



# Office Memorandum

Westlands Water District

**DATE:** April 21, 2015

**TO:** Water Policy Committee

**THROUGH:** Thomas W. Birmingham, General Manager  
Dan Pope, Chief Operating Officer

**FROM:** Jose Gutierrez, Deputy General Manager - Resources

**SUBJECT:** 2014-2015 Groundwater Conditions Update

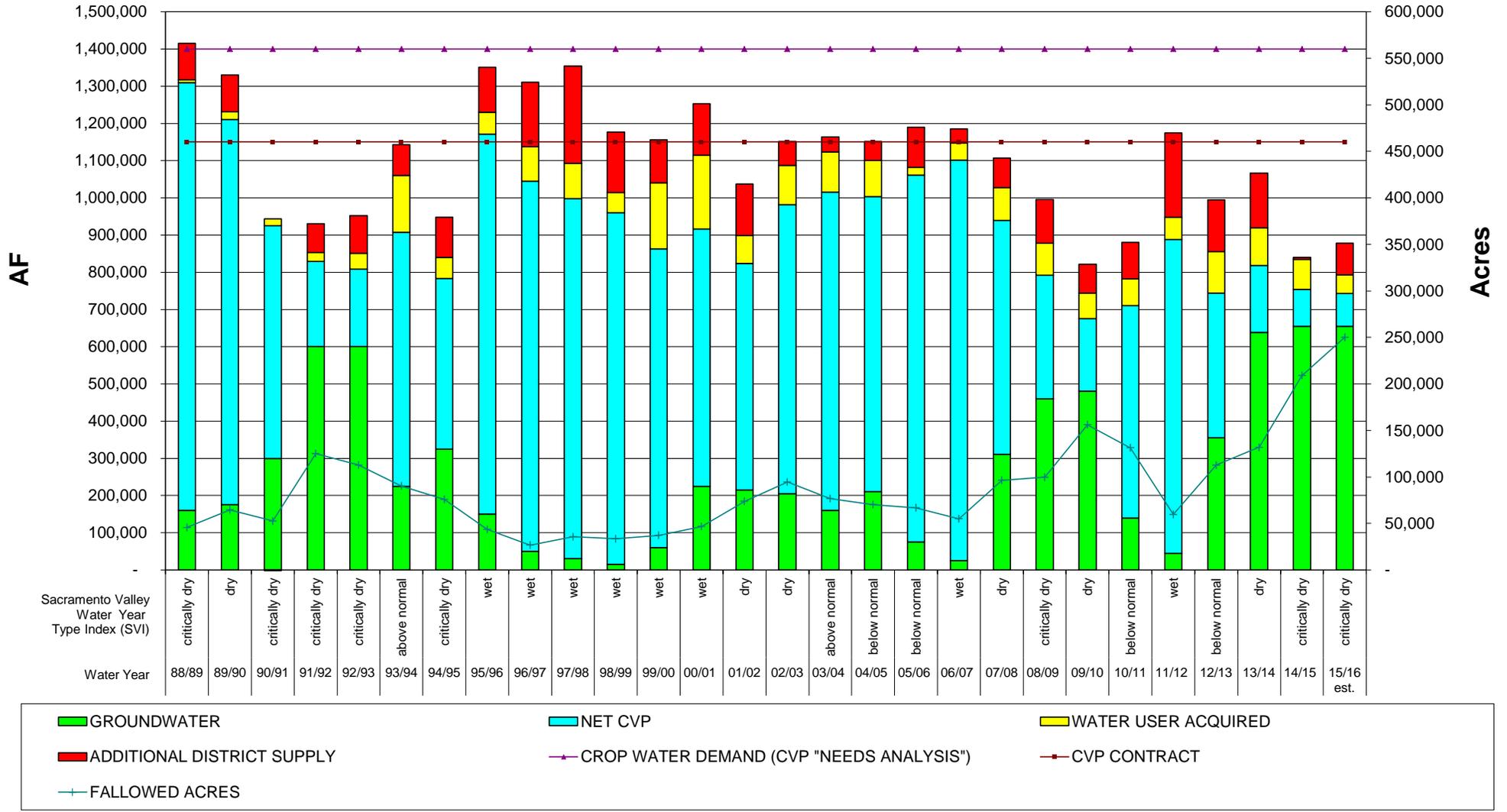
**DISCUSSION:**

The purpose of this memorandum is to provide the Committee with an update on groundwater conditions within Westlands Water District.

