Annual Monitoring Report for Calendar Year 2009

City of Paso Robles

Submitted to:
Paso Robles Groundwater Basin –
Groundwater Advisory Committee

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Table of Contents

1 Introduction 2

1.1 Paso Robles Groundwater Basin 2

1.2 Groundwater Level Monitoring Network 5

2 Conditions for Calendar Year 2009 8

2.1 Land and Water Use Conditions 8

2.2 Surface Water Imports 9

2.3 Hydrologic Conditions 10

2.4 Groundwater Levels 13

2.4.1 Current Groundwater Levels 13

2.4.2 Long-Term Change in Groundwater Levels 13

2.4.3 Groundwater Quality 13

2.4.4 Land Subsidence 14

3 Basin Management Objectives 17

3.1 Atascadero Subbasin 20

3.2 Bradley Subarea 22

3.3 Creston Subarea 22

3.4 Estrella Subarea 24

3.5 North Gabilan Subarea 26

3.6 San Juan Subarea 26

3.7 Shandon Subarea 28

3.8 South Gabilan Subarea 30

4 Status of Groundwater Management Activities 31

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1 Introduction

The purpose of this report is to summarize groundwater conditions in the Paso Robles Groundwater Basin for 2009. This report supports the implementation of the Paso Robles Groundwater Management Plan (Plan) completed in February 2011 by:

- Documenting annual changes in groundwater levels based on information collected from the existing monitoring network.
- Comparing changes in groundwater levels to the Basin Management Objectives (BMOs) identified in the Plan.
- Identifying Groundwater Management Activities (GMAs) undertaken during the development of the Groundwater Management Plan and identifying activities anticipated to be undertaken in 2011 in an attempt to meet the BMOs.

1.1 Paso Robles Groundwater Basin

The Paso Robles Groundwater Basin (Basin) is located in northern San Luis Obispo County (County) and southern Monterey County and was described in the 1958 California Department of Water Resources (DWR) Bulletin 118, San Luis Obispo County Investigation. As part of the efforts to map the groundwater basins in the State of California (State) presented in Bulletin 118, DWR identified the Paso Robles Area Groundwater Subbasin of the Salinas Valley Groundwater Basin and designated it as Basin Number 3-4.06. The Basin boundary was later updated in the Paso Robles Groundwater Basin Study (2002) and is shown on Figure 1-1.

The Basin was first formally defined by the California Department of Water Resources (DWR, 1958). In 1979, the DWR published a detailed investigation of the San Luis Obispo County portion of the Basin (DWR, 1979).

The Basin encompasses an area of approximately 505,000 acres (790 square miles). The Basin ranges from the Garden Farms area south of Atascadero to San Ardo in Monterey County, and from the Highway 101 corridor east to Shandon (Figure 1-1). Most of the Basin is hydraulically connected by thick sedimentary sections. The Basin is divided into smaller subareas based on water quality, source of recharge, groundwater movement, and the contours of the base of permeable sediments.

The Atascadero Subbasin is defined as that portion of the Basin west of the Rinconada fault. Between Atascadero and Creston, the Rinconada fault juxtaposes less permeable Monterey Formation rocks with the Paso Robles Formation basin sediments. South of the City of Paso Robles, the Paso Robles Formation is found on both sides of the Rinconada fault; however, the fault zone is believed to form a leaky barrier that restricts flow from the Atascadero Subbasin to the main part of the Basin. As a result of this, the Atascadero Subbasin is

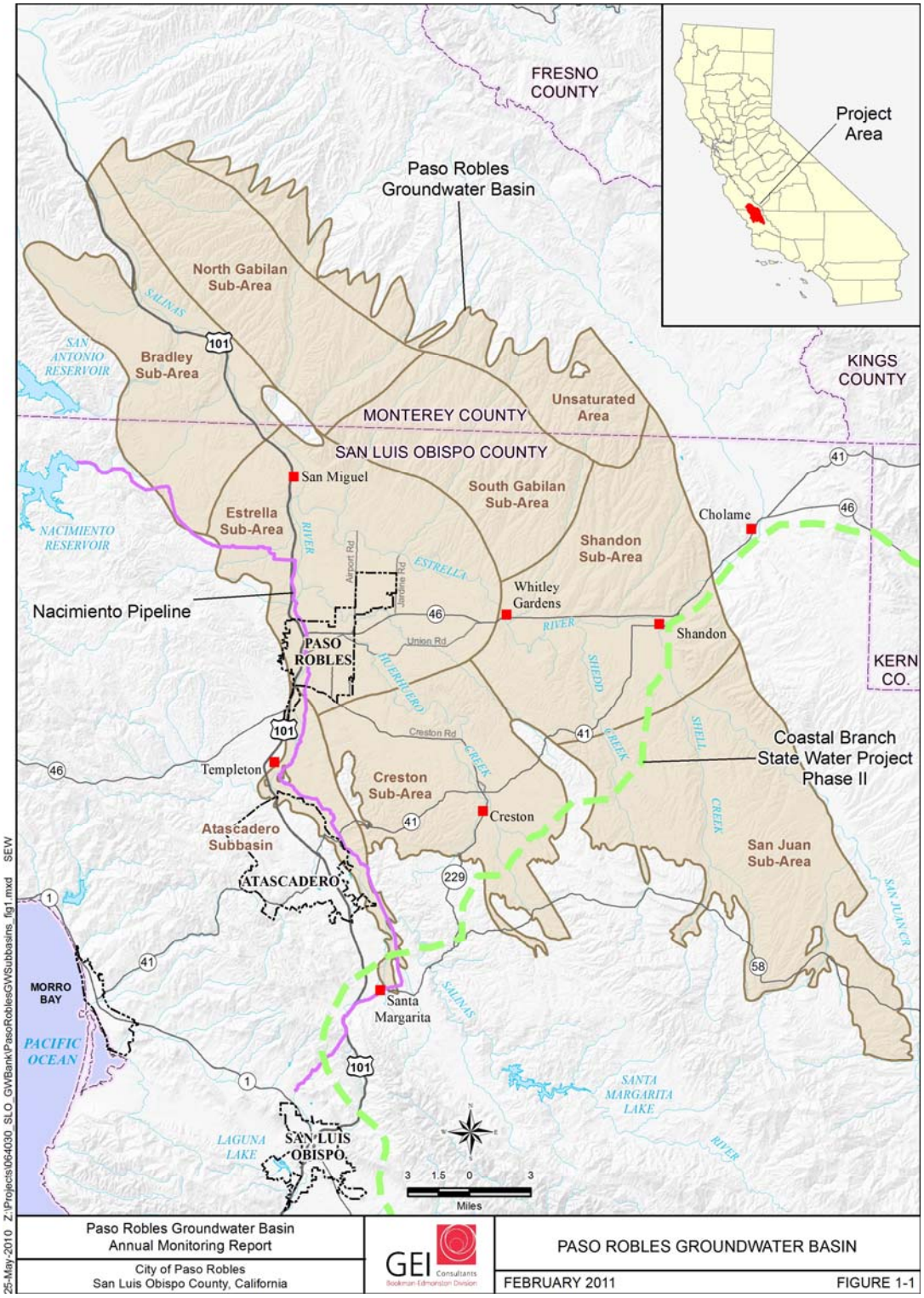
considered a hydrologically distinct subbasin within the Basin. The Rinconada Fault does not act as a hydraulic barrier to groundwater flow in the Salinas River Alluvium. As such, groundwater flow in the Alluvium is continuous along the stretch of the Salinas River that traverses the entire Basin. The Atascadero Subbasin encompasses the Salinas River corridor area south of Paso Robles and includes the communities of Garden Farms, Atascadero, and Templeton.

The western boundary of the Basin roughly follows Highway 101 from Santa Margarita northward to Hames Valley. The eastern boundary follows a rough line from Highway 58 in the San Juan Creek area northward to Shandon and Cholame. The Basin is downstream of and hydraulically connected by alluvial deposits to the Pozo Groundwater Basin south of the Basin, and to the Cholame Groundwater Basin north of the Basin. The Basin outlet is northwest and downstream of Bradley, where it is hydraulically connected with the Salinas Valley Groundwater Basin.

The Basin was subdivided into subareas in the Phase I Report (Fugro, 2002) as a practical approach to organize the 790 square mile Basin into smaller informal areas (see Figure 1-1) listed below:

1. Atascadero Subbasin
2. Creston Subarea
3. San Juan Subarea
4. Estrella Subarea
5. Shandon Subarea
6. North Gabilan Subarea
7. South Gabilan Subarea
8. Bradley Subarea

Figure 1-1. Paso Robles Groundwater Basin



1.2 Groundwater Level Monitoring Network

In the Basin, the County has been monitoring groundwater levels for more than 40 years. In 2003, an evaluation of the monitoring network was completed to evaluate the efficiency and effectiveness of the County's Monitoring Program for wells located in the Basin. Based on the final report, approximately 159 wells in the monitoring program (see Figure 1-2). Most wells are monitored by County Public Works employees and the remaining wells are monitored by local municipal water company employees (who forward the data to the County's Public Works department for inclusion in the monitoring program database). Additionally, three wells are located in Monterey County and are monitored by the Monterey County Water Resources Agency.

The County's Monitoring Program provides the best available groundwater elevation information to guide current groundwater management activities at current levels of implementation.

