Ventura County
Watershed Protection District
Water & Environmental Resources Division

2013 Groundwater Section
Annual Report

Ventura County
Watershed Protection District
Water & Environmental Resources Division

MISSION:

"Protect, sustain, and enhance
Ventura County watersheds now
and into the future for the benefit of
all by applying sound science,
technology, and policy."

2013 Groundwater Section
Annual Report

Cover Photo: Drip irrigation of celery on the Oxnard Plain.

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EXECUTIVE SUMMARY

Precipitation for water-year 2012/2013 is approximately one-third the long-term average and is the second consecutive below average precipitation year. This is the third driest year since the 1990/1991 water year. The 2012/2013 water year average precipitation value for the entire County was approximately 7.6 inches, the 2011/2012 water year average was just under 11 inches; in contrast, the average precipitation value for the water-year 2010/2011 was approximately 26 inches. The 23 year average (water-year) rainfall amount is approximately 20 inches.

Groundwater levels in all 16 key wells declined significantly in all basins for the spring 2013 measurement as compared to the 2012 spring measurement. Water levels decreased in all basins an average of approximately 13 feet, with a maximum water level decrease of 78.4 feet in the Ojai Valley. In some groundwater basins water levels are consistently, and substantially in some places, below sea level.

The County's water quality data for 2013 (173 wells sampled) was collected between August and November. It indicates groundwater from 21 of the 173 wells exceeded the State of California's maximum contaminant level (MCL) for nitrate. Data from some wells in the Tierra Rejada and Arroyo Santa Rosa Basin show nitrate concentrations consistently above the MCL. Other basins include wells that may produce water exceeding the MCL for nitrate (Fillmore, East Las Posas, and Oxnard Plain). Some basins have wells that produce water containing elevated levels of chloride, sulfate, and TDS.

The volume of water delivery from the three wholesale districts in the County increased approximately 1.3% (≈1,900 AF) from the previous year. The volume of groundwater extractions reported to the Fox Canyon Groundwater Management Agency for the first half of 2013 increased approximately 6.7% (≈2,000 AF) and for United Water Conservation District 11.4% (≈9,000 AF) as compared to the first half of the previous year.

We would also like to thank the hundreds of private and public well owners that make their wells available to the County for water level and water quality measurement.

Section 1.0
Introduction

The 2013 Groundwater Section Annual Report is a summary of this year's accomplishments, while also providing an overview of the groundwater conditions for the County for the past calendar year.

1.1 – Summary of Accomplishments

Over the last 12 months the Groundwater Section:

- Issued 139 various types of well permits, including 43 for new water supply wells, 15 water supply well destructions and 8 for water supply well repairs or modifications. Sixty-six inspections of sealing and perforation work were performed by Groundwater Staff.
- Sampled 173 wells as part of the annual groundwater sampling program. Analytical results are included in Section 3 and Appendix D.
- Measured the water level, quarterly, in approximately 200 wells countywide. All of the key well groundwater levels measured during spring 2013 were lower than the 2012 spring measurement.
- Completed potentiometric surface maps for the Santa Clara River Valley, Upper Aquifer System and Lower Aquifer System for 2013.
- Created numerous new maps and map layers using ArcView GIS.
- Assisted the Fox Canyon Groundwater Management Agency (FCGMA) and other departments and Agencies with groundwater and mapping needs.
- Compiled water level data gathered by Groundwater Staff with that gathered by other agencies and uploaded it to the CASGEM website semi-annually to maintain compliance with the State CASGEM program.
- Completed and published the 2012 Groundwater Section Annual Report.

1.2 - General County Information

The following sections contain a general overview regarding climate, population, surface water and changes in groundwater conditions in Ventura County for 2013.

1.2.1 - Population and Climate

On May 1, 2013, the California State Department of Finance estimated Ventura County's population to be 835,436, an increase of 0.8 percent over the revised 2012 population estimate of 829,065. The City of Port Hueneme had the largest estimated percentage increase in population (2.0 percent) over the previous year.

The mean annual daily air temperature at the National Weather Service Oxnard area office was 62.7 degrees Fahrenheit, with an average daily high of 73.2 degrees Fahrenheit and an average low of 52.1 degrees Fahrenheit[1]. The average annual rainfall, countywide (based on preliminary data from all active rain gages), was approximately 7.6 inches for the 2012/2013 water year[2]. Throughout the County, precipitation for the 2012/2013 water year was between 33 and 45 percent of normal, with Santa Paula receiving 33% of normal, while the Port Hueneme area received 45% of the normal rainfall total. Figure 1-1 below shows various rain gage/area rainfall totals comparing water year 2012/2013 to normal precipitation totals for that gage/area. Normals are determined from the 1957-1992 base period (i.e. the most recent 35 year period that represents average rainfall from gages with 80-120 years of record).

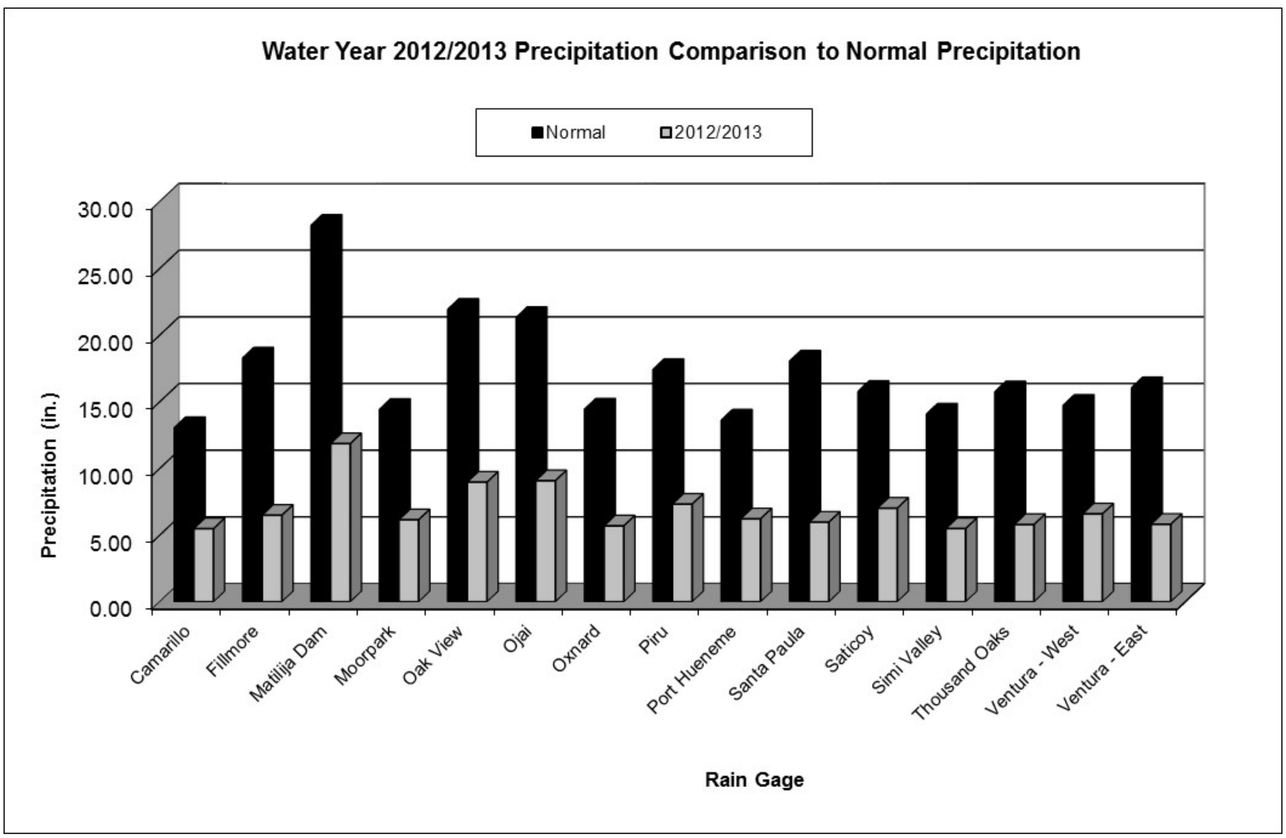


Figure 1-1: Chart comparing 2012/2013 rainfall totals to normal rainfall totals for the same area.

[1] Based on *preliminary* data from the National Climatic Data Center http://www.ncdc.noaa.gov.

[2] Water Year defined as: October 1 to September 30 of the following year. VCWPD precipitation data is *preliminary* and subject to change.

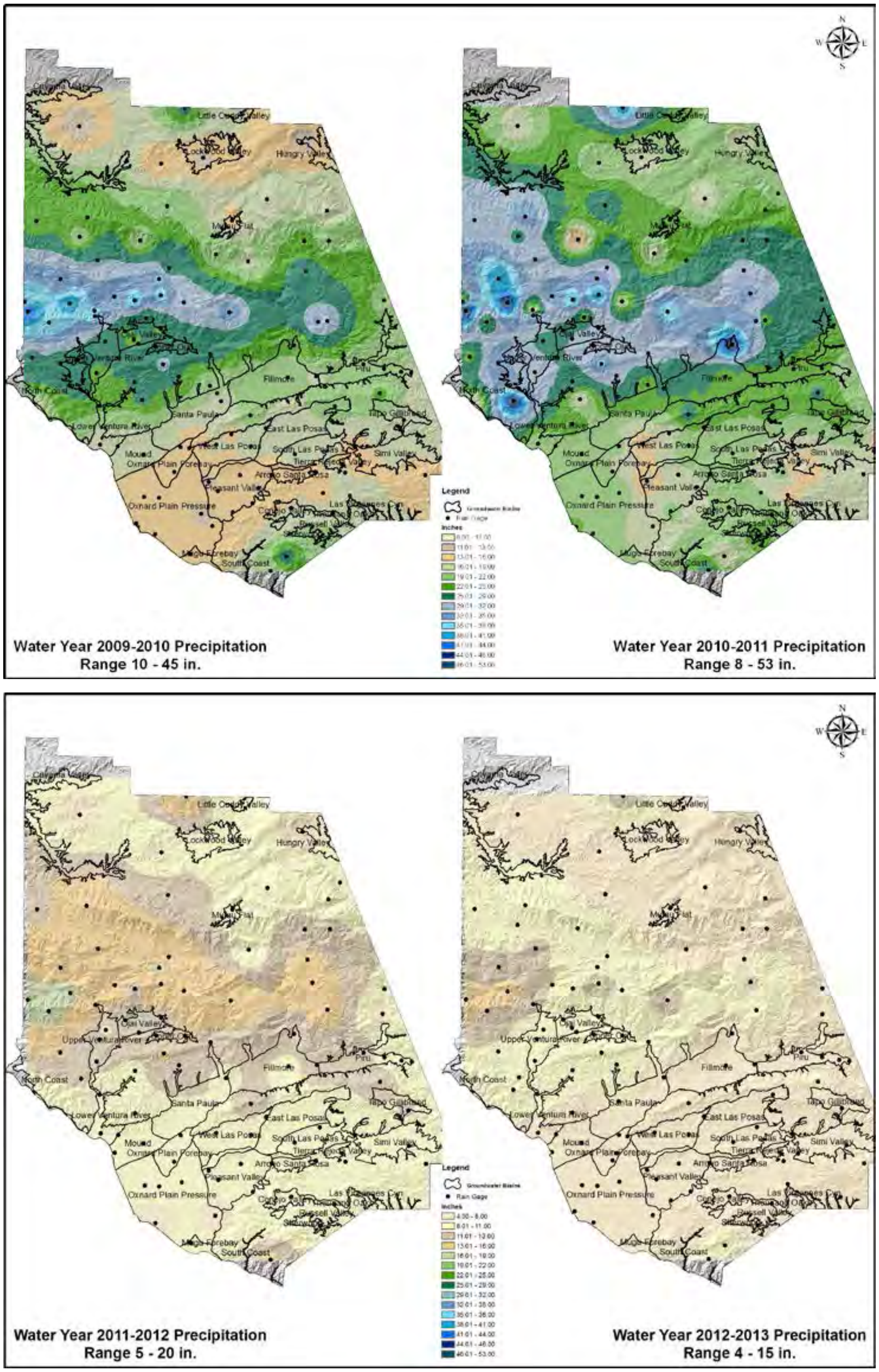


Figure 1-2: Generalized maps[3] comparing precipitation between water years 2009/2010, 2010/2011, 2011/2012 and 2012/2013.

The map above (Figure 1-2) shows a generalized distribution of rainfall across the county for water years 2009/2010, 2010/2011, 2011/2012 and 2012/2013. The chart on the following page (Figure 1-3) depicts average rainfall for the period 1990/1991 to 2012/2013 for all of Ventura County.

[3] Based on data from all active Ventura County rain gages. Data is *preliminary* and subject to change.

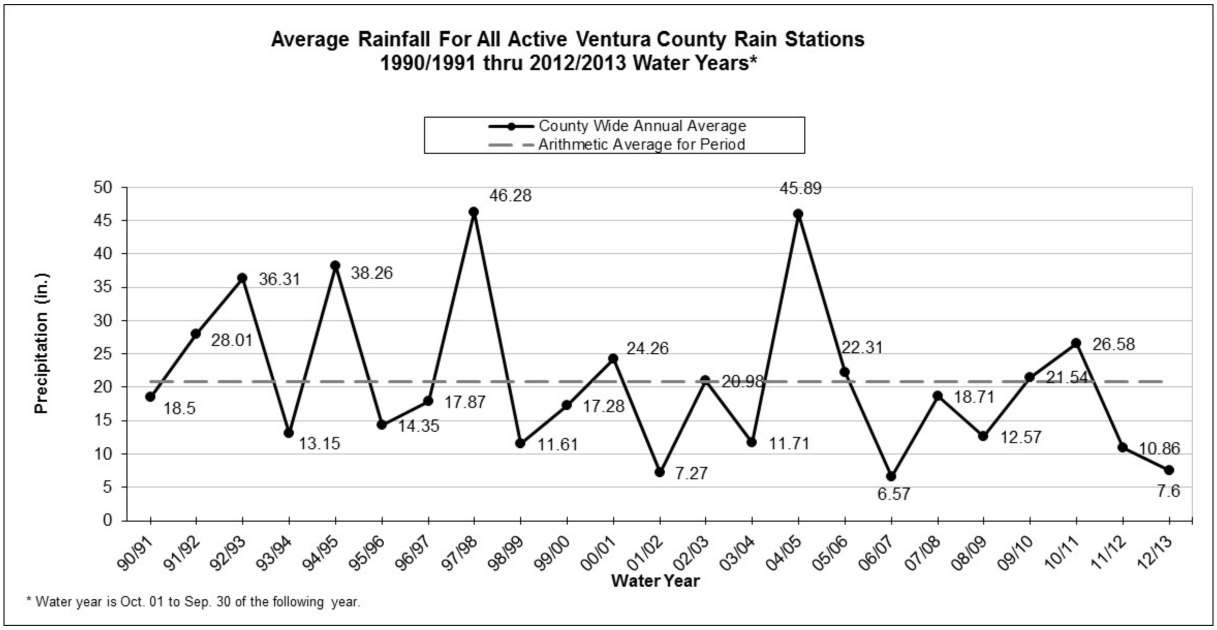


Figure 1-3: Chart comparing the average annual rainfall for Ventura County.

1.2.2 – Surface Water

In calendar year 2013 United Water Conservation District (UWCD) released approximately 5,798[4] acre feet (AF) of water from Lake Piru, which includes a fish passage requirement of 5 cubic feet per second (cfs) per day. UWCD diverted 11,254[4] AF from the Santa Clara River at the Freeman Diversion Dam with 34[4] AF sent to the Saticoy Spreading Grounds, 2,389[4] AF sent to the El Rio Spreading Grounds and 263[4] AF sent to the Noble pit, with some surface water also going to agricultural customers through the Pumping Trough Pipeline (PTP) and the Pleasant Valley Pipeline (PVP). At the end of 2013 there was 18,163[4] AF of water in storage in Lake Piru, 154,432[5] AF in Lake Casitas and 9,800[6] AF in Lake Bard. Casitas Water District releases 3,200 AF per year from Lake Casitas for the Robles Diversion Fish Passage.

[4] Data provided courtesy of UWCD is preliminary and subject to change per UWCD. Freeman diversion data from UWCD operations logs.

[5] Data provided courtesy of Casitas MWD.

[6] Data provided courtesy of Calleguas MWD.

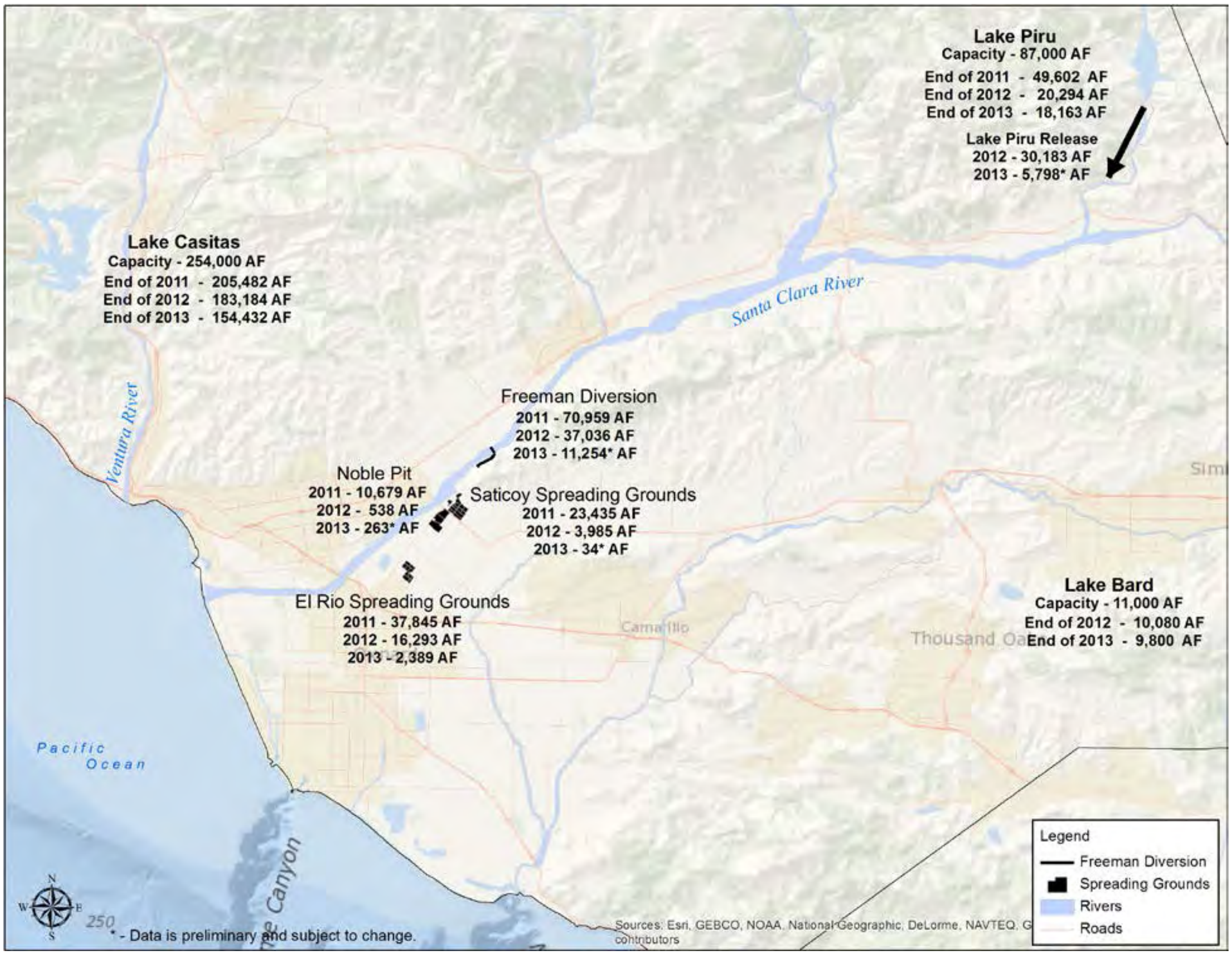


Figure 1-4: Map showing lake storage at the end of 2013 and Santa Clara River diversions.

1.2.3 – Groundwater

The majority of accessible groundwater is found in 32 groundwater basins within Ventura County. The groups of basins that make up the Santa Clara-Calleguas hydrologic unit contain the largest groundwater reserves in the County. The Groundwater Section of the Ventura County Watershed Protection District, the United Water Conservation District, dozens of individual water purveyors, and to a lesser extent the United States Geological Survey, all collect data to provide information concerning the status of groundwater in the County. Recharge of groundwater occurs naturally from infiltration of rainfall and river/streamflow, artificially through injection of imported water (Calleguas Municipal Water District) and spreading of diverted river water into recharge basins (United Water Conservation District).

Figure 1-5: Map showing groundwater basins in Ventura County.

Section 2.0

Duties and Responsibilities

2.1 – Well Ordinance
2.1.1 – Permits

The Groundwater Section issues permits for wells and engineering test holes throughout the County, except within the City of Oxnard. The Groundwater Section conditioned and issued 139 permits for wells and engineering test holes during calendar year 2013. Table 2-1 below shows the total number of permits issued for the year by type of permit. Figure 2-1 below shows the total number of permits issued per year for the period 2003 to 2013.

Table 2-1: Permits issued by type for calendar year 2013.

Type of Work	Engineering Test Hole	Monitoring Well – Destruction	Monitoring Well – New	Water Supply Well – New	Water Supply Well – Destruction	Water Supply Well - Repair	Cathodic Protection Well	**TOTAL**
Number 2013	19	31	21	43	15	8	2	139

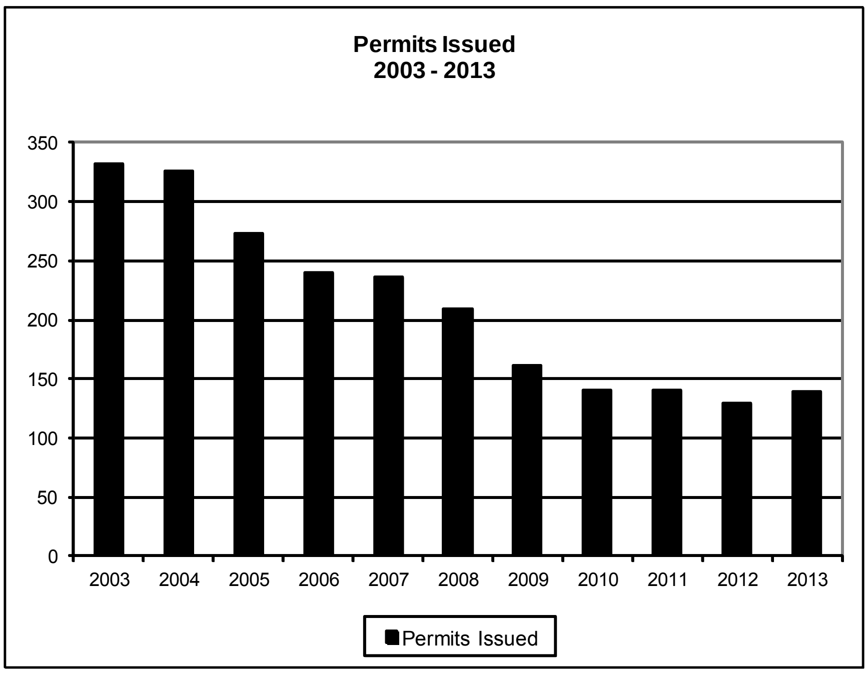


Figure 2-1: Permits issued for the period 2003 to 2013.

2.1.2 – Inspections

Groundwater Section staff perform inspections on all well perforation and sealing work for each new water supply well, well destruction, new cathodic protection well or destruction, and major modifications or repairs to existing water supply wells per the County's Well Ordinance. In 2013, staff performed 66 inspections throughout the County. Figure 2-2 on the following page shows the distribution of new well and well destruction locations inspected by Groundwater staff during 2013.

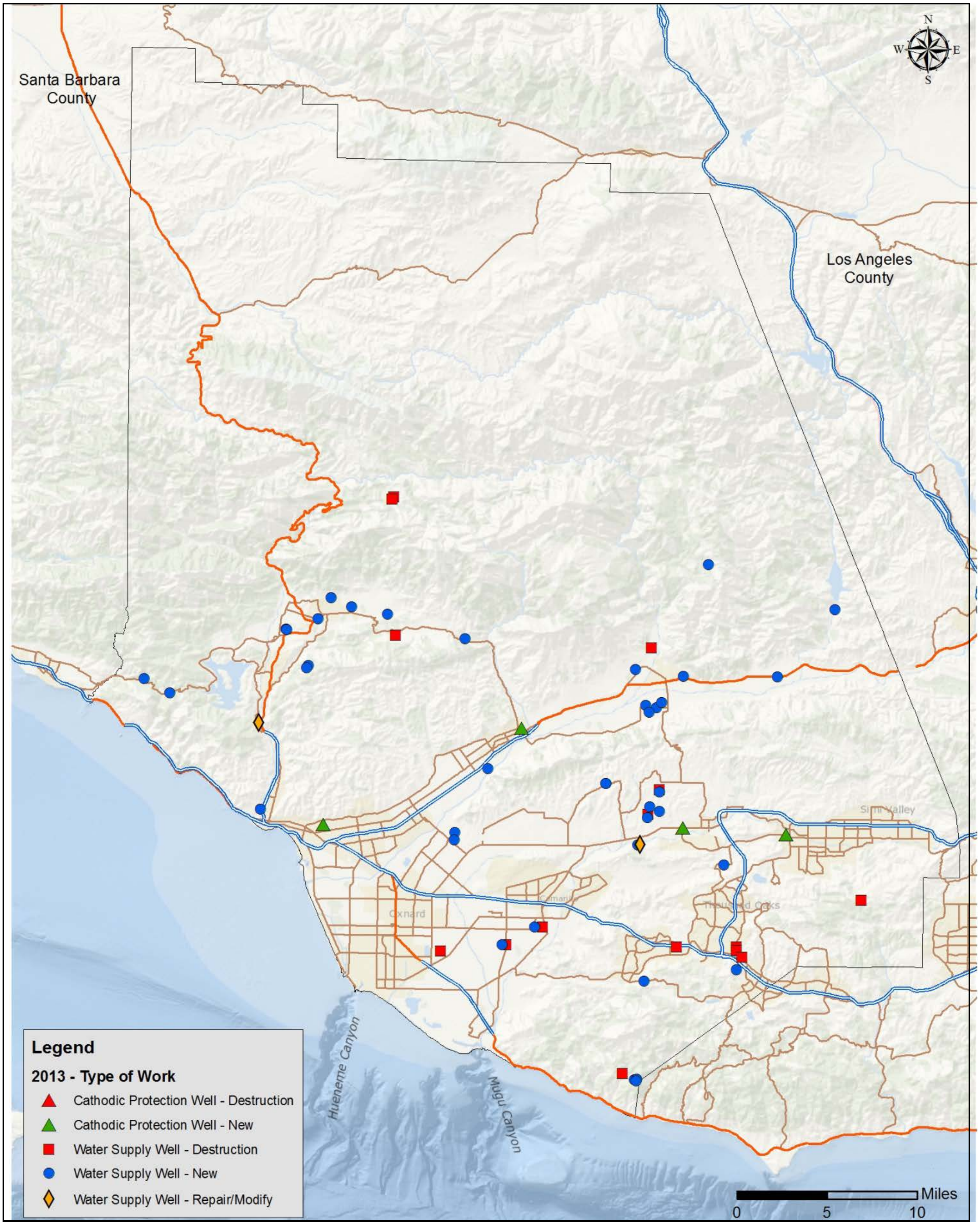


Figure 2-2: Location of well inspections in 2013.

2.2 – Inventory & Status of Wells

The Groundwater Section maintains an inventory of wells in a database that includes the status of all wells within Ventura County. The database contains details for wells of all types including water supply wells, long-term monitoring wells, cathodic protection wells, and also springs that were given a state well number. At the end of 2013 there were 8,913 well records in the database in the following categories.

2013 Status	Number
Active	3,885
Abandoned	419
Can't Locate	1,830
Non Compliant	93
Non Compliant Abandoned	146
Destroyed	2,526
Exempt	14

- Active wells are those wells that meet or exceed the minimum requirement of 8 hours pumping per calendar year as described in the County of Ventura Well Ordinance No. 4184.
- Abandoned wells are those wells that do not meet the 8 hour minimum usage requirement or are in a condition that no longer allows the well to be used.
- There are several reasons why a well may be listed as "Can't Locate". Generally, though, "Can't Locate" wells are old rural wells for which the Groundwater Section has historic well location data but the locations are now in areas that have subsequently been urbanized. The current owner of the property where the historical well was understood to be located may be unaware of the existence of a well on his/her property, or an approved search has been conducted and no well has been found.
- Non-Compliant wells are generally active wells where the owner of the well has failed to respond to written communication from the Groundwater Section.
- Non-Compliant Abandoned wells are those wells where the owner of an abandoned well has failed to respond to written communication from the Groundwater Section to take action on an inactive well. The County's Well Ordinance prohibits anyone from owning an abandoned well. Abandoned wells pose a safety risk and may also act as a potential pathway for contaminants to reach groundwater.
- Destroyed wells are wells that have been properly destroyed under permit.
- Exempt wells are wells that have been found to be in good enough condition to remain inactive for a period of 5 years before being re-activated or re-inspected. To be listed as exempt a well inspection report, from a registered geologist or civil engineer, and application fee must be submitted by the well owner to the Groundwater Section for review and approval.

Section 3.0
Groundwater Quality

3.1 – Water Quality Sampling

The Groundwater Section collects data and performs studies as needed for purposes of groundwater resource assessment and management. In 2013, Groundwater staff sampled a total of 174 wells throughout the county. All samples were analyzed for general minerals under the Irrigation Suitability suite (see Appendix Laboratory methods). Analyses were conducted by Fruit Growers Laboratory in Santa Paula. Title 22 metals were also analyzed on select samples under the Inorganic Chemical Suite and four samples were analyzed for Gross Alpha particles. Analytical results were entered into the Section's database and used to describe the chemistry of groundwater in the basins sampled. Complete results are listed in Appendix D, and interpretations are detailed in the following sub-sections. Wells sampled in the south half of the County are shown below in Figure 3-1. Wells sampled in the north half of the County are shown on the following page in Figure 3-2.

Additional groundwater quality data that was not used in this report is available from other sources, including data from water districts and agencies that collect and analyze groundwater samples for their own use. Organic groundwater chemistry data is also available for some areas of the county through the State Regional Water Quality Control Board's Geotracker website for environmental cleanup sites.

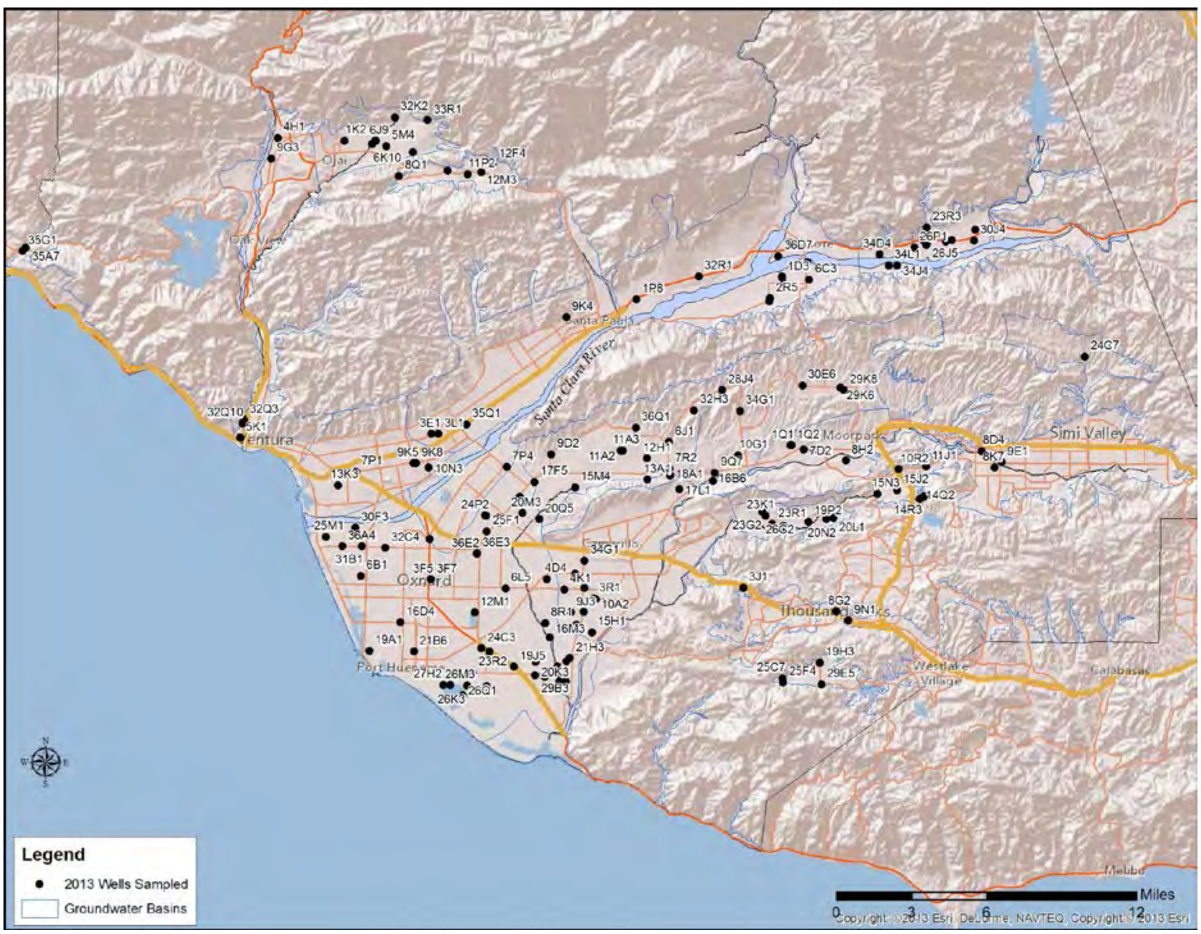


Figure 3-1: Map depicting sample locations for the south half of the County.

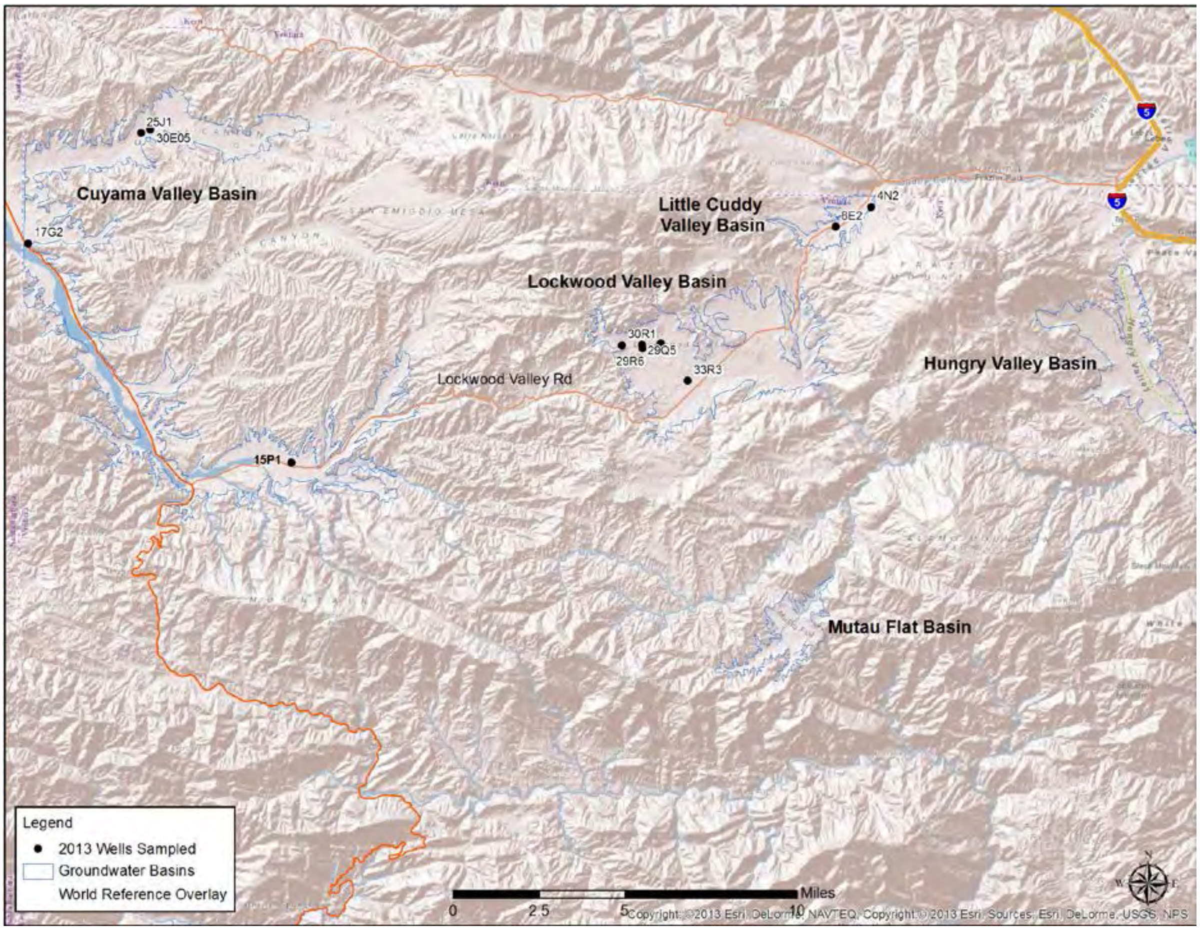


Figure 3-2: Map depicting sample locations for the northern half of the County.

3.2 – Current Conditions

A summary of the groundwater quality results for each groundwater basin sampled this year is included in this section. Basin summaries are presented in order from largest to smallest total available storage capacity as reported in California Department of Water Resources Bulletin No. 118. Ventura County groundwater, in general, has slightly high total dissolved solids and sulfate. Several areas are nitrate impacted (meaning Basin Management Water Quality Objectives for nitrate are exceeded).

The Groundwater Section has adopted the United States Environmental Protection Agency (EPA) National Drinking Water Regulations and California Code of Regulations (CCR) Title 22, Section 64431 (Table 3-1 below) for describing groundwater quality in Ventura County relative to maximum contaminant levels (MCL). National Primary Drinking Water Regulations, or primary standards, are legally enforceable standards that apply to public water systems. Primary standards protect public health by limiting the levels of contaminants in drinking water. Maximum contaminant level or MCL is the highest level of a contaminant allowed in drinking water by the United States Environmental Protection Agency. MCLs are set as close as feasible to the level that below which there is no known or expected health risk. National Secondary Drinking Water Regulations, or secondary standards, are guidelines for contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. The EPA recommends secondary standards to water systems but does not require systems to comply with the secondary standards. However, states may choose to adopt the secondary standards as enforceable standards. CCR, Title 22, Section 64431 lists MCLs for inorganic chemicals adopted by the State of California. In order to be certified as a permanent domestic or municipal water supply, water from wells located in the County of Ventura must meet these standards.

Table 3-1: U.S. Environmental Protection Agency Primary and Secondary Standards and California Code of Regulations, Title 22 Maximum Contaminant Levels (February 2012).

Primary Contaminants	Chemical Formula	EPA MCL (mg/l)	CCR, Title 22 MCL (mg/l)
Antimony	Sb	0.006	0.006
Arsenic	As	0	0.01
Asbestos		7 MFL[1]	7 MFL[1]
Barium	Ba	2	1
Beryllium	Be	0.004	0.004
Cadmium	Cd	0.005	0.005
Chromium	Cr	0.1	0.05
Copper	Cu	1.3	
Cyanide		0.2	0.15
Fluoride	F^-	4	2
Lead	Pb	0	
Mercury	Hg	0.002	0.002
Nitrate (as Nitrogen)	N	10	10
Nitrate[2]	NO_3^-		45
Nitrite (as Nitrogen)	N	1	1
Selenium	Se	0.05	0.05
Thallium	Tl	0.0005	0.002
Secondary Contaminants			
Aluminum[3]	Al	0.5 to 0.2	
Chloride	Cl^-	250	
Iron	Fe	0.3	
Manganese	Mn	0.05	
pH		6.5-8.5	
Silver	Ag	0.1	
Sulfate	SO_4^{2-}	250	
Total Dissolved Solids	TDS	500	
Zinc	Zn	5	

[1] MFL = Million fibers per liter longer than 10 um

[2] CCR, Title 22 standard for Nitrate reported as NO_3

[3] CCR, Title 22 lists Aluminum as a primary contaminant

One of the more widely used way to present water quality data graphically is the trilinear or piper diagram. The major ionic species in most natural waters are Na^+, K^+, Ca^{++}, Mg^{++}, Cl^-, CO_3^{2-}, HCO_3^-, and SO_4^{2-}. A piper diagram can show the percentage composition of three ions. By grouping Na^+ and K^+ together, the major cations can be displayed on one piper diagram. Likewise, if CO_3^{2-} and HCO_3^- are grouped, there are three groups of major anions. Figure 3-3 shows the form of a piper diagram that is commonly used in water-chemistry studies. Analyses are plotted on the basis of the percent of each cation or anion.

Each apex of a triangle represents 100 percent concentration of one of the three constituents. The diamond-shaped field between the two triangles is used to represent the composition of water with respect to both cations and anions. The first step in determining the water type is to convert the concentration of each anion or cation group in a sample to milliequivalents/L. Then calculate the percent of each. The percentage is then plotted on the appropriate piper diagrams. The position of the points are projected parallel to the magnesium and sulfate axes, respectively until they intersect in the center field (Fetter, 1988). Piper diagrams for each basin are located in Appendix D starting on pg. 135.

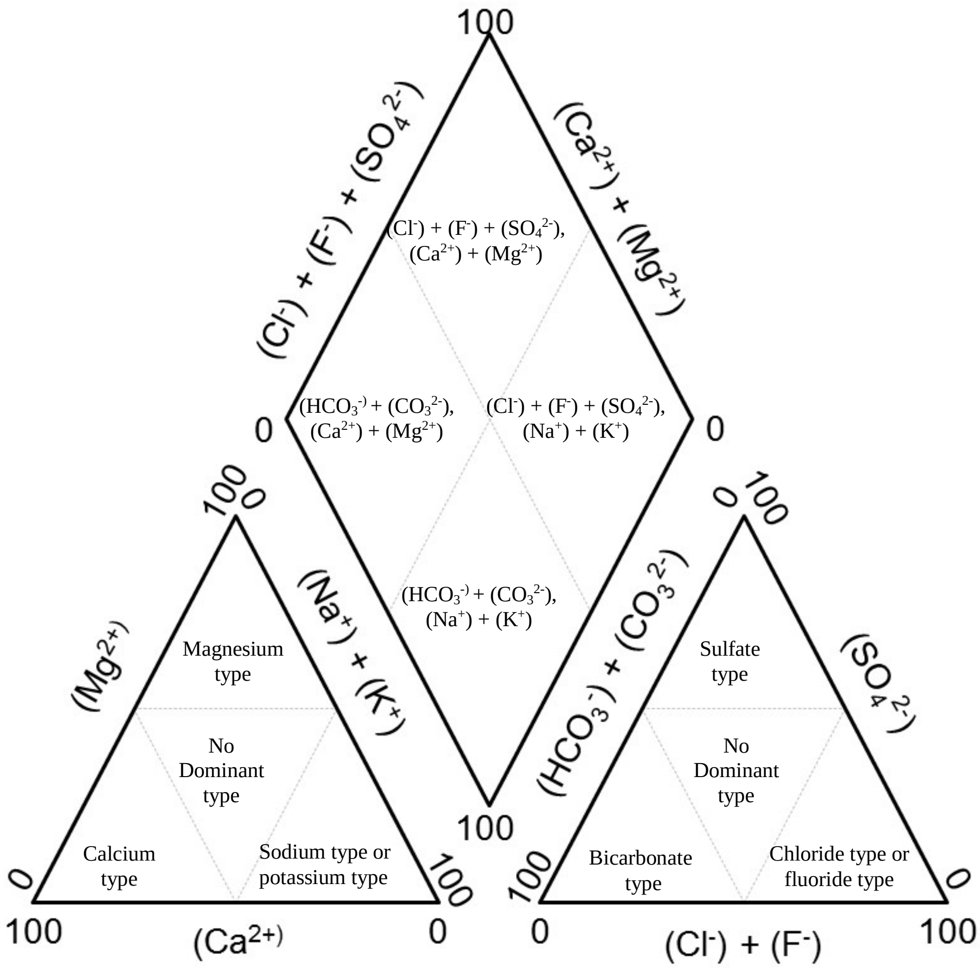


Figure 3-3: Example of a piper diagram. (USGS – Excel for Hydrology)

For example, the figure below shows a plot of the water quality from one of the wells that was sampled this year. The cation and anion triangles have different ion groups from the figure above, but the principle is the same. The cations plot as calcium type on the Cations triangle and the anions plot in the sulfate type on the Anions triangle. Positions of the points projected on to the diamond shaped center field shows the water is calcium magnesium, sulfate chloride fluoride water type.

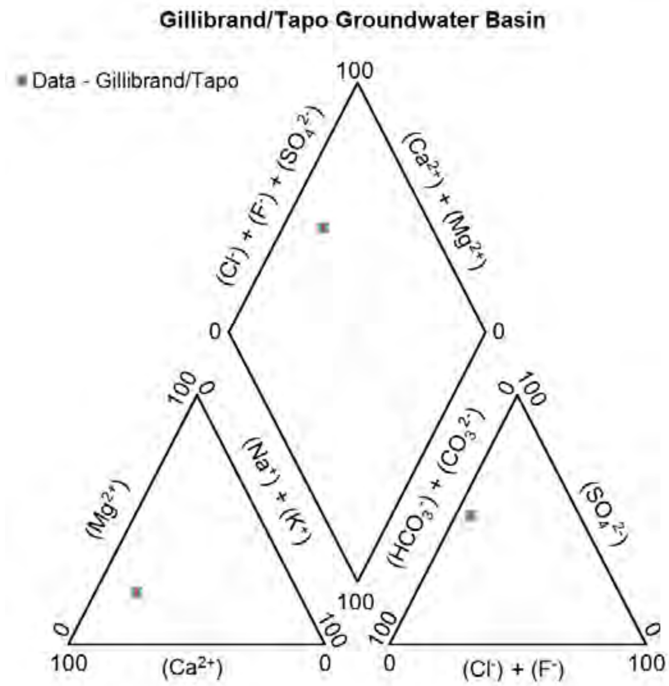


Figure 3-4: Piper diagram showing water quality of a well from Gillibrand/Tapo groundwater basin.

A second method to present results, a stiff diagram, is shown in Figure 3-5. The same cations and anions that are plotted in the piper diagrams are also shown in the stiff diagrams. The ions are plotted on either side of a vertical axis in milliequivalents per liter, cations on the left of the axis and anions on the right. The polygonal shape created is useful in making a quick visual comparison between water from different sources. Stiff diagrams for wells sampled this year are included on each basin map.

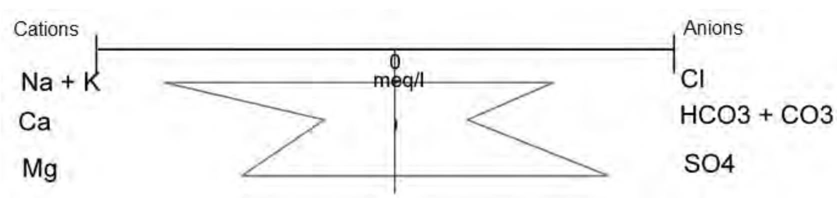


Figure 3-5: Example stiff diagram.

3.2.1 - Oxnard Plain Pressure Basin

The Oxnard Plain Pressure Basin is the largest and most complicated, hydraulically and hydrologically of the groundwater basins in Ventura County. The Oxnard Plain Pressure Basin consists of two major aquifer systems. The Upper Aquifer System (UAS) consists of the Perched, Semi Perched, Oxnard, and Mugu aquifers. Of the UAS aquifers, only the Oxnard and Mugu aquifers are sampled for water quality by the County. The Lower Aquifer System (LAS) consists of the Hueneme, Fox Canyon and Grimes Canyon aquifers. There are approximately 1560 water supply wells in the Oxnard Plain Pressure Basin; 499 are active. There are no wells perforated solely in the Grimes Canyon aquifer so the County cannot sample it specifically. The basin map in Figure 3-6 shows approximate well locations and (in call out boxes) concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Upper Aquifer System of the Oxnard Plain Pressure Basin. Figure 3-7 shows the same information for wells sampled in the Lower Aquifer System.

3.2.1.1 - Oxnard Aquifer (UAS)

The Oxnard aquifer is the shallowest of the confined aquifers. The Oxnard aquifer is the most developed production zone based on the number of wells. Average depth to the main water bearing material is 80 feet making it the easiest and least expensive aquifer in which to construct a water supply well. The piper diagram, Figure D-1 shows low variability in water quality of the wells sampled this year. There is no dominant cation; sulfate (SO_4^{2-}) is the major anion. The water is calcium magnesium, sulfate chloride fluoride type. Groundwater samples were collected from ten wells in the Oxnard Aquifer. A comparison of the stiff diagrams with those from the 2012 report shows no significant change in water quality.

Water from two of the wells has a concentration of iron (Fe) above the secondary MCL for drinking water. Samples from all ten of the wells have sulfate (SO_4^{2-}) above the secondary MCL for drinking water with an average value of 650 mg/L. Total dissolved solids (TDS) ranged from 1080 to 2850 mg/l with an average value of 1471 mg/l. Water from two of the wells sampled had nitrate (NO_3^-) concentrations above the primary MCL for drinking water. Samples from two wells were analyzed for inorganic chemicals (Title 22 metals). One sample had a selenium concentration above the MCL for drinking water; all other inorganic constituents were below the primary MCL for drinking water.

Groundwater plumes with elevated nitrate concentrations are common in the northern portion of the basin. Sources of nitrate are nitrogen based fertilizers in agricultural areas and septic systems in residential areas.

3.2.1.2 - Mugu Aquifer (UAS)

The Mugu aquifer is the lowest layer of the UAS and has similar physical and chemical characteristics to the Oxnard Aquifer, but has slightly better water quality, in part, because with increasing depth contaminants are generally less likely to infiltrate. This is shown graphically in the piper diagram, Figure D-2, and stiff diagram Figure 3-6. Average depth to the main water bearing material is 200 ft. Three wells that are perforated only in the Mugu aquifer were sampled. TDS ranges from 989 to 1110 mg/l with an average of 1050 mg/l. The piper diagram, Figure D-2, shows low variability in water quality of the wells sampled this year. There is no dominant cation; sulfate (SO_4^{2-}) is the major anion. The water is calcium magnesium, sulfate chloride fluoride type. All three wells sampled have sulfate concentrations above the secondary MCL for drinking water, two wells have iron concentrations above the secondary MCL and no well had nitrate above the primary MCL. No water sample from a well perforated solely in the Mugu was analyzed for inorganic chemicals (Title 22 metals).

Figure D-3, piper diagram shows water chemistry of wells that are screened in both the Oxnard and Mugu aquifers. It shows moderate variability in water quality of the wells sampled this year. There is no dominant cation; sulfate (SO_4^{2-}) is the dominant anion in four of the samples and there is no dominant anion for one sample. The water is calcium magnesium, sulfate chloride fluoride type. The piper diagram, Figure D-4, shows a comparison of all the wells sampled in the UAS. Two of the wells screened in the Oxnard aquifer have slightly higher calcium concentrations and one of the cross screened samples has a lower sulfate concentration.

OXNARD PLAIN PRESSURE BASIN
Upper Aquifer System

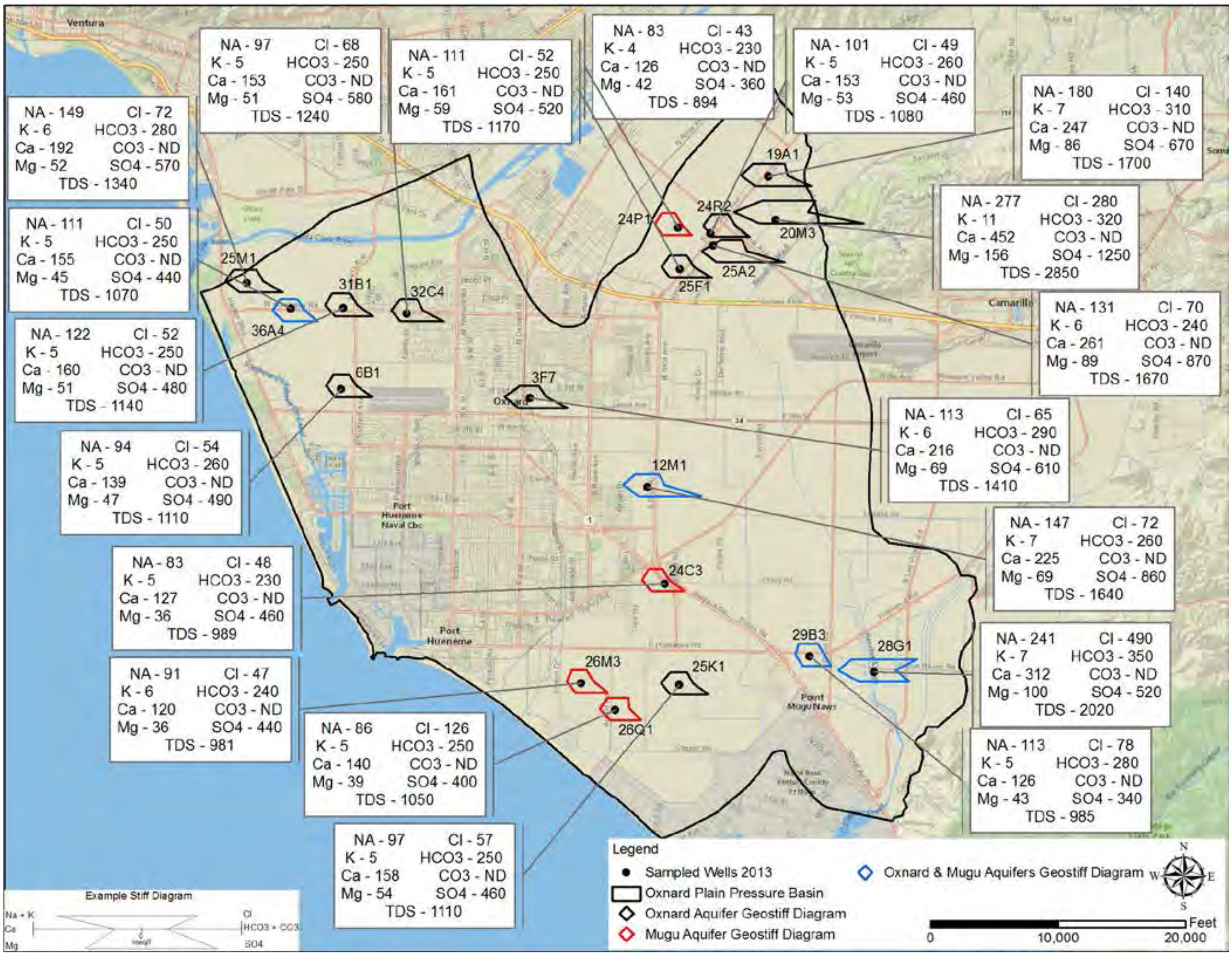


Figure 3-6: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams for each aquifer.

3.2.1.3 - Hueneme Aquifer (LAS)

The Hueneme aquifer is the shallowest of the Lower Aquifer System aquifers with depth to the main water bearing material approximately 375 feet. Very few wells are perforated exclusively in the Hueneme aquifer, making an accurate determination of water quality for the aquifer difficult. The historical average TDS concentration is 1180 mg/l. Three wells screened solely in the Hueneme were sampled this year. Figure D-5, piper diagram, shows low variability in water quality of the wells sampled this year. There is no dominant cation; sulfate (SO_4^{2-}) is the major anion. The water is calcium magnesium, sulfate chloride fluoride type. All three have elevated TDS and SO_4^{2-} concentrations compared to the secondary MCL for drinking water. Overall, water quality has not changed significantly since the previous round of sampling.

3.2.1.4 - Fox Canyon Aquifer (LAS)

The Fox Canyon aquifer is the second most developed production zone in the Oxnard Plain Pressure Basin based on the number of wells and depth of perforations. Depth to the main water bearing material is approximately 580 feet. The Fox Canyon aquifer generally has excellent water quality and high yield rates, but is subject to seawater intrusion near Point Mugu and the Hueneme Submarine Canyon. Extractions are monitored and allocated by the Fox Canyon Groundwater Management Agency in order to mitigate aquifer overdraft and reduce the intrusion of seawater. The piper diagram, Figure D-6, shows moderate variability in water quality of the wells sampled this year. Sodium and potassium are the dominant cations in one sample. There is no dominant cation in the remainder of the samples. Sulfate is the dominant anion in the majority of the samples but one sample has bicarbonate as the dominant anion and the remaining two samples have no dominant anion. One water sample is calcium magnesium bicarbonate type, one sample is sodium potassium, bicarbonate type and the remainder are calcium magnesium, sulfate chloride fluoride type. Of the wells perforated solely in the Fox Canyon Aquifer that were sampled this year, TDS concentrations varied from 563 mg/l to 957 mg/l with an average TDS of 807 mg/l and six water samples have iron, manganese, and sulfate concentrations above the secondary MCL for drinking water. Five samples were analyzed for inorganic chemicals (Title 22 metals). The concentrations of all inorganic constituents were below the MCL for drinking water.

Nine of the Oxnard Plain Pressure Basin wells that were sampled this year are perforated in both the Hueneme aquifer and the Fox Canyon aquifer and will be referred to as the LAS wells. Results for those wells are included in Appendix D and shown in blue on the map of the Lower Aquifer System (LAS) Figure 3-7. The piper diagram, Figure D-7, shows moderate variability in water quality of the wells sampled this year. Sodium and potassium are the dominant cations in two samples with no dominant cation in the remainder. There is no dominant anion in four samples with sulfate as the dominant anion in the remainder of the samples. Two water samples are sodium potassium, sulfate chloride fluoride type and the remainder are calcium magnesium, chloride + fluoride + sulfate type. TDS concentration of water from these wells varies between 834 mg/l and 1080 mg/l with an average of 955 mg/l for wells sampled this season. Samples from three LAS wells have iron concentrations above the secondary MCL for drinking water, four have manganese above the secondary MCL for drinking water, and six have sulfate above the secondary MCL. Water samples from five of the LAS wells were analyzed for inorganic chemicals (Title 22 metals). All inorganic constituents were well below the primary MCL for drinking water.

Aerial photo showing the extent of the Oxnard Pressure Plain groundwater basin.

OXNARD PLAIN PRESSURE BASIN
Lower Aquifer System

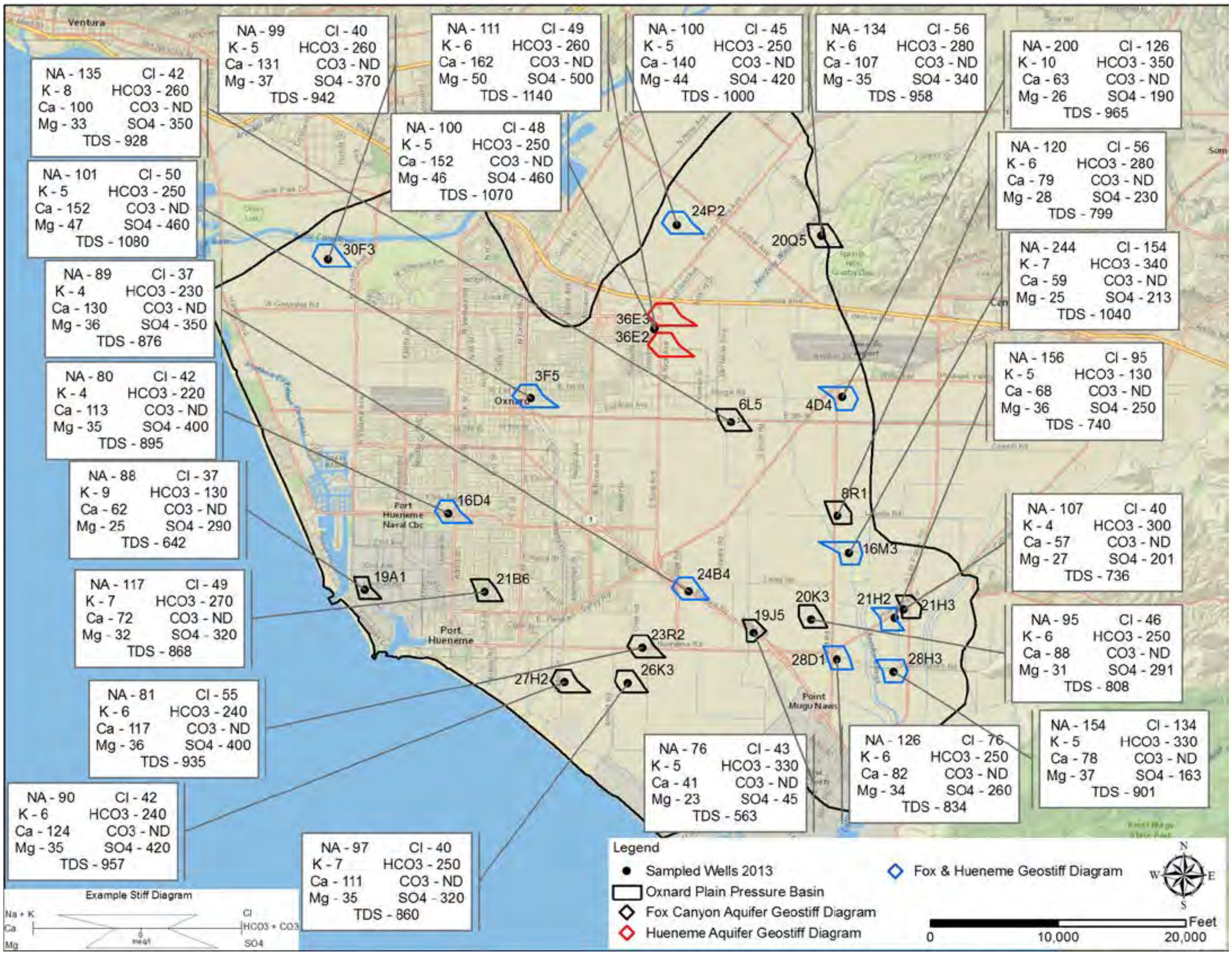
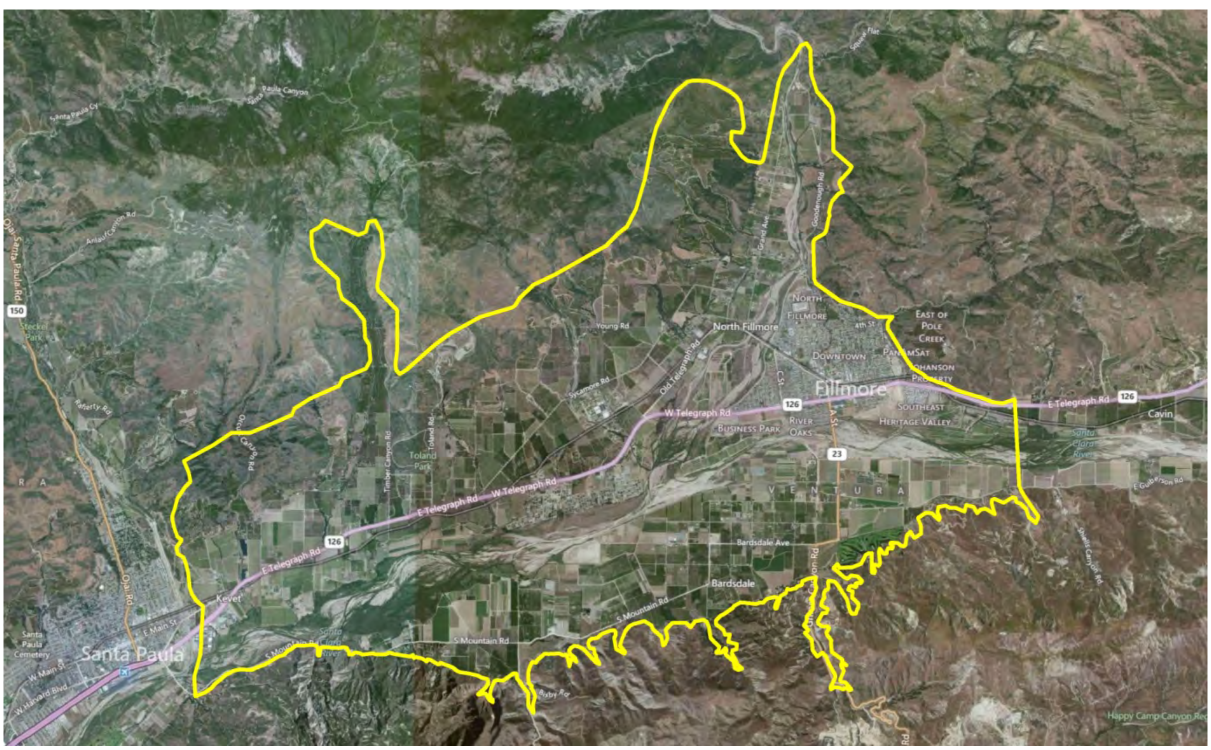


Figure 3-7: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

3.2.2 - Fillmore Basin

The Fillmore Basin, though small in geographic area, has a total aquifer thickness of almost 8,000 feet in some places. Despite the depth of the basin, County records indicate that water wells are generally no deeper than approximately 950 feet. Water quality can vary greatly depending on depth of the well. Shallow groundwater is generally younger and recharged by river flows with varying chemistry. Deeper groundwater is older and has acquired its chemistry through dissolution of constituents from the surrounding sediments. There are approximately 706 water supply wells in the Fillmore Basin; 450 are active. Historically, nitrate (NO_3^-) concentrations have been elevated because of extensive use of fertilizers and septic system discharges, but of the ten wells sampled this year only two showed elevated NO_3^- concentration relative to the primary MCL for drinking water. The piper diagram, Figure D-9, shows low variability in water quality of the wells sampled this year. The dominant cation for three samples is calcium; there is no dominant cation for the remainder of the samples. Sulfate is the major anion. The water is calcium magnesium, sulfate chloride fluoride type. Groundwater samples from all ten wells are above the secondary MCL for drinking water for sulfate (SO_4^{2-}). TDS ranges from 1040 mg/l to 3190 with an average for the wells sampled this year of 1645 mg/l, well above the secondary MCL for drinking water. Water samples from three wells were analyzed for inorganic chemicals (Title 22 metals). All inorganic constituents are below the primary MCL for drinking water. One well was analyzed for gross alpha. Gross alpha was above the MCL for drinking water so the water sample was further analyzed for uranium and the well was found to be in compliance with drinking water standards for radionuclides. Water quality tends to become poorer to the south east portion of the basin in the vicinity of the Oak Ridge fault. Figure D-9 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Fillmore Basin.



Aerial photo showing the extent of the Fillmore groundwater basin.

FILLMORE BASIN

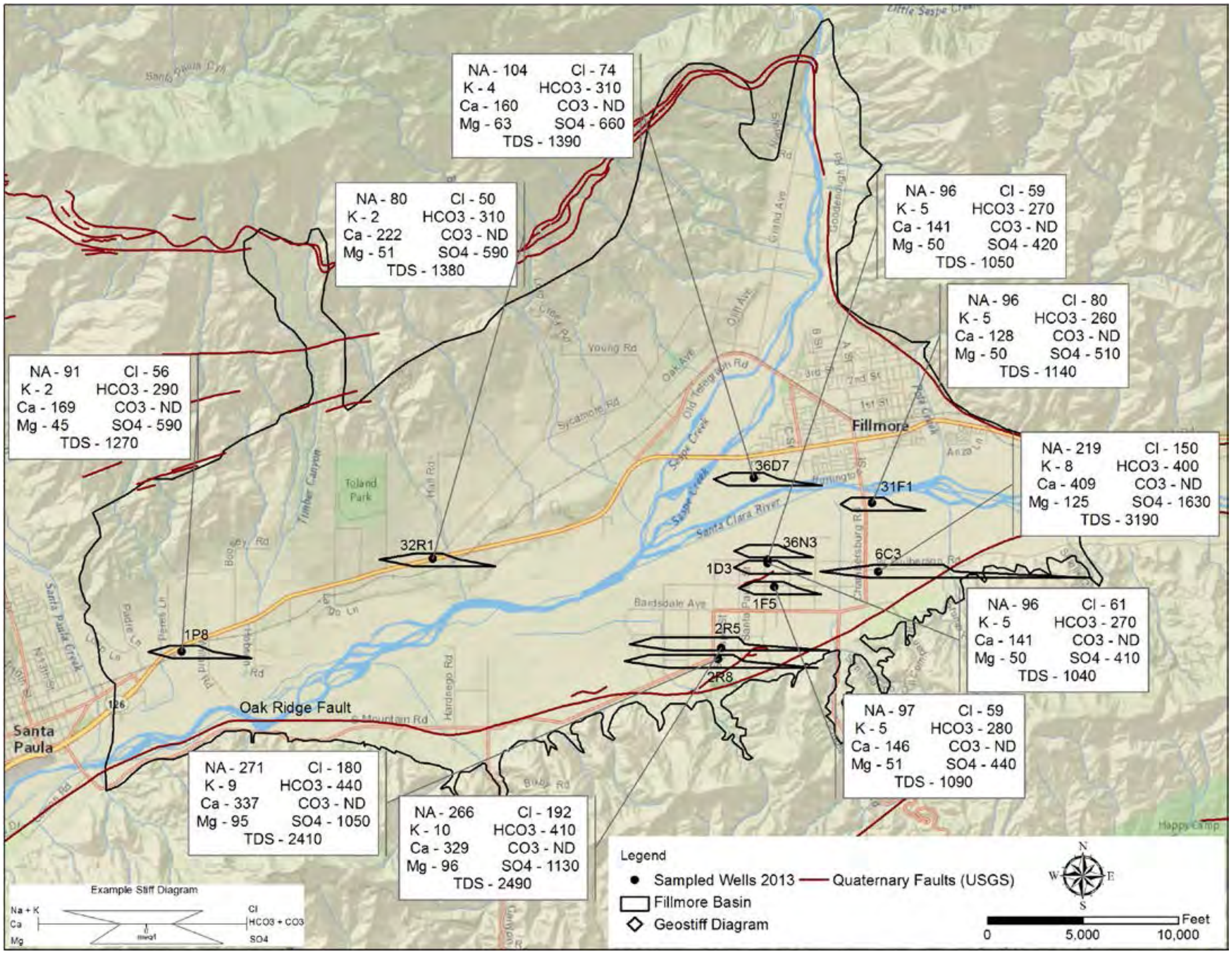


Figure 3-8: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

3.2.3 - Santa Paula Basin

The Santa Paula Basin is a court adjudicated groundwater basin. In an effort to prevent overdraft, a June 1991 judgment ordered the creation of the Santa Paula Basin Pumpers Association (SPBPA). The SPBPA regulates extractions in the Santa Paula Basin. The judgment stipulated an allotment of 27,000 acre-feet per year could be pumped from the basin. Water quality in the basin has not changed substantially since 2007. The depth to the water bearing material is 65 to 160 feet. There are approximately 364 water supply wells in the Santa Paula Basin; 164 are active. Figure D-10, piper diagram, shows low variability in water quality of the wells sampled this year. There is no dominant cation; sulfate is the major anion. The water is calcium magnesium, sulfate chloride fluoride type. TDS concentrations for water in the four wells sampled vary from 1050 to 2740 mg/l, with an average value of 2063 mg/l for wells sampled this season; all above the current secondary MCL for drinking water. Water samples from all the wells have concentrations above the secondary MCL for sulfate and manganese and three have concentrations above the secondary MCL for iron. Water samples from two agricultural wells were analyzed for inorganic chemicals (Title 22 metals). The concentrations of all inorganic chemicals were below the primary MCL. Figure 3-9 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium(Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Santa Paula Basin.