**District Supply (Surface Water and Groundwater)**

Figure 1 on the following page titled “Westlands Water District Water Supply, 1988 through 2015” demonstrates how the District and its water users conjunctively optimize the use of surface water when it is available, and shift to groundwater when necessary. Groundwater pumping in the District fluctuates annually, and the variation depends primarily on the CVP allocation. In a zero allocation year like 2015, pumping could reach 655,000 acre-feet (AF). In 2006, the last 100 percent CVP allocation year, groundwater pumping equaled 25,000 AF. Annual groundwater pumping has averaged about 255,000 AF since 1988. On a 10-year rolling average, District wide groundwater pumping exceeded 250,000 AF only two times since 1988. Conjunctive use of surface water and groundwater ensures that the District and its water users are optimizing the water demand and supply balance.

# WESTLANDS WATER DISTRICT WATER SUPPLY 1988 THROUGH 2015



## Groundwater Pumping

The 2014/15 groundwater meter readings are complete and the data collected are presented in Table 1 below. Also included in this table are statistics on the number of Groundwater Management Program (GWMP) wells, non-GWMP wells, and non-GWMP wells that were not read.

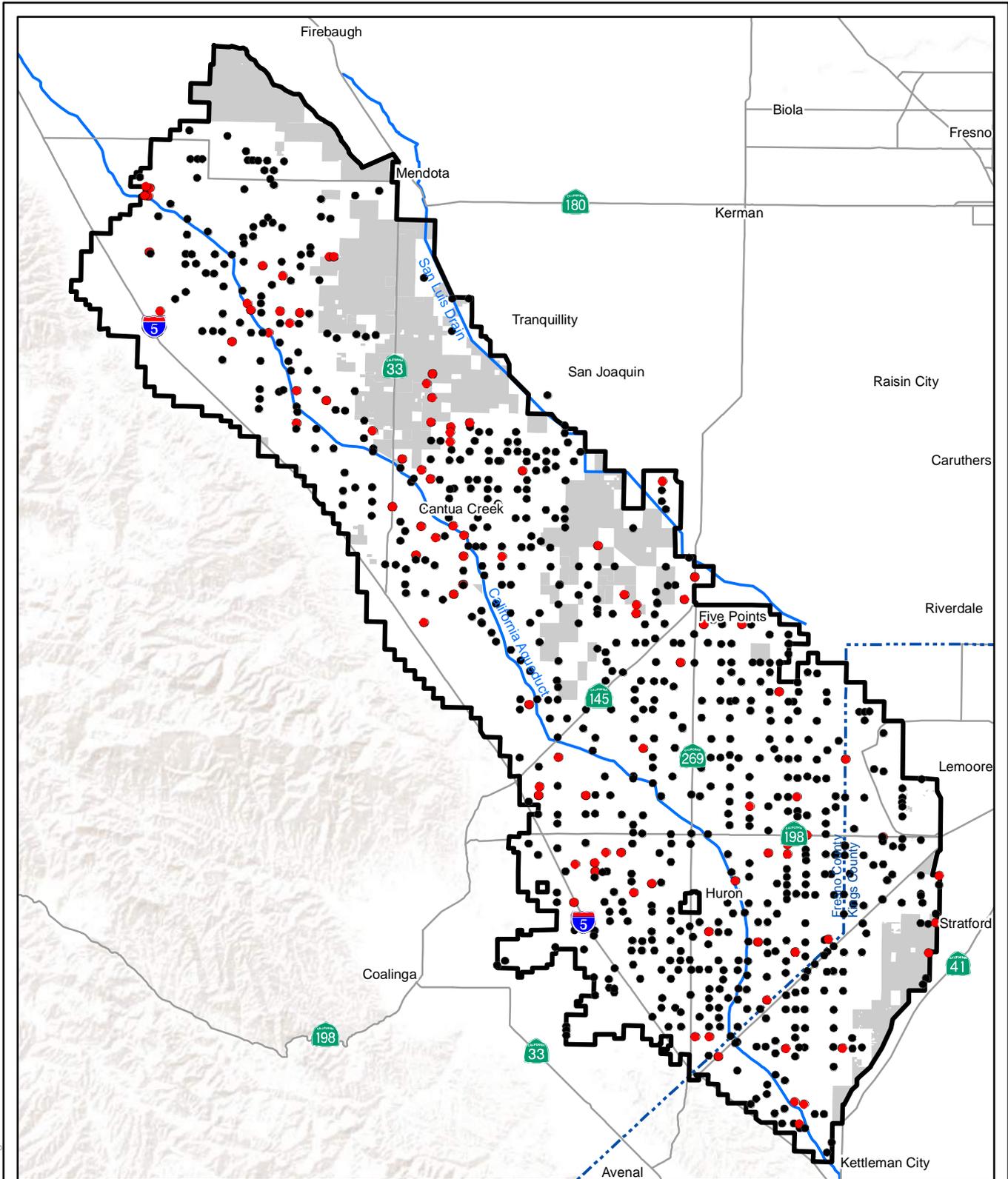
There are 266 wells in the GWMP (one more than 2013), 565 non-GWMP (52 more than 2013), and 831 total wells in the District (53 more than 2013). Some wells were not read for various reasons including inoperable meters, lack of meters, or lack of access due to locked structures. For the wells without meter readings, staff conservatively assumed that they operated and pumped groundwater at rates similar to wells with readings. Therefore, the total groundwater pumped District wide should be considered an upper limit.

