# County of Santa Barbara
# Groundwater Basins Status Report


**Public Works Department**
**Water Resources Division**
***Water Agency***

130 East Victoria Street
Santa Barbara, CA 93101
(805) 568-3440


October 14, 2014

**On the cover (clockwise from top right):**

Bales of alfalfa in the Cuyama Valley
Example of a groundwater production well
Lettuces grown in the Santa Maria Valley

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## Introduction

By some measures, the last three years have constituted the most severe drought of modern record, both locally and state-wide. On January 17, 2014 the Governor of California declared a State of Emergency due to drought conditions and the Santa Barbara County Board of Supervisors followed with a local emergency for Drought and Water Supply Conditions on January 21, 2014. On June 17, 2014 the County Drought Task Force presented to the Board of Supervisors a status report on the ongoing county-wide drought and water supply status. At that time, the Water Agency was directed to produce an expedited report on the status of local groundwater basins. This interim report is produced a year ahead of the usual groundwater report triennial cycle mandated by the Board of Directors in 2006. A full report will be produced in accordance with the Santa Barbara County Comprehensive Plan and submitted to the Board of Directors of the Water Agency in the spring of 2015.

This report discusses the status of the County's groundwater basins as it relates to the recent drought. There is a section on the development of the current drought and compares it to other dry periods of record. Table 1 summarizes each basin's characteristics and what is known about its status in regard to the balance of groundwater recharged and groundwater removed. Appendix A contains hydrographs for representative wells in each basin. From these it is possible to examine water levels for the recent dry period and throughout the period of record. Appendix B contains water level comparisons for each hydrograph well showing in graphical and tabular format how recent water levels compare to those throughout the period of record.

## Terminology

A brief explanation of the terminology used in the this report is needed since some of the technical terms may not be familiar to the reader and some of the terms used in the field of groundwater are now changing or becoming obsolete. For example, the term *overdraft* is used herein to describe a basin in which the rate of water leaving a basin exceeds that entering it over a long period of time. It should be noted that in using the term it is recognized that basins are similar to reservoirs in that greater extractions may result in lower groundwater levels but also in greater yields due to the ability to capture more water. *Recharge* is the sum of water entering the aquifer from direct percolation of rainfall, seepage from streams or rivers, return flows from irrigation, and artificial replenishment. An *acre-foot* is a unit of volume equal to the volume of a sheet of water one acre in area by one foot in depth, or 43,560 cubic feet.

Within the appendices, the hydrographs showing groundwater levels are labeled using *water surface elevation (WSEL)* which is the elevation of the groundwater above (or in some cases below) an established reference level, which in this case is *mean sea level (MSL)*. Each well's *land surface elevation* is indicated as the elevation in feet of the well's measuring point.

*WSEL* is determined by subtracting the measured depth to water from the land surface elevation. Similarly, depth to water below the land surface is determined by subtracting *WSEL* from *Land Surface Elevation (LSE).*

## Summary and Conclusions

Depending on their geologic and hydrologic characteristics, groundwater basins may be slow to react to changing climatological and land use conditions. Wet periods and heavy rainfall may take many years to become recharge in groundwater aquifers and be reflected in groundwater elevation measurements. Conversely, a well may recover with discontinued pumping even during a period of drought. However, recent groundwater elevation monitoring shows that many of the County's groundwater basins appear to be responding to the recent dry conditions with lowered water elevations over the last few years. Accordingly, many groundwater elevation measurements taken this year are the lowest of record. It is expected that groundwater levels in many parts of the County will continue to decline in response to the dry period now occurring. Continued drought conditions into the future would of course prolong and exacerbate groundwater impacts. Table 1 shows the County's Groundwater Basin characteristics and supply status.

In general, most South Coast basins are either managed or adjudicated and all have multiple water sources with which to conjunctively manage groundwater. Previous studies indicate that South Coast basins are in a state of long term balance or surplus. Groundwater basins of the Santa Ynez River Valley vary in their status and response to the drought. The Santa Ynez Uplands Basin supply is notably impacted by new Chromium 6 standards. The Santa Ynez Alluvial Groundwater Basin is subject to water rights agreements and therefore less subject to climate related trends. The Buellton Uplands Basin wells show a distinct lowering of water level since the beginning of the drought but the basin was previously determined to be in a long-term state of surplus. Groundwater within the Lompoc Plain is also managed in accordance with Water Rights Decisions. Some hydrographs from the Lompoc Uplands Groundwater Basin (including the Santa Rita Sub-area) show 2014 water levels that are the lowest of record. Past studies indicate that the Lompoc Uplands Basin is in a state of overdraft.

Wells of the San Antonio Valley Groundwater Basin have shown a recent response to dry conditions. Past studies have indicated that the basin is in overdraft. The Santa Maria Groundwater Basin is one of two adjudicated basins in Santa Barbara County and as such, water management is largely dictated by the courts. Recent water levels there are declining but the basin has been determined to not be in a State of overdraft. Cuyama Valley Groundwater Basin was the subject of a recently completed detailed study which concluded that the basin as a whole is in a state of significant overdraft and water levels in most parts of the basin have been declining for decades.

## **Table 1:** Major Groundwater Basins Status

| Groundwater Basin (south to north) | Size (sq. mi) | Users | Estimated "Usable" Water in Storage[1,2] | Annual Draw | Annual Surplus/Overdraft | Reference |
|---|---|---|---|---|---|---|
| **Carpinteria** | 10 | Farmsteads, Agriculture, Carpinteria Valley Water District | 16,000 | 3,750 | 125 | Carpinteria Water District, U.S. Geological Survey |
| **Montecito** (Includes Toro Canyon) | 7 | Farmsteads, Limited Agriculture, Montecito Water District | 16,100 | 500 | 0 | Montecito Water District, County Water Agency |
| **Santa Barbara** | **7** | City of Santa Barbara, Limited Agriculture | 10,000 | 500 | 2000 | USGS, City of Santa Barbara and County Water Agency |
| **Foothill** | 5 | Farmsteads, Limited Agriculture, City of Santa Barbara | 5,000 | 1,000 | Managed by City of Santa Barbara | USGS WRI 89-4107 |
| **Goleta** (West and North-Central) | 14 | Farmsteads, Agriculture, Goleta Water District, La Cumbre Mutual Water Co. | 70,000 | 4,000 | Adjudicated | Goleta Water District |
| **Santa Ynez Uplands** | 130 | Farmsteads, Agriculture, SYRWCD ID#1 | 900,000 | 11,000 | (2,028) | County Water Agency |
| **Santa Ynez River Alluvial Corridor** (includes Santa Rosa Area) | 19 | Farmsteads, Agriculture, City of Solvang, City of Buellton | 90,000 | 1,000 | 0 | USGS WSP 1107, County Water Agency |
| **Buellton Uplands** | 26 | Farmsteads, Agriculture, City of Solvang | 154,000 | 2,000 | 800 | County Water Agency |
| **Lompoc Basins** (includes Terrace, Plain, Uplands (Uplands includes Santa Rita Area)) | 77 | Farmsteads, Agriculture, VVCSD, MHCSD, City of Lompoc, VAFB | 170,000 | 28,000 | Terrace not used, Plain managed by WRD 89-18, Uplands (913), (mostly Santa Rita sub area) | U.S. Geological Survey, County Planning Department |
| **San Antonio** | 110 | Farmsteads, Agriculture, VAFB, Los Alamos CSD | 800,000 | 15,000 | (9,540) | County Water Agency |
| **Santa Maria** | 170 | Farmsteads, Agriculture, City of Santa Maria, Golden State Water Co. (Orcutt) | 1,100,000 | 130,000 | Adjudicated | Adjudication Annual Report, County Water Agency |
| **Cuyama** | 230 | Farmsteads, Agriculture, Ventucopa, New Cuyama CSD | 1,500,000 | 65,000 | (29,900) | County Water Agency, USGS SIR 2013-5108 |

[1] All Amounts listed are *Acre-Feet*

[2] "*Useable*" or "*working*" water in storage generally denotes that which is above sea level and also above the bottom of the deepest water wells constructed in that specific area

## This Update and Future Reports

In order to best present information directly pertinent to the drought as it relates to groundwater, this update varies from the format of the triennial report. Additional information and background not contained in this update can be found in the *Santa Barbara County, 2011 Groundwater Report* received by the Board on May 1, 2012.

This update contains a discussion of the current drought and precipitation as it pertains to groundwater use and recharge. It also presents groundwater measurements and elevation trends for representative wells within the County's groundwater basins. Hydrographs (graphical representations of groundwater elevations) are provided to examine relationships between recent water levels and drought conditions. In order to put the information in the context of water supply, the update provides estimates of useable storage and annual withdraw amounts for major basins (Table 1). It should be noted that groundwater elevations may take up to several years to respond to climatic conditions due to the time it takes for recharge to make its way to the main aquifers. This "lag time" is greatest in areas of deep water and low permeability geologic formations. In cases where lack of alternative supplies have prompted increases in groundwater withdraws, the relationship between dry conditions and groundwater level declines may be more quickly apparent.

As stated in the triennial report,

*The information and conclusions contained in this report reflect data developed by the Water Agency and data contained in [other] documents and reports… The Water Agency recognizes that other individuals/agencies might reach different conclusions based on different sources of data or interpretations. This report draws on the best available information, in some cases referencing conclusions from studies conducted over a decade ago. It is recognized that basin conditions may change with changes to water supply, land use, and other factors. Efforts have been made to consider the validity of the conclusions from the reports referenced and adjustments have been made where appropriate. In addition, information from more recent studies is included where applicable and sources of new information are noted in the text.*

The importance of groundwater as a resource and the lack of up to date groundwater analyses has prompted the Water Agency to propose periodic in-depth studies of the County's major basins. The Cuyama Valley Water Availability Study is now complete and was brought to the Board of Directors September 9, 2014. In addition, the Water Agency is in the process of informing stakeholders and soliciting comments on an in-depth study of the San Antonio Valley water resources. Staff will return to the Board of directors for direction on the San Antonio Study. More information on these studies is available online at http://ca.water.usgs.gov/user_projects/cuyama/ and http://www.countyofsb.org/sanantoniogwb/.

## Groundwater Monitoring Programs

### *Santa Barbara County/United States Geological Survey Cooperative Program*

In a cooperative program with the USGS, the Water Agency monitors over 300 groundwater wells annually throughout the County. As part of this program, groundwater quality is also monitored from a limited number of wells. The program provides vital data for tracking groundwater trends and conducting groundwater studies. This cooperative program has been in place for several decades and most of the data is available at http://waterdata.usgs.gov/nwis/gw. Other County agencies have similar programs with the USGS for their areas of jurisdiction or make groundwater measurements of their own.

### *California Statewide Groundwater Elevation Monitoring*

In 2009, the California legislature passed SBx7-6, the California Statewide Groundwater Elevation Monitoring Program (CASGEM) which mandates that local agencies track seasonal and long term trends in groundwater elevations in all State designated groundwater basins. Local entities that are eligible to be the designated monitoring entity for any basin within their jurisdiction but do not perform that function may be ineligible for State grants or loans. The Water Agency is the designated monitoring entity for three of the County's major groundwater basins. These and other basins monitored are shown in Table 2.

**Table 2:** CASGEM Basin Monitoring Summary

| CASGEM Basin Summary | | | | |
|---|---|---|---|---|
| **Basin No.** | **Basin Name** | **2010 Population** | **Basin Priority** | **Monitoring Entity** |
| 3-13 | Cuyama | 1,236 | Medium | County Water Agency |
| 3-12 | Santa Maria | 201,759 | High | Twitchell Mgmt Authority |
| 3-14 | San Antonio | 2,279 | Medium | County Water Agency |
| 3-15 | Santa Ynez | 75,460 | Medium | County Water Agency |
| 3-16 | Goleta | 47,252 | Medium | Goleta Water District |
| 3-53 | Foothill | 17,543 | Very Low | City of Santa Barbara |
| 3-17 | Santa Barbara | 63,966 | Very Low | City of Santa Barbara |
| 3-49 | Montecito | 9,885 | Very Low | N/A |
| 3-18 | Carpinteria | 14,561 | Very Low | Carpinteria Valley Water District |

### *Pending Groundwater Legislation*

The California Legislature recently adopted significant legislation requiring the study and management of California groundwater basins. (Assembly Bill 1739 (Dickinson) and Senate Bill 1168 and 1319(Pavley) (2014).) The groundwater legislation allows about five years for the development of sustainable groundwater management plans for all basins within the State that are designated as high or medium priority by the Department of Water Resources.

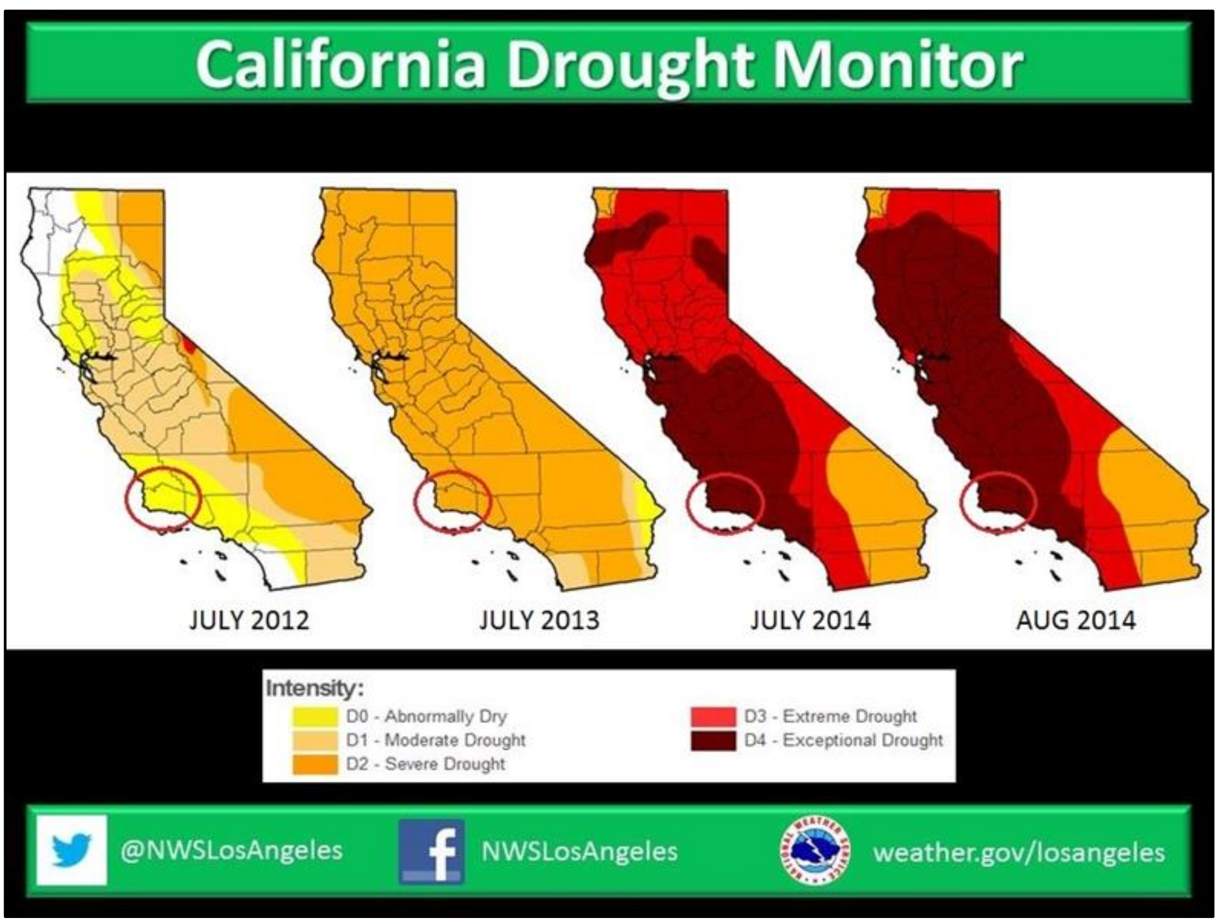
For the purposes of the legislation, sustainability is generally defined as the avoidance of significant economic, social, or environmental impacts. Local entities would be granted the authority to develop plans, collect water extraction data, collect fees, and establish a water allocation system. If local agencies are unable or unwilling to perform these tasks, the State could do so. It is possible that eligible local entities that do not perform this function may lose eligibility for some or all State grant and loan programs.

## Climate and Drought

Rainfall in California during the last few years has been significantly below normal. The National Weather Service (NWS-NOAA) issued a “California Drought Monitor” graphic depicting the increased severity of drought conditions within California since 2012 (Figure 1).

The most elevated drought intensity classification (Exceptional Drought) was assigned to Santa Barbara County in July & August 2014 along with other areas of California.

**Figure 1:** California Drought Monitor



### *Local Drought Conditions*

Santa Barbara County has also been impacted by drought conditions. Figure 2 shows Santa Barbara County-wide rainfall as a percent of normal since the year 2000. It is notable that 2012, 2013, and 2014 constitute the driest three year period ever recorded in Santa Barbara County. In addition, annual rainfall during the current drought period is the lowest ever recorded for many locations in the County (Table 3).

Figure 3, is a three year running average of rainfall at Gibraltar Reservoir. Rainfall at Gibraltar Reservoir is indicitive of potential for inflow to the three reservoirs in the Santa Ynez River Watershed which constitute a major supply source for the County's south coast and Santa Ynez Valley. A running average more clearly shows wet and dry trends. Figure 3 shows the severity of the current dry trend.

**Figure 2:** County Wide Percent of Normal Rainfall

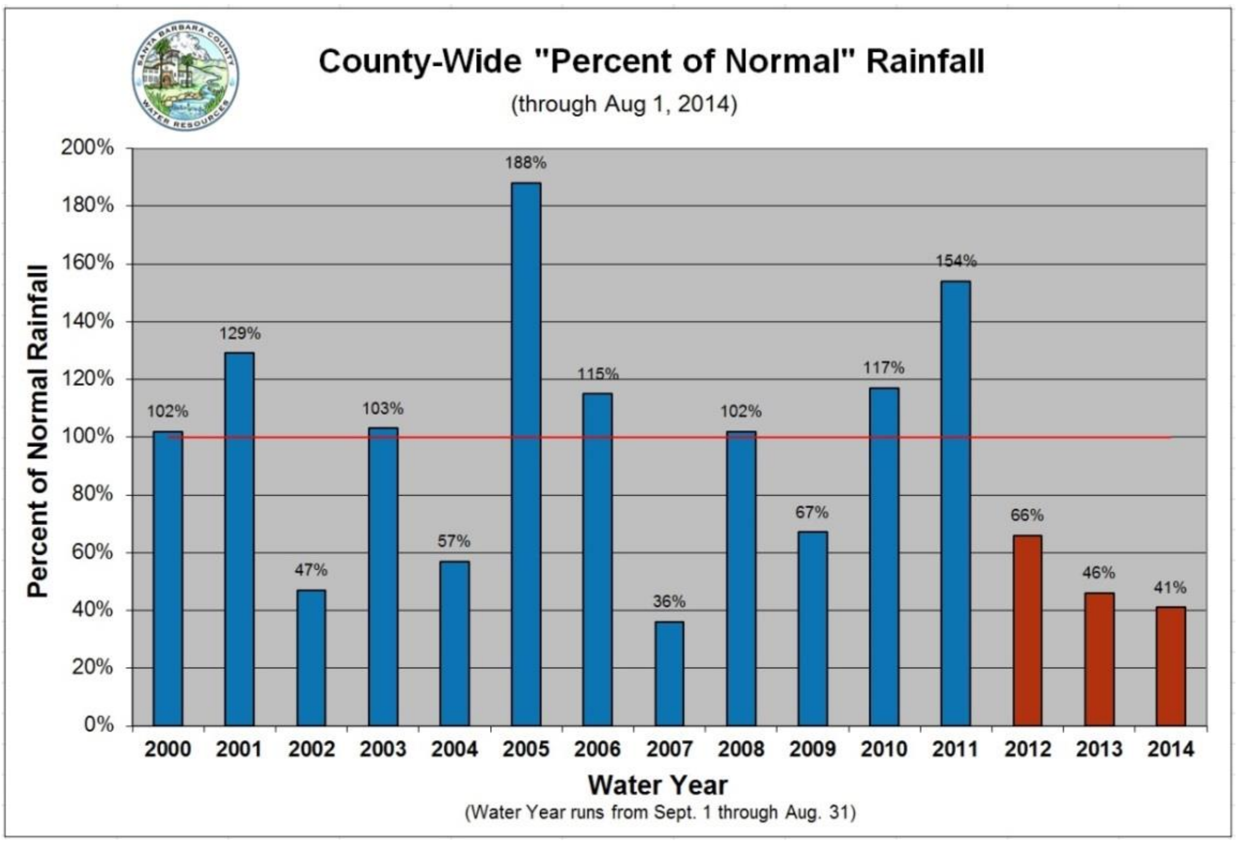
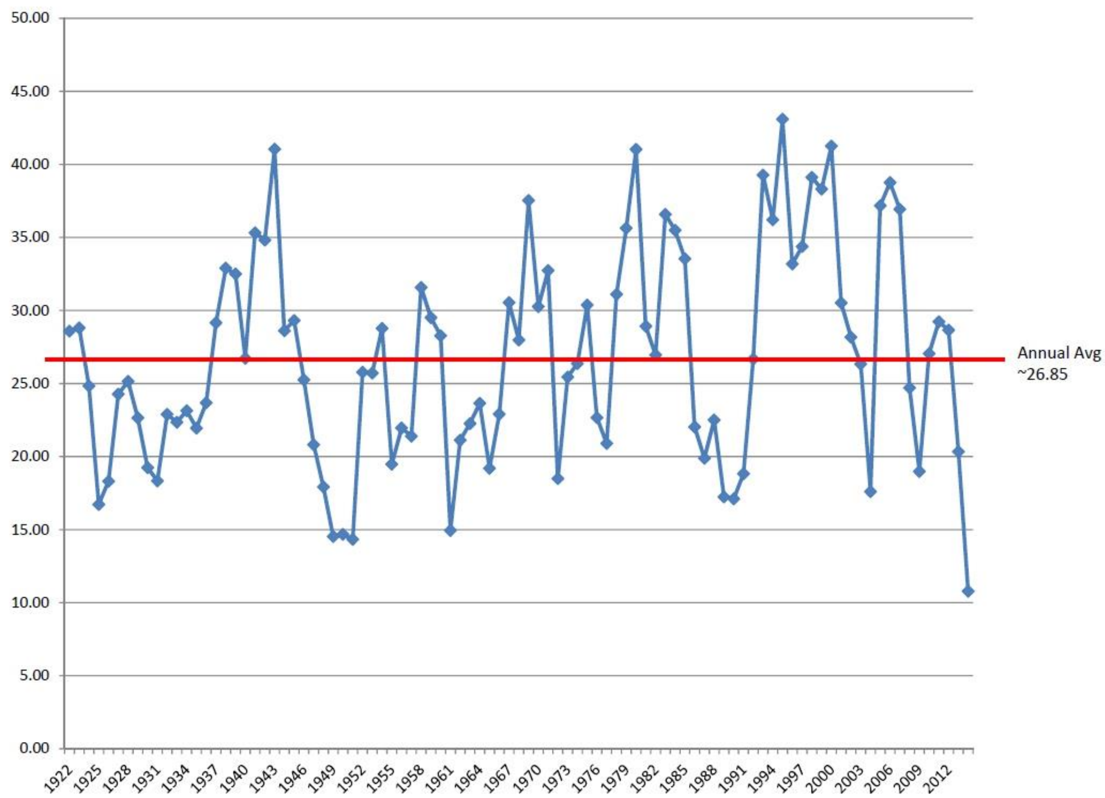