Figure D-12, piper diagram, compares water samples from the up-gradient Piru and Fillmore Basins to the Santa Paula Basin. The water chemistry is similar.

Aerial photo showing the extent of the Santa Paula groundwater basin.

SANTA PAULA BASIN

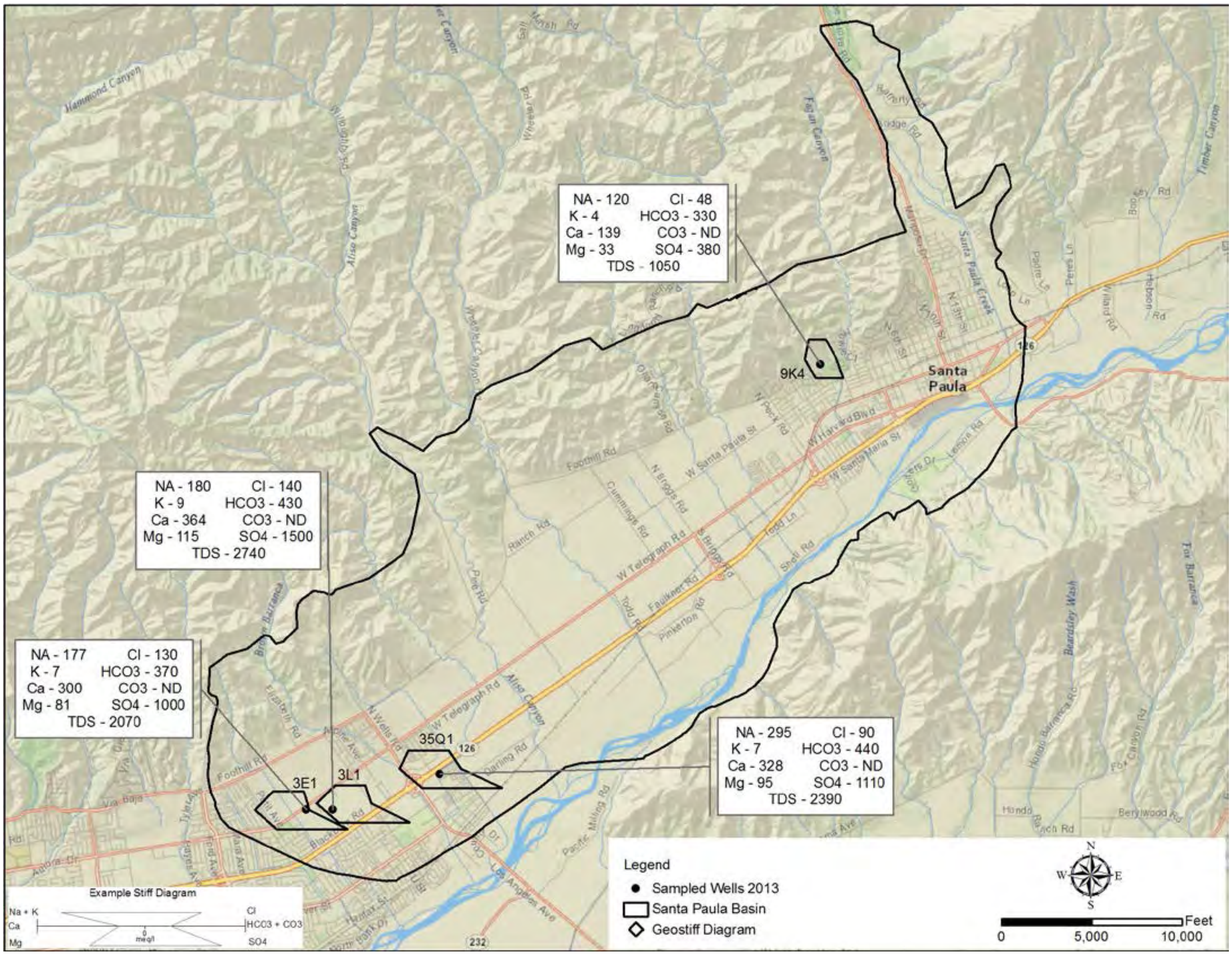


Figure 3-9: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

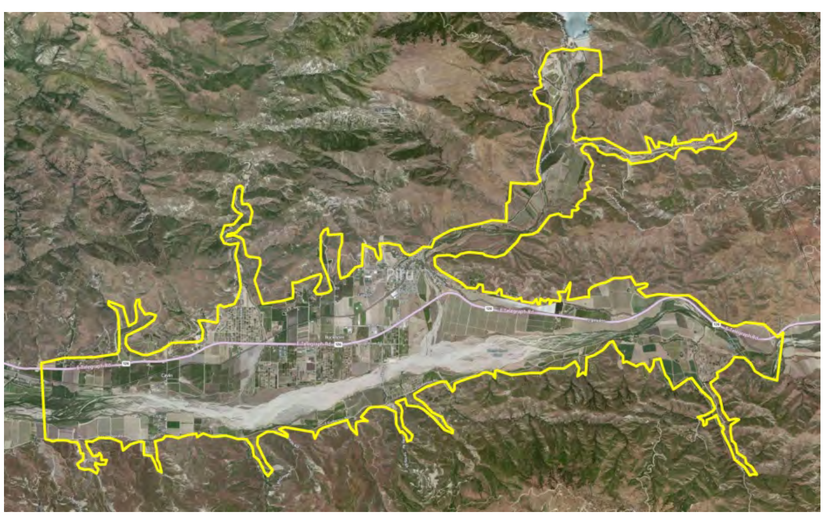
3.2.4 – Piru Basin

The Piru Basin groundwater recharge is principally from precipitation, releases of water by United Water Conservation District from Lake Piru, and the Santa Clara River. Flow from the Santa Clara River enters the basin from the east and carries discharges from wastewater treatment plants and urban and stormwater runoff from Los Angeles County. There are approximately 236 water supply wells in the Piru Basin; 163 are active. Depth to the main water bearing material is approximately 30 to 90 feet. The Los Angeles Regional Water Quality Control Board (LARWQCB) has adopted a Basin Plan Amendment that includes a Total Maximum Daily Load (TMDL) of 117 mg/l for chloride (Cl^-) in surface water and 150 mg/l in groundwater for the stretch of the Santa Clara River in Ventura County east of Piru Creek.

Fifteen wells were sampled in the Piru Basin during this round of sampling. None of the groundwater sampled has a Cl^- concentration above the chloride TMDL. The piper diagram, Figure D-11, shows moderate variability in water quality of the wells sampled this year. There is no dominant cation. There is no dominant anion for three of the samples; sulfate is the major anion for the remainder. The water is calcium magnesium, sulfate chloride fluoride type. The TDS concentration of the water sampled this season varies from 781 to 2270 mg/l with an average of 1435 mg/l with all wells above the secondary MCL for drinking water; three wells have concentrations significantly above 2000 mg/l. Water samples from fourteen wells have sulfate (SO_4^{-2}) concentrations greater than the secondary MCL for drinking water and four have manganese (Mn) concentrations greater than the secondary MCL. Figure 3-10 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}).

Water samples from all fourteen wells were analyzed for inorganic chemicals (Title 22 metals). Three wells in the Piru Basin located south of Highway 126 have consistently been found to have selenium levels that exceed the primary MCL for drinking water of 0.05 mg/l (50 µg/l). Elevated selenium concentrations occur in those wells perforated in the interval between approximately 125 to 250 feet below ground surface. A well located north of Highway 126 and perforated at a similar elevation does not have high selenium. Owners of the wells have been notified by Ventura County Environmental Health Department about possible adverse health effects from ingestion of water containing selenium.

Radiochemistry analysis was completed on water from two of the wells. Gross alpha was below the primary MCL for drinking water.



Aerial photo showing the extent of the Piru groundwater basin.

PIRU BASIN

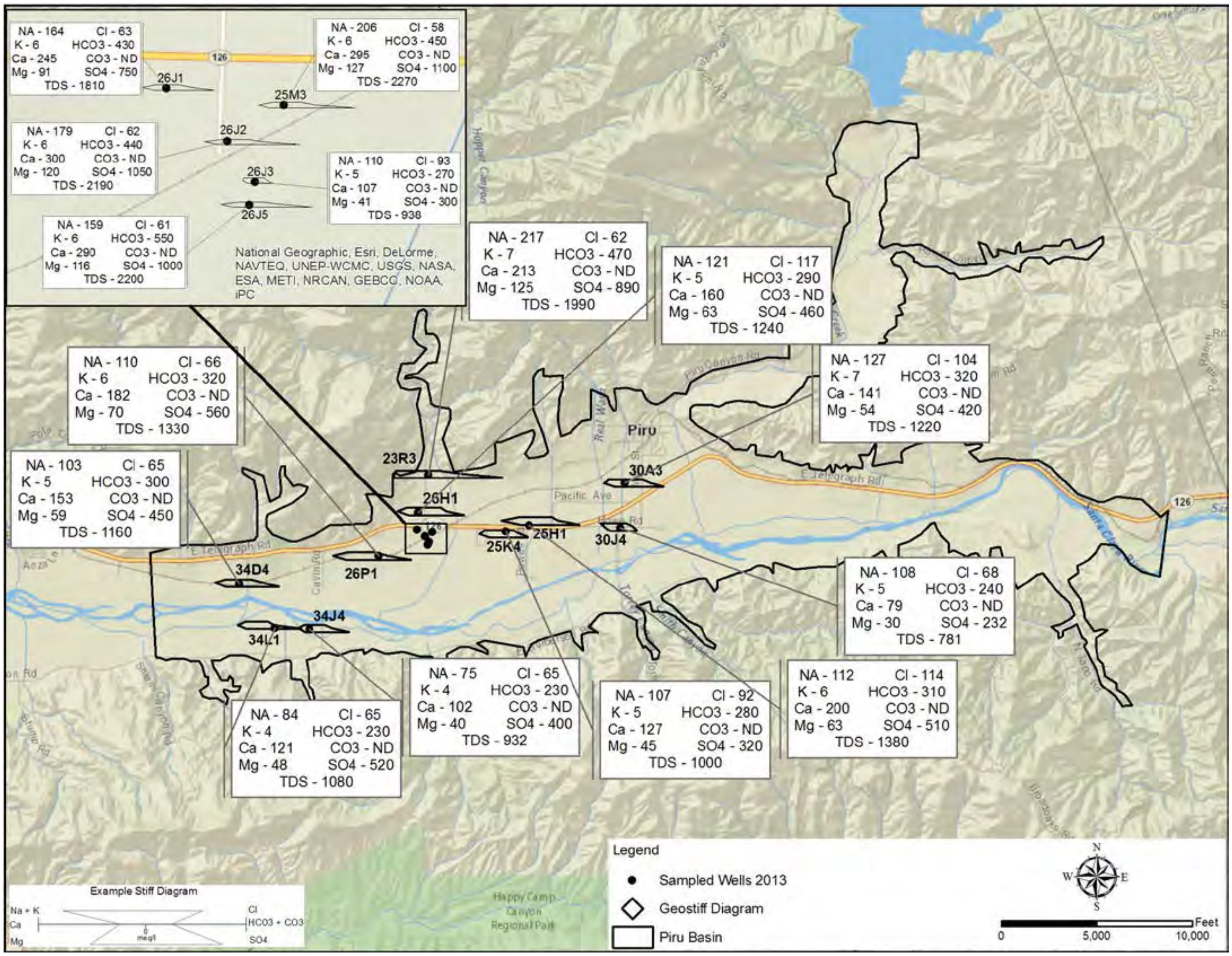
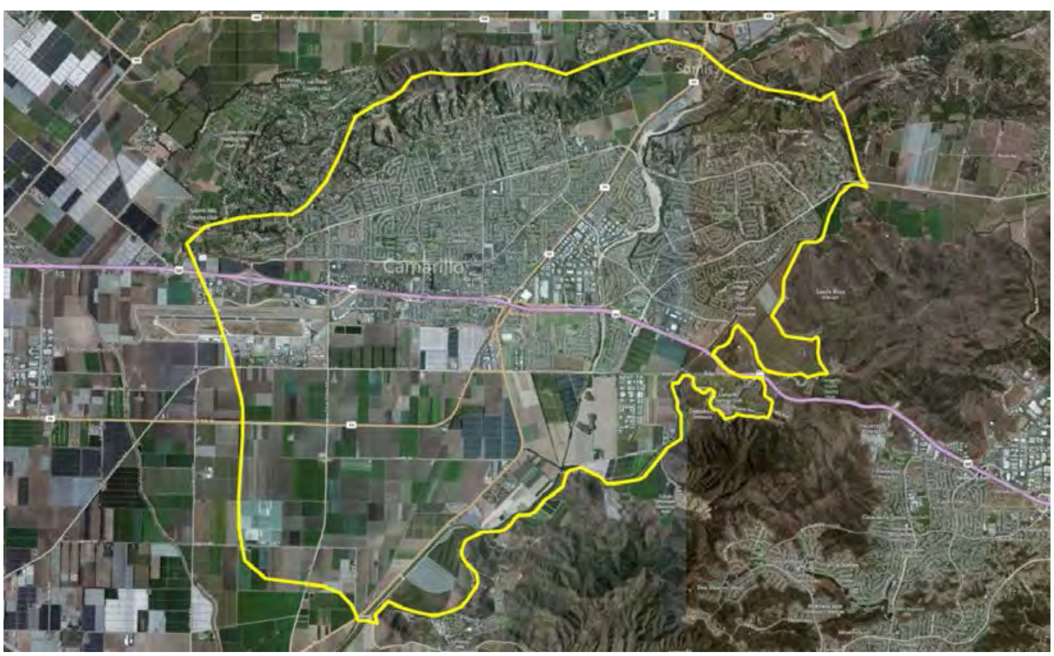


Figure 3-10: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

3.2.5 - Pleasant Valley Basin

In the Pleasant Valley Basin groundwater quality can vary greatly throughout the basin. The upper-most groundwater bearing unit at 35 to 60 feet is not used because the water quality is very poor. Permeable lenses of alluvial sands, gravels, silts, and clays of recent to Upper Pleistocene age that vary in thickness from a few feet to several hundred feet are equivalent to but not connected with the Oxnard Aquifer and are referred to here as the Shallow zone. Depth to the main water bearing unit is approximately 400 to 500 feet. This deeper zone is referred to in this section as the Lower Zone. It is made up of marine sands and gravels of the lower-most member of the early Pleistocene San Pedro Formation and is known as the Fox Canyon Aquifer. The Grimes Canyon aquifer underlies the Fox Canyon aquifer at depths below 1000 feet and is penetrated by only the deepest wells. There are approximately 476 water supply wells in the Pleasant Valley Basin; 86 are active. Eleven wells were sampled during this round of sampling. The piper diagram, Figure D-13, shows moderate variability in water quality of the wells sampled this year. Calcium is the dominant cation for one of the samples, sodium plus potassium is the dominant cation group for 3 wells and there is no dominant cation for the remainder. There is no dominant anion for six of the samples; sulfate is the major anion for the remainder. The water is calcium magnesium, sulfate chloride fluoride type. TDS concentrations vary from 784 to 4440 mg/l with an average of 1585 mg/l. Ten of the wells have sulfate (SO_4^{2-}) concentrations above the secondary MCL for drinking water with an average of 594 mg/l. Two water samples have iron (Fe) concentrations above the secondary MCL for drinking water and five have manganese (Mn) concentrations above the secondary MCL. Chloride (Cl^-) concentrations are above 117 mg/l in water samples from all except two wells with an average value of 215 mg/l. Samples from two wells have Cl^- concentrations above the secondary MCL for drinking water, but the LARWQCB Basin Plan indicates that agricultural beneficial uses are impaired when the concentration is above 117 mg/l. Two wells sampled this year were perforated solely in the shallow zone and have the poorest water quality; the highest sulfate, chloride and TDS concentrations. Water samples from four wells were analyzed for inorganic chemicals (Title 22 metals). No inorganic chemical was above the primary MCL for drinking water. Figure 3-11 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}).



Aerial photo showing the extent of the Pleasant Valley groundwater basin.

PLEASANT VALLEY BASIN

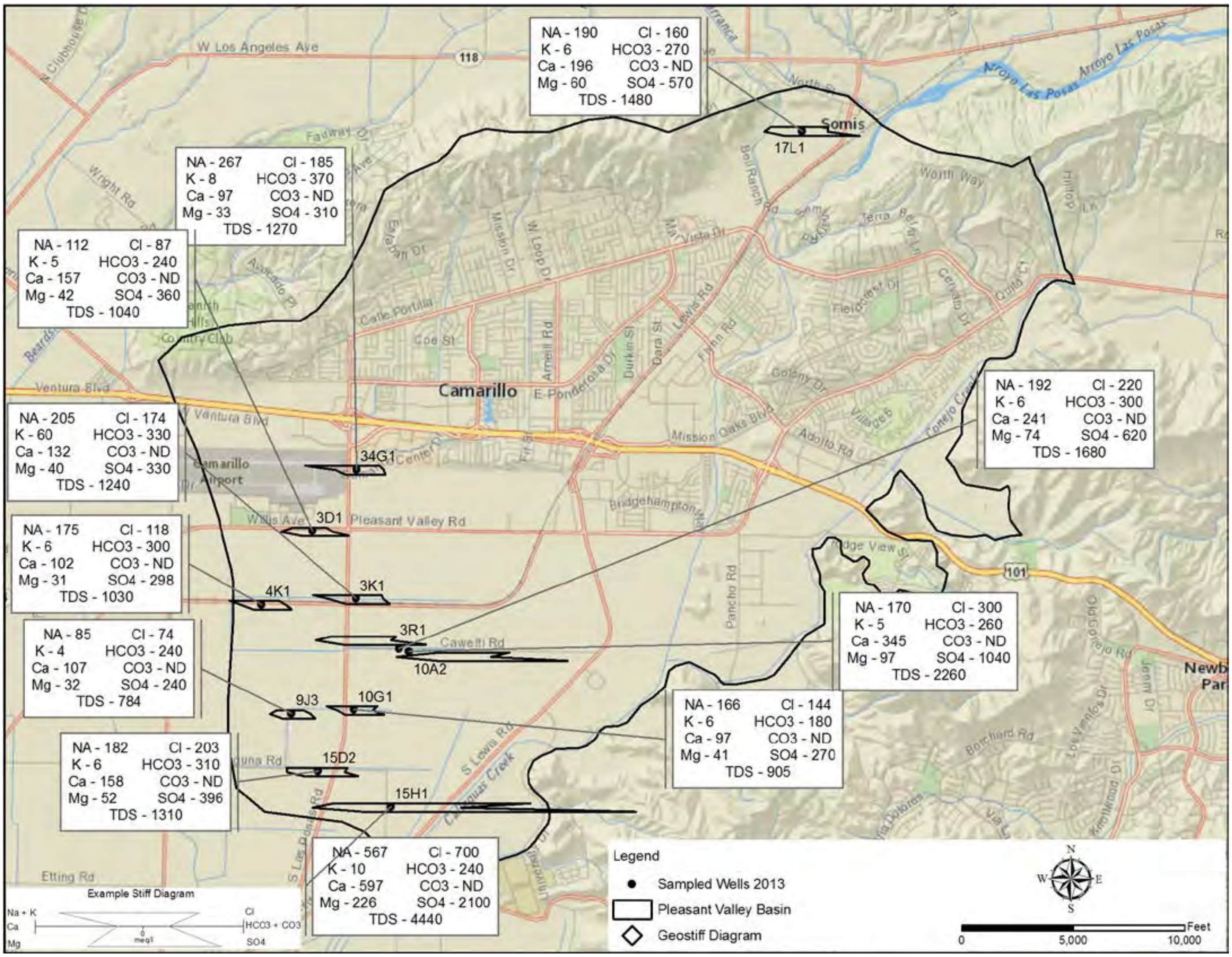


Figure 3-11: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

3.2.6 - Mound Basin

The Mound Basin water bearing units consist of Quaternary alluvium and the San Pedro Formation. These formations are divided into the Upper Aquifer System (UAS) and the Lower Aquifer System (LAS). The UAS consists of undifferentiated Holocene alluvium that make up the Oxnard aquifer and older Pleistocene alluvium that makes up the Mugu Aquifer. The alluvium consists of silts and clays with lenses of sand and gravel and reaches a maximum thickness of about 500 feet. The LAS consists dominantly of fine sands and gravels of the San Pedro Formation and extends as deep as 4,000 feet. The upper part of the San Pedro formation consists of variable amounts of clay, silty clay and sand. A series of inter-bedded water-bearing sands in this section are time equivalent to the Hueneme aquifer of the Oxnard Basin. The lower part of the San Pedro formation consists primarily of sand and gravel zones with layers of clay and silt and is known as the Fox Canyon aquifer in the Oxnard plain and extends into the Mound Basin. Groundwater is generally unconfined in the alluvium and confined in the San Pedro Formation. Historic water quality data for the basin shows that water quality is generally better in the lower zone but our data does not show that this year. Two wells sampled this year that are perforated in the LAS, much deeper than the others, have slightly better quality, but not significantly better. There are approximately 143 water supply wells in the Mound Basin; 26 are active water supply wells. Figure D-14, piper diagram, shows low variability in water quality of the wells sampled this year. There is no dominant cation; sulfate is the dominant anion. The water is calcium magnesium, sulfate chloride fluoride type. The average TDS concentration for the five wells sampled this year is 1626 mg/l; all above the secondary MCL for drinking water. Sulfate concentration is greater than the secondary MCL for drinking water in all five wells sampled, iron is above the secondary MCL in one well, and manganese is above the secondary MCL in four of the wells sampled. A water sample from one well was analyzed for inorganic chemicals (Title 22 metals). All inorganic constituents were below the primary MCL for drinking water. Water quality of the wells sampled in the Mound Basin is similar to that in the Santa Paula Basin. Figure 3-12 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}).

Aerial photo showing the extent of the Mound groundwater basin.

MOUND BASIN

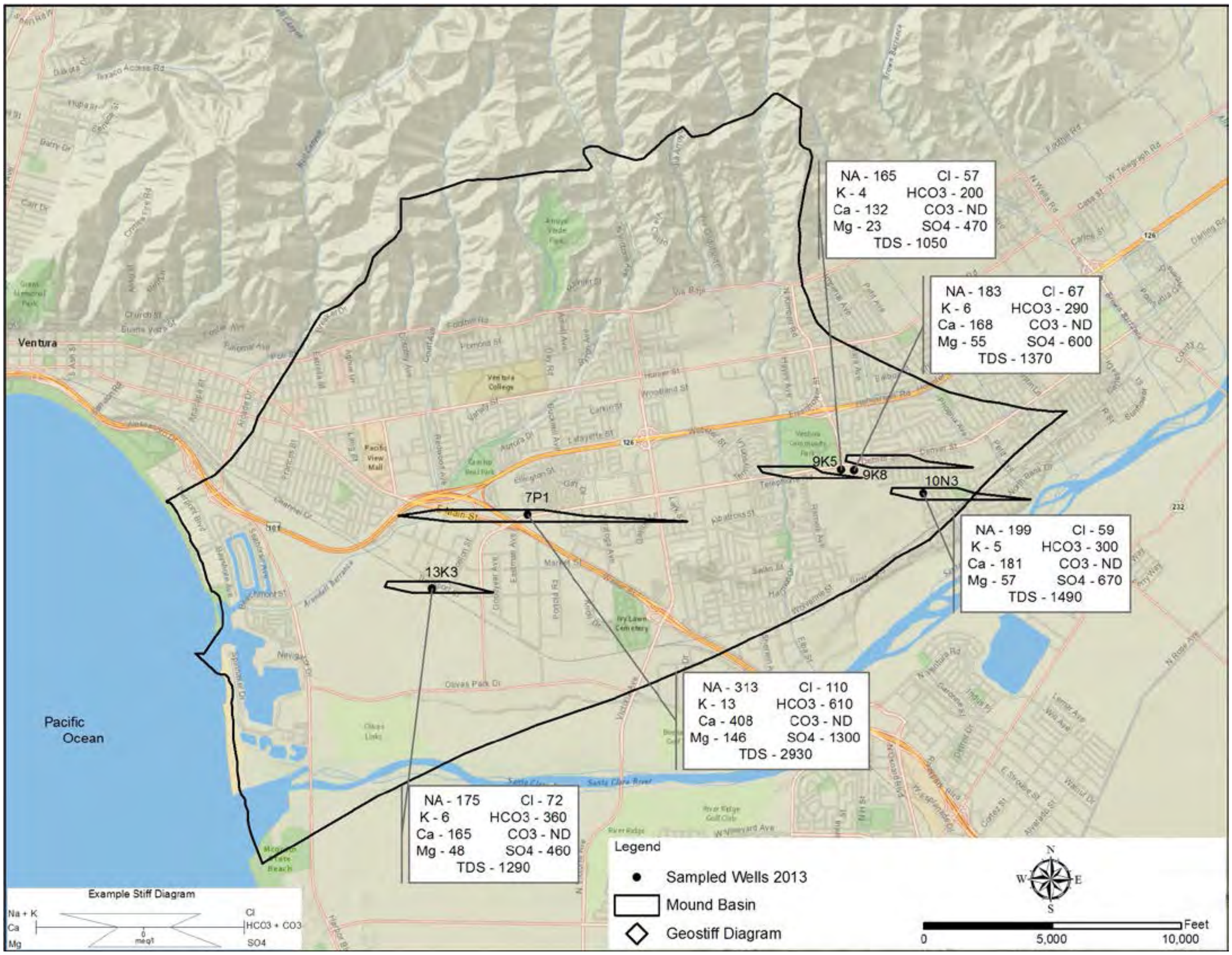


Figure 3-12: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagram.

3.2.7 - East Las Posas Basin

Water bearing material of the East Las Posas Basin consists of Recent and Pleistocene alluvial deposits of varying thickness. Water bearing material consists primarily of sand or a mixture of sand and gravel identified as the Fox Canyon Aquifer in this basin and is the basal member of the Pleistocene age, San Pedro Formation (Stokes, 1971). The Fox Canyon aquifer is generally considered to be confined in the East Las Posas Basin. However data indicates the Fox Canyon Aquifer receives recharge from leakage from aquifers located above it (FCGMA 2007 Basin Management Plan). The exact hydrogeologic connectivity is not well understood. Depth to the upper water bearing unit is approximately 120 to 150 feet and to the lower unit is approximately 530 to 580 feet. There are approximately 296 wells in the East Las Posas Basin; 142 are active water supply wells. Figure D-15, piper diagram, shows moderate variability in water quality of the wells sampled this year. Calcium is the dominant cation for four of the wells sampled; there is no dominant cation for the remainder. Bicarbonate is the dominant anion for four of the wells sampled; sulfate is the dominant anion for three of the wells and one well has no dominant anion. The water in half the wells sampled is calcium magnesium, sulfate chloride fluoride type and the other half are calcium magnesium, bicarbonate type. Of the seven wells sampled in the East Las Posas Basin, the three wells located in the southwest portion of the basin near the Arroyo Las Posas, have very different water chemistry from the other four. TDS, sulfate and manganese are above the secondary MCL for drinking water in all three southwestern wells and they are the only ones that plot as sulfate type on the piper diagram. The remainder of the wells have good water quality with an average TDS of 486 mg/l. Water from two wells was analyzed for inorganic chemicals (Title 22 metals). No inorganic constituent was above the primary MCL for drinking water. Figure D-18, piper diagram, shows a comparison of East, West, and South Las Posas water chemistry. There is moderate variability in the water quality of the combined basins. All three basins have the same water types but South Las Posas Basin has higher average calcium, sodium, and sulfate concentrations. The water chemistry of East and West Las Posas Basins is fairly similar, even though, based on the sharp change in water level between the East Las Posas and West Las Posas basins, the degree of hydrologic connection appears to be somewhat limited. Figure 3-13 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}).

Aerial photo showing the extent of the East Las Posas groundwater basin.

EAST LAS POSAS BASIN

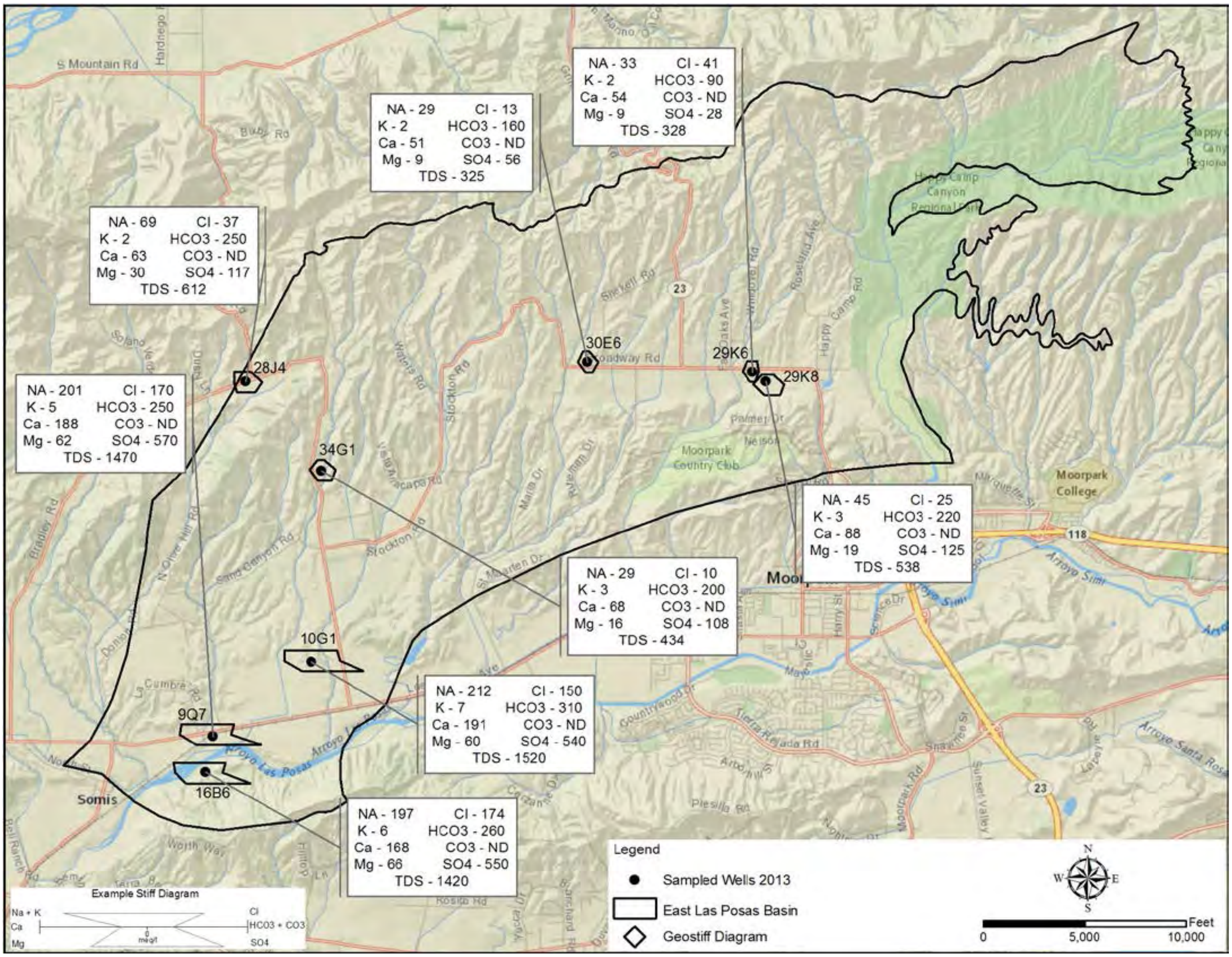
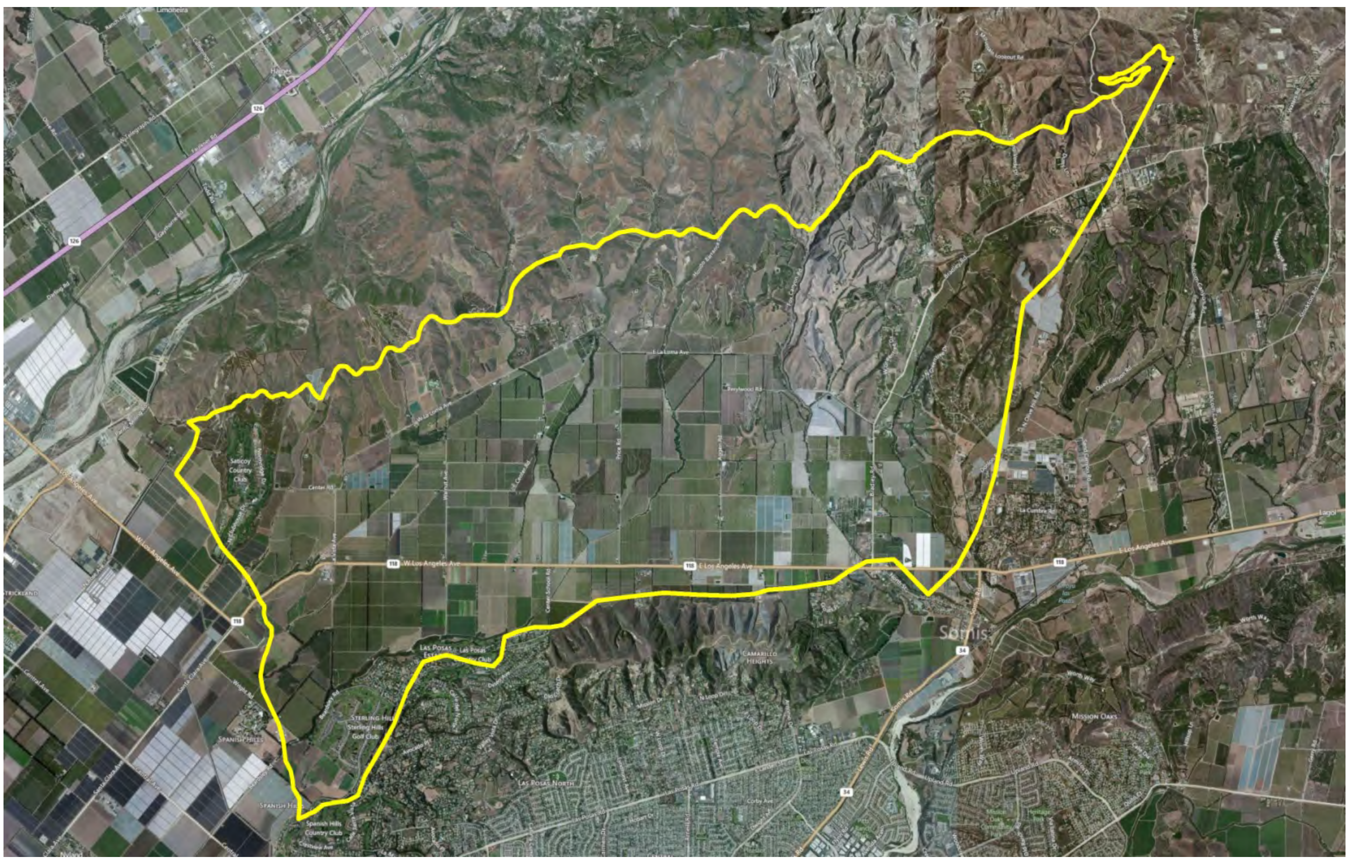


Figure 3-13: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents.

3.2.8 - West Las Posas Basin

There are approximately 158 wells in the West Las Posas Basin; 53 of those are active water supply wells. Figure D-16, piper diagram, shows moderate variability in water quality of the wells sampled this year. Calcium is the dominant cation for three of the wells sampled; there is no dominant cation for the remainder. Bicarbonate is the dominant anion for two of the wells sampled; sulfate is the dominant anion for five of the wells and three wells have no dominant anion. The water in eight wells is calcium magnesium, sulfate chloride fluoride type and the remainder are calcium magnesium, bicarbonate type. TDS above the secondary MCL for drinking water in nine of the ten wells sampled in the West Las Posas Basin this year have with an average of 874 mg/L. Two wells have nitrate concentrations above the primary MCL for drinking water. Four wells have sulfate (SO_4^{2-}) above the secondary MCL; five have manganese concentrations above the MCL and two have iron concentrations above the MCL. This piper diagram also shows two wells that are just outside the mapped basin boundary. The chemistry of these two wells is very similar to that of the wells inside the mapped boundary. Figure 3-14 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the West Las Posas Basin.



Aerial photo showing the extent of the West Las Posas groundwater basin.

WEST LAS POSAS BASIN

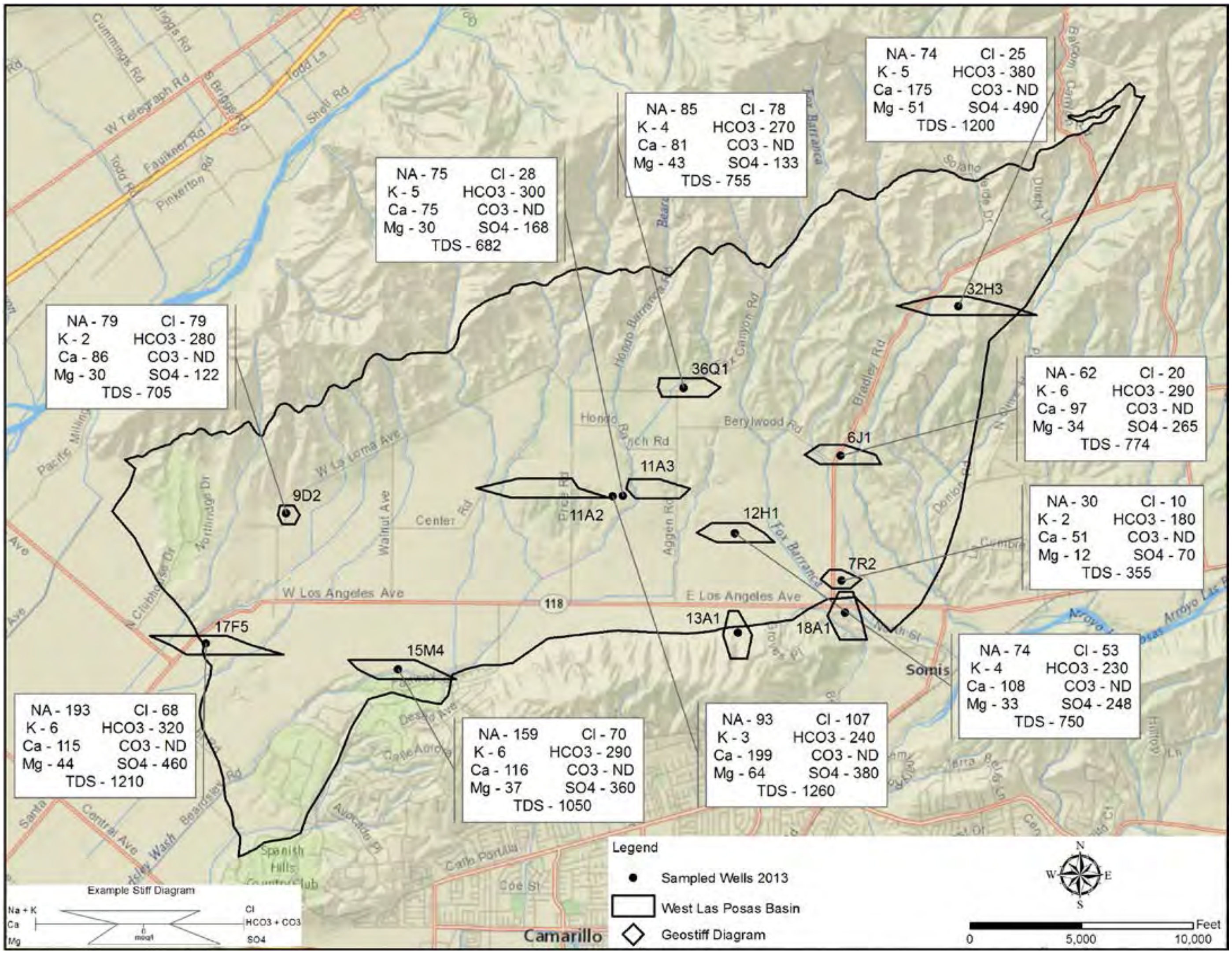
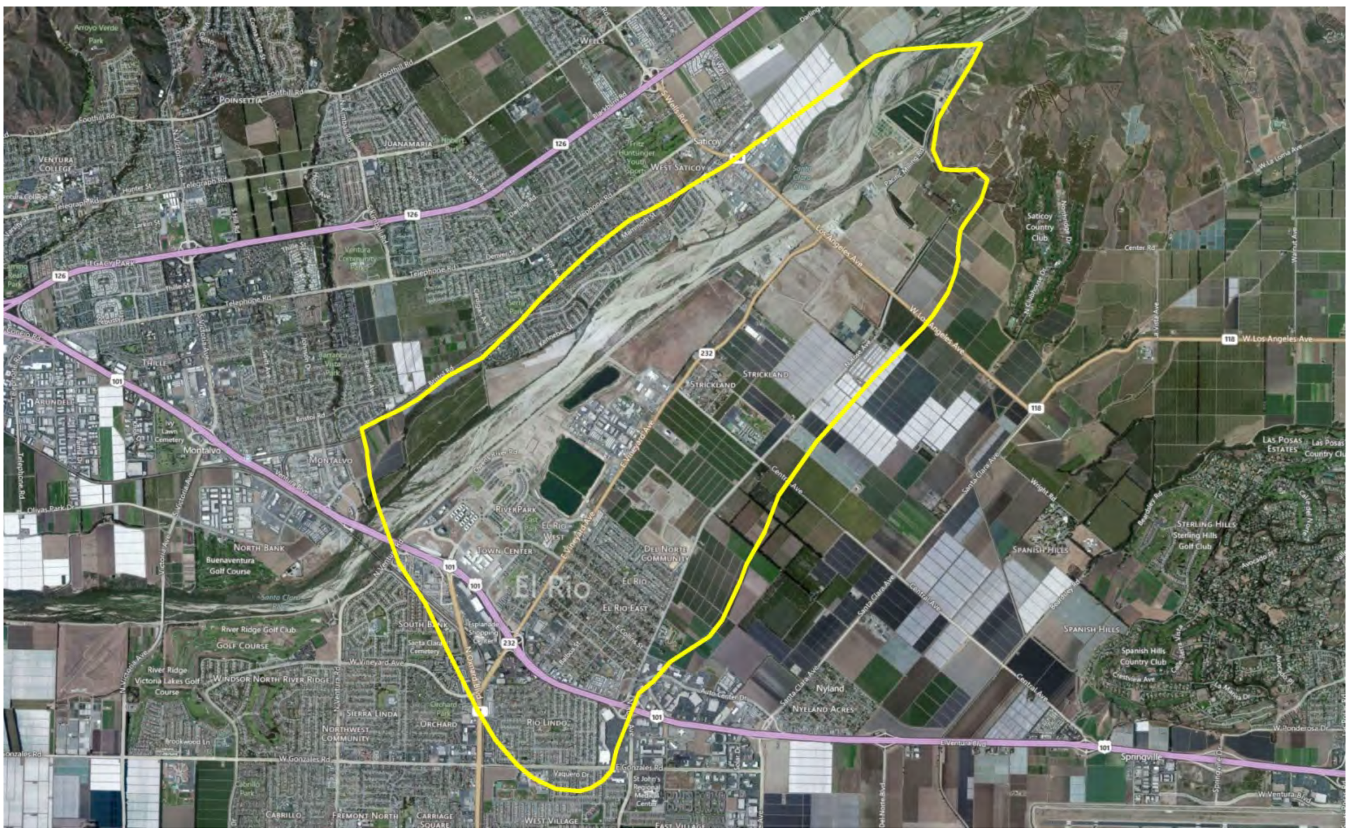


Figure 3-14: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

3.2.9 – Oxnard Plain Forebay Basin

The Oxnard Plain Forebay Basin is the principal recharge area for the Upper and Lower Aquifer Systems of the Oxnard Plain Pressure Basin. Approximate depth to the water bearing unit is 25 to 50 feet. There are approximately 367 wells in the Oxnard Plain Forebay Basin; 54 are active water supply wells. The Oxnard Plain Forebay generally has acceptable water quality except for the southern portion where high nitrate concentrations are common. The area to the north is predominantly agricultural with a few residential areas that still rely on individual septic systems. Three wells were sampled this season. Figure D-19, piper diagram, shows low variability in water quality of the wells sampled this year. There is no dominant cation; sulfate is the dominant anion. The water is calcium magnesium, sulfate chloride fluoride type. The piper diagram, Figure D-20, shows that the wells sampled have very similar chemistry to that of the UAS of the Oxnard Plain Pressure Basin. All three wells sampled have TDS and sulfate concentrations above the secondary MCL for drinking water. Two wells have nitrate concentrations above the MCL for drinking water. Figure 3-15 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Oxnard Forebay Basin.



Aerial photo showing the extent of the Oxnard Plain Forebay groundwater basin.

OXNARD FOREBAY BASIN

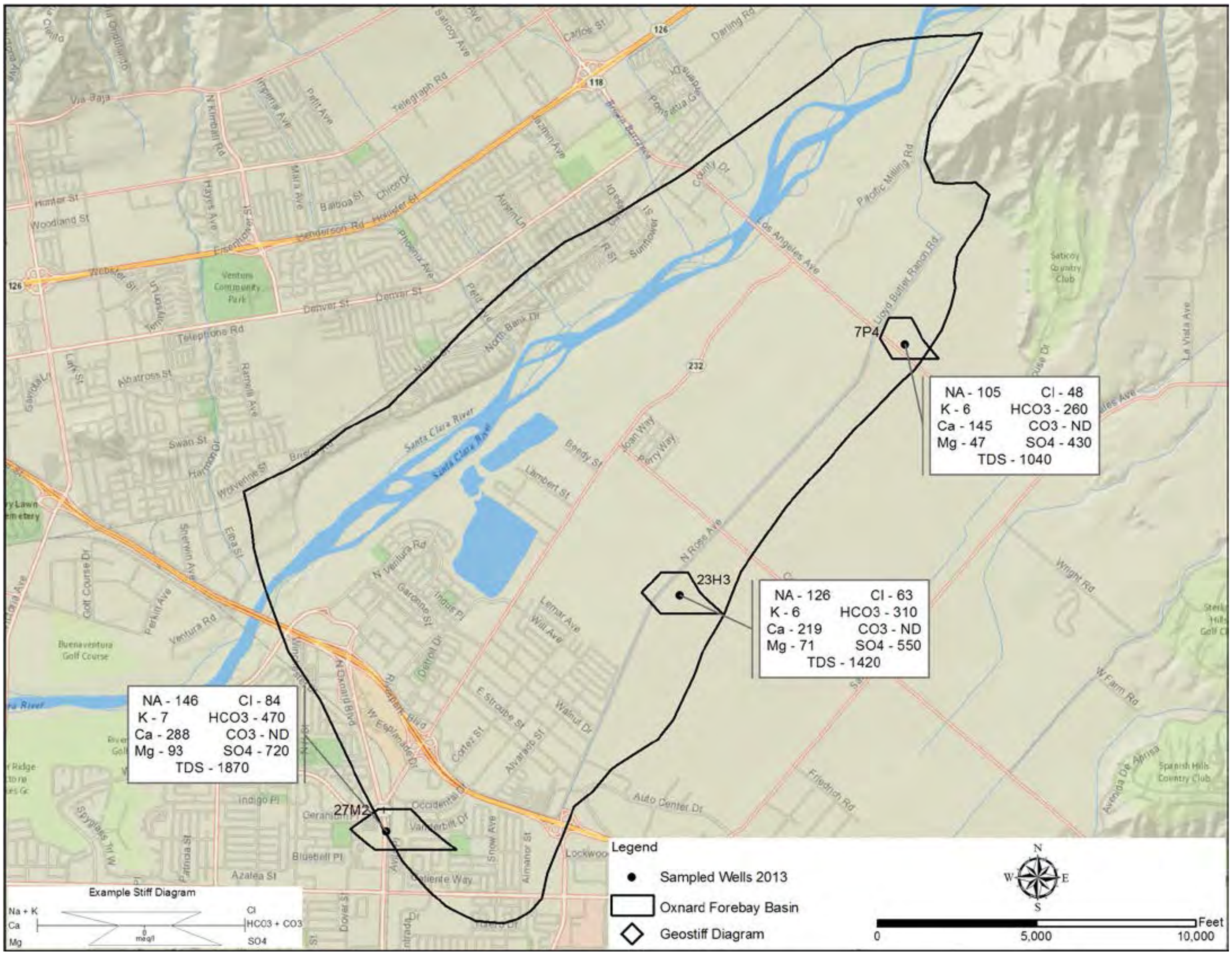
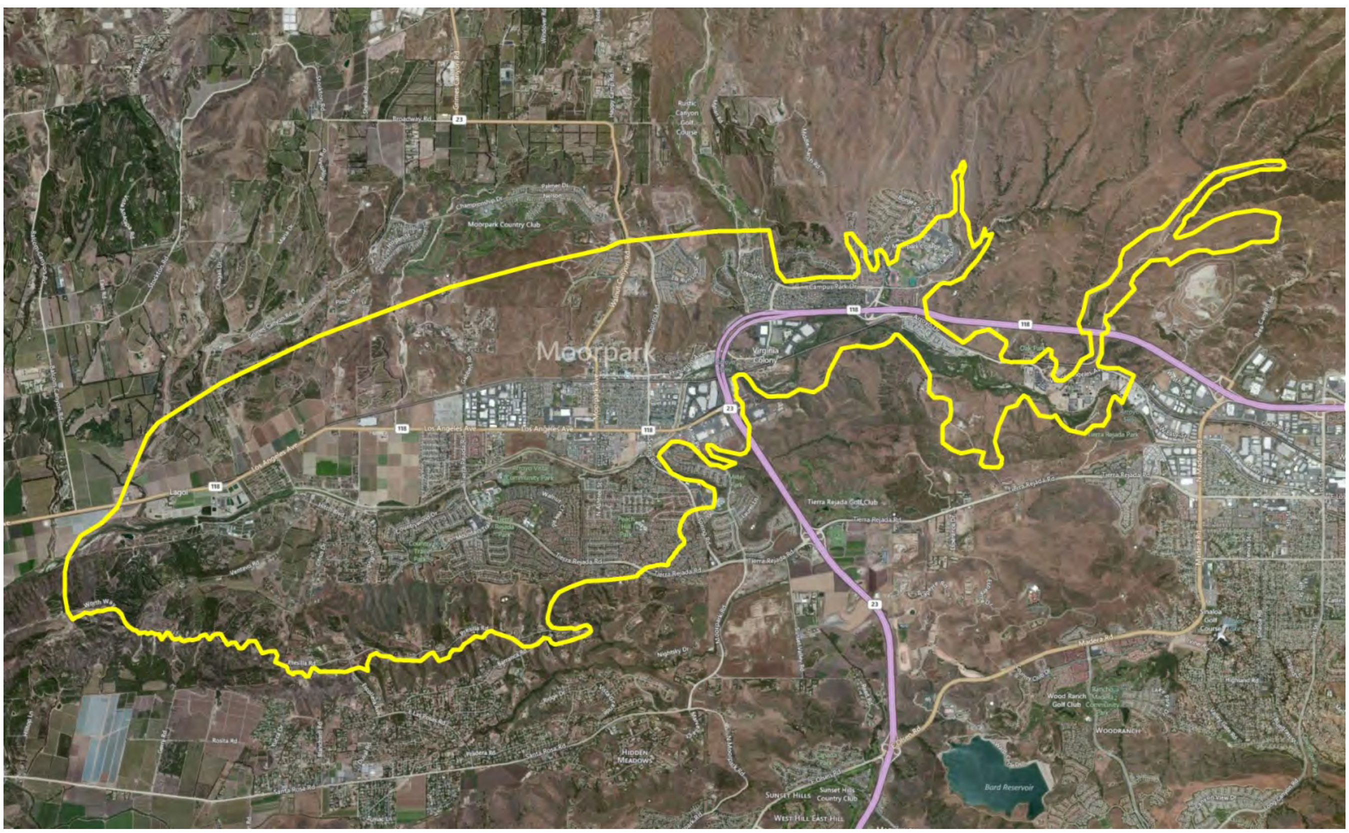


Figure 3-15: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

3.2.10 - South Las Posas Basin

The upper water bearing unit in the South Las Posas Basin is approximately 25 to 50 feet below ground surface and the lower is at approximately 350 to 500 feet below ground surface. Generally, deeper wells perforated in the Fox Canyon aquifer tend to have better water quality than the upper unit, however that has changed some over the years. Well 07B02 is perforated much deeper than the other two wells sampled but the water chemistry is similar. There are approximately 197 wells in the South Las Posas Basin; 24 are active water supply wells. Figure D-17, piper diagram, shows low variability in water quality of the wells sampled this year. Sodium potassium group is the dominant cation for one well; there is no dominant cation for the remainder. One sample has no dominant anion; sulfate is the dominant anion for the remainder. The water in four of the wells is calcium magnesium, sulfate chloride fluoride type and the remaining well is sodium potassium, sulfate chloride fluoride type. The South Las Posas Basin has had no significant change in water quality over the past year. Water from all five wells sampled has TDS and SO_4^{2-} concentrations above the secondary MCL for drinking water and slightly elevated chloride; not above the secondary MCL for drinking water (but high enough to be detrimental for some agricultural uses). No sample was analyzed for inorganic chemicals (Title 22 metals). Water chemistry in the South Las Posas Basin is fairly consistent across the basin. A comparison of the East, West, and South Las Posas Basins is shown in the piper diagram, Figure D-18. Figure 3-16 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the South Las Posas Basin.



Aerial photo showing the extent of the South Las Posas groundwater basin.

SOUTH LAS POSAS BASIN

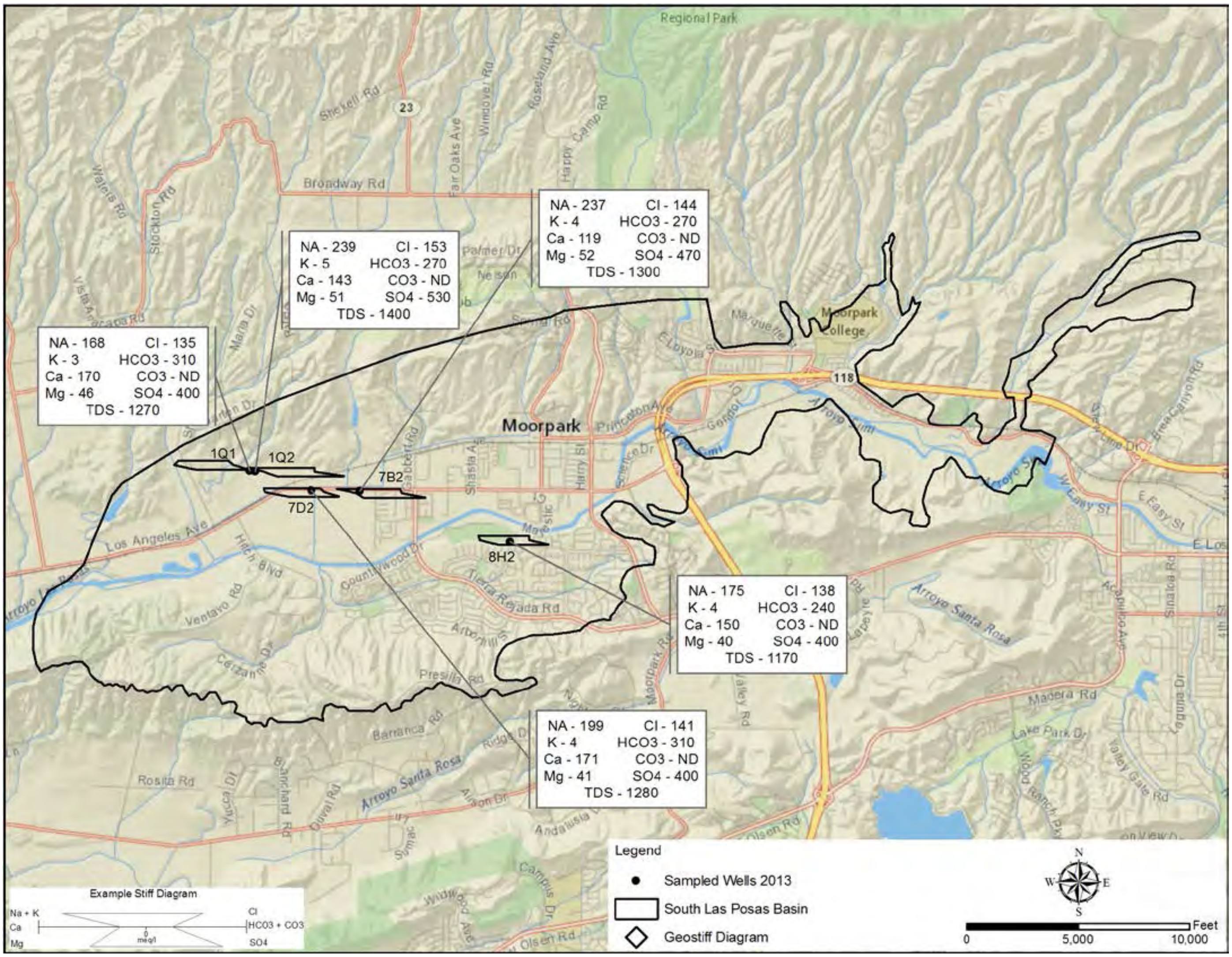
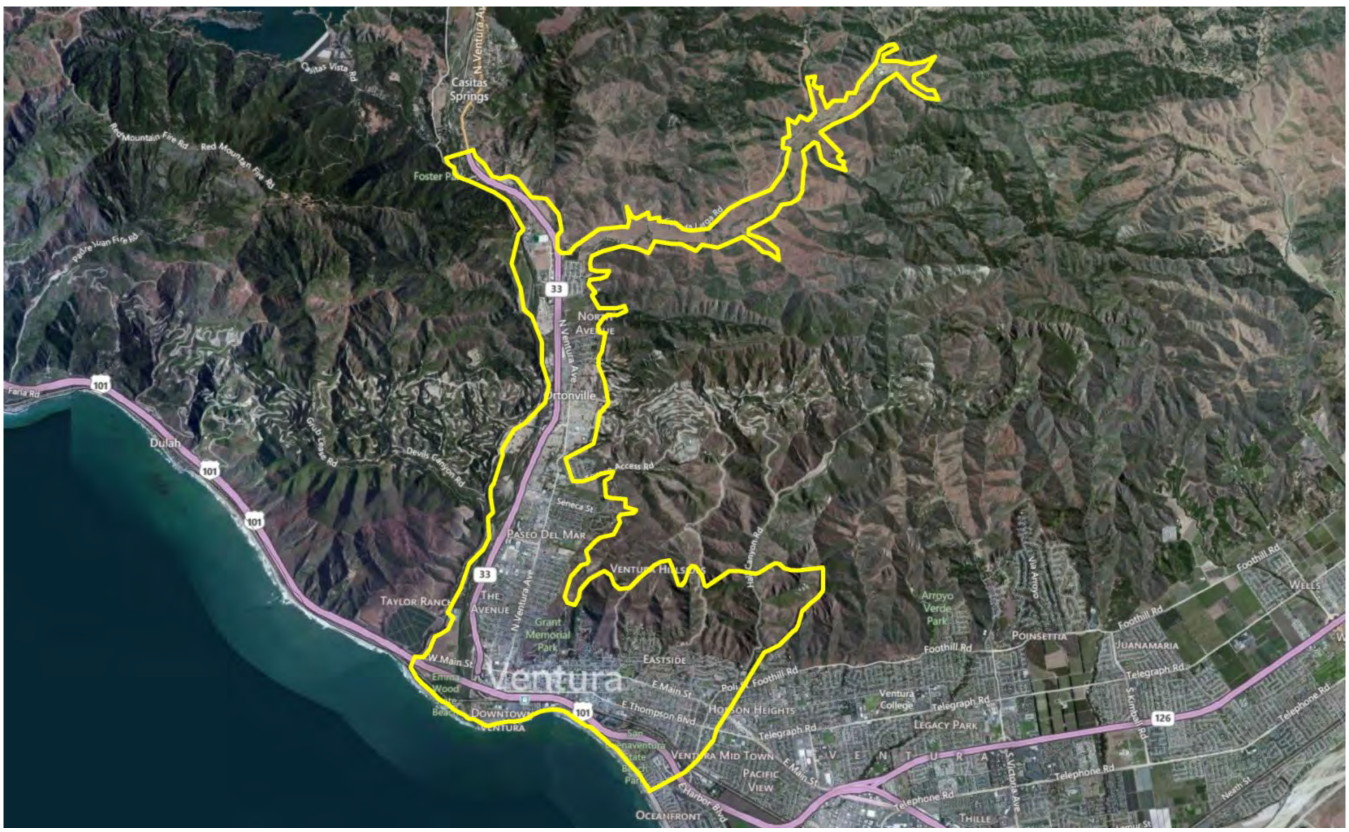


Figure 3-16: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

3.2.11 - Lower Ventura River Basin

The Lower Ventura River Basin has few remaining active water wells available for sampling. Depth to the water bearing unit is 3 to 13 feet below ground surface in the floodplain and deeper as the ground surface elevation increases towards the edge of the basin. There are approximately 61 water supply wells in the Lower Ventura River Basin; 11 are active. Figure D-21, piper diagram, shows low variability in water quality of the wells sampled this year. There is no dominant cation or anion. The water is calcium magnesium, chloride fluoride sulfate type. The three wells sampled this year are located in river alluvium near the coast. Total dissolved solids and sulfate concentrations are above the secondary MCL. Chloride is elevated but only above the MCL for drinking water in one sample. Piper diagram Figure D-23 shows a comparison of the chemistry between Upper and Lower Ventura River Basins. Water chemistry in the two basins is similar but not exactly the same. Figure 3-17 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Lower Ventura River basin.



Aerial photo showing the extent of the Lower Ventura River groundwater basin.

LOWER VENTURA RIVER BASIN

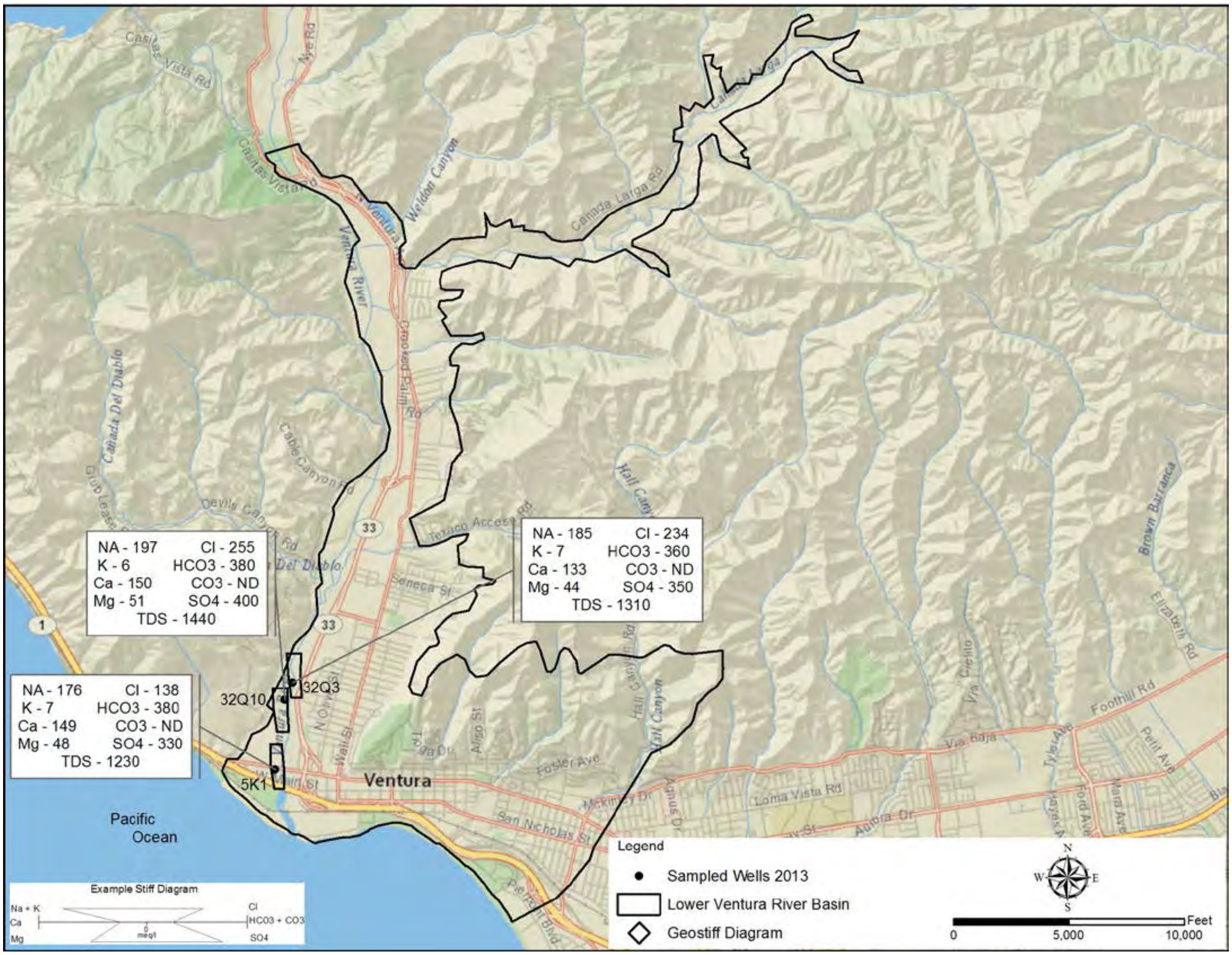
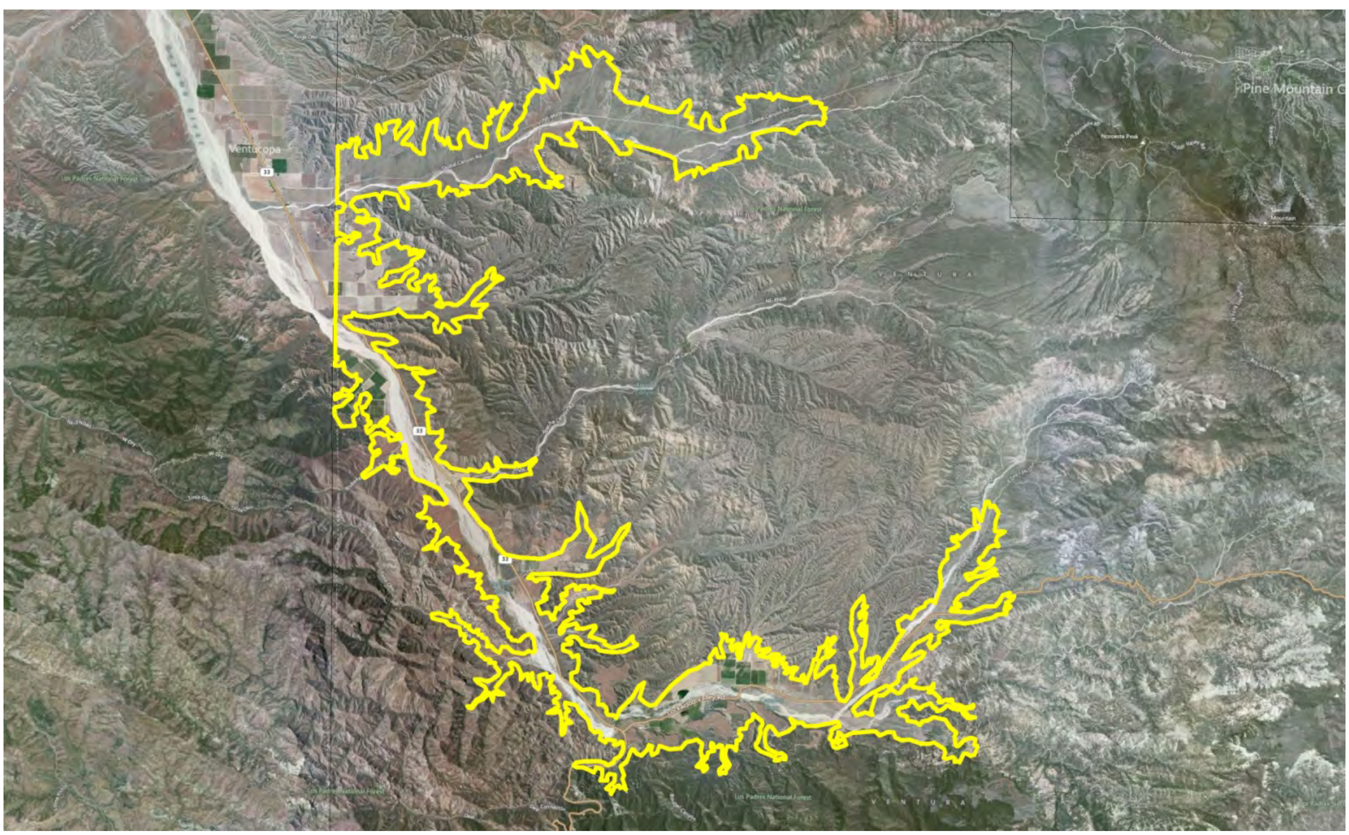


Figure 3-17: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

3.2.12 - Cuyama Valley Basin

The Cuyama Valley Basin is in a remote area in northwestern Ventura County. The aerial photo and the map in Figure 3-18 show only the portion of the basin that is in Ventura County. There are approximately 148 wells in the Cuyama Valley Basin; 102 are active water supply wells. Depth to the main water bearing unit varies between 40 to 170 feet below ground surface. Figure D-24, piper diagram, shows high variability in water quality of the wells sampled this year. The sodium + potassium group is the dominant cation in three samples; one has no dominant cation. The bicarbonate group is the dominant anion in three samples; one has no dominant anion. One sample is calcium magnesium, sulfate chloride fluoride type; one sample is calcium magnesium, bicarbonate type and two samples are sodium potassium, bicarbonate type. All four wells sampled this year have TDS above the secondary MCL for drinking water; two have elevated iron (Fe); and one has elevated sulfate (SO_4^{2-}). A water sample from one well was analyzed for inorganic chemicals (Title 22 metals). No inorganic constituent was above the primary MCL for drinking water. The piper diagram, Figure D-24, and stiff diagrams Figure 3-18 show the water quality in the north part of the basin is very different from that in the south but there are not enough samples to evaluate localized conditions. California Department of Water Resources Groundwater Bulletin No. 118 indicates groundwater quality has been deteriorating in some areas because of cycling and evaporation of irrigation water. Figure 3-18 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Cuyama Valley basin.