Figure 1-2. Monitoring Well Locations

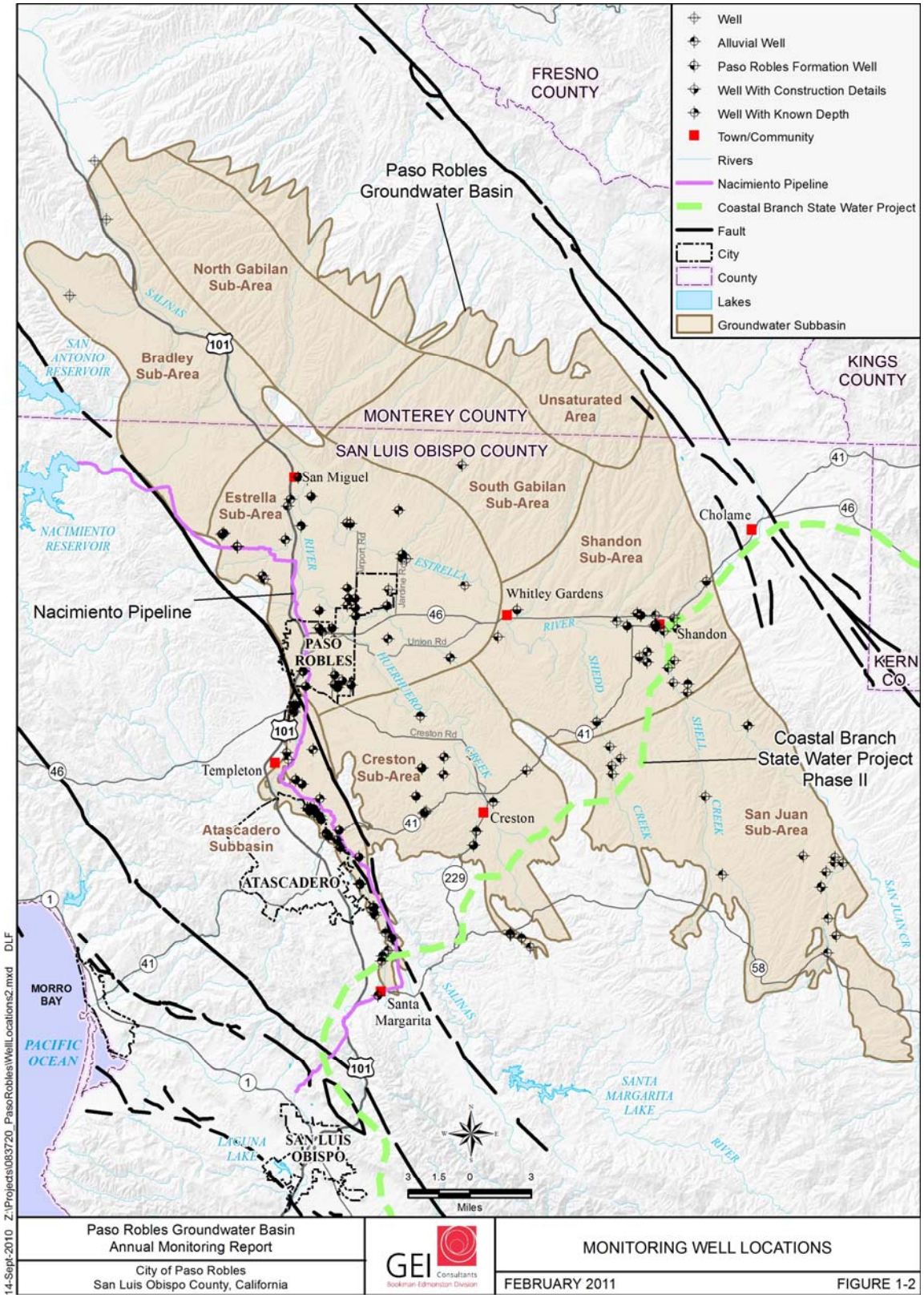


Table 1-1. Wells in the San Luis Obispo County Monitoring Network

Groundwater Subarea	Wells Currently in Program
Atascadero Subbasin	51
Bradley	0
Creston	17
Estrella	50
Gabilan (North and South)	1
San Juan	16
Shandon	24
TOTAL	**159**

2 Conditions for Calendar Year 2009

This section describes the conditions in the Paso Robles Groundwater Basin for calendar year 2009, including:

- Land and water use conditions
- Surface water imports
- Hydrologic conditions
- Groundwater elevations
- Groundwater quality data

2.1 Land and Water Use Conditions

The water demands and supplies for the Paso Robles Groundwater Basin are summarized from several of the documents as described in the Plan. Historically, all water demands in the Basin have been met with groundwater. This changed in early 2011 when Nacimiento Project Water began delivering water to some water users in the Basin.

Water demands in the Basin have generally been organized into five different "user sectors" including:

- **Agricultural** - Agricultural water demands are estimated using the crop acreage and water demands of different types of crops to determine the overall agricultural water demand. This method is used because records of agricultural pumping are not kept and reported.
- **Municipal** - Municipal pumping in the Basin includes four public water purveyors: 1) City of Paso Robles; 2) Atascadero Mutual Water Company; 3) Templeton Community Services District (CSD); and 4) San Miguel Community Services District. Pumping records were used to accurately calculate total municipal pumping.
- **Rural Residential** - Rural pumping includes domestic water use by development in rural areas. The estimate was derived by using parcel data and applying a water use factor, since records are not kept and reported.
- **Small Community Systems** - Small community systems include mutual water companies, county service areas, and mobile home parks. For systems that report groundwater pumping, well records were used to accurately determine their pumping. Using these reports, estimates were derived for the systems that do not report their water use.
- **Small Commercial Systems** - Small commercial pumping includes such users as wineries, golf courses, and schools. Water use estimates are based on factors from the Pacific Institute and information from consultation with winery operators.

The most recent Basin-wide water demand data is available for 2006 conditions, which are believed to represent approximate conditions for 2009. This information will be updated in the future as additional information is collected.

Table 2-1 shows the distribution of the demands by demand type and subarea for 2006. In 2006, agricultural demands were about 67 percent of the total demand in the Basin, with about one-third of the total agricultural demand occurring in the Estrella Subarea. Municipal demands were about 18 percent of the total demand and are concentrated in the Atascadero Subbasin and the Estrella Subarea. The small community demands are included as part of rural domestic demands. Rural domestic demands were about 13 percent of the total demand. Small commercial demands total about three percent of the total demand, and are concentrated in the Estrella Subarea.

Table 2-1. Distribution of 2006 Water Demands to Subareas

Subarea	Demand Type						
	Agriculture	Municipal	Small Community Systems	Small Commercial Systems	Rural Domestic	Total	Percentage
Atascadero Subbasin	1,348	11,735	0	430	2,032	15,545	17%
Bradley	6,933	0	0	184	109	7,226	8%
Creston	9,936	0	0	37	2,338	12,311	14%
Estrella	23,111	3,930	0	1,603	5,433	34,077	38%
North Gabilan	1,758	0	0	0	50	1,808	2%
San Juan	5,347	0	0	0	105	5,452	6%
Shandon	9,896	0	0	69	1,205	11,170	12%
South Gabilan	1,671	0	0	0	213	1,884	2%
Total	**60,000**	**15,665**	**0**	**2,323**	**11,485**	**89,473**	**100%**
Percent of Total	**67%**	**18%**	**0%**	**3%**	**13%**	**100%**	

2.2 Surface Water Imports

Several agencies and communities are participating in the Nacimiento Water Project to bring surface water into the Paso Robles Groundwater Basin. Table 2-2 lists the contract amounts and will track annual deliveries by year. Deliveries from the Nacimiento Project are expected to begin in early 2011.

Table 2-2 Imported Supplies from the Nacimiento Water Project

Entity	Contract Amount (Acre-Feet)	2010	2011	Total
City of Paso Robles	4,000	0		
Atascadero MWC	2,000	0		
Templeton CSD	250	0		
Total	6,250	0		

2.3 Hydrologic Conditions

The Paso Robles Groundwater Basin has a semi-arid Mediterranean climate, which is characterized by hot sunny summers and cool winters. Most of the precipitation occurs in the winter between November and April.

Rainfall is the primary source of recharge to the groundwater basin, and it is important to understand rainfall's relationship to groundwater management activities in the basin. The average rainfall over the basin ranges from about 18 inches in the west (at the Atascadero MWC Gage #34) to 11 inches in the east (at the Shandon #73) as shown on Table 2-3. Figure 2-1 shows the location of selected precipitation stations in the basin. The historical annual rainfall recorded is represented along the Salinas River at Paso Robles Gage (Gage #10) for the 1960 to 2009 period (50 years), shown on Figure 2-2. During this period, rainfall was highly variable, ranging from about 5 inches to over 30 inches per year, and averaging 14.88 inches per year.