**Table 3:** Santa Barbara County Water-Year Rainfall Comparison

| Santa Barbara County Water-Year Rainfall<br>Mean, Extremes, 2014, 2013, 2012 | | | | | | |
|---|---|---|---|---|---|---|
| **Location** | **Mean Annual Rainfall** | **Minimum Annual Rainfall** | **Maximum Annual Rainfall** | **WY 2014 Rainfall** | **WY 2013 Rainfall** | **WY 2012 Rainfall** |
| Buellton | 17.16” | 5.87” (2014) | 41.56” (1998) | 5.87” | 7.79” | 11.54” |
| Cachuma | 20.19” | 7.33” (2007) | 53.37” (1998) | 10.49” | 7.87” | 13.43” |
| Carpinteria | 19.57” | 5.83” (2014) | 51.48” (1998) | 5.83” | 8.33” | 9.83” |
| Cuyama | 7.80” | 1.71” (2014) | 19.78” (1998) | 1.71” | 2.32” | 5.09” |
| Gibraltar | 26.74” | 8.50” (2013) | 73.12” (1998) | 11.88” | 8.50” | 13.54” |
| Goleta | 18.77” | 6.88” (2014) | 47.93” (1983) | 6.88” | 11.03” | 13.60” |
| Lompoc | 14.74” | 5.31” (2007) | 34.42” (1983) | 7.18” | 7.25” | 10.62” |
| Los Alamos | 15.44” | 5.38” (1924) | 36.23” (1998) | 6.26” | 6.31” | 10.56” |
| San Marcos Pass | 34.99” | 10.90” (2007) | 87.95” (1983) | 12.04” | 17.96” | 18.66” |
| Santa Barbara | 18.55” | 6.41” (2007) | 46.97” (1998) | 8.06” | 8.98” | 11.62” |
| Santa Maria | 13.77” | 4.95” (2014) | 32.61” (1998) | 4.95” | 6.52” | 9.49” |

**Figure 3:** Gibraltar Dam 3-Year Running Average Rainfall



### *Water Supplies*

Many local water supplies have been severely reduced due to drought conditions. Storage within Cachuma, Gibraltar, and Jameson Reservoirs is currently at 31 percent, 21 percent, and 24 percent of capacity, respectively. State Water Project (SWP) allocation for 2014 was initially reduced to zero before being increased to 5 percent of Table A amounts (Table 4). Although cloud seeding effectively raises long term water availability, it is of little effect during drought conditions when there are few seed-able storm events.

During drought periods, groundwater supplies may be negatively impacted by several factors. Natural recharge to aquifers is reduced or eliminated during dry years. In addition, agriculture and landscaping that is irrigated with groundwater may require increased groundwater extraction due to the lack of irrigation from natural rainfall. Water purveyors that rely on groundwater as one of, or the only water supply source may be forced to increase extractions to compensate for the reduction in other supplies. The combined effect of such conditions is increased stress on groundwater basins with resultant lowering of groundwater levels.

**Table 4:** State Water Project Table A and 5% Deliveries

| State Water Project and 5% Deliveries in Santa Barbara County (AFY) | | | |
|---|---|---|---|
| **Project Participant** | **SWP Allocation** | **Drought Buffer** | **5% Deliveries** |
| City of Santa Maria | 16,200 | 1,620 | 810 |
| Golden State Water Company | 500 | 50 | 25 |
| City of Guadalupe | 550 | 55 | 28 |
| Vandenberg Air Force Base | 5,500 | 550 | 275 |
| City of Buellton | 578 | 58 | 29 |
| City of Solvang | 1,500 | 0 | 75 |
| Santa Ynez River Water Conservation District ID#1 | 500 | 200 | 25 |
| Raytheon Infrared Operations | 50 | 5 | 3 |
| Morehart Land Company | 200 | 20 | 10 |
| La Cumbre Mutual Water Company | 1,000 | 100 | 50 |
| Goleta Water District** | 4,500 | 450* | 225 |
| City of Santa Barbara | 3,000 | 300 | 150 |
| Montecito Water District | 3,000 | 200 | 150 |
| Carpinteria Valley Water District | 2,000 | 200 | 100 |
| **Total:** | **39,078** | **3,908** | **1,954** |

*******Goleta has an additional 2,500 AFY of drought buffer, in addition to its 450 AFY, Drought buffer does not have a pipeline or treatment plant capacity associated with it, thus it serves for increased reliability only*

## Groundwater Basin Status

The triennial groundwater report is designed to provide an overview of the groundwater basins, their history, characteristics, and status. For additional information, please refer to the 2011 groundwater report. This update is intended to provide information more specific to the drought conditions of the last few years. Review of this information generally shows a wide spread, short term response of the County's groundwater to the recent drought conditions. However, the exact cause of the response and the long term implications are not necessarily known without further detailed study. Table B1 shows selected groundwater level comparisons of the current drought period to historic levels. Table 5 shows the status of groundwater management plans for the County's major basins.

**Table 5:** Groundwater Management Plans Status

| Groundwater Management Plans Status | | | |
|---|---|---|---|
| **Basin** | **Public Agency Participants[1]** | **Status** | **Year** |
| Buellton Uplands | Santa Ynez River WCD, City of Buellton | Plan Adopted | 1995 |
| Carpinteria | Carpinteria Valley WD | Plan Adopted | 1996 |
| Foothill | City of Santa Barbara | Plan Adopted | 1994 |
| Goleta | Goleta WD | Court Action[2] | 1989 |
| Goleta | Goleta WD, La Cumbre Mutual Water Co. | Plan Adopted | 2010 |
| Lompoc | City of Lompoc | Plan Adopted | 2013 |
| Montecito | Montecito WD | Plan Adopted | 1998 |
| Santa Barbara | City of Santa Barbara | Plan Adopted | 1994 |
| Santa Maria Valley | City of Santa Maria, Santa Maria Valley WCD, Cal Cities | Plan Adopted | 1995 |
| Santa Maria Valley | City of Santa Maria, Santa Maria Valley WCD, Cal Cities | Court Action[3] | 2005 |

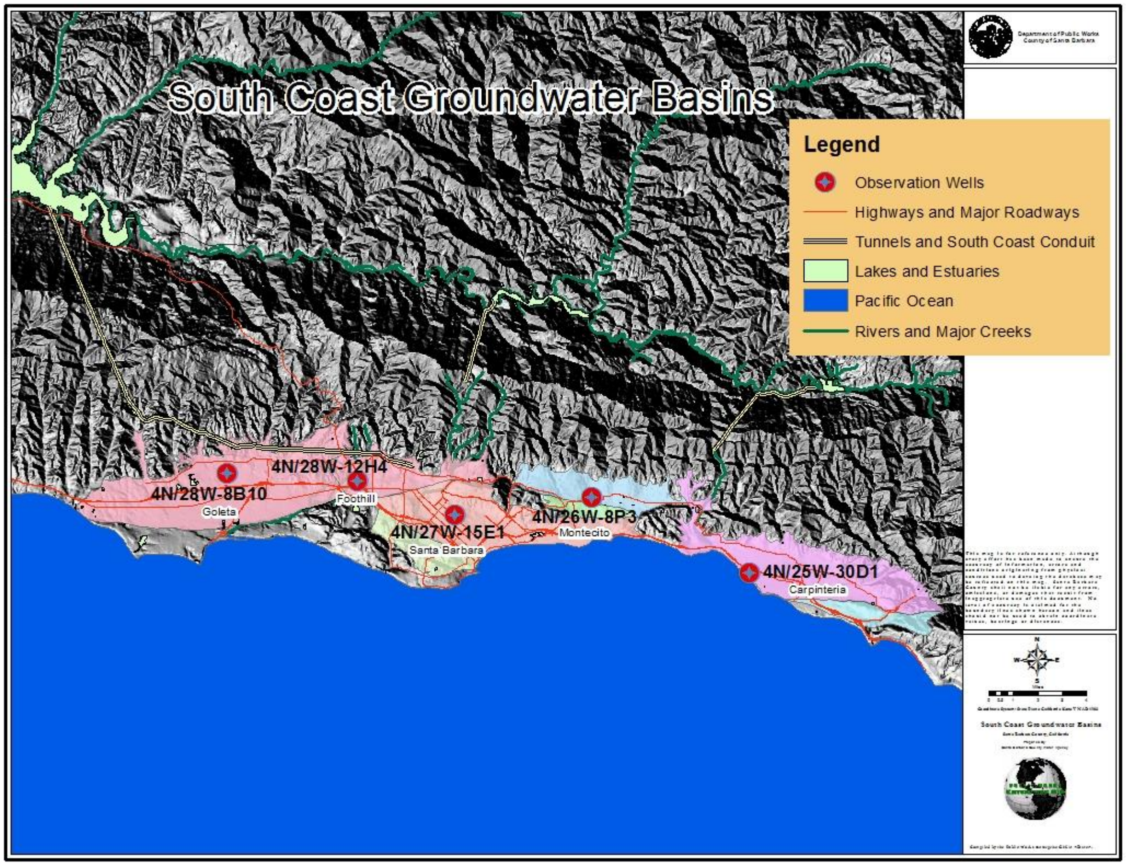
*[1] Other participants include private water companies and overlying property owners*

*[2] The "Wright Suit" Settlement stipulates management actions in the North and Central sub-basins*

*[3] Stipulation Agreement, California Superior Court, County of Santa Clara requres annual reporting on the conditions of the Santa Maria Valley Management Plan*

## *South Coast Groundwater Basins*

**Figure 4:** South Coast Groundwater Basins Map




The major South Coast Groundwater Basins include from East to West: Carpinteria, Montecito, Santa Barbara, Foothill, and the Goleta Groundwater Basins (Figure 4). These are generally comprised of unconsolidated alluvial material located between the Santa Ynez Mountains and the Pacific Ocean. In many cases, the location of the salt water/fresh water interface is unknown making salt water intrusion a concern with lowering water levels or increased pumping along the coast. In some areas such as the west beaches of Santa Barbara, "sentry" wells are monitored for early indication of salt water intrusion. Of note is that the actual boundaries between some of these basins may be inferred or assigned where direct physical evidence is missing. The most recent analyses of these basins show them to be in balance or with a slight surplus over the long term (Table 1).

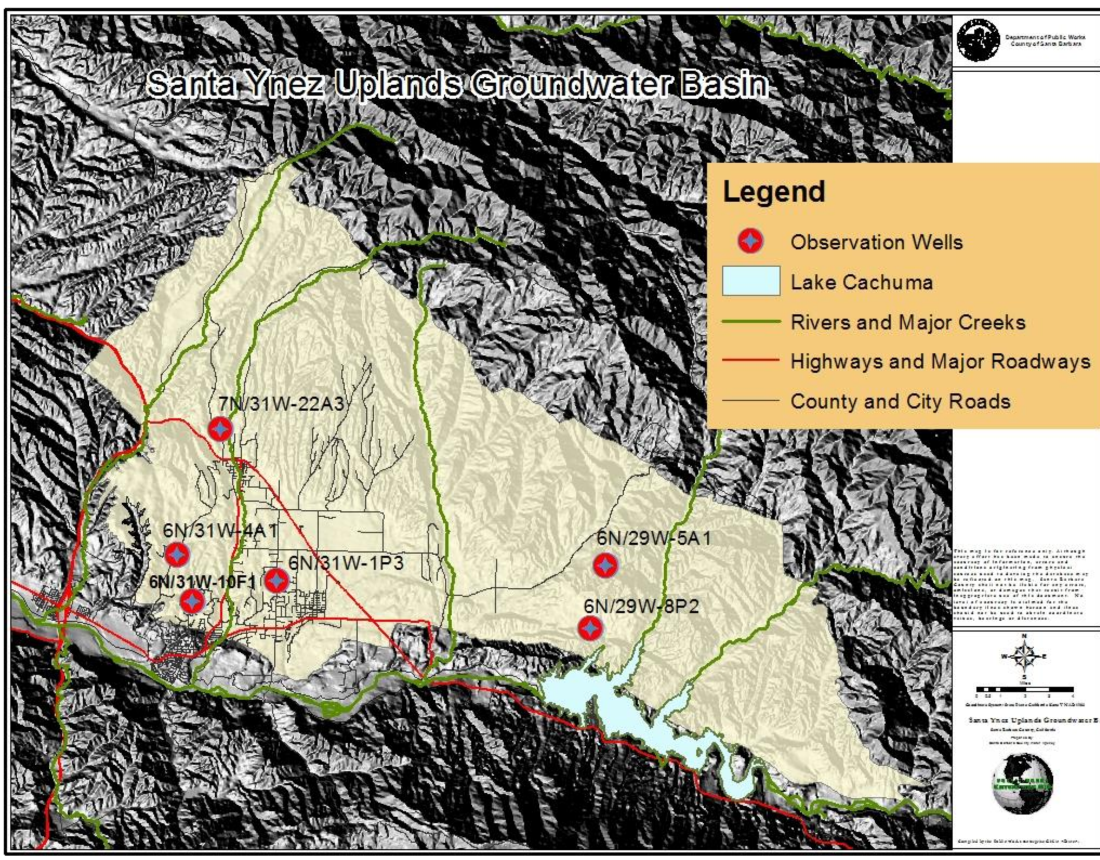
Typical hydrographs from the Carpinteria Basin show lowering of groundwater in the last few years but levels remain well within the highs and lows previously recorded. The hydrograph from the Montecito Basin shows a consistent decline over the period of record (since the early 1960s) and, with the exception of a couple of data points which may not reflect accurate measurements, shows a historic low water elevation. The hydrograph selected for the Santa Barbara Basin shows recent groundwater levels not much lower than previous highs. The

2014 measurement was higher than that of the previous year and nearly equal to that for 2012. A diverse water portfolio and significant control of the basin has allowed the City of Santa Barbara to manage the basin to avoid significant declines since the early 1990s.

Groundwater from the Foothill Basin, located to the Northwest of the City of Santa Barbara, is utilized by the City of Santa Barbara, La Cumbre Mutual Water Company, and private landholders. The Foothill hydrograph shows a pattern similar to that of the Santa Barbara Groundwater Basin of recovery during the 1990s except that water levels have consistently declined since mid-2000 and the 2014 measurement is within a foot or two of the lowest of record. The Goleta Groundwater Basin is one of two adjudicated basins in the County (Wright Vs. Goleta Water District, 1985). As such, there are requirements for its management and water extractions. In general, the hydrograph shows consistent basin recovery beginning in the early 1990s. Water levels have consecutively declined since 2012.

### *Santa Ynez River Watershed Groundwater Basin*

**Figure 5:** Santa Ynez Uplands Groundwater Basin Map

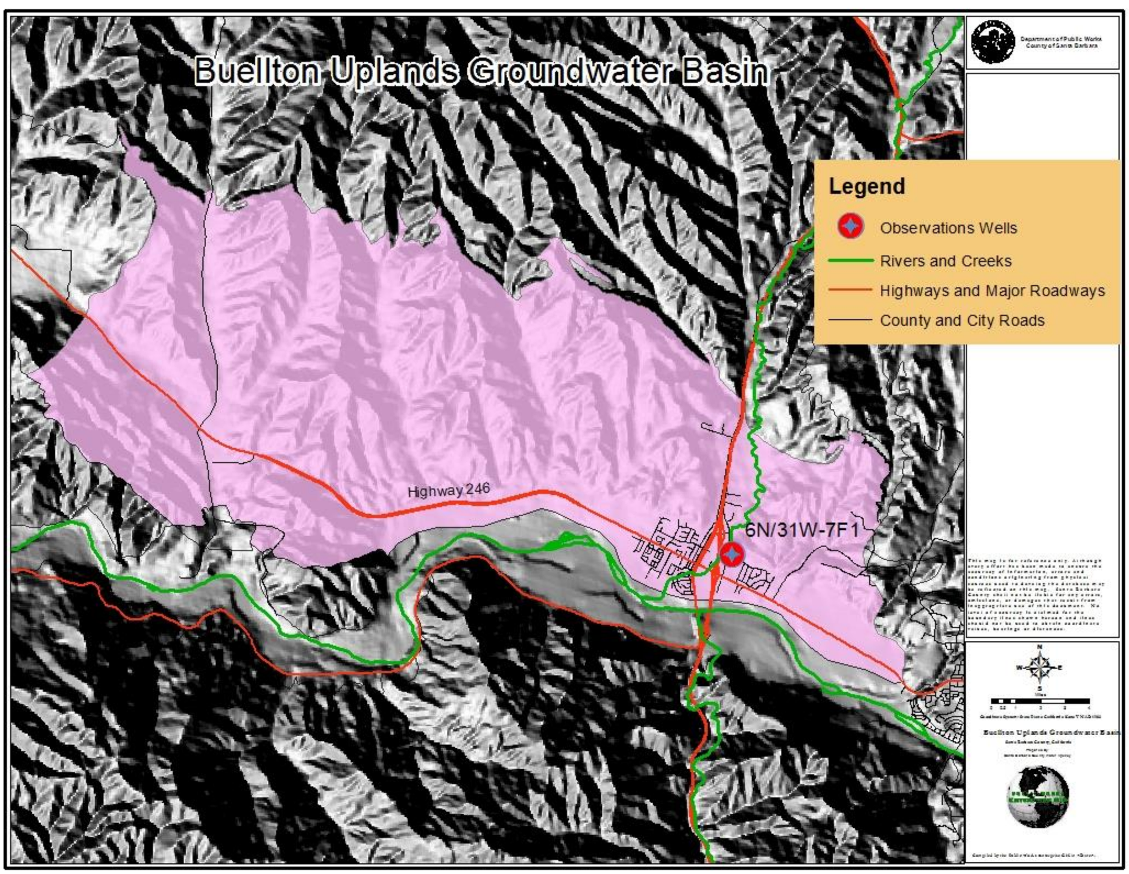



The major groundwater basins within the Santa Ynez River Watershed are, from east to west: Santa Ynez Uplands, Santa Ynez River Alluvial, Buellton Uplands, Lompoc Uplands, Lompoc Plain, and Lompoc Terrace Basins. These basins are adjacent to the Santa Ynez River and lie between the San Rafael Mountains to the North and east and the Santa Ynez Mountains to the South. Each basin is affected to some extent by water rights agreements and Cachuma Reservoir operations. Primary among these is the Water Rights Order 89-18 and the 2000 Biologic Opinion from the National Marine Fisheries Service.

Water use within the Santa Ynez Uplands Groundwater Basin is primarily for agriculture though there is also urban use within portions of the basin supplied by Santa Ynez Water Conservation District ID#1. Appendix A includes two hydrographs from the Santa Ynez Uplands Groundwater Basin which shows water levels above those of historic lows. However, recent lowering of the Chromium 6 standards has led to great concern over the usability of water within the basin.

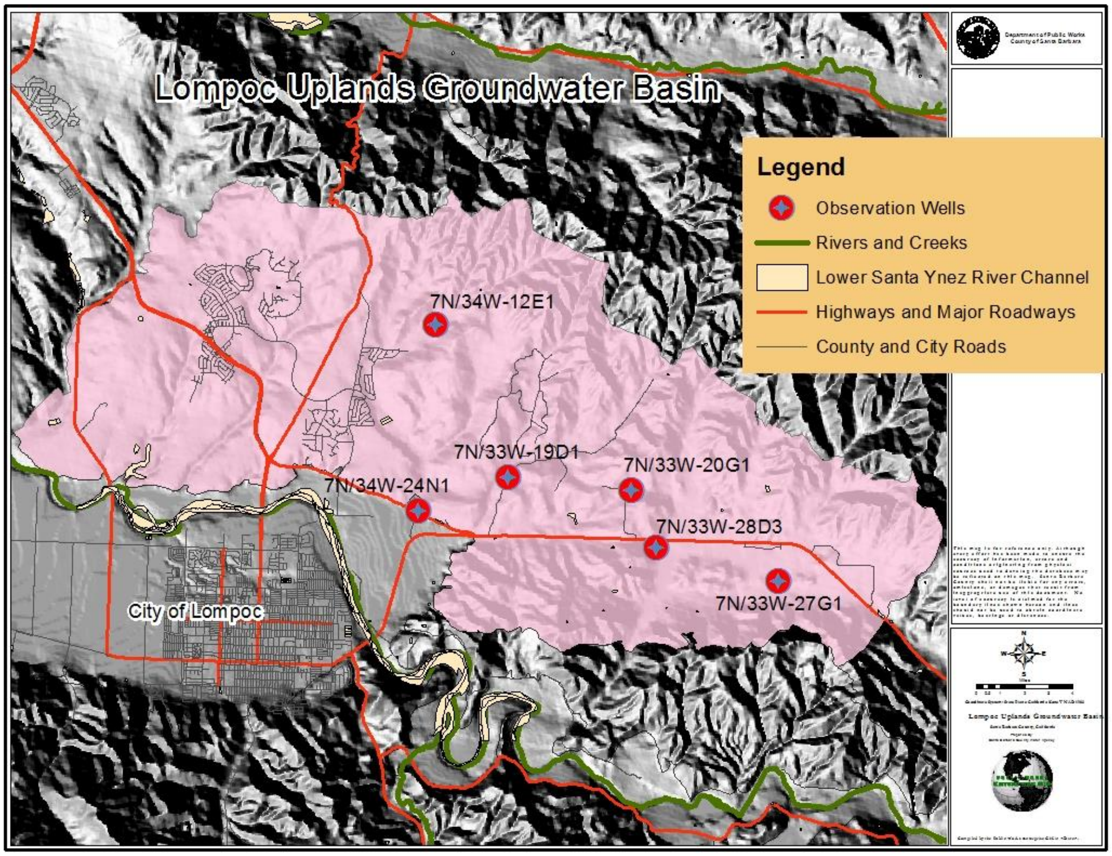
Groundwater within the Santa Ynez River Alluvial Basin is managed in accordance with Water Rights Decision 89-18. Therefore, water levels fluctuate in response to water available according to the Decision. To date, there is still water available for replenishment of the Water Rights account. In past studies, the Buellton Uplands Groundwater Basin was found be in a state of surplus. Sample hydrographs from the Buellton Uplands however show water levels for 2014 that are the lowest of record.