Aerial photo showing the extent of the Cuyama Valley groundwater basin.

CUYAMA VALLEY BASIN

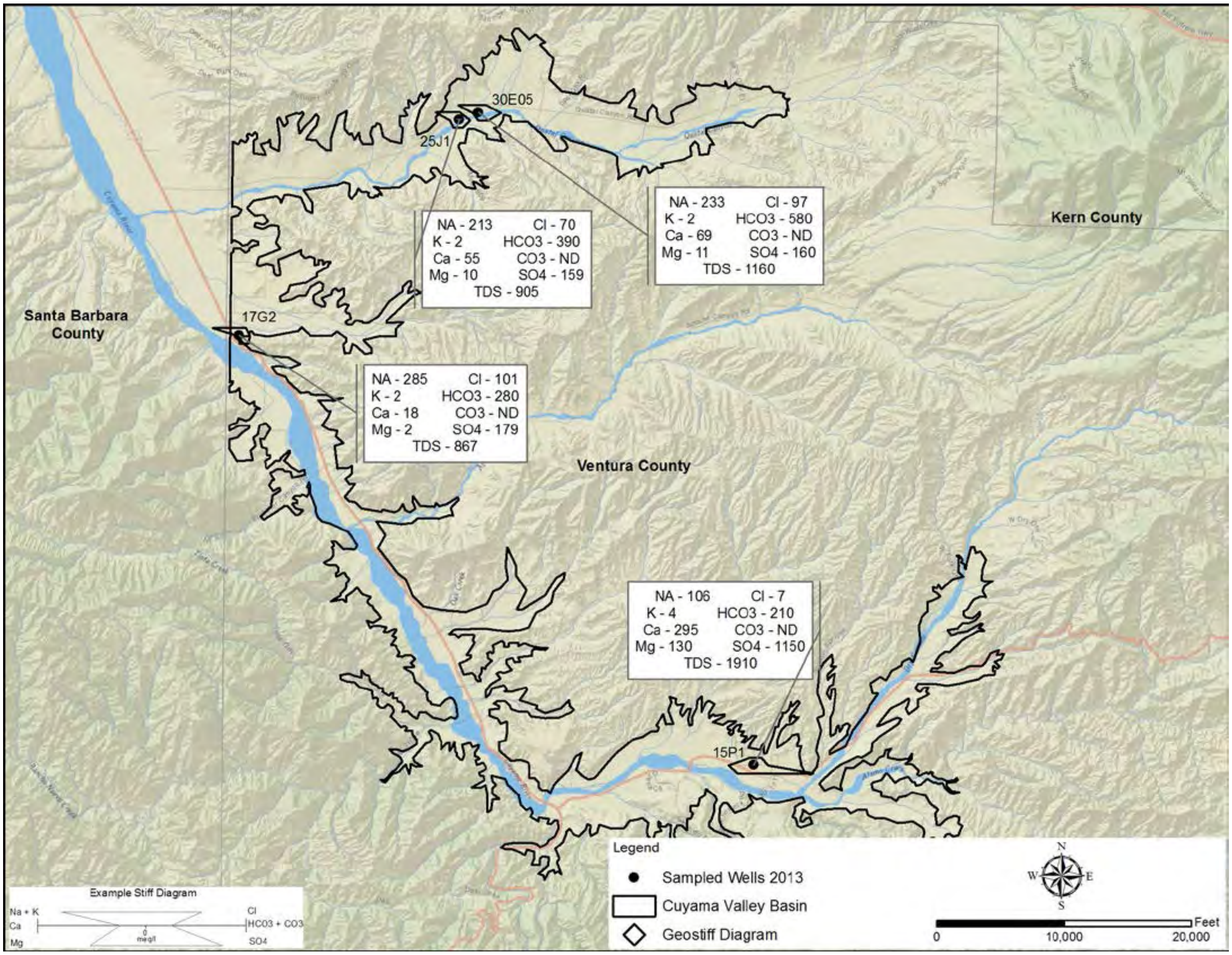
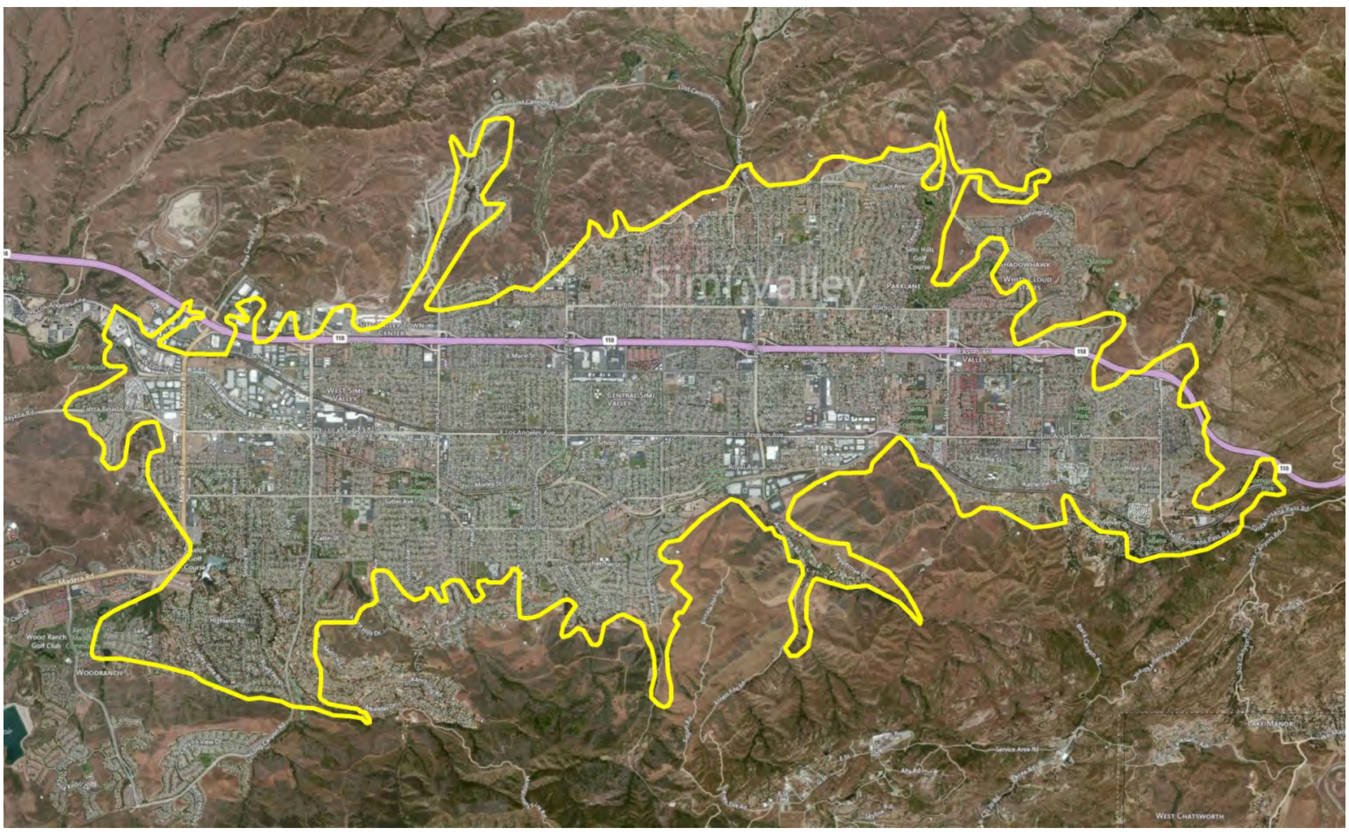


Figure 3-18: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagram.

3.2.13 - Simi Valley Basin

The Simi Valley Basin drains to the west and, historically, water quality becomes more enriched in salts farther west in the basin. There are approximately 595 wells in the Simi Valley Basin; 42 are active water supply wells. Depth to water bearing material is approximately 5 to 25 feet below ground surface. The City of Simi Valley has a high water table at the west end of the valley and several extraction wells have been installed to pump down the water table when groundwater gets too high. Figure D-25, piper diagram, shows low variability in water quality of the wells sampled this year. There is no dominant cation; sulfate is the dominant anion. The water is calcium magnesium, sulfate chloride fluoride type. Three wells sampled this year, all dewatering wells, located in the western half of the basin, have SO_4^{2-}, and TDS concentrations above the secondary MCL for drinking water and one well has elevated NO_3^-. All three samples also have concentrations of boron and chloride that exceed agricultural beneficial uses, but neither contaminant is above the primary MCL for drinking water. A water sample from one well was analyzed for inorganic chemicals (Title 22 metals). No inorganic constituent was above the primary MCL for drinking water. Figure 3-19 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Simi Valley basin.



Aerial photo showing the extent of the Simi Valley groundwater basin.

SIMI VALLEY BASIN

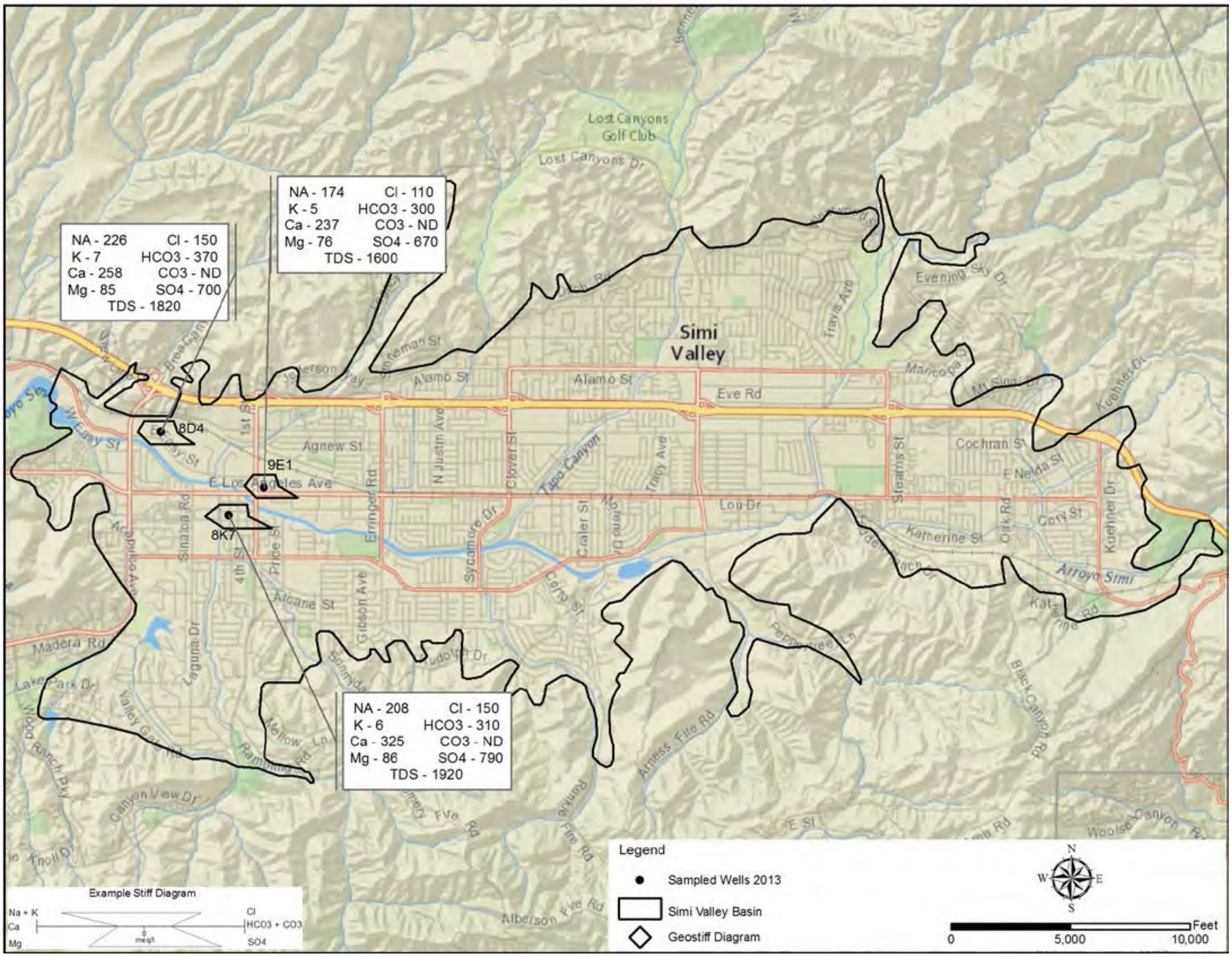
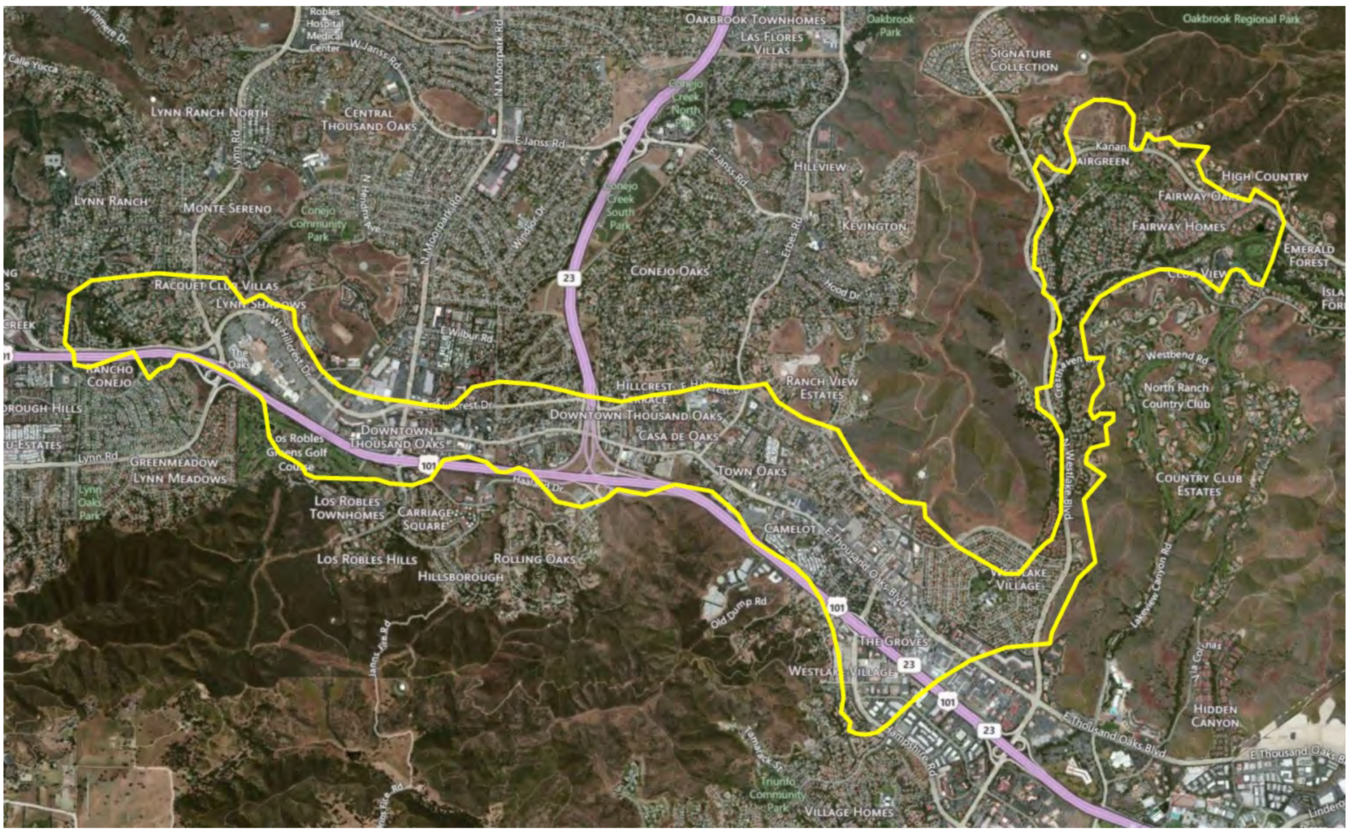


Figure 3-19: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagram.

3.2.14 - Thousand Oaks Basin

The Thousand Oaks Basin has very few active water wells available for sampling. The depth to the water bearing unit is approximately 25 to 30 feet. There are approximately 196 water supply wells in the Thousand Oaks Basin; 16 are active water supply wells. One well at the west end of the basin was sampled this year. Figure D-26, piper diagram, shows the water quality of the well sampled this year. There is no dominant cation; sulfate is the dominant anion. The water is calcium magnesium, sulfate chloride fluoride type. Concentrations of iron, manganese, sulfate and TDS are above the secondary MCL for drinking water the sample was analyzed for inorganic chemicals (Title 22 metals). None of the inorganic chemicals was above the primary MCL for drinking water. Figure 3-20 shows approximate well location and concentration of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the well sampled in Thousand Oaks basin.



Aerial photo showing the extent of the Thousand Oaks groundwater basin.

THOUSAND OAKS BASIN

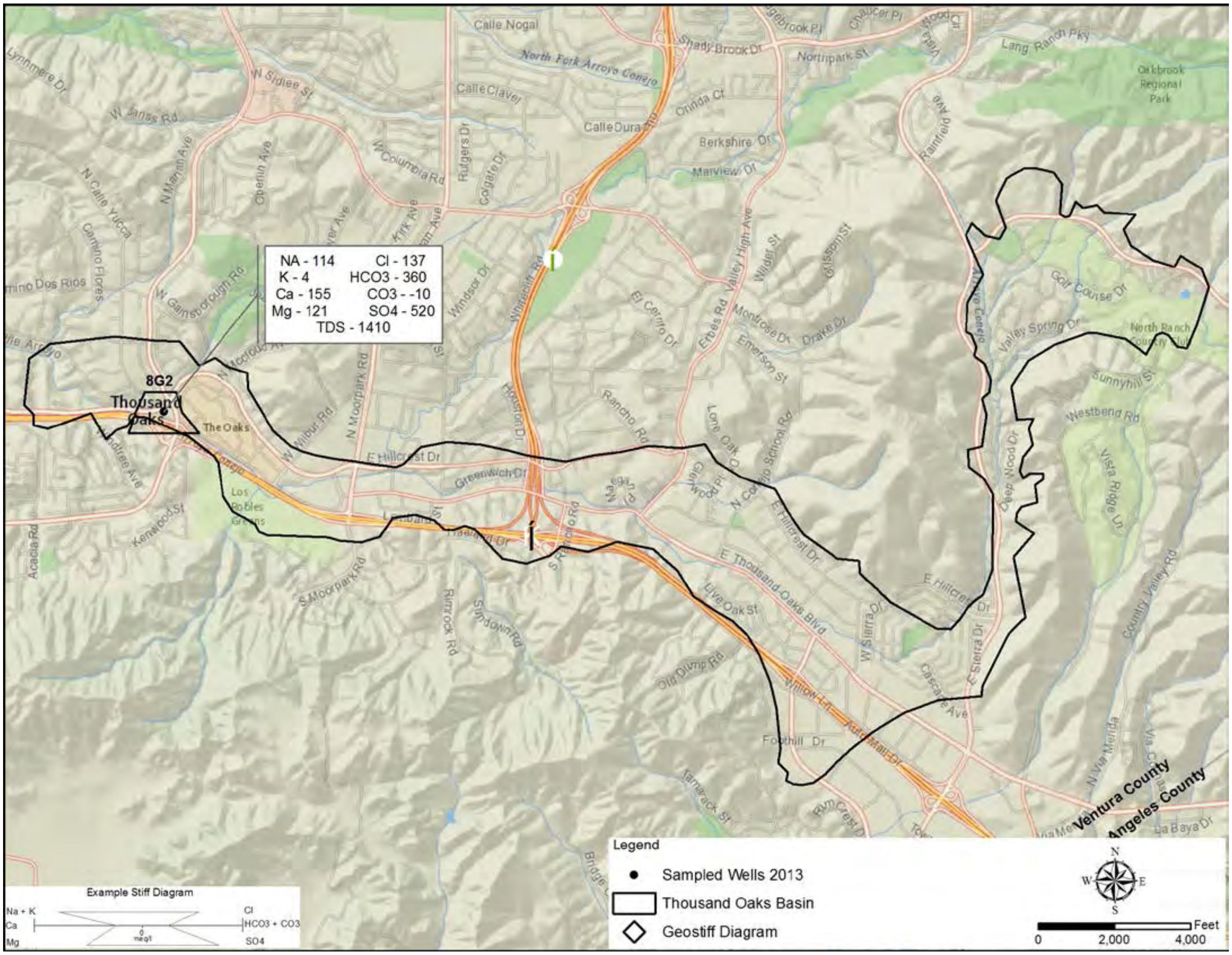
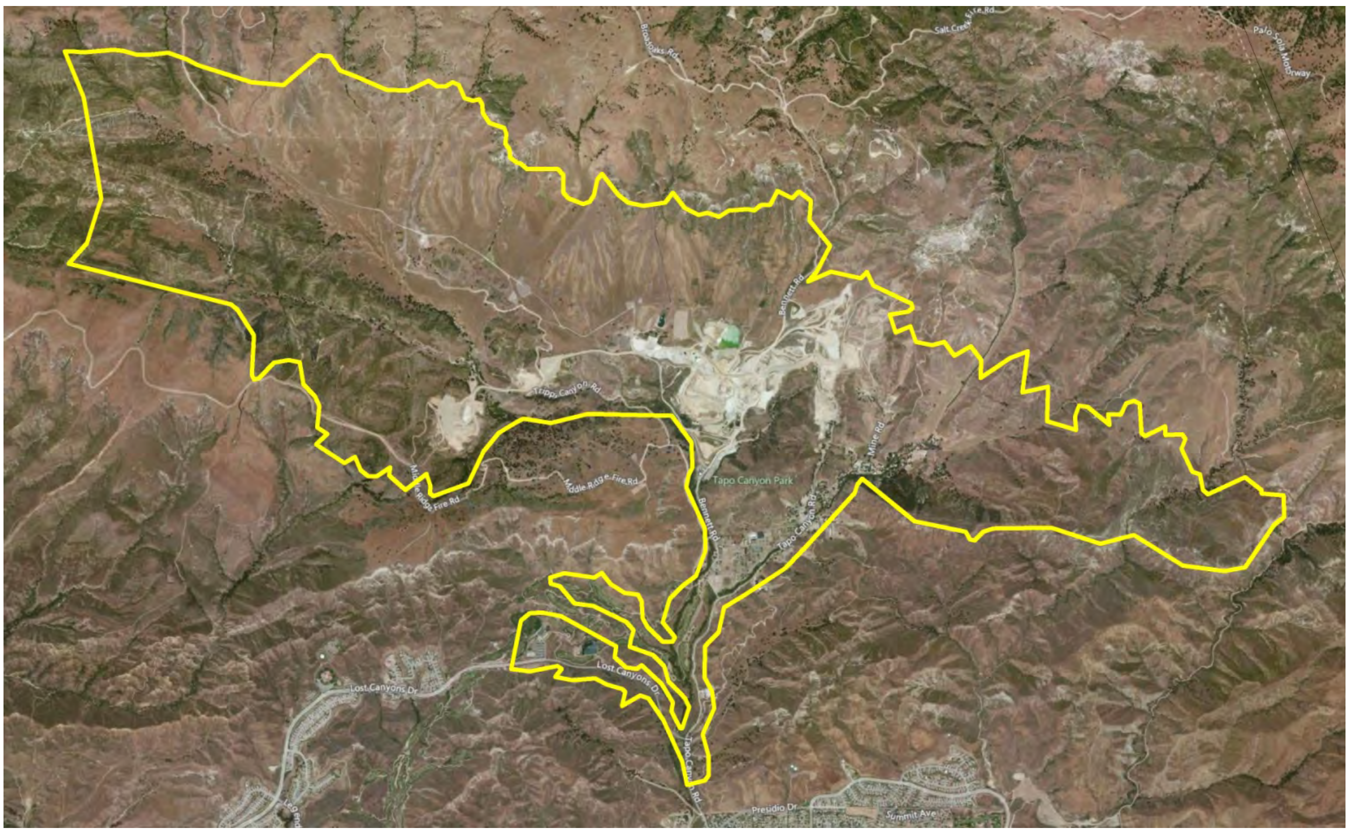


Figure 3-20: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagram.

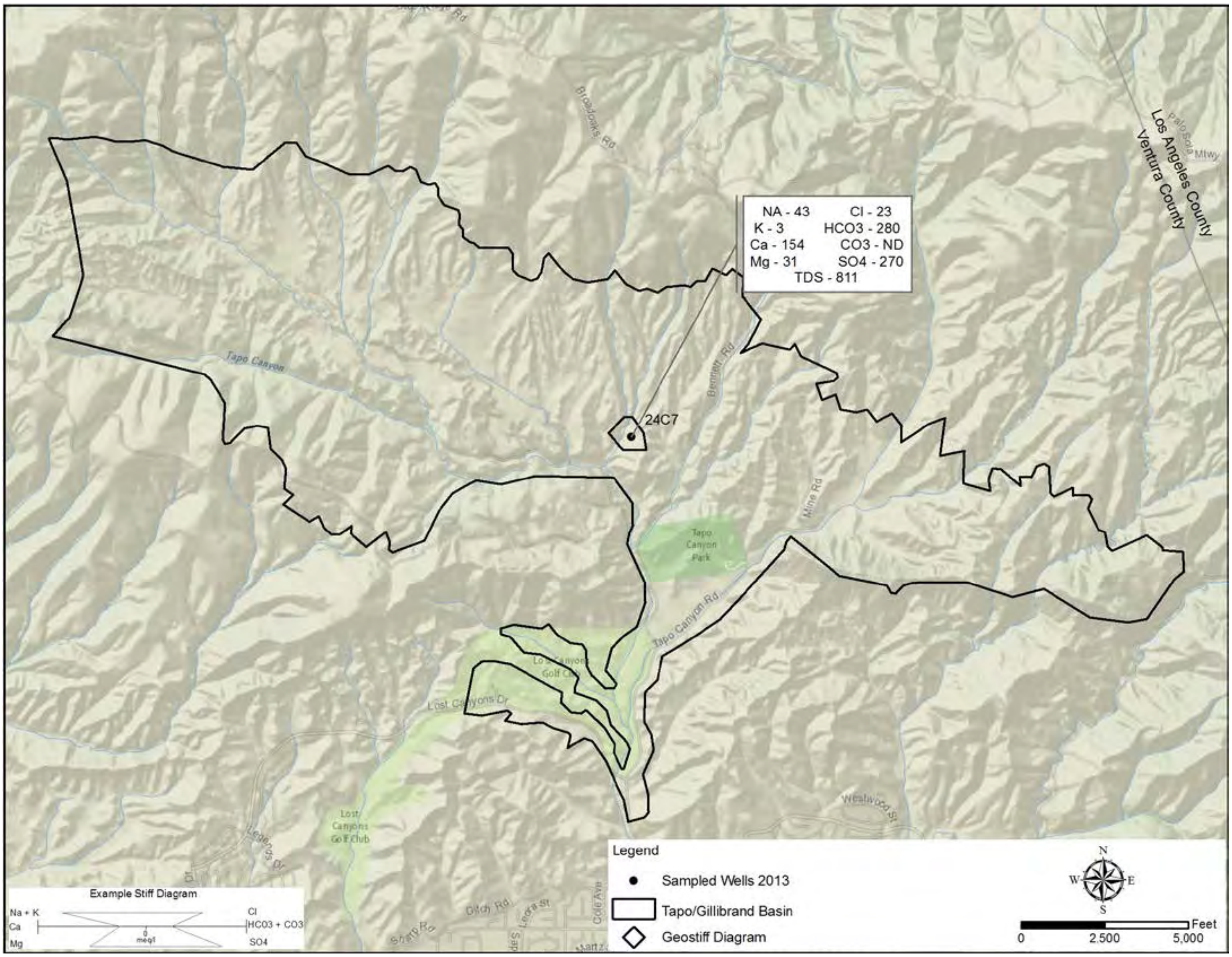
3.2.15 - Tapo/Gillibrand Basin

The Tapo/Gillibrand Basin is located to the north of Simi Valley and has very good groundwater quality. There are approximately 54 water supply wells in the Tapo/Gillibrand Basin; 42 are active. The City of Simi Valley operates several wells in the basin as a backup water supply. Figure D-27, piper diagram, shows water quality of the well sampled this year. There is no dominant cation; sulfate is the dominant anion in the sampled well. The water is calcium magnesium, sulfate chloride fluoride type. One well was sampled this year. TDS and SO_4^{2-} concentrations are above the secondary MCL for drinking water. The water sample was also analyzed for inorganic chemicals (Title 22 metals). No inorganic chemical was above the primary MCL for drinking water. Depth to the water bearing material is approximately 125 to 150 feet. Figure 3-21 shows approximate well location and concentration of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the well sampled in Tapo/Gillibrand basin.



Aerial photo showing the extent of the Tapo/Gillibrand groundwater basin.

TAPO/GILLIBRAND BASIN



<u>Figure 3-21</u>: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagram.

3.2.16 - Arroyo Santa Rosa Basin

The water bearing units of the Arroyo Santa Rosa Basin occupy almost the entire area beneath the Santa Rosa Valley, but the area west of the Bailey Fault is generally considered to be hydrogeologically separate from the area east of the fault (1997 Santa Rosa Basin Groundwater Management Plan) although some leakage across the fault does occur (CMWD, 2013). The water bearing units west of the fault are confined and those located east of the fault are unconfined. The degree of groundwater movement across the fault is not clearly understood. The Arroyo Santa Rosa Basin has a large area dedicated to agricultural use and a high number of individual septic systems; two main sources of nitrate to the groundwater. A large portion of recharge to the basin is discharge from the Thousand Oaks Hill Canyon Wastewater Treatment Plant. There are approximately 99 wells in the Arroyo Santa Rosa Basin; 33 are active water supply wells. Figure D-29, piper diagram, shows moderate variation in water quality of the wells sampled this year. There is no dominant cation. Bicarbonate is the dominant anion for two of the samples; there is no dominant anion for the remainder. Most of the water is calcium magnesium, chloride fluoride sulfate type; two samples were calcium magnesium, bicarbonate type. Water from six of the nine wells sampled this year has nitrate (NO_3^-) concentrations higher than the primary MCL for drinking water. All nine wells have TDS concentrations above the secondary MCL with an average of 952 mg/l. Chloride (Cl^-) concentrations in seven of the wells are above the level that can cause agricultural beneficial uses for sensitive plants to be impaired, but is not above the primary MCL for drinking water. Water samples from three wells were analyzed for inorganic chemicals (Title 22 metals). No inorganic chemical was above the primary MCL for drinking water. Depth to water bearing material is approximately 50 feet. Figure D-31, piper diagram, shows a comparison of water chemistry between Tierra Rejada Basin and Arroyo Santa Rosa Basin groundwater. Figure 3-22 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-})and sulfate (SO_4^{2-}) for the wells sampled in the Arroyo Santa Rosa basin.

Aerial photo showing the extent of the Arroyo Santa Rosa groundwater basin.

ARROYO SANTA ROSA BASIN

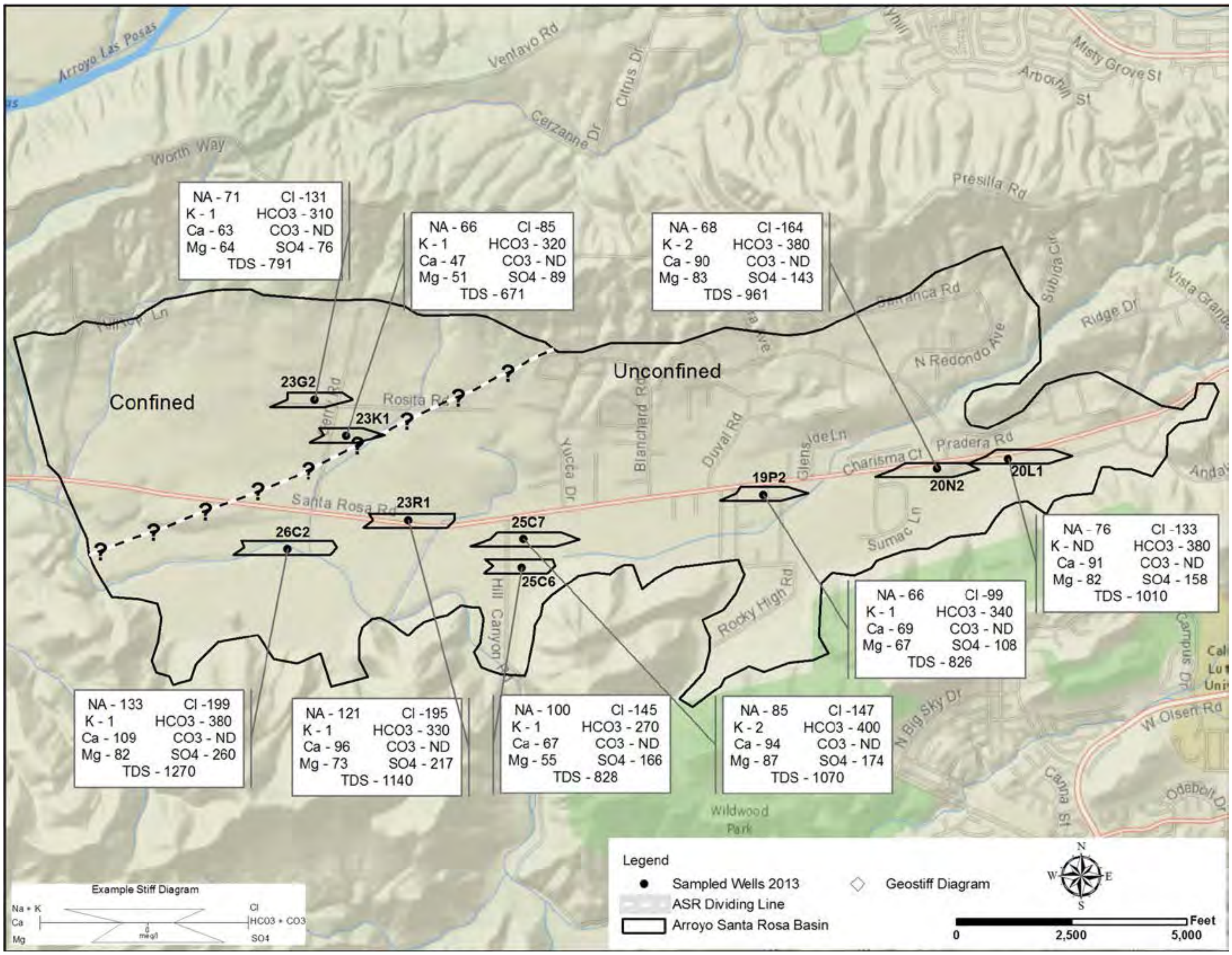


Figure 3-22: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

Figure 3-23 shows the geographic distribution of the wells sampled, with graduated symbols representing nitrate concentration for 2013. Figure 3-24 shows nitrate results for 1998 through 2013 in the same manner. The Groundwater Section has used three or more wells with nitrate concentrations above the state primary MCL in a given year as the criteria to classify the basin as nitrate-impacted. Comparison of the two shows that the Arroyo Santa Rosa Basin has remained nitrate impacted for many years. Management practices now in place include limiting the number of large animals and generally restricting septic systems to lots greater than 2.875 acres. It is not clear that the management practices are having the desired effect of reducing nitrate but no groundwater samples collected this year had nitrate (NO_3^-) concentration above 108 mg/l and in previous years some wells have been as high as 292 mg/l.

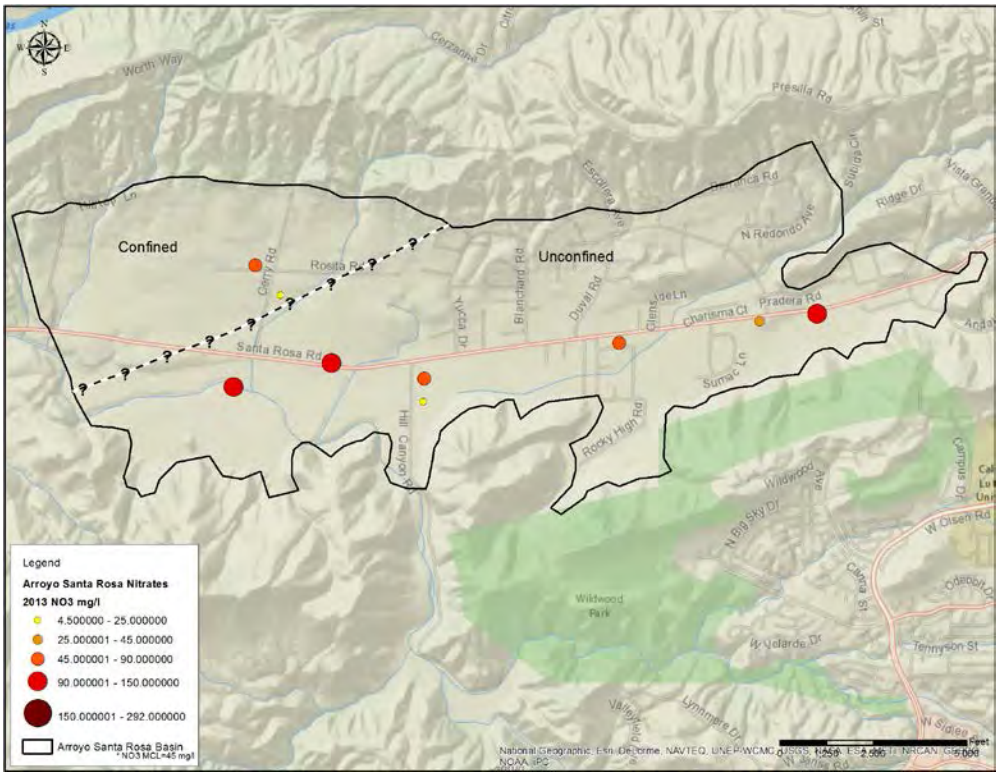


Figure 3-23: Map showing Nitrate results in mg/l for the year 2013.

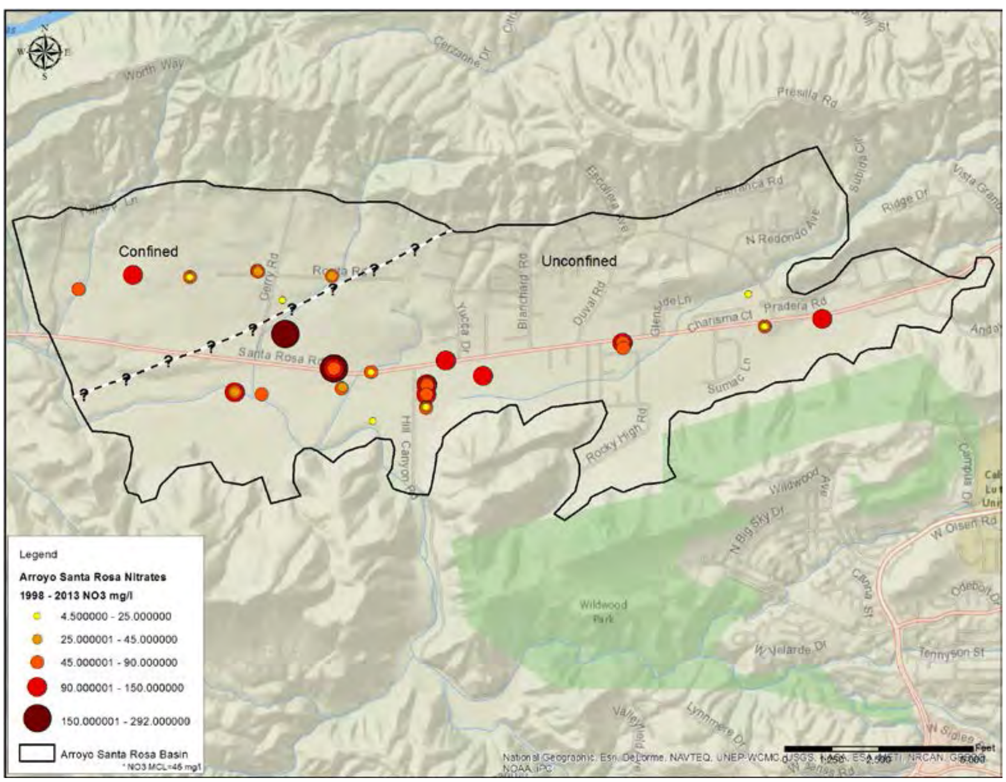
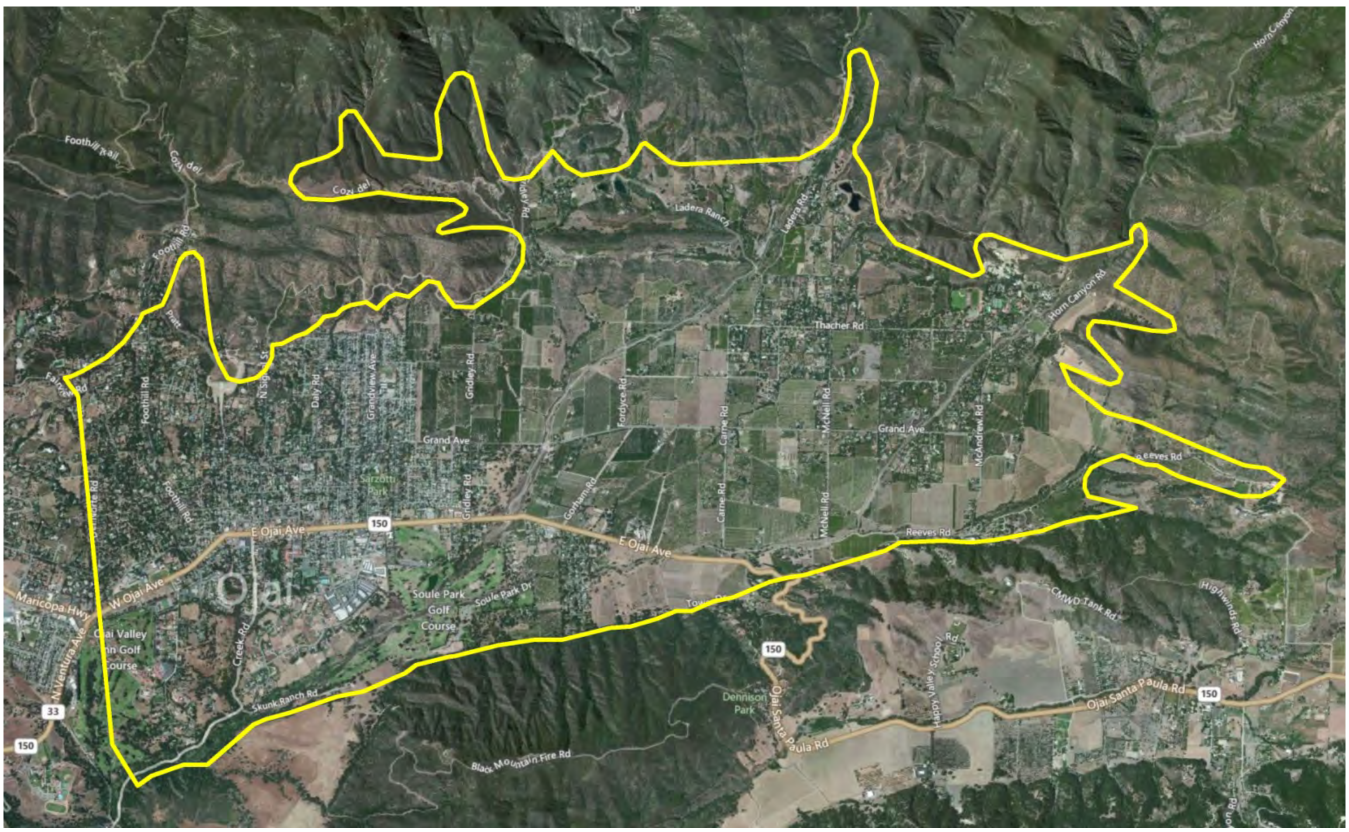


Figure 3-24: Map showing nitrate results for 1998 to 2013.

3.2.17 - Ojai Valley Basin

The aquifer system of the Ojai Valley Basin is considered unconfined except in the western end of the basin where a semi-confining to confining clay layer is present. The Ojai Valley Basin water quality is considered good. There are approximately 348 wells in the Ojai Valley Basin; 174 are active water supply wells. Depth to water bearing material is generally between 25 to 30 feet below ground surface. Figure D-33, piper diagram, shows moderate variation in water quality of the wells sampled this year. There is no dominant cation. Bicarbonate is the dominant anion for two of the samples; there is no dominant anion for the remainder. Two samples were calcium + magnesium, bicarbonate type; the remainder were calcium, chloride fluoride sulfate type. TDS ranges from 718 to 1230 mg/l with an average of 911 mg/l. Two wells have iron (Fe) and sulfate (SO_4^{2-}) concentrations above the secondary MCL for drinking water. Water samples from four wells were analyzed for inorganic chemicals (Title 22 metals). No inorganic chemical was above the primary MCL for drinking water. Figure 3-25 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Ojai Valley basin.



Aerial photo showing the extent of the Ojai Valley groundwater basin.

OJAI VALLEY BASIN

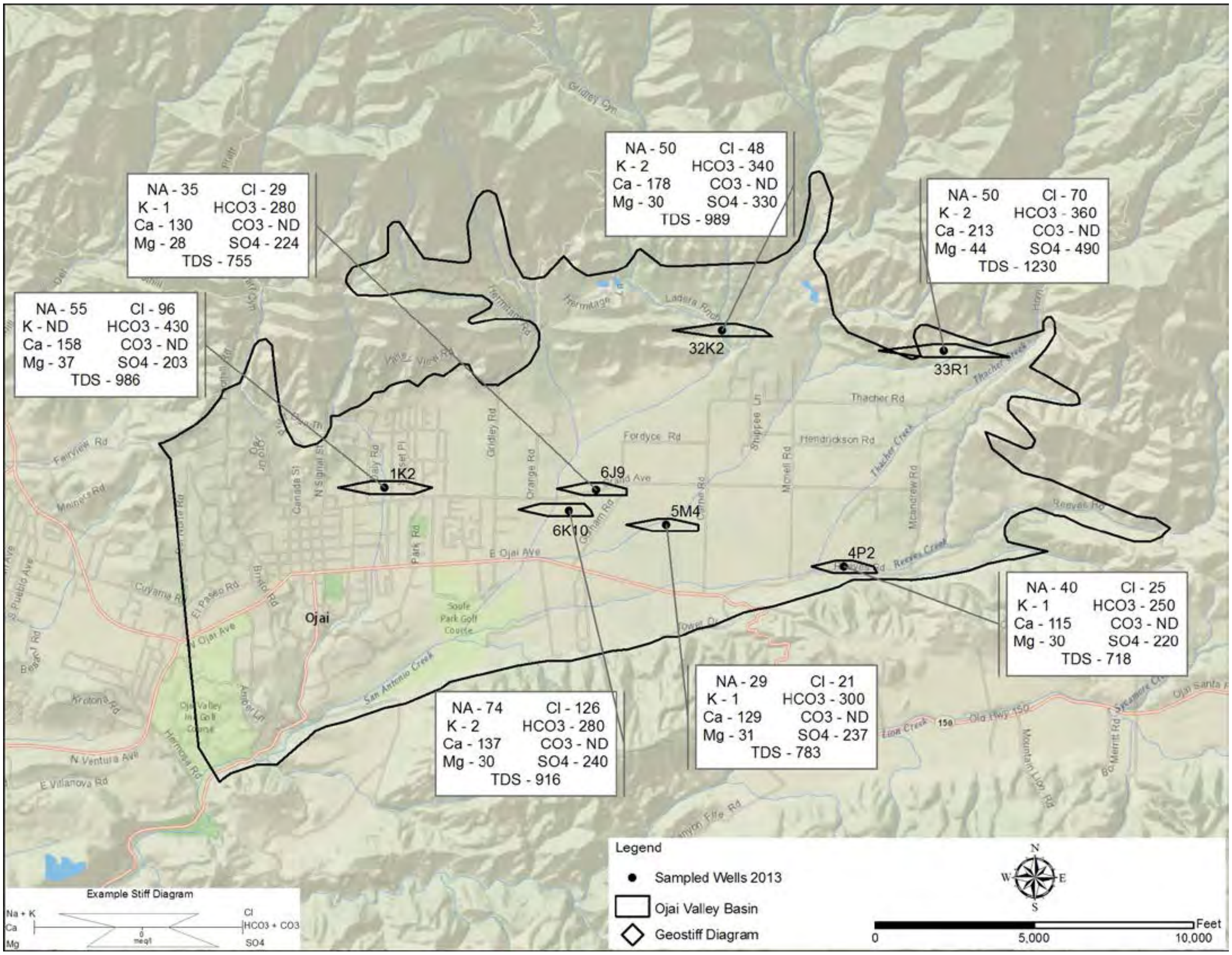
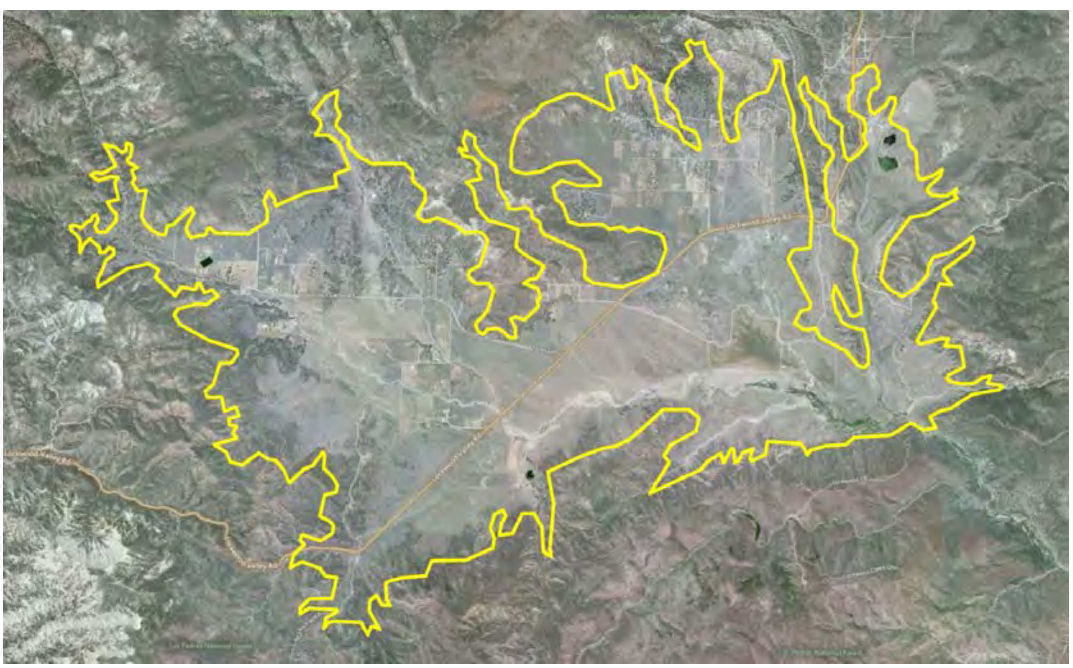


Figure 3-25: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

3.2.18 - Lockwood Valley Basin

The Lockwood Valley Basin groundwater quality ranges from good to unhealthful. The basin covers a large geographic area, approximately 34.1 square miles. Depth to water bearing material is approximately 55 to 60 feet. There are approximately 269 wells in the Lockwood Valley Basin; 208 are active water supply wells. Figure D-28, piper diagram, shows moderate variation in groundwater chemistry of the wells sampled this year. Calcium is the dominant cation in one sample and sodium potassium group is the dominant cation for the remainder. Sulfate is the dominant anion for four of the samples; there is no dominant anion for the remainder. Two samples were calcium magnesium, bicarbonate type; the remainder were calcium magnesium, sulfate chloride fluoride type. Six wells were sampled this year and of those, all have TDS concentrations above the secondary MCL for drinking water and five have sulfate (SO_4^{2-}) above the secondary MCL. Five of the wells sampled are along Boy Scout Camp Road. All 5 are about the same depth but the one with the poorest water quality has perforations starting about 100 feet shallower than the others. Samples from all six wells were also analyzed for inorganic chemicals (Title 22 metals). One has arsenic above the MCL but none of the remaining inorganic constituents were above the primary MCL for drinking water. Water from all six wells was tested for radionuclides. The result for gross alpha on all of the samples was above 5 pCi/L; that level requires the sample to be analyzed for uranium. In 2004, the Drinking Water Branch of the California Department of Public Health issued an Initial Monitoring and MCL Compliance Determination flow chart. The flow chart is used to determine the source of gross alpha for determining compliance in community water systems. Based on the flow chart, naturally occurring uranium was determined to be the source of the gross alpha in these samples. The Groundwater section has not investigated the geologic source(s) of the radionuclides. Following the additional uranium testing, radionuclides in two of the wells were determined to be above the MCL for drinking water. Figure 3-26 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Lockwood Valley basin.



Aerial photo showing the extent of the Lockwood Valley groundwater basin.

LOCKWOOD VALLEY BASIN

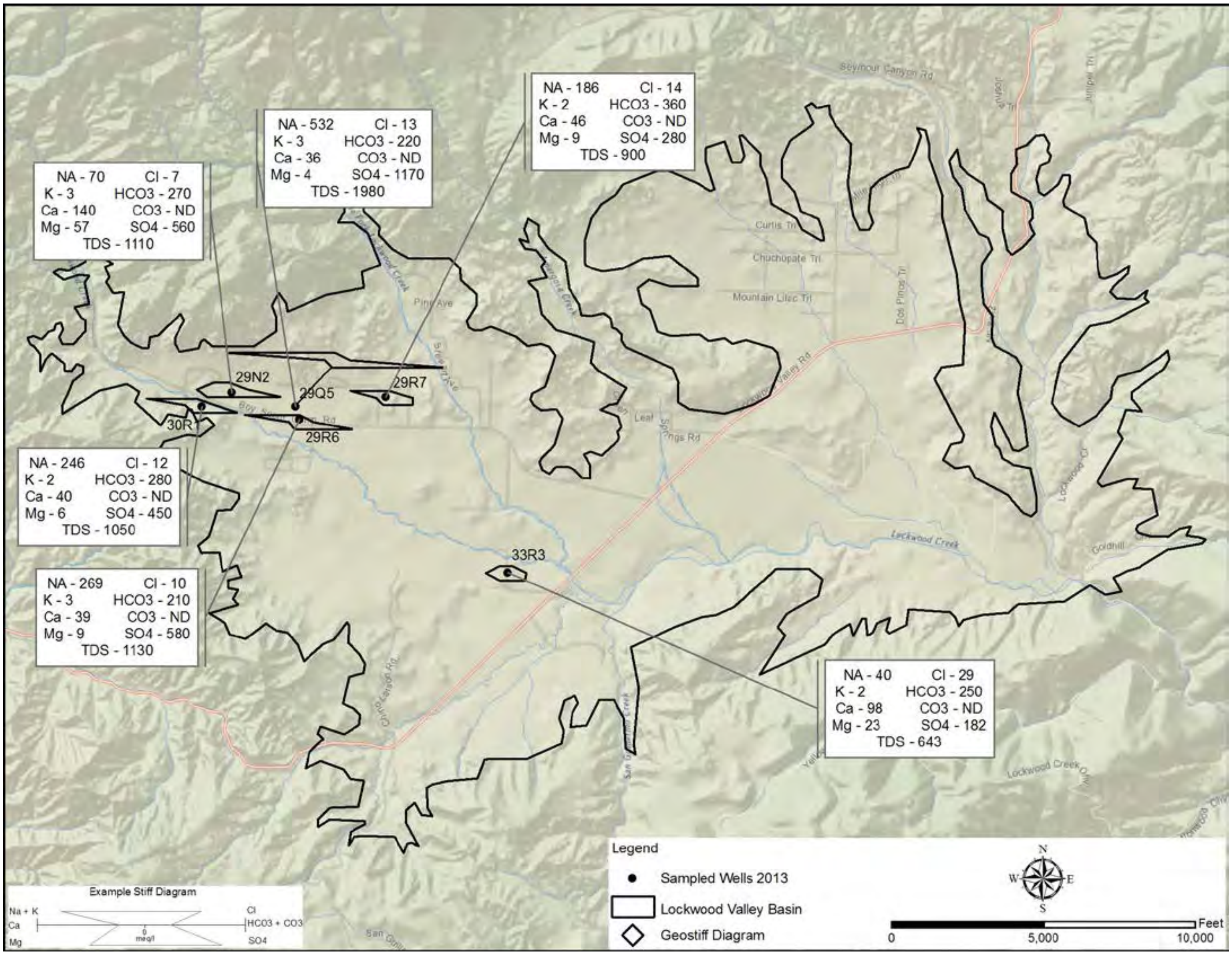


Figure 3-26: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagram.

3.2.19 - Tierra Rejada Valley Basin

Depth to water bearing materials varies between 20 to 80 feet. There are approximately 54 wells in the Tierra Rejada Valley Basin; 29 are active water supply. Six wells were sampled this year. Figure D-30, piper diagram, shows high variation in water quality. The dominant cation for one well is sodium + potassium group; the remainder have no dominant cation. The dominant anion for one sample is bicarbonate; the remainder have no dominant anion. Three wells were magnesium calcium, chloride fluoride sulfate type; 1 well was magnesium calcium, bicarbonate type; and one well was sodium potassium, chloride fluoride sulfate type. All six have concentrations above the secondary MCL for TDS with an average of 701 mg/l. Nitrate was above the MCL for drinking water in only one sample this year. Figure D-31, piper diagram, shows a comparison of water chemistry between Tierra Rejada and Arroyo Santa Rosa Basins. Chemistry in the two basins is similar but there is more variation in Tierra Rejada with slightly higher bicarbonate. No wells were analyzed for inorganic chemicals (Title 22 metals). Figure 3-27 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Tierra Rejada basin.

Aerial photo showing the extent of the Tierra Rejada Valley groundwater basin.

TIERRA REJADA BASIN

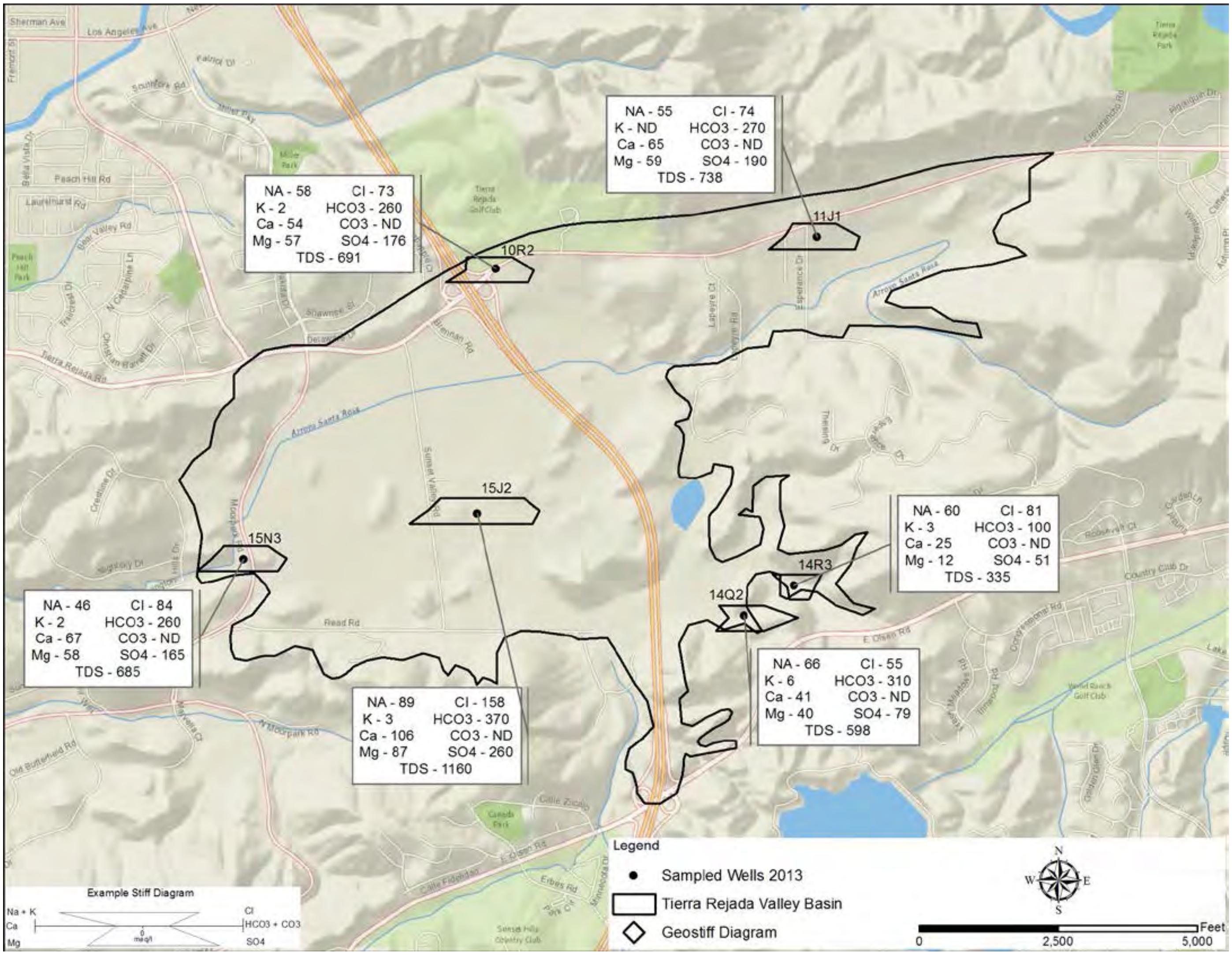


Figure 3-27: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

Figure 3-28 below shows nitrate concentrations for wells sampled in Tierra Rejada Basin in 2013. Groundwater from only one of the wells sampled this year has a nitrate concentration that exceeds the primary MCL for drinking water. Other wells sampled in the past that had elevated nitrate concentrations were not available for sampling this year.

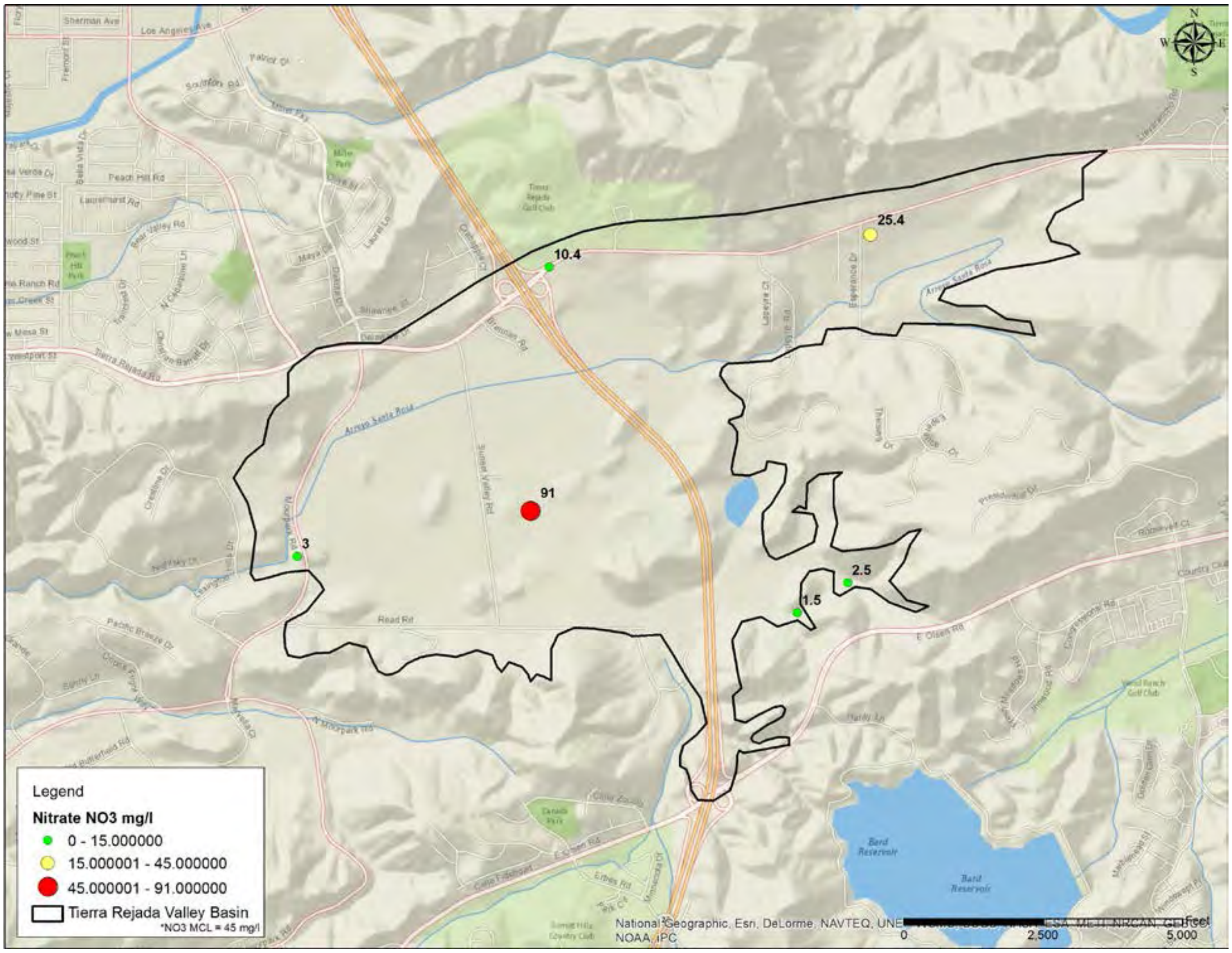
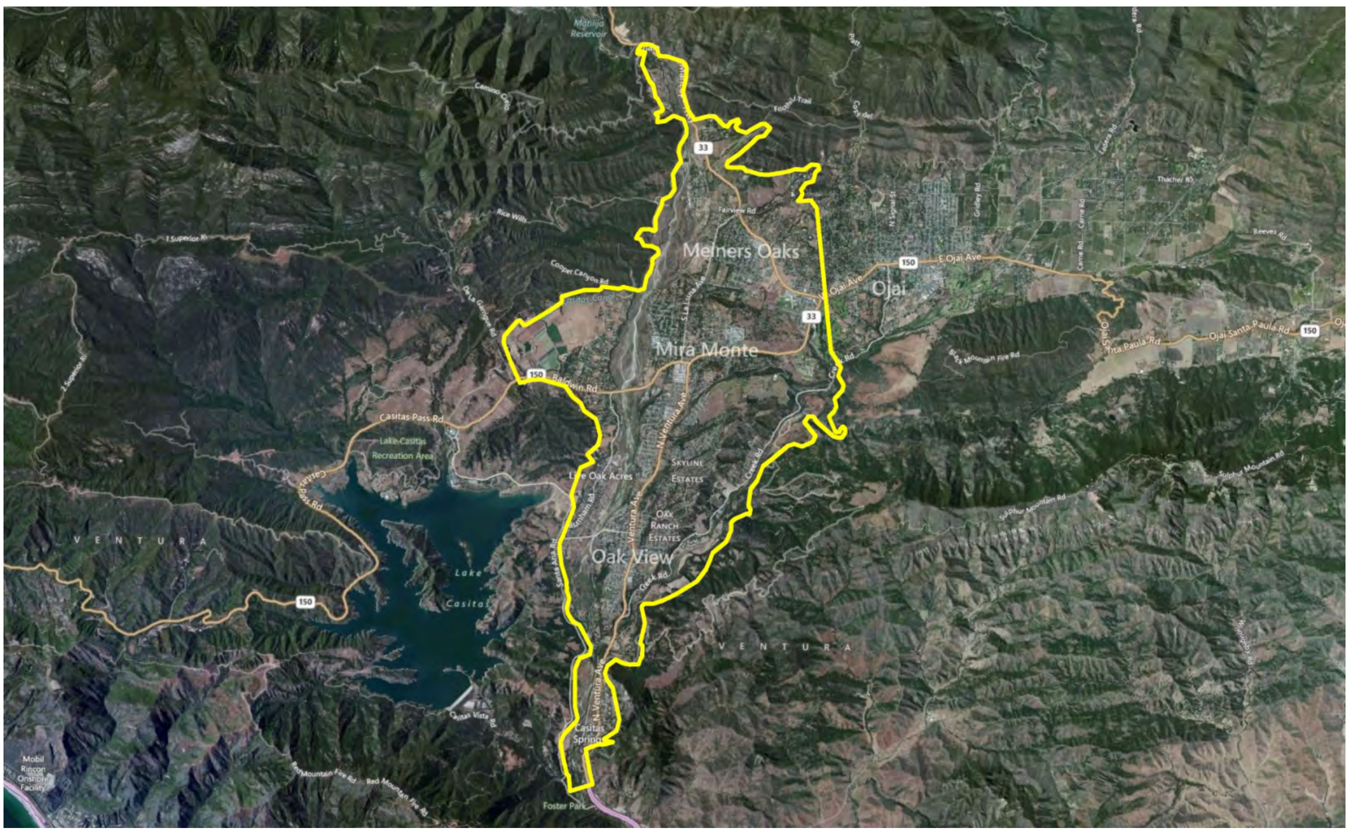


Figure 3-28: Map showing nitrate concentrations (mg/l). One of the six wells sampled this year has a nitrate concentration above the MCL for drinking water.