The total groundwater pumped District wide for the first two quarters of the 2014/15 contract year was 443,000 AF, which was 41,000 AF more than in 2013. The total groundwater pumped in the third and fourth quarters was 212,000 AF, which was 20,000 AF less than in 2013. Land fallowing and the December storms may have resulted in less pumping in the fourth quarter. The amount of groundwater pumping estimated for the 2015/16 contract year is 650,000 to 675,000 AF. Figure 2 illustrates the distribution of wells throughout the District.

Table 1: 2014/15 Districtwide Groundwater Pumping

Quarter	GWMP	Non-GWMP (meter reading)	Non-GWMP (no meter reading, est.)	District Wide Groundwater Pumping (est.)
March-May 2014 (# of wells)	271 (33%)	433 (54%)	104 (13%)	808
June-August 2014 (# of wells)	274 (33%)	455 (54%)	114 (13%)	843
September-November 2014 (# of wells)	275 (32%)	458 (54%)	117 (14%)	850
December 2014-February 2015 (#of wells)	266 (32%)	469 (56%)	96 (12%)	831
March-May 2014 (AF pumped)	72,000 (38%)	88,000 (47%)	28,000 (15%, est.)	188,000
June-August 2014 (AF pumped)	82,000 (32%)	133,000 (52%)	40,000 (16%, est.)	255,000
September-November 2014 (AF pumped)	38,000 (29%)	75,000 (55%)	21,000 (16%, est.)	134,000
December 2014-February 2015 (AF pumped)	29,000 (37%)	39,000 (50%)	10,000 (13%, est.)	78,000
<b>Total Annual (AF pumped)</b>	<b>221,000</b>	<b>335,000</b>	<b>99,000 (est.)</b>	<b>655,000</b>

C:\WWD\_Data\Well Pumping\Figures\Figure 2 Well Locations in Westlands.mxd



**Legend**

- Groundwater Pumping 2014/2015**
  - Well Not Read
  - Well Read
  - Highways/Major Roads
  - Waterway
  - Retired Lands
  - County Boundary
  - ▭ Westlands Water District Boundary
- 0 3 6 Miles