**Figure 6:** Buellton Uplands Groundwater Basin Map



***Lompoc Groundwater Basin***

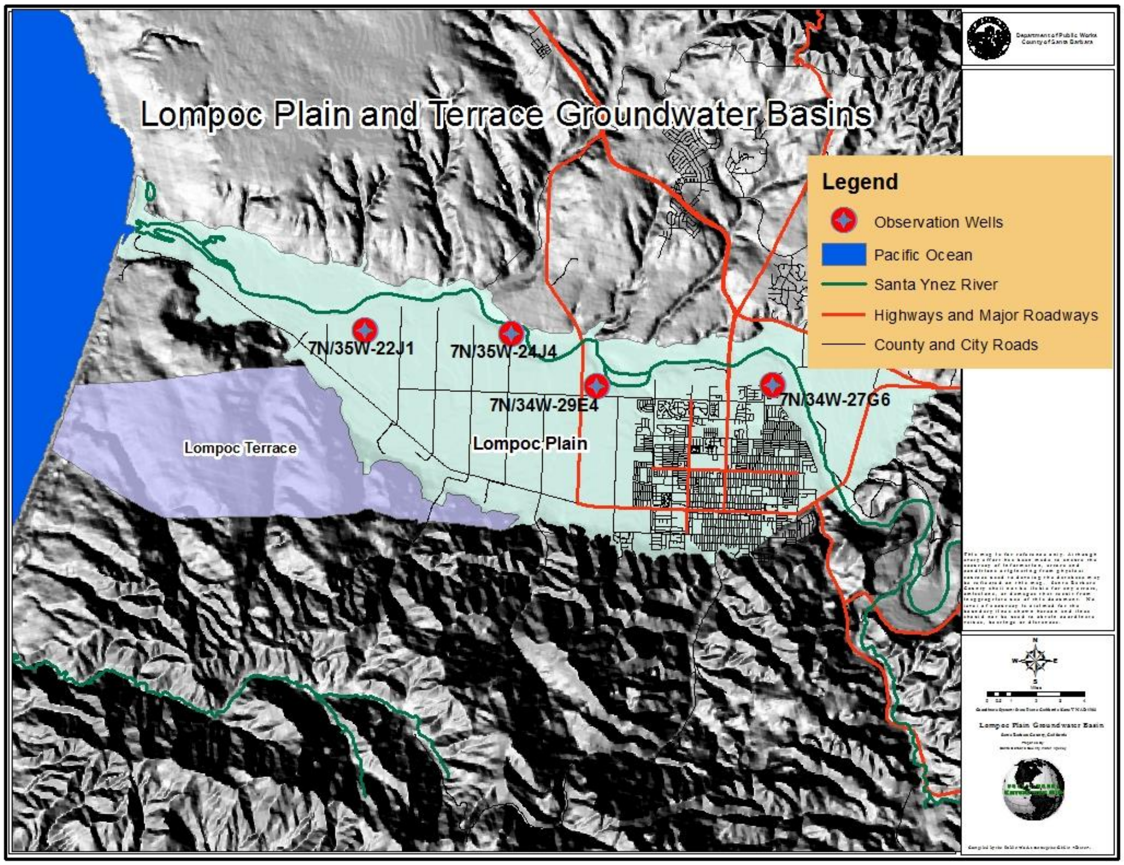
**Figure 7:** Lompoc Uplands Groundwater Basin Map




In Lompoc area basins, many hydrographs show consecutive years of decline in water surface elevation in the last few years. The water elevation in some wells is currently lower than any previously recorded. Groundwater within the Lompoc Plain is managed in accordance with Water Rights Decision 89-18. Therefore, water levels would not be expected to decline in response to climate but in response to the water available according to the Decision. In fact, water levels in wells from the Lompoc Plain are generally not the lowest of record and show only modest declines in recent years most likely due to releases from Cachuma.

Some hydrographs from the Lompoc Uplands Groundwater Basin (including the Santa Rita Sub-area) show 2014 water levels that are the lowest of record. Others not exhibiting this trend have not been pumped for several years due to water quality or other issues.  The Lompoc Uplands Groundwater Basin has been determined to have a long term overdraft of around 900 acre feet per year (AFY).

**Figure 8:** Lompoc Plain and Terrace Groundwater Basin Map



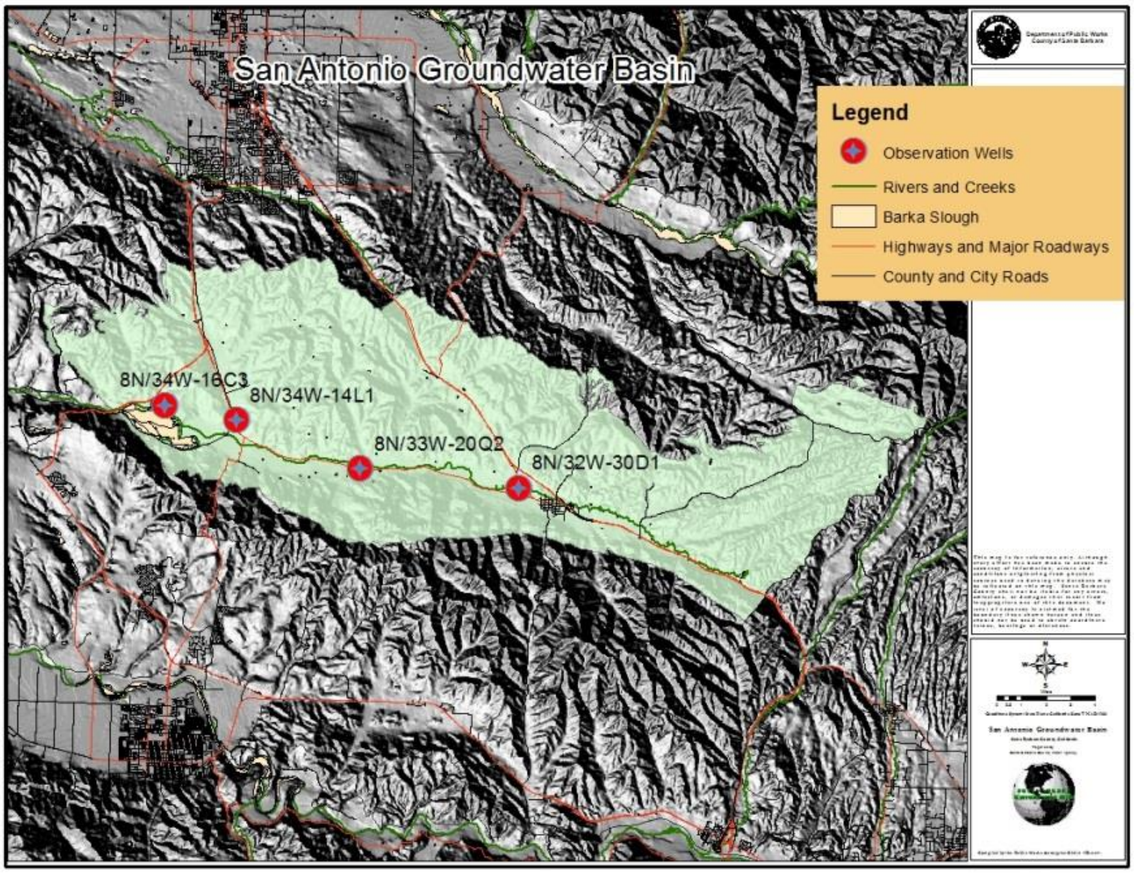

### *San Antonio Valley Groundwater Basin*

The San Antonio Groundwater Basin is located mid County and is about 30 miles in length from east to west. Rock units surfacing at the west end of the basin force water to the surface creating Barka Slough and eliminating the possibility of salt water intrusion into the aquifer. All water used within the San Antonio Valley is from the groundwater basin. Vandenberg Air Force Base (VAFB) uses water from the San Antonio Basin in addition to its State Water allocation to meet the Base's water demand.  The vast majority of water demand within the basin is from agriculture, a major component of which is viticulture. The basin also supplies ranching operations and the urban water demand of the town of Los Alamos.  Historic studies have indicated an overdraft of about 9,500 AFY in the basin (Appendix A and Table 1).

The Water Agency has proposed a detailed study of the San Antonio Basin similar to that conducted in the Cuyama Groundwater Basin and received by the Board of Directors on September 9, 2014. Staff will return to the Board of directors for direction on the San Antonio Study.

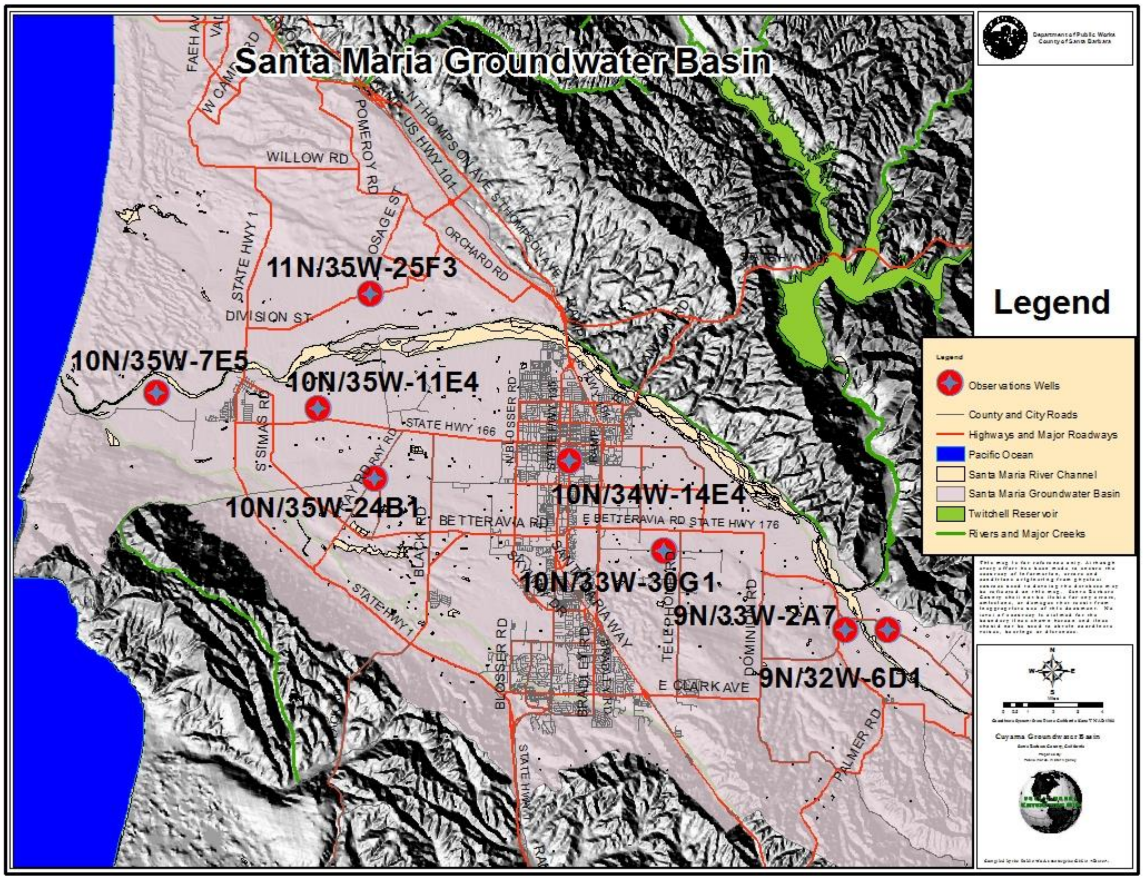
Appendix A includes four hydrographs for the San Antonio Basin. Well Numbers 16C3, 14L1, 20Q2, and 30D1 are located in Barka Slough, Northwest part of the basin, mid basin, and west of Los Alamos, respectively. Although each has a distinct hydrograph, there are some trends in common. For example, the wells tended toward recovery around 1997, the approximate time that State Water became available to VAFB, thereby allowing a reduction in VAFB extractions from the basin. Similarly, the water level has been generally declining during the recent dry years. However, in some cases this is part of a larger period of decline lasting from the mid-2000s.

**Figure 9:** San Antonio Valley Groundwater Basin Map



## *Santa Maria Groundwater Basin*

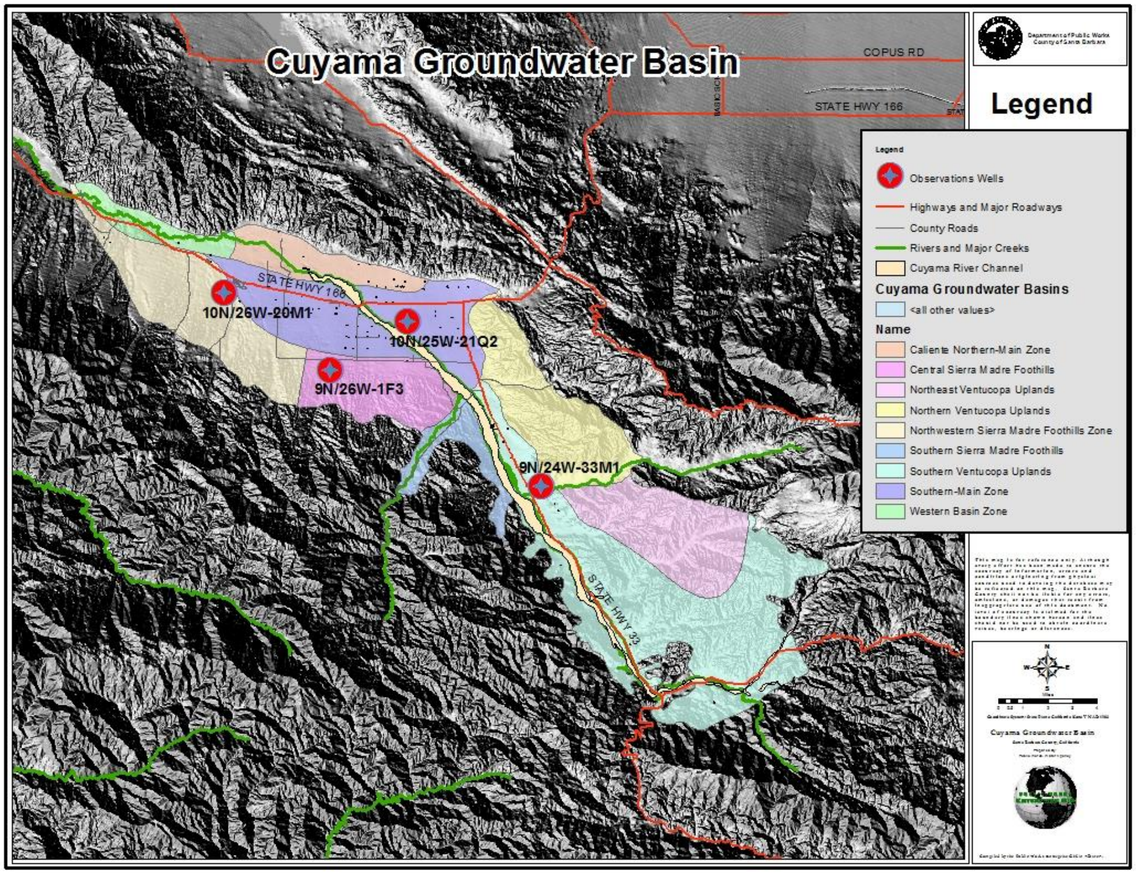
**Figure 10:** Santa Maria Groundwater Basin Map




The Santa Maria Groundwater Basin is one of two adjudicated basins in Santa Barbara County and as such, water management is largely dictated by the courts. All of the hydrographs included in this report for the Santa Maria Groundwater Basin show consecutive declining groundwater levels over the last three dry years and several show groundwater levels that are the lowest of record. Other hydrographs show water levels at their lowest elevations in 1991, at the end of the previous severe drought. The basin is managed and not believed to be in a state of overdraft.

### *Cuyama Valley Groundwater Basin*

**Figure 11:** Cuyama Valley Groundwater Basin Map




The Water Agency has recently completed a detailed study of the Cuyama Valley Groundwater Basin. Therefore, the status of groundwater there is well understood. The study and recent groundwater level measurements show significant groundwater level declines throughout history and over the last three years. In some areas, historical groundwater level declines exceed 400 feet. Three of the four hydrographs included in this report show 2014 groundwater levels to be the lowest of record. The hydrograph not showing this trend is from a well located in a sub-basin in which there is frequent recharge. Long term overdraft within the basin is nearly 30,000 AFY.

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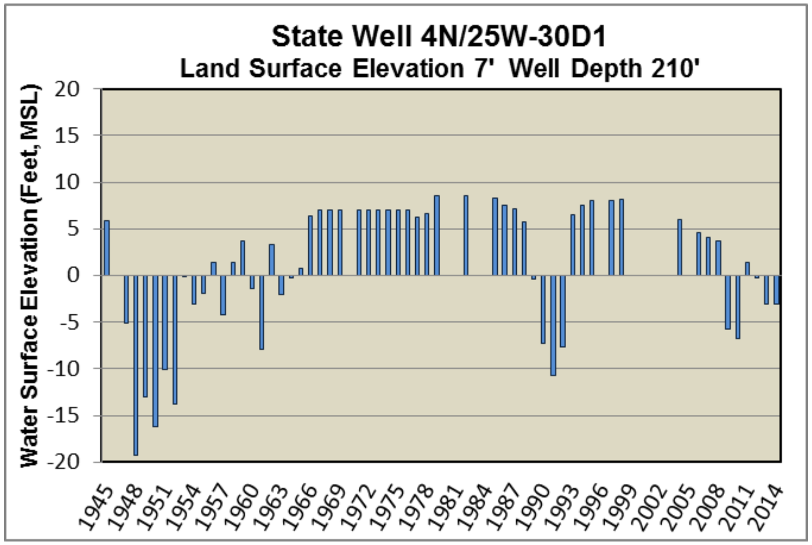
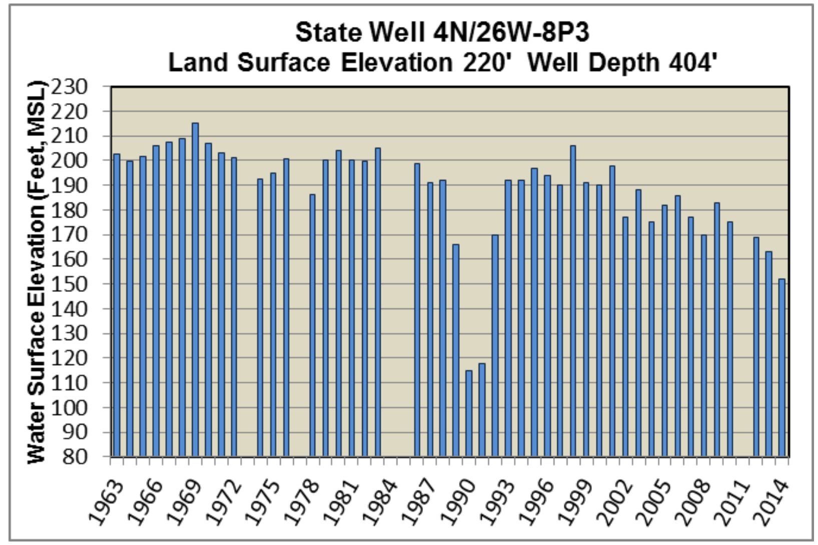
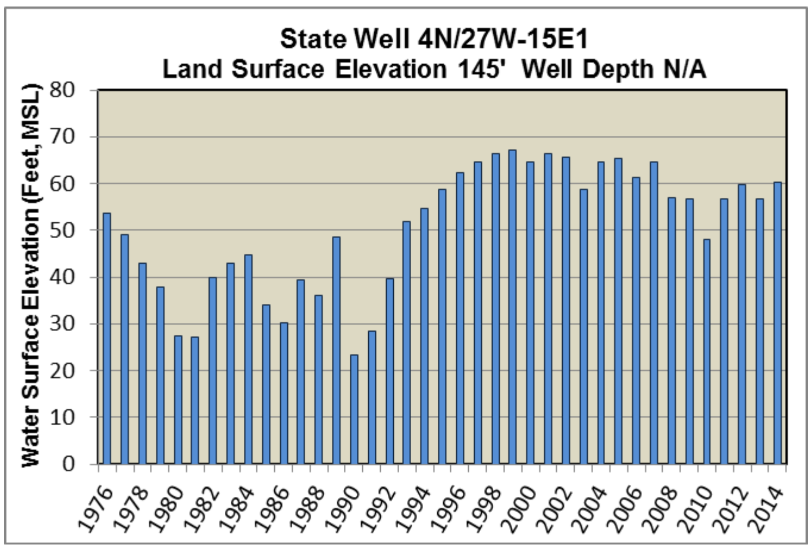
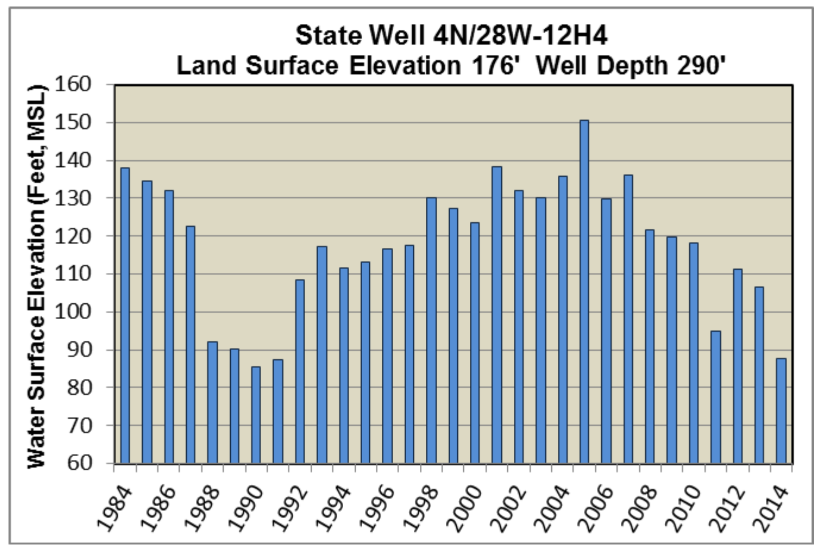
# APPENDIX A