3.2.20 - Upper Ventura River Basin

The Upper Ventura River Basin is mainly composed of thin alluvial deposits. Past County reports have included Lake Casitas within the boundary for the Upper Ventura River Basin. We no longer consider the saturated alluvium beneath the lake as an aquifer so we have excluded that area from our basin map. There are approximately 346 wells in the Upper Ventura River Basin; 153 are active water supply. Figure D-22, piper diagram, shows low variation in water quality. The dominant cation is calcium; the remainder have no dominant anion. The wells were calcium magnesium, chloride fluoride sulfate type. The wells sampled are both less than 125 feet deep, and have good water quality. Both have TDS concentrations that exceed the secondary MCL for drinking water, with an average concentration of 827 mg/l. Figure D-23, piper diagram, shows a comparison of the water chemistry for the Upper and Lower Ventura River Basins. Water chemistry is similar except the Upper Ventura River basin is higher in calcium.

Figure 3-29 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Upper Ventura River basin.



Aerial photo showing the extent of the Upper Ventura River groundwater basin.

Upper Ventura River Basin

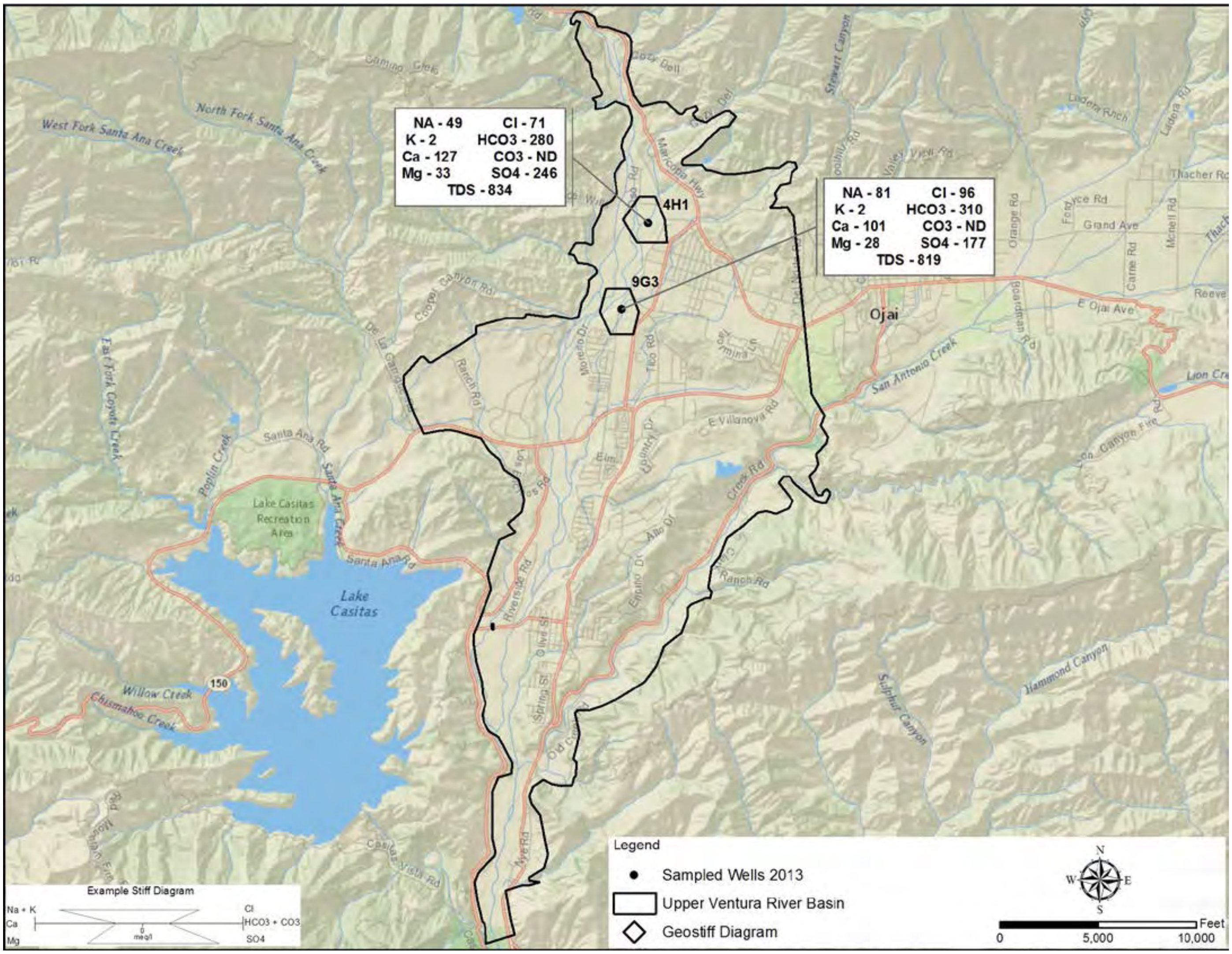
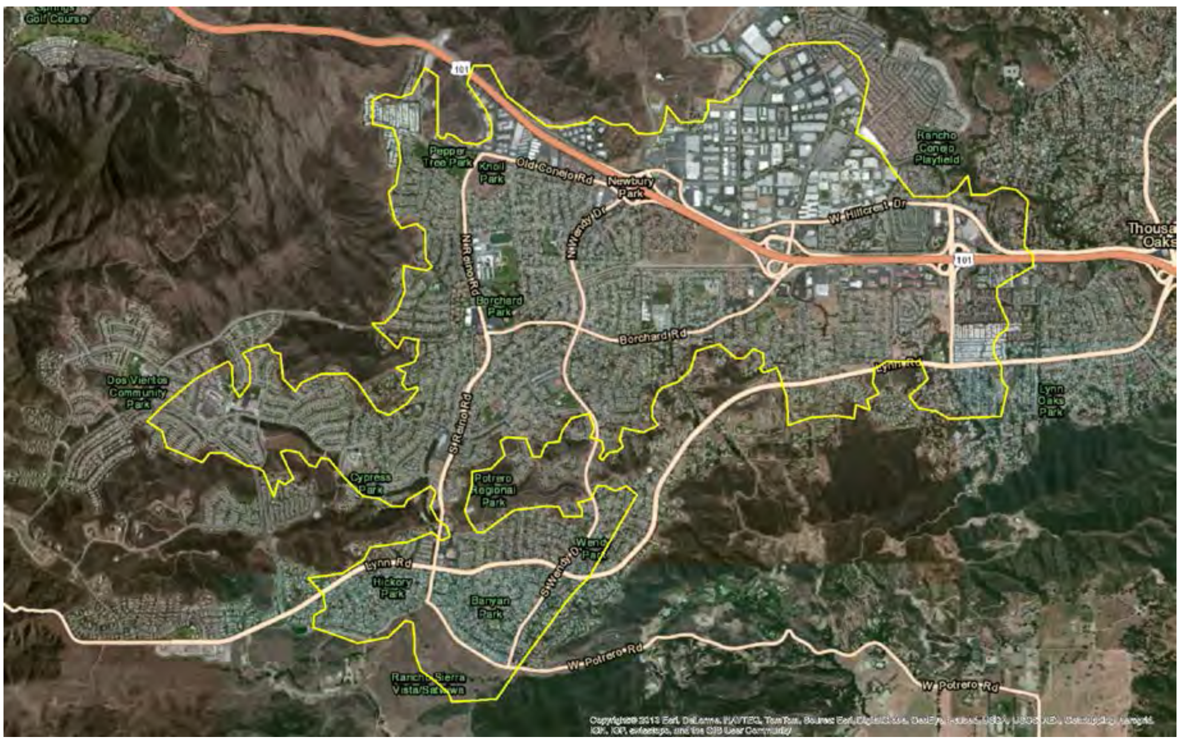


Figure 3-29: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

3.2.21 – Conejo Valley Basin

The Conejo Valley Basin has very few active water wells available for sampling. The depth to groundwater averages about 50 feet. There are approximately 170 wells in the Conejo Valley Basin; 11 are active water supply wells. One well at the northwest corner of the basin was sampled this year. Figure D-35, piper diagram, shows water quality of the well sampled this year. There is no dominant cation; bicarbonate is the dominant anion. The water is magnesium calcium, bicarbonate type. TDS concentration is above the secondary MCL for drinking water. The sample was analyzed for inorganic chemicals (Title 22 metals). No inorganic chemical was above the MCL for drinking water.

Figure 3-30 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Upper Ventura River basin.



Aerial photo showing the extent of the Conejo Valley groundwater basin.

Conejo Valley Basin

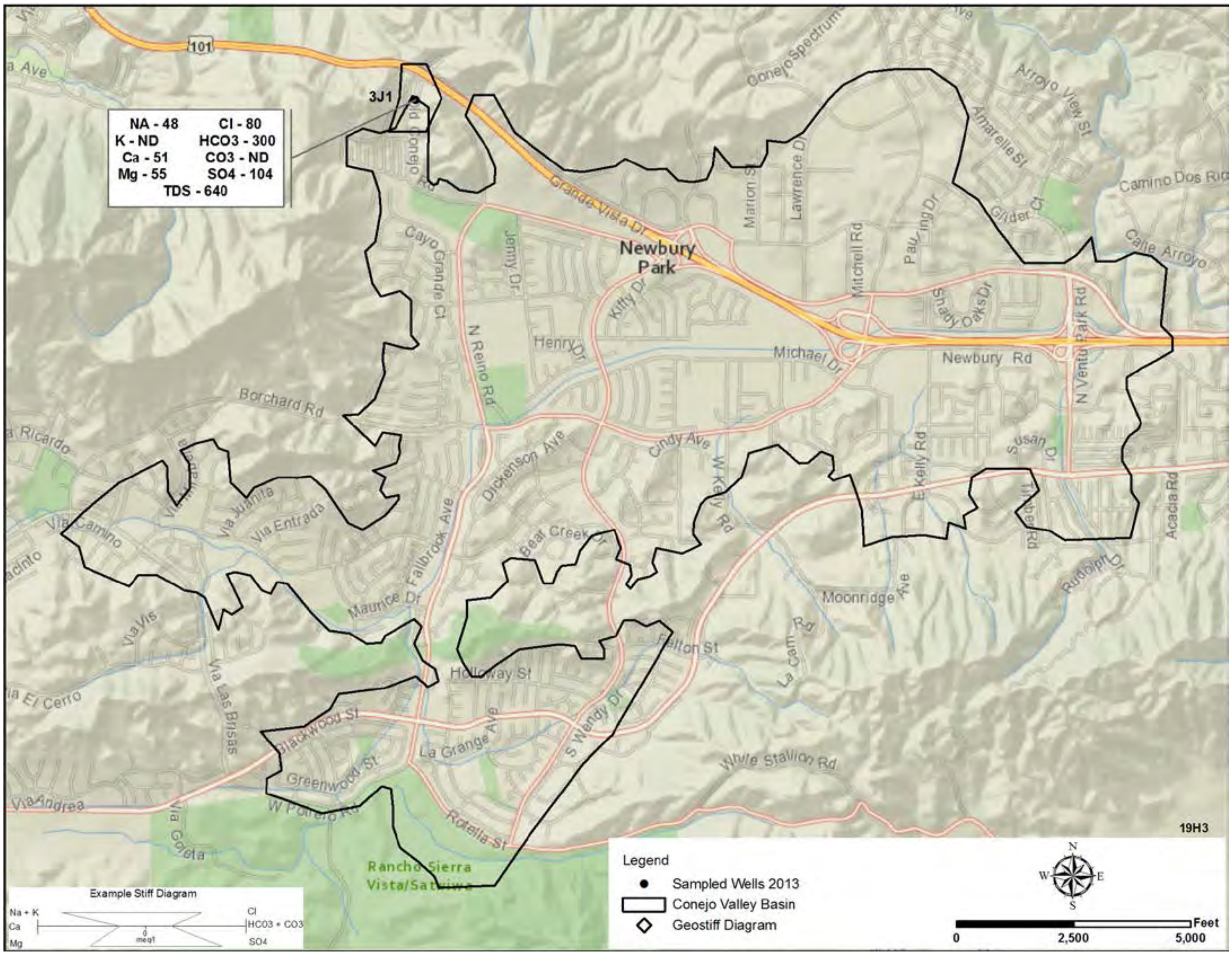


Figure 3-30: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagrams.

3.2.22 - North Coast Basin

The North Coast Basin does not fit the definition of a basin based solely on the Glossary of Geology definition that defines a basin as an aquifer or aquifer system having well defined boundaries and more or less definite areas of recharge and discharge. The North Coast Basin consists of narrow, thin strips of permeable sediments and marine terrace deposits along the coastline from Rincon Creek to just north west of the Ventura River. There are 44 wells in the North Coast Basin; only 8 are active water supply wells with the majority in the northwest portion along Rincon Creek. Water samples were collected from three wells at the northwest end of the basin. Figure D-36, piper diagram, shows moderate variation in the water quality of the wells sampled this year. There is no dominant cation; bicarbonate is the dominant anion in one sample, sulfate in one sample, and one sample has no dominant anion. The water is calcium magnesium, chloride fluoride sulfate type in two samples and calcium magnesium, bicarbonate type in the remaining sample. All samples have TDS above the secondary MCL with an average of 974 mg/l and two have sulfate concentrations above the secondary MCL. One well (35A07) had iron, manganese and zinc well above the MCL for drinking water but it had not been pumped on a regular basis this year. Figure 3-31 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the North Coast basin.

Aerial photo showing the extent of the North Coast groundwater basin.

NORTH COAST BASIN

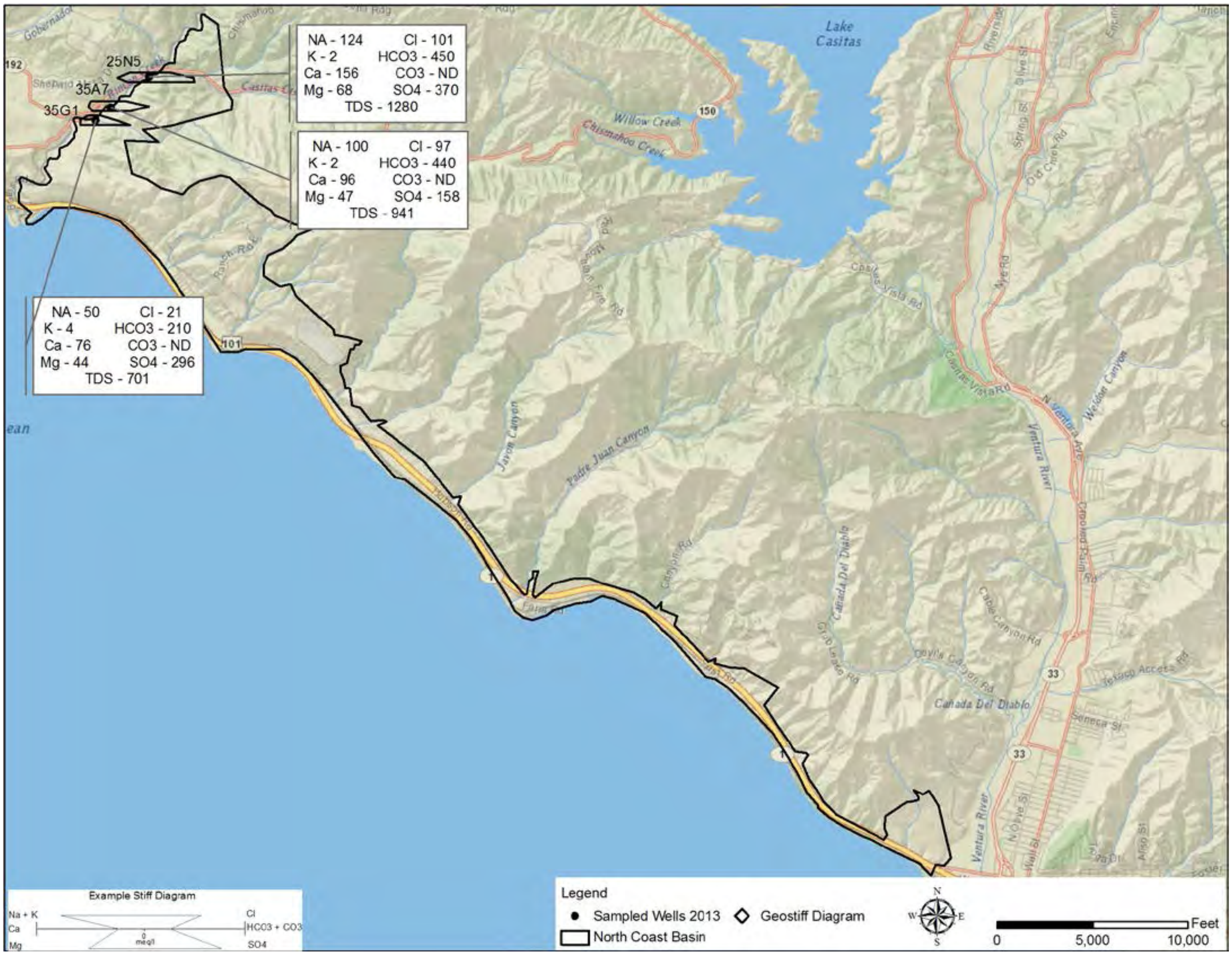
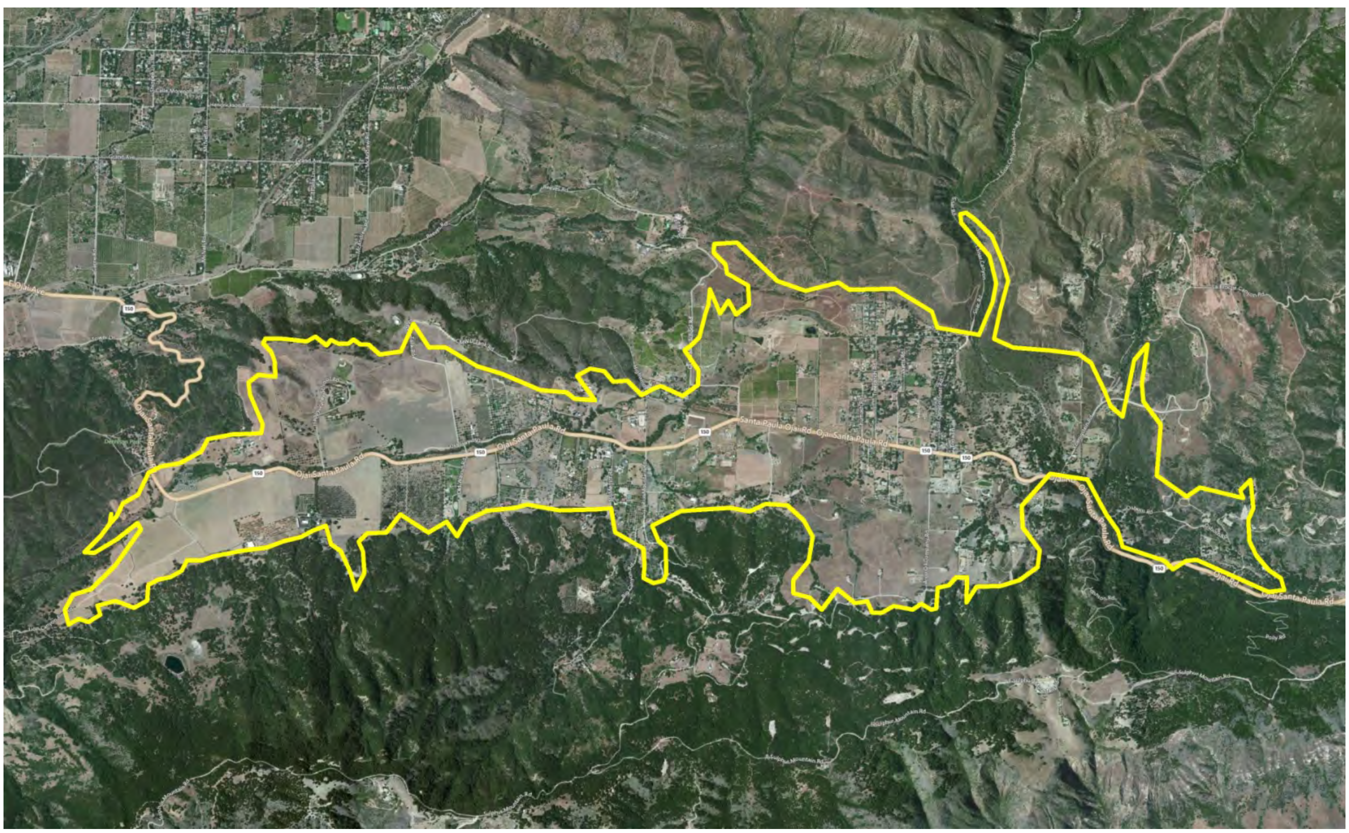


Figure 3-31: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents and piper diagram.

3.2.23 - Upper Ojai Basin

The Upper Ojai Basin is a small, linear valley southeast of and at a higher elevation than the Ojai Valley Basin. The average thickness of water bearing deposits is approximately 60 feet and is encountered approximately 45 to 60 feet below ground surface. Groundwater quality is considered good, but varies seasonally and usually has better quality during winter months. There are approximately 150 wells in the Upper Ojai Basin; 97 are active water supply wells. Five wells were sampled this year. Figure D-32, piper diagram, shows high variation in the water quality of the wells sampled this year. Calcium is the dominant cation in two samples; sodium potassium group in one sample and there is no dominant cation in the remaining two samples. Bicarbonate is the dominant anion in three samples, and one sample has no dominant anion. The water is calcium magnesium, chloride fluoride sulfate type in one sample; and calcium magnesium, bicarbonate type in three samples and sodium fluoride, bicarbonate type in the remaining sample. TDS for the wells sampled this year ranged from 375 to 764 mg/l with an average concentration of 613. One well has an iron concentration well above the secondary MCL and two wells have manganese concentrations above the MCL for drinking water. Water samples from three wells were analyzed for inorganic chemicals (Title 22 metals). No inorganic chemical was above the primary MCL for drinking water. Figure 3-32 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled.



Aerial photo showing the extent of the Upper Ojai groundwater basin.

UPPER OJAI BASIN

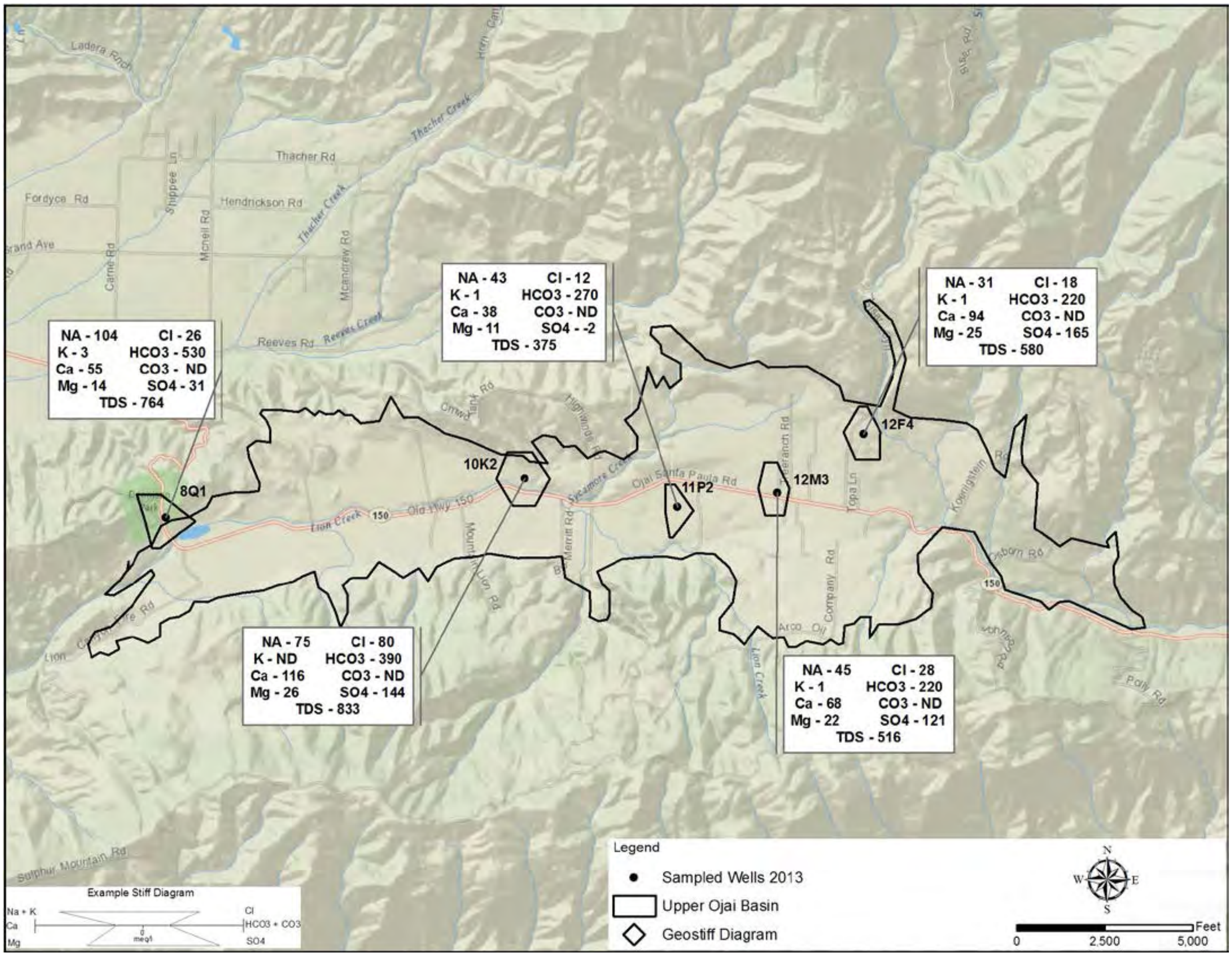
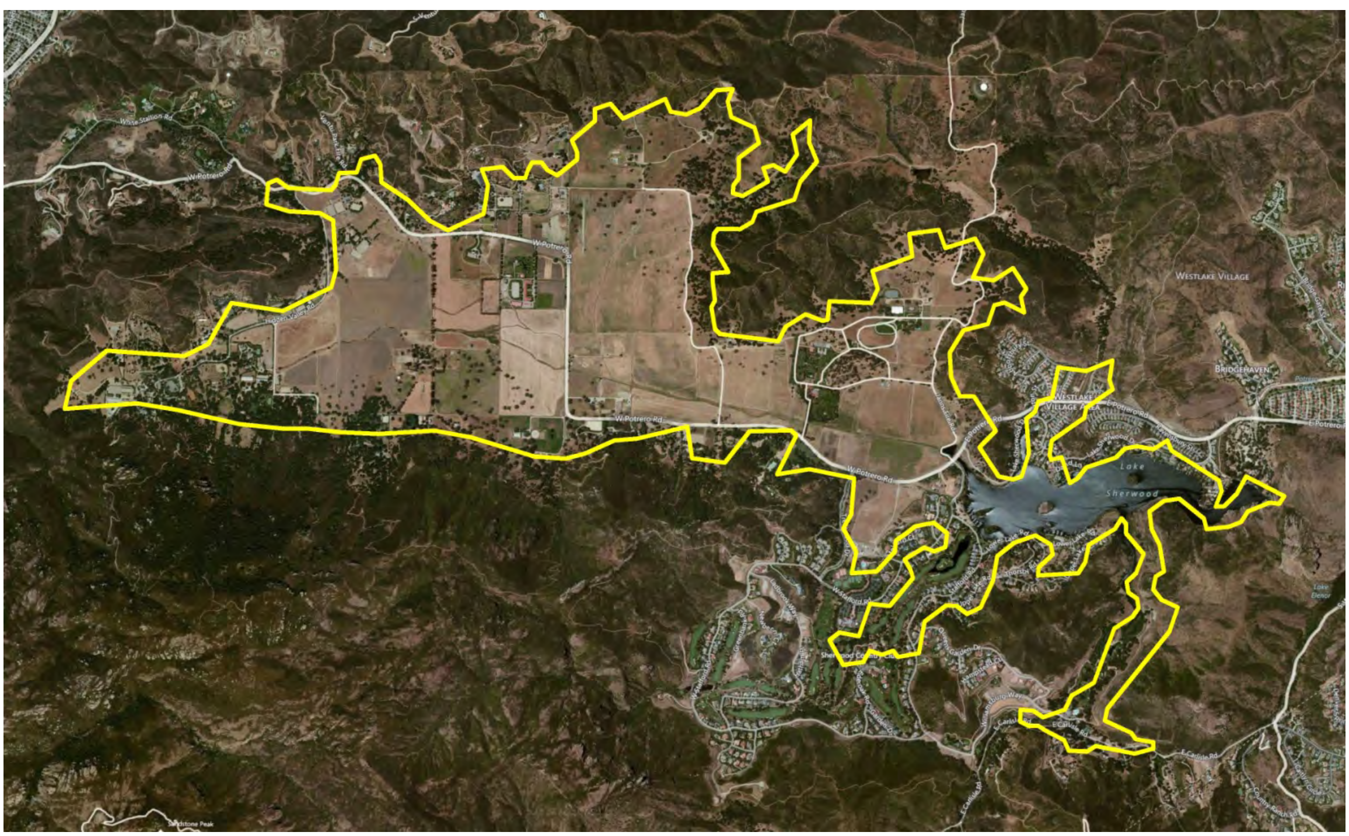


Figure 3-32: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents.

3.2.24 - Sherwood Basin

The Sherwood Basin consists mainly of fractured volcanic rock providing inconsistent groundwater supply throughout the basin because much of the water is stored in fractures. The water quality varies because of the heterogeneous nature of the aquifer. There are approximately 155 water supply wells in the Sherwood Basin; 99 are active. Four wells were sampled and analyzed this year. Figure D-37, piper diagram, shows high variation in the water quality of the wells sampled this year. Calcium is the dominant cation in one samples; sodium potassium group in one sample and there is no dominant cation in the remaining two samples. Bicarbonate is the dominant anion in three samples, and one sample has no dominant anion. The water is calcium magnesium, chloride fluoride type in one sample; and calcium magnesium, bicarbonate type in two samples and sodium fluoride, bicarbonate in the remaining sample. Manganese is above the secondary MCL in one well; iron and TDS are above the secondary MCL in all three wells. TDS concentrations range from 429 to 1110 mg/l with an average of 706 mg/l for wells sampled this season. Water samples from two wells were analyzed for inorganic chemicals (Title 22 metals). No inorganic chemical was above the primary MCL for drinking water. Figure 3-33 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Sherwood basin.



Aerial photo showing the extent of the Lake Sherwood groundwater basin.

SHERWOOD BASIN

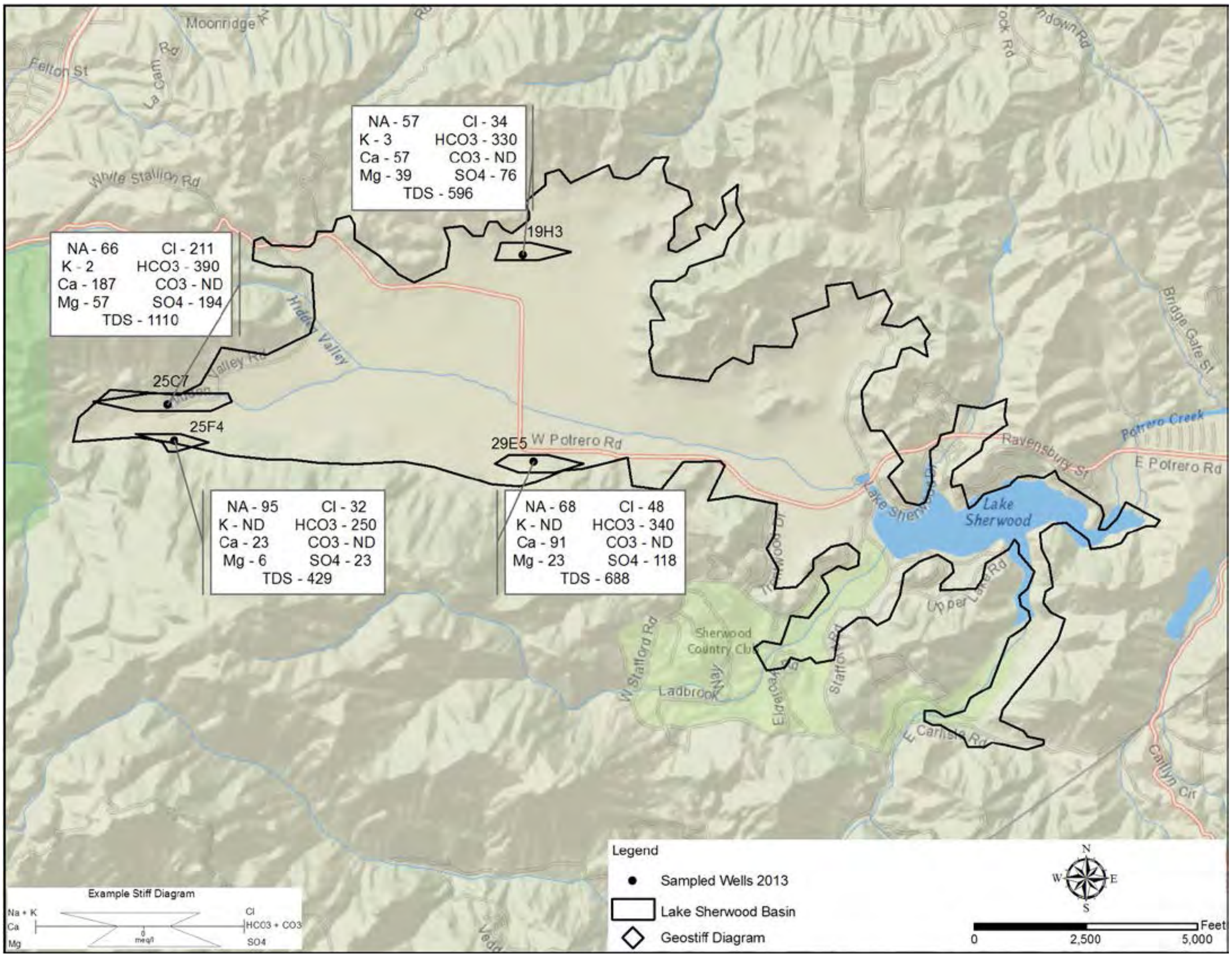
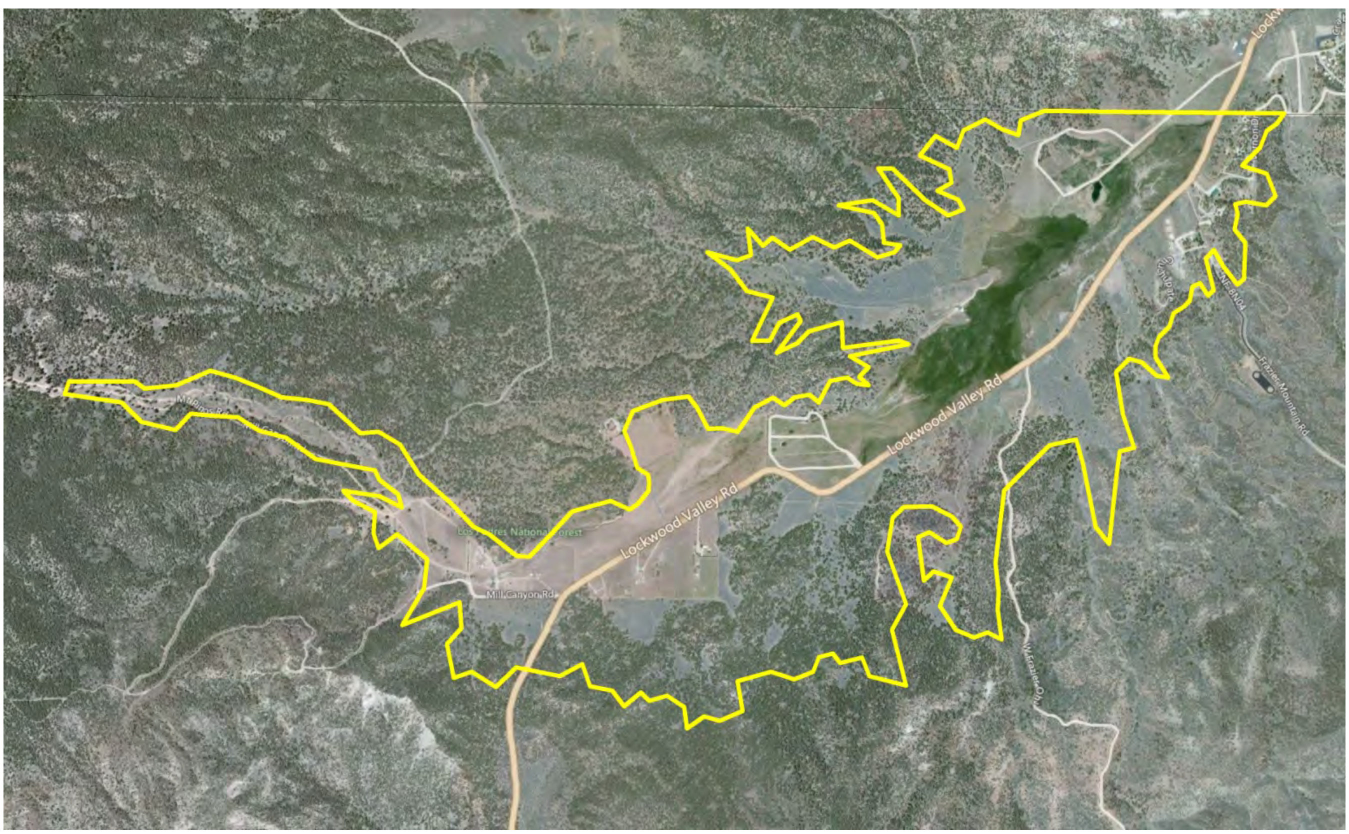


Figure 3-33: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents.

3.2.25 - Little Cuddy Valley Basin

The Little Cuddy Valley Basin is located in the northeastern part of Ventura County near the Kern County Line. Groundwater bearing layers consist of permeable sediment lenses in the Quaternary and Tertiary rocks and Holocene shallow alluvium with the syncline that makes up the valley floor. Depth to water bearing material is approximately 20 to 30 feet. Historically groundwater quality has been considered very good. There are approximately 30 wells in the Little Cuddy Valley Basin; 27 are active water supply wells. Two wells were sampled in the basin this year. Figure D-38, piper diagram, shows low variation in the water quality of the wells sampled this year. Calcium is the dominant cation in one sample; there is no dominant cation in the remaining sample. Bicarbonate is the dominant anion in both samples. The water is calcium magnesium, chloride fluoride type. TDS is above the MCL for drinking water in one of the wells. Both samples were analyzed for inorganic chemicals (Title 22 metals) and gross alpha. No inorganic constituent or radionuclide was above the MCL for drinking water. Figure 3-34 shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) and sulfate (SO_4^{2-}) for the wells sampled in the Little Cuddy Valley basin.



Aerial photo showing the extent of the Little Cuddy Valley groundwater basin.

LITTLE CUDDY VALLEY BASIN

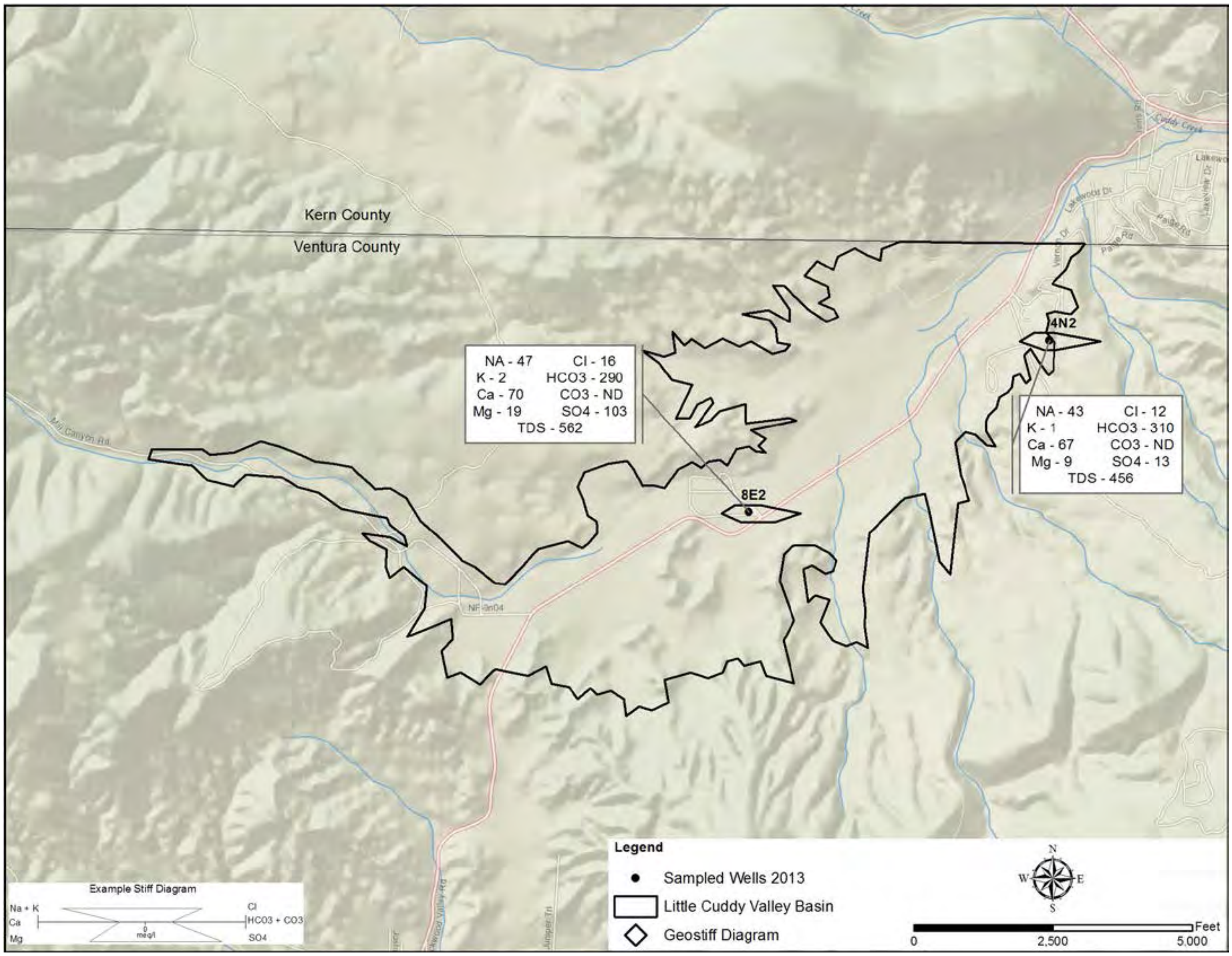


Figure 3-34: Map showing approximate location of sampled wells with concentrations (mg/l) of selected inorganic constituents.

Section 4.0
Water Quantity

4.1 – Groundwater

The following sub-sections describe the Groundwater Section's annual groundwater level monitoring program, involvement in the State CASGEM program, as well as, a general overview of water use in the County for 2013.

4.1.1 – CASGEM Program

The California Statewide Groundwater Elevation Monitoring (CASGEM) Program was developed by the Department of Water Resources (DWR) in response to the passing of Senate Bill Number 6 in November 2009. The law directs that groundwater elevations in all basins and subbasins in California be regularly and systematically monitored, preferably by local entities, with the goal of demonstrating seasonal and long-term trends in groundwater elevations. DWR is directed to make the resulting information readily and widely available. The CASGEM program established a permanent, locally-managed system to monitor groundwater elevation in California's alluvial groundwater basins and subbasins identified in DWR Bulletin No. 118. The CASGEM program relies and builds on the many, established local long-term groundwater monitoring and management programs.

The Ventura County Watershed Protection District (VCWPD) acts as the Umbrella Monitoring Entity for Ventura County. The Groundwater Section staff collect water level data quarterly or semi-annually. The County compiles data it collects along with water level measurements taken by other agencies and uploads it to the CASGEM website a minimum of two times per year.

4.1.2 – Water Level Measurements

Groundwater Section staff, and several water districts and purveyors measure water levels in production and monitoring wells throughout the County. Changes in water levels are tracked and help determine change in storage, and to track trends in groundwater extraction and recharge. Last year, water levels were measured quarterly in approximately 200 wells throughout the County. In the southern half of the County, water levels were measured four times, while in the more remote northern half, wells are monitored twice each year. "Key" wells for seventeen of the largest groundwater basins in the County have been established. A key well is a well selected as one giving the most representational data for the basin, or for a specific aquifer in a basin. Key wells are chosen based on their location in the basin, and availability of construction information and historical water level data.

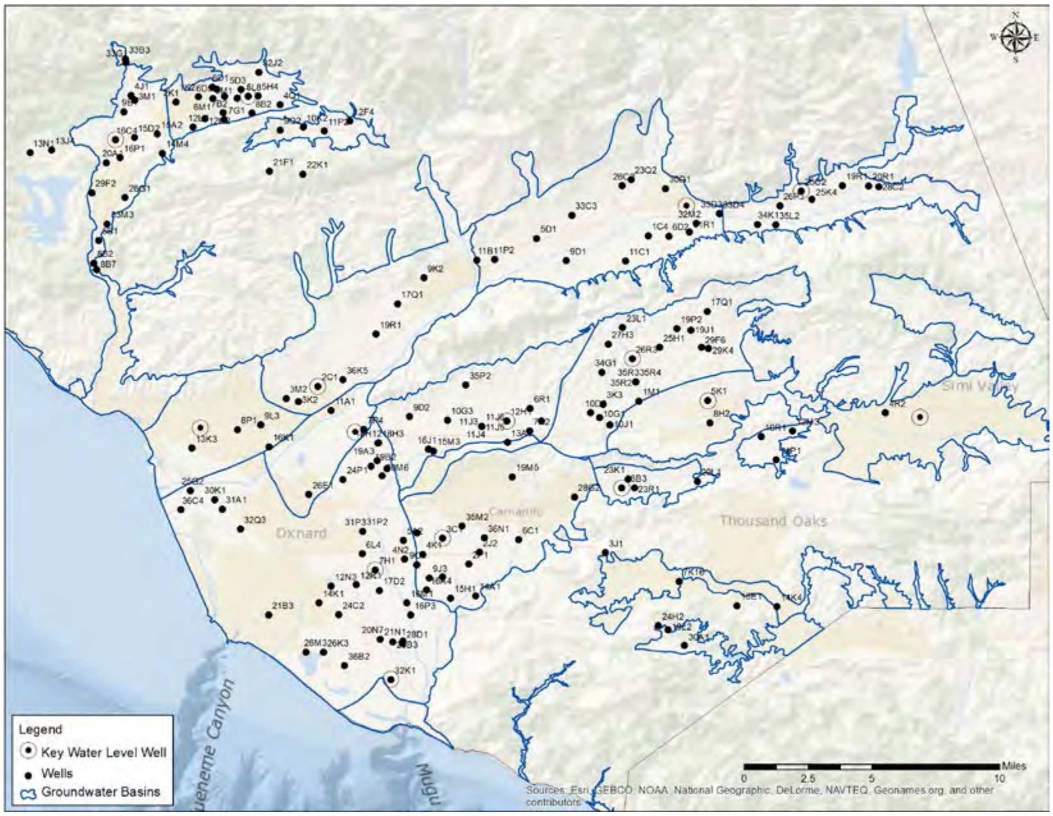


Figure 4-1: Water level wells measured in the southern half of the County.

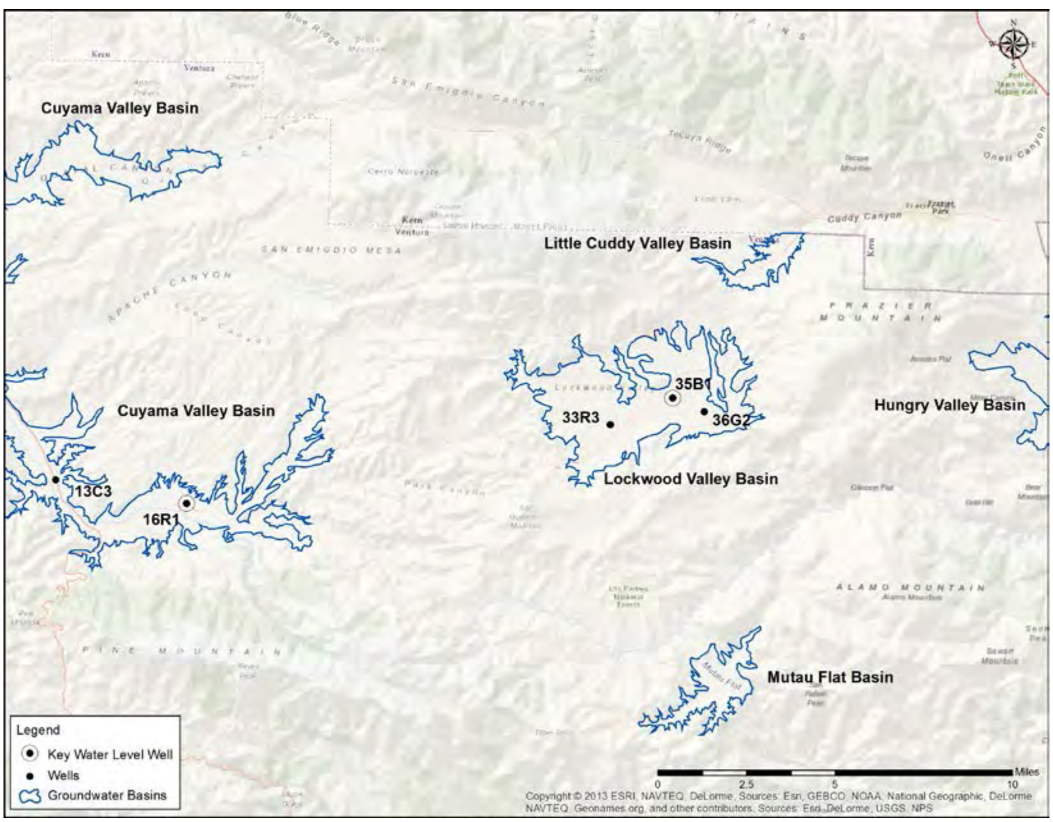


Figure 4-2: Water level wells measured in the northern half of the County.

4.1.3 – Water Level Hydrographs

The Groundwater Section maintains a database containing current and historical water levels for wells throughout the County. The database produces hydrographs for measured wells and can be used to show fluctuations in groundwater levels on a yearly basis or track long-term trends in a basin over decades. This data along with climate, stream flow, groundwater recharge, quality and pumping data can be used to determine groundwater conditions in the County. Hydrographs for all "key" water level wells are shown in Appendix B. An example hydrograph for Well No. 01N21W02J02S is shown below (Figure 4-3).

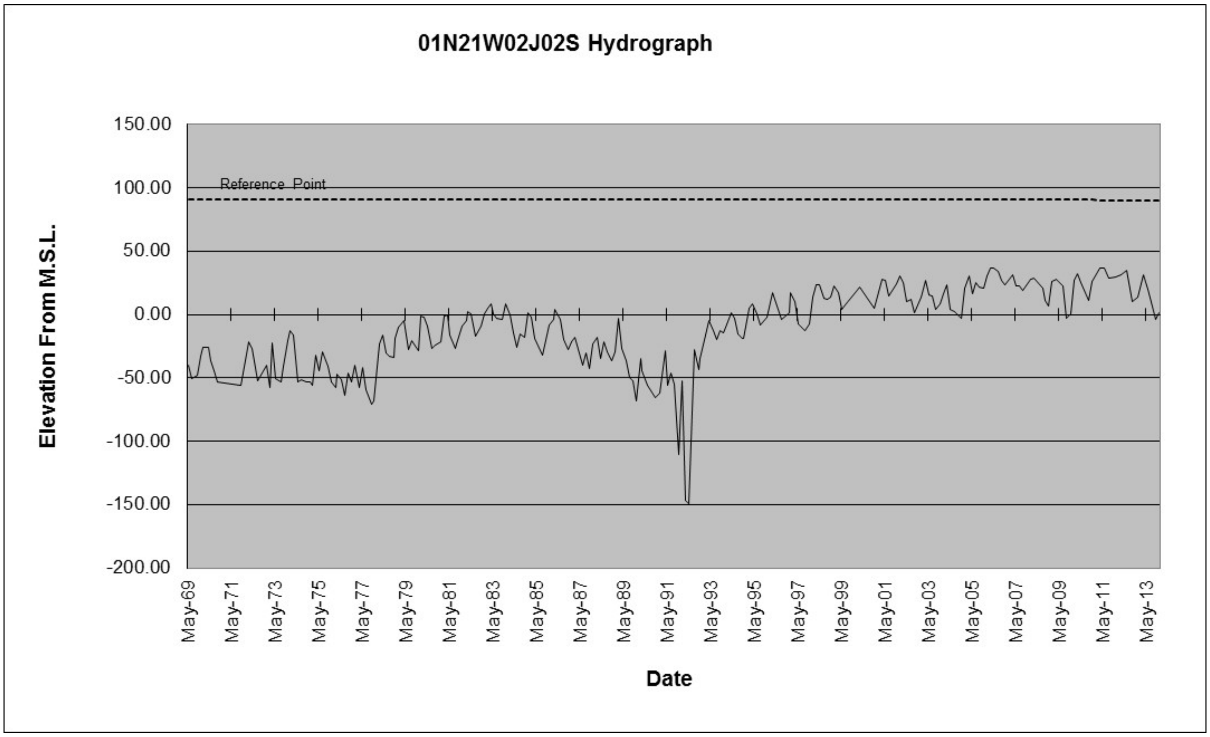


Figure 4-3: Water level hydrograph for Well No. 01N21W02J02S located in the Pleasant Valley basin.
*reference point – the elevation of the measuring point of the well.

4.1.4 – Summary of Changes to Spring Depth to Groundwater in Key Wells

The following summary is based on information gathered from key wells from major groundwater basins as shown in Table B-2 in Appendix B. The increase or decrease in water level for the year and the water level data referred to is the spring measurement or the first measurement of the year for those wells measured twice each year.

The Forebay area of the Oxnard Plain, responds quickly to seasonal and annual changes in precipitation and recharge. The water elevation in the Forebay area key Well No. 02N22W12R01S (UWCD) was down 26.9 feet from the 2012 measurement which was down 30.5 feet from the 2011 measurement. The water elevation in the Oxnard aquifer key Well No. 01N21W07H01S was down 8.7 feet from the previous spring. The water elevation in the Oxnard Plain Fox Canyon aquifer key Well No. 01N21W32K01S was down 14 feet from the 2012 spring measurement.

In the Pleasant Valley Fox Canyon aquifer the water level elevation in key Well No. 01N21W03C01S was down 15.5 feet from the 2012 measurement.

In the Las Posas valley, the water level elevation in the West Las Posas basin key Well No. 02N21W12H01S was down 4.3 feet from the 2012 spring measurement. In the East Las Posas basin the water level elevation in key Well No. 03N20W26R03S was down 1.6 feet. The water levels in this well have been declining over the previous ten year period, with the exception of 2003 and 2007. The water level elevation in the South Las Posas key Well No. 02N19W05K01S continued its slight upward trend of the past several years but was down slightly 0.9 feet in 2013. The depth to water in this well has risen from 136 feet to 27 feet below ground surface since 1975. This trend is attributed to groundwater recharge from treated effluent from upstream waste water treatment plants and groundwater discharge to surface from the Simi Valley basin.

In the Santa Rosa Valley the water level elevation in key Well No. 02N20W26B03S was down 10.9 feet from the 2012 measurement. The water level elevation in the Simi Valley Basin key Well No. 02N18W10A02S was down 8.1 feet from the 2012 measurement. This well has seen only slight changes in depth over the past ten years (less than plus or minus 10 feet).

In the Ojai Valley, the water level elevation in key Well No. 04N22W05L08S was down 78.4 feet from the 2012 measurement after having recovered from the 31.1 foot decline in 2009. The Ojai Valley basin responds quickly to rainfall or the lack of rainfall, and it is not uncommon to see large drops in water level during dry periods and recovery to at or above normal levels during wet periods (see Hydrograph in Appendix B). In the northern end of the Upper Ventura River Basin, the water level elevation in key Well No. 04N23W16C04S was down 20.1 feet from the measurement in 2012.

The basins that underlie the Santa Clara River valley are other areas that respond quickly to fluctuations in annual rainfall. The water level elevation in the Piru basin key well was down 8.7 feet in 2013 from 2012. The water level elevation in the Fillmore basin key well was down 3.5 feet after being down 6.7 feet the previous spring, and in the Santa Paula basin the water level elevation in the key well was down 1.7 feet from the 2012 measurement. In the Mound basin the water level elevation in key Well No. 02N22W07M02S was down 2.3 feet from the 2012 spring measurement.

In the north half of the County the Lockwood Valley basin key Well No. 08N21W35B01S was unable to be measured in the spring of 2013. The water level elevation in the Cuyama Valley basin key Well No. 07N23W16R01S was down 6.9 feet after being down 3.6 feet for the 2012 measurement.

4.1.5 – Groundwater Extractions

Groundwater is extracted and used for domestic, municipal and industrial uses, the majority of reported groundwater extractions (≈ 70%) in the Fox Canyon Groundwater Management agency is used for agricultural irrigation purposes with the remaining 30% for municipal, industrial and domestic uses (FCGMA 2012 Annual Report). The owners and operators of wells within the boundaries of any of the three Groundwater Management Agencies, Fox Canyon Groundwater Management Agency, Ojai Basin Groundwater Management Agency and United Water Conservation District, are required to report their groundwater extractions twice each year to the respective agency. Approximately 2,000 of the 3,500 plus active wells in the County are within one or more of these agency boundaries. Owners of wells located outside of these agencies are not required to report their extractions but are asked to report the status of their well to the County each year. The table at the top of the following page compares extractions reported to the three agencies for the years 2005 to 2013. Note: the boundaries of the FCGMA and UWCD overlap.

Table 4-1: Groundwater extractions within reporting agencies 2005-2013[3,7,8]

	Agency		
Reported Extractions (AF)	UWCD	FCGMA	OBGMA
2005-1	58,045.00	41,811.56	1,748.07
2005-2	95,174.00	64,578.80	2,880.39
Annual Total 2005	**153,219.00**	**106,390.35**	**4,628.46**
2006-1	65,469.00	43,697.47	1,722.17
2006-2	101,684.00	69,827.60	2,234.77
Annual Total 2006	**167,153.00**	**113,525.07**	**3,956.94**
2007-1	90,701.00	59,449.79	2,708.68
2007-2	108,289.70	77,642.73	2,759.06
Annual Total 2007	**198,990.70**	**137,092.52**	**5,467.74**
2008-1	90,997.65	63,821.98	2,650.38
2008-2	102,106.68	75,467.27	2,590.30
Annual Total 2008	**193,104.33**	**139,289.25**	**5,240.68**
2009-1	82,505.37	62,497.79	2,553.48
2009-2	104,049.64	81,274.51	2,871.94
Annual Total 2009	**186,555.01**	**143,772.30**	**5,425.42**
2010-1	69,541.85	52,696.43	2,004.86
2010-2	89,558.90	68,875.72	3,001.11
Annual Total 2010	**159,100.75**	**121,572.15**	**5,005.97**
2011-1	72,940.07	52,422.24	2,050.00
2011-2	86,560.99	62,933.95	3,099.00
Annual Total 2011	**159,501.06**	**115,356.19**	**5,149.00**
2012-1*	78,716.61	59,551.19	2,845.56
2012-2**	99,285.26	74,930.63	2,559.40
Annual Total 2012	**178,001.87**	**134,481.81**	**5,404.96**
2013-1**	87,695.27	63,539.88	2,754.63
2013-2		Not Yet Reported	

*Reflects revised values for all agencies.

**Values are subject to change.

4.2 – Surface and Imported Water

The following subsections focus on water supplied and imported by the three wholesale water districts in the County: United Water Conservation District (UWCD), Casitas Municipal Water District (Casitas) and Calleguas Municipal Water District (Calleguas).

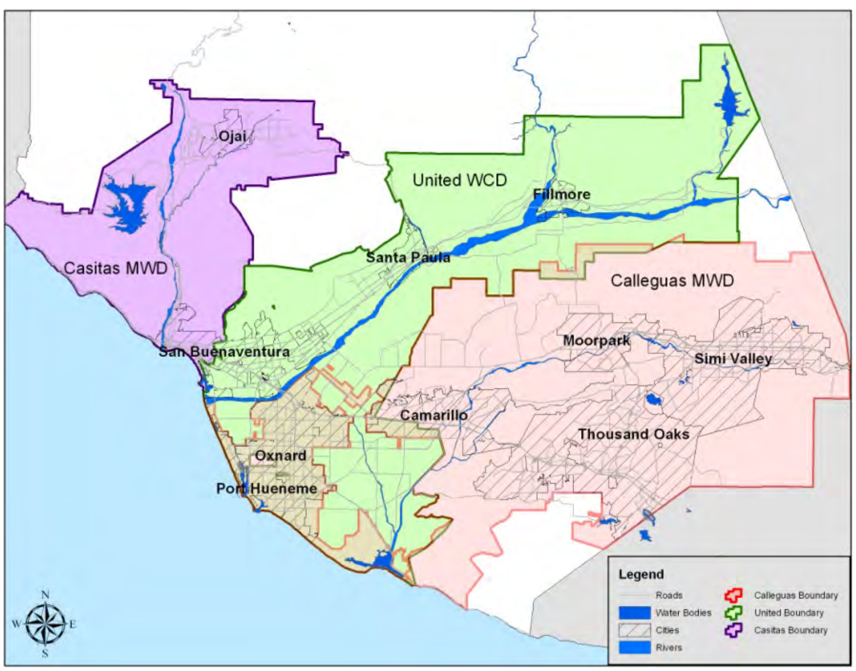


Figure 4-4: Map of the boundaries of the three wholesale water districts within the County.

[7] Data courtesy of FCGMA.

[8] Data courtesy of OBGMA.

4.2.1 – Surface & Imported Water Background

Of the ten incorporated cities within Ventura County only two, Santa Paula and Fillmore do not rely on water supplied by one of the three major wholesale districts (Casitas Municipal Water District, Calleguas Municipal Water District and United Water Conservation District).

Two cities (Ventura and Oxnard) use a blend of imported water, groundwater and treated surface water to meet demands. The City of Ventura's water supply comes from treated water diverted from the Ventura River, groundwater extracted from City wells, and from Lake Casitas delivered by Casitas MWD. The City of Oxnard receives water from UWCD, imported water from Calleguas and groundwater from City well fields.

In the south half of the County, the cities of Simi Valley, Moorpark and Thousand Oaks as well as the Communities of Bell Canyon, Newbury Park, Hidden Valley, Lake Sherwood, Oak Park and part of Westlake Village rely mainly on water imported from Calleguas.

The City of Simi Valley residents receive water from Ventura County Water Works District 8 (VCWWD8). The District extracts groundwater currently used for agricultural purposes, from three wells in the Tapo Canyon area. Also, groundwater is extracted from several wells at the west end of the city for de-watering purposes. The water from these wells is discharged to the Arroyo Simi. The City is currently nearing completion of the Tapo Canyon Water Treatment Plant, a 1 MGD treatment plant, which will utilize the three Tapo Canyon wells to provide water to approximately 500 homes. Golden State Water Company (GSWC) in Simi Valley extracts groundwater from one well and blends it with imported water from Calleguas (10% groundwater, 90% imported water)[9]. VCWWD8 serves 68% of demand or over 23,000 AF of water while GSWC serves the remaining 32%, approximately 8,500 AF[10]. In 2013 Calleguas delivered 23,220.5[6] AF to VCWWD8 and 6,583.7[6] AF to GSWC.

The City of Moorpark residents receive water from Ventura County Water Works District 1 (VCWWD1). Approximately 75-80% of VCWWD1's water is imported from Calleguas. In 2013 Calleguas delivered 8,630.4[6] AF to VCWWD1. The City also extracts groundwater from two wells used for park irrigation.

The City of Thousand Oaks extracts groundwater using it for median irrigation on Hillcrest Ave and golf course irrigation at the Los Robles Golf Course. California Water Service and California American Water along with the City of Thousand Oaks Water Department provide water imported from Calleguas in the Thousand Oaks, Newbury Park and Westlake Village area. According to the City of Thousand Oaks 2010 Urban Water Management Plan, the City supplies water to approximately 36% of water users, California American Water 48%, and California Water Service Company 16%. In 2013 these three water purveyors received 38,842.1[6] AF of water from Calleguas.

The City of Camarillo relies on groundwater and imported water from Calleguas. The city extracts groundwater from four wells, supplying approximately 40-50% of the city's water demand with the remaining demand supplied by imported water. In 2013 Calleguas delivered 5,223[6] AF of water to the City of Camarillo. Water for some residents is supplied by Pleasant Valley Mutual (groundwater and imported water), Crestview Mutual (groundwater and imported water), California American Water Co. (imported water), and Camrosa Water District (groundwater and imported water).

The Port Hueneme Water Agency receives and treats water from UWCD and blends it with water from Calleguas for the City of Port Hueneme, Channel Islands Beach Services Community District and Naval Base Ventura County.

[9] Golden State Water Company, 2010 Urban Water Management Plan – Simi Valley.

[10] Ventura County Waterworks District No. 8, City of Simi Valley, 2010 Urban Water Management Plan.

In the Ojai Valley the City of Ojai and the communities of Casitas Springs, Meiners Oaks and Oak View rely on a mixture of groundwater extracted by local purveyors, and wholesale water from Lake Casitas delivered by the Casitas Municipal Water District to local water purveyors.

In the Santa Clara River Valley area, the City of Santa Paula relies on local groundwater (approximately 5,000 to 7,000 AF/yr based on reporting to UWCD). In addition, some surface water is diverted from Santa Paula Creek (approximately 500 AF/yr)[11] and is sent to Canyon Irrigation Company in exchange for extraction credits for the Santa Paula Basin. The City of Fillmore relies solely on groundwater extracted from City water wells (approximately 2,600 to 2,800 AF/yr based on reporting to UWCD). The community of Piru relies on groundwater delivered by local water purveyors.

Residents of the Lockwood Valley area and the Santa Monica Mountains area, as well as, residents living in areas not served by a water company rely on private domestic water wells. Water is extracted from groundwater basins, or from fractured volcanic rock and bedrock in areas outside of groundwater basins.

4.2.2 – Wholesale Districts

Of the three water wholesalers in the County, Calleguas delivers the largest volume of water to retailers. Approximately 75% of the population in the County receives water imported by Calleguas. Calleguas, a member agency of the Metropolitan Water District (MWD), imports State Water Project (SWP) water from northern California. Calleguas delivered 111,283[6] AF of water to retailers in 2013 compared to 104,104[6] AF in 2012 and 97,218[6] AF in 2011. The Calleguas Municipal Water District imported a total of 112,466[6] AF of treated SWP water in 2013. Production from the District's ASR wellfield was 1,042.6 AF in 2013 (FCGMA 2013 data). Some imported water is also injected in the East Las Posas groundwater basin through the Las Posas Aquifer Storage and Recovery (ASR) Project. 1,461.4 AF of water was injected in 2013 in the ASR wellfield (FCGMA 2013 data). Up to 11,000 AF of water can be stored by Calleguas in Lake Bard and can supply all of the District's needs for short periods of time. The end of year volume of water in storage in Lake Bard was 9,800[6] AF. The Las Posas Basin ASR wellfield currently has 18 wells, operated by Calleguas. The wells are 800 to 1,200 feet deep and perforate the Fox Canyon Aquifer (Calleguas 2007).