Table 2-3. Precipitation Stations in the Paso Robles Groundwater Basin

Precipitation Station	Period of Record	Average Annual Precipitation (inches)			
		Period of Record	1960 to 2009	1981 to 2009	1997 to 2009
Paso Robles Gage #10	1901 to 2009	15.04	14.88	14.49	13.73
Atascadero Mutual WC #34	1931 to 2009	17.65	17.85	17.58	17.49
Erickson Ranch 52.1	1928 to 2009	11.89	12.81	12.85	13.15
Shandon # 73	1937 to 2009	10.69	10.76	11.10	11.06
Sinclair #125	1949 to 2009	11.69	12.02	12.21	11.67

Figure 2-1. Precipitation and Surface Water Gaging Stations in the Paso Robles Area

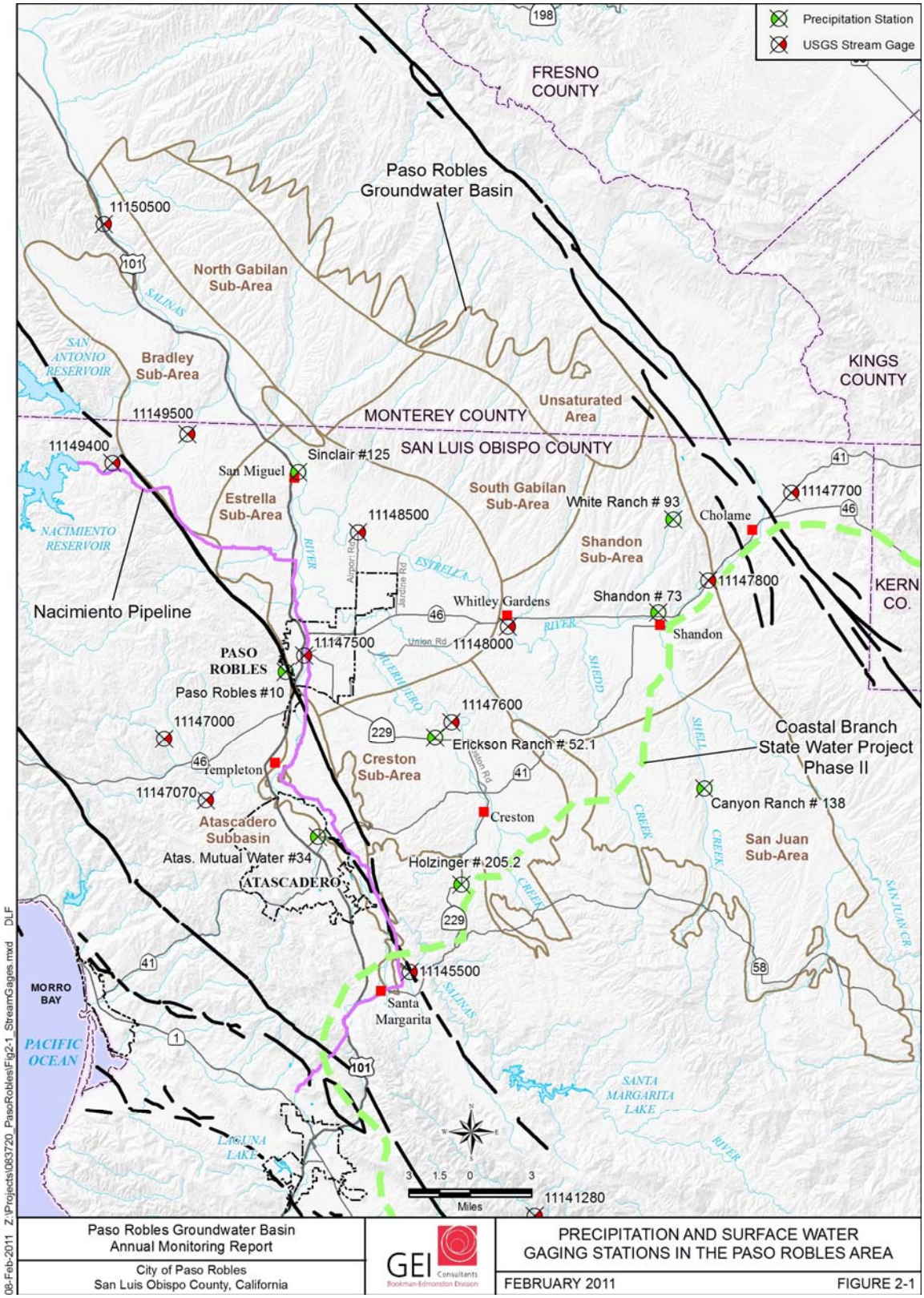
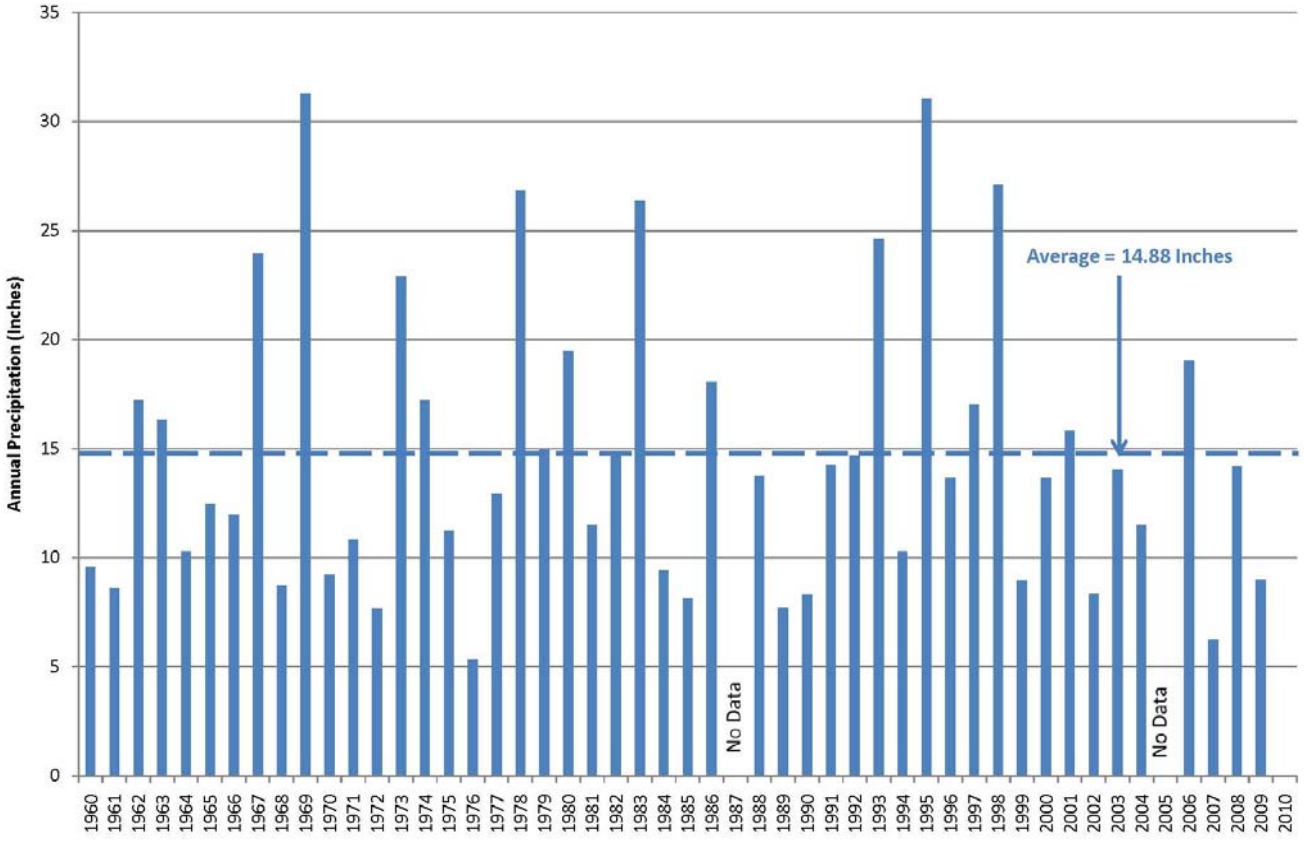


Figure 2-2. Annual Precipitation at the Paso Robles Gage for 1960-2009



2.4 Groundwater Levels

2.4.1 Current Groundwater Levels

Spring 2009 shows that groundwater levels in the Basin range from approximately 1,500 feet above mean sea level (msl) in upland areas to less than 600 feet msl in the northwestern Bradley area as shown on Figure 2-3. Groundwater moves generally northwesterly from the San Juan area into Shandon and then into the Estrella area. Groundwater flow from Creston is also northerly into the Estrella area. In the northern portion of the Basin, groundwater moves southwesterly toward Estrella and the Salinas River in the area near San Miguel.

2.4.2 Long-Term Change in Groundwater Levels

A groundwater elevation change map has been prepared that represents the changes in groundwater levels for the 1997 to 2009 period and is shown on Figure 2-4. This map shows that the greatest change in groundwater elevations has occurred in the Estrella Subarea, and to a lesser extent in the Creston and Shandon Subareas. Groundwater levels in the western portion of the Paso Robles Basin have declined in excess of 70 feet since 1997 during a period when precipitation was just slightly less than the long-term average annual precipitation.

2.4.3 Groundwater Quality

In general, the quality of groundwater in the Basin is relatively good, with few areas of poor quality or trends of ongoing water quality deterioration. Historical water quality trends were evaluated to identify areas of deteriorating water quality. Some areas are experiencing rising concentrations of total dissolved solids (TDS), chloride, and nitrate. The water quality data is collected by entities that deliver potable water. Table 2-4 provides a range of values for selected water quality constituents for agencies within the Paso Robles Basin.

The first dataset was provided by the San Luis Obispo County Department of Public Works Water Quality Database. Values from this dataset are measured in milligrams per liter (mg/L) or micrograms per liter (ug/L). These ranges were calculated from the provided dataset and cover a variety of wells under the jurisdiction of each listed entity.

The second dataset was gleaned from annual water quality reports provided by water agencies or cities. Values from this dataset are measured in parts per million (ppm) or parts per billion (ppb). Ranges were provided in each report and are unique to that agency's analysis set.