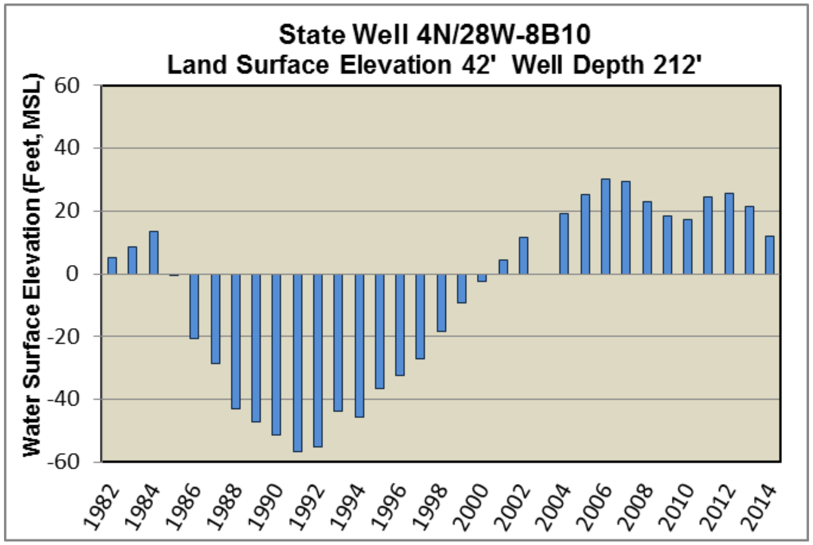
**Figures A1-A5:** South Coast Groundwater Basins Hydrographs



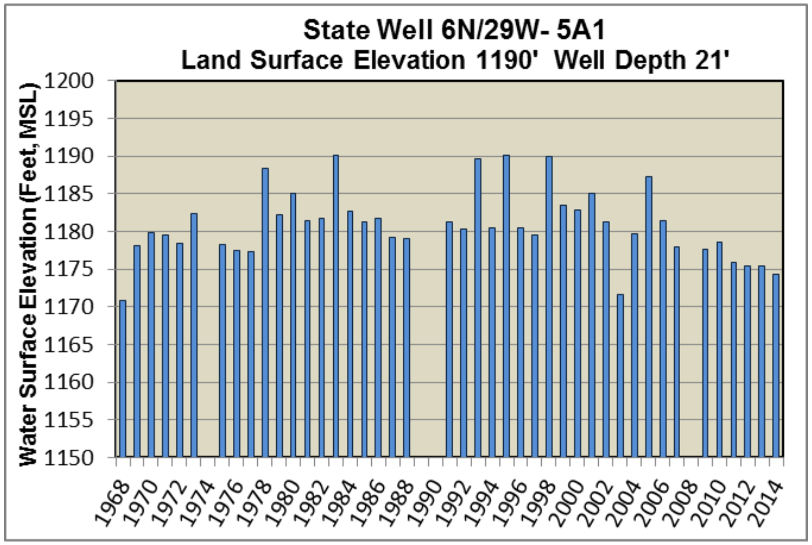



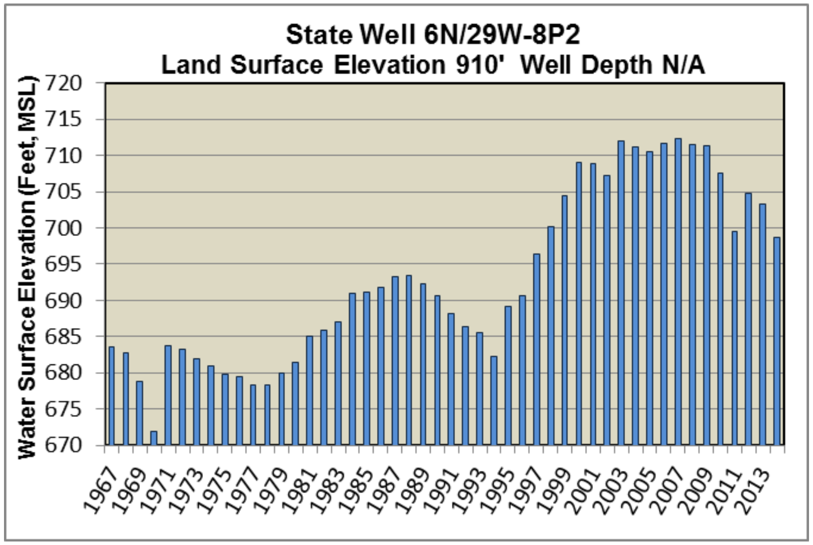



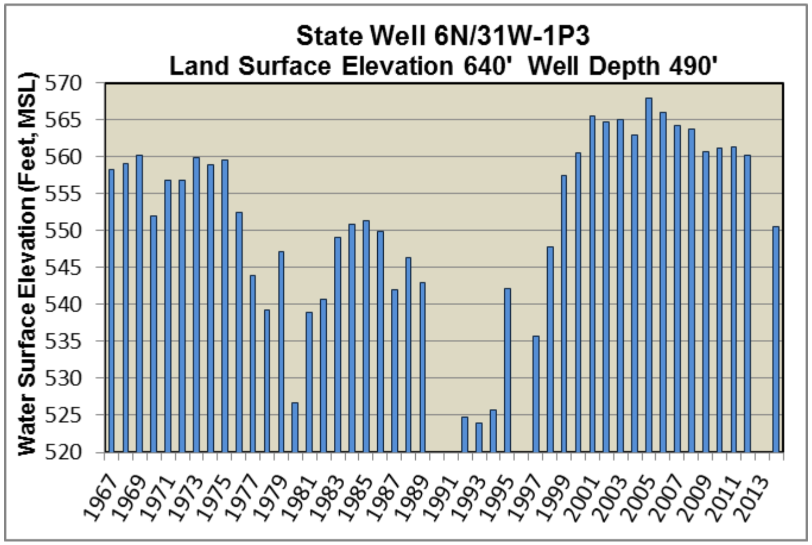



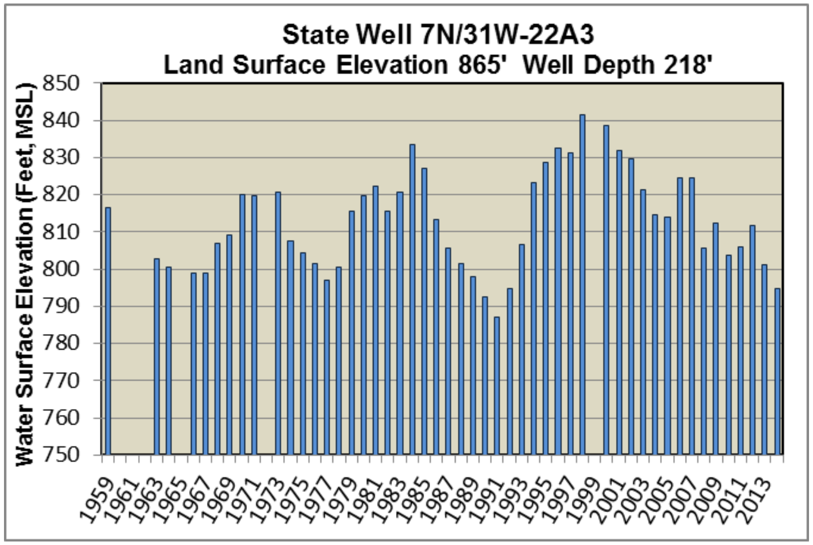

State Well 4N/28W-8B10
Land Surface Elevation 42' Well Depth 212'
Water Surface Elevation (Feet, MSL)
60
40
20
0
-20
-40
-60
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014

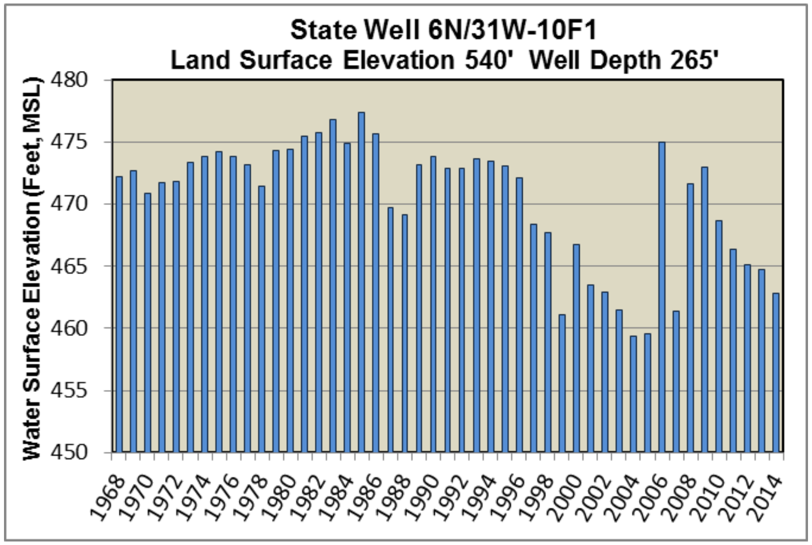
**Figures A6-A12:** Santa Ynez River Watershed Groundwater Basin Hydrographs

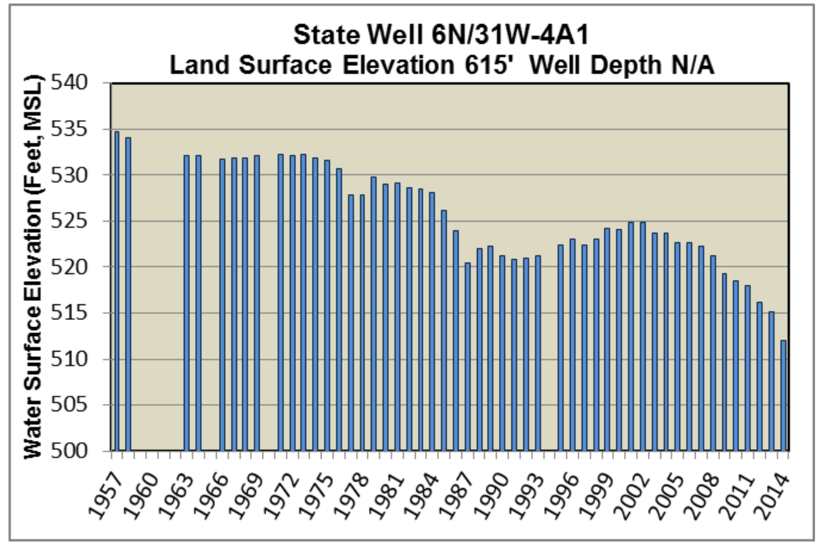


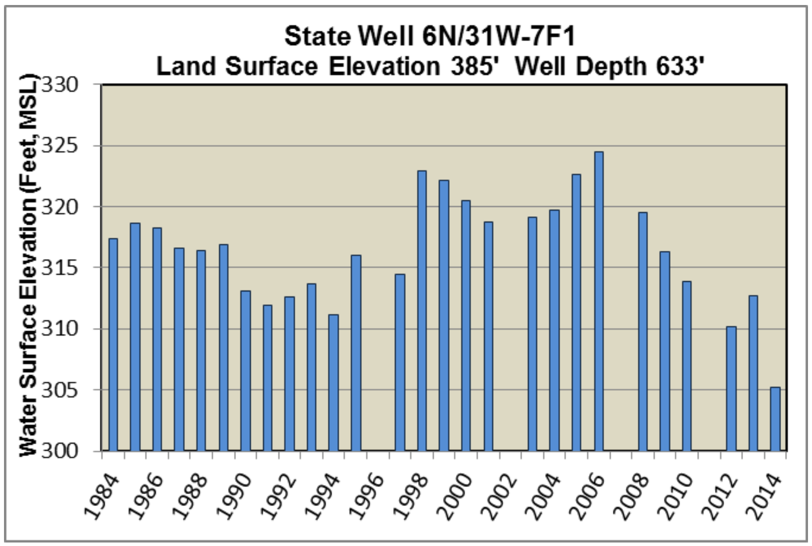



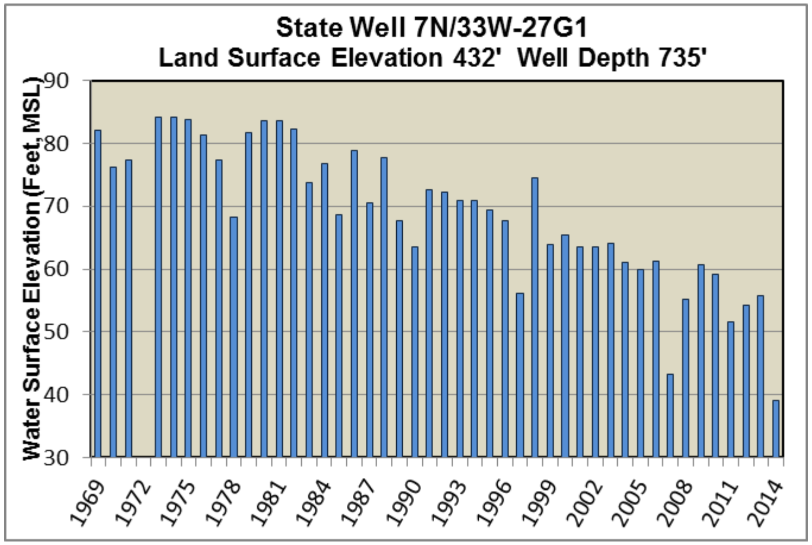



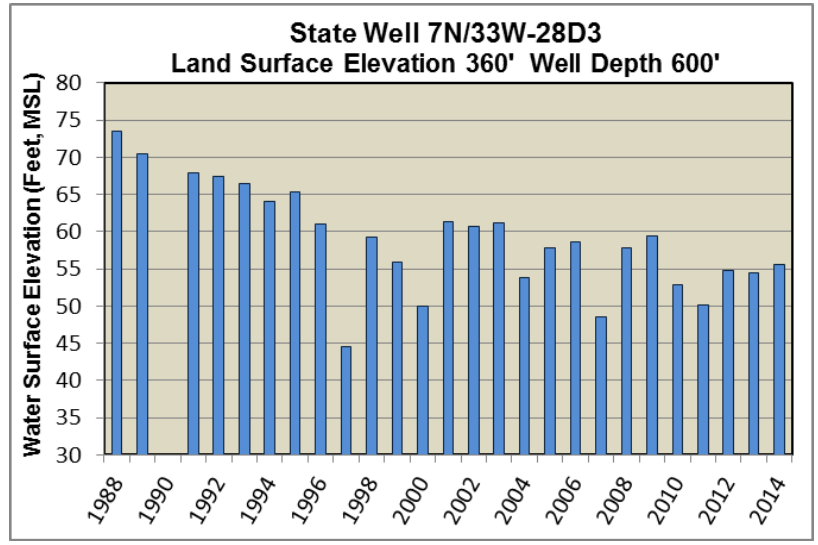

State Well 6N/31W-10F1
Land Surface Elevation 540' Well Depth 265'
Water Surface Elevation (Feet, MSL)
480
475
470
465
460
455
450
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014

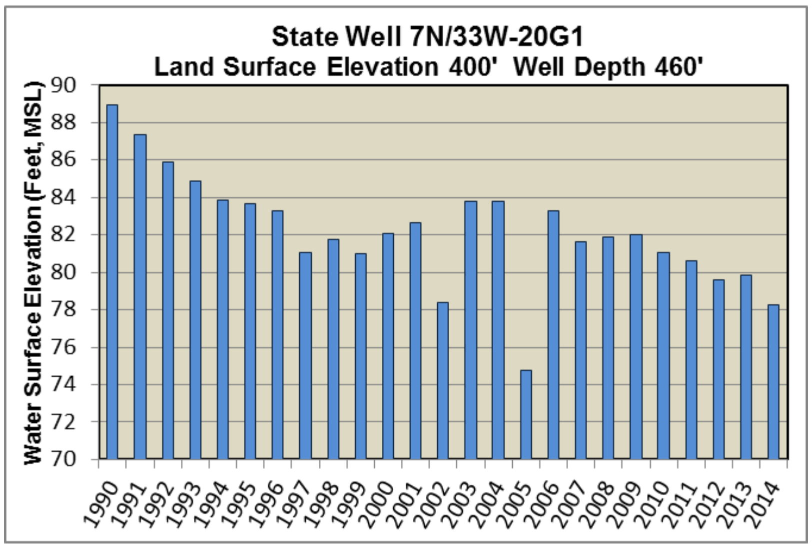

State Well 6N/31W-4A1
Land Surface Elevation 615' Well Depth N/A
Water Surface Elevation (Feet, MSL)
540
535
530
525
520
515
510
505
500
1957
1960
1963
1966
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014

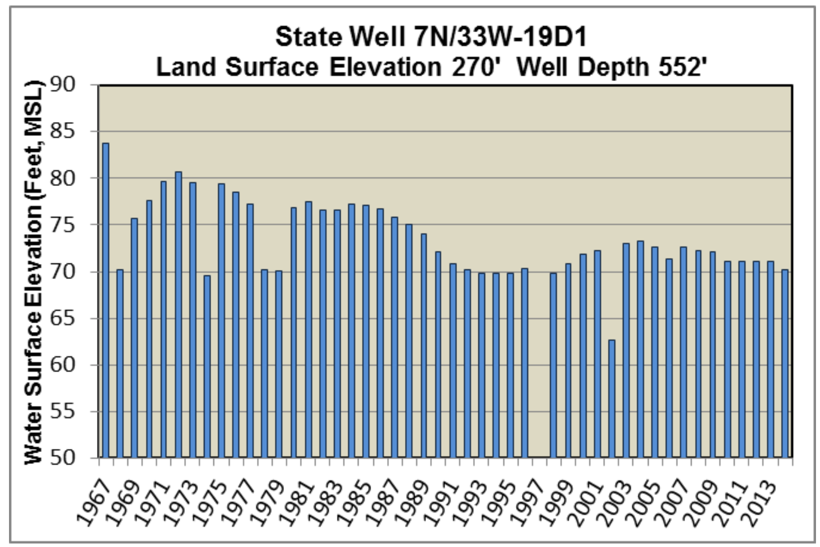

State Well 6N/31W-7F1
Land Surface Elevation 385' Well Depth 633'
Water Surface Elevation (Feet, MSL)
330
325
320
315
310
305
300
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014

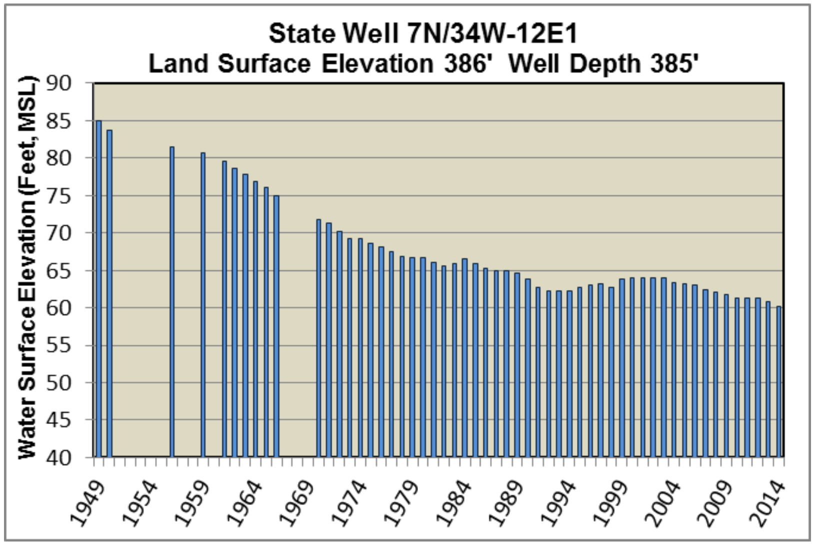
**Figures A13-A23:** Lompoc Groundwater Basin Hydrographs