UWCD delivered 24,358.1[4] AF of water to retailers and end-users in 2013 down from 32,638[4] AF in 2012. UWCD can store up to 87,000 AF of water in Lake Piru. At the end of 2013 there was 18,163[4] AF of water in storage in Lake Piru. UWCD released 5,798[4] *(preliminary data)* AF of water from the lake in 2013. UWCD imported 2,890[4] AF of State Project water into Ventura County from Lake Pyramid in 2013. Water released from Lake Piru flows down Piru Creek to the Santa Clara River where it is ultimately diverted downstream at the Freeman Diversion Dam. UWCD operates spreading basins in the Oxnard Forebay Groundwater Basin for the purpose of groundwater recharge. Some of the water diverted from the Santa Clara River at the Freeman diversion is sent to the spreading basins in Saticoy and El Rio, the remainder is sent through the Pleasant Valley Pipeline (PVP) and the Pumping Trough Pipeline (PTP). Table 4-2 and Figure 4-3 on the following page compare the volume of water diverted and sent to spreading grounds by UWCD. Annual precipitation for the period of 1995 to 2013 is also shown, however recharge to basins is also a function of State Water Project deliveries and restrictions form agencies.

[11] Data from City of Santa Paula 2010 Urban Water Management Plan

Table 4-2: Comparison of precipitation versus recharge water volume by Calendar Year for UWCD[4].

CY Year	Precipitation El Rio Spreading Grounds Gage 239(in.)	Saticoy Recharge (AF)	El Rio Recharge (AF)	Noble Pit (AF)
1995	27.27	35419.44	52876.00	10657.00
1996	20.25	25608.38	24633.00	3806.00
1997	13.3	22323.03	25271.00	4412.00
1998	30.88	56934.95	43027.00	18710.00
1999	9.39	16538.51	17992.00	1285.00
2000	15.59	28620.11	23173.00	0.00
2001	22.4	26918.00	39434.00	8824.00
2002	8.97	5291.00	14886.00	32.00
2003	14.79	7158.00	26909.00	44.00
2004	16.13	8105.00	15061.00	0.00
2005	24.43	46872.00	52267.00	19490.00
2006	15.29	29005.00	40840.00	10709.00
2007	7.77	11404.00	18200.00	99.00
2008	14.07	28,631.00	19,631.00	8,562.00
2009	10.86	9,215	13,223	0.00
2010	22.07	15,108	30,125	995.00
2011	10.95	23,435.00	37,845.00	10,679.00
2012	8.79	3,985.00	16,293.00	538.00
2013	2.97	34	2,389	263

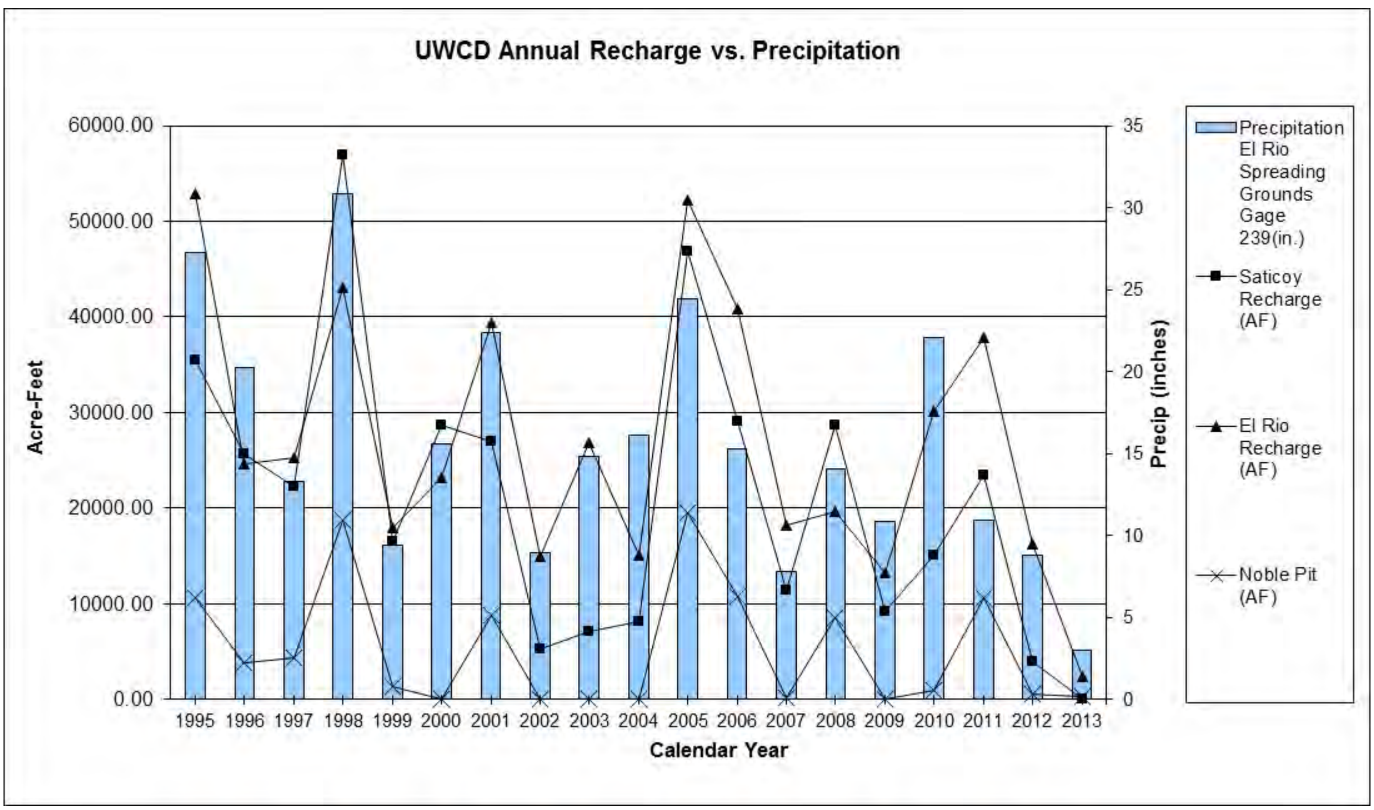


Figure 4-5: Graph depicting precipitation versus recharge for UWCD[4].

The Casitas Municipal Water District delivered 18,270[5] AF in 2013, with approximately 7,195[5] AF sold to retail water purveyors. The district provides water to residential and agricultural customers, and some of the 23 water purveyors located within the district's boundaries. Annual water deliveries can vary from 13,000 to 23,000 AF. Casitas provides a blend of groundwater and surface water to its customers. Surface water is stored in Lake Casitas which has an overall capacity of 254,000 AF. At the end of 2013 there was 154,432[5] AF of water stored in the lake. Water from the Ventura River is diverted at the Robles Diversion facility. The facility diverts high flows from rainstorms and operates on average only 53 days[5] per year. Casitas diverts, on average 31% of the Ventura River flow, with 10% of that volume being redirected downstream through the Robles Diversion Fish Passage for the endangered steelhead trout and to enhance recovery of the Ventura River habitat.

Table 4-3 below compares the volume of water delivered by the three major water districts in the County for the period of 2005 to 2013.

Table 4-3: Comparison of Wholesale District water deliveries 2005-2013.

	Total Water Deliveries in Acre Feet (AF)			
Year	**Casitas MWD**	**Calleguas MWD**	**United WCD**	**Annual Total**
2005	16,526.50	116,431.80	30,271.46	163,229.76
2006	15,873.80	120,736.30	30,627.87	167,237.97
2007	20,080.90	131,206.10	41,387.64	192,674.64
2008	16,497.70	125,367.50	39,903.80	181,769.00
2009	15,736.10	108,726.00	41,478.00	165,940.10
2010	13,497.48	94,863.70	34,075.80	142,436.98
2011	13,439.25	97,218.00	31,868.00	142,525.25
2012	15,268.49	104,104.00	32,638.00	152,010.49
2013	18270.00	111,283.00	24,358.10	153,911.10
Period Total	**145,190.22**	**1,009,936.40**	**306,608.67**	**1,461,735.29**

Section 5.0

Groundwater Potentiometric Surface Maps

5.1 – Mapping

Contour maps are a useful way to visualize spatial distribution of data values. ESRI's ArcMap GIS software was used to generate the contours in the report. Because the contour lines are the end result of a series of code based mathematical calculations the resulting lines should be considered only as an interpretation of the conditions in the area mapped. Contour lines drawn by the software were adjusted manually by staff in some cases to better reflect expected edge of basin conditions.

5.1.1 –Maps

The 2011 Groundwater Section Annual Report contained a series of three different potentiometric surface maps covering: a) The Santa Clara River Valley, which includes the Piru Basin, Fillmore Basin, Santa Paula Basin, and the Mound Basin; b) The Oxnard Plain, Oxnard Forebay, and Pleasant Valley Basin; and c) the Oxnard Plain, Oxnard Forebay, Pleasant Valley, and the West, East and South Las Posas Basins. One drawback to grouping them this way is that it separated the Mound and Santa Paula Basin on one map, from the Oxnard Plain and Forebay Basin on another map, possibly giving the impression that there may not be flow between the basins.

The following pages contain a series of two different potentiometric surface maps created from 2013 groundwater level data for the a) Santa Clara River Valley and the upper aquifer system of the Oxnard Plain and Pleasant Valley, and b) the lower aquifer system of the Oxnard Plain, Pleasant Valley, and Las Posas Valley Basins. Following a review of information regarding the Mound Basin boundaries contained in United Water Conservation District's open File Report 2012-01 and DWR Bulletin 118, it appears that the existing mapped boundaries may not in fact be complete barriers to groundwater flow. We have decided to continue potentiometric surface lines across the southern mapped Mound Basin boundary for the upper and lower system, and across the Santa Paula/Mound Basin Boundary for the upper system in this report. Doing so still demonstrates the boundary condition at the Santa Paula Basin and Mound Basin boundary, while providing information about water levels in the Oxnard Plain and Mound Basin on the same map.

Figures 5-1 thru 5-2 on pages 80-81 are generalized potentiometric surface maps for 2013 for the Santa Clara River Valley area encompassing the Mound, Santa Paula, Fillmore, and Piru groundwater basins. The maps also include the upper aquifer system of the Oxnard Plain and Pleasant Valley area. The contours were created using data collected by County staff, United Water Conservation District staff, and the staff of other agencies, cities and water companies. For this exercise the basin area was truncated to include only the extent of the alluvial area of the valley, instead of using the full area of the basin as depicted by the groundwater basin lines on the maps. Note that the Forebay area has no confining clay cap as there is overlying the Oxnard Plain Pressure Basin, therefore the Oxnard aquifer is not recognized as being present here. In the Pleasant Valley area the upper aquifer system is not typically present, but there are areas of shallow alluvial sediments similar to Oxnard and Mugu aquifer units from which wells are extracting groundwater. No well data from the perched or semi-perched zone of the Oxnard Plain was used to generate these contours.

Figures 5-3 thru 5-4 on pages 82-83 are generalized groundwater potentiometric surface maps for the lower aquifer system for 2013 of the Mound basin, Oxnard Plain, Pleasant Valley and Las Posas Valley area. In previous reports we have used the Moorpark anticline as a boundary between the East and South Las Posas Basins to map potentiometric surface maps. DWR Bulletin 118 does not divide the Las Posas Basin, but maps it as one large basin. That plus additional reports, indicate there may not be a significant groundwater flow barrier in that location. This technical issue will benefit from additional research in the future. In this report the potentiometric surface is mapped to reflect no barrier to flow between the East Las Posas Basin and the South Las Posas Basin. Data points for wells perforated in the shallow sand and gravel zones of the Las Posas Valley were not used to generate these contours.

The Groundwater Section welcomes comments and suggestions concerning the potentiometric surface maps presented on the following pages or the report in general. Please contact Jeff Dorrington at jeff.dorrington@ventura.org

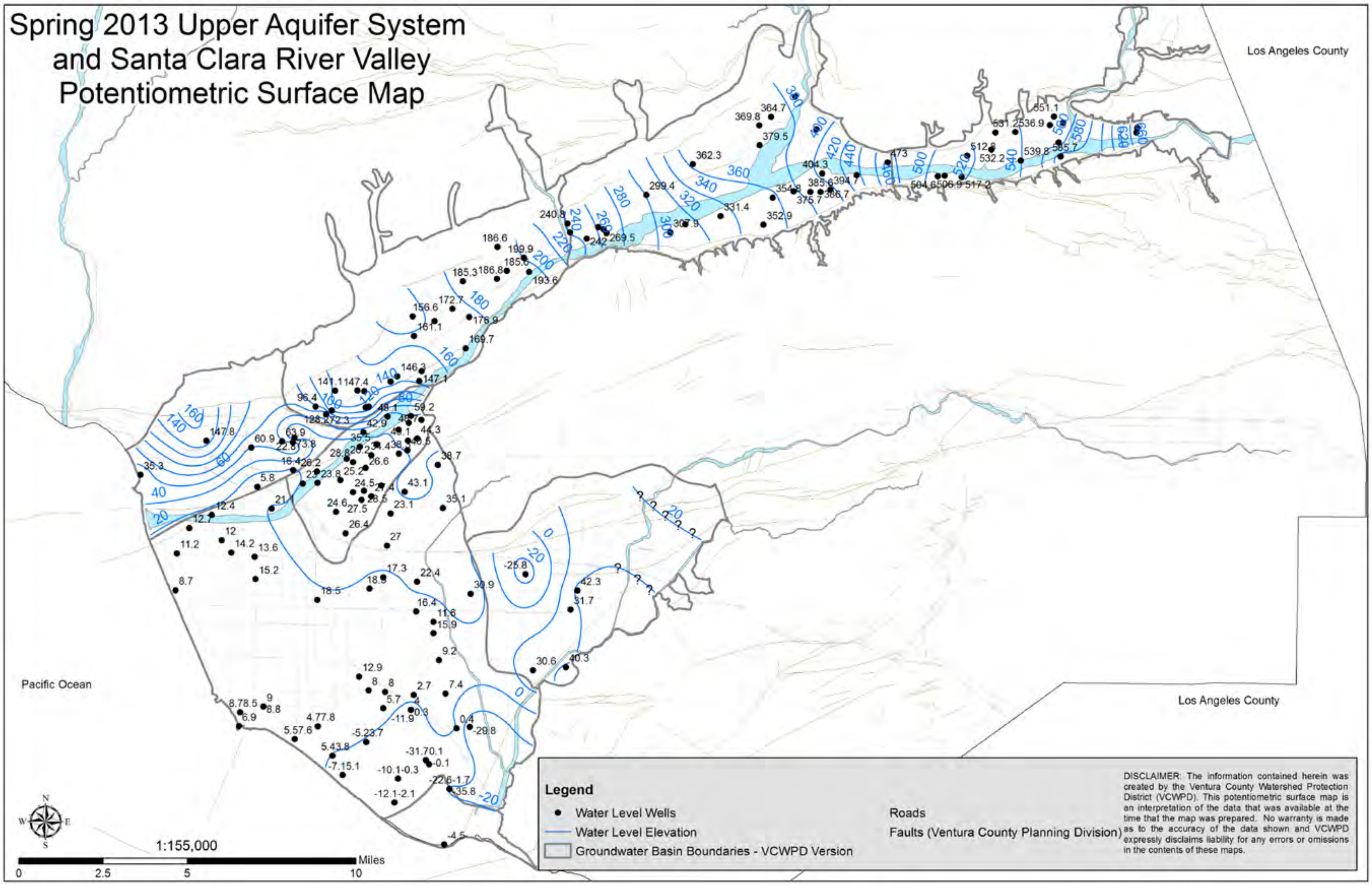


Figure 5-1: The map above depicts water level surface elevation contours for the Santa Clara River Valley area and the Upper Aquifer System for spring 2013.

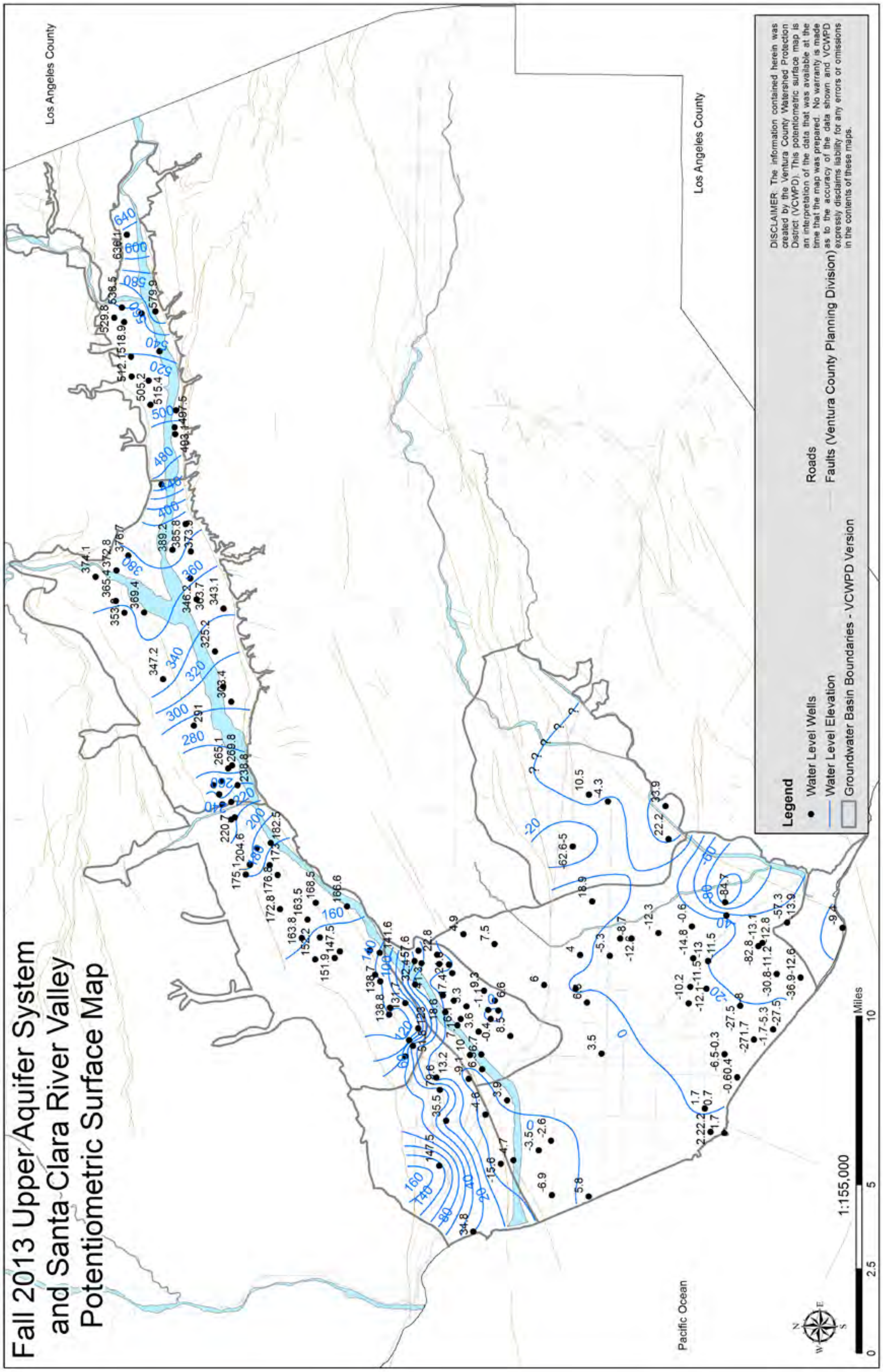


Figure 5-2: The map above depicts water level surface elevation contours for the Santa Clara River Valley area and the Upper Aquifer System for fall 2013.

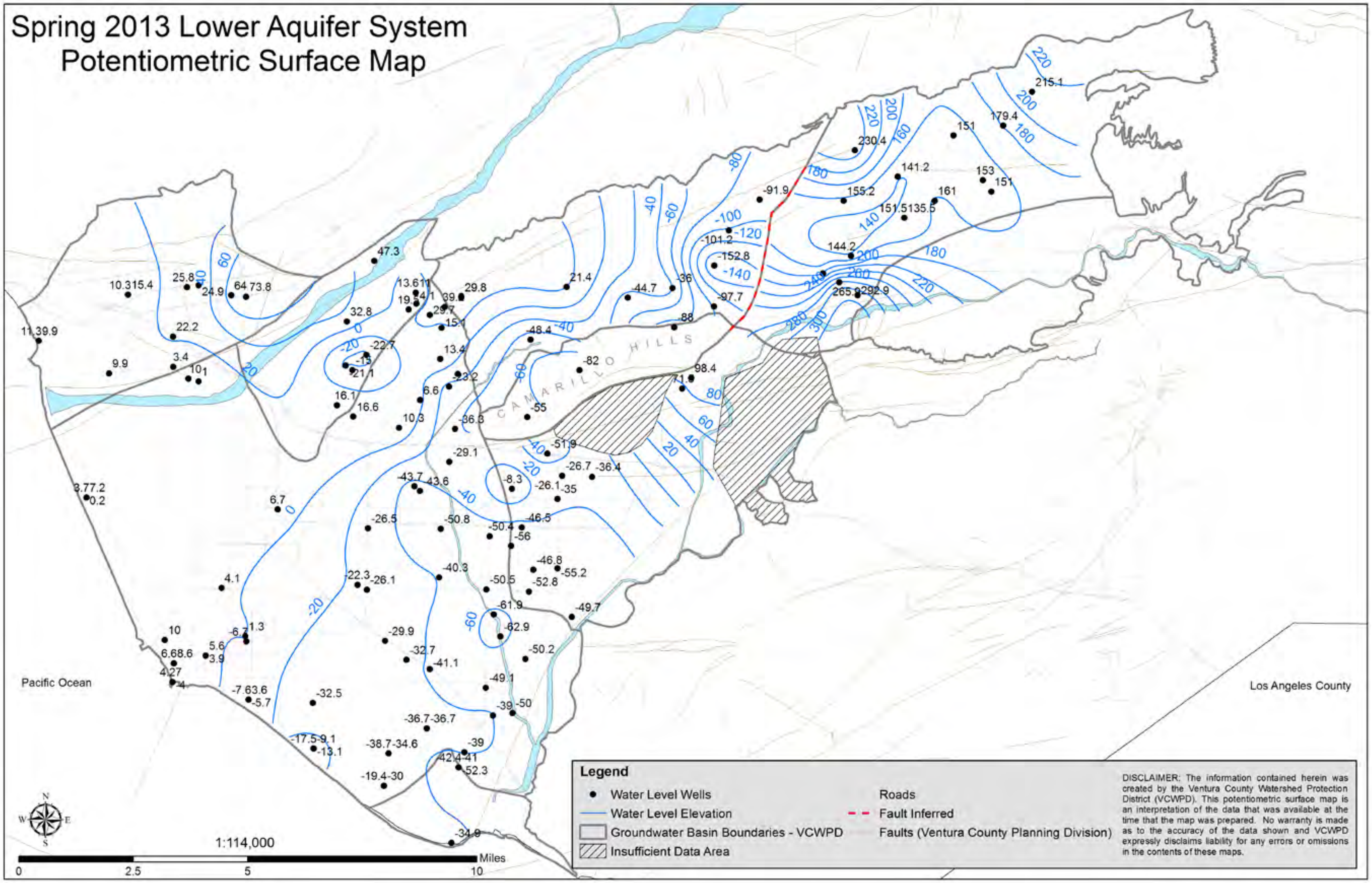


Figure 5-3: The map above depicts water level surface elevation contours for the Lower Aquifer System for spring 2013.

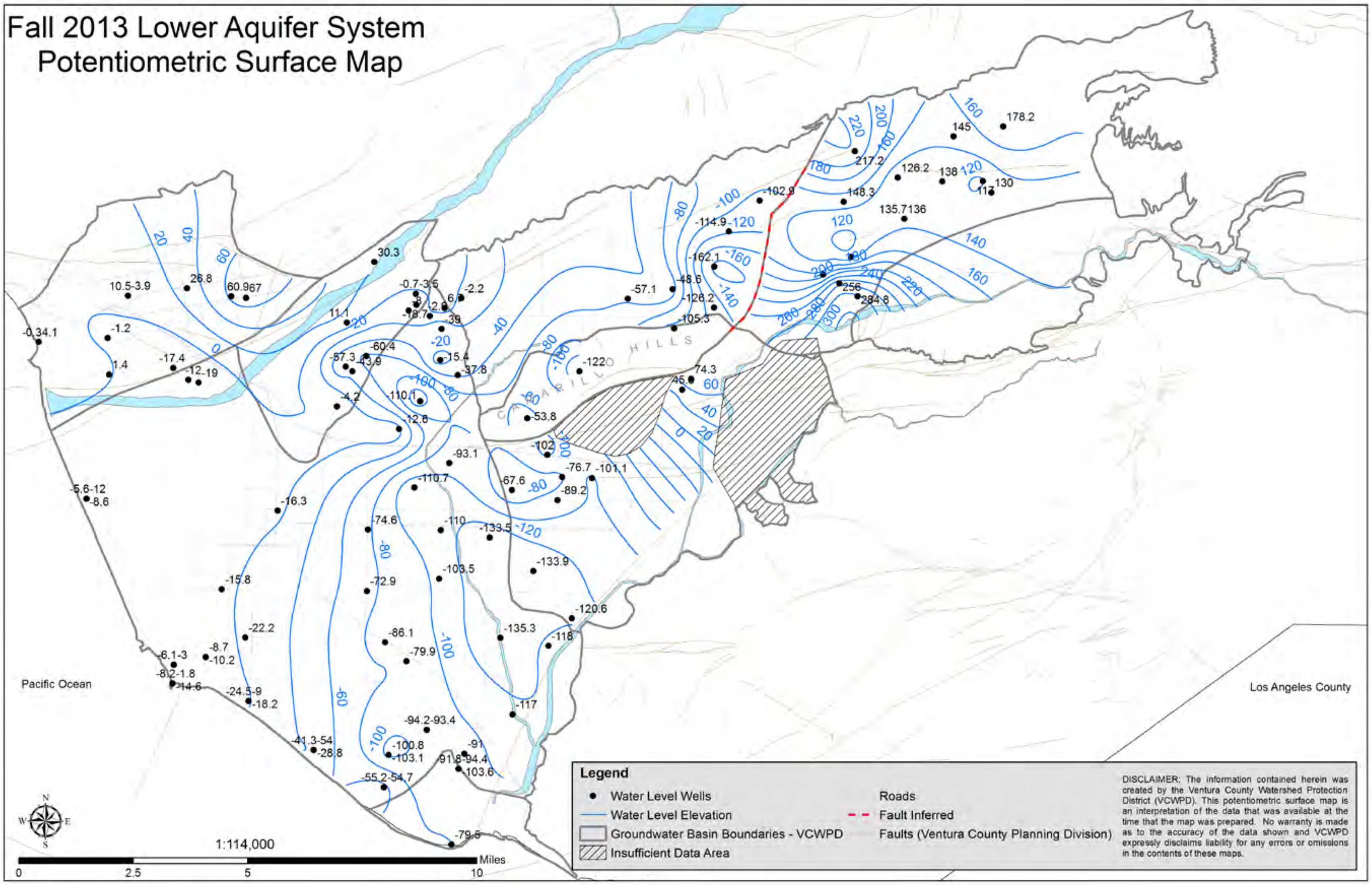


Figure 5-4: The map above depicts water level surface elevation contours for the Lower Aquifer System area for fall 2013.

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Appendix A – Glossary of Groundwater Terms

Aquifer: A body of rock that is sufficiently permeable to conduct ground water and to yield economically significant quantities of water to wells and springs. (Glossary of Geology, 1987)

Abandoned Well: Means any of the following:

(1) A water well used less than 8 hours in any twelve-month period. Failure to submit reports of well usage will result in a well being classified as abandoned.
(2) A monitoring well from which no monitoring data has been taken for a period of two years.
(3) A well which is in such a state of disrepair that it cannot be made functional for its original use or any other use.
(4) An open engineering test hole after 24 hours has elapsed after construction and testing work has been completed on the site.
(5) A cathodic protection well which is no longer used for its intended purpose.

(Ventura County Ordinance No. 4184)

Confined Aquifer: An aquifer bounded above and below by impermeable beds, or by beds of distinctly lower permeability than that of the aquifer itself; an aquifer containing confined ground water. (Glossary of Geology, 1987)

Contamination: Alteration of waters by waste, salt-water intrusion or other materials to a degree which creates a hazard to the public health through actual or potential poisoning or through actual or potential spreading of disease. (Ventura County Ordinance No. 4184)

Department of Water Resources: (DWR) operates and maintains the State Water Project, including the California Aqueduct. The department also provides dam safety and flood control services, assists local water districts in water management and conservation activities, promotes recreational opportunities, and plans for future statewide water needs.

Fox Canyon Groundwater Management Agency (FCGMA): The Agency created when the California State Legislature enacted and passed State Assembly Bill No. 2995 on Sept. 13, 1982 creating the *Fox Canyon Groundwater Management Agency (GMA)*. This law, also referred to as AB2995, granted jurisdiction over all lands overlying the Fox Canyon aquifer zone to control seawater intrusion, protect water quality, and manage water resources.

Groundwater: Water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water.

Groundwater Basin: A geologically and hydrologically defined area containing one or more aquifers, which store and transmit water yielding significant quantities of water to extraction facilities.

Lower Aquifer System (LAS): The area underlying the Oxnard Pressure Basin, which contains the Hueneme aquifer, the Fox Canyon Aquifer and the Grimes Canyon aquifer. The LAS is recharged from the Fox Canyon and Grimes Canyon Outcrops, the areas where the aquifers come to the surface exposing the permeable sands and gravels to recharge from rainfall and surface runoff.

Overdraft: Withdrawal of ground water in excess of replenishment. (Glossary of Geology, 1987)

Perched or Semi-Perched Aquifer: The water bearing area that is located between the earth's surface and clay deposits that exist above an Aquifer.

Receiving Waters: All waters that are "Waters of the State" within the scope of the State Water Code, including but not limited to, natural streams, creeks, rivers, reservoirs, lakes, ponds, water in vernal pools, lagoons, estuaries, bays, the Pacific Ocean, and ground water.

Appendix A – Glossary of Groundwater Terms

Seawater Intrusion: The overdrafting of aquifers, which results in, the depletion of water supplies, lowering of water levels and degradation from seawater intrusion. Seawater intrusion results from the reversal of hydrostatic pressure allowing water flow to be onshore rather than offshore.

Total Dissolved Solids: (TDS) is a term that represents the amount of natural minerals that is dissolved in water.

Total Maximum Daily Load (TMDL) is a number that represents the assimilative capacity of a receiving water to absorb a pollutant. The TMDL is the sum of the individual waste-load allocations for point sources, load allocations for nonpoint sources plus an allotment for natural background loading, and a margin of safety. TMDL's can be expressed in terms of mass per time (the traditional approach) or in other ways such as toxicity or a percentage reduction or other appropriate measure relating to a state water quality objective. A TMDL is implemented by reallocating the total allowable pollution among the different pollutant sources (through the permitting process or other regulatory means) to ensure that the water quality objectives are achieved.

United Water Conservation District (UWCD): The District administers a "basin management" program for the Santa Clara Valley and Oxnard Plain, utilizing the surface flow of the Santa Clara River and its tributaries for replenishment of groundwater. Originally established as the Santa Clara River Water Conservation District in 1927.

Upper Aquifer System (UAS): The area underlying the Oxnard Pressure Basin, which contains the perched and semi-perched zones, the Oxnard aquifer zone, and the Mugu aquifer. The UAS is recharged via the twenty-three square mile unconfined Oxnard Forebay Basin near El Rio.

Water Quality Standards: Defined as the beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.) of water and the water quality objectives adopted by the State or the United States Environmental Protection Agency to protect those uses.

Water Well Ordinance No. 4184: The Ventura County Groundwater Conservation Ordinance which was originally adopted by the Board of Supervisors in October 1970 and revised in 1979, 1984, 1985, 1987, 1991 and most recently in May 1999. The purpose of the ordinance is to ensure that all new or modified water wells, cathodic protection wells and monitoring wells are drilled by licensed water well contractors and are properly sealed so that they cannot serve as conduits for the movement of poor quality or polluted waters into useable aquifers or be hazardous to people or animals.

Well Destruction: To fill a well (including both interior and annular spaces if the well is cased) completely in such a manner that it will not produce water or act as a conduit for the transmission of water between any water-bearing formations penetrated.

Well Owner: The owner of the land on which a well is located. (Ventura County Ordinance No. 4184)

Appendix B – Key Water Level Wells

FIGURES Page

Tables Page

Appendix B – Key Water Level Wells

Key water levels for the most significant groundwater basins are depicted on the following pages to provide visual representations of groundwater conditions over time. Note that the time duration of data may vary.

Each of the following pages is organized to describe the key water level well measured by staff. Each well listed includes a line graph (hydrograph) of groundwater levels measured in relation to the ground surface or some specific reference point (RP) which is usually the top of the well casing or the concrete slab at the wellhead. The hydrographs are accompanied by an up-down graph to track change from the previous spring.

The following summary sheet for 2013 is used by Groundwater Section Staff to track long-term trends. Spring season measurements are used for comparison since this time period is typically at the end of the seasonal and annual rainfall year when groundwater basins should be at their fullest.

Key wells were selected many years ago as representative data points based on a centralized location within any particular groundwater basin, a sufficient penetration (depth) or perforation interval within the target aquifer, proper structural or sanitary seals, adequate well construction and site access, and potential for long-term use (measurement).

These data are static water level measurements. Standard operating procedure for County Groundwater Staff is to have well pumps off for 24 hours prior to gauging.

Appendix B – Key Water Level Wells

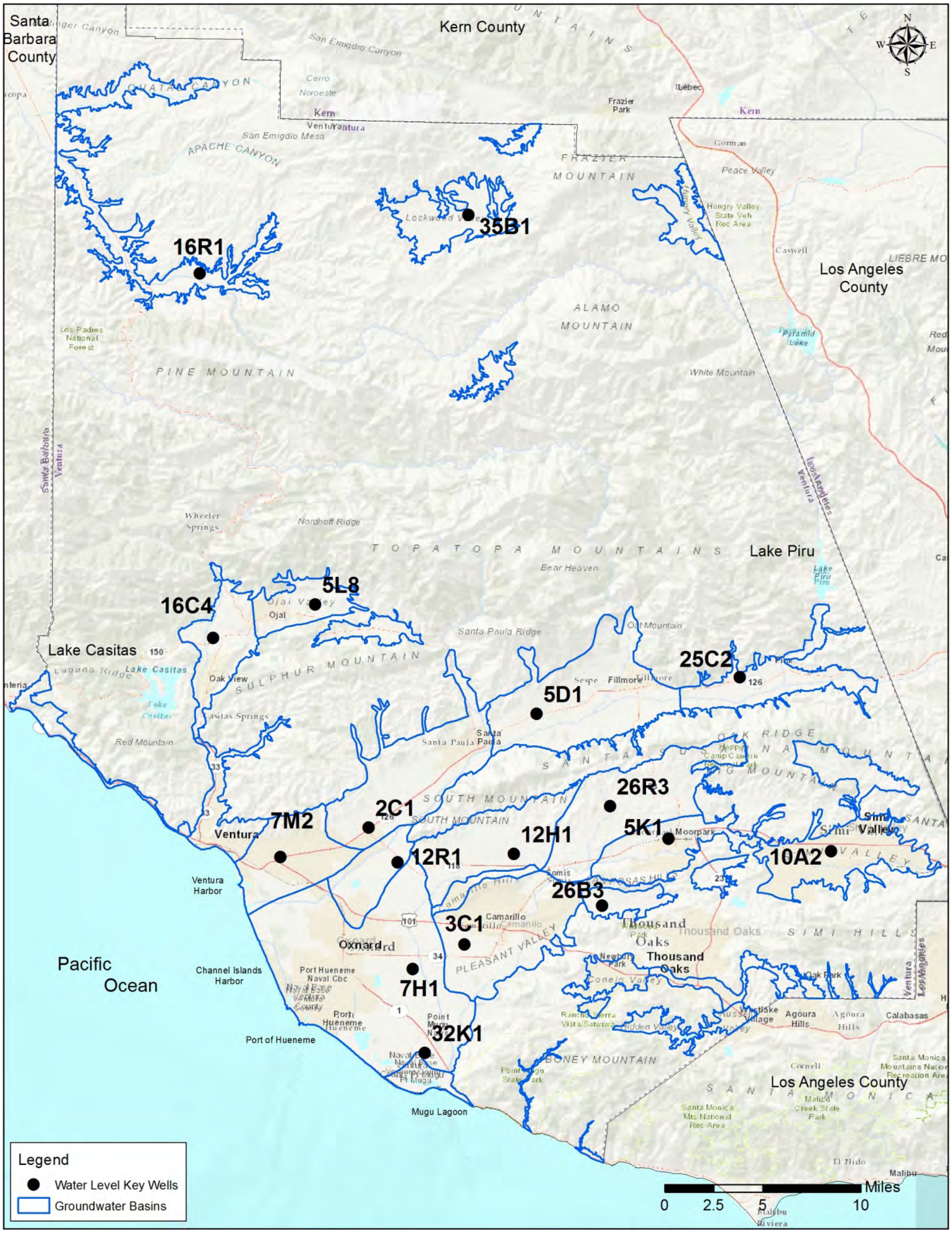

Figure B-1: Map showing key water level wells in Ventura County.

Appendix B– Key Water Level Wells
SPRING WATER LEVELS

BASIN	WELL NUMBER	RECORD HIGH	RECORD LOW	WATER LEVEL	WATER LEVEL	WATER LEVEL	Change From Previous Year	10 Year Average Annual Water Level	2013 Average Annual Water Level	2013 Change From Previous 10 Year Annual Average
	(RECORD)	(DATE)	(DATE)	(YEAR 2011)	(YEAR 2012)	(YEAR 2013)	(UP/DOWN)	2001-2012	2013	(UP/DOWN)
OXNARD PLAIN										
Oxnard Aquifer	01N21W07H01S	3.4 ft.	88.4 ft.	19.1 ft.	16.3 ft.	25.0 ft.	DOWN 8.7 ft.	19.8 ft.	37.0 ft.	DOWN 13.7 ft.
	(1/31-present)	(3/99)	(9/64)	(3/14)	(3/6)	(3/5)				
Forebay Area	02N22W12R01S	14.6 ft.	136.8 ft.	36.3 ft.	66.8 ft.	93.7 ft.	DOWN 26.9 ft.	62.1 ft.	100.1 ft.	DOWN 38 ft.
(UWCD)	(5/31-present)	(6/98)	(2/91)	(4/5)	(3/29)	(4/9)				
Fox Canyon	01N21W32K01S	18.0 ft.	129.0 ft.	35.0 ft.	35.0 ft.	49 ft.	DOWN 14 ft.	55.5 ft.	82 ft.	DOWN 26.5 ft.
Aquifer	(12/72-present)	(4/83)	(12/90)	(3/21)	(3/5)	(3/4)				
PLEASANT VALLEY										
Fox Canyon	01N21W03C01S	87.5 ft.	253.9 ft.	102.2 ft.	91.8 ft.	107.3 ft.	DOWN 15.5 ft.	117.2 ft.	143.7 ft.	DOWN 26.5 ft.
Aquifer	(2/73-present)	(8/95)	(11/91)	(3/14)	(3/7)	(3/6)				
WEST LAS POSAS	02N21W12H01S	422.2 ft.	501.8 ft.	445.0	449.6 ft.	453.9 ft.	DOWN 4.3 ft.	454.7 ft.	461.1 ft.	DOWN 6.4 ft.
	(10/72-present)	(3/75)	(12/91)	(3/7)	(3/21)	(3/4)				
EAST LAS POSAS	03N20W26R03S	503.0 ft.	619.3 ft.	588.5 ft.	575 ft.	576.6 ft.	DOWN 1.6 ft.	556.9 ft.	586.0 ft.	DOWN 29.1 ft.
	(1985-present)	(4/86)	(9/09)	(3/7)	(3/28)	(3/14)				
SOUTH LAS POSAS	02N19W05K01S	27.5 ft.	136.2 ft.	30.6 ft.	29.1 ft.	30.0 ft.	DOWN 0.9 ft.	30.8 ft.	30.3 ft.	UP 0.5 ft.
	(6/75-present)	(7/06)	(6/75)	(3/7)	(3/21)	(3/20)				
SANTA ROSA	02N20W26B03S	13.2 ft.	60.3 ft.	29.0 ft.	28.5 ft.	39.4 ft.	DOWN 10.9 ft.	37.6 ft.	50 ft.	DOWN 12.4 ft.
VALLEY	(10/72-present)	(4/79)	(11/04)	(3/11)	(3/8)	(3/7)				
SIMI VALLEY	02N18W10A02S	45.0 ft.	92.0 ft.	75.6 ft.	71.6 ft.	79.7 ft.	DOWN 8.1 ft.	77.8 ft.	81.1 ft.	DOWN 3.3 ft.
	(12/84-present)	(2/98)	(6/92)	(3/11)	(3/8)	(3/15)				
VENTURA RIVER	04N23W16C04S	3.9 ft.	101.0 ft.	23.0 ft.	44.7 ft.	64.8 ft.	DOWN 20.1 ft.	43.7 ft.	72.9 ft.	DOWN 29.2 ft.
	(7/49-present)	(3/83)	(2/91)	(3/8)	(3/13)	(3/5)				
OJAI VALLEY	04N22W05L08S	38.2 ft.	312.0 ft.	94.3 ft.	97.6 ft.	176 ft.	DOWN 78.4 ft.	138 ft.	202.3 ft.	DOWN 64.3 ft.
	(10/49-present)	(4/78)	(9/51)	(6/23)	(3/15)	(3/12)				
MOUND	02N22W07M02S	126.6 ft.	176.2 ft.	148.3 ft.	146.4 ft.	148.7 ft.	DOWN 2.3 ft.	152.3 ft.	158.1 ft.	DOWN 5.8 ft.
	(4/96-present)	(4/98)	(4/96)	(4/6)	(4/4)	(3/28)				
SANTA PAULA	02N22W02C01S	20.7 ft.	51.9 ft.	27.7 ft.	35.1 ft.	36.8 ft.	DOWN 1.7 ft.	36.1 ft.	40.8 ft.	DOWN 4.7 ft.
	(10/72-present)	(4/83)	(12/91)	(3/29)	(3/5)	(3/4)				
FILLMORE	03N20W05D01S	107.8 ft.	163.7 ft.	127.5 ft.	134.2 ft.	137.7 ft.	DOWN 3.5 ft.	133.7 ft.	141.1 ft	DOWN 7.4 ft.
	(10/72-present)	(2/79)	(12/77)	(3/9)	(3/5)	(3/4)				
PIRU	04N19W25C02S	43.1 ft.	183.2 ft.	64.9 ft.	71.2 ft.	79.9 ft.	DOWN 8.7 ft.	68.7 ft.	91 ft.	DOWN 22.3 ft.
	(9/61-present)	(3/93)	(10/65)	(3/9)	(3/5)	(3/4)				
LOCKWOOD VALLEY	08N21W35B01S	19.3 ft.	52.9 ft.	46.8 ft.	No Reading	No Reading				
	(6/56-present)	(05/10)	(10/91)	(6/23)						
CUYAMA VALLEY	07N23W16R01S	15.0 ft.	47.5 ft.	28.9 ft.	32.5 ft.	39.4	DOWN 6.9 ft.	31.8 ft.	39.4 ft.	DOWN 7.6 ft.
	(3/72-present)	(4/93)	(9/90)	(6/23)	(4/19)	(3/26)				
Data prepared: 1/15/2014										

Table B-1: Key Well Water Level Changes for 2013.

Appendix B – Key Water Level Wells

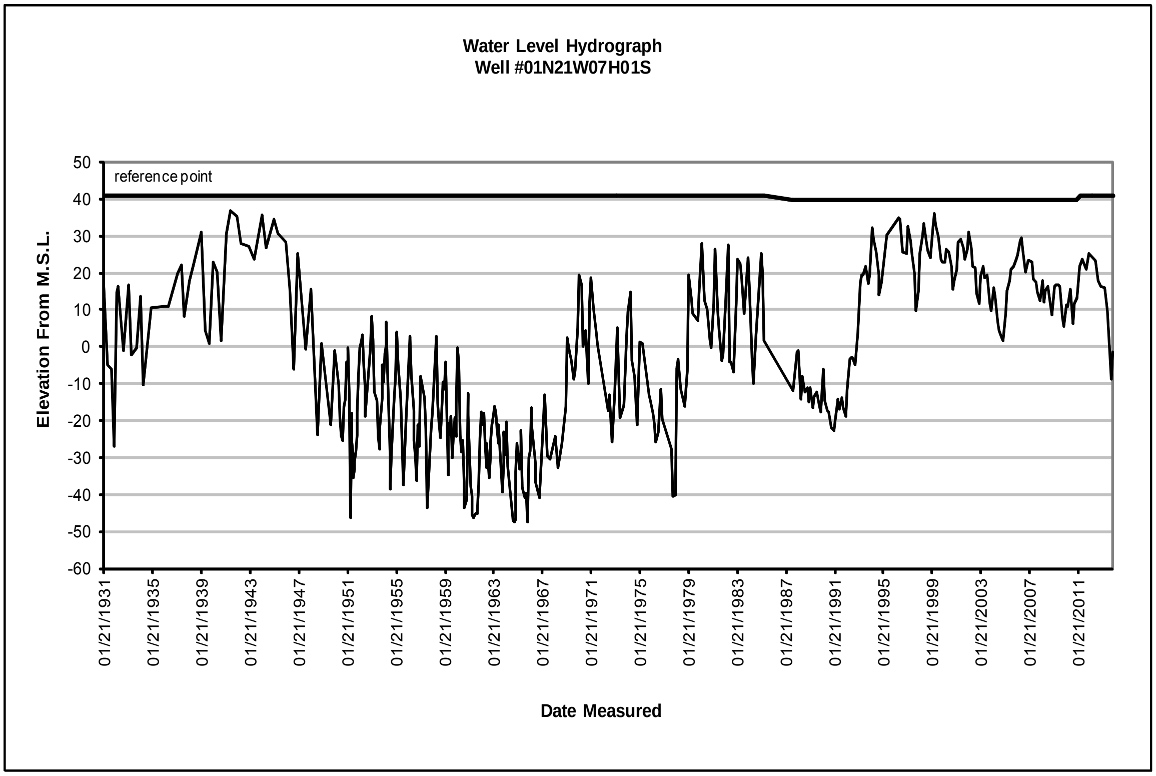

Figure B-2: Oxnard aquifer key well Hydrograph.

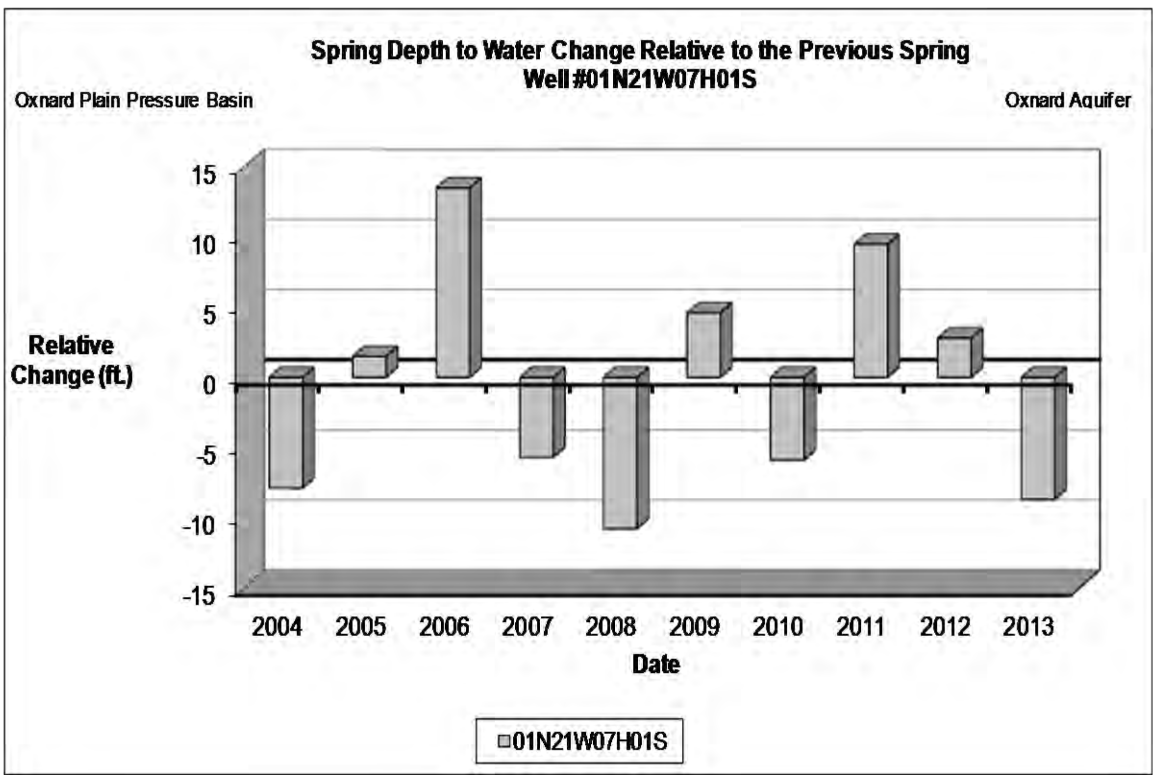

Figure B-3: Oxnard aquifer 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

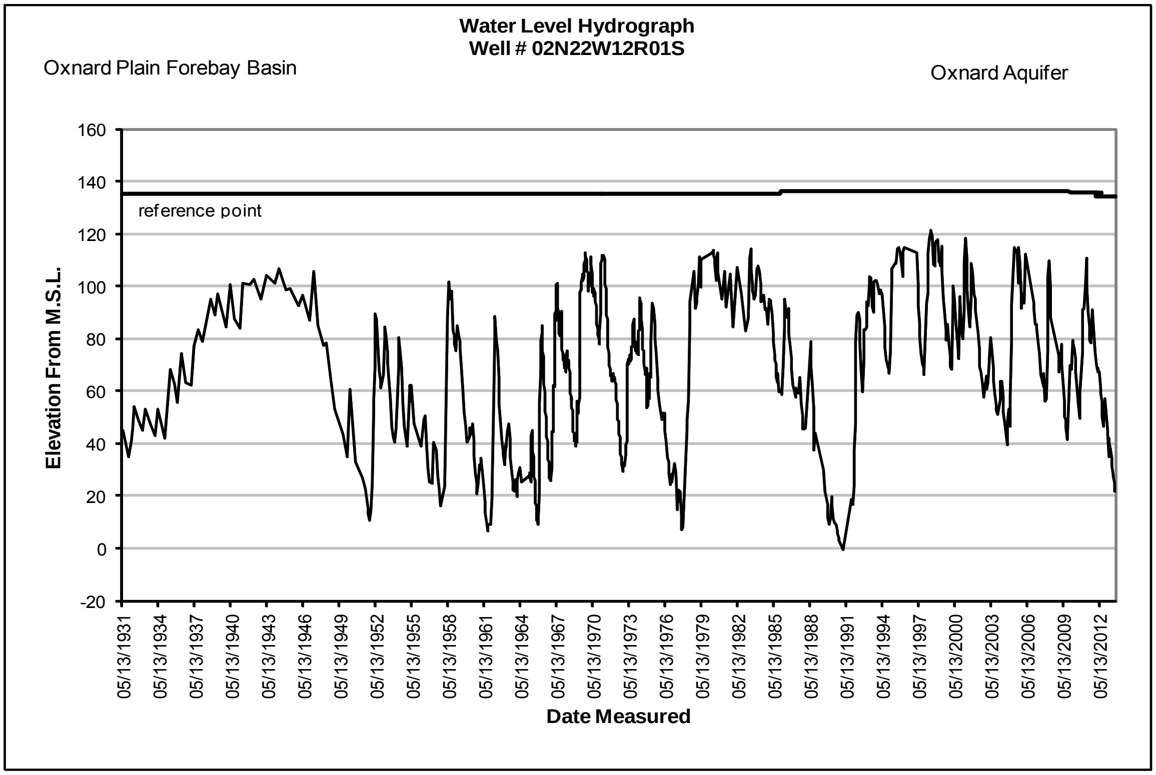

Figure B-4: Forebay area key well Hydrograph.

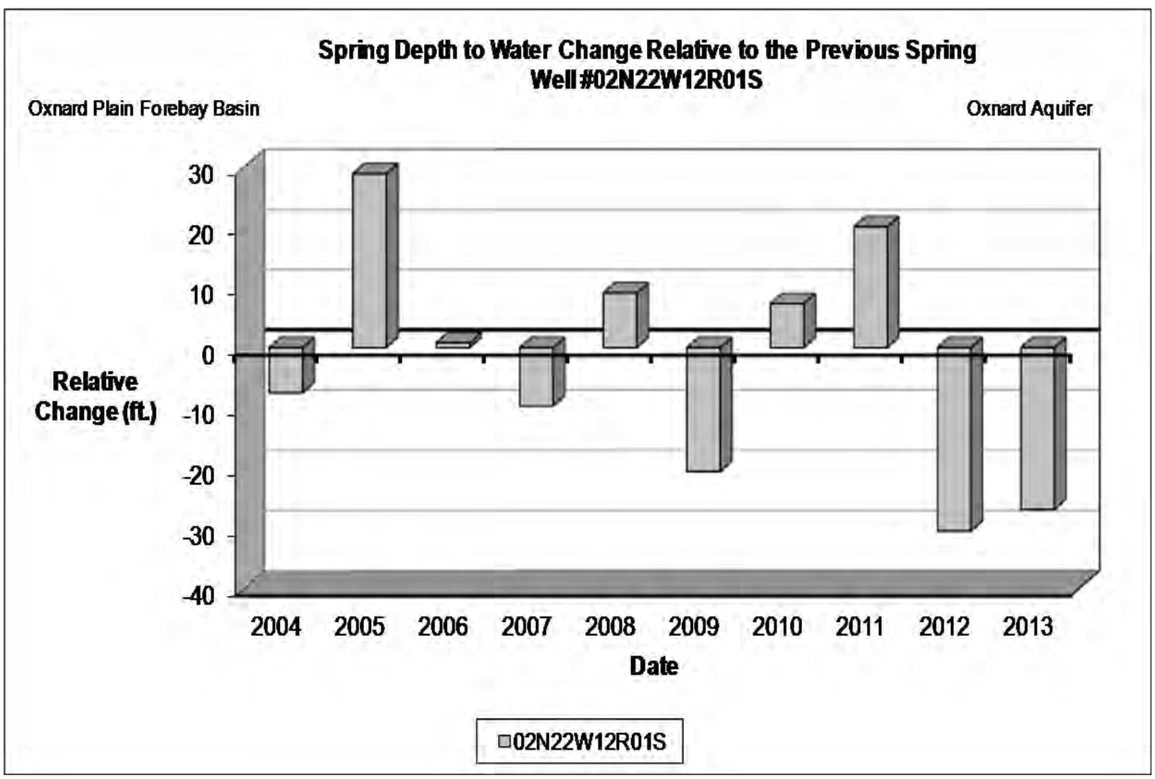

Figure B-5: Forebay Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

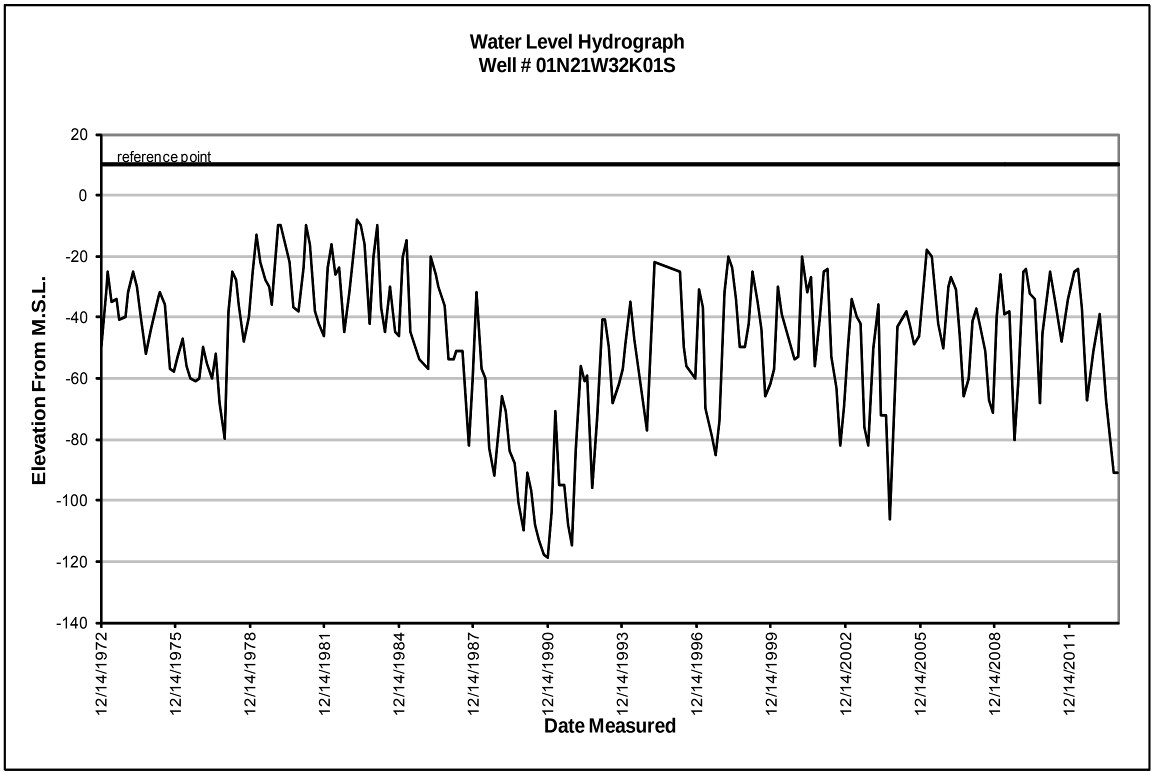

Figure B-6: Forebay Basin Fox Canyon Aquifer Key Well Hydrograph.

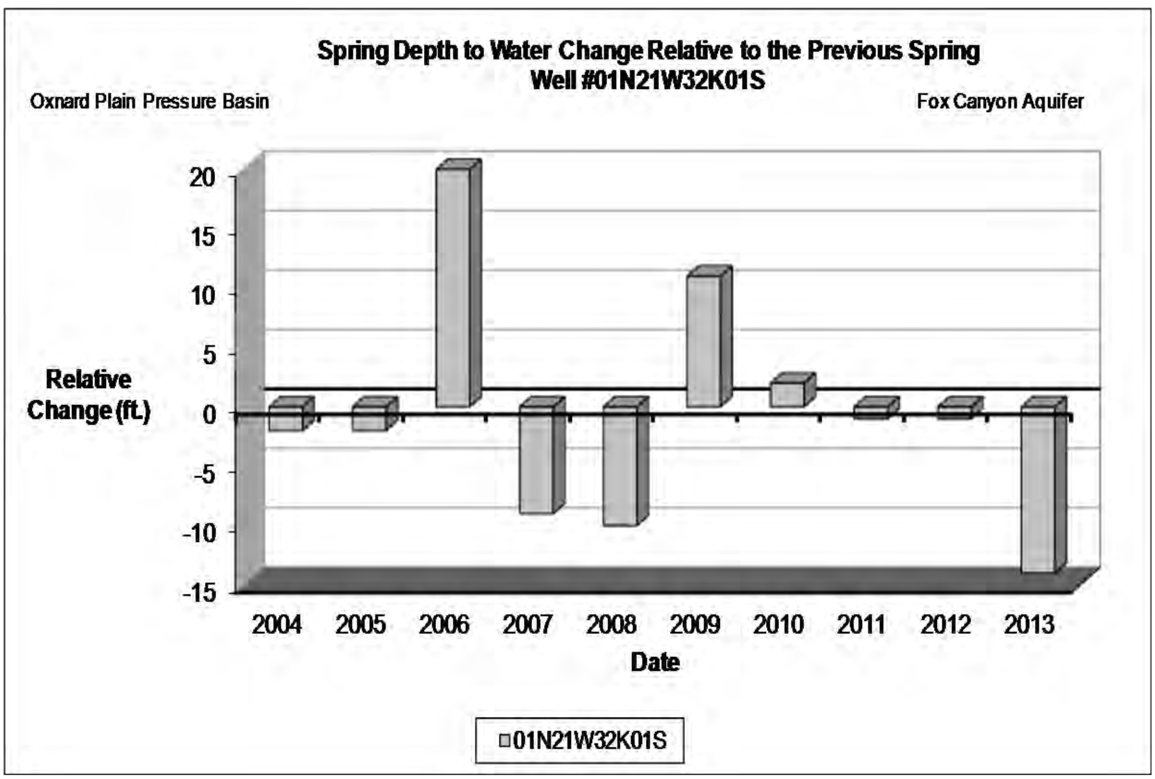

Figure B-7: Forebay Basin Fox Canyon Aquifer 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

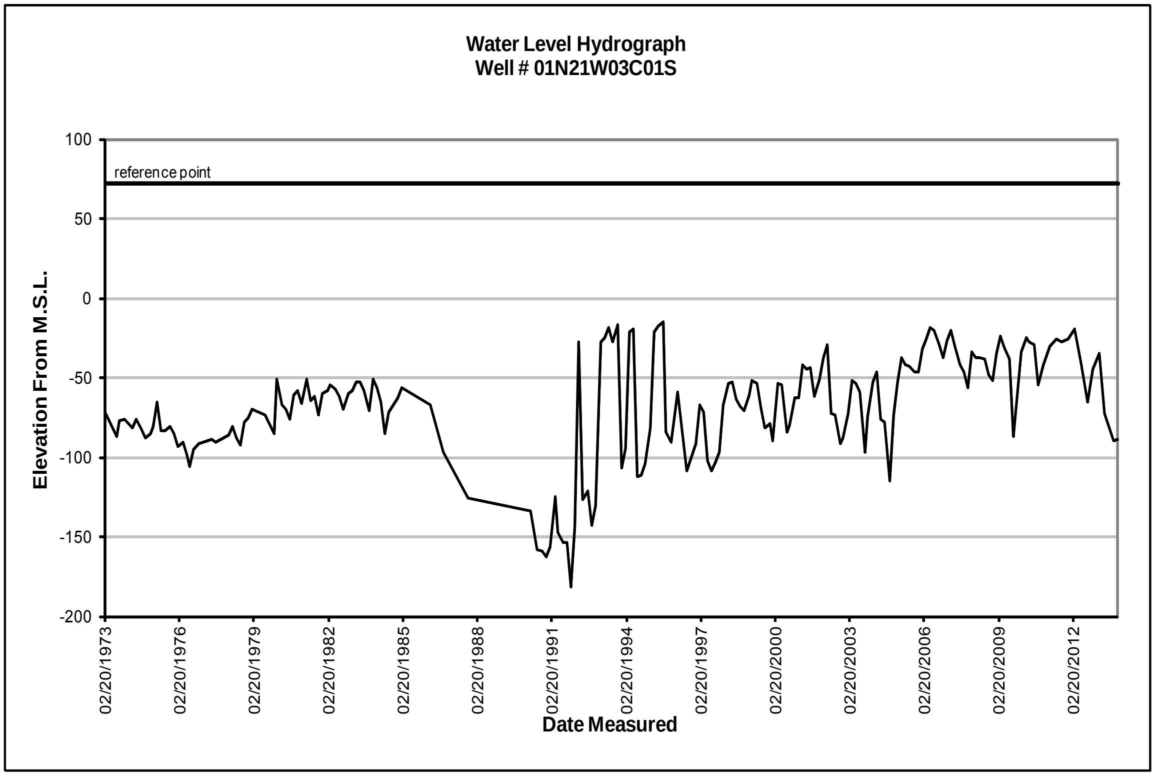

Figure B-8: Pleasant Valley Basin Fox Canyon Aquifer Key Well Hydrograph.

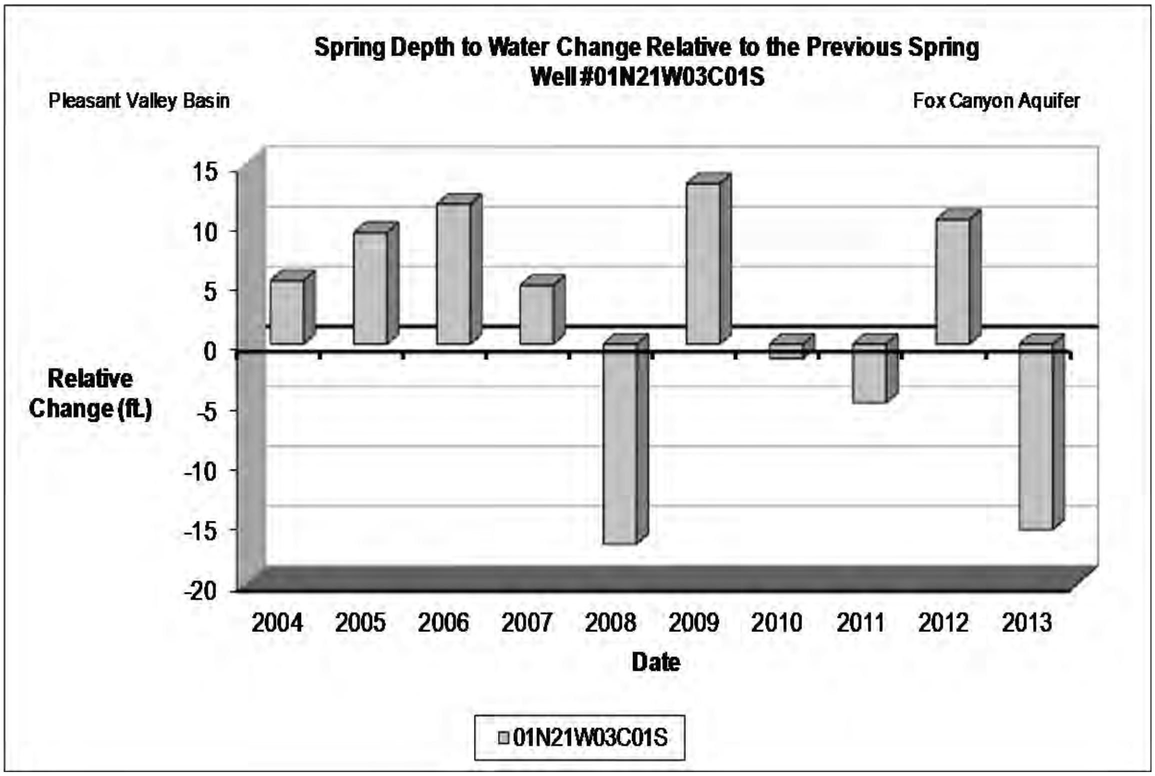

Figure B-9: Pleasant Valley Basin Fox Canyon Aquifer 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

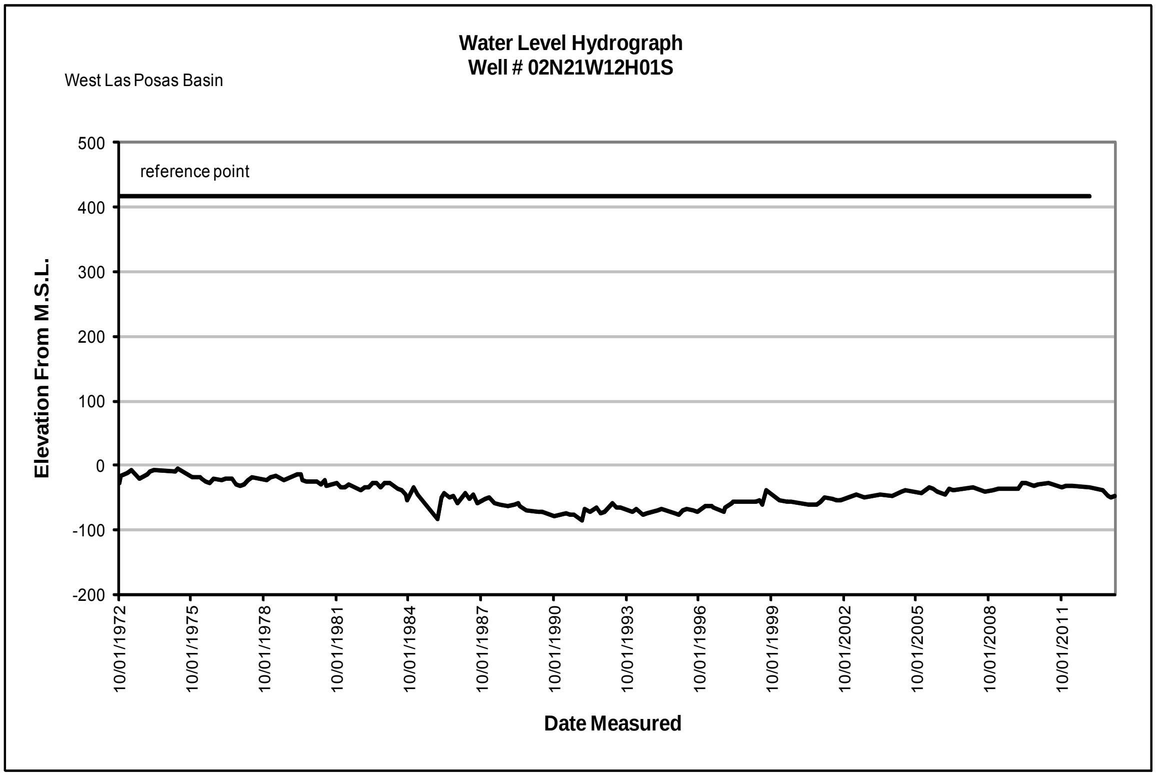

Figure B-10: West Las Posas Basin Key Well Hydrograph.