**Figure 2**  
**Well Locations in Westlands**

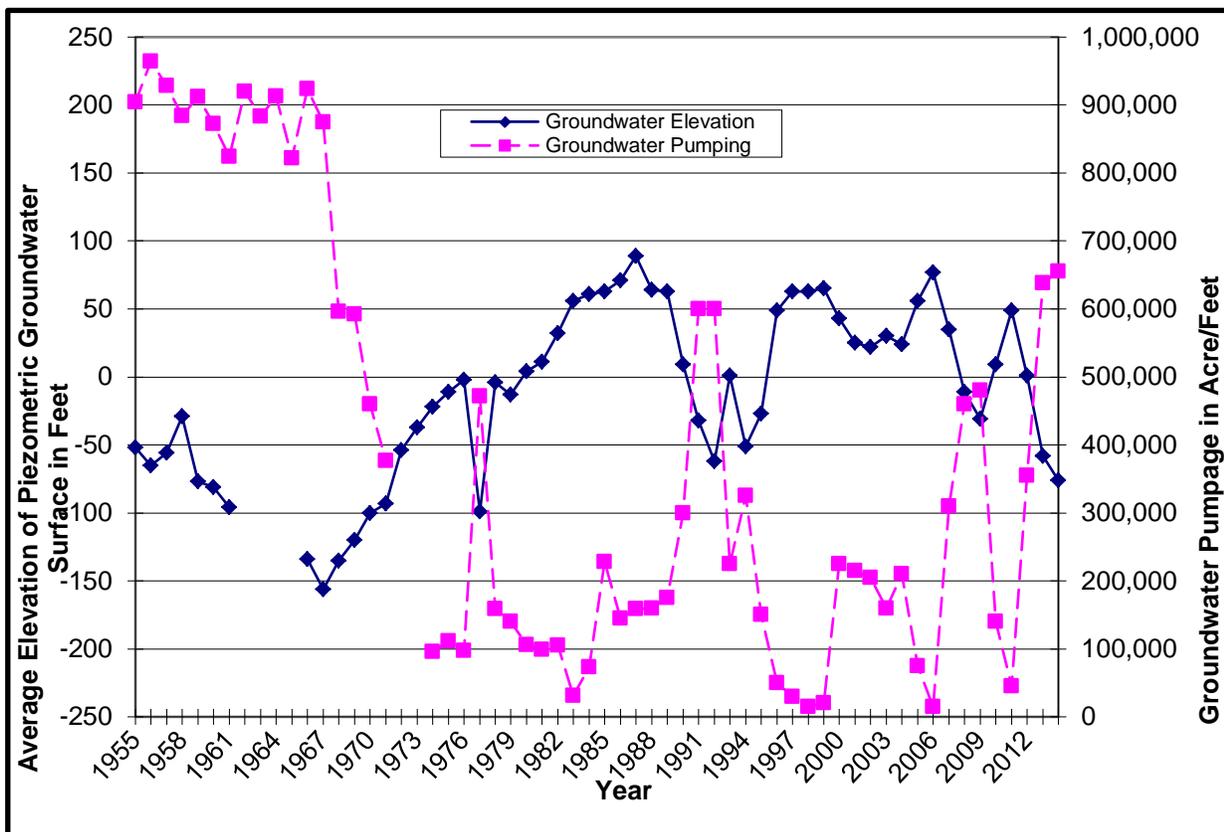
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## Groundwater Levels

Figure 3 below illustrates historical groundwater pumping rates and the average piezometric groundwater surface elevation throughout the District. In 2014, elevations dropped by approximately 18 feet, when compared to 2013 levels. Groundwater levels have not reached the historical low measured in 1967.

Although the amount of groundwater pumped over the last three years raises concerns, the groundwater surface elevation will recover or stabilize in years when there is sufficient CVP, Supplemental Water, and water user acquired supplies.

**Figure 3: Historical Groundwater Pumping Rate (1955-2014)**



## 2014 Groundwater Conditions

As shown in Table 2, groundwater pumping District-wide has exceeded 250,000 AF from 2012 through 2014.

**Table 2: District-wide Groundwater Pumping**

<b>Year</b>	<b>Groundwater Pumping (AF)</b>
2007/08	310,000
2008/09	460,000
2009/10	480,000
2010/11	140,000
2011/12	45,000
2012/13	355,000
2013/14	638,000
2014/15	655,000
2015/16	650,000- 700,000 (est.)

Staff developed Figures 4, 5, 6, and 7 to illustrate the measured ground subsidence, groundwater volume pumped and the change in elevation to the Sub-Corcoran piezometric water level. The majority of 2014 groundwater pumping occurred in the southern half of the District.

*Figure 4: Measured Subsidence*

Figure 4 illustrates preliminary data on the subsidence experienced throughout the Central Valley and District during peak groundwater pumping months, May through October of 2014. The southern part of the District (around the Avenal Cutoff Road) experienced the greatest subsidence, ranging from 4- inches to 8-inches. Areas bordering the western boundary of the District were the least impacted.

*Figures 5 and 6: District-wide Groundwater Pumping 2014-2015*

Figures 5 and 6 illustrate the distribution of groundwater pumping throughout the District. There are certain regions of the District where groundwater pumping was concentrated. The majority of groundwater pumping occurred in the southern half of the District.