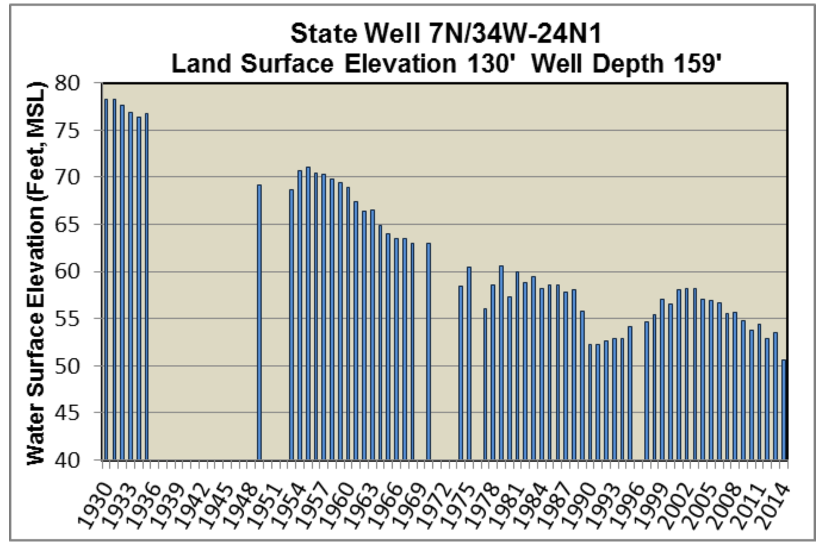


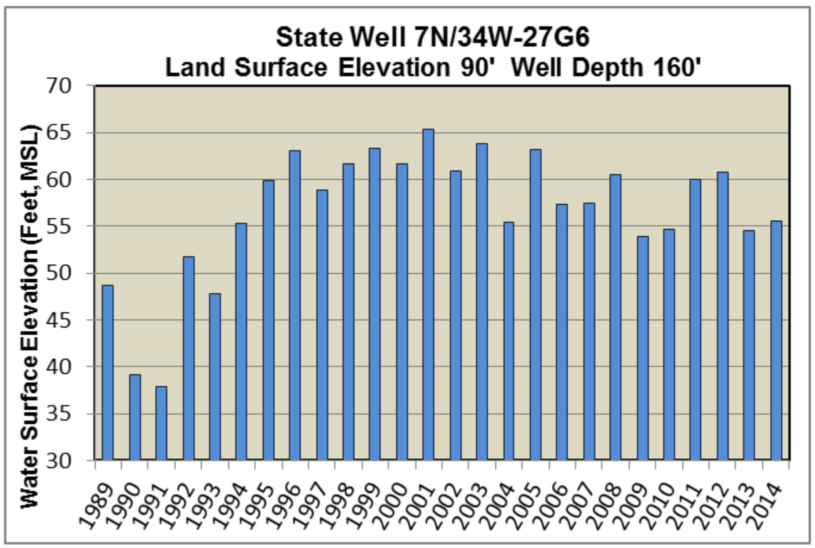



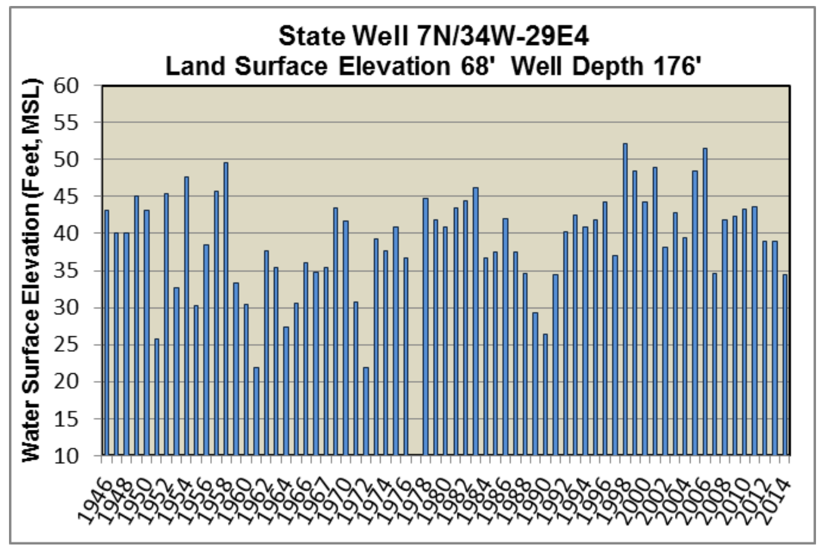



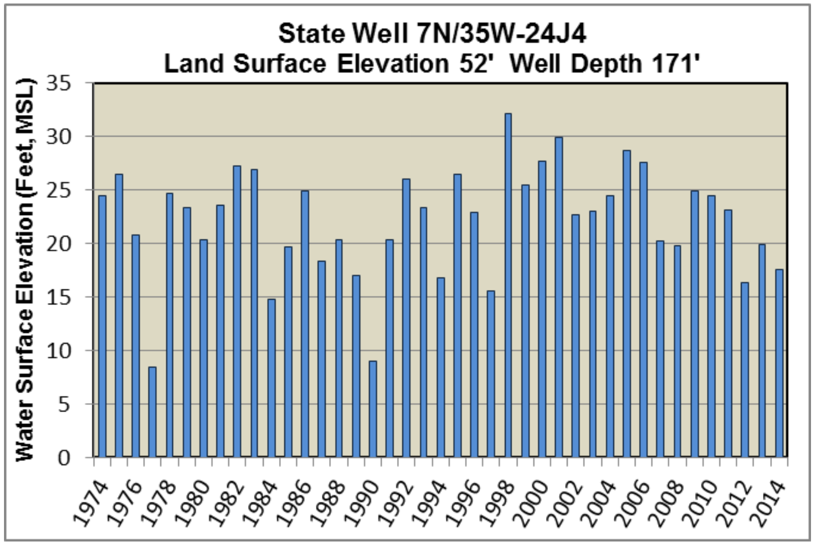



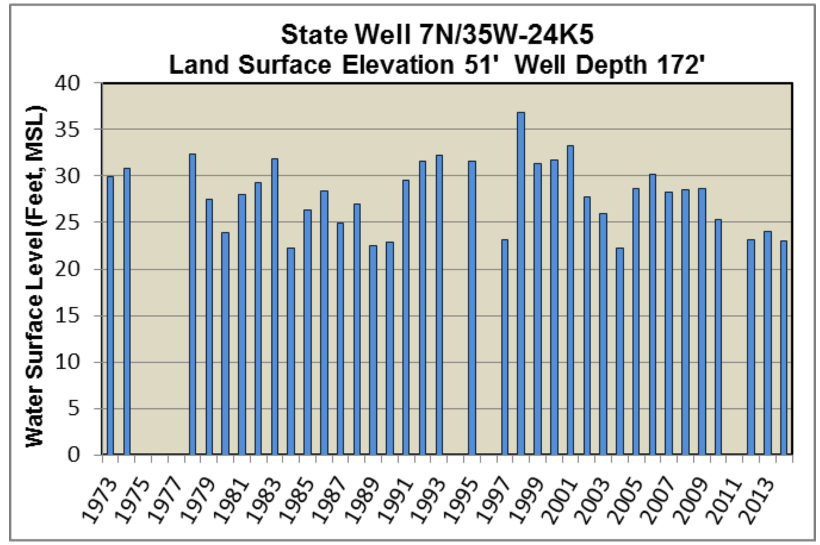

State Well 7N/34W-12E1
Land Surface Elevation 386' Well Depth 385'
Water Surface Elevation (Feet, MSL)
90
85
80
75
70
65
60
55
50
45
40
1949
1954
1959
1964
1969
1974
1979
1984
1989
1994
1999
2004
2009
2014

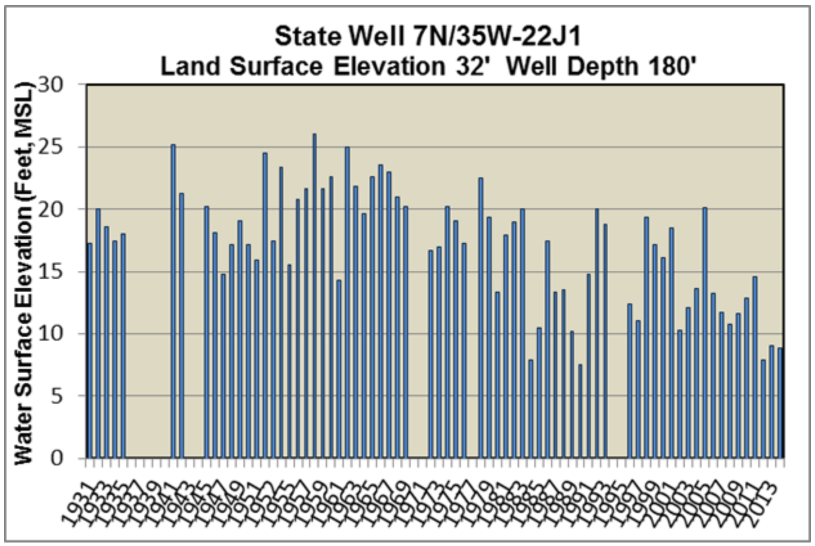

State Well 7N/34W-24N1
Land Surface Elevation 130' Well Depth 159'
Water Surface Elevation (Feet, MSL)
80
75
70
65
60
55
50
45
40


State Well 7N/34W-27G6
Land Surface Elevation 90' Well Depth 160'
Water Surface Elevation (Feet, MSL)
70
65
60
55
50
45
40
35
30
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

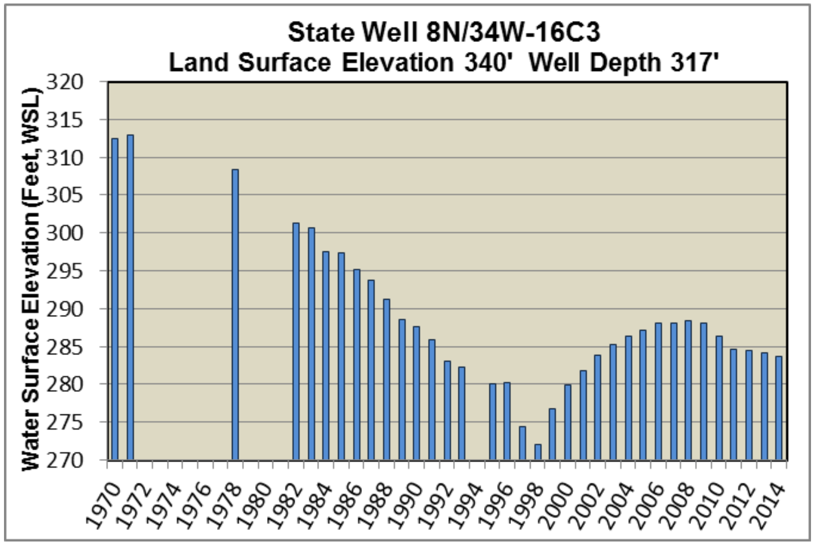

State Well 7N/34W-29E4
Land Surface Elevation 68' Well Depth 176'
Water Surface Elevation (Feet, MSL)
60
55
50
45
40
35
30
25
20
15
10

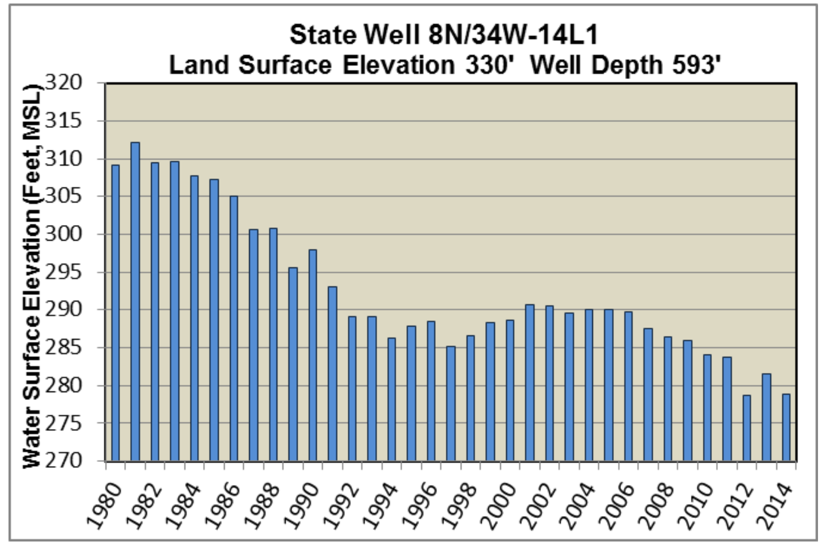

State Well 7N/35W-24J4
Land Surface Elevation 52' Well Depth 171'
Water Surface Elevation (Feet, MSL)
0
5
10
15
20
25
30
35
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014

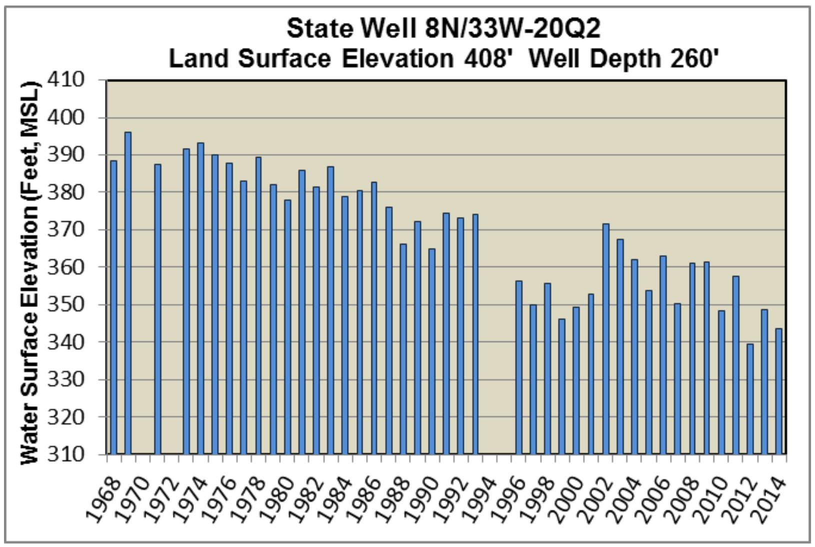

State Well 7N/35W-24K5
Land Surface Elevation 51' Well Depth 172'
Water Surface Level (Feet, MSL)
0
5
10
15
20
25
30
35
40
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013

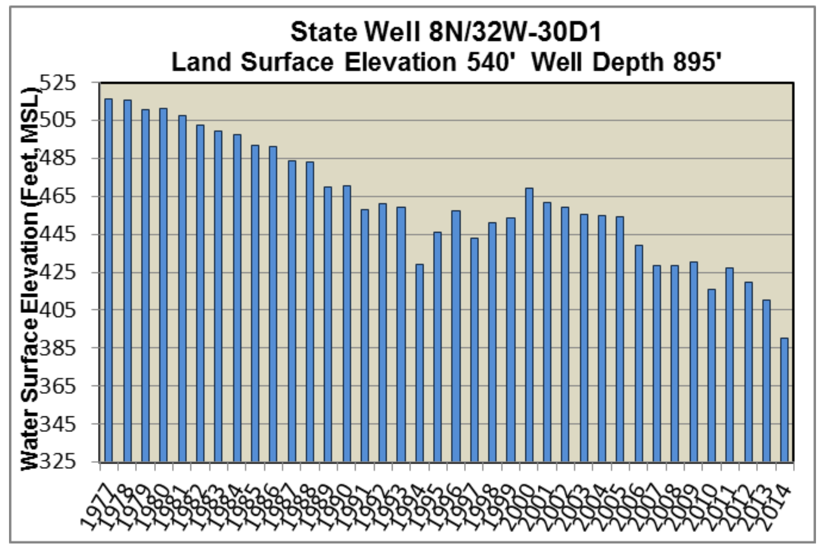

State Well 7N/35W-22J1
Land Surface Elevation 32' Well Depth 180'
Water Surface Elevation (Feet, MSL)
0
5
10
15
20
25
30

**Figures A24-A27:** San Antonio Valley Groundwater Basin Hydrographs

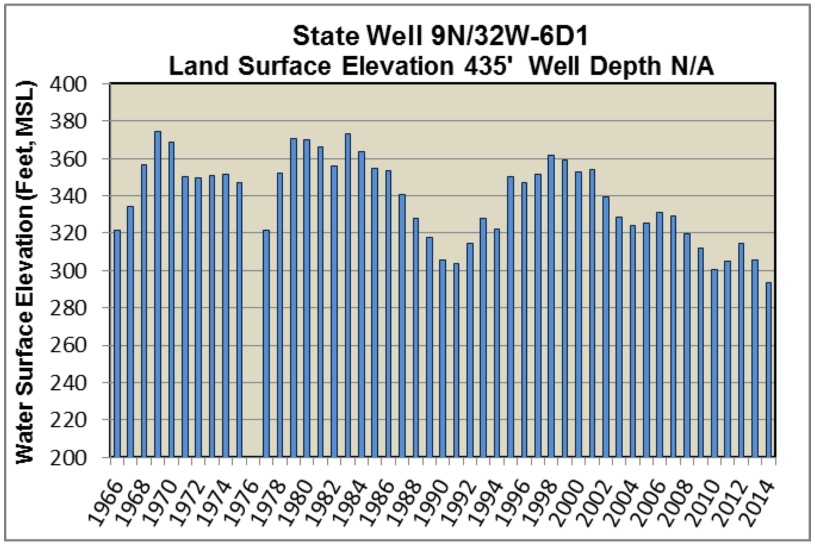


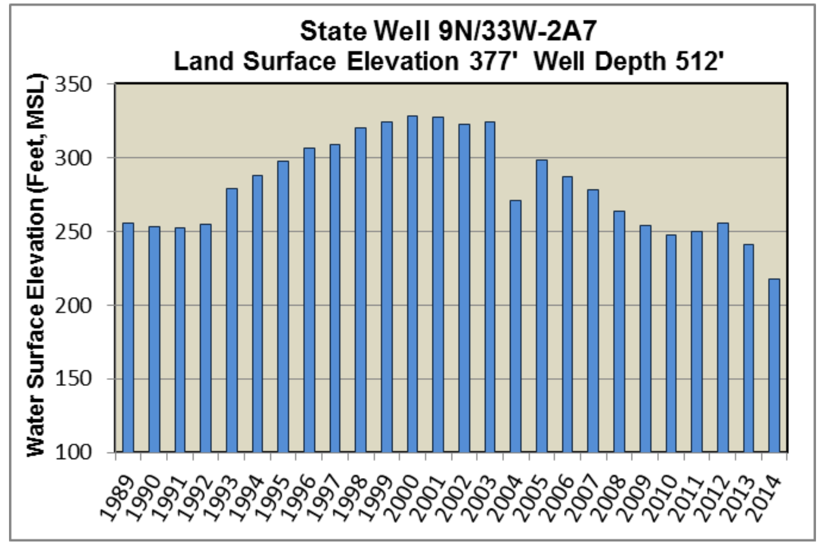



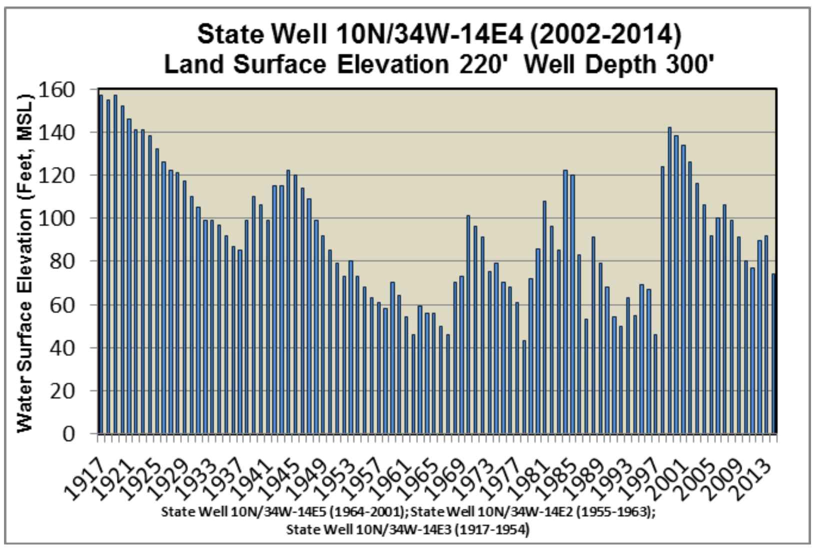



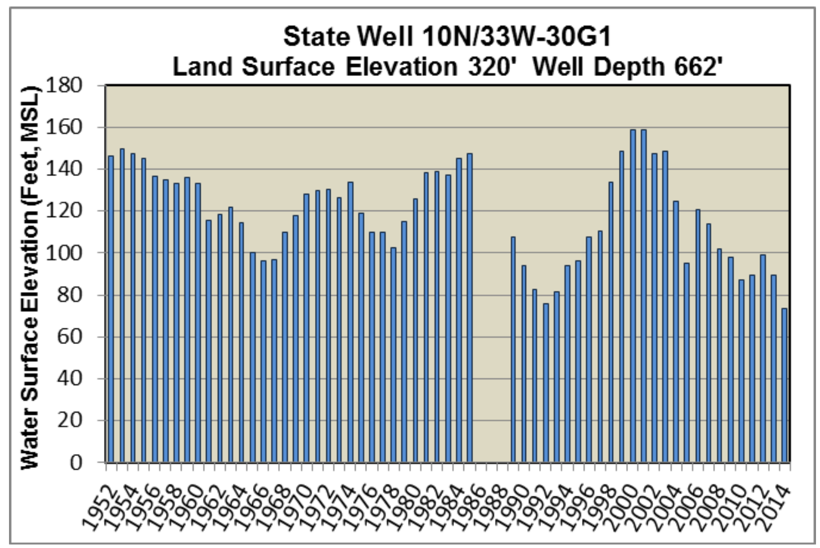



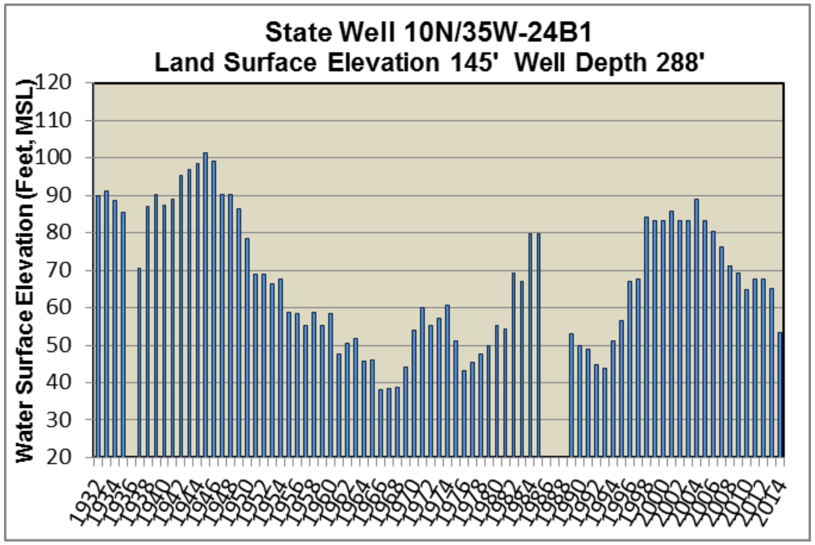
**Figures A28-A35:** Santa Maria Groundwater Basin Hydrographs