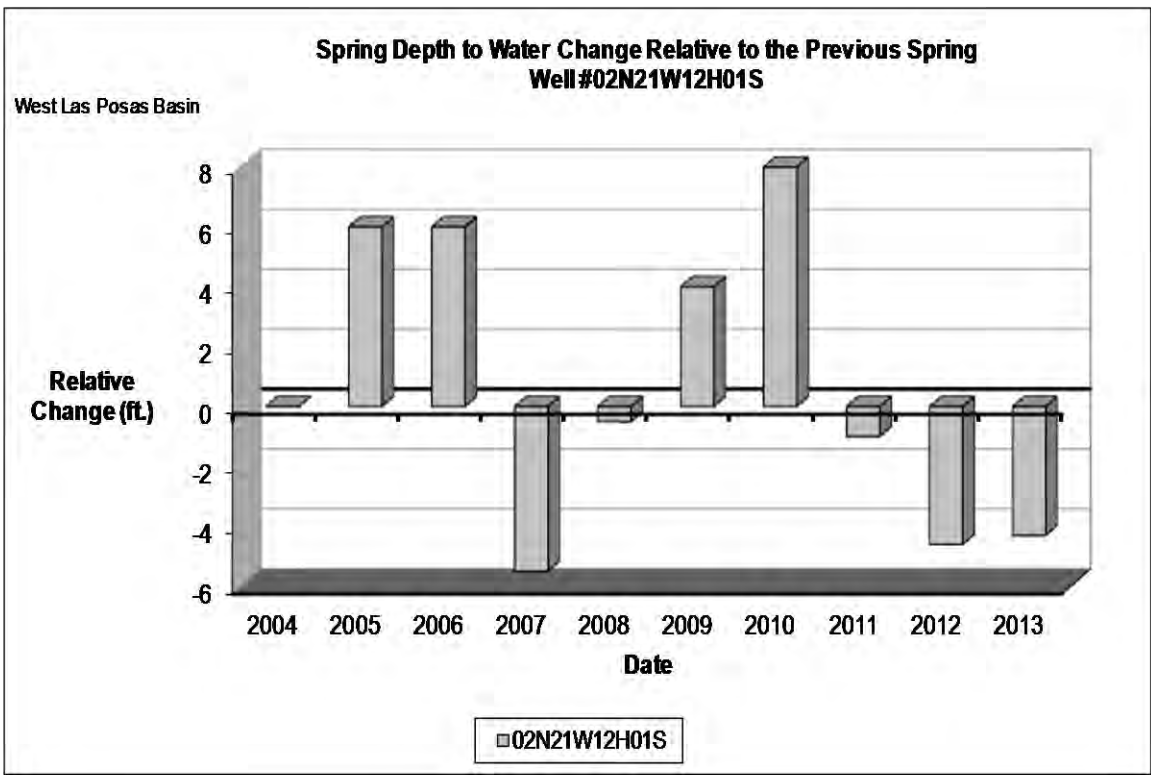

Figure B-11: West Las Posas Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

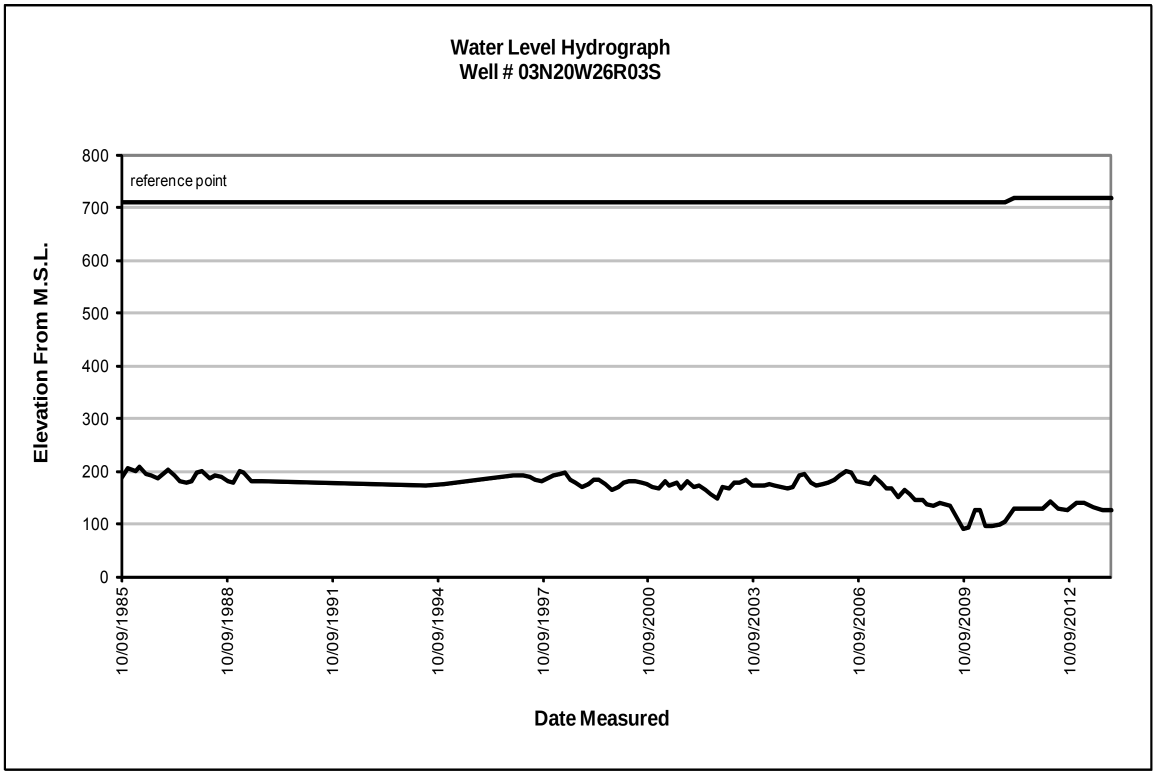

Figure B-12: East Las Posas Key Well Hydrograph.

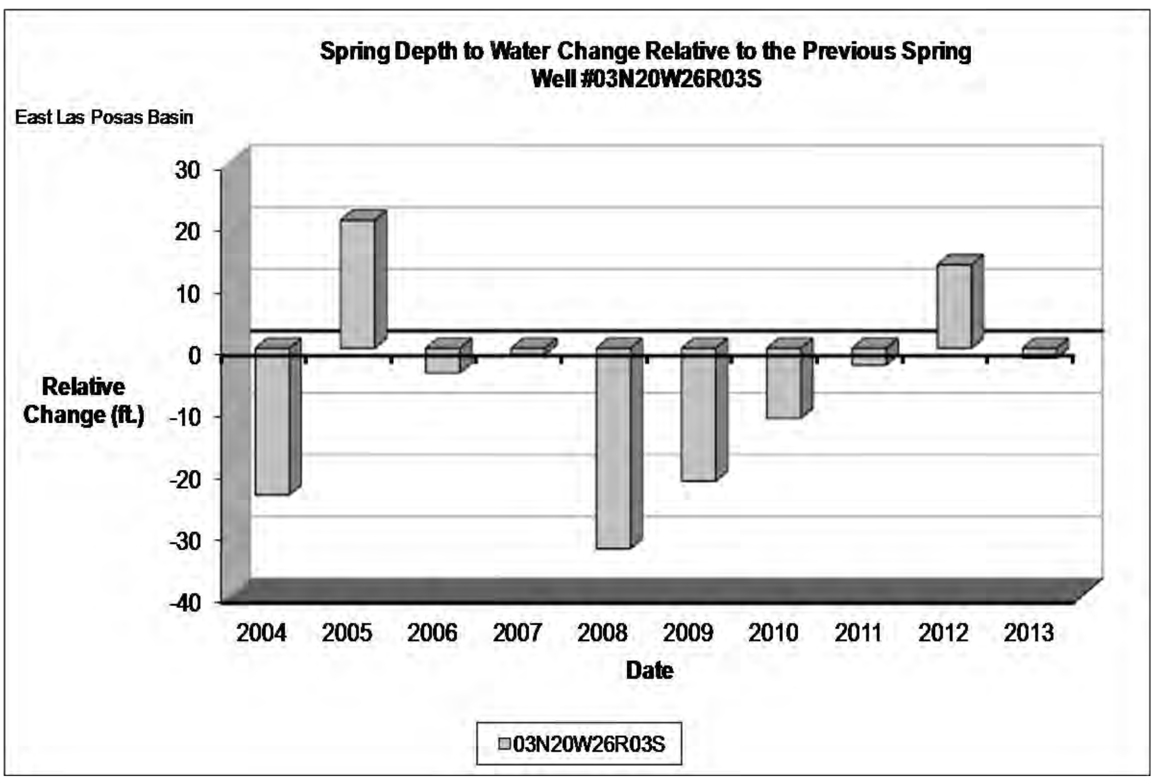

Figure B-13: East Las Posas Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

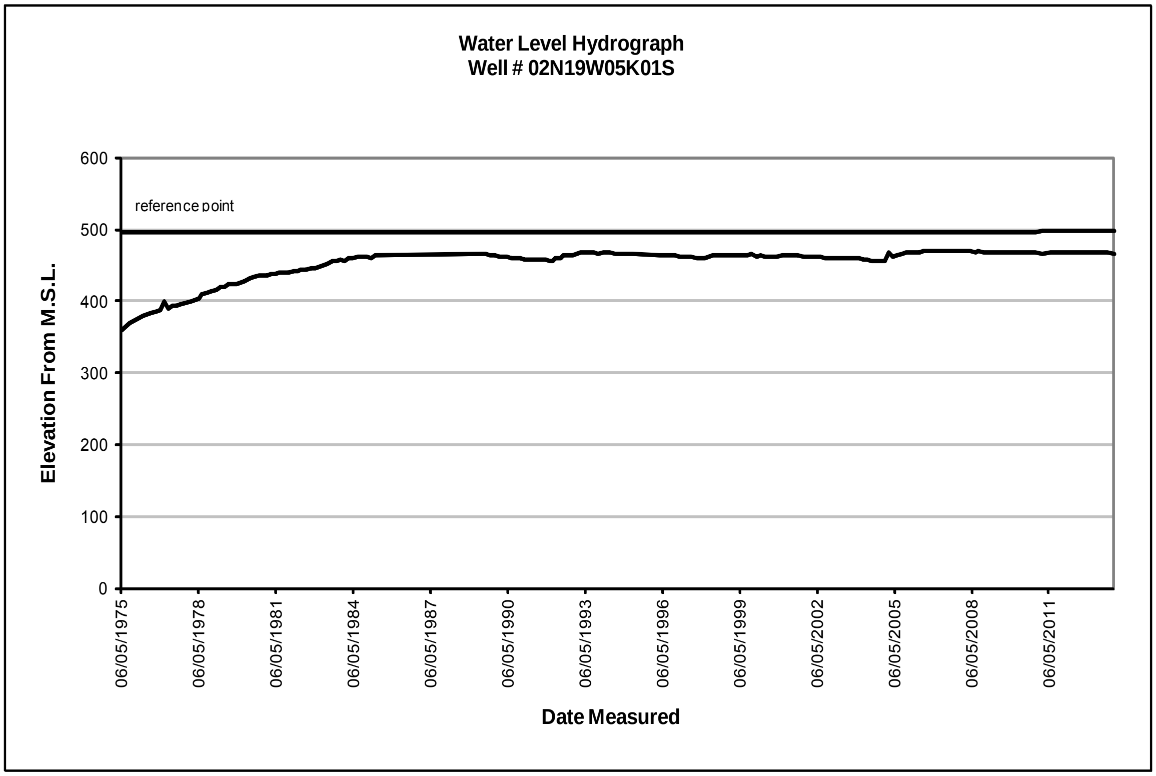

Figure B-14: South Las Posas Basin Key Well Hydrograph.

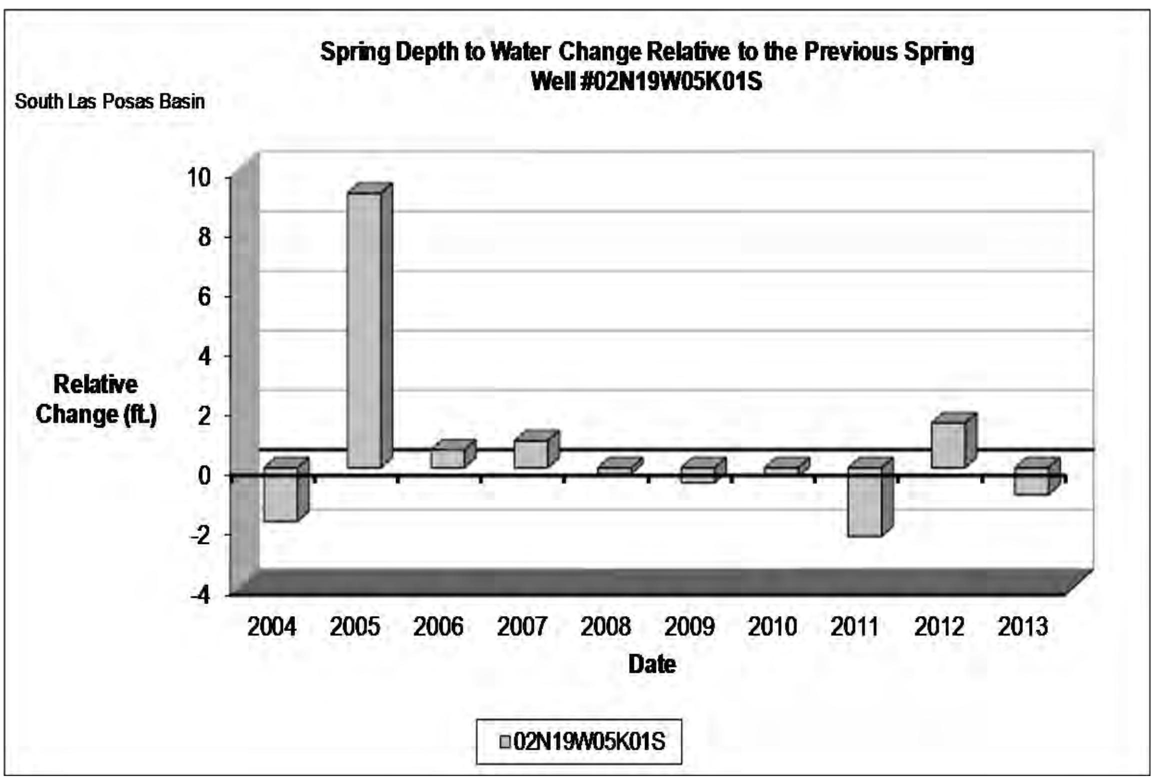

Figure B-15: South Las Posas Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

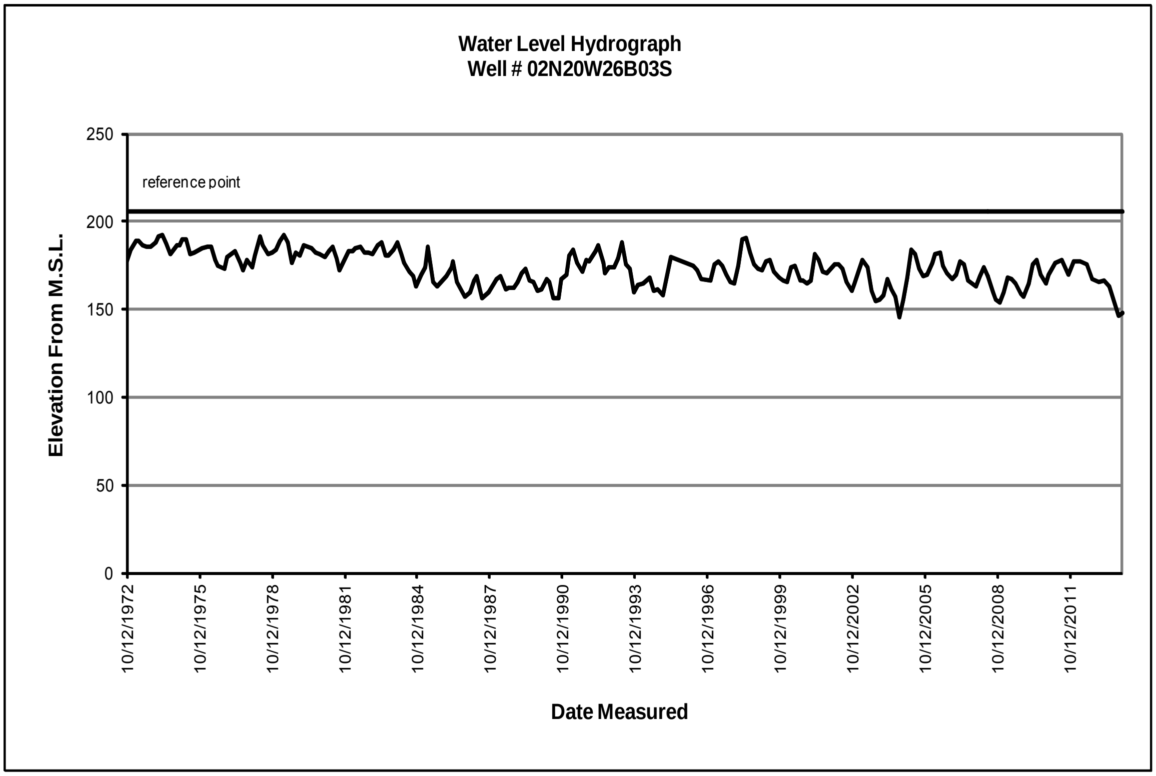

Figure B-16: Arroyo Santa Rosa Basin Key Well Hydrograph.

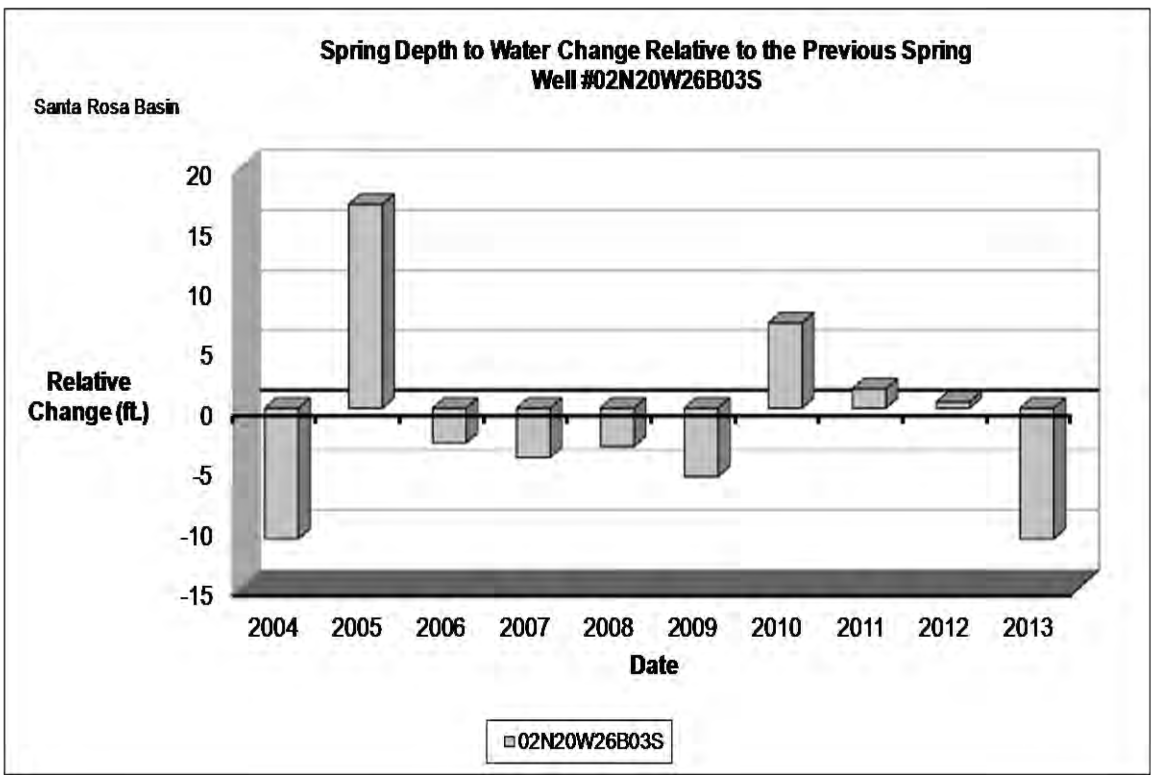

Figure B-17: Arroyo Santa Rosa Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

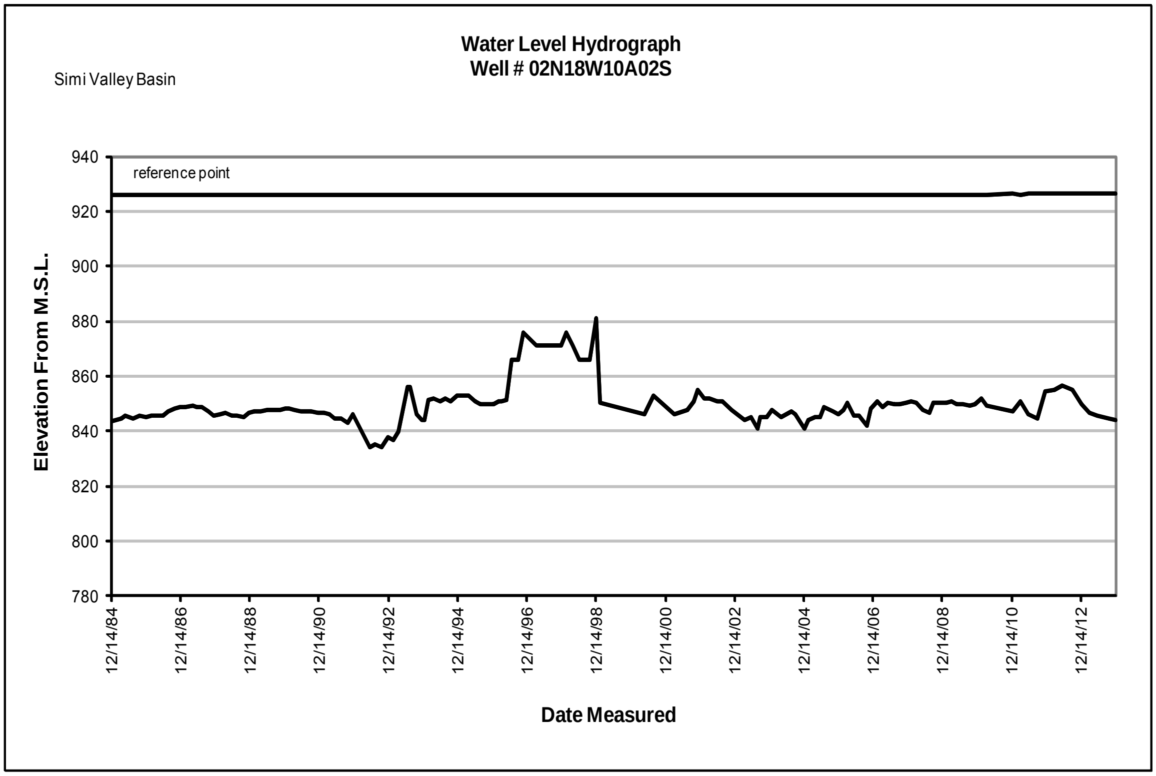

Figure B-18: Simi Valley Basin Key Well Hydrograph.

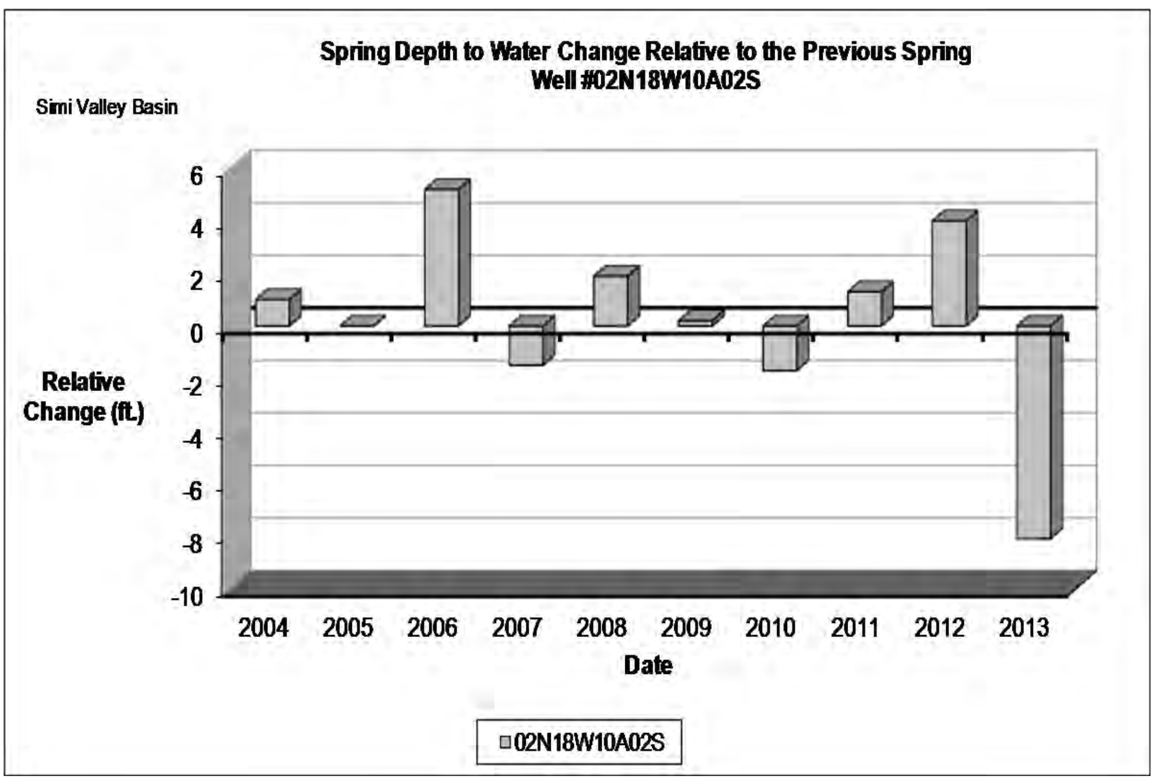

Figure B-19: Simi Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

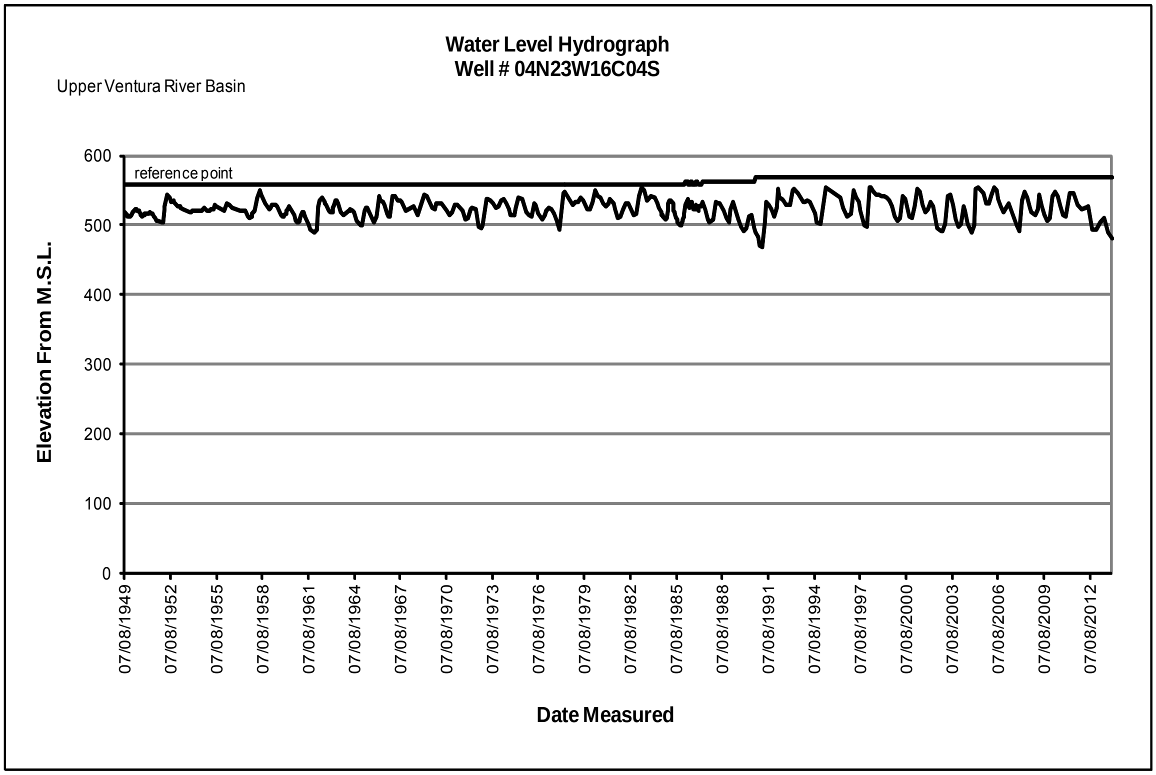

Figure B-20: Ventura River Basin Key Well Hydrograph.

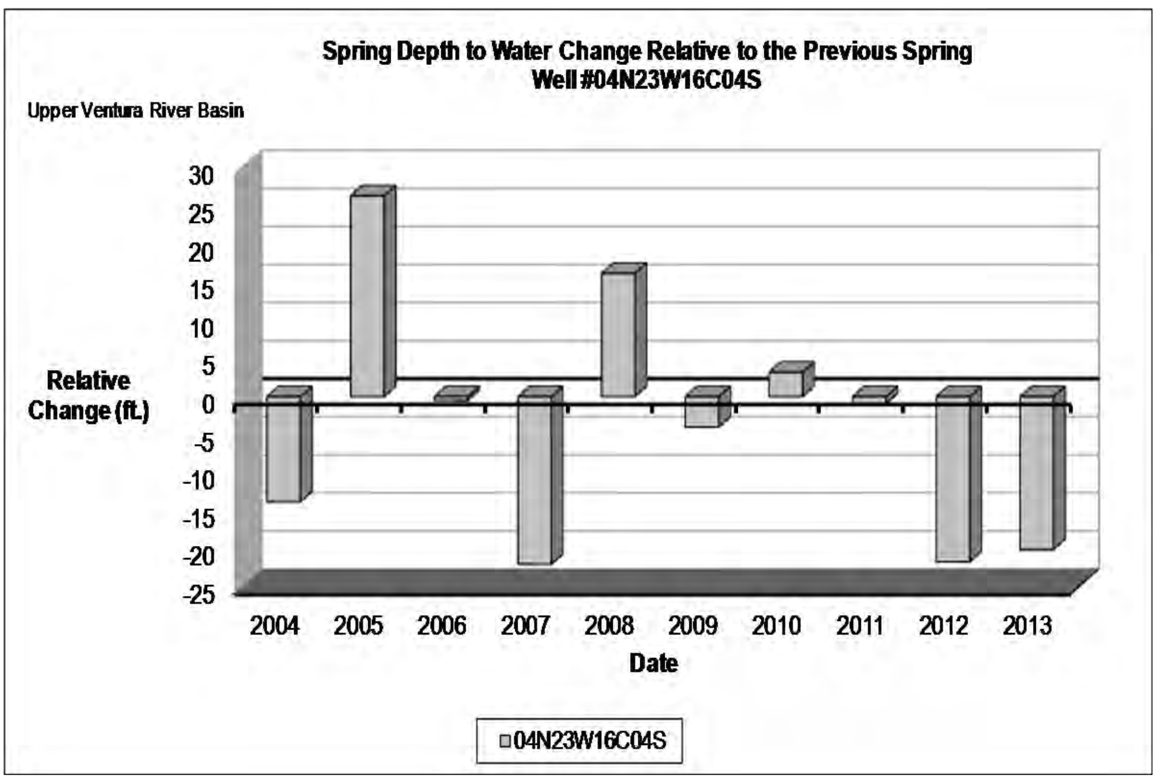

Figure B-21: Ventura River Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

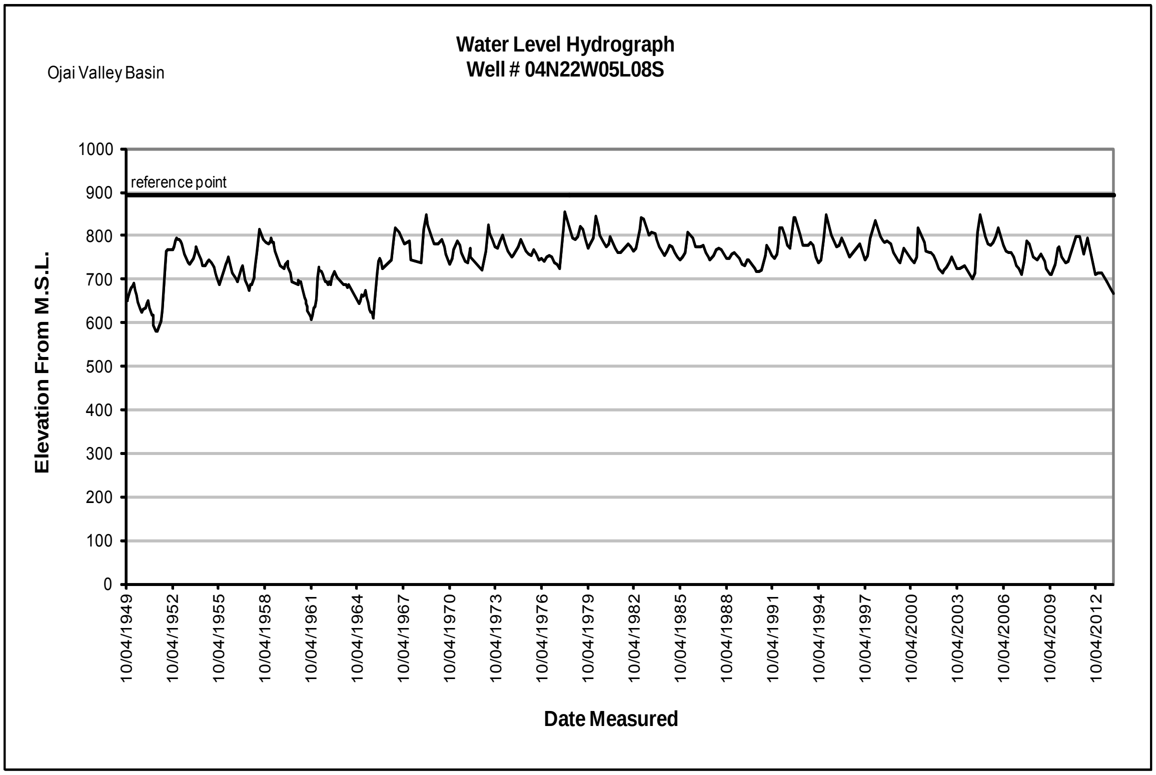

Figure B-22: Ojai Valley Basin Key Well Hydrograph.

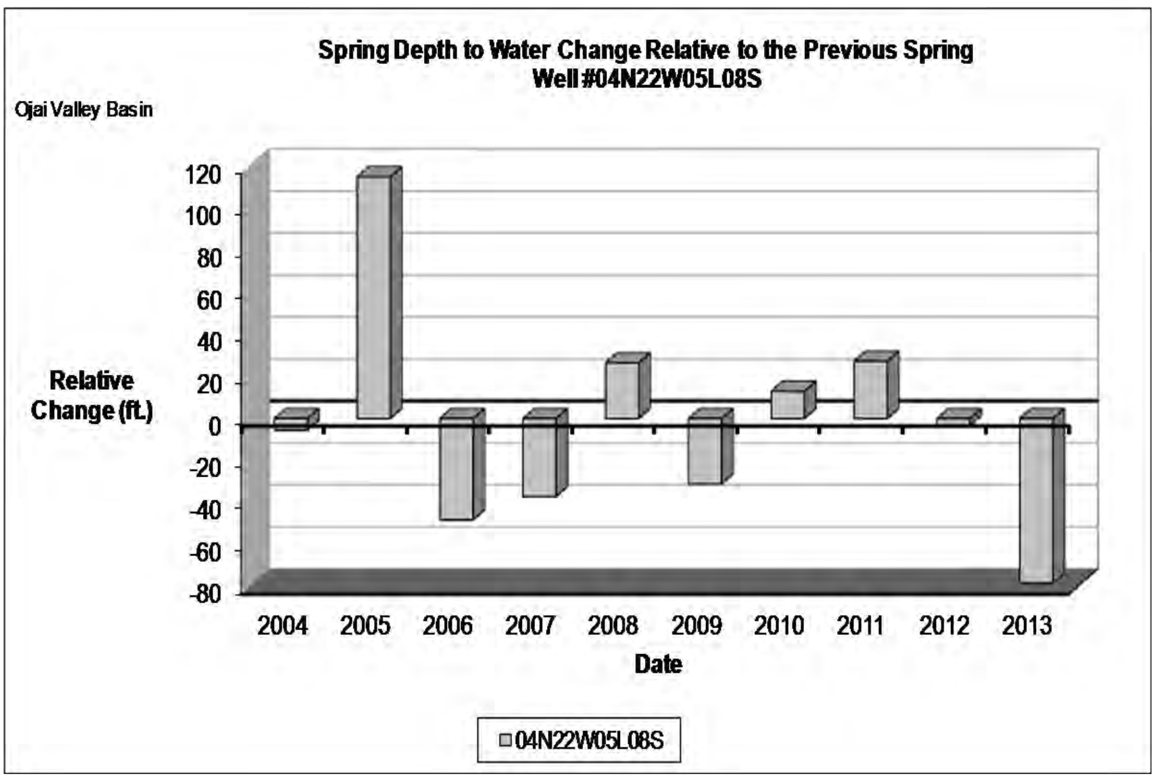

Figure B-23: Ojai Valley Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

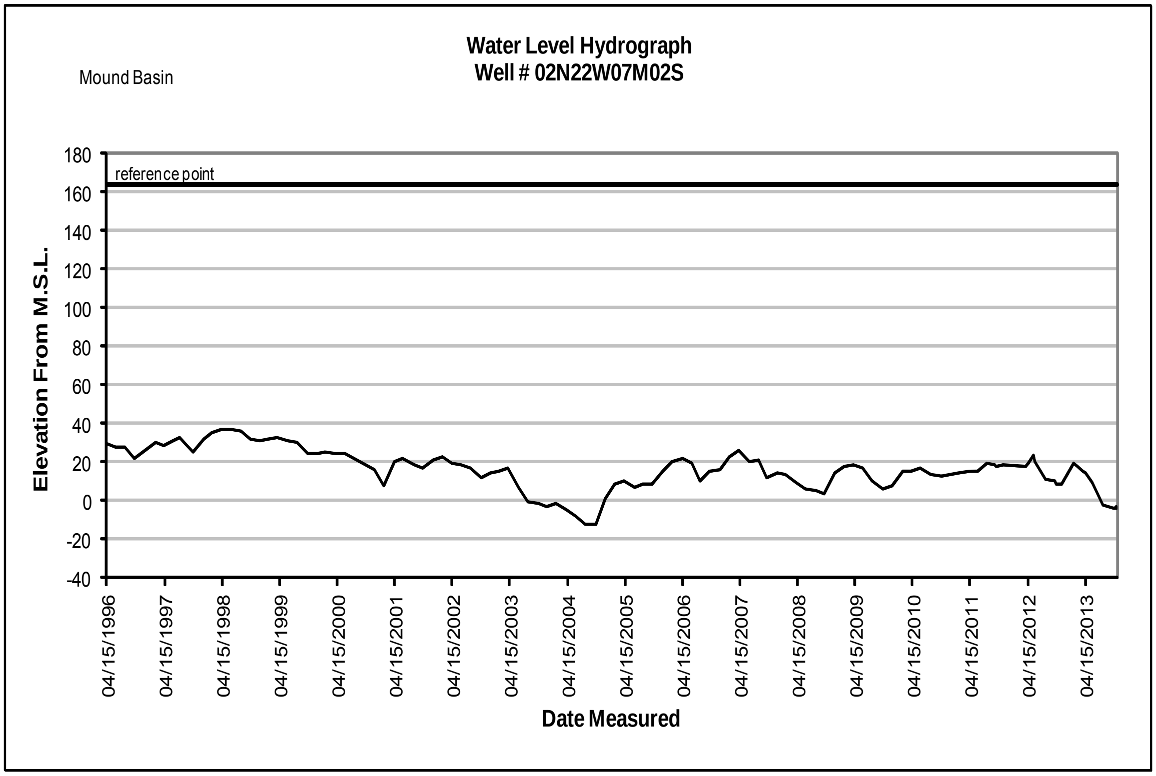

Figure B-24: Mound Basin Key Well Hydrograph.

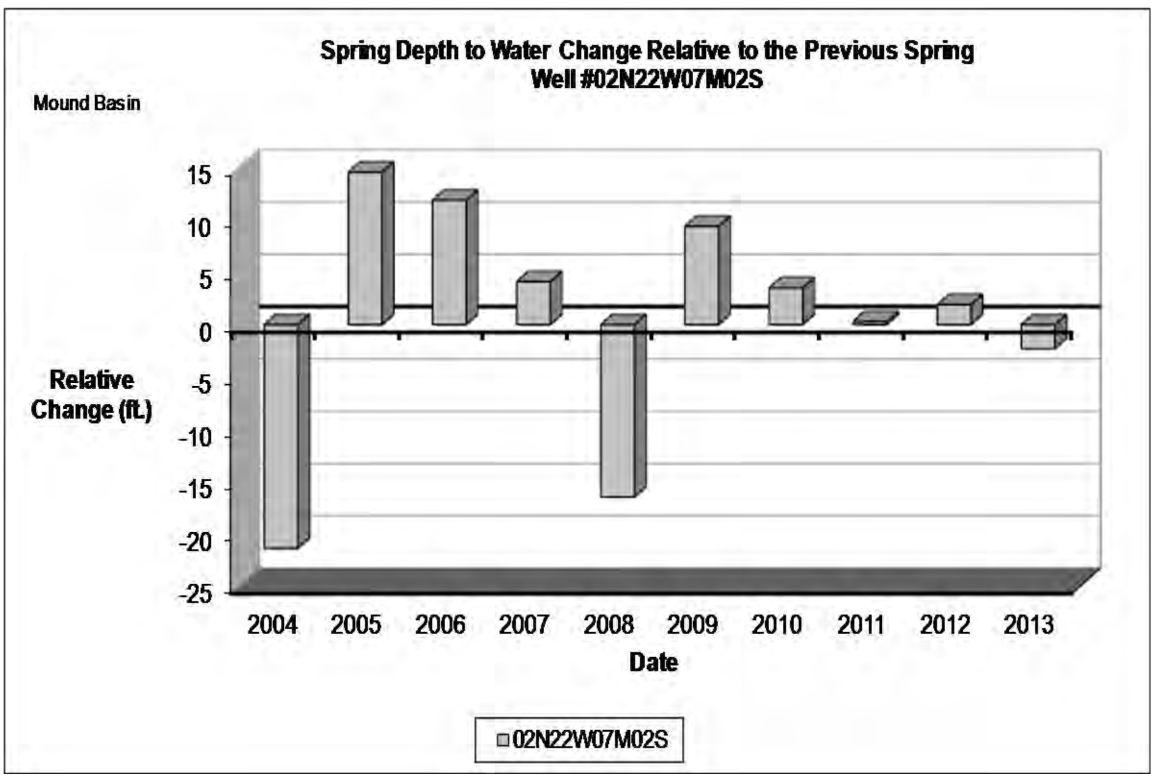

Figure B-25: Mound Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

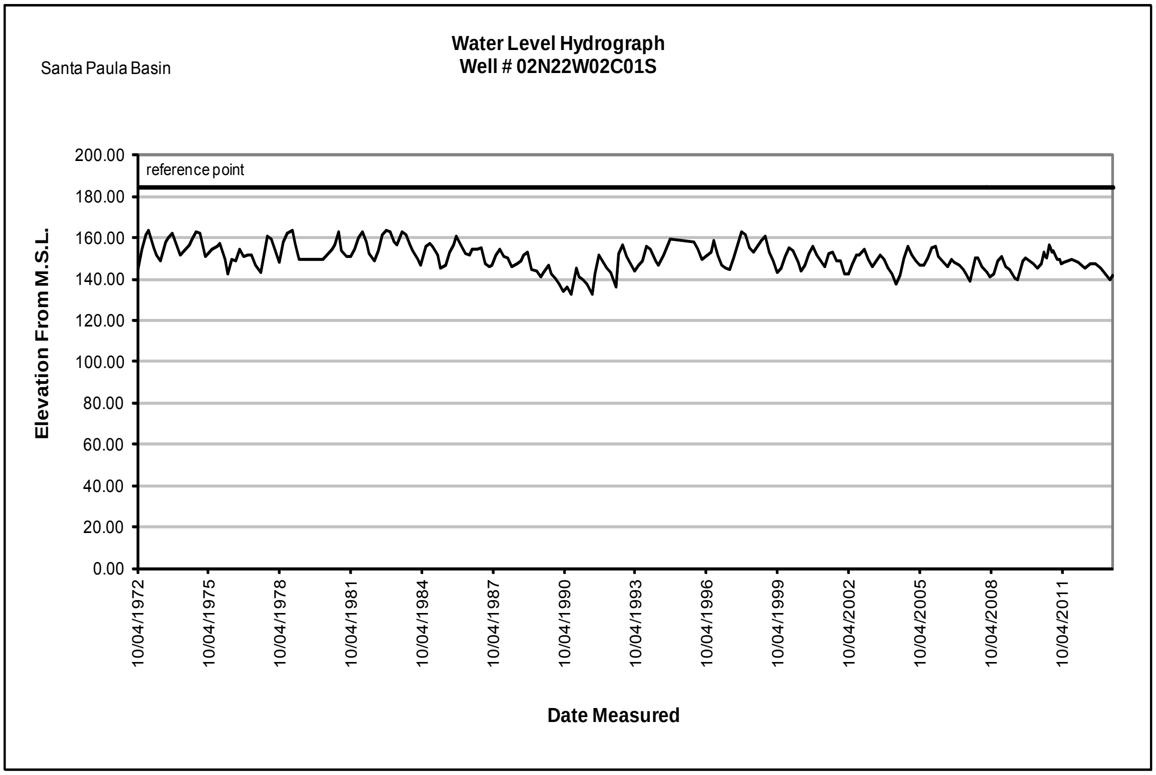

Figure B-26: Santa Paula Basin Key Well Hydrograph.

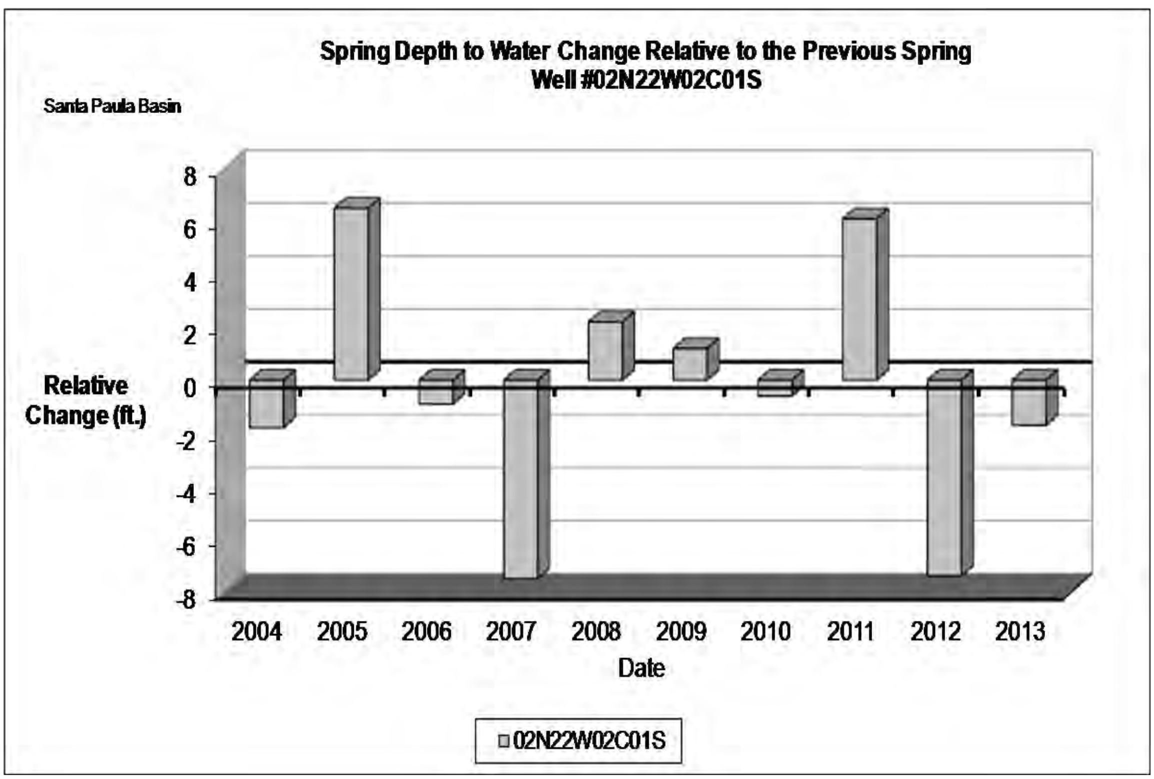

Figure B-27: Santa Paula Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

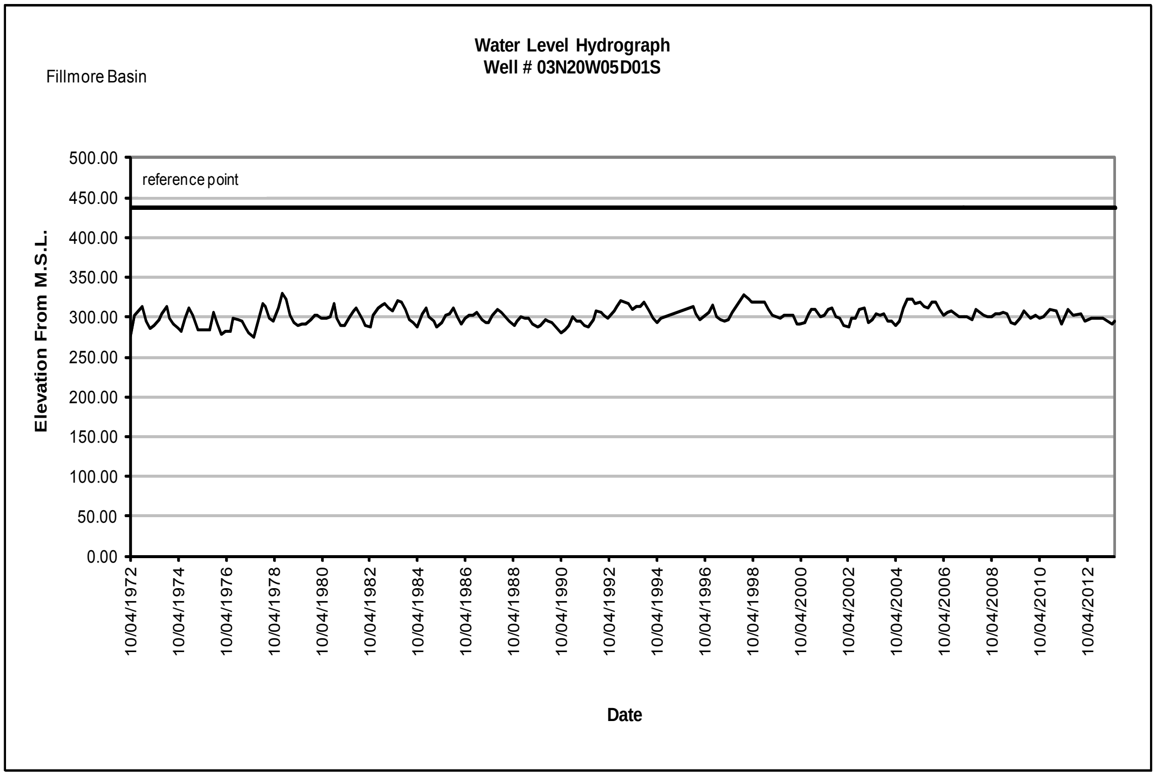

Figure B-28: Fillmore Basin Key Well Hydrograph.

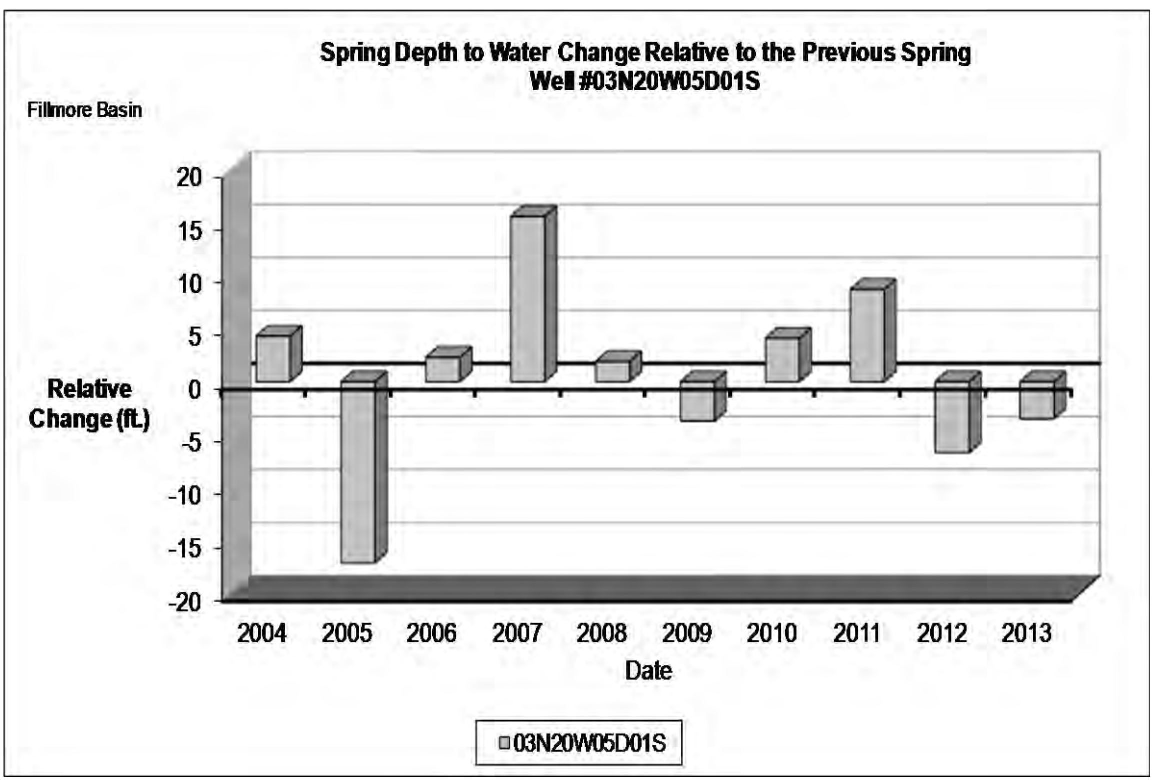

Figure B-29: Fillmore Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

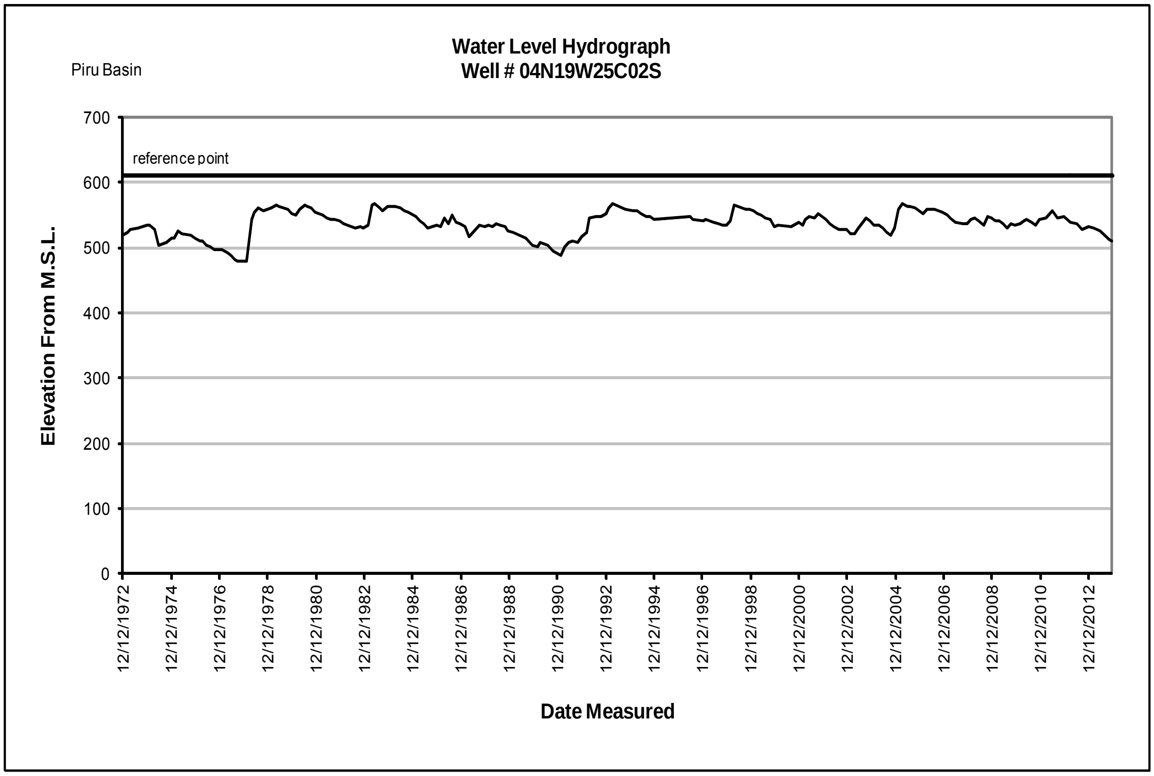

Figure B-30: Piru Basin Key Well Hydrograph.

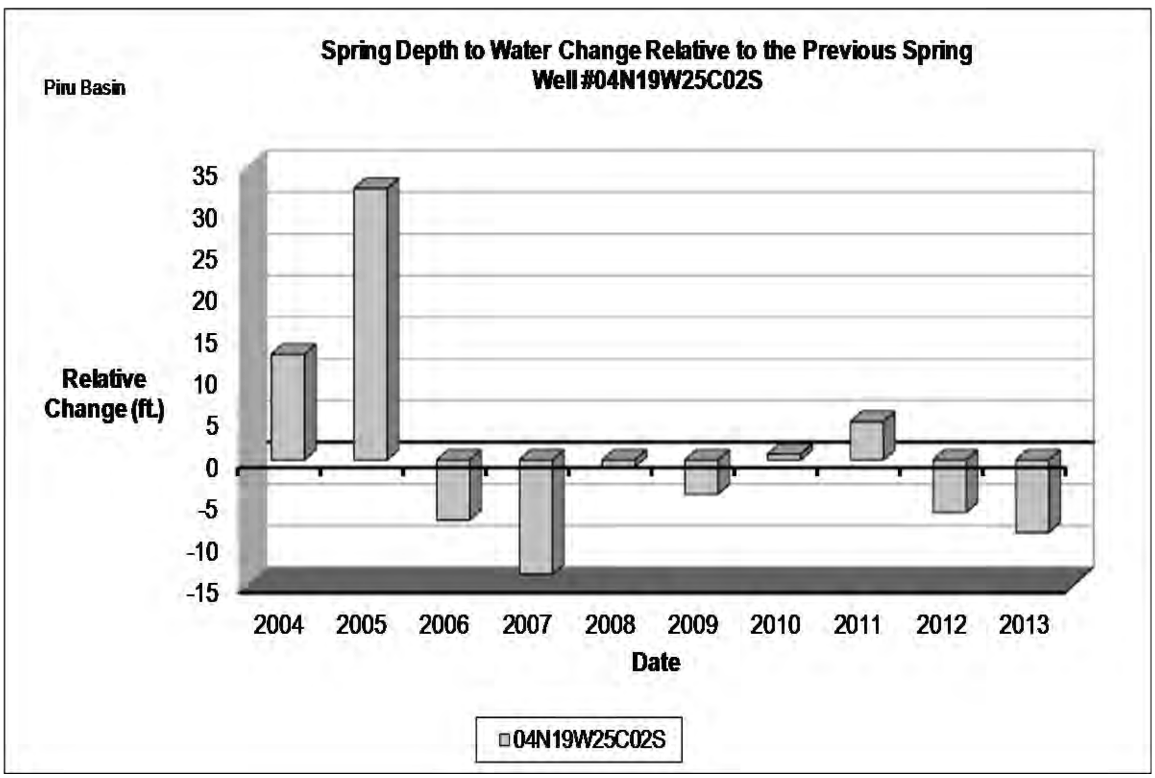

Figure B-31: Piru Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

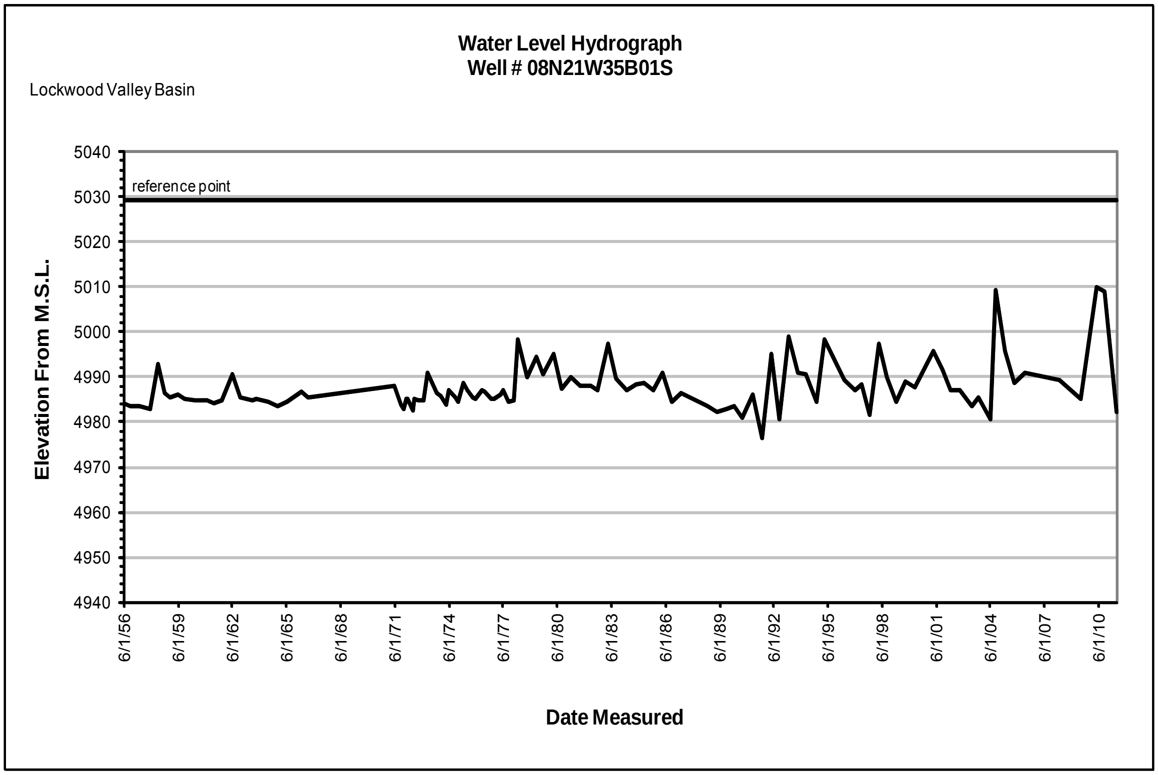

Figure B-32: Lockwood Valley Basin Key Well Hydrograph.

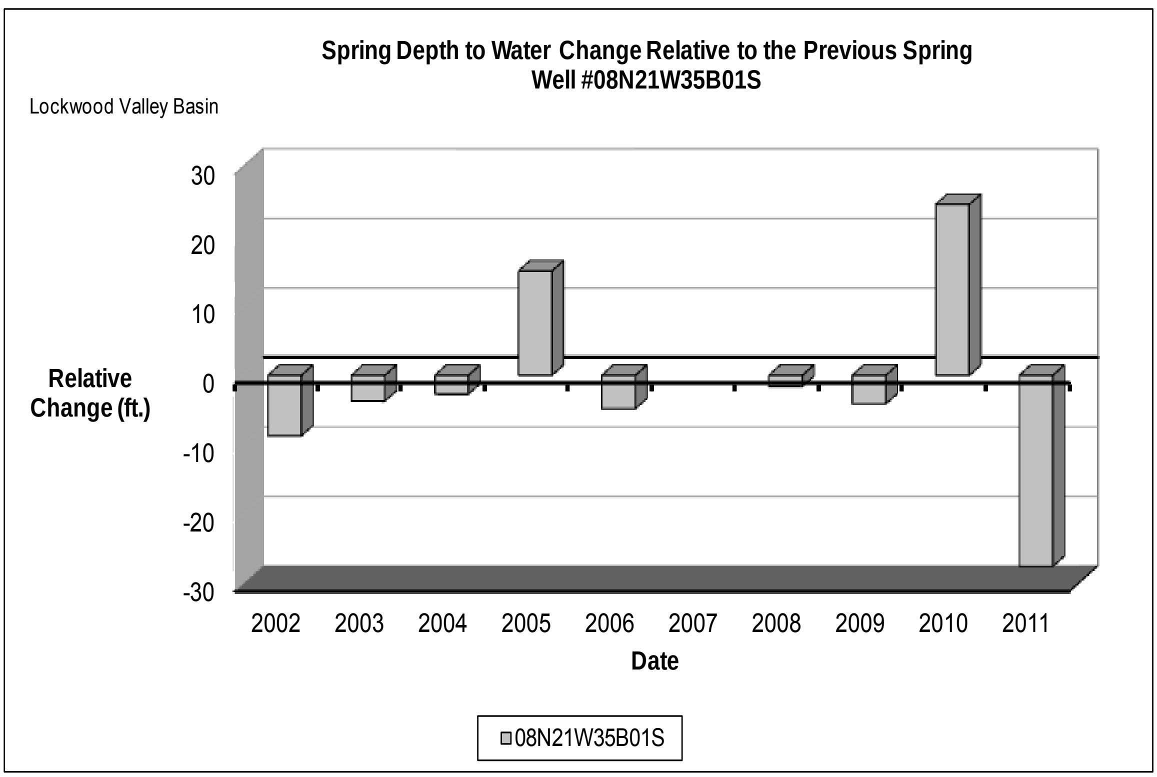

Figure B-33: Lockwood Valley Basin 10 year spring level change depicted on Up/Down graph.

Appendix B – Key Water Level Wells

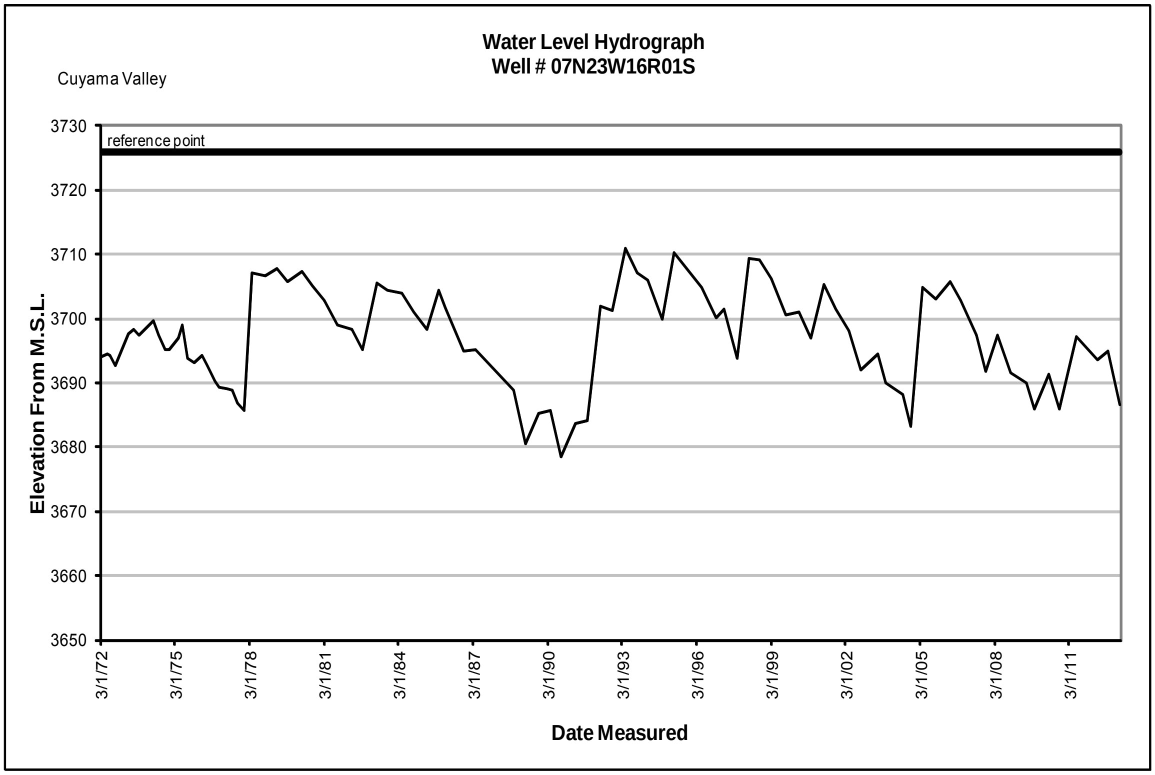

Figure B-34: Cuyama Valley Basin Key Well Hydrograph.