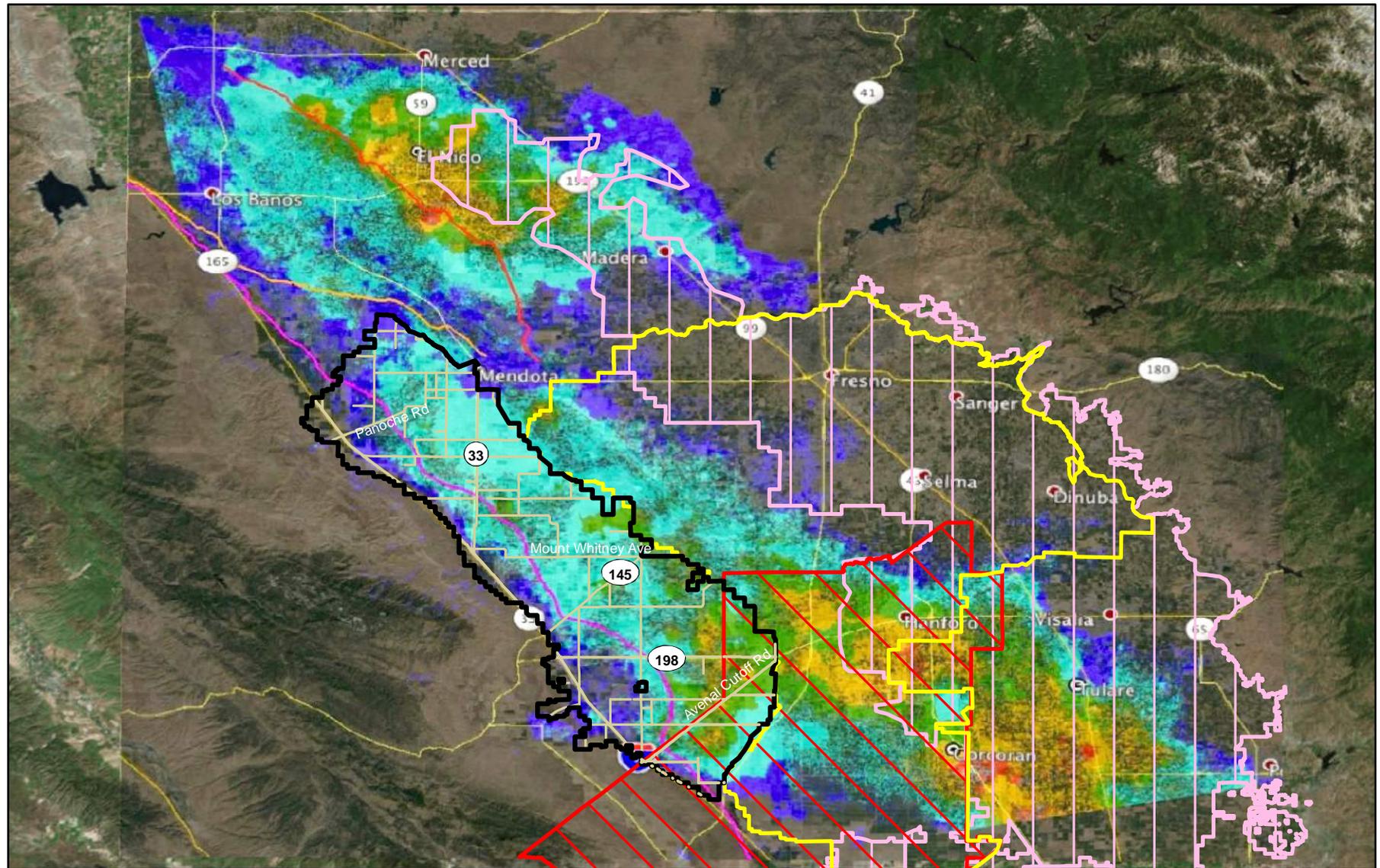
*Figure 7: Change in Elevation to Sub-Corcoran Piezometric Groundwater 2013/14*

Figure 7 provides the District-wide groundwater level elevation change resulting from 2014 groundwater pumping. There are a few areas highlighted in red that experienced up to 300 feet drop in groundwater elevation. However, on average the District groundwater elevation dropped 18 feet from the 2013/14 to 2014/15 contract year.

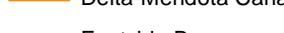
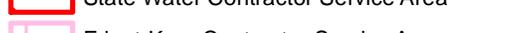
**RECOMMENDATION:**

No action required. Item presented for information only.

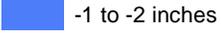
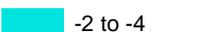
# PRELIMINARY DATA\*



**Legend**

-  California Aqueduct
-  Delta-Mendota Canal
-  Eastside Bypass
-  WWD Boundary
-  Kings River Conservation District Boundary
-  State Water Contractor Service Area
-  Friant-Kern Contractor Service Area