Table 2-4. Selected Groundwater Quality Data

Agency/Project	Analysis Full Name	Range	Units
SAN LUIS OBISPO CSA #16 - SHANDON	Chloride	61.7 - 114	mg/L
	Manganese	< 5	ug/L
	Nitrate and Nitrite Combined as Nitrogen	2420 - 4130	ug/L
	Nitrate as Nitrogen	2420 - 4140	ug/L
	Nitrate as NO3	10.7 - 18.3	mg/L
	Total Dissolved Solids	390 - 550	mg/L
SAN LUIS OBISPO CSA 23 - SANTA MARGARITA	Arsenic	< 1.0 - 6.2	ug/L
	Manganese	<5 - 12	ug/L
	Nitrate as Nitrogen	< 100 - 321	ug/L
	Nitrate as NO3	< 0.443 - 1.4	mg/L
SAN MIGUEL COMMUNITY SERVICES DISTRICT	Chloride	78.8 - 114	mg/L
	Manganese	< 5 -	ug/L
	Nitrate and Nitrite Combined as Nitrogen	3500 - 3600	ug/L
	Nitrate as Nitrogen	2340 - 11200	ug/L
	Nitrate as NO3	10.4 - 49.6	mg/L
	Total Dissolved Solids	580 - 770	mg/L
SANTA MARGARITA RECREATION AREA	Nitrate as Nitrogen	- <100	ug/L
	Nitrate as NO3	- < 0.443	mg/L
CITY OF PASO ROBLES	Arsenic	ND - 6.3	ppb
	Chloride	35 - 150	ppm
	Manganese	ND - 27	ppb
	Nitrate and Nitrite Combined as Nitrogen	ND - 3500	ppb
	Nitrate as Nitrogen	---	---
	Nitrate as NO3	ND - 28.5	ppb
	Total Dissolved Solids	370 - 740	ppm
ATASCADERO MUTUAL WATER COMPANY	Arsenic	---	---
	Chloride	11 - 220	ppm
	Manganese	ND - 0.046	ppb
	Nitrate and Nitrite Combined as Nitrogen	---	---
	Nitrate as Nitrogen	---	---
	Nitrate as NO3	ND - 16	ppb
	Total Dissolved Solids	350 - 990	ppm
TEMPLETON COMMUNITY SERVICES DISTRICT	Arsenic	0 - 12	ppb
	Chloride	57 - 165	ppm
	Manganese	0 - 7.8	ppb
	Nitrate and Nitrite Combined as Nitrogen	---	---
	Nitrate as Nitrogen	0 - .95	ppm
	Nitrate as NO3	0 - 43	ppb
	Total Dissolved Solids	560 - 1000	ppm

2.4.4 Land Subsidence

There has been no significant long-term land subsidence in the Basin so currently there are no plans to develop a formal program to monitor and measure the rate of inelastic land surface subsidence within the Basin. The need for land subsidence monitoring will continue to be considered on an annual basis.

Figure 2-3. Groundwater Elevations Spring 2009

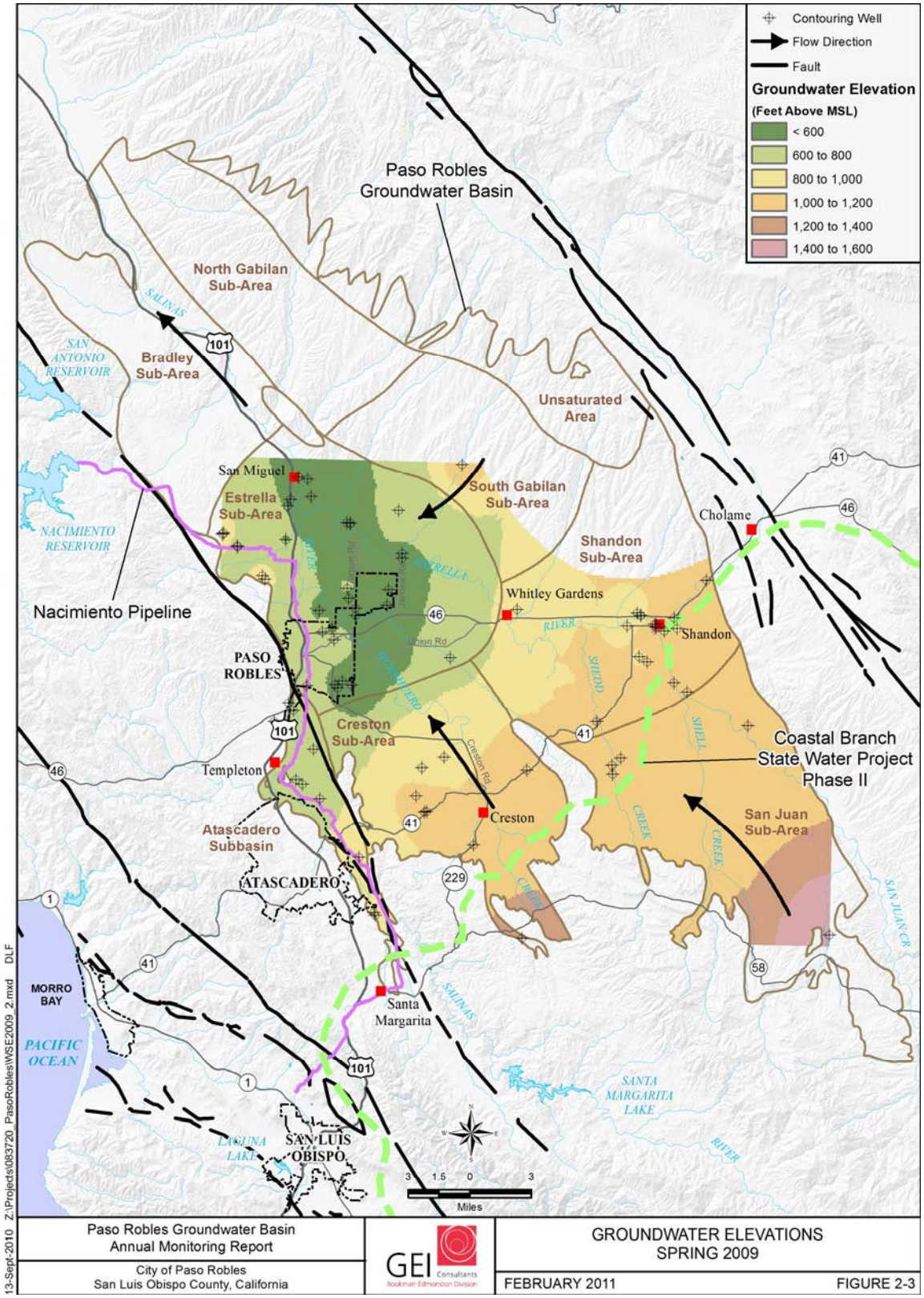
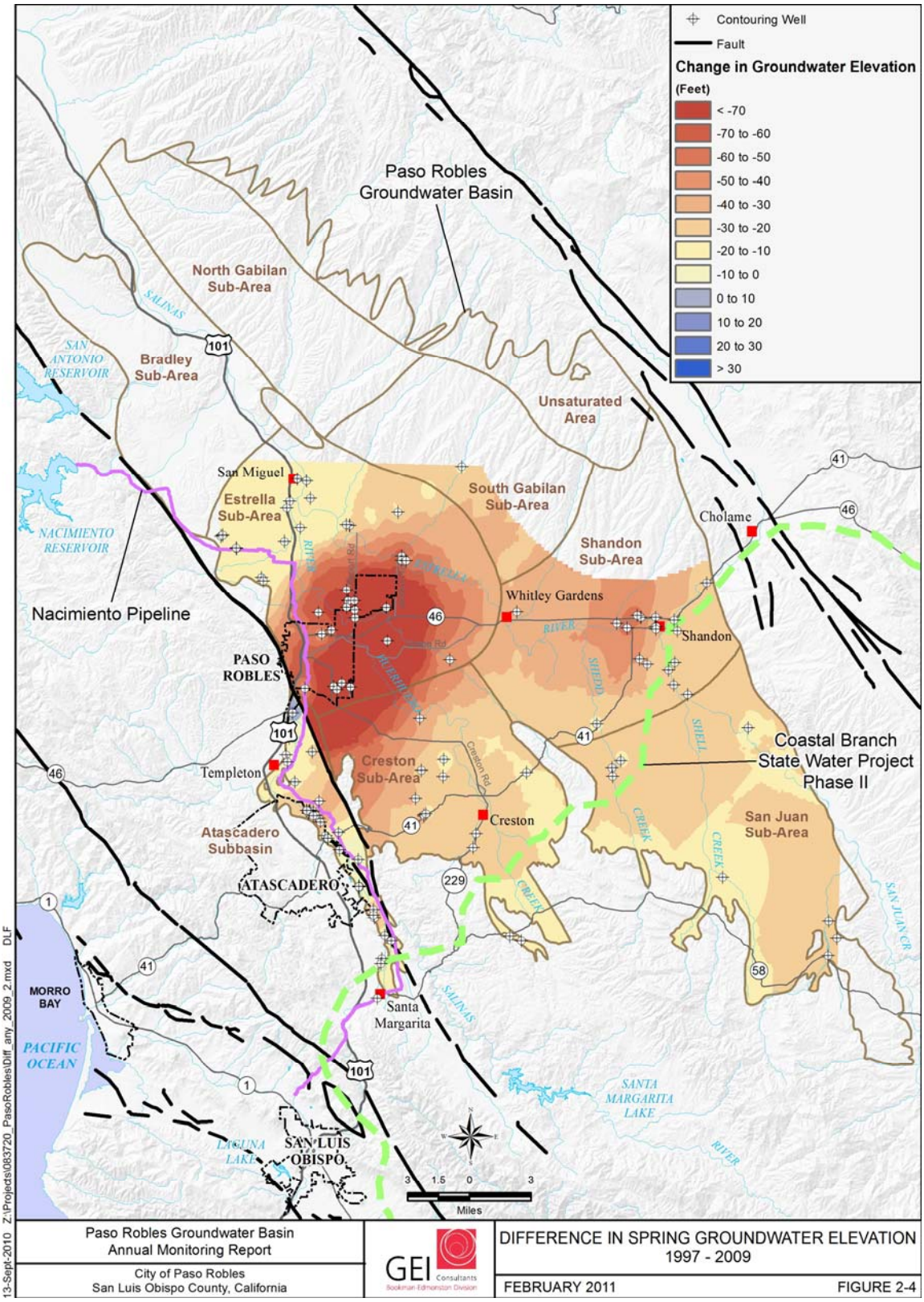


Figure 2-4. Difference in Spring Groundwater Elevations 1997 to 2009



3 Basin Management Objectives

During the development of the Groundwater Management Plan, the groundwater level BMOs established by the stakeholders for each subarea are listed in Table 3-1. The BMOs are used to establish a long-term management goal for groundwater levels. Each year, the measured groundwater levels will be compared to the groundwater level BMO to determine the condition of the Basin. This information will be reported by the Steering Committee to the Groundwater Advisory Committee and other interested parties and stakeholders to improve the understanding of the current conditions of the groundwater basin, and support future groundwater management decisions.