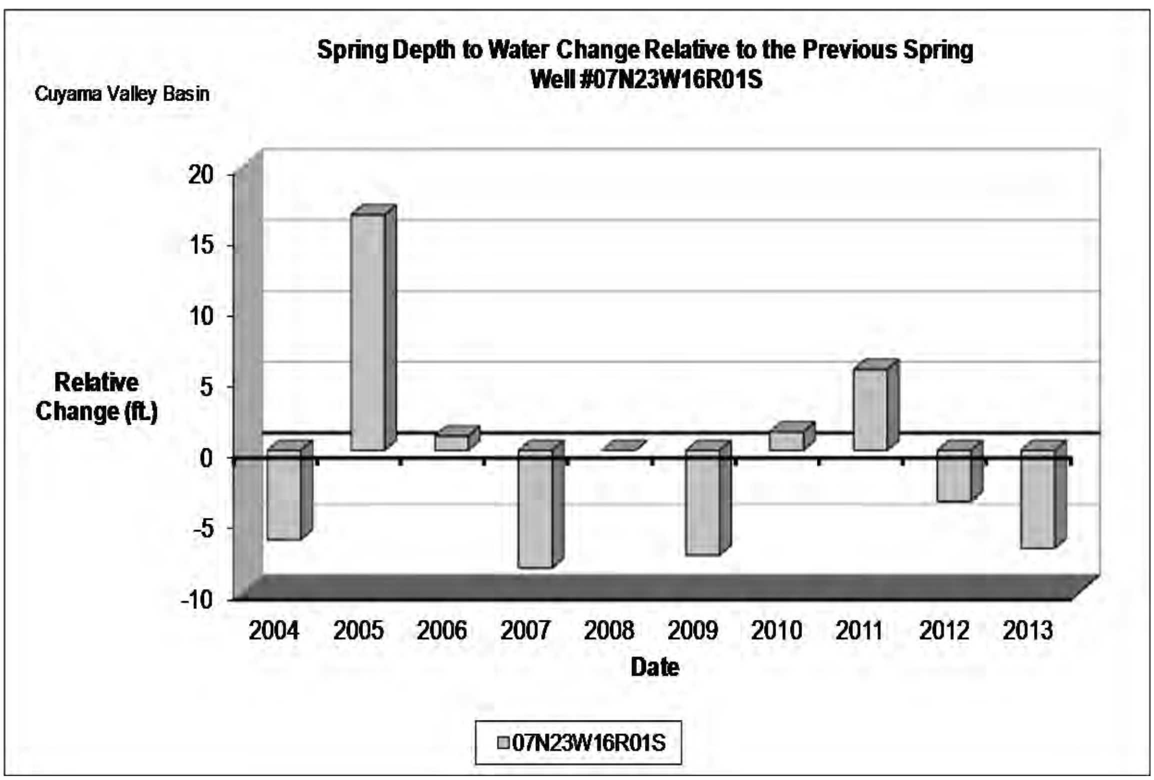

Figure B-35: Cuyama Valley Basin 10 year spring level change depicted on Up/Down graph.

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Arroyo Santa Rosa	02N19W20L01S	03/07/2013	307.66	60.60	247.06	
		06/05/2013	307.66	NM	-----	Pumping
		10/16/2013	307.66	NM	-----	Pumping
		12/05/2013	307.66	63.10	244.56	
	02N20W23G01S	03/07/2013	370.80	277.90	92.90	
		06/06/2013	370.80	278.90	91.90	
		10/16/2013	370.80	282.30	88.50	
		12/05/2013	370.80	282.90	87.90	
	02N20W23K01S	03/07/2013	274.11	194.30	79.81	
		06/06/2013	274.11	204.00	70.11	
		10/16/2013	274.11	211.30	62.81	
		12/05/2013	274.11	NM	-----	Pumping
	02N20W23R01S	03/07/2013	235.21	72.20	163.01	
		06/06/2013	235.21	85.10	150.11	
		10/16/2013	235.21	NM	-----	Pumping
		12/05/2013	235.21	NM	-----	Pumping
	02N20W26B03S*	03/07/2013	205.87	39.41	166.46	
		06/05/2013	205.87	42.70	163.17	
		10/16/2013	205.87	59.70	146.17	
		12/05/2013	205.87	58.10	147.77	
Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Conejo Valley	01N19W07K16S	03/18/2013	635.46	9.35	626.11	
		06/11/2013	635.46	10.10	625.36	
		09/19/2013	635.46	10.00	625.46	
		12/11/2013	635.46	11.10	624.36	
	01N20W03J01S	03/18/2013	764.40	45.35	719.05	
		06/11/2013	764.40	49.10	715.30	
		09/19/2013	764.40	54.50	709.90	
		12/11/2013	764.40	53.30	711.10	
Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Cuyama Valley	07N23W16R01S*	03/26/2013	3,726.00	39.40	3,686.60	
		09/18/2013	3,726.00	NM	-----	Locked Out
	07N24W13C03S	03/26/2013	3,435.00	34.25	3,400.75	
		09/18/2013	3,435.00	38.75	3,396.25	

* - Denotes Key water level well.

Note: The term Special is used to note when a well could not be measured due to the property being inaccessible, animals in the way, bees in well, or any condition not covered by a standard no measure code.

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Fillmore	03N19W06D02S	03/04/2013	434.60	47.90	386.70	
		06/03/2013	434.60	51.97	382.63	
		10/14/2013	434.60	60.70	373.90	
		12/02/2013	434.60	62.95	371.65	
	03N20W01C04S	03/04/2013	404.58	28.90	375.68	
		06/03/2013	404.58	32.40	372.18	
		10/14/2013	404.58	40.90	363.68	
		12/02/2013	404.58	42.20	362.38	
	03N20W05D01S*	03/04/2013	437.12	137.70	299.42	
		06/03/2013	437.12	138.49	298.63	
		10/14/2013	437.12	146.10	291.02	
		12/02/2013	437.12	142.10	295.02	
	03N20W09D01S	03/04/2013	325.20	9.99	315.21	
		06/03/2013	325.20	NM	-----	Pumping
		10/14/2013	325.20	15.00	310.20	
		12/02/2013	325.20	15.30	309.90	
	03N20W11C01S	03/04/2013	397.11	44.20	352.91	
		06/03/2013	397.11	47.20	349.91	
		10/14/2013	397.11	54.00	343.11	
		12/02/2013	397.11	55.30	341.81	
	03N21W01P02S	03/04/2013	301.85	NM	-----	Special
		06/03/2013	301.85	46.70	255.15	
		10/14/2013	301.85	50.70	251.15	
		12/02/2013	301.85	49.20	252.65	
	03N21W11B01S	03/04/2013	336.24	95.39	240.85	
		06/03/2013	336.24	94.25	241.99	
		10/14/2013	336.24	99.87	236.37	
		12/02/2013	336.24	102.20	234.04	
	04N19W30D01S	03/04/2013	434.43	43.58	390.85	
		06/03/2013	434.43	NM	-----	Pumping
		10/18/2013	434.43	58.50	375.93	
		12/02/2013	434.43	58.55	375.88	
	04N19W31R01S	03/04/2013	448.85	NM	-----	Pumping
		06/03/2013	448.85	NM	-----	Pumping
		10/18/2013	448.85	63.10	385.75	
		12/02/2013	448.85	NM	-----	Pumping
	04N19W32M02S	03/04/2013	449.46	16.10	433.36	
		06/03/2013	449.46	NM	-----	Pumping
		10/14/2013	449.46	NM	-----	Pumping
		12/02/2013	449.46	NM	-----	Pumping
	04N19W33D03S	03/04/2013	477.43	NM	-----	Pumping
		06/03/2013	477.43	NM	-----	Pumping
		10/14/2013	477.43	NM	-----	Pumping
		12/02/2013	477.43	NM	-----	Pumping
	04N19W33D04S	03/04/2013	477.90	4.00	473.90	
		06/03/2013	477.90	9.20	468.70	
		10/14/2013	477.90	10.90	467.00	
		12/02/2013	477.90	12.40	465.50	

* - Denotes Key water level well.

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Fillmore	04N20W23Q02S	03/04/2013	513.88	NM	-----	Pumping
		06/03/2013	513.88	130.92	382.96	
		10/18/2013	513.88	148.45	365.43	
		12/02/2013	513.88	NM	-----	Pumping
	04N20W26C02S	03/04/2013	505.35	135.55	369.80	
		06/03/2013	505.35	143.70	361.65	
		10/14/2013	505.35	151.60	353.75	
		12/02/2013	505.35	147.30	358.05	
	04N20W33C03S	03/04/2013	526.87	164.60	362.27	
		06/03/2013	526.87	167.90	358.97	
		10/14/2013	526.87	179.70	347.17	
		12/02/2013	526.87	NM	-----	Pumping
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
East Las Posas	02N20W01M01S	03/04/2013	470.05	NM	-----	Pumping
		06/06/2013	470.05	NM	-----	Special
		09/16/2013	470.05	NM	-----	Special
		12/16/2013	470.05	NM	-----	Special
	02N20W03K03S	03/04/2013	485.50	NM	-----	Special
		06/06/2013	485.50	NM	-----	Special
		09/16/2013	485.50	NM	-----	Special
		12/16/2013	485.50	NM	-----	Special
	02N20W10D02S	03/14/2013	459.53	284.60	174.93	
		06/10/2013	459.53	290.60	168.93	
		09/16/2013	459.53	295.05	164.48	
		12/17/2013	459.53	303.60	155.93	
	02N20W10G01S	03/14/2013	415.47	149.55	265.92	
		06/06/2013	415.47	159.10	256.37	
		09/16/2013	415.47	159.50	255.97	
		12/17/2013	415.47	162.80	252.67	
	02N20W10J01S	03/14/2013	406.87	114.00	292.87	
		06/06/2013	406.87	117.80	289.07	
		09/16/2013	406.87	122.05	284.82	
		12/17/2013	406.87	123.50	283.37	
	03N19W17Q01S	03/21/2013	1,311.06	1,096.00	215.06	
		06/10/2013	1,311.06	NM	-----	Special
		09/13/2013	1,311.06	NM	-----	Special
		12/18/2013	1,311.06	NM	-----	Special
	03N19W19J01S	03/14/2013	1,026.90	847.50	179.40	
		06/06/2013	1,026.90	848.20	178.70	
		09/23/2013	1,026.90	848.70	178.20	
		12/17/2013	1,026.90	852.50	174.40	
	03N19W19P02S	03/14/2013	1,057.94	NM	-----	Special
		06/10/2013	1,057.94	NM	-----	Special
		09/23/2013	1,057.94	NM	-----	Special
		12/17/2013	1,057.94	NM	-----	Special

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
East Las Posas	03N19W29F06S	03/14/2013	855.20	235.90	619.30	
		06/10/2013	855.20	244.10	611.10	
		09/13/2013	855.20	250.75	604.45	
		12/16/2013	855.20	251.50	603.70	
	03N19W29K04S	03/20/2013	843.32	NM	-----	Special
		06/10/2013	843.32	NM	-----	Special
		09/23/2013	843.32	NM	-----	Pumping
		12/18/2013	843.32	NM	-----	Special
	03N20W23L01S	03/14/2013	970.30	NM	-----	Special
		06/10/2013	970.30	NM	-----	Special
		09/23/2013	970.30	NM	-----	Special
		12/17/2013	970.30	NM	-----	Special
	03N20W25H01S	03/14/2013	823.84	217.80	606.04	
		06/12/2013	823.84	584.50	239.34	
		09/17/2013	823.84	216.80	607.04	
		12/17/2013	823.84	217.20	606.64	
	03N20W26R03S*	03/14/2013	717.81	576.60	141.21	
		06/10/2013	717.81	584.50	133.31	
		09/13/2013	717.81	591.60	126.21	
		12/18/2013	717.81	591.40	126.41	
	03N20W27H03S	03/20/2013	840.25	609.80	230.45	
		06/06/2013	840.25	618.20	222.05	
		09/13/2013	840.25	623.10	217.15	
		12/16/2013	840.25	624.50	215.75	
	03N20W34G01S	03/20/2013	680.48	525.30	155.18	
		06/10/2013	680.48	527.70	152.78	
		09/13/2013	680.48	532.20	148.28	
		12/16/2013	680.48	NM	-----	Pumping
	03N20W35R03S	03/14/2013	572.67	421.20	151.47	
		06/10/2013	572.67	429.20	143.47	
		09/13/2013	572.67	437.00	135.67	
		12/18/2013	572.67	435.20	137.47	
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
South Las Posas	02N19W05K01S*	03/20/2013	497.80	30.00	467.80	
		06/10/2013	497.80	30.25	467.55	
		09/16/2013	497.80	30.25	467.55	
		12/18/2013	497.80	30.67	467.13	
	02N19W08H02S	03/20/2013	494.87	24.20	470.67	
		06/11/2013	494.87	25.00	469.87	
		09/16/2013	494.87	27.80	467.07	
		12/18/2013	494.87	24.80	470.07	

* - Denotes Key water level well.

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
West Las Posas	02N20W06R01S	03/20/2013	461.19	NM	-----	Pumping
		06/06/2013	461.19	0.00	461.19	
		09/16/2013	461.19	NM	-----	Pumping
		12/16/2013	461.19	NM	-----	Pumping
	02N20W07R02S	03/20/2013	395.00	492.70	-97.70	
		06/12/2013	395.00	495.40	-100.40	
		09/16/2013	395.00	521.20	-126.20	
		12/16/2013	395.00	NM	-----	Pumping
	02N20W08F01S	03/04/2013	436.17	NM	-----	Pumping
		06/10/2013	436.17	0.00	436.17	
		09/16/2013	436.17	NM	-----	Pumping
		12/16/2013	436.17	NM	-----	Special
	02N21W09D02S	03/18/2013	323.75	226.80	96.95	
		06/09/2013	323.75	231.42	92.33	
		08/30/2013	323.75	231.40	92.35	
		12/02/2013	323.75	231.40	92.35	
	02N21W10G03S	03/21/2013	381.01	359.65	21.36	
		06/10/2013	381.01	367.90	13.11	
		09/13/2013	381.01	NM	-----	Pumping
		12/20/2013	381.01	390.70	-9.69	
	02N21W11J03S	03/04/2013	379.39	424.10	-44.71	
		06/06/2013	379.39	429.50	-50.11	
		09/16/2013	379.39	436.50	-57.11	
		12/18/2013	379.39	442.00	-62.61	
	02N21W11J04S	03/04/2013	379.39	379.30	0.09	
		06/06/2013	379.39	381.10	-1.71	
		09/16/2013	379.39	385.70	-6.31	
		12/18/2013	379.39	386.70	-7.31	
	02N21W11J05S	03/04/2013	379.39	206.80	172.59	
		06/06/2013	379.39	207.70	171.69	
		09/16/2013	379.39	211.90	167.49	
		12/18/2013	379.39	212.00	167.39	
	02N21W11J06S	03/04/2013	379.39	178.40	200.99	
		06/06/2013	379.39	177.60	201.79	
		09/16/2013	379.39	178.80	200.59	
		12/18/2013	379.39	179.70	199.69	
	02N21W12H01S*	03/04/2013	417.89	453.90	-36.01	
		06/10/2013	417.89	456.10	-38.21	
		09/25/2013	417.89	464.70	-46.81	
		12/17/2013	417.89	464.40	-46.51	
	02N21W15M03S	03/04/2013	263.87	137.90	125.97	
		06/06/2013	263.87	NM	-----	Locked Out
		09/13/2013	263.87	282.90	-19.03	
		12/16/2013	263.87	277.20	-13.33	
	02N21W16J01S	03/04/2013	259.90	13.05	246.85	
		06/06/2013	259.90	13.80	246.10	
		09/13/2013	259.90	14.20	245.70	
		12/16/2013	259.90	15.10	244.80	
	03N21W35P02S	03/14/2013	564.11	492.10	72.01	
		06/06/2013	564.11	0.00	564.11	
		09/17/2013	564.11	533.20	30.91	
		12/16/2013	564.11	509.90	54.21	

* - Denotes Key water level well.

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Little Cuddy Valley	08N20W08B01S	03/26/2013	5,300.00	8.55	5,291.45	
		09/18/2013	5,300.00	11.25	5,288.75	
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
Lockwood Valley	08N21W33R03S	03/26/2013	5,150.00	41.20	5,108.80	
		09/18/2013	5,150.00	45.00	5,105.00	
	08N21W35B01S*	03/26/2013	5,029.20	NM	-----	Dry
		09/18/2013	5,029.20	NM	-----	Tape Hung Up
	08N21W36G02S	03/26/2013	4,922.00	19.35	4,902.65	
		09/18/2013	4,922.00	19.80	4,902.20	
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
Mound	02N22W08P01S	03/04/2013	213.79	152.90	60.89	
		06/03/2013	213.79	162.20	51.59	
		10/22/2013	213.79	178.30	35.49	
		12/02/2013	213.79	176.00	37.79	
	02N22W09L03S	03/07/2013	251.25	187.30	63.95	
		06/04/2013	251.25	186.40	64.85	
		10/14/2013	251.25	190.40	60.85	
		12/02/2013	251.25	190.70	60.55	
	02N22W09L04S	03/07/2013	251.25	NM	-----	Special
		06/04/2013	251.25	185.60	65.65	
		10/14/2013	251.25	167.20	84.05	
		12/02/2013	251.25	171.20	80.05	
	02N22W16K01S	03/05/2013	149.37	133.00	16.37	
		06/03/2013	149.37	140.90	8.47	
		10/14/2013	149.37	158.50	-9.13	
		12/02/2013	149.37	157.00	-7.63	
	02N23W13K03S	03/04/2013	68.71	NM	-----	Special
		06/04/2013	68.71	65.20	3.51	
		10/15/2013	68.71	69.90	-1.19	
		12/03/2013	68.71	69.00	-0.29	
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
Ojai Valley	04N22W04Q01S	03/12/2013	1,045.50	95.50	950.00	
		06/19/2013	1,045.50	NM	-----	Pumping
		09/12/2013	1,045.50	NM	-----	Pumping
		12/06/2013	1,045.50	NM	-----	Pumping
	04N22W05D03S	03/12/2013	895.97	176.70	719.27	
		06/04/2013	895.97	204.00	691.97	
		09/12/2013	895.97	226.70	669.27	
		12/04/2013	895.97	NM	-----	Special
	04N22W05H04S	03/12/2013	950.22	236.50	713.72	
		06/05/2013	950.22	266.30	683.92	
		09/12/2013	950.22	280.80	669.42	
		12/06/2013	950.22	268.60	681.62	
	04N22W05L08S*	03/12/2013	892.09	176.00	716.09	
		06/19/2013	892.09	196.20	695.89	
		09/24/2013	892.09	213.80	678.29	
		12/13/2013	892.09	223.10	668.99	

* - Denotes Key water level well.

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Ojai Valley	04N22W05M01S	03/12/2013	843.47	134.95	708.52	
		06/04/2013	843.47	153.40	690.07	
		09/12/2013	843.47	174.40	669.07	
		12/03/2013	843.47	177.80	665.67	
	04N22W06D01S	03/06/2013	846.66	120.40	726.26	
		06/04/2013	846.66	130.50	716.16	
		09/12/2013	846.66	140.25	706.41	
		12/06/2013	846.66	142.40	704.26	
	04N22W06D05S	03/06/2013	853.21	131.50	721.71	
		06/03/2013	853.21	145.90	707.31	
		09/12/2013	853.21	156.30	696.91	
		12/06/2013	853.21	162.30	690.91	
	04N22W06K03S	03/05/2013	801.80	121.00	680.80	
		12/02/2013	801.80	158.00	643.80	
	04N22W06K12S	03/12/2013	812.70	126.30	686.40	
		06/04/2013	812.70	157.10	655.60	
		09/11/2013	812.70	187.90	624.80	
		12/05/2013	812.70	187.40	625.30	
	04N22W06M01S	03/12/2013	794.78	81.90	712.88	
		06/03/2013	794.78	86.46	708.32	
		09/12/2013	794.78	92.90	701.88	
		12/10/2013	794.78	93.60	701.18	
	04N22W07B02S	03/12/2013	773.77	84.20	689.57	
		06/04/2013	773.77	105.30	668.47	
		09/12/2013	773.77	124.10	649.67	
		12/03/2013	773.77	129.75	644.02	
	04N22W07G01S	03/05/2013	771.20	55.45	715.75	
		06/04/2013	771.20	66.40	704.80	
		09/23/2013	771.20	NM	-----	Pumping
		12/03/2013	771.20	85.60	685.60	
	04N22W08B02S	03/12/2013	870.57	149.60	720.97	
		06/19/2013	870.57	173.70	696.87	
		09/12/2013	870.57	NM	-----	Pumping
		12/06/2013	870.57	213.00	657.57	
	04N23W01K02S	03/05/2013	786.38	29.20	757.18	
		06/03/2013	786.38	54.38	732.00	
		09/12/2013	786.38	59.80	726.58	
		12/10/2013	786.38	55.10	731.28	
	04N23W02K01S	03/05/2013	869.49	2.60	866.89	
		06/03/2013	869.49	4.75	864.74	
		09/10/2013	869.49	4.20	865.29	
		12/10/2013	869.49	4.30	865.19	
	04N23W12H02S	03/19/2013	716.61	35.50	681.11	
		06/05/2013	716.61	36.50	680.11	
		09/23/2013	716.61	42.50	674.11	
		12/10/2013	716.61	42.70	673.91	
	04N23W12L02S	03/19/2013	682.50	NM	-----	Tape Hung Up
		06/05/2013	682.50	NM	-----	Tape Hung Up
		09/23/2013	682.50	NM	-----	Tape Hung Up
		12/04/2013	682.50	NM	-----	Tape Hung Up
	05N22W32J02S	03/12/2013	1,139.80	60.65	1,079.15	
		06/05/2013	1,139.80	63.10	1,076.70	
		09/12/2013	1,139.80	62.70	1,077.10	
		12/06/2013	1,139.80	61.20	1,078.60	

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Oxnard Plain Forebay	02N21W07P04S	03/20/2013	138.78	134.70	4.08	
		06/10/2013	138.78	148.40	-9.62	
		09/25/2013	138.78	157.50	-18.72	
		12/18/2013	138.78	167.90	-29.12	
	02N22W11A01S	03/04/2013	133.44	88.00	45.44	
		06/03/2013	133.44	NM	-----	Pumping
		10/14/2013	133.44	104.40	29.04	
		12/02/2013	133.44	103.15	30.29	
	02N22W26E01S	03/22/2013	86.96	60.53	26.43	
		06/06/2013	86.96	66.80	20.16	
		10/14/2013	86.96	NM	-----	Pumping
		12/04/2013	86.96	82.05	4.91	
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
Oxnard Plain Pressure	01N21W04N02S	03/06/2013	43.33	93.69	-50.36	
		06/05/2013	43.33	131.50	-88.17	
		10/16/2013	43.33	176.80	-133.47	
		12/04/2013	43.33	163.40	-120.07	
	01N21W05A02S	03/06/2013	51.54	20.59	30.95	
		06/04/2013	51.54	24.68	26.86	
		10/15/2013	51.54	32.60	18.94	
		12/03/2013	51.54	38.80	12.74	
	01N21W06L04S	03/06/2013	47.85	31.40	16.45	
		06/04/2013	47.85	37.10	10.75	
		10/15/2013	47.85	53.10	-5.25	
		12/04/2013	47.85	50.15	-2.30	
	01N21W07H01S*	03/05/2013	40.87	25.00	15.87	
		06/04/2013	40.87	31.09	9.78	
		10/15/2013	40.87	49.60	-8.73	
		12/04/2013	40.87	42.30	-1.43	
	01N21W09C04S	03/06/2013	39.96	96.00	-56.04	
		06/05/2013	39.96	NM	-----	Pumping
		10/16/2013	39.96	NM	-----	Pumping
		12/04/2013	39.96	NM	-----	Pumping
	01N21W16M01S	03/05/2013	22.79	84.70	-61.91	
		06/04/2013	22.79	107.90	-85.11	
		10/15/2013	22.79	160.00	-137.21	Nearby Pumping
		12/04/2013	22.79	140.00	-117.21	
	01N21W16P03S	03/06/2013	19.39	82.30	-62.91	
		06/04/2013	19.39	105.49	-86.10	
		10/15/2013	19.39	154.70	-135.31	Nearby Pumping
		12/04/2013	19.39	131.90	-112.51	
	01N21W17D02S	03/06/2013	28.21	19.05	9.16	
		06/05/2013	28.21	23.70	4.51	
		10/15/2013	28.21	40.50	-12.29	
		12/04/2013	28.21	34.20	-5.99	

* - Denotes Key water level well.

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Oxnard Plain Pressure	01N21W20N07S	03/05/2013	16.98	NM	-----	Special
		06/04/2013	16.98	NM	-----	Special
		10/15/2013	16.98	NM	-----	Special
		12/04/2013	16.98	NM	-----	Special
	01N21W21N01S	03/05/2013	15.74	45.50	-29.76	
		06/04/2013	15.74	70.00	-54.26	
		10/15/2013	15.74	100.40	-84.66	
		12/04/2013	15.74	99.70	-83.96	
	01N21W28D01S	03/05/2013	14.75	63.90	-49.15	
		06/17/2013	14.75	89.70	-74.95	
		10/15/2013	14.75	NM	-----	Pumping
		12/04/2013	14.75	113.05	-98.30	
	01N21W29B03S	03/05/2013	18.19	17.77	0.42	
		06/04/2013	18.19	NM	-----	Special
		10/15/2013	18.19	39.60	-21.41	
		12/04/2013	18.19	NM	-----	Special
	01N21W32K01S*	03/04/2013	10.00	49.00	-39.00	
		06/10/2013	10.00	77.00	-67.00	
		10/14/2013	10.00	101.00	-91.00	
		12/09/2013	10.00	101.00	-91.00	
	01N22W12N03S	03/06/2013	38.46	60.71	-22.25	
		06/04/2013	38.46	80.07	-41.61	
		10/15/2013	38.46	NM	-----	Special
		12/04/2013	38.46	102.50	-64.04	
	01N22W12R01S	03/06/2013	34.00	NM	-----	Special
		06/07/2013	34.00	71.50	-37.50	
		10/15/2013	34.00	NM	-----	Special
		12/04/2013	34.00	NM	-----	Pumping
	01N22W14K01S	03/05/2013	33.97	21.05	12.92	
		06/04/2013	33.97	27.10	6.87	
		10/15/2013	33.97	NM	-----	Special
		12/03/2013	33.97	NM	-----	Special
	01N22W21B03S	03/05/2013	15.28	13.35	1.93	
		06/04/2013	15.28	21.72	-6.44	
		10/15/2013	15.28	37.50	-22.22	
		12/03/2013	15.28	38.40	-23.12	
	01N22W24C02S	03/05/2013	29.10	21.12	7.98	
		06/04/2013	29.10	26.90	2.20	
		10/15/2013	29.10	41.15	-12.05	
		12/03/2013	29.10	37.80	-8.70	
	01N22W26K03S	03/05/2013	13.06	63.50	-50.44	
		06/17/2013	13.06	63.90	-50.84	
		10/15/2013	13.06	NM	-----	Pumping
		12/03/2013	13.06	84.60	-71.54	
	01N22W26M03S	03/05/2013	13.00	45.47	-32.47	
		06/17/2013	13.00	55.45	-42.45	
		10/15/2013	13.00	NM	-----	Pumping
		12/03/2013	13.00	NM	-----	Pumping

* - Denotes Key water level well.

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Oxnard Plain Pressure	01N22W36B02S	03/05/2013	11.50	NM	-----	Pumping
		06/04/2013	11.50	NM	-----	Pumping
		10/15/2013	11.50	NM	-----	Pumping
		12/03/2013	11.50	NM	-----	Pumping
	02N21W18H03S	03/28/2013	118.41	79.70	38.71	
		06/17/2013	118.41	93.01	25.40	
		10/28/2013	118.41	113.50	4.91	
		12/04/2013	118.41	NM	-----	Pumping
	02N21W18H12S	03/28/2013	117.88	102.80	15.08	
		06/10/2013	117.88	124.50	-6.62	
		10/28/2013	117.88	156.90	-39.02	
		12/04/2013	117.88	NM	-----	Pumping
	02N21W19A03S	03/04/2013	102.70	89.30	13.40	
		06/06/2013	102.70	101.30	1.40	
		09/13/2013	102.70	118.10	-15.40	
		12/16/2013	102.70	113.20	-10.50	
	02N21W19B02S	03/28/2013	101.80	NM	-----	Special
		06/06/2013	101.80	75.00	26.80	
		10/16/2013	101.80	94.30	7.50	
		12/04/2013	101.80	NM	-----	Pumping
	02N21W20F02S	03/14/2013	113.36	124.85	-11.49	
		06/06/2013	113.36	136.90	-23.54	
		09/13/2013	113.36	151.20	-37.84	
		12/16/2013	113.36	141.20	-27.84	
	02N21W20M06S	03/07/2013	92.09	120.00	-27.91	Nearby Pumping
		06/06/2013	92.09	127.30	-35.21	
		10/16/2013	92.09	NM	-----	Pumping
		12/04/2013	92.09	138.10	-46.01	
	02N21W31P02S	03/05/2013	57.75	35.32	22.43	
		06/04/2013	57.75	40.47	17.28	
		10/15/2013	57.75	53.80	3.95	
		12/04/2013	57.75	51.80	5.95	
	02N21W31P03S	03/05/2013	55.17	98.90	-43.73	
		06/04/2013	55.17	110.15	-54.98	
		10/15/2013	55.17	165.90	-110.73	
		12/04/2013	55.17	153.95	-98.78	
	02N22W24P01S	03/07/2013	94.30	71.20	23.10	
		06/17/2013	94.30	86.70	7.60	
		10/16/2013	94.30	NM	-----	Pumping
		12/04/2013	94.30	NM	-----	Pumping
	02N22W30K01S	03/05/2013	42.38	30.36	12.02	
		06/04/2013	42.38	39.49	2.89	
		10/15/2013	42.38	45.90	-3.52	
		12/03/2013	42.38	45.70	-3.32	
	02N22W31A01S	03/05/2013	42.30	28.10	14.20	
		06/04/2013	42.30	36.15	6.15	
		10/15/2013	42.30	44.95	-2.65	
		12/03/2013	42.30	43.50	-1.20	

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Oxnard Plain Pressure	02N22W32Q03S	03/06/2013	40.10	24.95	15.15	
		06/04/2013	40.10	NM	-----	Special
		10/15/2013	40.10	NM	-----	Special
		12/03/2013	40.10	41.80	-1.70	
	02N23W25G02S	03/05/2013	23.22	10.48	12.74	
		06/04/2013	23.22	22.60	0.62	
		10/15/2013	23.22	NM	-----	Special
		12/03/2013	23.22	NM	-----	Special
	02N23W36C04S	03/05/2013	27.73	16.50	11.23	
		06/04/2013	27.73	25.80	1.93	
		10/15/2013	27.73	34.60	-6.87	
		12/03/2013	27.73	31.20	-3.47	
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
Piru	04N18W19R01S	03/04/2013	655.63	101.01	554.62	
		06/03/2013	655.63	NM	-----	Pumping
		10/14/2013	655.63	125.80	529.83	
		12/02/2013	655.63	NM	-----	Pumping
	04N18W20R01S	03/04/2013	661.29	NM	-----	Pumping
		06/03/2013	661.29	NM	-----	Pumping
		12/02/2013	661.29	NM	-----	Pumping
	04N18W28C02S	03/04/2013	676.44	NM	-----	Special
		06/03/2013	676.44	NM	-----	Pumping
		10/14/2013	676.44	NM	-----	Pumping
		12/02/2013	676.44	NM	-----	Pumping
	04N19W25C02S*	03/04/2013	611.09	79.90	531.19	
		06/03/2013	611.09	85.50	525.59	
		10/14/2013	611.09	99.00	512.09	
		12/02/2013	611.09	99.70	511.39	
	04N19W25K04S	03/04/2013	593.97	NM	-----	Pumping
		06/03/2013	593.97	NM	-----	Pumping
		10/14/2013	593.97	NM	-----	Pumping
		12/02/2013	593.97	NM	-----	Pumping
	04N19W26P01S	03/04/2013	563.00	NM	-----	Pumping
		06/03/2013	563.00	NM	-----	Pumping
		10/14/2013	563.00	NM	-----	Pumping
		12/02/2013	563.00	NM	-----	Pumping
	04N19W34K01S	03/04/2013	519.51	14.90	504.61	
		06/03/2013	519.51	19.90	499.61	
		10/14/2013	519.51	26.40	493.11	
		12/02/2013	519.51	NM	-----	Special
	04N19W35L02S	03/04/2013	541.08	23.90	517.18	
		06/03/2013	541.08	28.22	512.86	
		10/14/2013	541.08	37.60	503.48	
		12/02/2013	541.08	39.80	501.28	

* - Denotes Key water level well.

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Pleasant Valley	01N21W02J02S	03/06/2013	89.51	57.80	31.71	
		06/05/2013	89.51	69.30	20.21	
		10/16/2013	89.51	93.85	-4.34	
		12/03/2013	89.51	88.10	1.41	
	01N21W02P01S	03/06/2013	67.98	84.40	-16.42	
		06/05/2013	67.98	113.05	-45.07	
		10/16/2013	67.98	142.70	-74.72	
		12/03/2013	67.98	138.40	-70.42	
	01N21W03C01S*	03/06/2013	72.28	107.30	-35.02	
		06/04/2013	72.28	144.90	-72.62	
		10/15/2013	72.28	161.50	-89.22	
		12/04/2013	72.28	161.10	-88.82	
	01N21W04K01S	03/06/2013	47.52	94.05	-46.53	
		06/17/2013	47.52	101.70	-54.18	
		10/16/2013	47.52	NM	-----	Pumping
		12/04/2013	47.52	NM	-----	Special
	01N21W09J03S	03/07/2013	30.56	77.40	-46.84	
		06/06/2013	30.56	102.00	-71.44	
		10/16/2013	30.56	164.50	-133.94	
		12/10/2013	30.56	132.90	-102.34	
	01N21W10G01S	03/06/2013	38.72	93.90	-55.18	
		06/17/2013	38.72	122.71	-83.99	
		10/16/2013	38.72	NM	-----	Pumping
		12/10/2013	38.72	148.90	-110.18	
	01N21W14A01S	03/06/2013	50.11	9.80	40.31	
		06/05/2013	50.11	12.00	38.11	
		10/16/2013	50.11	16.20	33.91	
		12/03/2013	50.11	18.50	31.61	
	01N21W15H01S	03/06/2013	33.17	2.55	30.62	
		06/05/2013	33.17	3.10	30.07	
		10/16/2013	33.17	11.00	22.17	
		12/03/2013	33.17	14.00	19.17	
	01N21W16A04S	03/07/2013	25.69	78.48	-52.79	
		06/17/2013	25.69	81.80	-56.11	
		10/16/2013	25.69	NM	-----	Pumping
		12/04/2013	25.69	NM	-----	Pumping
	02N20W19M05S	03/06/2013	200.47	129.00	71.47	
		06/04/2013	200.47	139.60	60.87	
		10/15/2013	200.47	154.70	45.77	
		12/04/2013	200.47	154.60	45.87	
	02N20W28G02S	03/06/2013	170.60	NM	-----	Special
		06/06/2013	170.60	NM	-----	Special
		10/15/2013	170.60	NM	-----	Special
		12/04/2013	170.60	NM	-----	Special
	02N21W33P02S	03/06/2013	64.63	72.96	-8.33	
		06/04/2013	64.63	99.00	-34.37	
		10/15/2013	64.63	132.20	-67.57	
		12/03/2013	64.63	143.60	-78.97	
	02N21W35M02S	03/06/2013	90.60	127.01	-36.41	
		06/05/2013	90.60	158.30	-67.70	
		10/16/2013	90.60	191.70	-101.10	
		12/04/2013	90.60	187.70	-97.10	
	02N21W36N01S	03/06/2013	111.18	68.90	42.28	
		06/05/2013	111.18	77.65	33.53	
		10/16/2013	111.18	100.70	10.48	
		12/03/2013	111.18	103.30	7.88	

* - Denotes key water level well.

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Santa Paula	02N22W02C01S*	03/04/2013	184.38	36.80	147.58	
		06/03/2013	184.38	38.80	145.58	
		10/14/2013	184.38	44.50	139.88	
		12/02/2013	184.38	42.90	141.48	
	02N22W03K02S	03/04/2013	248.75	121.90	126.85	
		06/03/2013	248.75	123.90	124.85	
		10/14/2013	248.75	122.90	125.85	
		12/03/2013	248.75	124.85	123.90	
	02N22W03M02S	03/05/2013	291.50	194.70	96.80	
		06/03/2013	291.50	NM	-----	Special
		10/18/2013	291.50	195.70	95.80	
		12/03/2013	291.50	197.20	94.30	
	03N21W09K02S	03/04/2013	362.18	NM	-----	Pumping
		06/03/2013	362.18	NM	-----	Special
		10/14/2013	362.18	NM	-----	Special
		12/02/2013	362.18	NM	-----	Pumping
	03N21W17Q01S	03/04/2013	283.35	98.10	185.25	
		06/03/2013	283.35	105.36	177.99	
		10/14/2013	283.35	110.60	172.75	
		12/02/2013	283.35	NM	-----	Pumping
	03N21W19R01S	03/05/2013	235.39	72.70	162.69	
		06/03/2013	235.39	NM	-----	Special
		10/18/2013	235.39	79.10	156.29	
		12/03/2013	235.39	-27.00	262.39	
	03N22W36K05S	03/04/2013	180.89	33.00	147.89	
		06/03/2013	180.89	34.30	146.59	
		10/14/2013	180.89	43.05	137.84	
		12/02/2013	180.89	41.20	139.69	
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
Sherwood	01N19W19L02S	03/18/2013	1,082.00	268.90	813.10	
		06/11/2013	1,082.00	287.80	794.20	
		09/19/2013	1,082.00	307.10	774.90	
		12/11/2013	1,082.00	320.10	761.90	
	01N19W30A01S	03/18/2013	999.98	43.40	956.58	
		06/11/2013	999.98	NM	-----	Special
		09/19/2013	999.98	55.40	944.58	
		12/11/2013	999.98	55.60	944.38	
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
Simi Valley	02N18W04R02S	03/07/2013	870.00	49.95	820.05	
		06/05/2013	870.00	NM	------	Special
		10/16/2013	870.00	51.30	818.70	
		12/05/2013	870.00	51.20	818.80	
	02N18W10A02S*	03/15/2013	926.40	79.70	846.70	
		06/03/2013	926.40	80.7	845.70	
		10/01/2013	926.40	81.80	844.60	
		12/17/2013	926.40	82.30	844.10	
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
Thousand Oaks	01N19W14K04S	03/18/2013	908.79	23.20	885.59	
		06/11/2013	908.79	23.50	885.29	
		09/19/2013	908.79	24.50	884.29	
		12/11/2013	908.79	24.75	884.04	

* - Denotes Key water level well.

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Tierra Rejada	02N19W10R01S	03/07/2013	619.29	101.00	518.29	
		06/05/2013	619.29	104.00	515.29	
		10/16/2013	619.29	NM	-----	Pumping
		12/05/2013	619.29	110.10	509.19	
	02N19W12M03S	03/07/2013	718.95	85.90	633.05	
		06/05/2013	718.95	NM	-----	Pumping
		10/16/2013	718.95	88.20	630.75	
		12/05/2013	718.95	88.70	630.25	
	02N19W14P01S	03/07/2013	678.12	32.90	645.22	
		06/05/2013	678.12	33.50	644.62	
		10/16/2013	678.12	34.50	643.62	
		12/05/2013	678.12	NM	-----	Special
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
Undefined	01N19W15E01S	03/18/2013	903.53	24.45	879.08	
		06/11/2013	903.53	26.20	877.33	
		09/19/2013	903.53	26.90	876.63	
		12/11/2013	903.53	26.70	876.83	
	01N20W24H02S	03/18/2013	1,126.54	NM	-----	Tape Hung Up
		06/11/2013	1,126.54	NM	-----	Tape Hung Up
		09/19/2013	1,126.54	NM	-----	Tape Hung Up
		12/11/2013	1,126.54	NM	-----	Tape Hung Up
	02N21W13A01S	03/25/2013	440.00	528.00	-88.00	
		06/18/2013	440.00	533.80	-93.80	
		09/26/2013	440.00	545.30	-105.30	
		12/20/2013	440.00	552.30	-112.30	
	04N22W21F01S	03/19/2013	2,570.00	168.40	2,401.60	
		09/18/2013	2,570.00	161.90	2,408.10	
		03/19/2013	2,400.00	309.60	2,090.40	
		09/18/2013	2,400.00	246.50	2,153.50	
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
Upper Ojai	04N22W09Q02S	03/19/2013	1,278.80	25.20	1,253.60	
		06/05/2013	1,278.80	NM	-----	Pumping
		09/12/2013	1,278.80	NM	-----	Pumping
		12/05/2013	1,278.80	29.80	1,249.00	
	04N22W10K02S	03/19/2013	1,325.90	NM	-----	Special
		06/12/2013	1,325.90	41.90	1,284.00	
		09/12/2013	1,325.90	70.00	1,255.90	
		12/05/2013	1,325.90	NM	-----	Pumping
	04N22W11P02S	03/19/2013	1,420.60	21.80	1,398.80	
		06/12/2013	1,420.60	32.10	1,388.50	
		09/23/2013	1,420.60	29.90	1,390.70	
		12/05/2013	1,420.60	30.20	1,390.40	
	04N22W12F04S	03/19/2013	1,616.90	144.25	1,472.65	
		06/12/2013	1,616.90	154.20	1,462.70	
		09/23/2013	1,616.90	170.70	1,446.20	
		12/05/2013	1,616.90	NM	-----	Pumping

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Lower Ventura River	03N23W08B07S	03/05/2013	239.19	15.10	224.09	
		06/03/2013	239.19	15.25	223.94	
		09/10/2013	239.19	17.20	221.99	
		12/03/2013	239.19	23.10	216.09	
	03N23W32Q03S	04/16/2013	50.86	NM	-----	Pumping
		06/19/2013	50.86	33.80	17.06	Nearby Pumping
		09/25/2013	50.86	33.20	17.66	
		12/05/2013	50.86	NM	-----	Pumping
	03N23W32Q07S	04/16/2013	46.10	26.50	19.60	
		06/19/2013	46.10	26.60	19.50	
		09/25/2013	46.10	26.50	19.60	
		12/05/2013	46.10	NM	-----	Pumping
Basin	**SWN**	**Date**	**RP**	**Depth Below RP**	**Elev. Above MSL**	**Note**
Upper Ventura River	03N23W05B01S	03/05/2013	293.20	34.20	259.00	
		06/04/2013	293.20	32.70	260.50	
		09/10/2013	293.20	39.10	254.10	
		12/03/2013	293.20	47.60	245.60	
	03N23W08B02S	03/05/2013	249.30	18.10	231.20	
		09/10/2013	249.30	NM	-----	Special
		12/03/2013	249.30	NM	-----	Special
	04N23W03M01S	03/06/2013	760.85	96.00	664.85	
		06/05/2013	760.85	98.75	662.10	
		09/11/2013	760.85	105.50	655.35	
		12/04/2013	760.85	107.30	653.55	
	04N23W04J01S	03/06/2013	713.04	64.20	648.84	
		06/05/2013	713.04	71.50	641.54	
		09/11/2013	713.04	73.90	639.14	
		12/04/2013	713.04	78.10	634.94	
	04N23W09B01S	03/12/2013	662.30	34.40	627.90	
		06/05/2013	662.30	57.20	605.10	
		09/11/2013	662.30	77.90	584.40	Nearby Pumping
		12/04/2013	662.30	77.70	584.60	
	04N23W14M04S	03/19/2013	554.50	-0.1	554.60	Flowing
		06/05/2013	554.50	NM	-----	Special
		09/23/2013	554.50	NM	-----	Inaccessible
		12/04/2013	554.50	NM	-----	Tape Hung Up
	04N23W15A02S	03/06/2013	680.90	82.20	598.70	
		06/05/2013	680.90	97.67	583.23	
		09/23/2013	680.90	90.80	590.10	
		12/10/2013	680.90	88.30	592.60	
	04N23W15D02S	03/05/2013	634.30	143.20	491.10	
		06/03/2013	634.30	141.34	492.96	
		09/13/2013	634.30	146.40	487.90	
		12/03/2013	634.30	151.20	483.10	

Appendix C – Groundwater Level Measurement Data

Basin	SWN	Date	RP	Depth Below RP	Elev. Above MSL	Note
Upper Ventura River	04N23W16C04S*	03/05/2013	569.10	64.75	504.35	
		06/03/2013	569.10	59.54	509.56	
		09/12/2013	569.10	78.90	490.20	
		12/04/2013	569.10	88.60	480.50	
	04N23W16P01S	03/05/2013	619.89	69.00	550.89	
		06/03/2013	619.89	68.75	551.14	
		09/13/2013	619.89	70.80	549.09	
		12/03/2013	619.89	71.95	547.94	
	04N23W20A01S	03/05/2013	488.89	27.30	461.59	
		06/03/2013	488.89	27.25	461.64	
		09/10/2013	488.89	34.20	454.69	
		12/03/2013	488.89	31.00	457.89	
	04N23W28G01S	03/12/2013	402.37	16.00	386.37	
		06/05/2013	402.37	26.10	376.27	
		09/23/2013	402.37	30.25	372.12	
		12/10/2013	402.37	30.20	372.17	
	04N23W29F02S	03/05/2013	396.58	41.10	355.48	
		06/03/2013	396.58	36.50	360.08	
		09/10/2013	396.58	59.60	336.98	
		12/03/2013	396.58	62.70	333.88	
	04N23W33M03S	03/12/2013	331.80	13.30	318.50	
		06/05/2013	331.80	18.25	313.55	
		09/10/2013	331.80	21.90	309.90	
		12/03/2013	331.80	22.50	309.30	
	04N24W13J04S	03/05/2013	626.45	6.70	619.75	
		06/03/2013	626.45	11.20	615.25	
		09/10/2013	626.45	15.00	611.45	
		12/03/2013	626.45	14.90	611.55	
	04N24W13N01S	03/05/2013	642.12	3.10	639.02	
		06/03/2013	642.12	4.25	637.87	
		09/10/2013	642.12	6.00	636.12	
		12/03/2013	642.12	6.50	635.62	
	05N23W33B03S	03/06/2013	829.00	23.90	805.10	
		06/05/2013	829.00	32.34	796.66	
		09/11/2013	829.00	36.60	792.40	
		12/04/2013	829.00	26.25	802.75	
	05N23W33G01S	03/12/2013	816.21	21.30	794.91	
		06/05/2013	816.21	24.90	791.31	
		09/11/2013	816.21	28.90	787.31	
		12/04/2013	816.21	23.40	792.81	

* - Denotes Key water level well.

Appendix D – Water Quality Section

TABLES Page

General Minerals Table D-1			
Mineral	Abbreviation	Reported Units	Laboratory Analytical Method
Boron	B	mg/l	EPA 200.7
Bicarbonate	HCO_3^-	mg/l	SM23320B
Calcium	Ca	mg/l	EPA 200.7
Copper	Cu	µg/l	EPA 200.7
Carbonate	CO_3^{2-}	mg/l	SM23320B
Chloride	Cl^-	mg/l	EPA 300.0
Electrical Conductivity	eC	µmhos/cm	SM2510B
Fluoride	F^-	mg/l	EPA 300.0
Iron	Fe	µg/l	EPA 200.7
Potassium	K	mg/l	EPA 200.7
Magnesium	Mg	mg/l	EPA 200.7
Manganese	Mn	µg/l	EPA 200.7
Nitrate	NO_3^-	mg/l	SM4500NO3F
Sodium	Na	mg/l	EPA 200.7
Sulfate	SO_4^{2-}	mg/l	EPA 300.0
Total Dissolved Solids	TDS	mg/l	EPA 200.7
Zinc	Zn	µg/l	EPA 200.7
pH	pH	units	SM4500-H B

Table D-1 General Minerals

GW Basin	SWN	Date	B	HCO_3^-	Ca	CO_3^{2-}	Cl^-	Cu	E C	F^-	Fe	K	Mg	Mn	NO_3^-	Na	SO_4^{2-}	TDS	ZN	pH
Arroyo Santa Rosa	02N19W20N02S	12/11/2013	0.2	380	90	ND	164	ND	1360	0.2	ND	2	83	ND	30.7	68	143	961	ND	7.8
Arroyo Santa Rosa	02N19W20L01S	12/11/2013	0.1	380	91	ND	133	ND	1380	0.1	ND	ND	82	ND	94	76	158	1010	ND	7.7
Arroyo Santa Rosa	02N20W23G03S	12/11/2013	0.1	310	63	ND	131	ND	1140	0.1	170	1	64	10	75	71	76	791	ND	7.6
Arroyo Santa Rosa	02N20W25C06S	12/11/2013	0.3	270	67	ND	145	ND	1200	0.2	ND	1	55	ND	23.3	100	166	828	ND	7.4
Arroyo Santa Rosa	02N20W25C07S	12/11/2013	0.2	400	94	ND	147	ND	1460	0.2	ND	2	87	20	84.7	85	174	1070	ND	7.6
Arroyo Santa Rosa	02N19W19P02S	12/11/2013	0.1	340	69	ND	99	ND	1150	0.2	ND	1	67	ND	76.1	66	108	826	ND	7.9
Arroyo Santa Rosa	02N20W26C02S	12/05/2013	0.3	380	109	ND	199	ND	1720	0.1	ND	1	82	ND	108	133	260	1270	ND	7.4
Arroyo Santa Rosa	02N20W23K01S	12/05/2013	0.1	320	47	ND	85	10	905	ND	ND	1	51	30	11.6	66	89	671	ND	7.8
Arroyo Santa Rosa	02N20W23R01S	12/05/2013	0.3	330	96	ND	195	ND	1540	0.1	ND	1	73	ND	104	121	217	1140	ND	7.6
Conejo Valley	01N20W03J01S	12/11/2013	ND	300	51	ND	80	ND	912	0.2	ND	ND	55	ND	2	48	104	640	80	7.4
Cuyama Valley	07N23W15P01S	09/18/2013	0.2	210	295	ND	7	ND	2180	0.9	150	4	130	ND	2.8	106	1150	1910	ND	7.6
Cuyama Valley	08N24W17G02S	09/18/2013	0.5	280	18	ND	101	ND	1170	0.3	380	2	2	30	ND	285	179	867	50	8.3
Cuyama Valley	09N23W30E05S	09/18/2013	0.5	580	69	ND	97	ND	1210	0.9	ND	2	11	ND	4.6	233	160	1160	ND	7.5
Cuyama Valley	09N24W25J01S	09/18/2013	0.4	390	55	ND	70	ND	1160	0.9	ND	2	10	ND	4.8	213	159	905	ND	7.5
Fillmore	03N19W06C03S	08/13/2013	1.6	400	409	ND	150	ND	3270	0.6	110	8	125	ND	251	219	1630	3190	180	7.4
Fillmore	03N20W01D03S	11/14/2013	0.5	270	141	ND	61	ND	1380	0.6	ND	5	50	ND	10.7	96	410	1040	30	7.4
Fillmore	03N20W01F05S	11/14/2013	0.6	280	146	ND	59	20	1410	0.6	ND	5	51	ND	14.6	97	440	1090	80	7.6
Fillmore	03N20W02R05S	10/25/2013	1.4	410	329	ND	192	ND	2940	0.5	ND	10	96	30	54.2	266	1130	2490	ND	7.3
Fillmore	03N20W02R08S	11/14/2013	1.3	440	337	ND	180	ND	2940	0.5	90	9	95	40	26.9	271	1050	2410	10	7.1
Fillmore	03N21W01P08S	08/13/2013	0.6	290	169	ND	56	ND	1460	0.6	ND	2	45	300	30.8	91	590	1270	ND	7.3
Fillmore	04N19W31F01S	08/13/2013	0.6	260	128	ND	80	ND	1370	0.8	ND	5	50	ND	10.6	96	510	1140	ND	7.6
Fillmore	04N20W32R03S	10/25/2013	0.2	310	222	ND	50	ND	1640	0.5	ND	2	51	80	73	80	590	1380	ND	7.3
Fillmore	04N20W36D07S	08/13/2013	0.7	310	160	ND	74	ND	1590	0.8	ND	4	63	ND	14	104	660	1390	ND	7.4
Fillmore	04N20W36N03S	11/14/2013	0.5	270	141	ND	59	ND	1380	0.6	ND	5	50	ND	10.5	96	420	1050	230	7.6
Gillibrand/Tapo	03N18W24C07S	10/29/2013	0.2	280	154	ND	23	20	1060	0.1	ND	3	31	ND	6.6	43	270	811	ND	7.3
Las Posas - East	02N20W09Q07S	10/23/2013	0.8	250	188	ND	170	ND	2040	0.2	ND	5	62	190	22.2	201	570	1470	ND	7.6
Las Posas - East	02N20W10G01S	10/23/2013	0.8	310	191	ND	150	ND	2050	0.1	ND	7	60	50	51.9	212	540	1520	ND	7.5
Las Posas - East	02N20W16B06S	11/06/2013	0.8	260	168	ND	174	ND	1890	0.4	100	6	66	60	2.2	197	550	1420	ND	7.4
Las Posas - East	03N19W29K06S	10/29/2013	ND	90	54	ND	41	10	522	0.2	70	2	9	ND	71	33	28	328	ND	6.8
Las Posas - East	03N19W29K08S	10/29/2013	0.1	220	88	ND	25	ND	744	0.2	ND	3	19	ND	13.2	45	125	538	740	7.4
Las Posas - East	03N19W30E06S	10/29/2013	ND	160	51	ND	13	20	435	0.2	ND	2	9	ND	5.2	29	56	325	30	7.6
Las Posas - East	03N20W28J04S	10/23/2013	0.1	250	63	ND	37	ND	841	0.4	ND	2	30	ND	44.1	69	117	612	20	7.7
Las Posas - East	03N20W34G01S	10/23/2013	ND	200	68	ND	10	ND	586	0.2	460	3	16	140	ND	29	108	434	ND	7.7
Las Posas - South	02N19W07B02S	10/23/2013	1	270	119	ND	144	ND	1830	0.5	ND	4	52	10	2.9	237	470	1300	ND	7.6
Las Posas - South	02N19W07D02S	10/29/2013	0.9	310	171	ND	141	ND	1780	0.3	ND	4	41	ND	16.5	199	400	1280	50	7.3
Las Posas - South	02N19W08H02S	10/29/2013	0.7	240	150	ND	138	ND	1670	0.2	210	4	40	10	20.6	175	400	1170	450	7.3
Las Posas - South	02N20W01Q01S	10/23/2013	0.8	310	170	ND	135	ND	1760	0.2	ND	3	46	ND	39.6	168	400	1270	ND	7.3
Las Posas - South	02N20W01Q02S	10/23/2013	1	270	143	ND	153	ND	1960	0.4	ND	5	51	ND	13.1	239	530	1400	ND	7.6
Las Posas - West	02N20W07R02S	10/23/2013	ND	180	51	ND	10	ND	465	0.2	290	2	12	80	ND	30	70	355	ND	7.9

Table D-1 General Minerals (cont.)

GW Basin	SWN	Date	B	HCO_3^-	Ca	CO_3^{2-}	Cl^-	Cu	E C	F^-	Fe	K	Mg	Mn	NO_3^-	Na	SO_4^{2-}	TDS	ZN	pH
Las Posas - West	02N21W09D02S	10/23/2013	0.2	280	86	ND	79	ND	1000	0.2	ND	2	30	20	26.7	79	122	705	ND	7.6
Las Posas - West	02N21W11A02S	10/23/2013	0.2	240	199	ND	107	ND	1740	0.2	ND	3	64	ND	169	93	380	1260	ND	7.4
Las Posas - West	02N21W11A03S	10/23/2013	0.2	300	75	ND	28	ND	906	0.1	170	5	30	50	0.6	75	168	682	ND	7.8
Las Posas - West	02N21W12H01S	11/06/2013	0.2	230	108	ND	53	ND	971	0.2	170	4	33	80	ND	74	248	750	ND	7.5
Las Posas - West	02N21W15M04S	10/29/2013	0.4	290	116	ND	70	ND	1360	0.2	ND	6	37	60	13.3	159	360	1050	ND	7.6
Las Posas - West	02N21W17F05S	11/06/2013	0.6	320	115	ND	68	ND	1480	0.2	200	6	44	50	1.1	193	460	1210	ND	7.6
Las Posas - West	03N21W36Q01S	10/23/2013	0.2	270	81	ND	78	ND	1080	0.3	ND	4	43	ND	60.8	85	133	755	ND	7.6
Las Posas - West	03N20W32H03S	12/05/2013	ND	380	175	ND	25	ND	1380	0.2	4260	5	51	650	ND	74	490	1200	ND	7.9
Las Posas - West	02N20W06J01S	12/05/2013	0.1	290	97	ND	20	ND	968	0.2	430	6	34	170	ND	62	265	774	ND	7.7
Little Cuddy Valley	08N20W04N02S	09/18/2013	ND	310	67	ND	12	ND	536	0.2	ND	1	9	ND	1.2	43	13	456	ND	7.2
Little Cuddy Valley	08N20W08E03S	12/02/2013	0.5	290	70	ND	16	ND	717	0.3	ND	2	19	ND	14.7	47	103	562	360	7.6
Lockwood Valley	08N21W29R06S	12/02/2013	2.6	210	39	ND	10	ND	1520	1.4	ND	3	9	ND	8.1	269	580	1130	50	8.3
Lockwood Valley	08N21W29R07S	12/02/2013	11.7	360	46	ND	14	ND	1110	0.9	ND	2	9	ND	2.4	186	280	900	200	8.2
Lockwood Valley	08N21W29Q05S	12/02/2013	6.1	220	36	ND	13	ND	2540	1.2	ND	3	4	ND	1.2	532	1170	1980	ND	8.2
Lockwood Valley	08N21W30R01S	12/02/2013	1.1	280	40	ND	12	ND	1370	0.6	ND	2	6	ND	15.4	246	450	1050	ND	7.9
Lockwood Valley	08N21W29N02S	12/02/2013	2.2	270	140	ND	7	ND	1320	0.6	260	3	57	ND	1.5	70	560	1110	30	7.5
Lockwood Valley	08N21W33R03S	12/02/2013	0.8	250	98	ND	29	ND	816	0.4	ND	2	23	ND	18.4	40	182	643	20	7.6
Mound	02N22W07P01S	10/22/2013	1.2	610	408	ND	110	ND	3450	0.2	290	13	146	360	29.2	313	1300	2930	ND	7.1
Mound	02N22W09K05S	10/22/2013	0.4	200	132	ND	57	ND	1460	0.1	370	4	23	70	2.1	165	470	1050	70	7.7
Mound	02N22W09K08S	10/22/2013	0.6	290	168	ND	67	ND	1880	0.2	ND	6	55	250	5.5	183	600	1370	ND	7.6
Mound	02N22W10N03S	10/22/2013	0.5	300	181	ND	59	ND	1970	0.3	ND	5	57	ND	19.2	199	670	1490	150	7.4
Mound	02N23W13K03S	10/21/2013	0.7	360	165	ND	72	ND	1050	0.3	ND	6	48	220	2.5	175	460	1290	ND	7.4
North Coast	04N25W25N06S	10/22/2013	0.3	450	156	ND	101	10	1660	0.5	ND	2	68	ND	6.7	124	370	1280	60	7.4
North Coast	04N25W35A07S	10/22/2013	0.2	440	96	ND	97	ND	1280	0.2	15000	2	47	400	0.7	100	158	941	1300	7.5
North Coast	04N25W35G01S	10/22/2013	0.3	210	76	ND	21	70	954	0.3	ND	4	44	ND	ND	50	296	701	420	8.2
Ojai Valley	04N22W04P05S	11/20/2013	0.1	250	115	ND	25	ND	894	0.4	ND	1	30	ND	37.1	40	220	718	ND	7.2
Ojai Valley	04N22W06K10S	11/20/2013	0.3	280	137	ND	126	ND	1210	0.3	ND	2	30	80	26.3	74	240	916	ND	7.6
Ojai Valley	04N23W01K02S	11/20/2013	0.1	430	158	ND	96	ND	1240	0.4	ND	ND	37	ND	6.2	55	203	986	ND	7.5
Ojai Valley	05N22W33J01S	11/20/2013	ND	360	213	ND	70	ND	1440	0.3	2490	2	44	430	ND	50	490	1230	90	7.2
Ojai Valley	05N22W32K02S	12/10/2013	ND	340	178	ND	48	ND	1210	0.3	2100	2	30	400	11.1	50	330	989	190	7
Ojai Valley	04N22W06J09S	12/04/2013	ND	280	130	ND	29	ND	914	0.1	ND	1	28	ND	27.9	35	224	755	ND	7.6
Ojai Valley	04N22W05M04S	12/03/2013	ND	300	129	ND	21	ND	923	0.2	ND	1	31	ND	34.8	29	237	783	ND	7.6
Oxnard Plain Forebay	02N21W07P04S	10/22/2013	0.6	260	145	ND	48	ND	1400	0.4	560	6	47	120	ND	105	430	1040	ND	7.4
Oxnard Plain Forebay	02N22W23H03S	10/22/2013	0.8	310	219	ND	63	ND	1850	0.4	ND	6	71	ND	71.2	126	550	1420	ND	7.3
Oxnard Plain Forebay	02N22W27M02S	11/06/2013	1	470	288	ND	84	ND	2140	0.4	ND	7	93	10	65.5	146	720	1870	ND	7.6
Oxnard Plain Pressure	01N21W04D04S	10/17/2013	0.6	350	63	ND	126	10	1500	0.2	140	10	26	30	ND	200	190	965	90	7.6
Oxnard Plain Pressure	01N21W06L05S	11/06/2013	0.5	260	100	ND	42	10	1170	0.1	240	8	33	100	ND	135	350	928	50	7.8
Oxnard Plain Pressure	01N21W08R01S	10/17/2013	0.4	280	79	ND	56	ND	1200	0.2	450	6	28	40	ND	120	230	799	30	7.7
Oxnard Plain Pressure	01N21W16M03S	10/21/2013	0.7	340	59	ND	154	ND	1490	0.2	ND	7	25	20	ND	244	213	1040	ND	7.7

Table D-1 General Minerals (cont.)

GW Basin	SWN	Date	B	HCO_3^-	Ca	CO_3^{2-}	Cl^-	Cu	E C	F^-	Fe	K	Mg	Mn	NO_3^-	Na	SO_4^{2-}	TDS	ZN	pH
Oxnard Plain Pressure	01N21W21H02S	10/17/2013	0.5	130	68	ND	95	ND	1320	0.1	80	5	36	20	ND	156	250	740	ND	7.8
Oxnard Plain Pressure	01N21W21K03S	10/21/2013	0.4	270	64	ND	74	ND	1160	0.1	160	6	36	40	ND	142	250	842	ND	7.9
Oxnard Plain Pressure	01N21W28D01S	10/17/2013	0.5	250	82	ND	76	ND	1230	0.1	ND	6	34	20	ND	126	260	834	ND	7.7
Oxnard Plain Pressure	01N21W28G01S	10/21/2013	0.5	350	312	ND	490	ND	2920	0.1	1030	7	100	1600	ND	241	520	2020	ND	7.4
Oxnard Plain Pressure	01N21W28H03S	10/21/2013	0.4	330	78	ND	134	ND	1280	0.1	330	5	37	60	ND	154	163	901	960	8
Oxnard Plain Pressure	01N21W29B03S	10/21/2013	0.5	280	126	ND	78	ND	1320	0.3	ND	5	43	880	ND	113	340	985	ND	7.5
Oxnard Plain Pressure	01N22W03F05S	11/06/2013	0.7	250	152	ND	50	ND	1360	0.6	230	5	47	50	16.5	101	460	1080	ND	7.5
Oxnard Plain Pressure	01N22W03F07S	11/06/2013	0.8	290	216	ND	65	ND	1740	ND	120	6	69	40	41	113	610	1410	ND	7.5
Oxnard Plain Pressure	01N22W19A01S	11/06/2013	0.6	130	62	ND	37	ND	846	0.5	140	9	25	30	ND	88	290	642	1300	8.4
Oxnard Plain Pressure	01N22W24B04S	10/21/2013	0.6	230	130	ND	37	ND	1170	0.3	100	4	36	160	ND	89	350	876	ND	7.9
Oxnard Plain Pressure	01N22W25K01S	10/21/2013	0.6	250	158	ND	57	ND	1450	0.5	ND	5	54	ND	26.5	97	460	1110	30	7.6
Oxnard Plain Pressure	01N22W26K03S	10/21/2013	0.5	250	111	ND	40	ND	1140	0.1	500	7	35	90	ND	97	320	860	ND	7.8
Oxnard Plain Pressure	02N21W19A01S	10/22/2013	0.7	310	247	ND	140	10	2430	0.4	ND	7	86	40	63.4	180	670	1700	60	7.2
Oxnard Plain Pressure	02N21W20M03S	10/22/2013	0.8	320	452	ND	280	ND	3560	0.2	ND	11	156	480	105	277	1250	2850	ND	7.1
Oxnard Plain Pressure	02N21W20Q05S	10/22/2013	0.6	280	107	ND	56	ND	1320	0.2	590	6	35	80	ND	134	340	958	ND	7.6
Oxnard Plain Pressure	02N22W24P01S	10/22/2013	0.5	230	126	ND	43	ND	1240	0.5	ND	4	42	ND	5.9	83	360	894	ND	7.5
Oxnard Plain Pressure	02N22W24P02S	10/22/2013	0.6	250	140	ND	45	30	1340	0.5	60	5	44	ND	ND	100	420	1000	60	7.2
Oxnard Plain Pressure	02N22W24R02S	10/22/2013	0.6	260	153	ND	49	180	1420	0.5	2920	5	53	30	ND	101	460	1080	1010	7.1
Oxnard Plain Pressure	02N22W25A02S	10/22/2013	0.8	240	261	ND	70	ND	2130	0.5	60	6	89	ND	5	131	870	1670	ND	7.4
Oxnard Plain Pressure	02N22W25F01S	10/22/2013	0.7	250	161	ND	52	ND	1590	0.4	310	5	59	70	8.1	111	520	1170	70	7.8
Oxnard Plain Pressure	02N22W30F03S	10/21/2013	0.6	260	131	ND	40	ND	1260	0.4	1020	5	37	140	ND	99	370	942	ND	7.4
Oxnard Plain Pressure	02N22W31B01S	10/21/2013	0.7	250	160	ND	52	ND	1440	0.5	ND	5	51	ND	15.6	122	480	1140	ND	7.6
Oxnard Plain Pressure	02N22W36E02S	11/06/2013	0.7	250	152	ND	48	ND	1360	0.6	ND	5	46	ND	8	100	460	1070	ND	7.6
Oxnard Plain Pressure	02N22W36E03S	11/06/2013	0.7	260	162	ND	49	ND	1420	0.6	80	6	50	50	ND	111	500	1140	20	7.6
Oxnard Plain Pressure	02N23W25M01S	10/21/2013	0.6	280	192	ND	72	ND	1720	0.3	ND	6	52	490	15.4	149	570	1340	30	7.3
Oxnard Plain Pressure	02N23W36A04S	10/21/2013	0.6	250	155	ND	50	ND	1420	0.4	180	5	45	300	10.2	111	440	1070	ND	7.8
Oxnard Plain Pressure	01N22W24C03S	12/03/2013	0.7	230	127	ND	48	ND	1220	0.4	680	5	36	190	ND	83	460	989	ND	7.6
Oxnard Plain Pressure	01N22W26Q01S	12/03/2013	0.6	250	140	ND	126	ND	1330	0.4	350	5	39	300	ND	86	400	1050	ND	7.6
Oxnard Plain Pressure	02N22W32C04S	12/03/2013	0.7	250	153	ND	68	ND	1480	0.5	ND	5	51	ND	35.5	97	580	1240	ND	7.5
Oxnard Plain Pressure	01N22W12M01S	12/13/2013	0.8	260	225	ND	72	ND	1920	0.5	120	7	69	380	ND	147	860	1640	ND	7.5
Oxnard Plain Pressure	01N22W27H02S	12/13/2013	0.4	240	124	ND	42	ND	1190	0.2	460	6	35	180	ND	90	420	957	ND	8
Oxnard Plain Pressure	01N21W20K03S	12/05/2013	0.5	250	88	ND	46	ND	1030	0.1	320	6	31	40	0.7	95	291	808	ND	7.9
Oxnard Plain Pressure	01N22W06B01S	12/17/2013	0.7	260	139	ND	54	ND	1380	0.5	60	5	47	ND	22.5	94	490	1110	30	7.6
Oxnard Plain Pressure	01N22W21B06S	12/17/2013	0.4	270	72	ND	49	ND	1120	0.2	1290	7	32	120	0.6	117	320	868	20	7.8
Oxnard Plain Pressure	01N22W16D04S	12/17/2013	0.6	220	113	ND	42	70	1140	0.6	3050	4	35	90	0.4	80	400	895	190	7.6
Oxnard Plain Pressure	01N22W26M03S	12/17/2013	0.5	240	120	ND	47	ND	1230	0.2	310	6	36	180	0.8	91	440	981	ND	7.6
Oxnard Plain Pressure	01N22W23R02S	12/17/2013	0.6	240	117	ND	55	ND	1190	0.4	550	6	36	150	ND	81	400	935	ND	7.6
Oxnard Plain Pressure	01N21W19J05S	12/17/2013	0.6	330	41	ND	43	ND	723	0.2	90	5	23	ND	ND	76	45	563	ND	7.7
Oxnard Plain Pressure	01N21W21H03S	12/17/2013	0.4	300	57	ND	40	ND	960	0.1	390	4	27	70	ND	107	201	736	ND	7.8

Table D-1 General Minerals (cont.)