**PRELIMINARY Subsidence**

-  -1 to -2 inches
-  -2 to -4
-  -4 to -6

 -6 to -8

 -8 to -10

 -10 to -12



 Miles  
0 7.5 15

**Figure 4**  
**Measured Subsidence**  
**May 3 - October 18, 2014**

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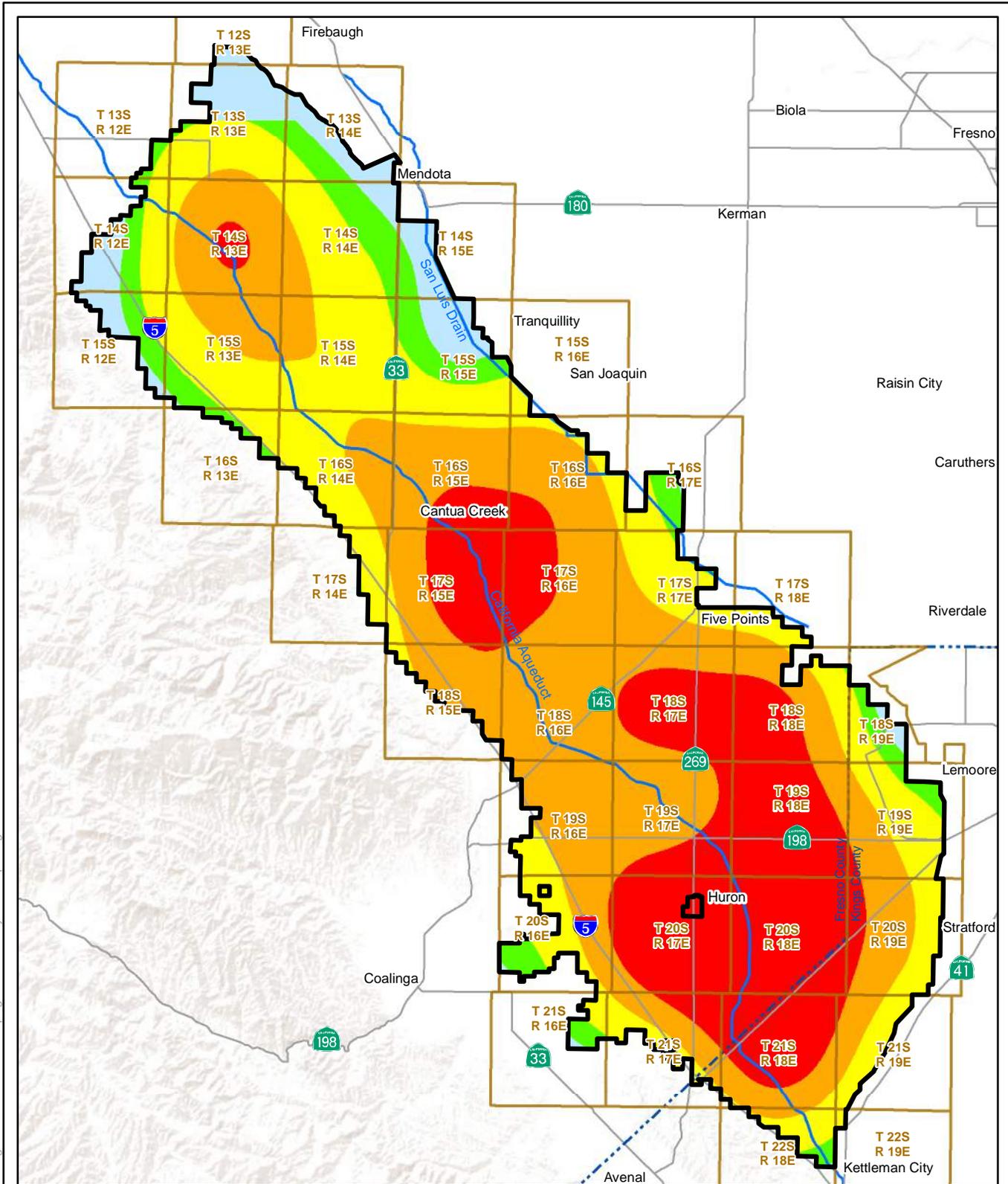
C:\Subsidence\Reformatted\Subsidence\_Reformatted\_GIS.mxd

Ground Surface Elevation Datums: Horizontal Datum of NAD83 and Vertical Datum of NAVD 88

Date: 4/13/2015

\*[http://water.ca.gov/waterconditions/docs/DWR\\_PublicUpdateforDroughtResponse\\_GroundwaterBasins.pdf](http://water.ca.gov/waterconditions/docs/DWR_PublicUpdateforDroughtResponse_GroundwaterBasins.pdf)

C:\VWD\_Data\Well Pumping\Figure 5 Groundwater Pumping 2014 - 2015 by Township Range Ver D.mxd



**Legend**

- Westlands Water District Boundary
- Highways/Major Roads
- Waterway
- Township/Range
- County Boundary