In general, the initial groundwater level BMO was selected by the subarea stakeholders to maintain or stabilize groundwater levels at or near current conditions. Several subareas identified this as the initial BMO with the expectation that stabilizing groundwater levels needed to be achieved before improving groundwater levels could be considered.

Table 3-1. Basin Management Objective by Subarea

Subarea/Subbasin	Basin Management Objective (BMO)
Atascadero	Stabilize groundwater levels at 2009 levels
Bradley	Maintain groundwater levels
Creston	Stop decline and stabilize levels at 2009 levels
Estrella	Stabilize groundwater levels
North Gabilan	Maintain groundwater levels
San Juan	Maintain groundwater levels
Shandon	Stabilize groundwater levels
South Gabilan	Maintain groundwater levels

A summary of groundwater level conditions is presented below for each subarea based on the BMO hydrographs prepared during the development of the Paso Robles Basin Groundwater Management Plan.

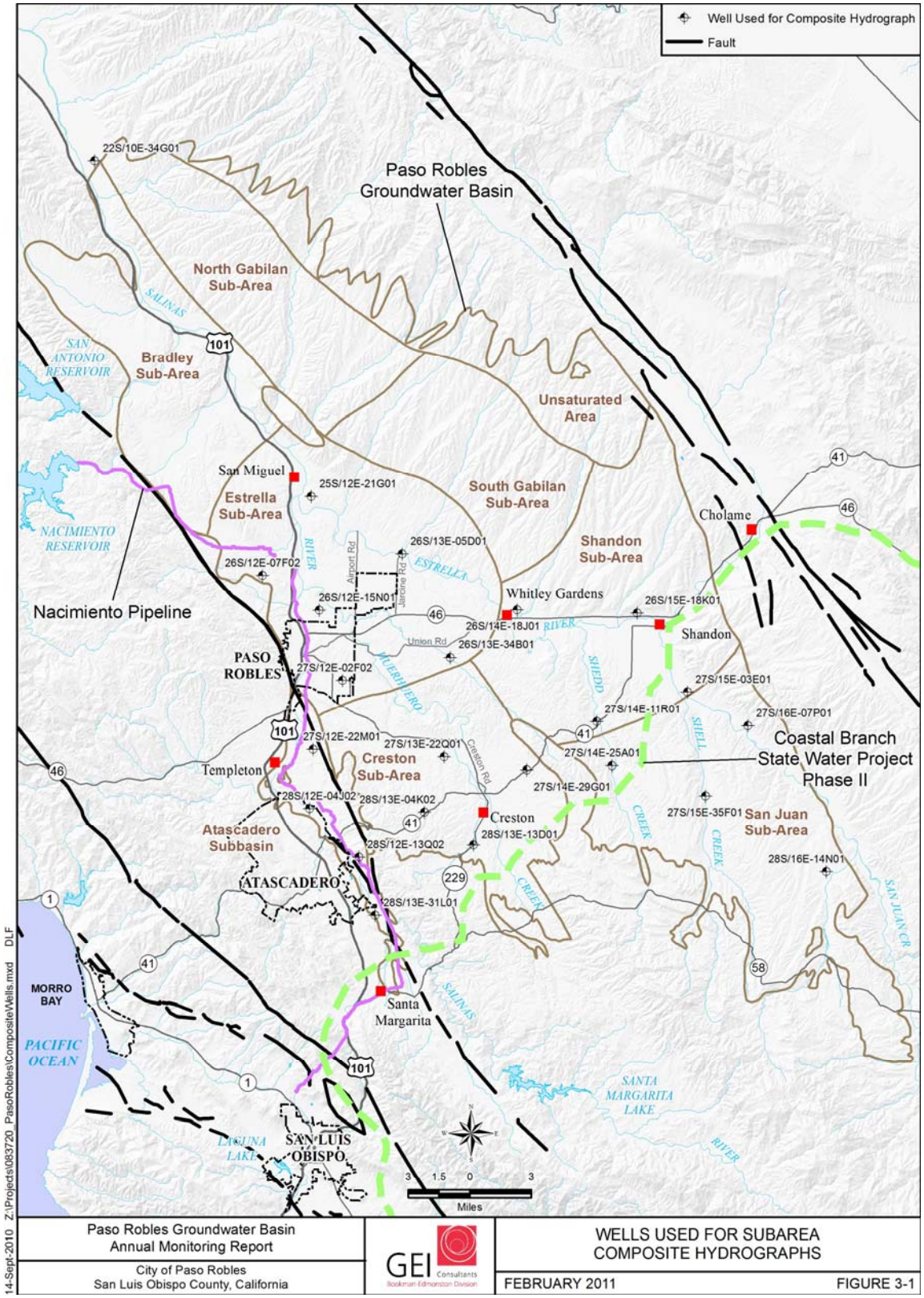
As part of the development of groundwater level BMOs, key wells were identified within each subarea to establish the representative groundwater levels that will be used to monitor the change in groundwater levels. Since the Paso Robles Basin groundwater monitoring network is voluntary, there is a limited amount of information that is available to identify key wells. The key wells were selected based on number of monitoring observations during the 1981 to 2009 period of record and the geographic location within the subarea. The wells meeting these two criteria were identified as key wells and used to develop the subarea hydrographs. The locations of these key wells used to create the subarea-specific BMO hydrographs are shown on Figure 3-1.

In addition to the BMO hydrograph that shows annual changes in groundwater levels for the 1981 to 2009 period, a summary table presenting the recent changes (since 2008) in groundwater levels is provided for each subarea. This table provides an annual comparison of the following:

- The annual change in the groundwater level associated with BMO hydrograph
- The cumulative change in groundwater levels since 1981
- A comparison of the current groundwater level to the established BMO groundwater level

This information can be used to determine the groundwater levels trends, determine the effectiveness of current groundwater management activities, and provide direction for future activities.

Figure 3-1. Wells Used for Subarea Hydrographs



3.1 Atascadero Subbasin

The location of the four wells identified to be representative of changes in groundwater level conditions in the Atascadero Subbasin is shown on Figure 3-1. The composite hydrograph showing the annual change and cumulative change in the average groundwater levels during the 1981 to 2009 period in the Atascadero Subbasin is included in Figure 3-2.

This figure shows that in a single year, the average groundwater level can increase or decrease by up to 15 feet. The overall trend of the average groundwater levels has remained relatively constant since the early 1980s with groundwater levels rising and falling primarily in response to changing hydrologic conditions and increasing demands.

Figure 3-2. Atascadero Subbasin Composite Hydrograph and Annual Precipitation

Sub-Area Information	
Sub-Area	Atascadero
Basin Name	Atascadero

Sub-Area Well Records	
Period of Record	1966-2009
Num. BMO Wells	4

Report Information	
Report Start Year	1981
Period of Record	1981-2009

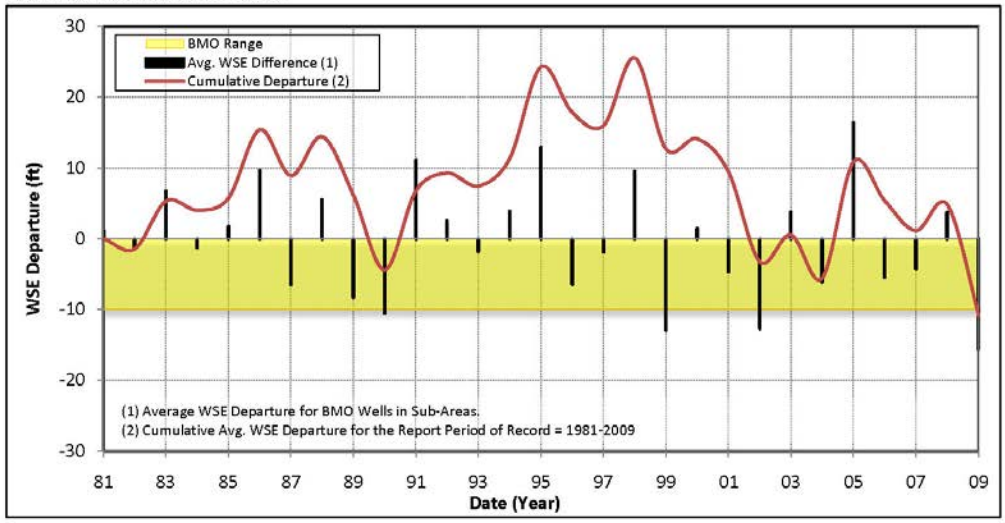
Raingage Information	
Raingage Name	Atas. Mutual Water # 34
Raingage Elev.	835.00 ft

Raingage Records	
Period of Record	1966-2009
Average Precip.	17.64 in

Trend Analysis Results	
BMO Departure[1)]	(10.00 ft)
2009 Departure	(10.75 ft)