GW Basin	SWN	Date	B	HCO_3^-	Ca	CO_3^{2-}	Cl^-	Cu	E C	F^-	Fe	K	Mg	Mn	NO_3^-	Na	SO_4^{2-}	TDS	ZN	pH
Piru	04N18W30A03S	10/25/2013	0.6	320	141	ND	104	ND	1600	0.4	260	7	54	ND	43.4	127	420	1220	60	7.6
Piru	04N19W23R03S	10/25/2013	0.5	470	213	ND	62	ND	2310	0.6	90	7	125	240	4.5	217	890	1990	ND	7.3
Piru	04N19W25H01S	08/06/2013	0.6	310	200	ND	114	ND	1810	0.5	ND	6	63	ND	69.1	112	510	1380	ND	7.4
Piru	04N19W25K04S	08/06/2013	0.6	280	127	ND	92	ND	1380	0.6	ND	5	45	ND	26.2	107	320	1000	ND	7.6
Piru	04N19W25M03S	08/06/2013	0.8	450	295	ND	58	20	2650	0.7	ND	6	127	660	26.2	206	1100	2270	ND	7.2
Piru	04N19W26H01S	10/25/2013	0.7	290	160	ND	117	ND	1620	0.6	ND	5	63	ND	24.6	121	460	1240	ND	7.6
Piru	04N19W26J01S	08/06/2013	0.7	430	245	ND	63	20	2210	0.5	ND	6	91	30	60.6	164	750	1810	ND	7.4
Piru	04N19W26J02S	08/06/2013	0.9	440	300	ND	62	ND	2580	0.5	ND	6	120	460	33.6	179	1050	2190	ND	7.2
Piru	04N19W26J03S	08/06/2013	0.6	270	107	ND	93	ND	1310	0.6	ND	5	41	ND	11.9	110	300	938	ND	7.6
Piru	04N19W26J05S	08/06/2013	1	550	290	ND	61	ND	2500	0.6	ND	6	116	620	21.6	159	1000	2200	ND	7.2
Piru	04N19W26P01S	10/14/2013	0.7	320	182	ND	66	ND	1650	0.6	ND	6	70	50	17.5	110	560	1330	ND	7.6
Piru	04N18W30J04S	08/06/2013	0.5	240	79	ND	68	ND	1100	0.5	220	5	30	ND	18.6	108	232	781	130	7.8
Piru	04N19W34D03S	08/06/2013	0.7	300	153	ND	65	ND	1510	0.6	ND	5	59	ND	26.4	103	450	1160	ND	7.4
Piru	04N19W34J04S	08/13/2013	0.5	230	102	ND	65	ND	1120	0.9	ND	4	40	ND	14.7	75	400	932	ND	7.5
Piru	04N19W34L01S	08/13/2013	0.6	230	121	ND	65	ND	1280	0.9	ND	4	48	ND	11.8	84	520	1080	ND	7.4
Pleasant Valley	01N21W03D01S	10/21/2013	0.4	240	157	ND	87	20	1420	0.2	70	5	42	30	40.6	112	360	1040	ND	7.5
Pleasant Valley	01N21W03K01S	10/17/2013	0.7	330	132	ND	174	ND	1800	0.2	ND	60	40	60	27	205	330	1240	ND	7.4
Pleasant Valley	01N21W03R01S	10/17/2013	0.6	300	241	ND	220	ND	2450	0.1	ND	6	74	30	25.5	192	620	1680	ND	7.3
Pleasant Valley	01N21W04K01S	10/17/2013	0.5	300	102	ND	118	ND	1480	0.3	90	6	31	40	ND	175	298	1030	ND	7.5
Pleasant Valley	01N21W09J03S	10/17/2013	0.3	240	107	ND	74	50	1160	0.2	2400	4	32	ND	2.2	85	240	784	ND	7.4
Pleasant Valley	01N21W10G01S	10/17/2013	0.5	180	97	ND	144	ND	1590	0.1	70	6	41	30	0.5	166	270	905	ND	7.5
Pleasant Valley	01N21W15D02S	10/17/2013	0.6	310	158	ND	203	ND	1960	0.1	ND	6	52	170	0.5	182	396	1310	ND	7.6
Pleasant Valley	01N21W15H01S	10/21/2013	1.8	240	597	ND	700	ND	5550	ND	2320	10	226	2180	ND	567	2100	4440	90	7.2
Pleasant Valley	02N20W17L01S	10/23/2013	0.7	270	196	ND	160	ND	2020	0.2	70	6	60	300	30.9	190	570	1480	ND	7.6
Pleasant Valley	02N21W34G01S	10/17/2013	0.8	370	97	ND	185	ND	1880	0.2	100	8	33	30	ND	267	310	1270	ND	7.6
Pleasant Valley	01N21W10A02S	12/17/2013	0.5	260	345	ND	300	ND	2800	0.1	60	5	97	1310	38.7	170	1040	2260	880	7.6
Santa Paula	03N21W09K04S	08/06/2013	0.4	330	139	ND	48	ND	1340	0.3	310	4	33	430	ND	120	380	1050	ND	7.4
Santa Paula	03N22W35Q01S	10/22/2013	1	440	328	ND	90	ND	3050	0.2	ND	7	95	780	29	295	1110	2390	20	7.2
Santa Paula	02N22W03E01S	12/16/2013	0.6	370	300	ND	130	ND	2410	0.3	1600	7	81	460	0.6	177	1000	2070	20	7.5
Santa Paula	02N22W03L01S	11/18/2013	0.9	430	364	ND	140	ND	3170	0.3	1800	9	115	810	ND	180	1500	2740	ND	7.3
Sherwood	01N19W19H03S	11/07/2013	0.1	330	57	ND	34	ND	787	0.1	ND	3	39	20	ND	57	76	596	70	8.2
Sherwood	01N20W25C07S	11/07/2013	0.1	390	187	ND	211	ND	1590	0.1	ND	2	57	10	1.5	66	194	1110	3120	7.6
Sherwood	01N20W25F04S	11/07/2013	ND	250	23	ND	32	ND	560	ND	210	ND	6	30	ND	95	23	429	300	8.3
Sherwood	01N19W29E05S	12/11/2013	0.1	340	91	ND	48	ND	905	ND	310	ND	23	160	ND	68	118	688	40	7.8
Simi Valley	02N18W08D04S	10/29/2013	1.2	370	258	ND	150	ND	2430	0.2	70	7	85	320	19.3	226	700	1820	ND	7.3
Simi Valley	02N18W08K07S	10/29/2013	1	310	325	ND	150	ND	2510	0.3	ND	6	86	ND	49.1	208	790	1920	ND	7.2
Simi Valley	02N18W09E01S	10/29/2013	0.9	300	237	ND	110	200	2140	0.4	ND	5	76	ND	24.7	174	670	1600	120	7.4
Thousand Oaks	01N19W08G02S	11/07/2013	0.2	360	155	ND	137	ND	1830	0.2	990	4	121	130	ND	114	520	1410	30	7.7

Table D-1 General Minerals (cont.)

GW Basin	SWN	Date	B	HCO_3^-	Ca	CO_3^{2-}	Cl^-	Cu	E C	F^-	Fe	K	Mg	Mn	NO_3^-	Na	SO_4^{2-}	TDS	ZN	pH
Tierra Rejada Valley	02N19W10R02S	12/13/2013	0.2	260	54	ND	73	ND	942	0.3	ND	2	57	ND	10.4	58	176	691	ND	7.7
Tierra Rejada Valley	02N19W14R03S	12/11/2013	0.2	100	25	ND	81	10	544	0.8	ND	3	12	ND	2.5	60	51	335	50	8.2
Tierra Rejada Valley	02N19W14Q02S	12/11/2013	ND	310	41	ND	55	ND	794	ND	ND	6	40	50	1.5	66	79	598	40	7.7
Tierra Rejada Valley	02N19W15N03S	12/11/2013	ND	260	67	ND	84	ND	981	0.2	60	2	58	ND	3	46	165	685	50	7.6
Tierra Rejada Valley	02N19W15J02S	12/05/2013	0.1	370	106	ND	158	ND	1540	ND	ND	3	87	ND	91	89	260	1160	30	7.6
Tierra Rejada Valley	02N19W11J03S	12/05/2013	0.1	270	65	ND	74	ND	1020	0.1	130	ND	59	ND	25.4	55	190	738	250	7.8
U N D E F I N E D	02N20W18A01S	10/23/2013	0.1	190	105	ND	40	ND	918	0.2	ND	3	26	30	12.1	53	217	646	ND	7.5
U N D E F I N E D	02N21W13A01S	10/23/2013	ND	230	68	ND	11	ND	658	0.2	120	3	19	70	ND	43	123	497	90	7.9
Upper Ojai	04N22W12M03S	11/20/2013	0.1	220	68	ND	28	ND	664	0.3	ND	1	22	20	11.2	45	121	516	ND	6.9
Upper Ojai	04N22W10K02S	11/18/2013	0.3	390	116	ND	80	ND	1100	0.5	ND	ND	26	200	1.4	75	144	833	ND	7.1
Upper Ojai	04N22W11P02S	11/18/2013	ND	270	38	ND	12	ND	458	ND	2900	1	11	260	ND	43	-2	375	ND	7.6
Upper Ojai	04N22W08Q01S	11/18/2013	0.4	530	55	ND	26	ND	940	0.5	60	3	14	10	ND	104	31	764	ND	7.4
Upper Ojai	04N22W12F04S	11/18/2013	0.1	220	94	ND	18	ND	747	0.2	ND	1	25	ND	26.3	31	165	580	ND	7
Ventura River - Lower	02N23W05K01S	10/22/2013	0.8	380	149	ND	138	ND	1730	0.4	370	7	48	200	2.1	176	330	1230	ND	7.8
Ventura River - Lower	03N23W32Q03S	12/17/2013	0.9	360	133	ND	234	ND	1820	0.4	ND	7	44	170	ND	185	350	1310	ND	7.8
Ventura River - Lower	03N23W32Q10S	12/17/2013	0.9	380	150	ND	255	ND	1990	0.4	150	6	51	110	4.8	197	400	1440	ND	7.6
Ventura River - Upper	04N23W09G03S	12/04/2013	0.5	310	101	ND	96	ND	1060	0.2	ND	2	28	20	23.9	81	177	819	190	7.7
Ventura River - Upper	04N23W04H01S	12/04/2013	0.6	280	127	ND	71	ND	1050	0.4	ND	2	33	ND	25.3	49	246	834	ND	7.4

* Undefined – These wells are outside of known groundwater basin boundaries.

Metals

Metals Table D-2			
Element Name	Element Symbol	Reported Units	Laboratory Analytical Method
Aluminum	Al	µg/l	EPA 200.8
Antimony	Sb	µg/l	EPA 200.8
Arsenic	As	µg/l	EPA 200.8
Barium	Ba	µg/l	EPA 200.8
Beryllium	Be	µg/l	EPA 200.8
Cadmium	Cd	µg/l	EPA 200.8
Chromium	Cr	µg/l	EPA 200.8
Lead	Pb	µg/l	EPA 200.8
Mercury	Hg	µg/l	EPA 245.1
Nickel	Ni	µg/l	EPA 200.8
Selenium	Se	µg/l	EPA 200.8
Silver	Ag	µg/l	EPA 200.8
Thallium	Tl	µg/l	EPA 200.8
Vanadium	V	µg/l	EPA 200.8

Radio Chemistry

Radio Chemistry Table D-3			
Name	Element Symbol	Reported Units	Laboratory Analytical Method
Gross Alpha	α	pCi/l	EPA 900.0
Uranium	U	pCi/l	EPA 908.0

Table D-2 Metals

GW Basin	SWN	Date	Al	Sb	As	Ba	Be	Cd	Cr	Pb	Hg	Ni	Se	Ag	Tl	V
Arroyo Santa Rosa	02N19W20N02S	12/11/2013	ND	ND	2	4	ND	ND	8	ND	ND	ND	4	ND	ND	43
Arroyo Santa Rosa	02N19W19P02S	12/11/2013	ND	ND	3	17.8	ND	ND	17	ND	ND	2	3	ND	ND	63
Arroyo Santa Rosa	02N20W23G03S	12/11/2013	60	ND	4	40	ND	ND	4	ND	ND	ND	5	ND	ND	94
Conejo Valley	01N20W03J01S	12/11/2013	ND	ND	ND	0.3	ND	ND	ND	ND	ND	ND	1	ND	ND	21
Cuyama Valley	07N23W15P01S	09/18/2013	ND	ND	ND	10.1	ND	ND	ND	ND	ND	2	1	ND	ND	ND
Cuyama Valley	08N24W17G02S	09/18/2013	ND	ND	ND	23	ND	ND	ND	ND	ND	ND	1	ND	ND	ND
Cuyama Valley	09N24W25J01S	09/18/2013	ND	ND	ND	23.3	ND	ND	1	ND	ND	ND	7	ND	ND	ND
Fillmore	03N20W02R05S	10/25/2013	ND	ND	ND	34.1	ND	0.7	ND	ND	ND	3	12	ND	ND	3
Fillmore	03N21W01P08S	08/13/2013	ND	ND	ND	30.7	ND	0.3	2	ND	ND	ND	7	ND	ND	2
Fillmore	04N20W32R03S	10/25/2013	40	ND	ND	69.4	ND	ND	ND	ND	ND	ND	5	ND	ND	ND
Gillibrand/Tapo	03N18W24C07S	10/29/2013	20	ND	3	61.8	ND	0.2	ND	1.6	ND	ND	36	ND	ND	14
Las Posas - East	03N19W30E06S	10/29/2013	ND	ND	ND	89.6	ND	ND	ND	3.2	ND	1	ND	ND	ND	4
Las Posas - East	02N20W09Q07S	10/23/2013	10	ND	2	28.4	ND	ND	3	ND	ND	7	8	ND	ND	ND
Las Posas - East	02N20W16B06S	11/06/2013	10	ND	ND	21.9	ND	ND	ND	0.8	ND	8	2	ND	ND	ND
Las Posas - East	03N20W28J04S	10/23/2013	20	ND	ND	42.8	ND	ND	10	ND	ND	ND	10	ND	ND	5
Las Posas - West	03N20W32H03S	12/05/2013	ND	ND	ND	33.9	ND	ND	ND	ND	ND	1	ND	ND	ND	ND
Las Posas - West	02N21W09D02S	10/23/2013	10	ND	ND	58.2	ND	ND	3	ND	ND	ND	16	ND	ND	5
Little Cuddy Valley	08N20W04N02S	09/18/2013	ND	ND	ND	145	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Little Cuddy Valley	08N20W08E03S	12/02/2013	ND	ND	3	71.3	ND	ND	ND	ND	ND	ND	1	ND	ND	2
Lockwood Valley	08N21W29R06S	12/02/2013	ND	ND	13	22.3	ND	ND	ND	ND	ND	ND	10	ND	ND	108
Lockwood Valley	08N21W29R07S	12/02/2013	ND	ND	4	38	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Lockwood Valley	08N21W29Q05S	12/02/2013	ND	ND	8	11.9	ND	ND	ND	ND	ND	ND	11	ND	ND	15
Lockwood Valley	08N21W30R01S	12/02/2013	ND	ND	4	16.8	ND	ND	2	ND	ND	ND	3	ND	ND	14
Lockwood Valley	08N21W29N02S	12/02/2013	ND	ND	ND	30.4	ND	ND	ND	2.4	ND	ND	1	ND	ND	ND
Lockwood Valley	08N21W33R03S	12/02/2013	ND	ND	ND	26.8	ND	ND	1	0.5	ND	ND	8	ND	ND	4
Mound	02N22W10N03S	10/22/2013	50	10	ND	14.2	ND	ND	3	4.6	ND	2	17	ND	ND	ND
North Coast	04N25W25N06S	10/22/2013	ND	ND	ND	29	ND	ND	4	0.8	ND	1	6	ND	ND	ND
Ojai Valley	04N22W04P05S	11/20/2013	ND	ND	ND	31.8	ND	ND	ND	ND	ND	ND	5	ND	ND	ND
Ojai Valley	04N23W01K02S	11/20/2013	ND	ND	ND	65.8	ND	ND	1	ND	ND	ND	4	ND	ND	2
Ojai Valley	04N22W05M04S	12/03/2013	ND	ND	ND	30.8	ND	ND	ND	ND	ND	ND	3	ND	ND	ND
Ojai Valley	04N22W06J09S	12/04/2013	20	ND	ND	58.5	ND	ND	ND	1.3	ND	ND	1	ND	ND	ND
Oxnard Plain Pressure	02N22W32C04S	12/03/2013	ND	ND	ND	21.3	ND	ND	ND	ND	ND	ND	11	ND	ND	2
Oxnard Plain Pressure	01N22W12M01S	12/13/2013	ND	ND	3	35.8	ND	ND	ND	ND	ND	ND	3	ND	ND	ND
Oxnard Plain Pressure	01N21W19J05S	12/17/2013	ND	ND	ND	272	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Oxnard Plain Pressure	01N21W21K03S	10/21/2013	10	ND	ND	33.8	ND	ND	2	ND	ND	ND	ND	ND	ND	ND
Oxnard Plain Pressure	01N22W03F05S	11/06/2013	10	ND	ND	26.5	ND	ND	ND	3.2	ND	3	11	ND	ND	3
Oxnard Plain Pressure	01N22W19A01S	11/06/2013	10	ND	ND	22	ND	ND	6	2.6	ND	8	2	ND	ND	ND
Oxnard Plain Pressure	01N22W24B04S	10/21/2013	10	ND	ND	44	ND	ND	3	ND	ND	ND	ND	ND	ND	ND
Oxnard Plain Pressure	01N21W16M03S	10/21/2013	20	ND	ND	62	ND	ND	3	ND	ND	ND	1	ND	ND	ND

Table D-2 Metals (cont.)

GW Basin	SWN	Date	Al	Sb	As	Ba	Be	Cd	Cr	Pb	Hg	Ni	Se	Ag	Tl	V
Oxnard Plain Pressure	02N21W20M03S	10/22/2013	20	ND	3	39	ND	0.8	3	0.6	ND	2	81	ND	ND	ND
Oxnard Plain Pressure	02N22W24P01S	10/22/2013	20	ND	2	38.8	ND	0.8	3	0.7	ND	2	79	ND	ND	2
Oxnard Plain Pressure	01N21W20K03S	12/05/2013	50	ND	ND	42.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Oxnard Plain Pressure	01N21W04D04S	10/17/2013	120	ND	ND	97.8	ND	ND	2	4.4	ND	1	1	ND	ND	ND
Oxnard Plain Pressure	01N22W21B06S	12/17/2013	150	ND	ND	46.4	ND	ND	1	0.9	ND	3	1	ND	ND	ND
Oxnard Plain Pressure	01N21W28H03S	10/21/2013	190	ND	ND	91.9	ND	ND	3	1.2	ND	5	1	ND	ND	ND
Piru	04N19W25H01S	08/06/2013	ND	ND	ND	27.7	ND	0.3	2	ND	ND	ND	8	ND	ND	3
Piru	04N19W25K04S	08/06/2013	ND	ND	ND	22.2	ND	ND	2	ND	ND	2	5	ND	ND	3
Piru	04N19W25M03S	08/06/2013	ND	ND	7	23.3	ND	1.2	2	ND	ND	4	404	ND	ND	3
Piru	04N19W26J01S	08/06/2013	ND	ND	ND	21.1	ND	1	3	ND	ND	5	9	ND	ND	3
Piru	04N19W26J02S	08/06/2013	ND	ND	4	23.1	ND	1.3	3	ND	ND	6	207	ND	ND	4
Piru	04N19W26J03S	08/06/2013	ND	ND	ND	21.7	ND	ND	2	ND	ND	2	3	ND	ND	3
Piru	04N19W26J05S	08/06/2013	ND	ND	4	20.8	ND	1.1	3	ND	ND	6	263	ND	ND	3
Piru	04N18W30J04S	08/06/2013	ND	ND	ND	21.8	ND	ND	2	0.9	ND	1	4	ND	ND	2
Piru	04N19W34D03S	08/06/2013	ND	ND	ND	21.9	ND	0.3	2	ND	ND	ND	12	ND	ND	3
Piru	04N19W34J04S	08/13/2013	ND	ND	ND	17.5	ND	ND	2	ND	ND	ND	5	ND	ND	3
Piru	04N19W34L01S	08/13/2013	ND	ND	ND	18.2	ND	ND	2	0.6	ND	ND	7	ND	ND	4
Piru	04N19W23R03S	10/25/2013	10	ND	ND	29.2	ND	0.8	ND	ND	ND	9	3	ND	ND	4
Piru	04N19W26H01S	10/25/2013	10	ND	ND	30.7	ND	ND	ND	ND	ND	2	3	ND	ND	4
Piru	04N18W30A03S	10/25/2013	280	ND	ND	51.3	ND	0.3	2	0.5	ND	3	3	ND	ND	5
Pleasant Valley	01N21W10G01S	10/17/2013	ND	ND	3	32.9	ND	ND	3	ND	ND	3	3	ND	ND	ND
Pleasant Valley	02N20W17L01S	10/23/2013	20	ND	2	29.3	ND	ND	3	ND	ND	7	12	ND	ND	ND
Santa Paula	03N21W09K04S	08/06/2013	ND	ND	5	27.9	ND	ND	2	ND	ND	ND	1	ND	ND	ND
Santa Paula	02N22W03L01S	11/18/2013	ND	ND	3	21.8	ND	ND	1	ND	ND	ND	5	ND	ND	ND
Sherwood	01N19W19H03S	11/07/2013	ND	3	4	11.1	ND	ND	2	ND	ND	1	ND	ND	ND	ND
Sherwood	01N19W29E05S	12/11/2013	ND	2	ND	68.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Simi Valley	02N18W09E01S	10/29/2013	ND	ND	ND	19.4	ND	ND	2	6.8	0	6	27	ND	ND	6
Thousand Oaks	01N19W08G02S	11/07/2013	ND	ND	ND	21.7	ND	ND	2	0.9	ND	1	ND	ND	ND	ND
Thousand Oaks	01N19W09N01S	11/07/2013	80	ND	2	32.6	ND	ND	2	2.3	ND	1	ND	ND	ND	2
U N D E F I N E D	02N21W13A01S	10/23/2013	20	ND	ND	44.7	ND	ND	2	ND	ND	1	ND	ND	ND	ND
Upper Ojai	04N22W12M03S	11/20/2013	ND	ND	ND	54.6	ND	ND	ND	ND	0.1	ND	2	ND	ND	ND
Upper Ojai	04N22W12F04S	11/18/2013	ND	ND	ND	41.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Ojai	04N22W08Q01S	11/18/2013	30	ND	ND	394	ND	ND	1	ND	ND	ND	7	ND	ND	ND
Ventura River - Lower	02N23W05K01S	10/22/2013	ND	ND	3	33	ND	ND	3	ND	ND	3	3	ND	ND	ND
Ventura River - Lower	03N23W32Q03S	12/17/2013	ND	ND	2	28.6	ND	0.4	1	ND	ND	4	6	ND	ND	ND
Ventura River - Lower	03N23W32Q10S	12/17/2013	ND	ND	4	28.3	ND	0.3	1	ND	ND	3	8	ND	ND	ND
Ventura River - Upper	04N23W09G03S	12/04/2013	ND	ND	ND	56.5	ND	ND	ND	ND	ND	ND	2	ND	ND	ND
Ventura River - Upper	04N23W04H01S	12/04/2013	ND	ND	ND	30.9	ND	ND	ND	ND	ND	ND	1	ND	ND	ND

Table D-3 Radiochemistry

GW Basin	SWN	Date	Alpha pCi/L	CE	Uranium pCi/L	CE
Cuyama Valley	07N23W15P01S	09/18/2013	7.54	4.2	2.17	1
Cuyama Valley	08N24W17G02S	09/18/2013	10.1	2.6	4.42	1.3
Fillmore	03N20W02R05S	10/25/2013	17.8	3.9	15.4	2.8
Little Cuddy Valley	08N20W04N02S	09/18/2013	6.71	1.8	5.46	1.6
Little Cuddy Valley	08N20W08E03S	12/02/2013	8.07	2.2	6.72	2.1
Lockwood Valley	08N21W33R03S	12/02/2013	5.6	1.8	6.19	2
Lockwood Valley	08N21W29R07S	12/02/2013	6.63	2.7	5.93	2
Lockwood Valley	08N21W29N02S	12/02/2013	7.68	2.1	3.82	1.7
Lockwood Valley	08N21W29R06S	12/02/2013	18.5	3.4	21.6	3.4
Lockwood Valley	08N21W29Q05S	12/02/2013	19.04	5.1	11.1	2.5
Lockwood Valley	08N21W30R01S	12/02/2013	33.5	4.7	26.1	3.7
Piru	04N19W26H01S	10/25/2013	4.78	2.1	5.22	1.8
Piru	04N19W23R03S	10/25/2013	7.73	2.8	11.7	2.5

* CE – Counting Error

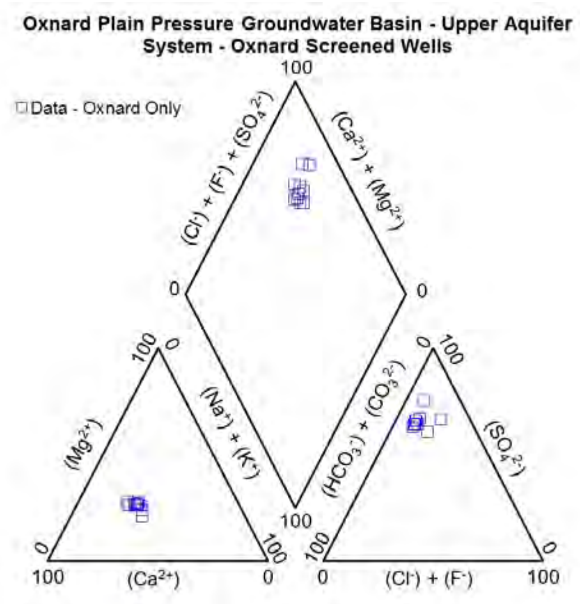

Figure D-1: Oxnard Aquifer piper diagram.

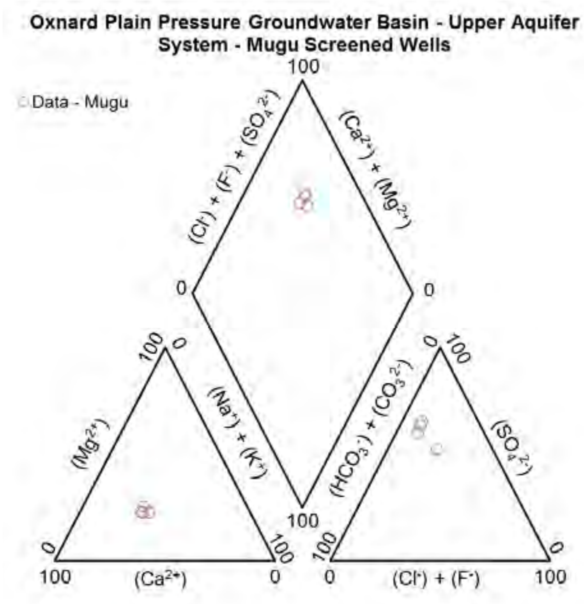

Figure D-2: Mugu Aquifer piper diagram.

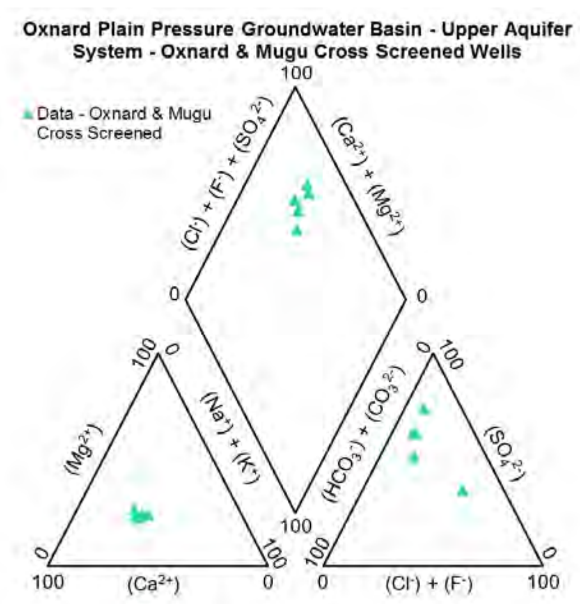

Figure D-3: Oxnard & Mugu Cross Screened piper diagram.

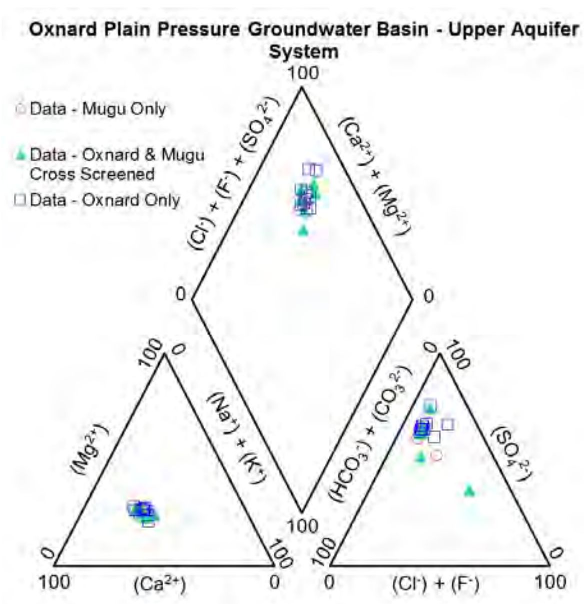

Figure D-4: All Upper Aquifer System piper diagram.

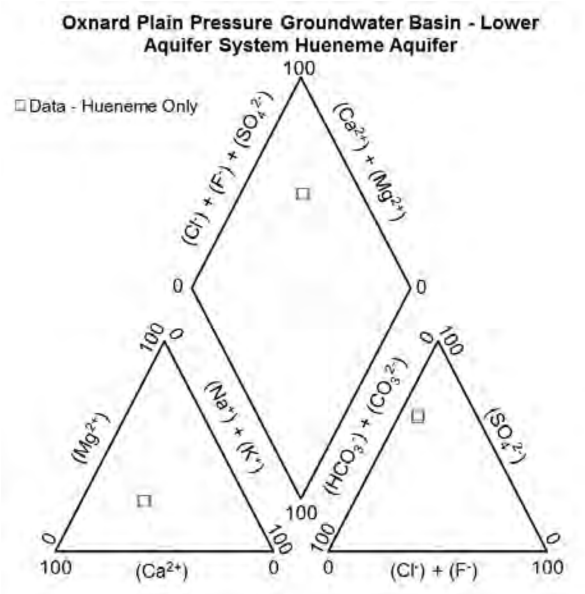

Figure D-5: Hueneme Aquifer piper diagram.

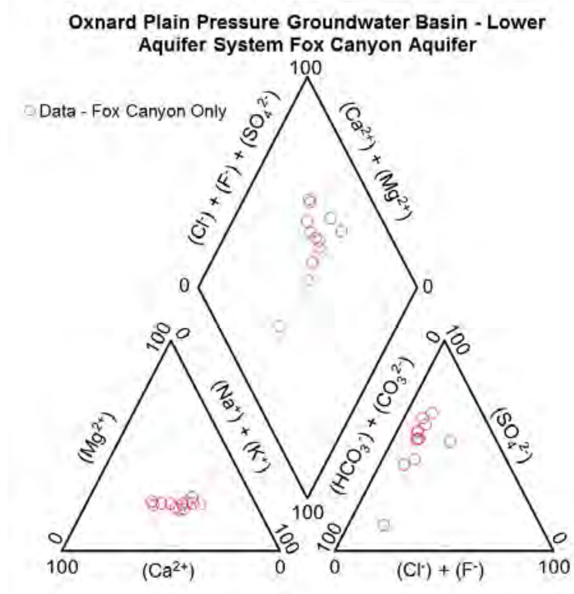

Figure D-6: Fox Canyon Aquifer piper diagram.

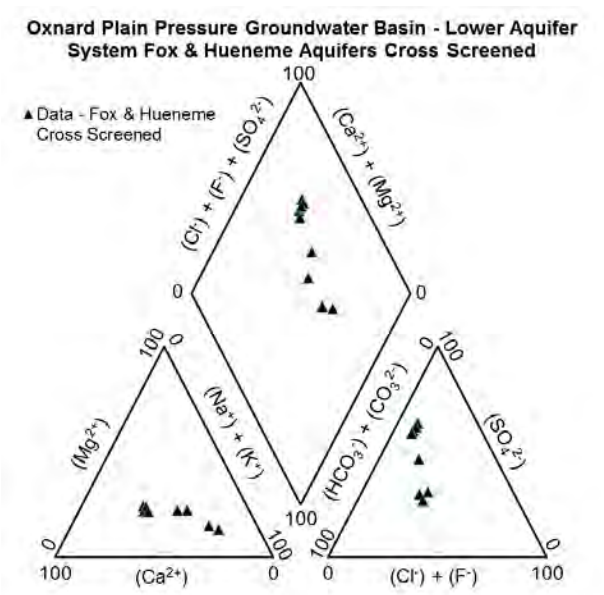

Figure D-7: Fox and Hueneme cross screened piper diagram.

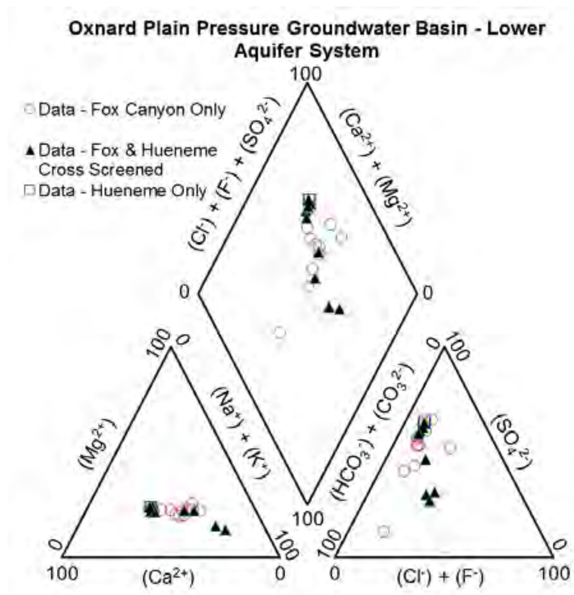

Figure D-8: All Lower Aquifer System piper diagram.

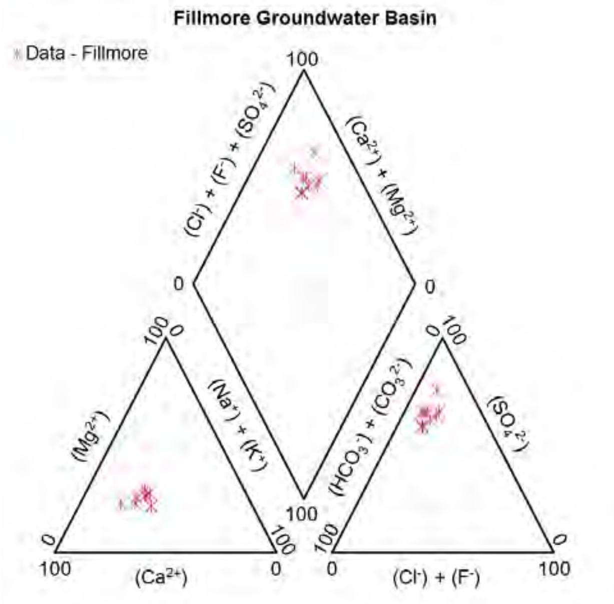

Figure D-9: Fillmore basin piper diagram.

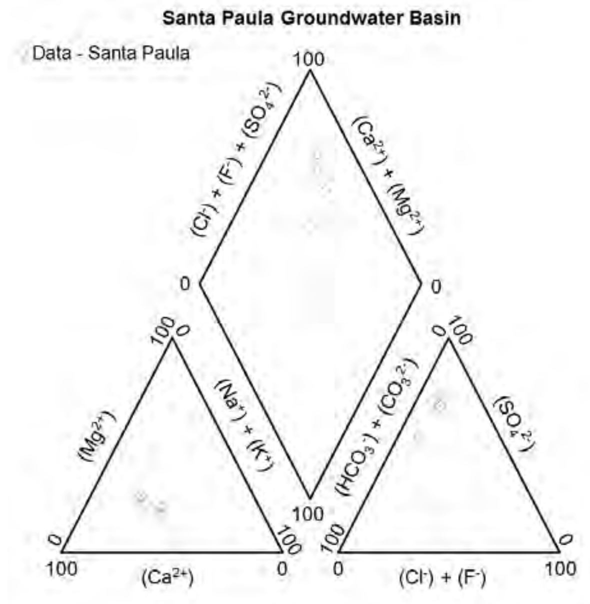

Figure D-10: Santa Paula basin piper diagram.

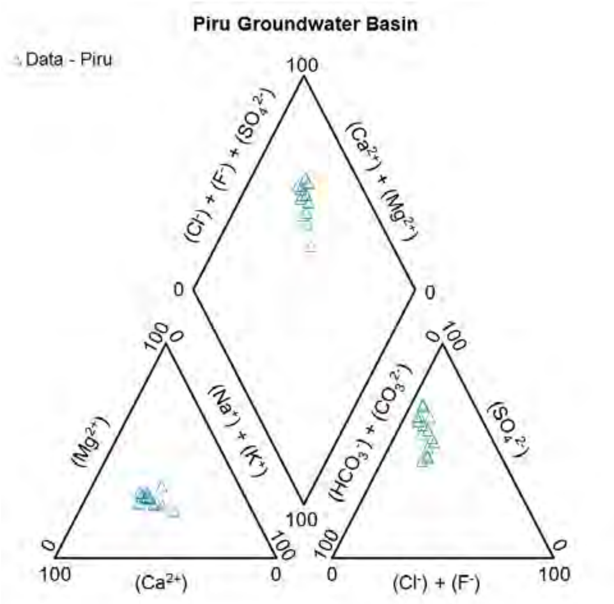

Figure D-11: Piru basin piper diagram.

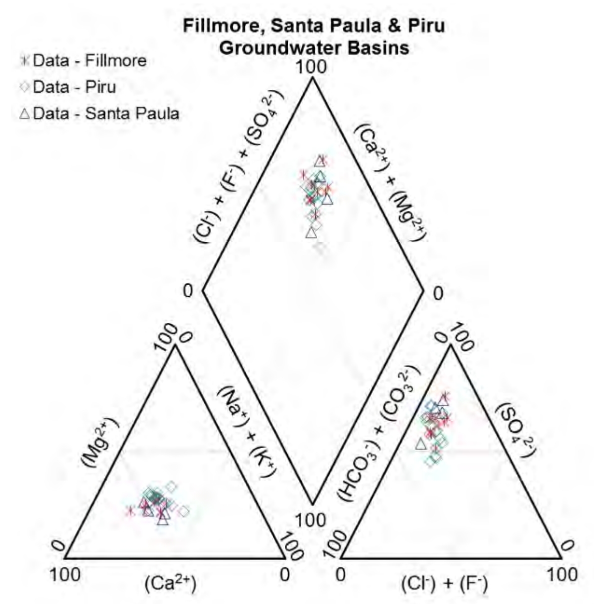

Figure D-12: Fillmore, Piru, and Santa Paula comparison piper diagram.

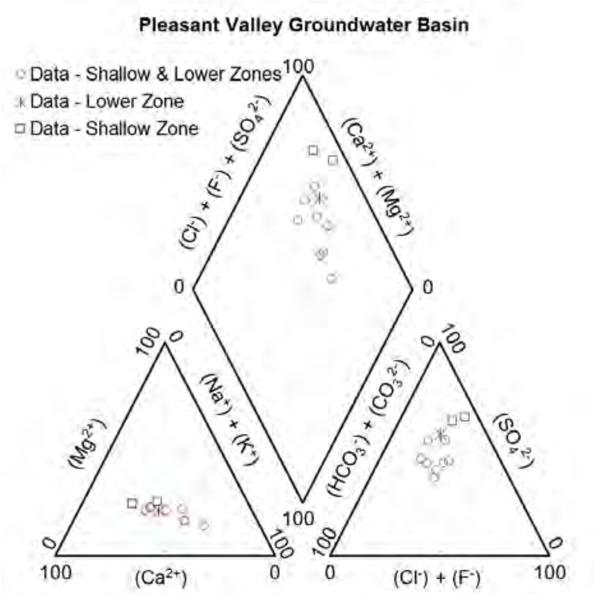

Figure D-13: Pleasant Valley basin piper diagram.

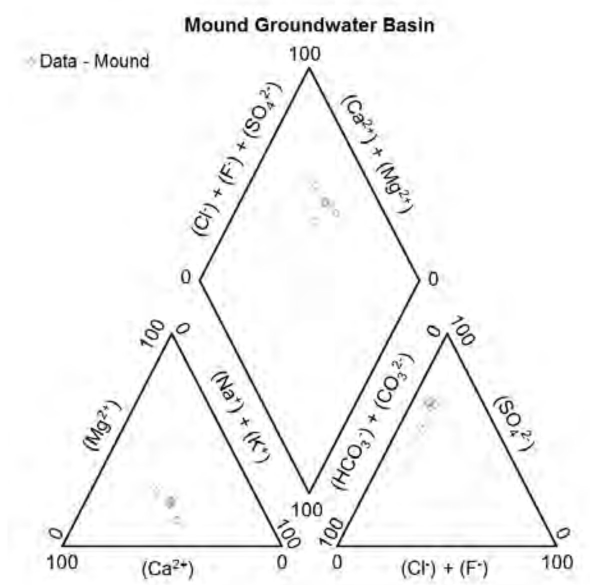

Figure D-14: Mound basin piper diagram.

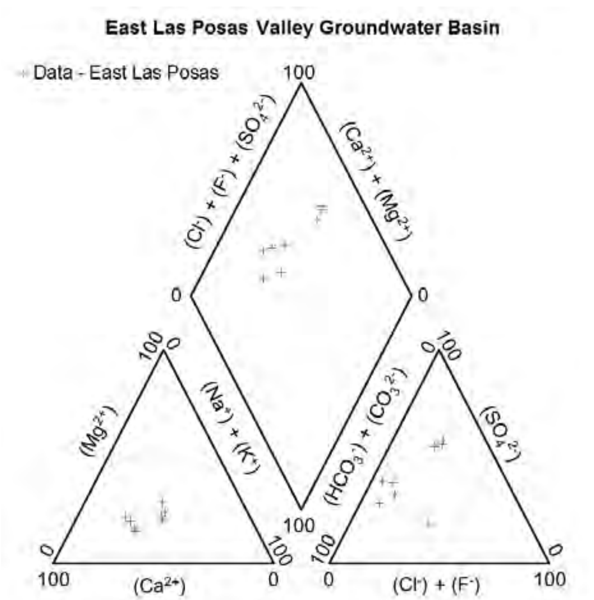

Figure D-15: East Las Posas basin piper diagram.

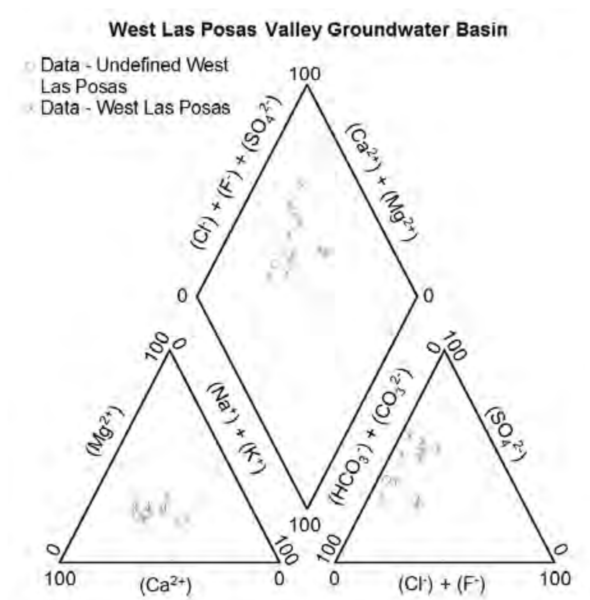

Figure D-16: West Las Posas basin piper diagram.

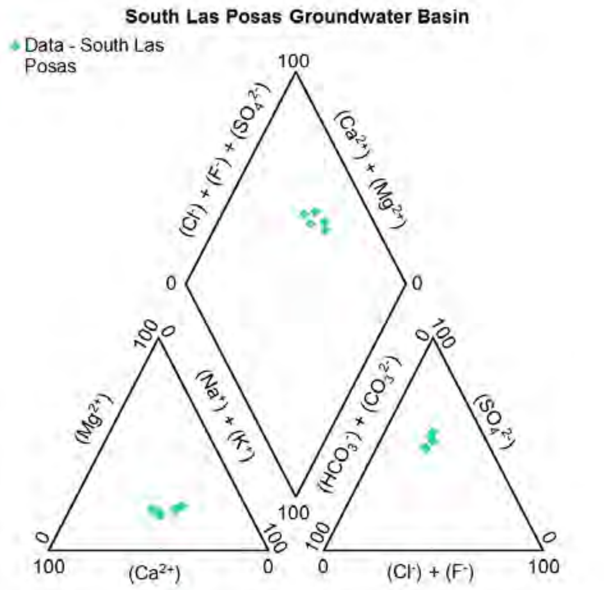

Figure D-17: South Las Posas basin piper diagram.

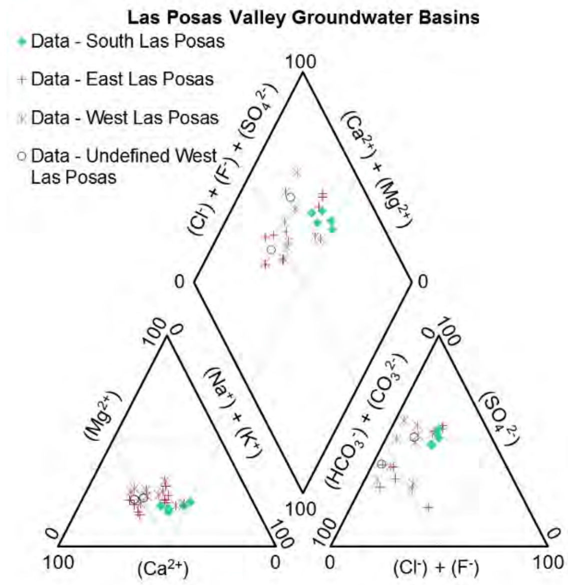

Figure D-18: All Las Posas basins comparison piper diagram.

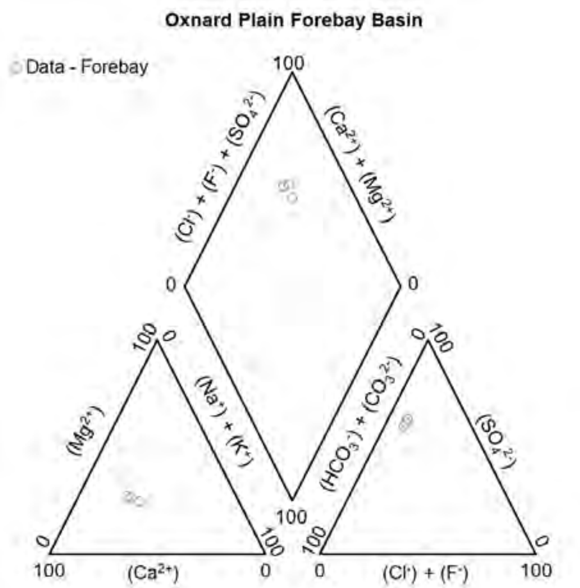

Figure D-19: Oxnard Forebay basin piper diagram.

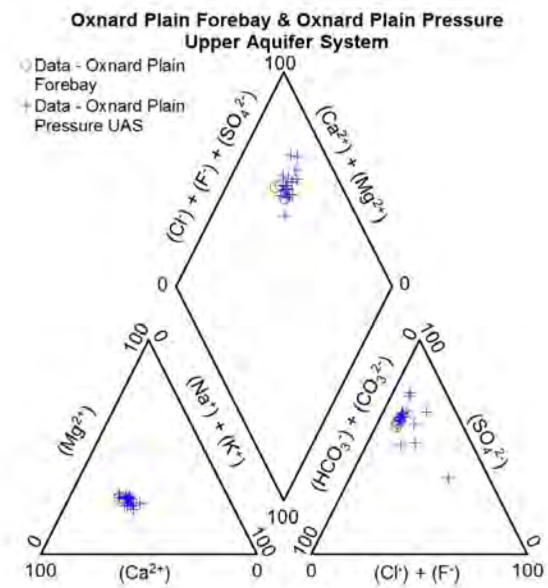

Figure D-20: Oxnard Forebay basin and UAS comparison piper diagram.

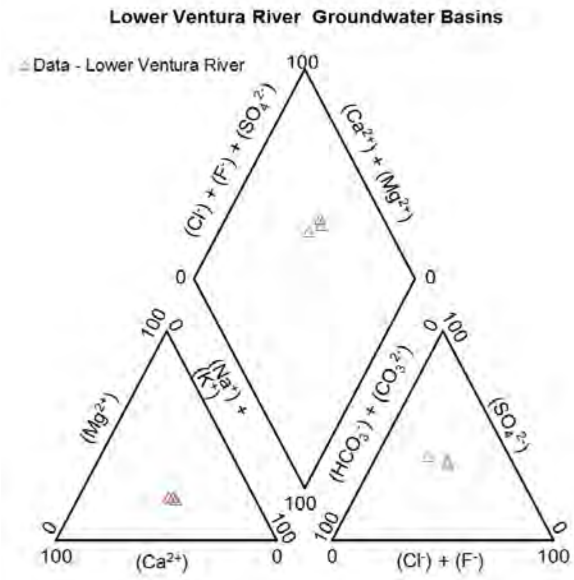

Figure D-21: Lower Ventura River basin piper diagram.

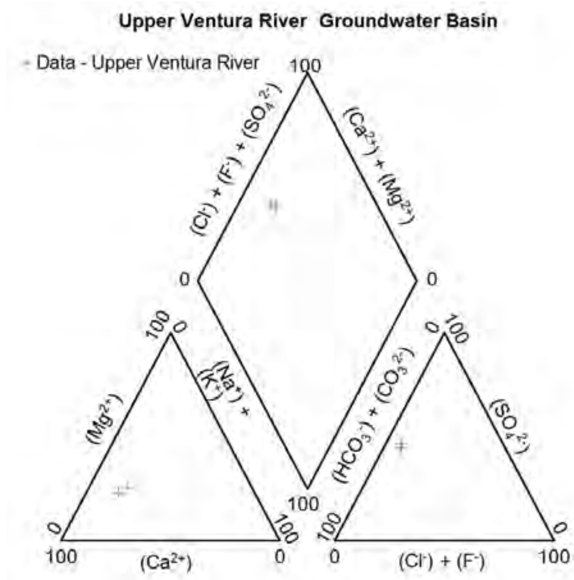

Figure D-22: Upper Ventura River basin piper diagram.

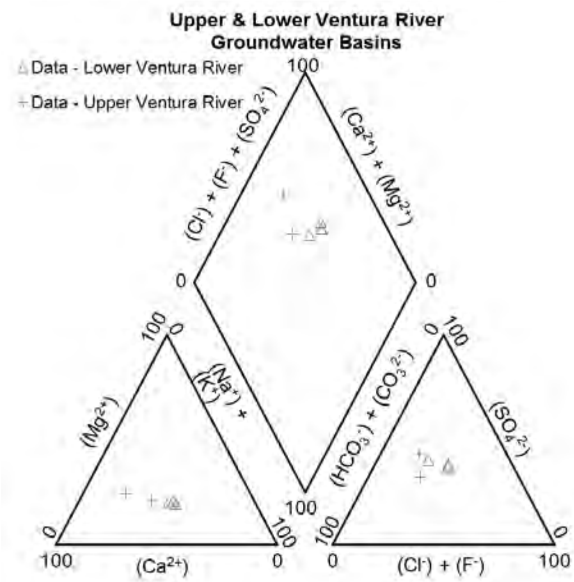

Figure D-23: Upper and Lower Ventura River basins piper diagram.

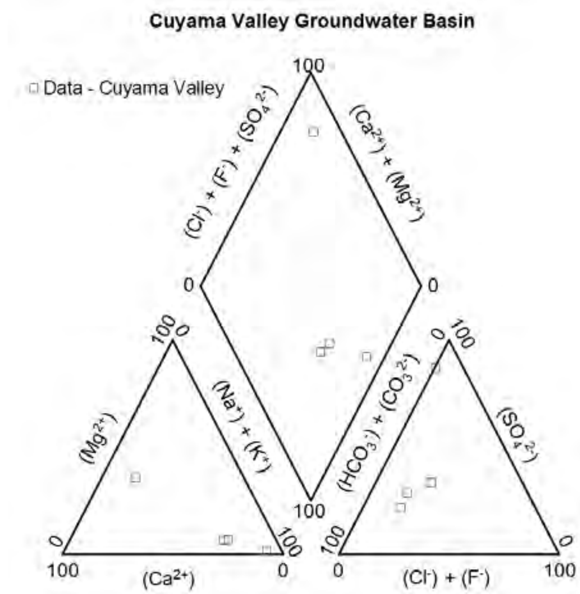

Figure D-24: Cuyama Valley basin piper diagram.

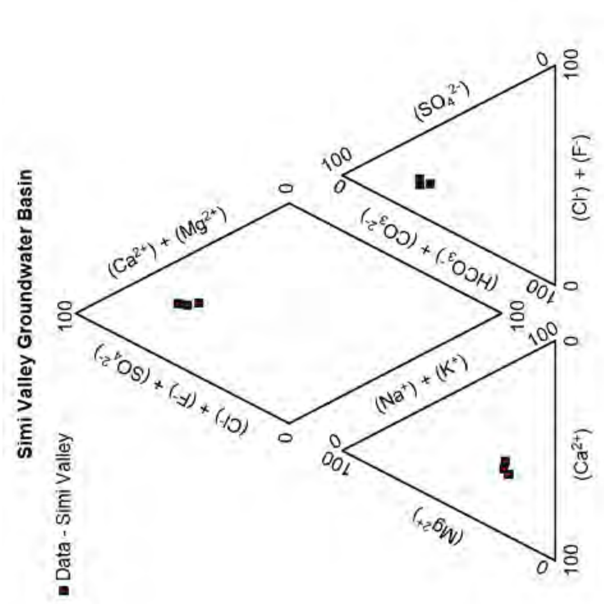

Figure D-25: Simi Valley basin piper diagram.

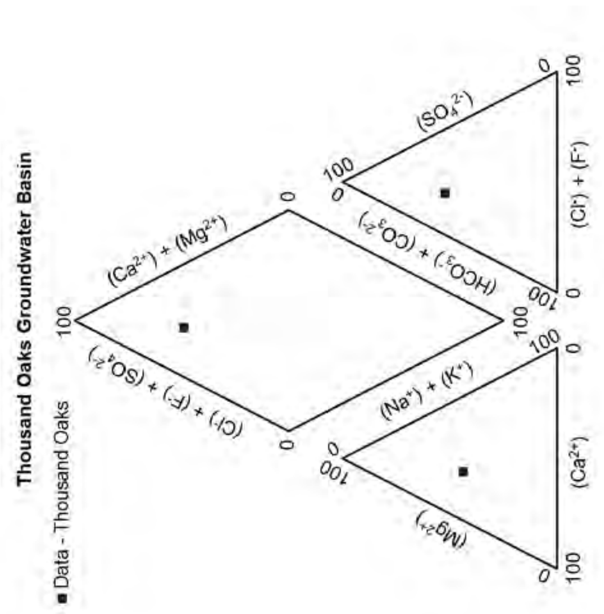

Figure D-26: Thousand Oaks basin piper diagram.

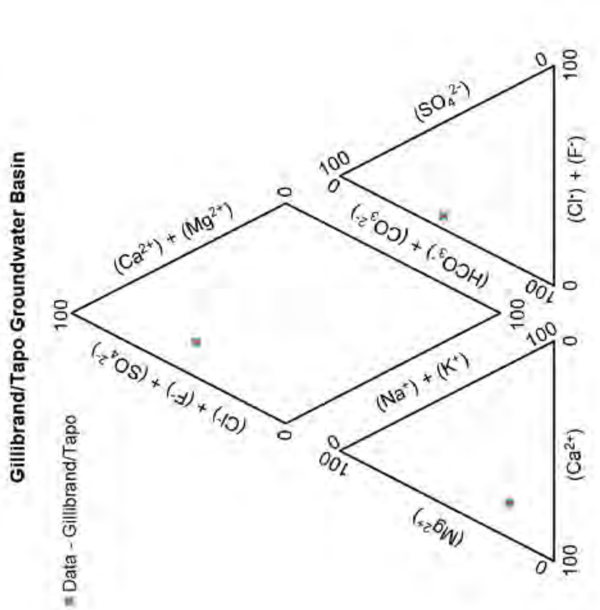

Figure D-27: Tapo/Gillibrand basin piper diagram.

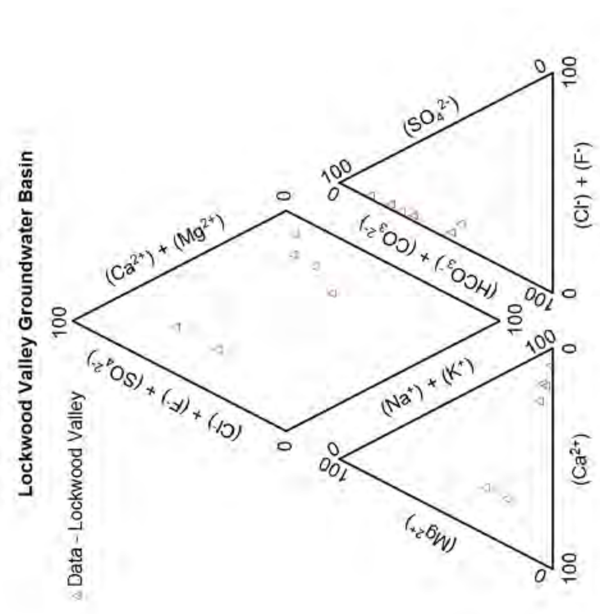

Figure D-28: Lockwood Valley basin piper diagram.

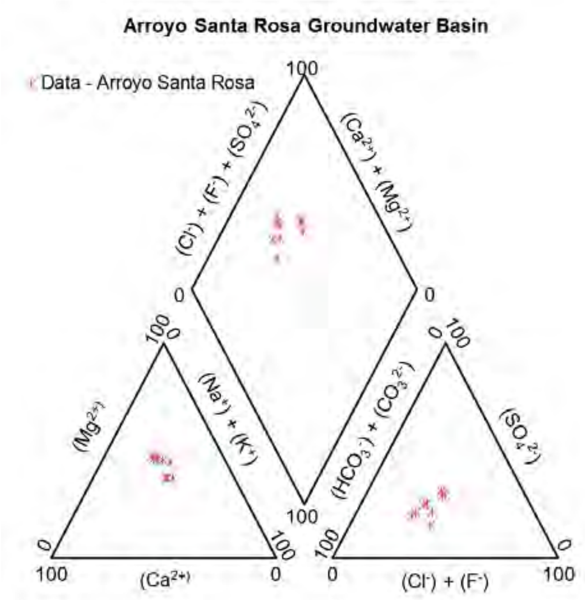

Figure D-29: Arroyo Santa Rosa basin piper diagram.

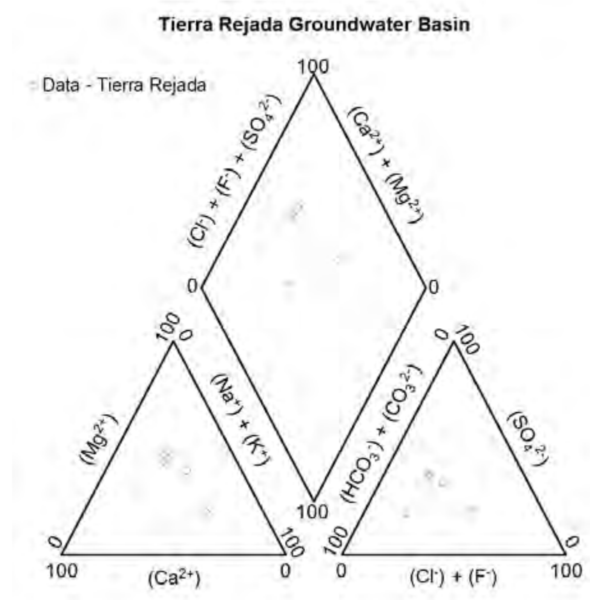

Figure D-30: Tierra Rejada basin piper diagram.

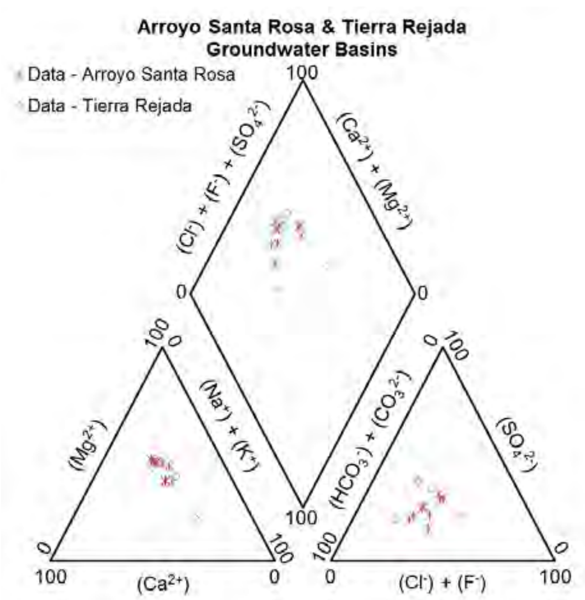

Figure D-31: Arroyo Santa Rosa & Tierra Rejada basins piper diagram.

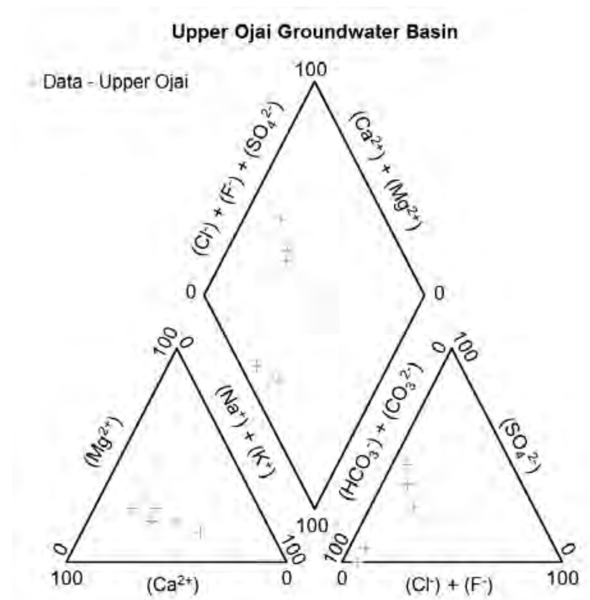

Figure D-32: Upper Ojai basin piper diagram.

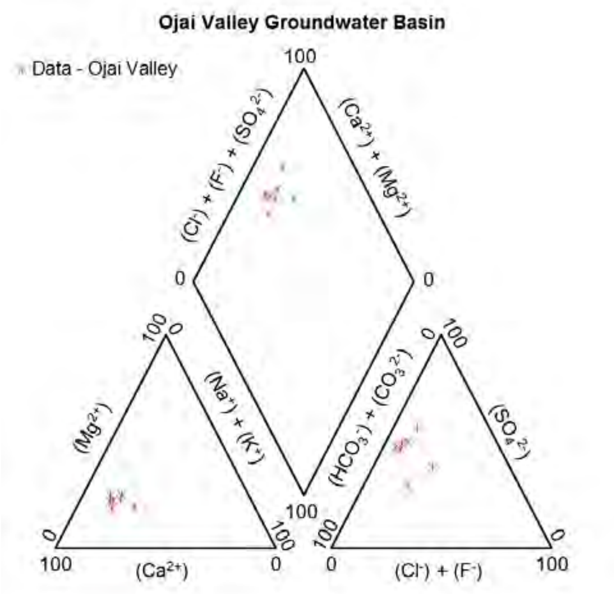

Figure D-33: Ojai Valley basin piper diagram.

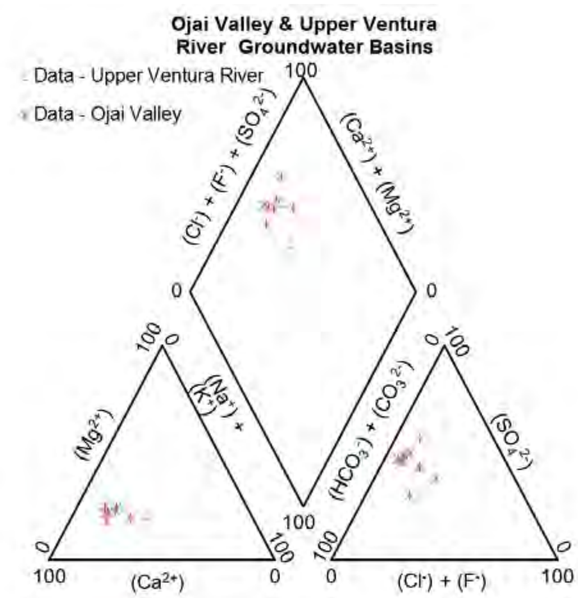

Figure D-34: Ojai Valley & Upper Ventura River basins comparison piper diagram.

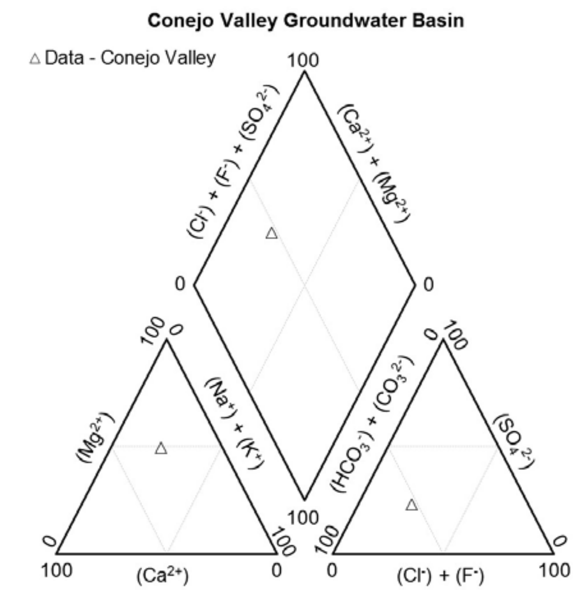

Figure D-35: Conejo Valley basin piper diagram.

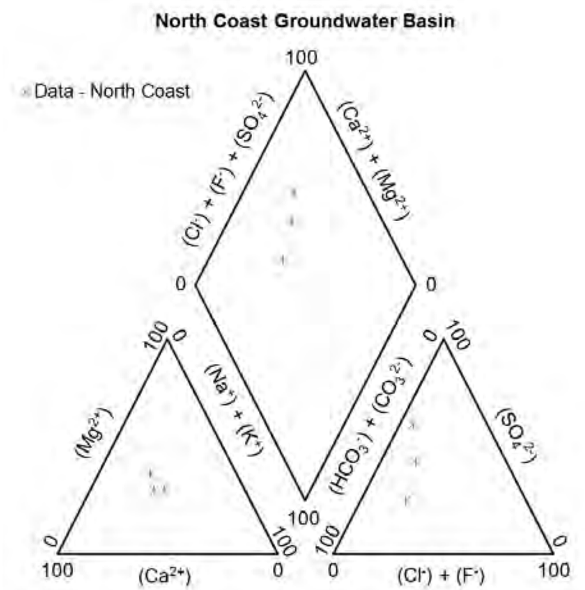

Figure D-36: North Coast basin piper diagram.

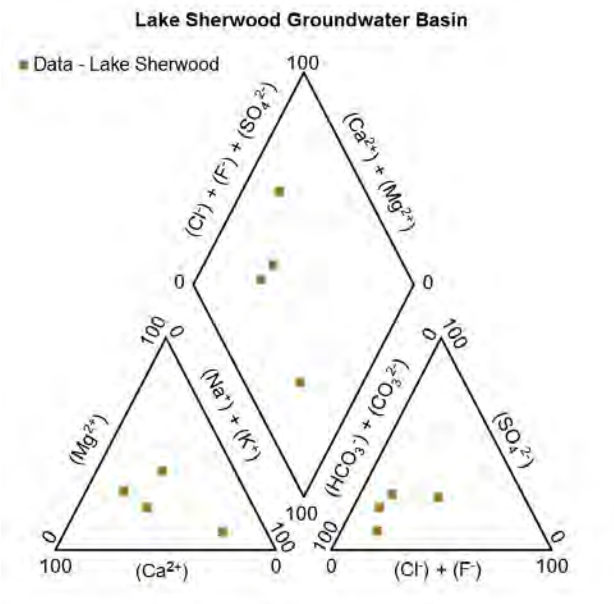

Figure D-37: Lake Sherwood basin piper diagram.

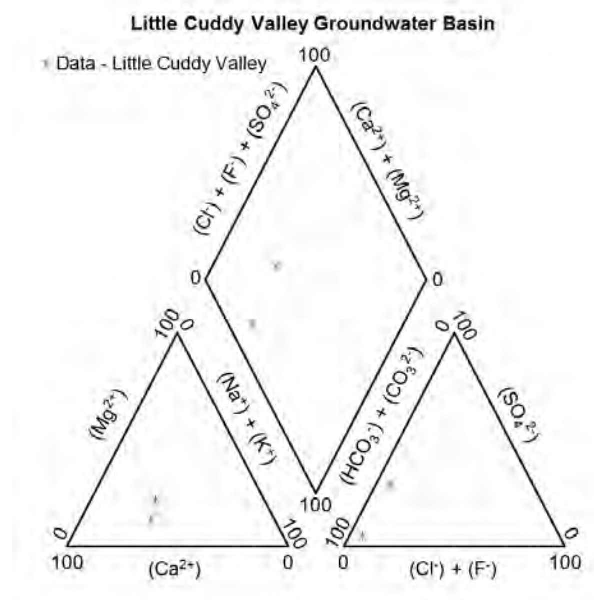

Figure D-38: Little Cuddy Valley basin piper diagram.