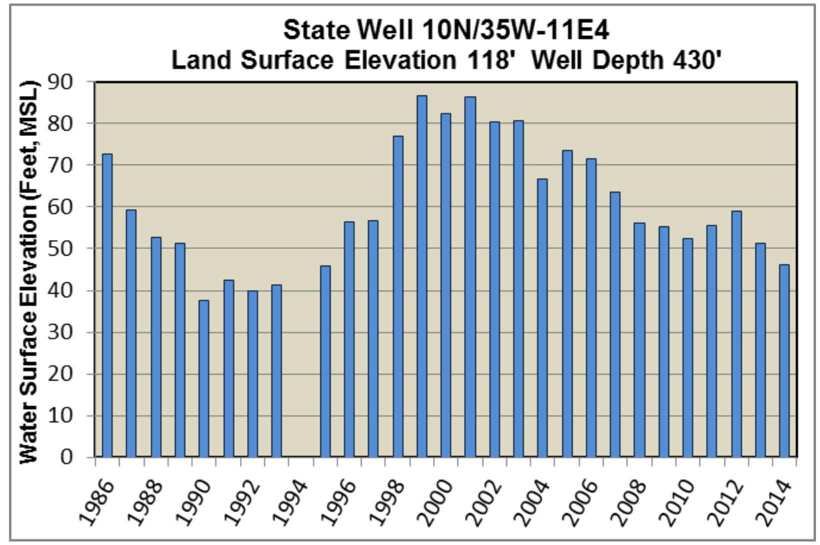


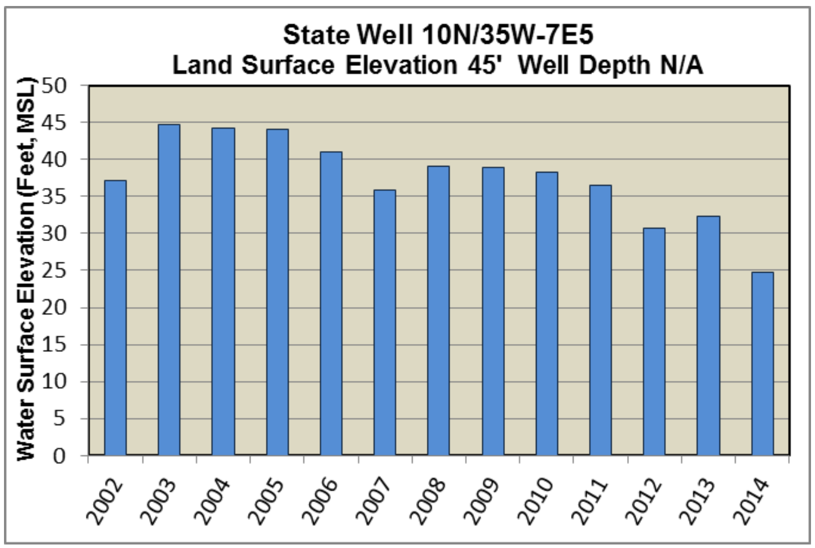



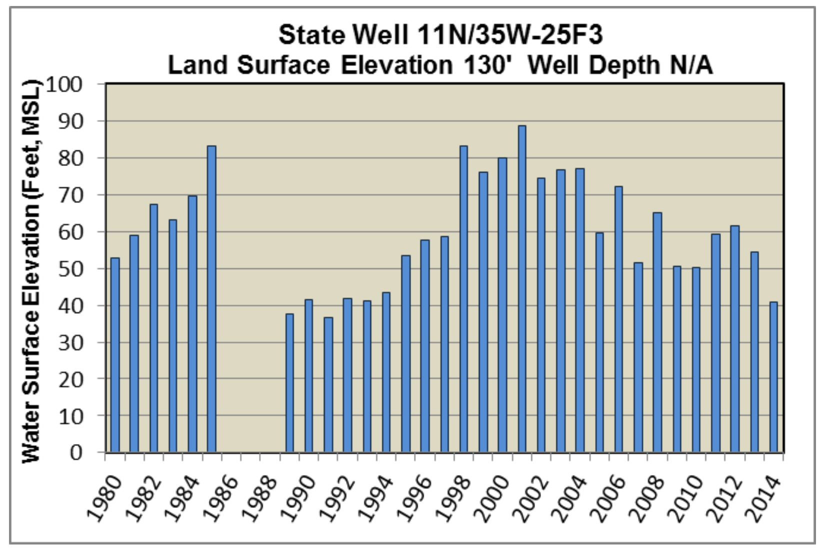



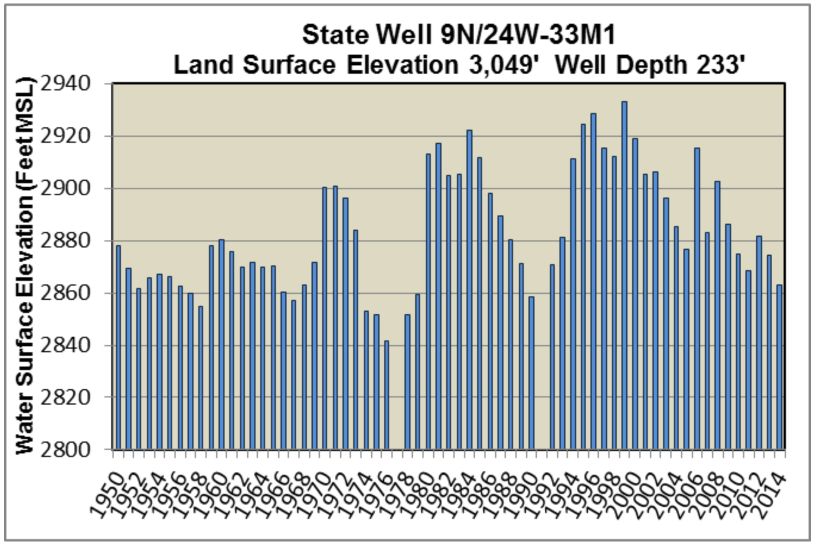

State Well 10N/35W-24B1
Land Surface Elevation 145' Well Depth 288'
Water Surface Elevation (Feet, MSL)
120
110
100
90
80
70
60
50
40
30
20

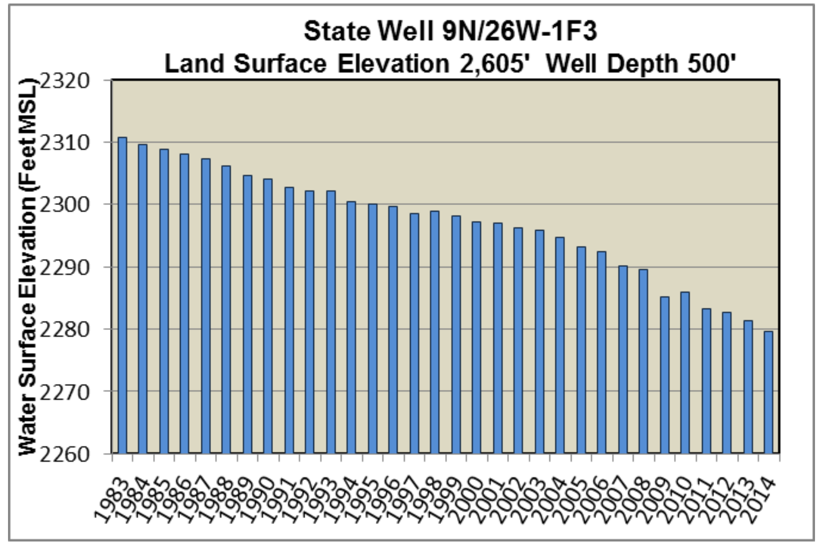

State Well 10N/35W-11E4
Land Surface Elevation 118' Well Depth 430'
Water Surface Elevation (Feet, MSL)
90
80
70
60
50
40
30
20
10
0
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014

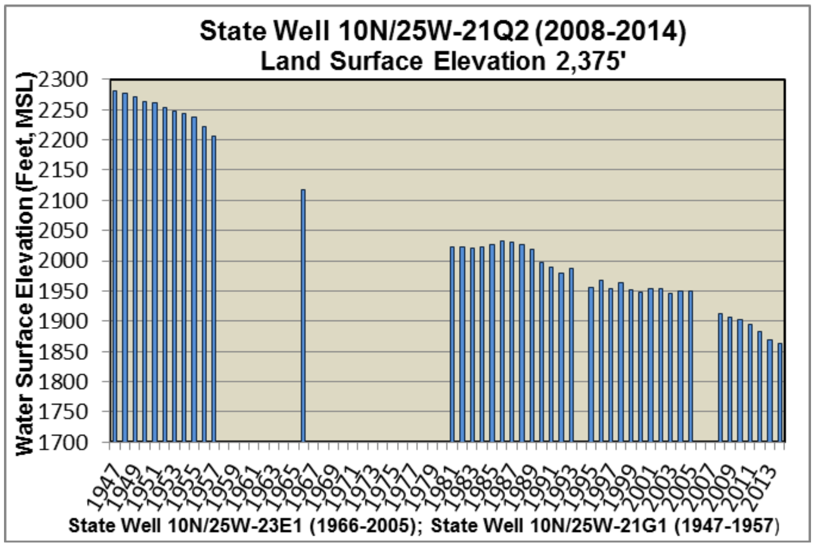

State Well 10N/35W-7E5
Land Surface Elevation 45' Well Depth N/A
Water Surface Elevation (Feet, MSL)
50
45
40
35
30
25
20
15
10
5
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

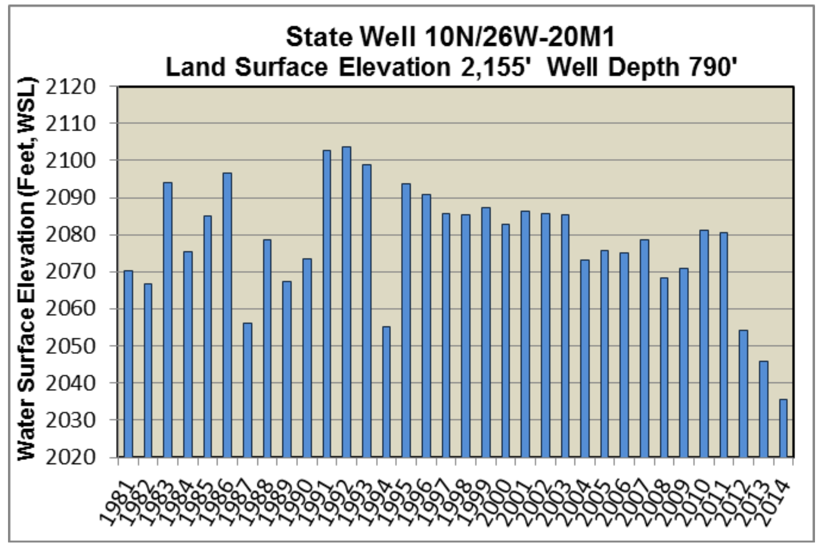

State Well 11N/35W-25F3
Land Surface Elevation 130' Well Depth N/A
Water Surface Elevation (Feet, MSL)
100
90
80
70
60
50
40
30
20
10
0
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014

**Figures A36-A39:** Cuyama Valley Groundwater Basin Hydrographs



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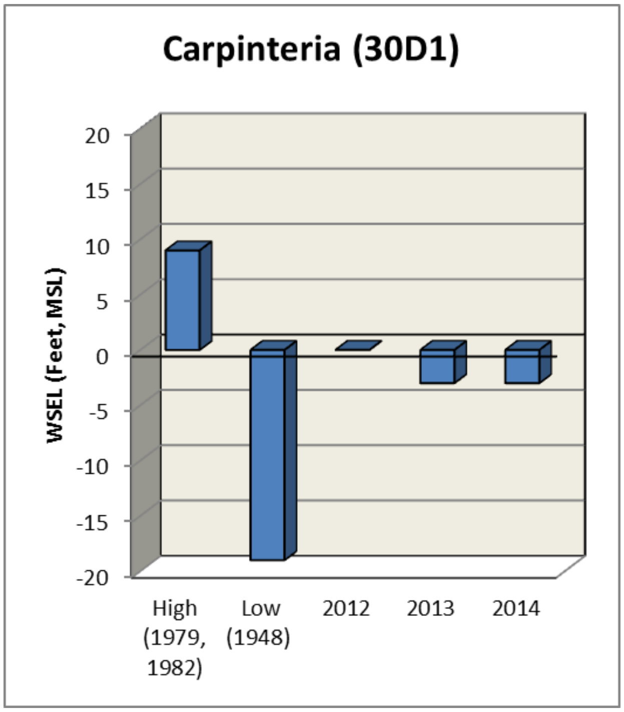
## APPENDIX B

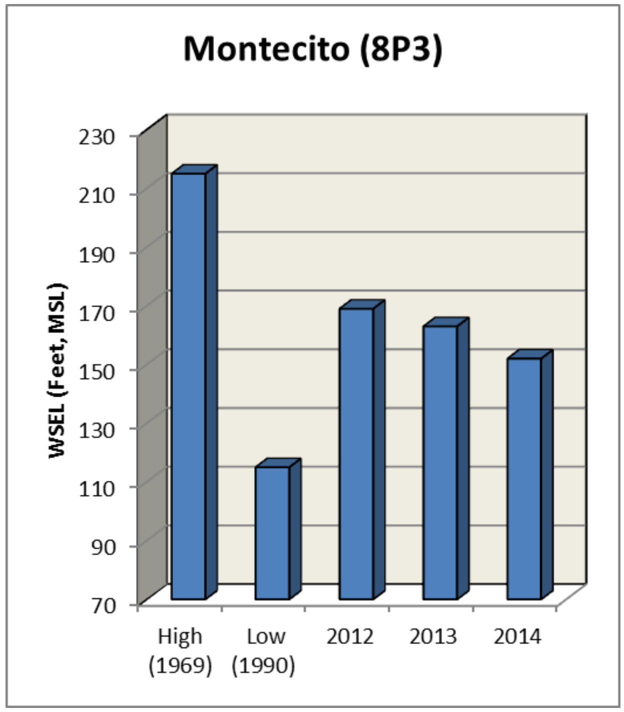
**Table B1:** Historical Water Level Comparison

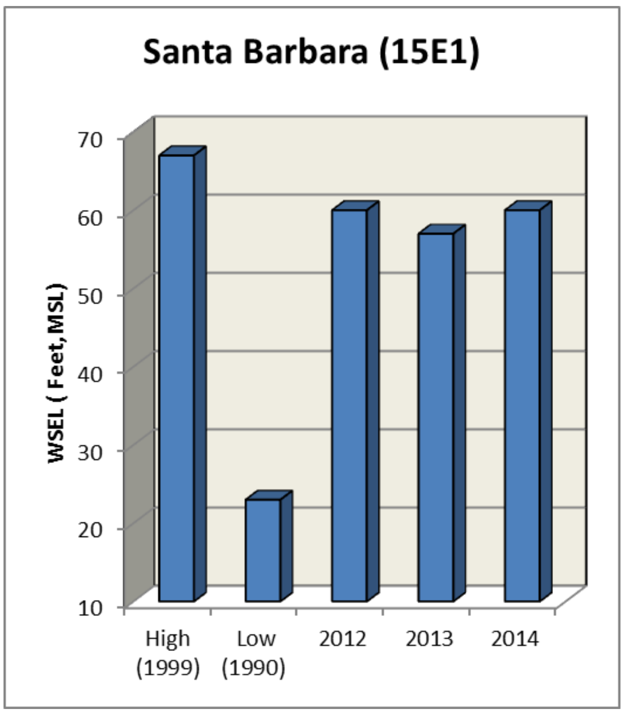
| Basin | Subarea | Well Number | Year of First Record | Historic (Year) High | Historic (Year) Low | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|
| South Coast | Carpinteria | 4N/25W-30D1 | 1945 | 9 (1979, 1982) | -19 (1948) | 0 | -3 | -3 |
| | Montecito | 4N/26W-8P3 | 1963 | 215 (1969) | 115 (1990) | 169 | 163 | 152 |
| | Santa Barbara | 4N/27W-15E1 | 1976 | 67 (1999) | 23 (1990) | 60 | 57 | 60 |
| | Foothill | 4N/28W-12H4 | 1984 | 151 (2005) | 85 (1990) | 111 | 107 | 88 |
| | Goleta | 4N/28W-8B10 | 1982 | 30 (2006) | -57 (1991) | 26 | 21 | 12 |
| Santa Ynez | Santa Ynez Uplands | 6N/29W-5A1 | 1968 | 1190 (1983, 1993, 1995, 1998) | 1171 (1968) | 1175 | 1175 | 1174 |
| | Santa Ynez Uplands | 6N/29W-8P2 | 1967 | 712 (2003, 2006-07) | 672 (1970) | 705 | 703 | 699 |
| | Santa Ynez | 6N/31W-1P3 | 1967 | 568 (2005) | 524 (1993) | 560 | N/A | 551 |
| | Lower Foxen Canyon | 7N/31W-22A3 | 1959 | 841 (1998) | 787 (1991) | 812 | 801 | 795 |
| | Fredenborg Canyon | 6N/31W-10F1 | 1968 | 477 (1983, 1985) | 459 (2004) | 465 | 465 | 463 |
| | Ballard Canyon | 6N/31W-4A1 | 1957 | 535 (1957) | 512 (2014) | 516 | 515 | 512 |
| | Buellton Uplands | 6N/31W-7F1 | 1984 | 325 (2006) | 305 (2014) | 310 | 313 | 305 |
| Lompoc | Santa Rita | 7N/33W-27G1 | 1969 | 84 (1973-75, 1980-81) | 39 (2014) | 54 | 56 | 39 |
| | Santa Rita | 7N/33W-28D3 | 1988 | 74 (1988) | 45 (1997) | 55 | 54 | 56 |
| | Santa Rita / Lompoc Uplands | 7N/33W-20G1 | 1990 | 89 (1990) | 75 (2005) | 80 | 80 | 78 |
| | Lompoc Uplands / Cebada | 7N/33W-19D1 | 1967 | 84 (1967) | 63 (2002) | 71 | 71 | 70 |
| | Lompoc Uplands | 7N/34W-12E1 | 1949 | 85 (1949) | 60 (2014) | 61 | 61 | 60 |
| | Lompoc Uplands | 7N/34W-24N1 | 1930 | 78 (1930-32) | 51 (2014) | 53 | 53 | 51 |

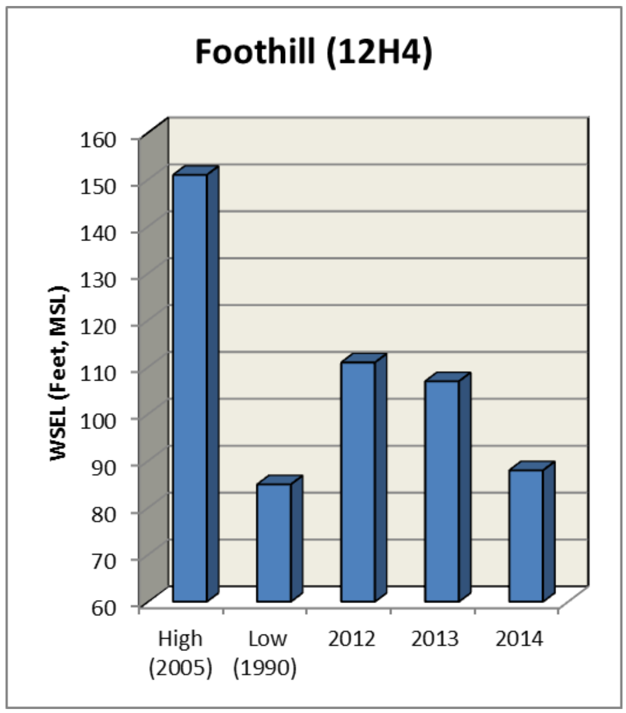
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Lompoc Plain | 7N/34W-27G6 | 1989 | 65 (2001) | 38 (1991) | 61 | 55 | 56 |
| | Lompoc Plain | 7N/34W-29E4 | 1946 | 52 (1998) | 22 (1961, 1972) | 39 | 39 | 34 |
| | Lompoc Plain | 7N/35W-24J4 | 1974 | 32 (1998) | 8 (1977) | 16 | 20 | 18 |
| | W. Lompoc Plain | 7N/35W-22J1 | 1931 | 26 (1958) | 8 (1984, 1990, 2012) | 8 | 9 | 9 |
| **San Antonio** | Barka Slough | 8N/34W-16C3 | 1970 | 313 (1970-71) | 272 (1978) | 285 | 284 | 284 |
| | Lower Harris Canyon | 8N/34W-14L1 | 1980 | 312 (1981) | 279 (2012, 2014) | 279 | 281 | 279 |
| | Mid San Antonio | 8N/33W-20Q2 | 1968 | 396 (1969) | 339 (2012) | 339 | 349 | 344 |
| | W. of Los Alamos | 8N/32W-30D1 | 1977 | 516 (1977) | 390 (2014) | 420 | 410 | 390 |
| **Santa Maria** | Santa Maria Mesa | 9N/32W-6D1 | 1966 | 374 (1969) | 303 (1991) | 315 | 306 | 294 |
| | Garey | 9N/33W-2A7 | 1989 | 328 (2000-01) | 217 (2014) | 255 | 241 | 217 |
| | Santa Maria Central | 10N/34W-14E4 (E5, E2, E3) | 1917 | 157 (1917, 1919) | 43 (1978) | 90 | 92 | 74 |
| | SM Central / Orcutt Uplands Transition | 10N/33W-30G1 | 1952 | 159 (2000-01) | 74 (2014) | 99 | 89 | 74 |
| | Lower Orcutt Creek | 10N/35W-24B1 | 1932 | 101 (1945) | 38 (1966-67) | 68 | 65 | 53 |
| | Santa Maria Western | 10N/35W-11E4 | 1986 | 87 (1999) | 37 (1990) | 59 | 51 | 46 |
| | Guadalupe West | 10N/35W-7E5 | 2002 | 45 (2003) | 25 (2014) | 31 | 32 | 25 |
| | Oso Flaco | 11N/35W-25F3 | 1980 | 89 (2001) | 37 (1991) | 62 | 54 | 41 |
| **Cuyama** | Ventucopa Uplands | 9N/24W-33M1 | 1950 | 2933 (1999) | 2842 (1976) | 2882 | 2874 | 2863 |
| | Sierra Madre Foothills | 9N/26W-1F3 | 1983 | 2311 (1983) | 2280 (2014) | 2283 | 2281 | 2280 |
| | Main Zone | 10N/25W-21Q2 (23E1, 21G1) | 1947 | 2281 (1947) | 1863 (2014) | 1883 | 1869 | 1863 |
| | Sierra Madre Foothills Main Zone Transition | 10N/26W-20M1 | 1981 | 2104 (1992) | 2036 (2014) | 2054 | 2046 | 2036 |

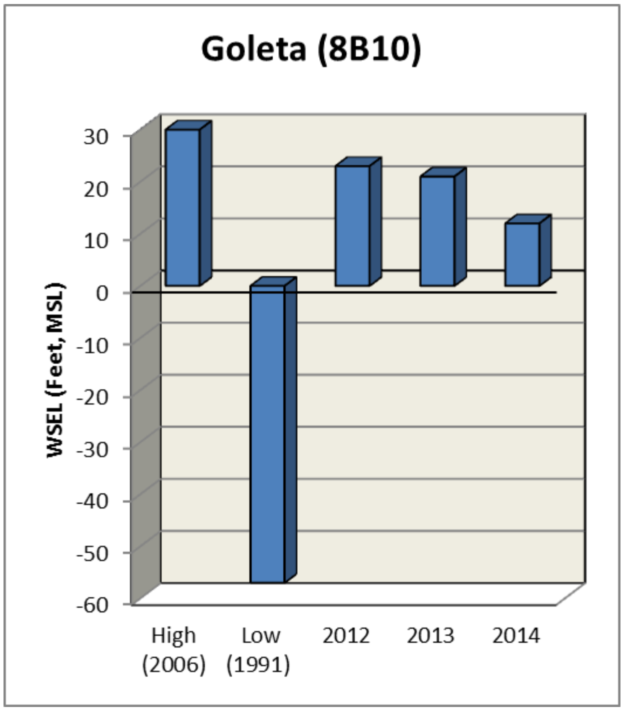
**Figures B1-B5:** South Coast Groundwater Basins Level Comparison