NOTES: 1) BMO Cumulative Departure Since 1981

Water Surface Elevation Trends



Precipitation Trends

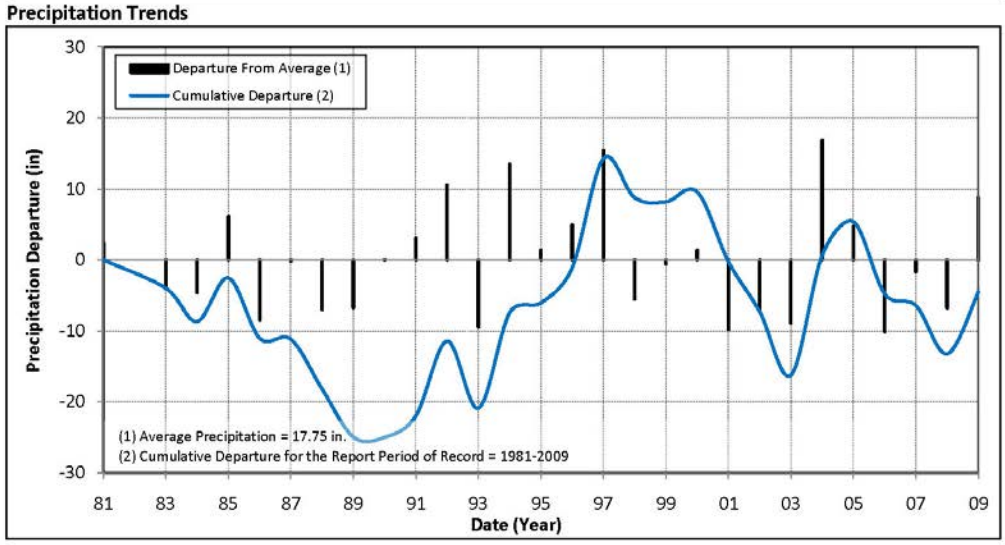


Table 3-2 presents the changes in BMO groundwater levels in the Atascadero Subbasin since 2008. In 2008, the composite BMO groundwater levels increased by 3.7 feet resulting in a cumulative groundwater level change since 1981 of +4.9 feet (14.8 feet above the BMO level). In 2009, the composite BMO groundwater levels decreased by 15.6 feet resulting in a cumulative groundwater level change of -10.8 feet (0.8 feet below the BMO level) since 1981.

At this time, groundwater levels in the Atascadero Subbasin are just below the established BMO level. This is the first time the observed BMO groundwater level has dropped below the established BMO level.

Table 3-2. Changes BMO Groundwater Levels in the Atascadero Subbasin

Period	Annual Change (feet)	Cumulative Change Since 1981 (feet)	Comparison of Cumulative Change to BMO Level (feet)
BMO Groundwater Level			**-10**
2008 Observed Level	3.7	+4.8	+14.8
2009 Observed Level	-15.6	-10.8	-0.8

3.2 Bradley Subarea

The changes in groundwater levels in the Bradley Subarea are currently recorded at one well that is included in the groundwater monitoring network of Monterey County Water Resources Agency (MCWRA). Construction details for this well are unknown and it may not be representative of groundwater levels throughout the Bradley Subarea. The lack of data prevents the development of groundwater level hydrographs or composite hydrographs as developed for other subareas. At this time, we are not aware of any reports or anecdotal information that suggests groundwater levels in the Bradley Subarea are declining to the point of causing problems for local groundwater users.

3.3 Creston Subarea

The location of the four wells identified to be representative of changes in groundwater level conditions in the Creston Subarea is shown of Figure 3-1. The composite hydrograph showing the annual change and cumulative change in the average groundwater levels during the 1981 to 2009 period in the Creston Subarea is included in Figure 3-3. This figure shows the average groundwater levels in the subarea appear to have peaked at about 1999. Since this time, groundwater levels have generally declined. This may be due to the increase in water demands between 1997 and 2006.

Figure 3-3. Creston Subarea Composite Hydrograph and Annual Precipitation

Sub-Area Information	
Sub-Area	Creston
Basin Name	Paso Robles

Sub-Area Well Records	
Period of Record	1960-2009
Num. BMO Wells	4

Report Information	
Report Start Year	1981
Period of Record	1981-2009

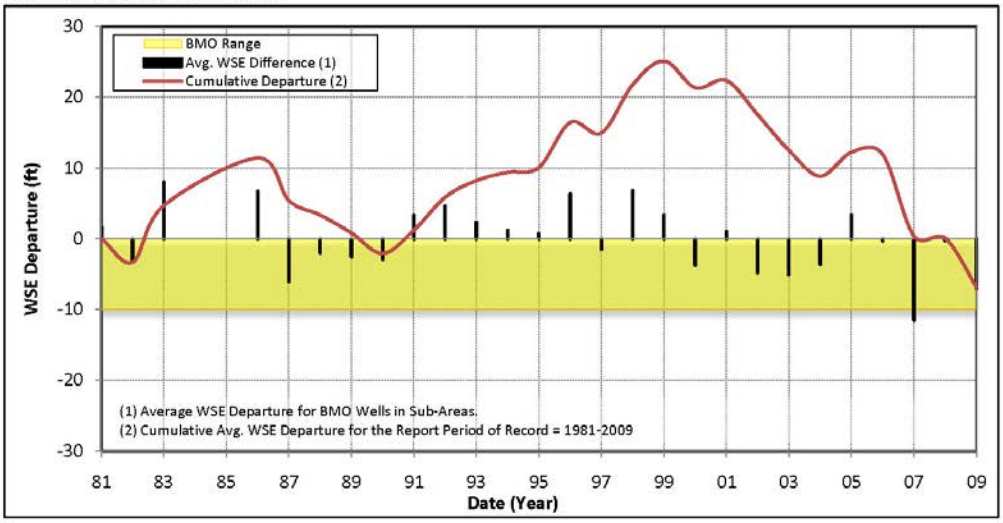
Raingage Information	
Raingage Name	Atas. Mutual Water # 34
Raingage Elev.	835.00 ft

Raingage Records	
Period of Record	1960-2009
Average Precip.	17.64 in

Trend Analysis Results	
BMO Departure[1)]	(10.00 ft)
2009 Departure	(6.91 ft)

NOTES: 1) BMO Cumulative Departure Since 1981

Water Surface Elevation Trends



Precipitation Trends

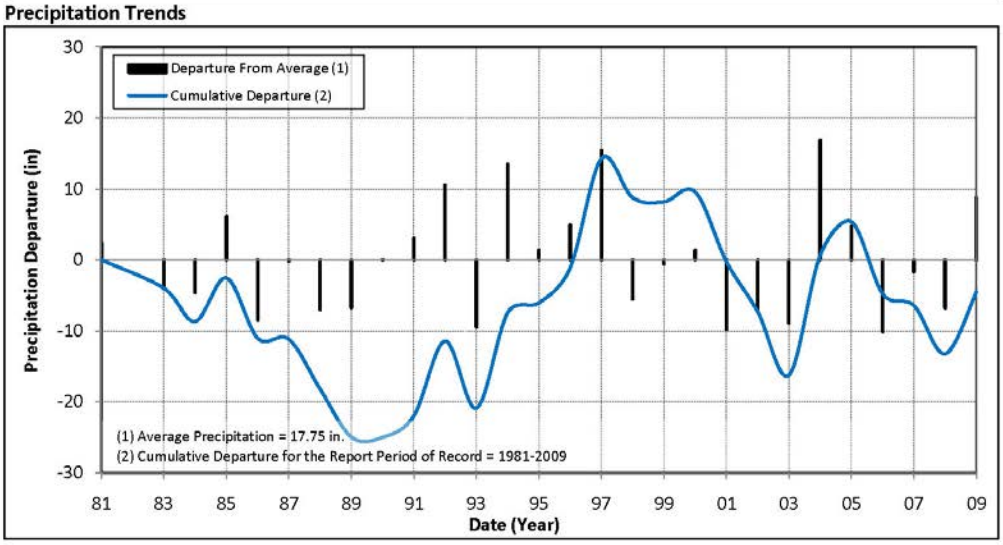


Table 3-3 presents the changes in BMO groundwater levels in the Creston Subbasin since 2008. In 2008, the composite BMO groundwater level decreased by 0.3 feet resulting in a cumulative groundwater level change of +0.1 feet since 1981 (10.1 feet above the BMO level). In 2009, the composite BMO groundwater level decreased by 7.0 feet resulting in a cumulative groundwater level change of -6.9 feet since 1981 (3.1 feet above the BMO level).

At this time, groundwater levels in the Creston Subarea are just within the established BMO level. It should be noted that the BMO wells selected from the Creston Subarea are not entirely representative of the entire subarea because no wells were available in the northwestern portion of the subarea. Based on the low and declining groundwater levels in the adjacent Estrella Subarea, groundwater levels in the northwestern portion of the Creston Subarea are anticipated to be lower than other parts of the subarea.

Table 3-3. Changes BMO Groundwater Levels in the Creston Subarea

Period	Annual Change (feet)	Cumulative Change Since 1981 (feet)	Comparison of Cumulative Change to BMO Level (feet)
BMO Groundwater Level			**-10**
2008 Observed Level	-0.3	+0.1	+10.1
2009 Observed Level	-7.0	-6.9	+3.1

3.4 Estrella Subarea

The location of the six wells identified to be representative of changes in groundwater level conditions in the Estrella Subarea is shown on Figure 3-1. The composite hydrograph showing the annual change and cumulative change in the average groundwater levels during the 1981 to 2009 period in the Estrella Subarea is included in Figure 3-4, which shows groundwater levels steadily declining during the period by over 70 feet. The Estrella Subarea recorded the largest decline in groundwater levels (about 50 feet) during the 1997 to 2009 period.