**Acre-Feet Pumped 2014/2015**

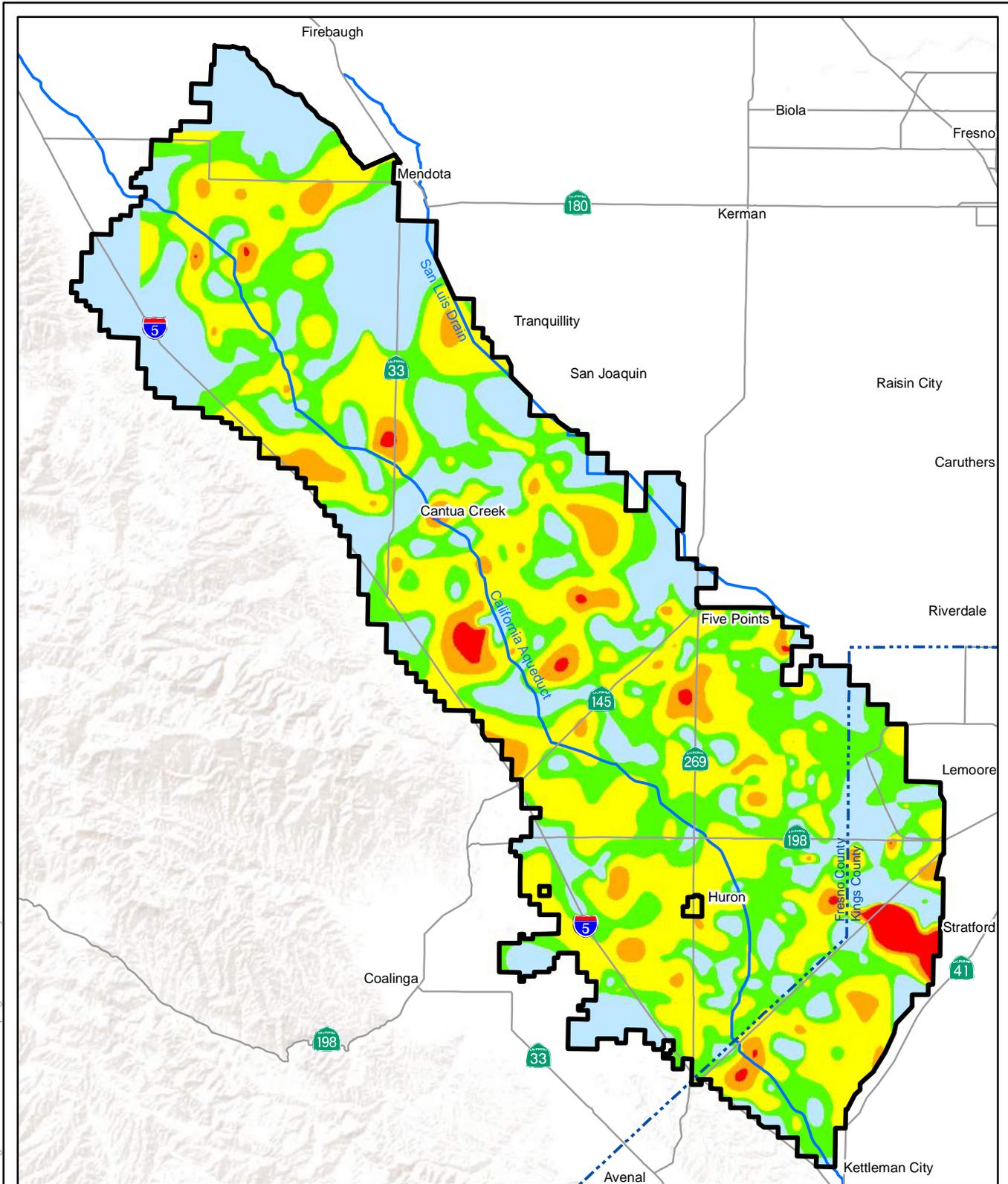
- Less
- More

**Figure 5  
Groundwater Pumping by Area**

Miles  
0 3 6

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C:\WWD\_Data\Well Pumping\Figures\Figure 1 Groundwater Pumping 2014 - 2015 by Individual Wells Ver B.mxd



**Legend**

- Highways/Major Roads
- Waterway
- - - County Boundary
- ▭ Westlands Water District Boundary