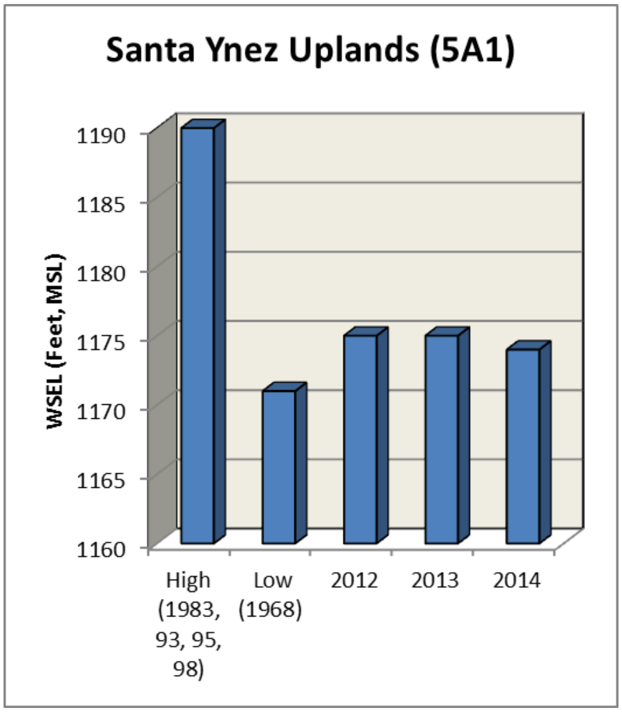



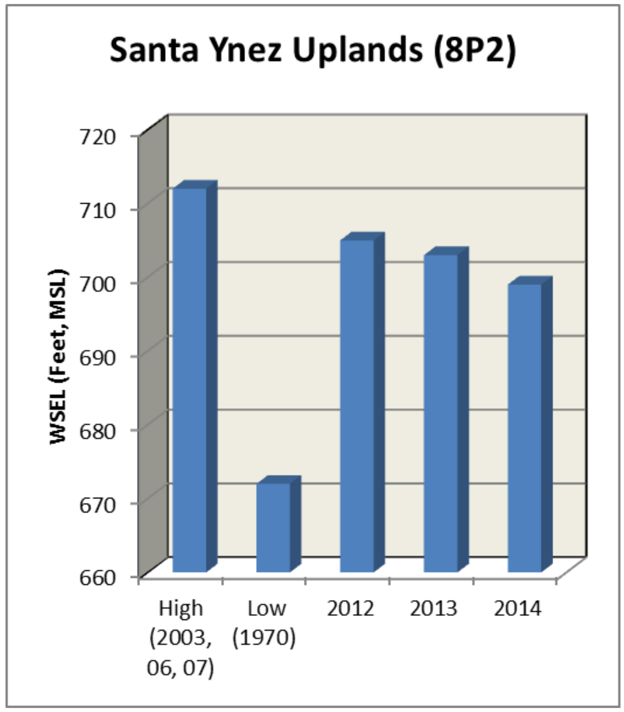



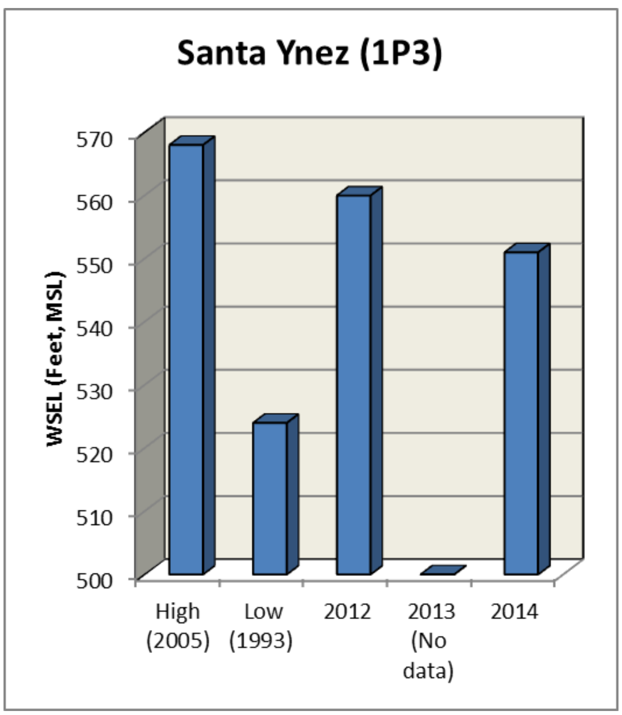


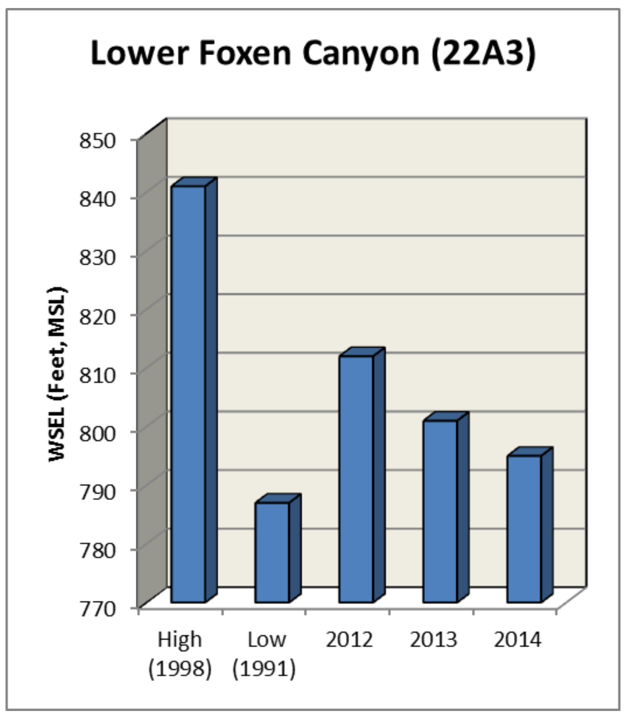
Goleta (8B10)
30
20
10
0
-10
-20
-30
-40
-50
-60
WSEL (Feet, MSL)
High (2006)
Low (1991)
2012
2013
2014

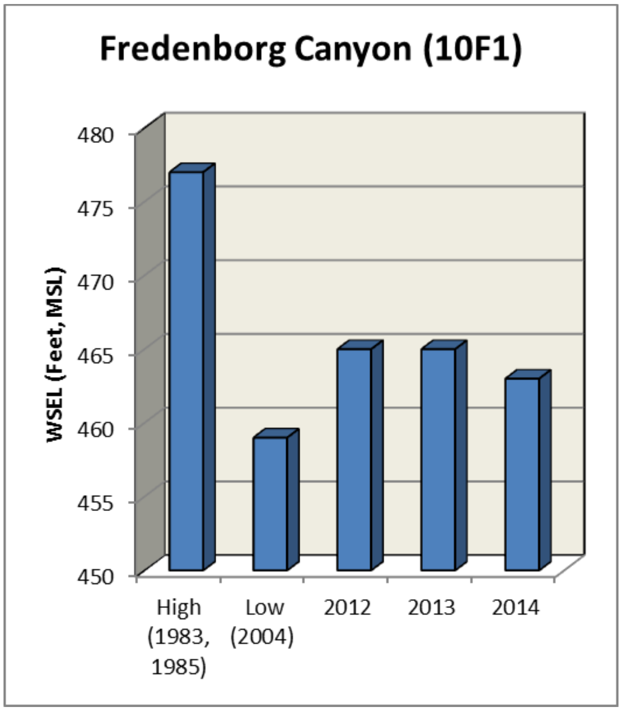
**Figures B6-B12:** Santa Ynez River Watershed Groundwater Basin Level Comparison

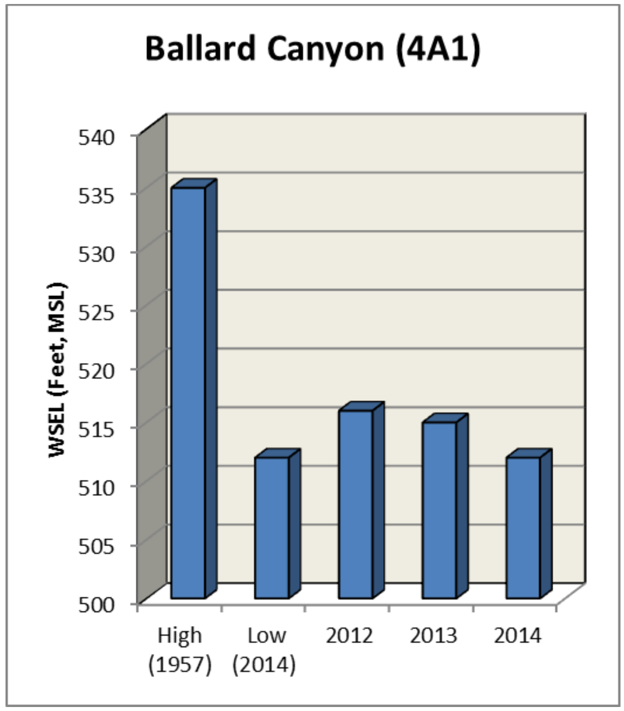


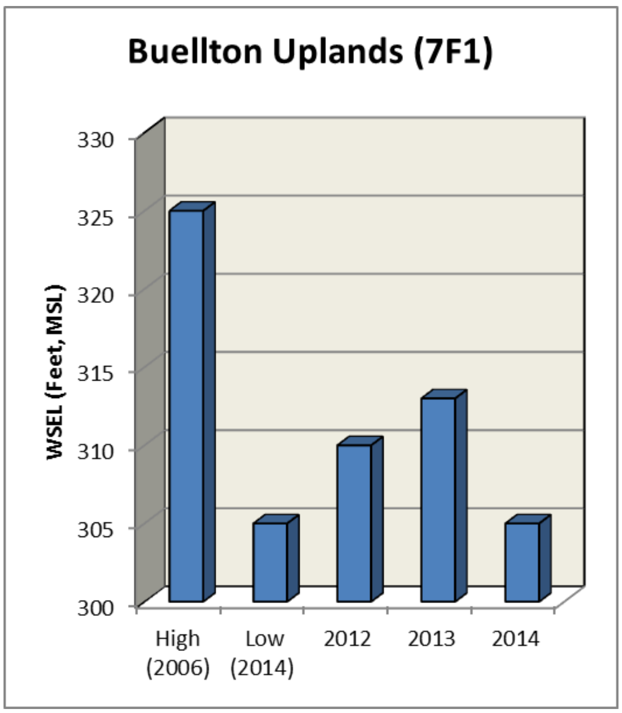



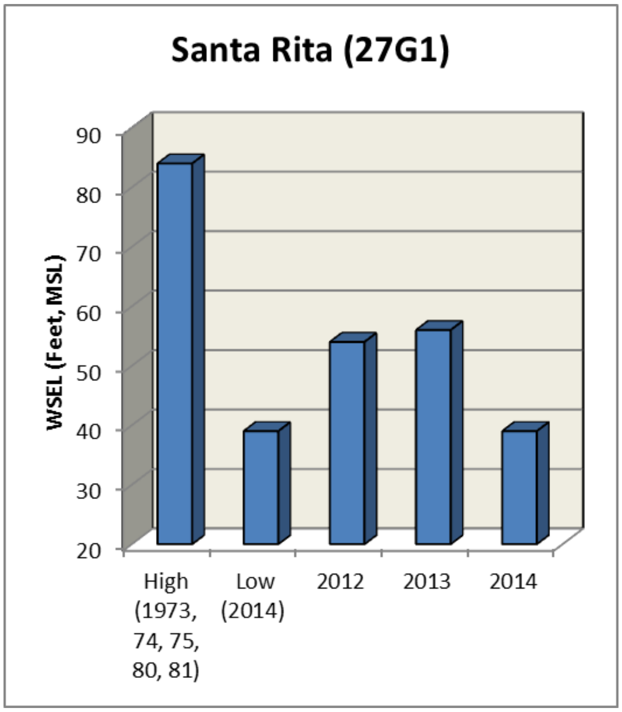



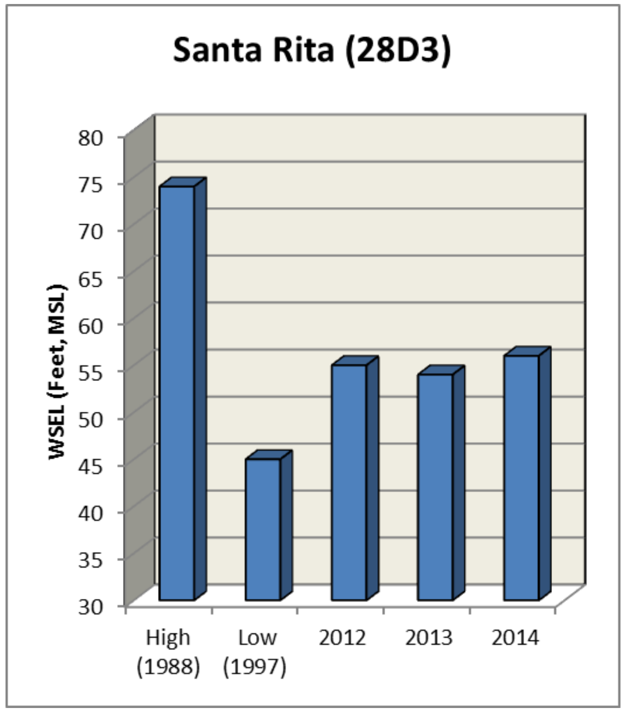

Fredenborg Canyon (10F1)
WSEL (Feet, MSL)
480
475
470
465
460
455
450
High (1983, 1985)
Low (2004)
2012
2013
2014

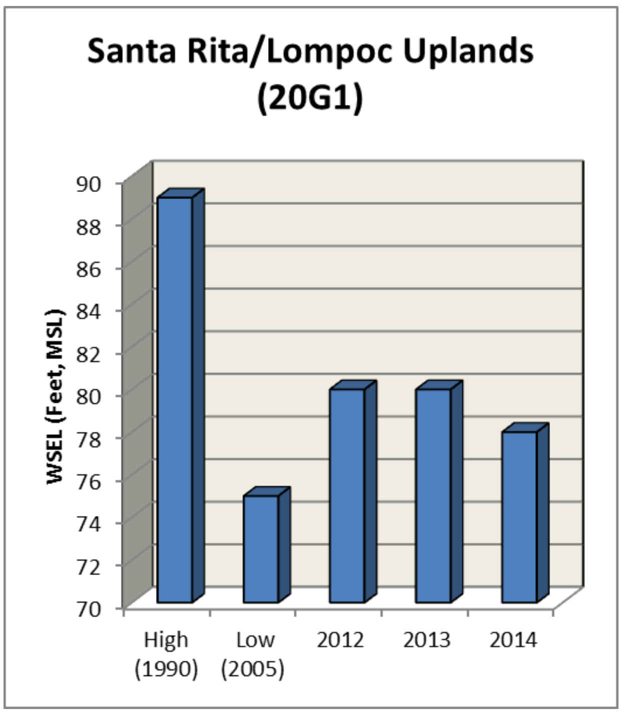

Ballard Canyon (4A1)
WSEL (Feet, MSL)
540
535
530
525
520
515
510
505
500
High (1957)
Low (2014)
2012
2013
2014

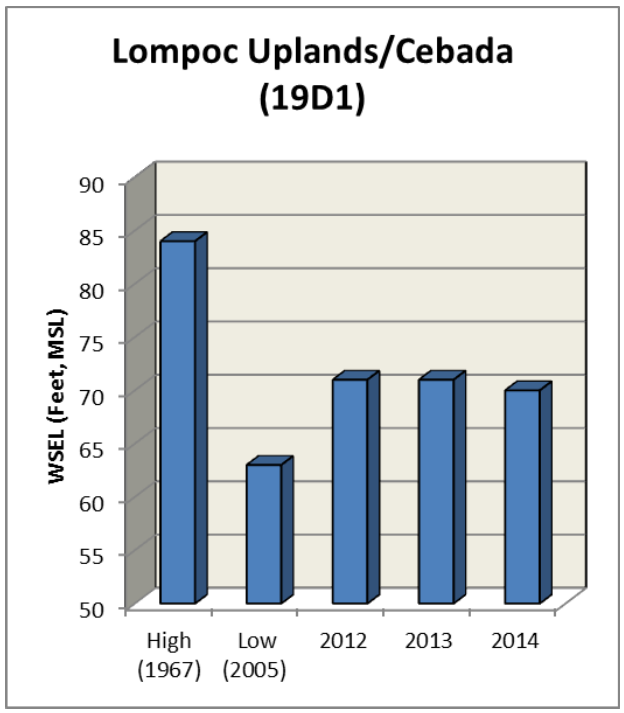

Buellton Uplands (7F1)
WSEL (Feet, MSL)
330
325
320
315
310
305
300
High (2006)
Low (2014)
2012
2013
2014

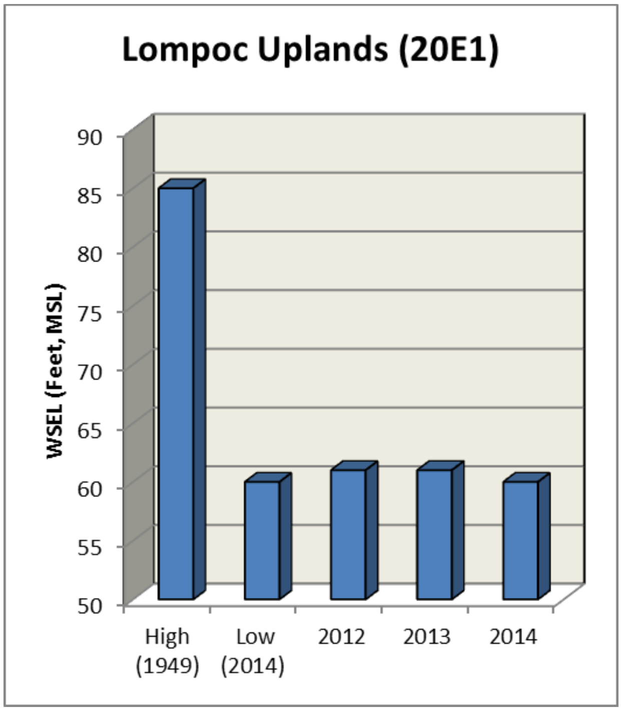
**Figures B13-B23:** Lompoc Groundwater Basin Level Comparison

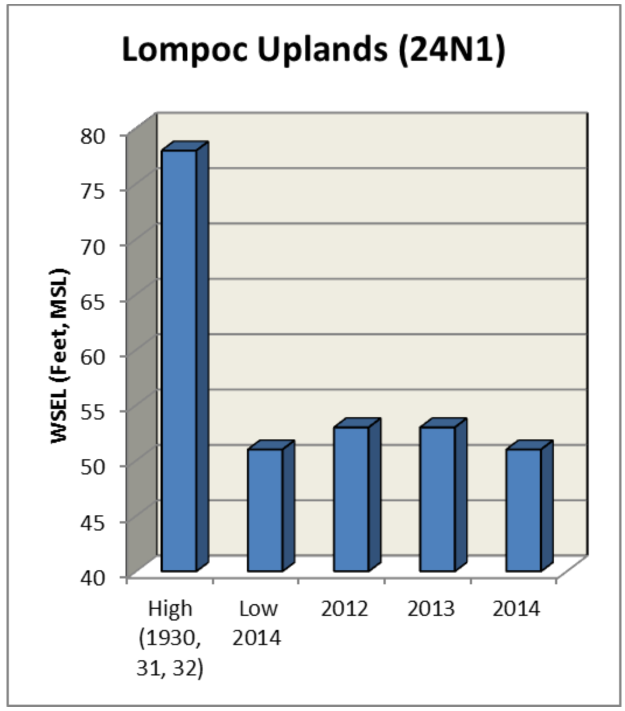


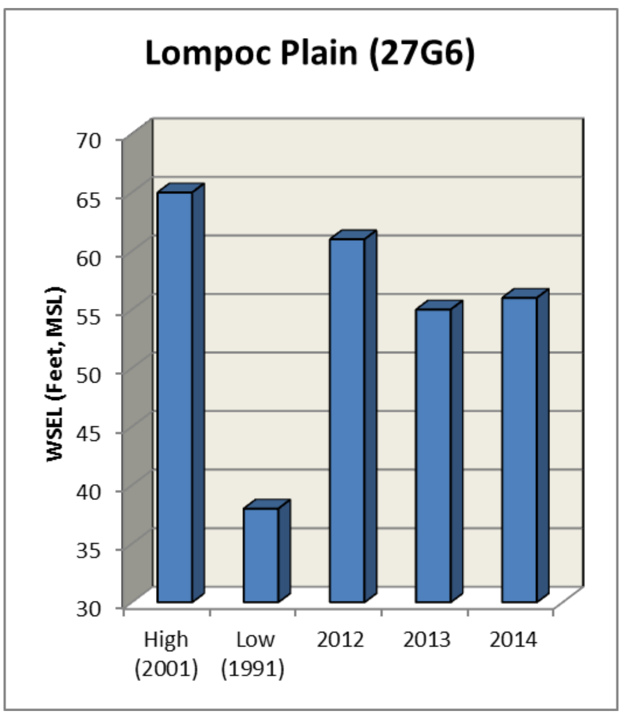



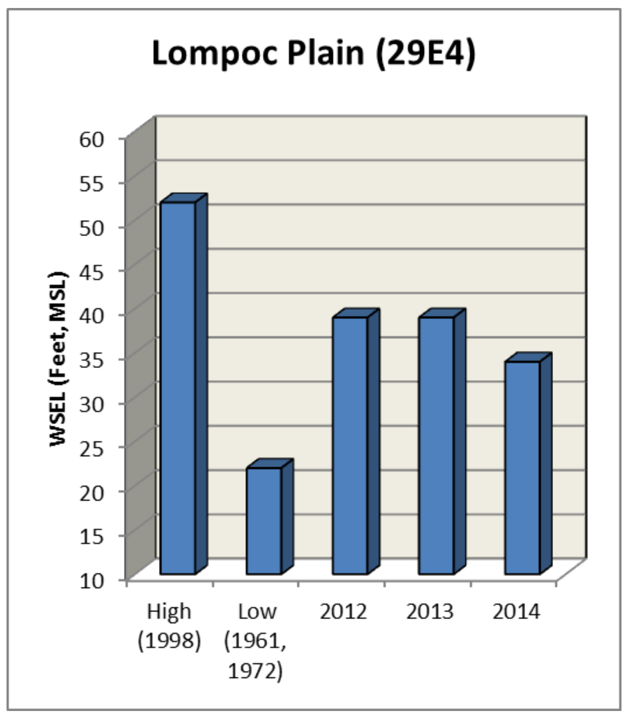



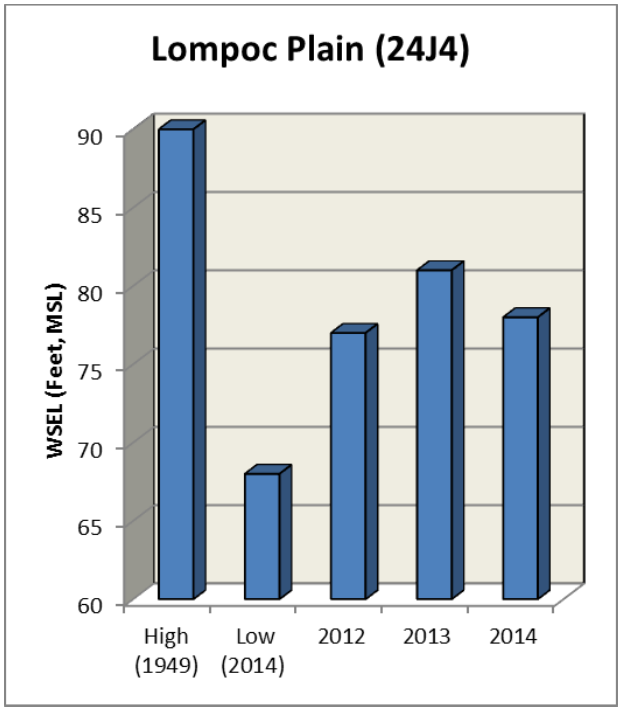



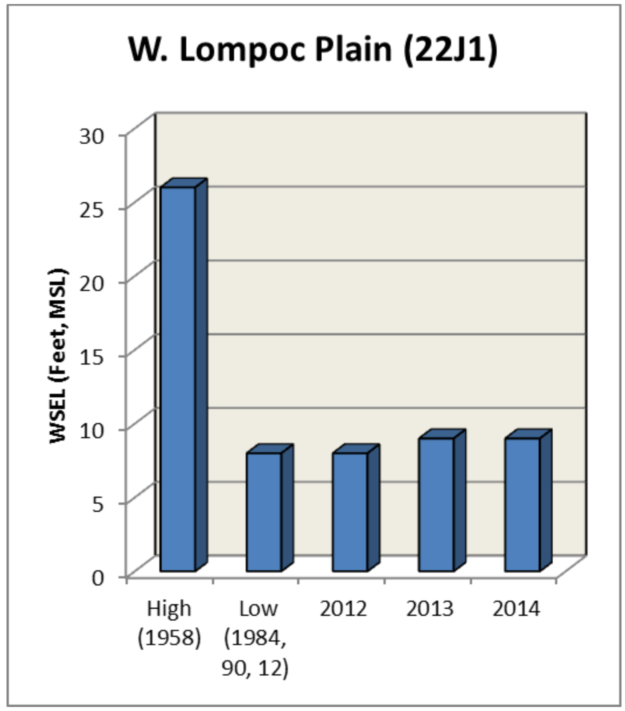

Lompoc Uplands (20E1)
WSEL (Feet, MSL)
90
85
80
75
70
65
60
55
50
High (1949)
Low (2014)
2012
2013
2014