Figure 3-4. Estrella Subarea Composite Hydrograph and Annual Precipitation

Sub-Area Information	
Sub-Area	Estrella
Basin Name	Paso Robles

Sub-Area Well Records	
Period of Record	1967-2009
Num. BMO Wells	6

Report Information	
Report Start Year	1981
Period of Record	1981-2009

Raingage Information	
Raingage Name	Atas. Mutual Water # 34
Raingage Elev.	835.00 ft

Raingage Records	
Period of Record	1967-2009
Average Precip.	17.64 in

Trend Analysis Results	
BMO Departure[1)]	(60.00 ft)
2009 Departure	(75.43 ft)

NOTES: 1) BMO Cumulative Departure Since 1981

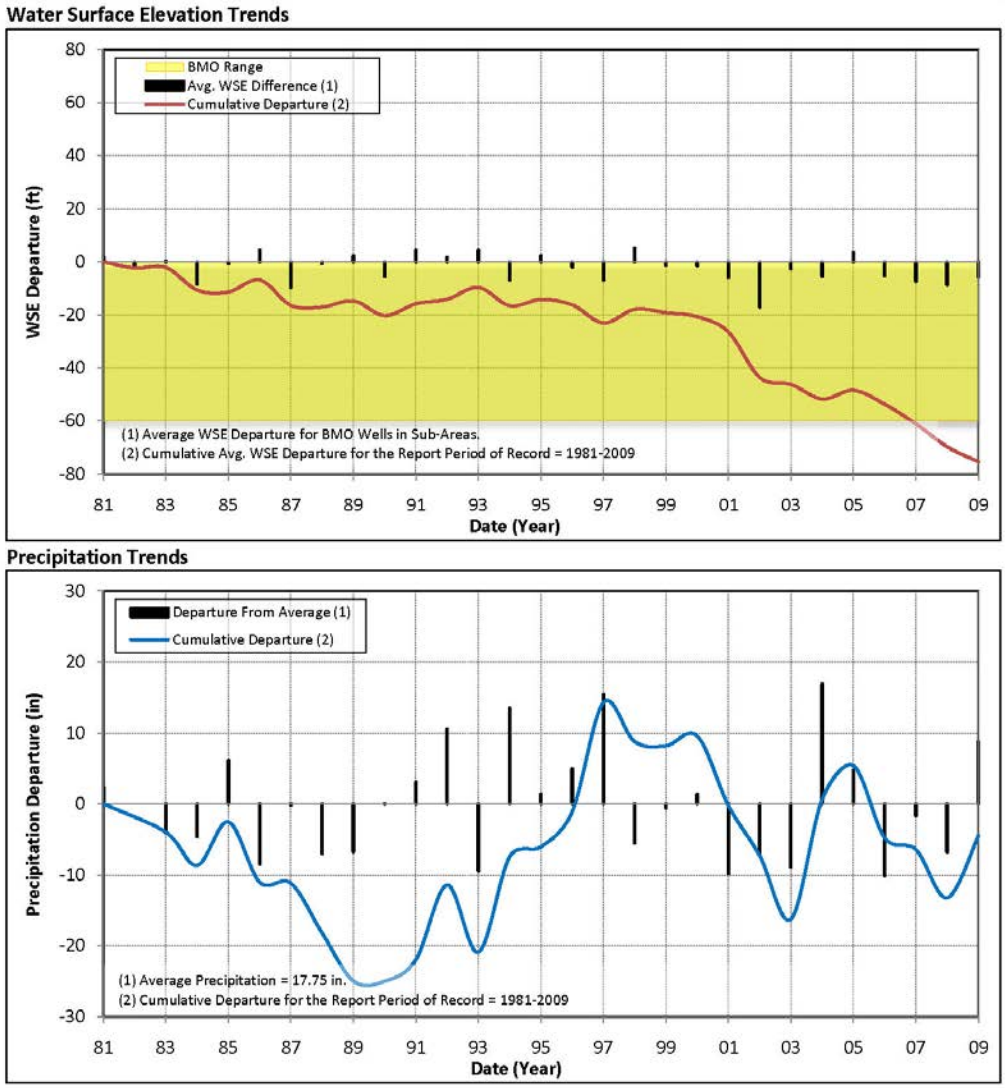


Table 3-4 presents the changes in BMO groundwater levels in the Estrella Subarea since 2008. In 2008, the composite BMO groundwater level decreased by 8.6 feet resulting in a cumulative groundwater level decline of 69.7 feet since 1981 (9.7 feet below the BMO level). In 2009, the composite BMO groundwater level decreased by 5.7 feet resulting in a cumulative groundwater level decline of 75.4 feet since 1981 (15.4 feet below the BMO level).

At this time, groundwater levels in the Estrella Subarea are below the established BMO level, and have dropped for the last two years.

Table 3-4. Changes BMO Groundwater Levels in the Estrella Subarea

Period	Annual Change (feet)	Cumulative Change Since 1981 (feet)	Comparison of Cumulative Change to BMO Level (feet)
BMO Groundwater Level			**-60**
2008 Observed Level	-8.6	-69.7	-9.7
2009 Observed Level	-5.7	-75.4	-15.4

3.5 North Gabilan Subarea

There is limited groundwater level data available, and no data that could be used to represent the average groundwater levels in the North Gabilan subarea. Additionally, there are no identified groundwater problems or issues that have been presented to the Groundwater Advisory Committee. Because of the limited available data and identification of groundwater issues in the subarea, it is not practical to identify BMOs that can be measured at this time.

3.6 San Juan Subarea

The location of the four wells identified to be representative of changes in groundwater level conditions in the San Juan Subarea is shown of Figure 3-1. The composite hydrograph showing the annual change and cumulative change in the average groundwater levels during the 1981 to 2009 period in the San Juan Subarea is included in Figure 3-5, which shows that the groundwater levels in the San Juan Subarea are highly variable on an annual basis. It appears that groundwater levels in the San Juan Subarea respond quickly to changes in hydrologic conditions, with average groundwater levels increasing or decreasing by as much as 35 feet in a single year. Overall, during the 1981 to 2009 period, average groundwater levels in the San Juan Subarea declined by about 25 feet.

Figure 3-5. San Juan Subarea Composite Hydrograph and Annual Precipitation

Sub-Area Information	
Sub-Area	San Juan
Basin Name	Paso Robles

Sub-Area Well Records	
Period of Record	1960-2009
Num. BMO Wells	4

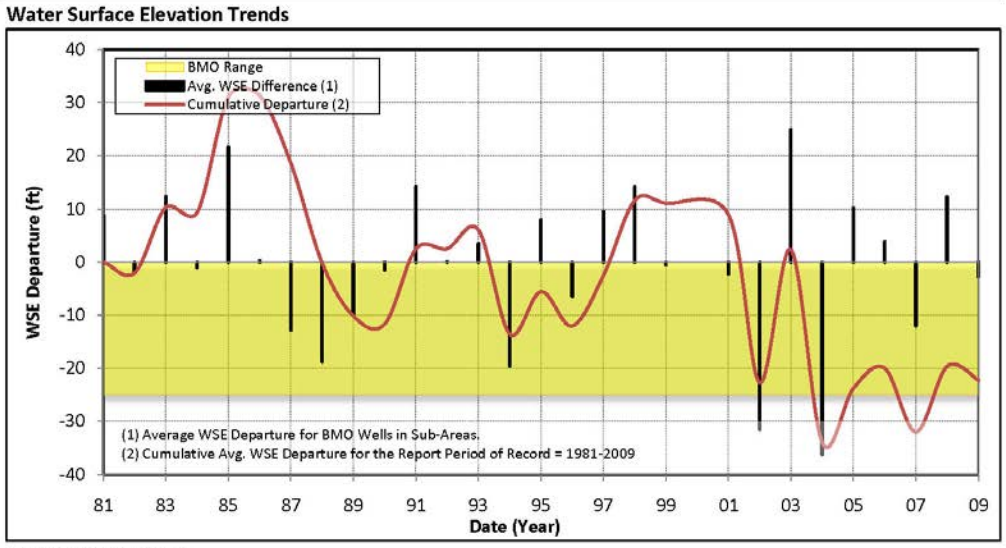
Report Information	
Report Start Year	1981
Period of Record	1981-2009

Raingage Information	
Raingage Name	Atas. Mutual Water # 34
Raingage Elev.	835.00 ft

Raingage Records	
Period of Record	1960-2009
Average Precip.	17.64 in

Trend Analysis Results	
BMO Departure[1)]	(25.00 ft)
2009 Departure	(22.24 ft)

NOTES: 1) BMO Cumulative Departure Since 1981



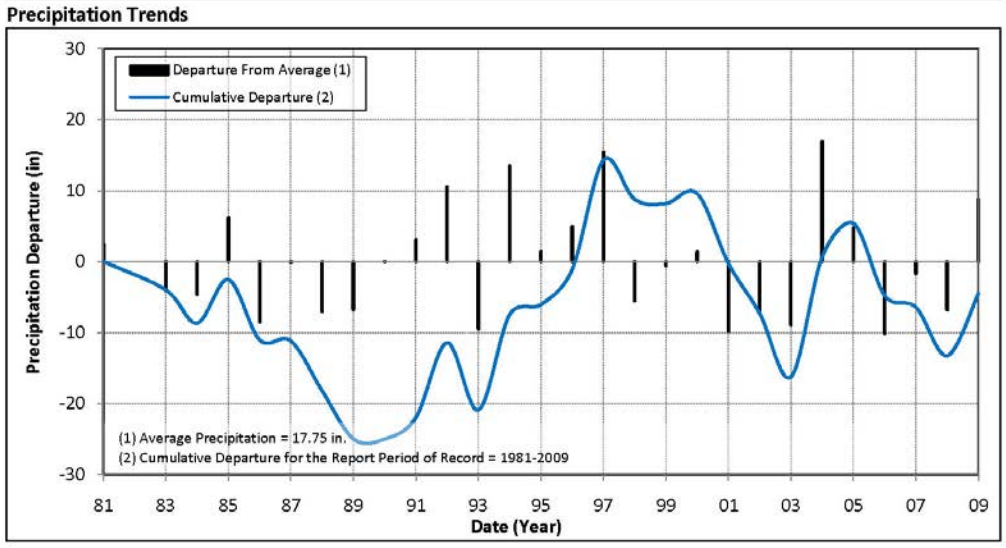


Table 3-5 presents the changes in BMO groundwater levels in the San Juan Subarea since 2008. In 2008, the composite BMO groundwater level decreased by 12.4 feet resulting in a cumulative groundwater level decline of 19.6 feet since 1981 (5.4 feet above the BMO level). In 2009, the composite BMO groundwater level decreased by 2.6 feet resulting in a cumulative groundwater level decline of 22.2 feet since 1981 (2.8 feet above the BMO level).