**Well Readings 2014/2015**

**Acre-Feet Pumped Per Well**

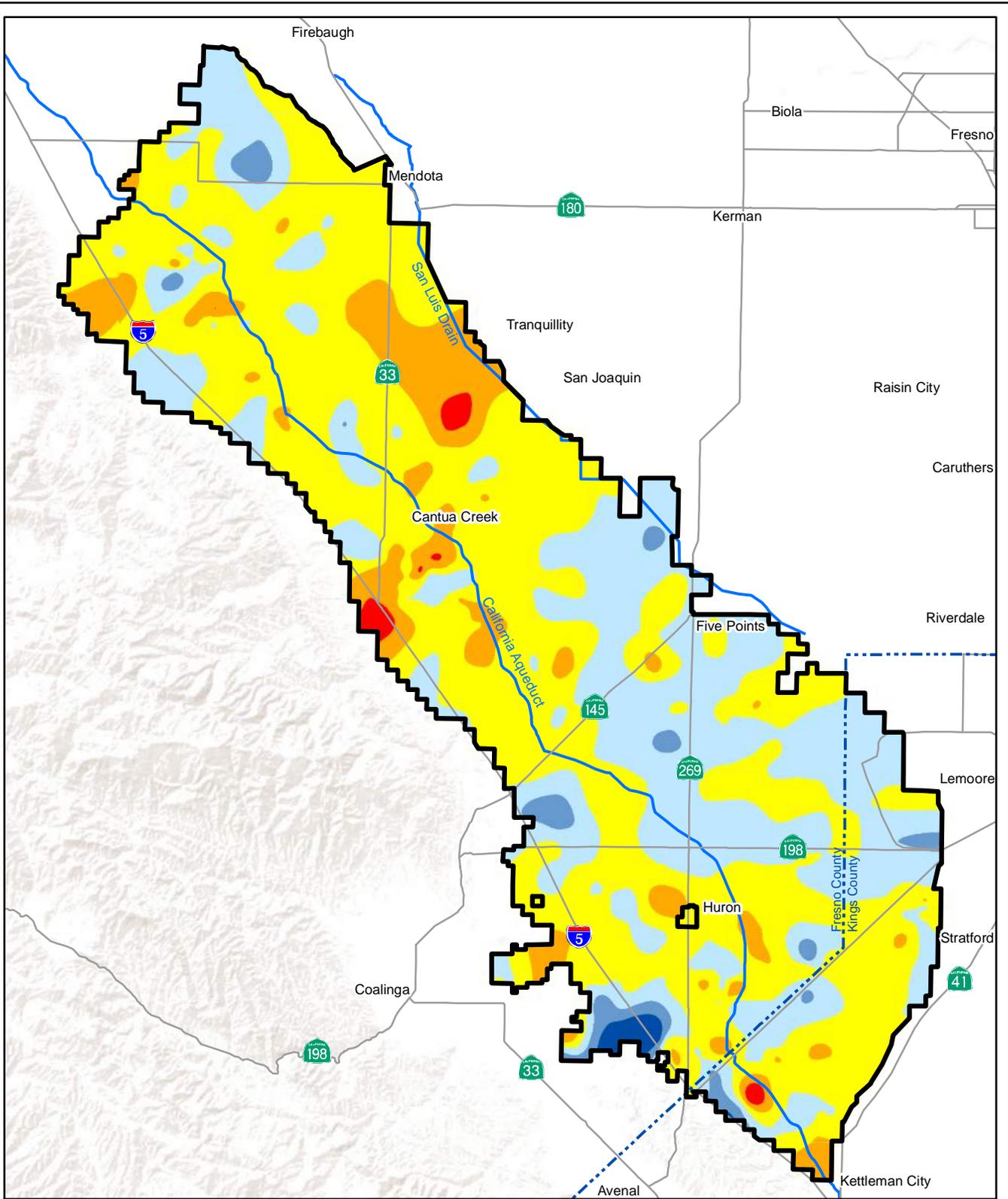
	0 - 500		1,000 - 2,000
	500 - 1,000		2,000 - 3,000
	>3,000		



**Figure 6**  
**Groundwater Pumping**  
**Per Well**

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C:\WWD\_Data\Groundwater\2014\GIS\_Figures\Elevation\_Changes\Figure 5 Change in Elevation 2013 - 2014 From Groundwater Pumping\_Ver B.mxd



**Legend**

- Highways/Major Roads
- Waterway
- - - County Boundary
- ▭ Westlands Water District Boundary

**Change in Elevation**

Water Level Gain		Water Level Drop	
Light Blue	0 - 100'	Yellow	0 - 100'
Blue	100' - 200'	Orange	100' - 200'
Dark Blue	200' - 300'	Red	200' - 300'



0 3 6 Miles

**Figure 7**  
**Change in Elevation to Sub-Corcoran**  
**Piezometric Head 2013/2014**



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