Lompoc Uplands (24N1)
WSEL (Feet, MSL)
80
75
70
65
60
55
50
45
40
High (1930, 31, 32)
Low 2014
2012
2013
2014

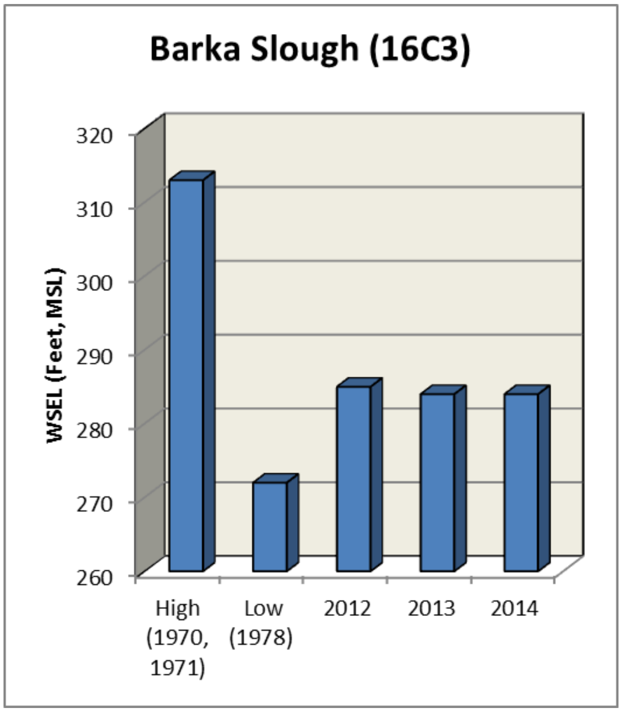

Lompoc Plain (27G6)
WSEL (Feet, MSL)
70
65
60
55
50
45
40
35
30
High (2001)
Low (1991)
2012
2013
2014

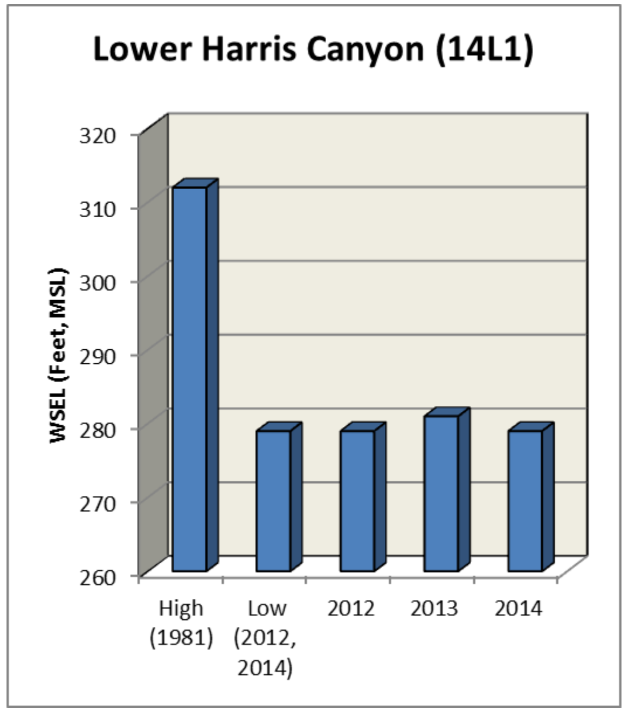

Lompoc Plain (29E4)
WSEL (Feet, MSL)
60
55
50
45
40
35
30
25
20
15
10
High (1998)
Low (1961, 1972)
2012
2013
2014

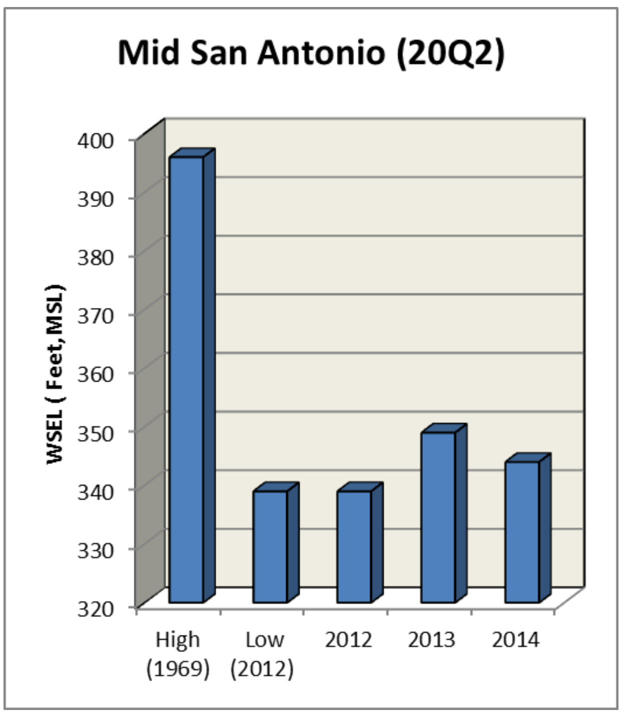

Lompoc Plain (24J4)
WSEL (Feet, MSL)
90
85
80
75
70
65
60
High (1949)
Low (2014)
2012
2013
2014

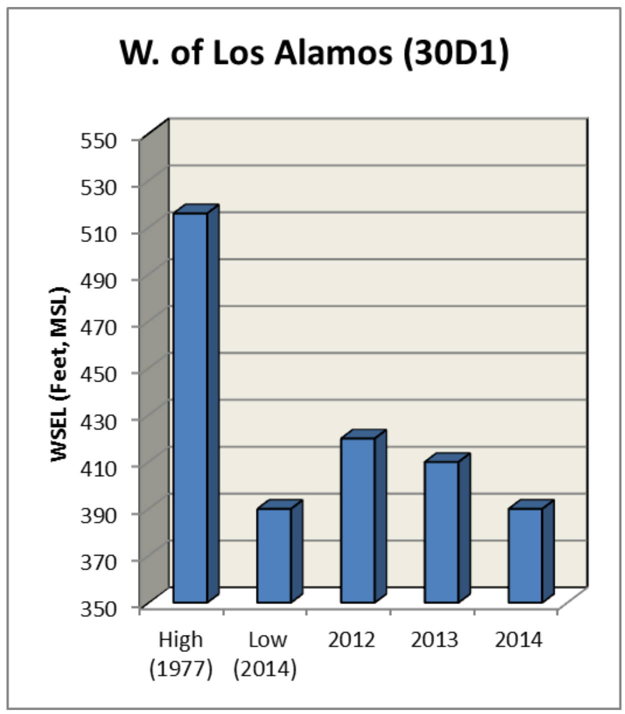

W. Lompoc Plain (22J1)
WSEL (Feet, MSL)
30
25
20
15
10
5
0
High (1958)
Low (1984, 90, 12)
2012
2013
2014

**Figures B24-B27:** San Antonio Valley Groundwater Basin Level Comparison

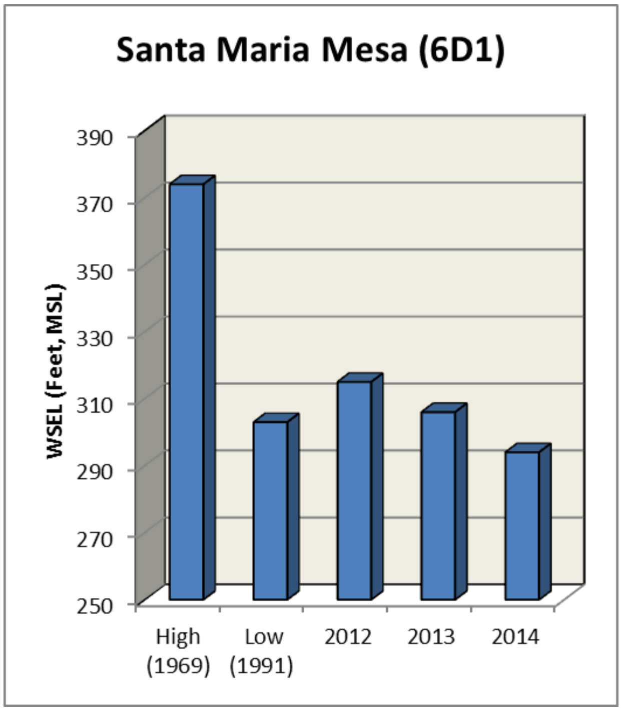


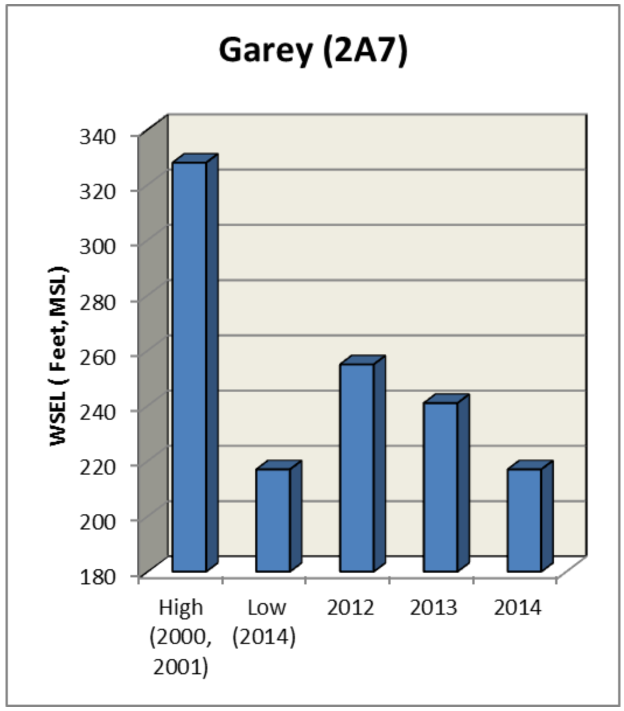



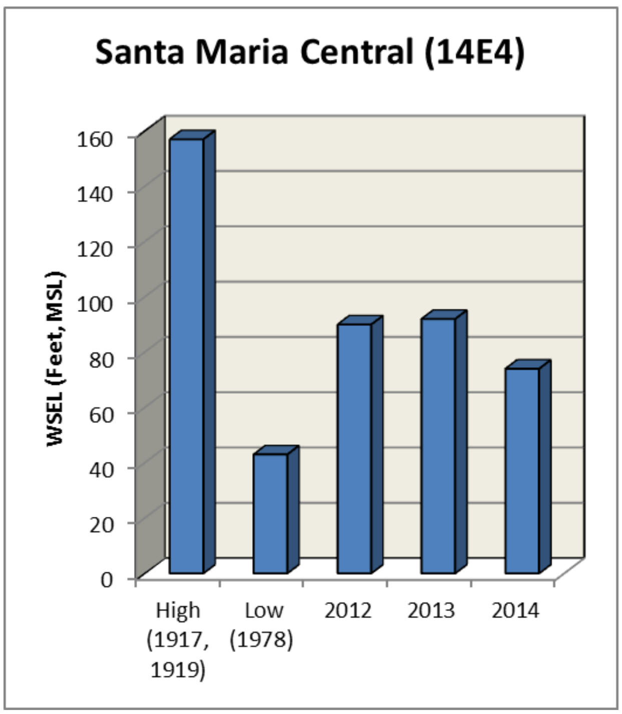



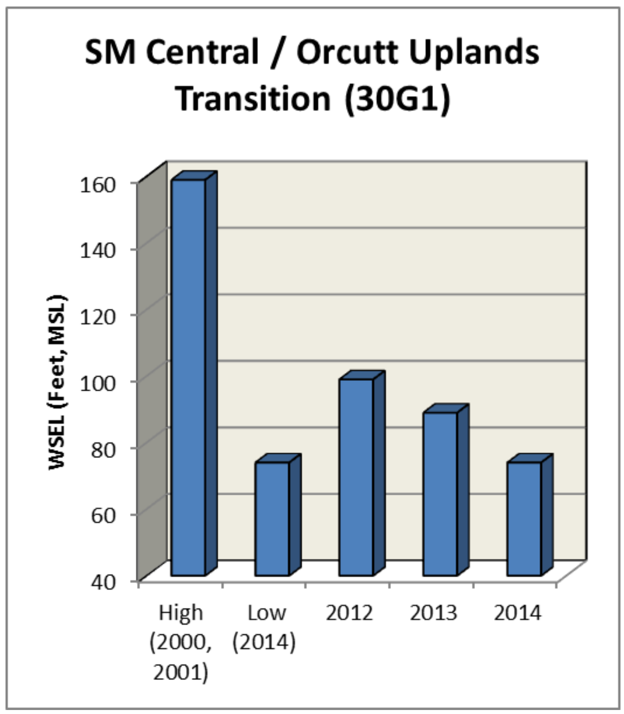



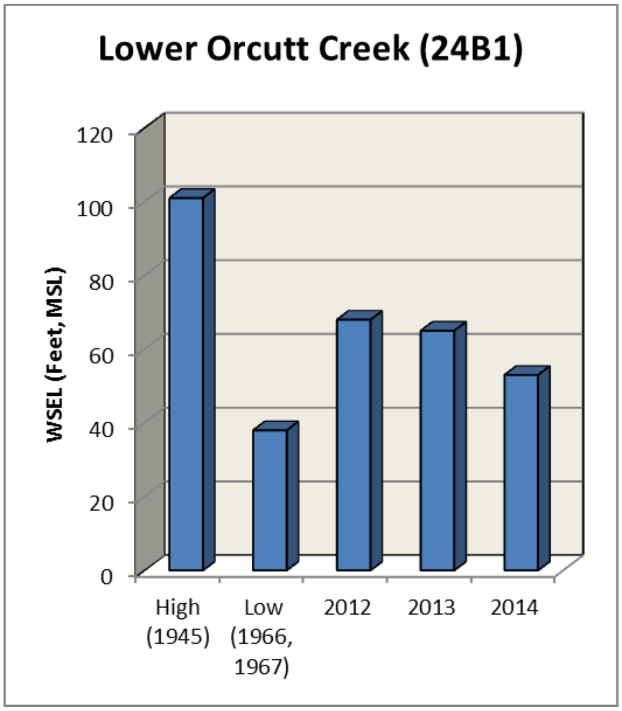
**Figures B28-B35:** Santa Maria Groundwater Basin Level Comparison

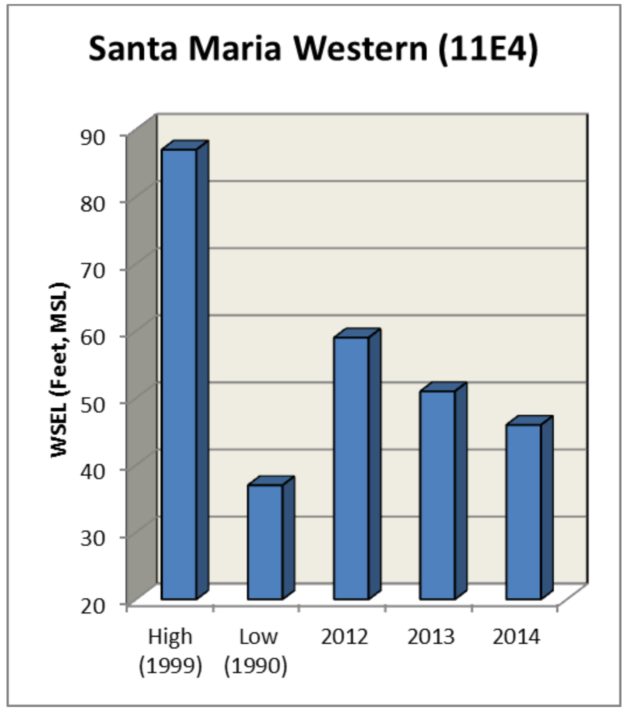


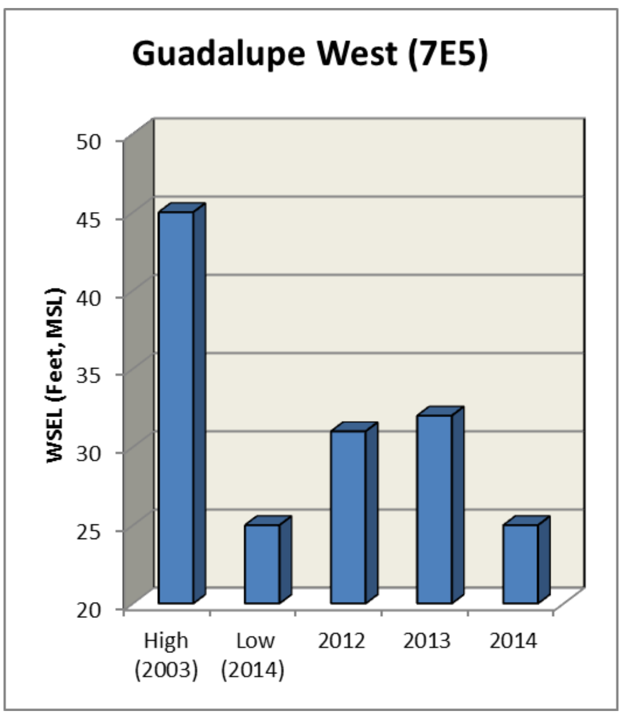



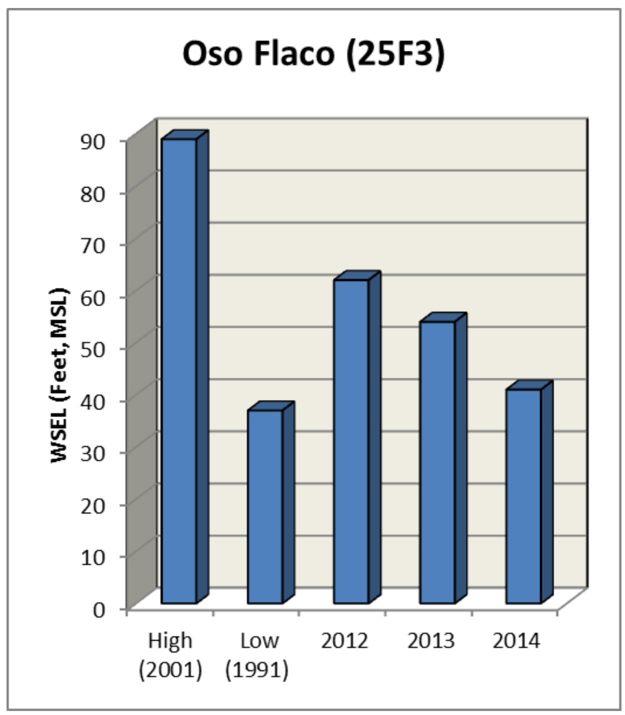




Lower Orcutt Creek (24B1)
WSEL (Feet, MSL)
120
100
80
60
40
20
0
High (1945)
Low (1966, 1967)
2012
2013
2014


Santa Maria Western (11E4)
WSEL (Feet, MSL)
90
80
70
60
50
40
30
20
High (1999)
Low (1990)
2012
2013
2014


Guadalupe West (7E5)
WSEL (Feet, MSL)
50
45
40
35
30
25
20
High (2003)
Low (2014)
2012
2013
2014


Oso Flaco (25F3)
WSEL (Feet, MSL)
90
80
70
60
50
40
30
20
10
0
High (2001)
Low (1991)
2012
2013
2014

**Figures B36-B39:** Cuyama Valley Groundwater Basin Level Comparison