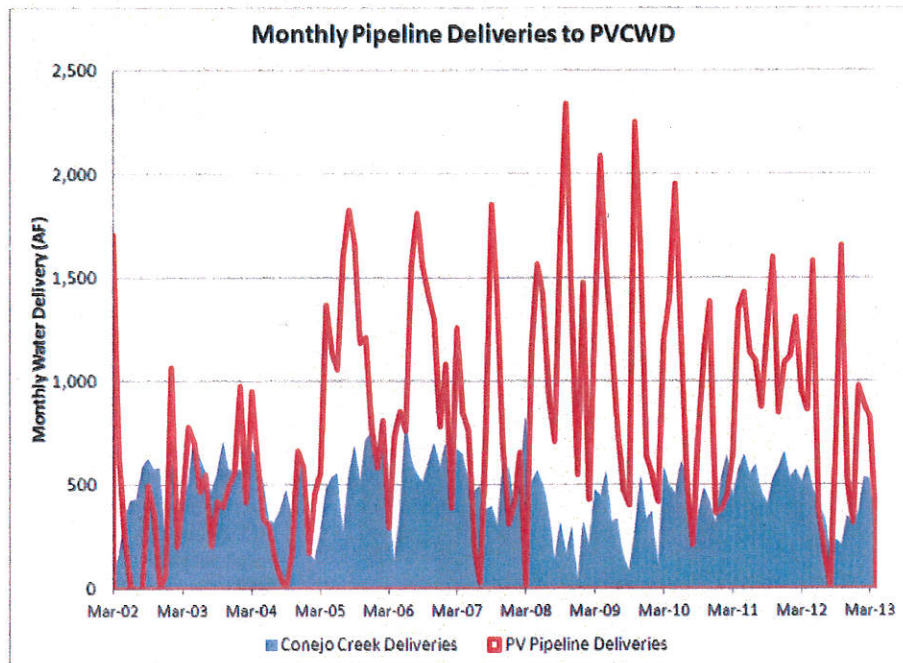


Figure 9. Pumping by section in the scenario where there is no Conejo Creek water supply agreement between Camrosa and PVCWD. Pumping is assumed the same as the annual average for the period 2008-11, except that there is increased pumping by PVCWD to replace Conejo Creek deliveries. The increased pumping occurs at or adjacent to the pumping depression present in the Pleasant Valley basin.

## Importance of Conejo Creek Project as Drought Buffer

The significant advantage that the Conejo Creek project has is that it is partially drought-proof. Because a portion of the flow of Conejo Creek is recycled water, flow is steadier during drought periods (see blue area of Figure 10). In contrast, deliveries of Santa Clara River are highly variable and can disappear during drought periods as the river dries. This is shown in a blow-up of a portion of Figure 10 during the period 2002-03 (Figure 11). PV Pipeline flow was eliminated during the dry portions of the year, whereas Conejo Creek project deliveries remained. A conservation release from Lake Piru during the Fall of 2002 increased the PV deliveries temporarily. That did not happen in 2013, where Lake Piru was too depleted for a release, and may not occur in 2014 unless there is significant runoff this winter.

The advantage of Conejo Creek deliveries during a dry period is that they allow PVCWD to continue to pump their wells less. This is especially important during a drought where other pumpers increase their pumping.



**Figure 10. Monthly pipeline deliveries to PVCWD through the PV Pipeline (United Water Conservation District) and the Conejo Creek project. The Conejo Creek project commenced delivery of water in 2002.**

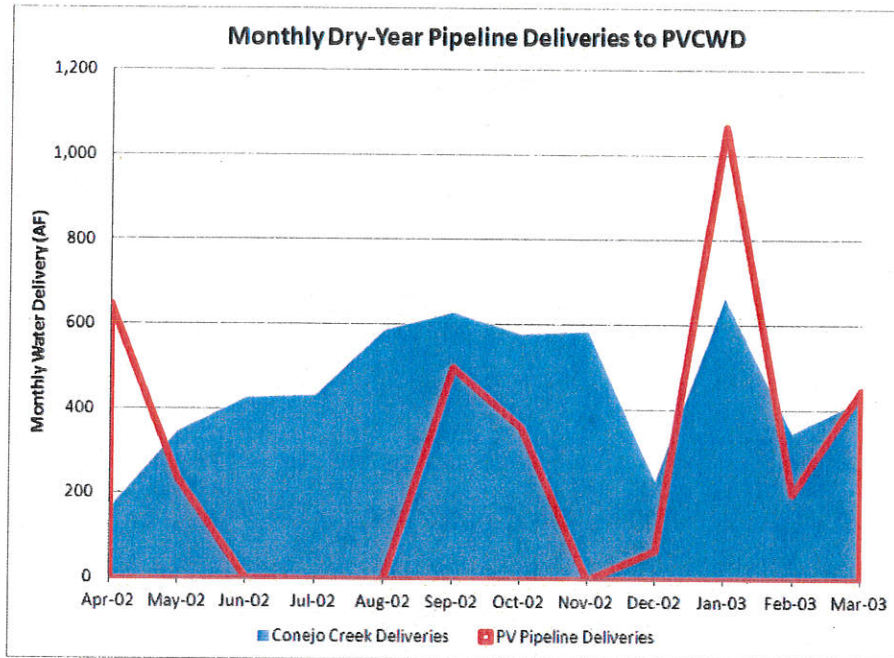


Figure 11. Blow-up of dry-year example from previous figure. Summer PV Pipeline deliveries were eliminated when the Santa Clara River dried. Increased PV flows in the Fall were the result of a conservation release from Lake Piru; such a release did not occur in Fall 2013, which extended the no-delivery time of the PV Pipeline.

## Conclusions

Deliveries of Conejo Creek water to PVCWD have significantly reduced groundwater pumping by PVCWD. In turn, groundwater elevations have risen in proximity to PVCWD's wells. This area of the Pleasant Valley basin is critical because it is the location of a groundwater pumping depression that has caused poorer-quality water to be pulled into the aquifer. The depression is also inland from areas of seawater intrusion and may exacerbate that problem.

An added benefit of the Conejo Creek project is that it is relatively drought-proof because of its component of recycled water. Conejo Creek water continues to be delivered during dry periods, resulting in less pumping by PVCWD during the time when regional groundwater elevations are lowest and there is the highest probability of pulling in poor-quality water.

The effect of having a water-supply delivery agreement between Camrosa and PVCWD is essentially a movement of the location of pumping. With the agreement, pumping is moved away from the pumping depression and the coast to a more-inland area. This more-inland area is also where recharge of storm water occurs from Arroyo Las Posas. Without the agreement, Conejo Creek water is delivered elsewhere and PVCWD pumping would increase to replace that water source. It is likely that groundwater elevations in the pumping depression would drop as this overlying pumping increased. Thus, it appears that the project with a water supply agreement will be a net advantage to the basin.

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<sup>1</sup> FCGMA, 2007, *Groundwater Management Plan*, 147 p.

<sup>2</sup> *Ibid.*