Since 2004, groundwater levels in the San Juan Subarea are near the established BMO level, but are not on a declining trend.

Table 3-5. Changes BMO Groundwater Levels for the San Juan Subarea

Period	Annual Change (feet)	Cumulative Change Since 1981 (feet)	Comparison of Cumulative Change to BMO Level (feet)
BMO Groundwater Level			**-25**
2008 Observed Level	12.4	-19.6	+5.4
2009 Observed Level	-2.6	-22.2	+2.8

3.7 Shandon Subarea

The location of the four wells identified to be representative of changes in groundwater level conditions in the Shandon Subarea is shown of Figure 3-1. The composite hydrograph showing the annual change and cumulative change in the average groundwater levels during the 1981 to 2009 period in the Shandon Subarea is included in Figure 3-6, which shows average groundwater levels in the Shandon Subarea declined by about 65 feet (about 2.3 feet per year), in response to a combination of increasing water demands that are met by groundwater.

Figure 3-6. Shandon Subarea Composite Hydrograph and Annual Precipitation

Sub-Area Information	
Sub-Area	Shandon
Basin Name	Paso Robles

Sub-Area Well Records	
Period of Record	1967-2009
Num. BMO Wells	4

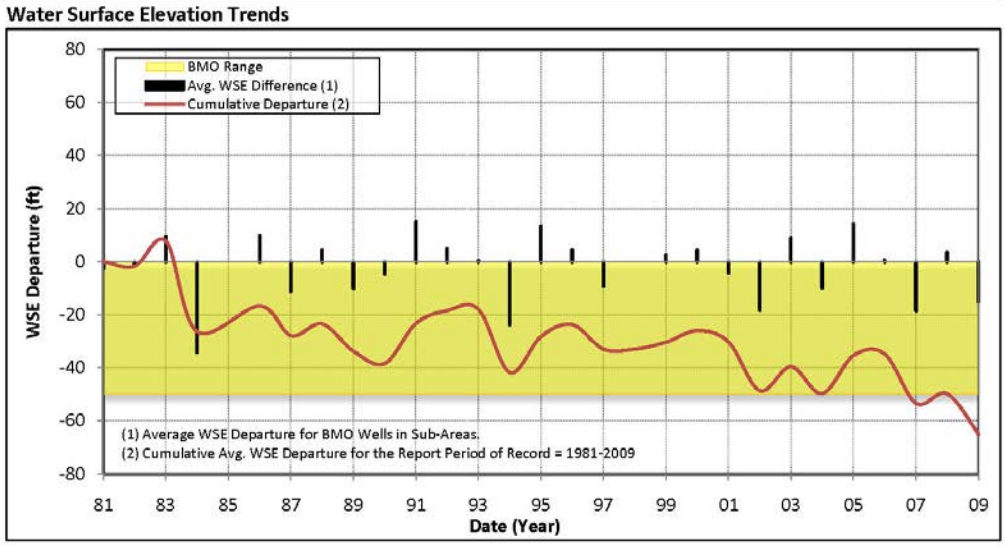
Report Information	
Report Start Year	1981
Period of Record	1981-2009

Raingage Information	
Raingage Name	Atas. Mutual Water # 34
Raingage Elev.	835.00 ft

Raingage Records	
Period of Record	1967-2009
Average Precip.	17.64 in

Trend Analysis Results	
BMO Departure[1)]	(50.00 ft)
2009 Departure	(64.99 ft)

NOTES: 1) BMO Cumulative Departure Since 1981



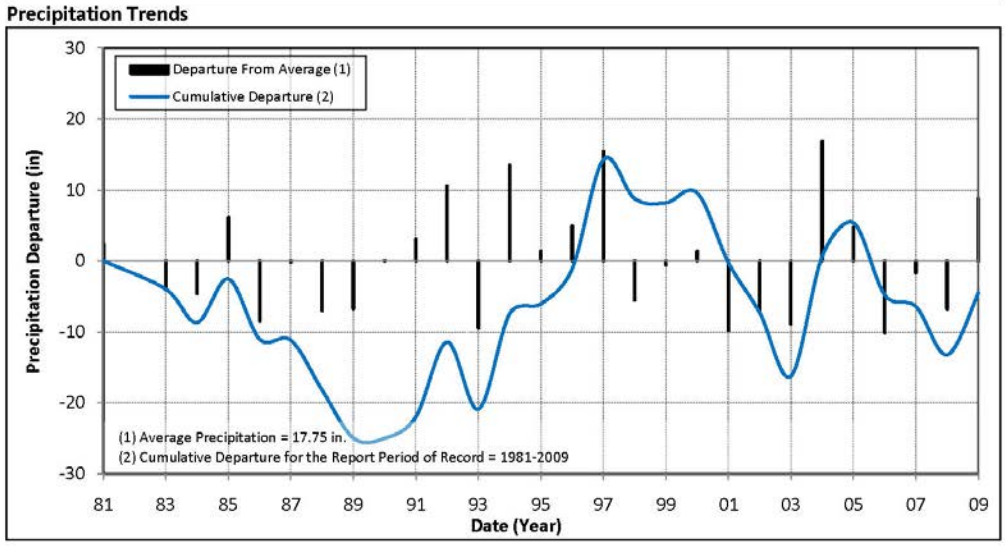


Table 3-6 presents the changes in BMO groundwater levels in the Shandon Subarea since 2008. In 2008, the composite BMO groundwater level increased by 3.6 feet resulting in a cumulative groundwater level decline of 49.7 feet since 1981 (0.3 feet above the BMO level). In 2009, the composite BMO groundwater level decreased by 15.2 feet resulting in a

cumulative groundwater level decline of 64.9 feet since 1981 (14.9 feet below the BMO level).

At this time, groundwater levels in the San Juan Subarea are below the established BMO level, and appear to be on a declining trend.

Table 3-6. Changes BMO Groundwater Levels in the Shandon Subarea

Period	Annual Change (feet)	Cumulative Change Since 1981 (feet)	Comparison of Cumulative Change to BMO Level (feet)
BMO Groundwater Level			**-50**
2008 Observed Level	3.6	-49.7	+0.3
2009 Observed Level	-15.2	-64.9	-14.9

3.8 South Gabilan Subarea

There is limited groundwater level data available, and no data that could be used to represent average groundwater levels in the subarea. Additionally, there are no identified groundwater problems or issues that have been presented to the Groundwater Advisory Committee.

Due to the limited available data and identification of groundwater issues in the subarea, it is not practical to identify BMOs that can be measured at present.

4 Status of Groundwater Management Activities

The Paso Robles Groundwater Management Plan identified over 70 Groundwater Management Activities (GMAs) that may be implemented over time to help meet the identified Basin Management Objectives. The complete list of GMAs is included in the Plan (see Table 7-1). Table 4-1 identifies the currently active GMAs. It includes the GMAs that were developed or active during the development of the Plan and identifies the activities that are anticipated to be undertaken in calendar year 2011.

The Plan included a variety of actions that are required by the Water Code, recommended by DWR Bulletin 118 California's Groundwater (DWR, 2003), and identified as optional programs under the Water Code. In the Plan, these actions are grouped into the following groundwater management components.

1. Stakeholder Involvement and Coordination
2. Groundwater Monitoring and Data Collection
3. Groundwater Resource Protection
4. Groundwater Sustainability
5. Water Management

The GMAs listed on Table 4-1 are identified by number corresponding to the groundwater management components identified in the Plan.

Table 4-1. Current Groundwater Management Activities

Groundwater Management Activity	Accomplishments during Development of Groundwater Management Plan	Anticipated Activities for Calendar Year 2011
1.2 - Formation of Implementation GAC	Formed Steering Committee to direct implementation of Groundwater Management Plan	Develop Steering Committee Meeting schedule for 2011 and Plan implementation
1.3 – Coordinate with Resource Capacity Study	Resource Capacity Study for Paso Robles Basin Certified by San Luis Obispo County Board of Supervisors in February 2011	• The San Luis Obispo County Planning Department is expected to develop schedule for implementing the land use actions identified in RCS
2.1 – Groundwater Elevation Monitoring	• San Luis Obispo County Flood Control and Water Conservation District was identified as monitoring entity for groundwater basins in County for the California Statewide Groundwater Elevation (CASGEMs) Program • Groundwater level data through 2009 used to support development of the Plan and the Basin Management Objectives	• Report 2011 groundwater levels to DWR as part of CASGEMs Program • Prepare Annual Monitoring Report for Calendar Year 2010 • Identify opportunities to expand groundwater level monitoring network • Identify opportunities to begin development of a dedicated groundwater level monitoring network • Identify new wells to become part of groundwater level monitoring program (as needed)
2.2– Groundwater Quality Monitoring	Groundwater quality data for the basin is provided to San Luis Obispo County Department of Public Works by water system operators within the County.	Continue to monitor water quality trends in the Basin.
2.4– Data Management System	• Develop tool to extract and present groundwater level data from County groundwater level database	
2.5– Project Reporting	• Prepare Annual Monitoring Report for Calendar Year 2009 • Establish annual reporting format	• Prepare Annual Monitoring Report for Calendar Year 2010
4.1 – Replenishment of Groundwater	• Continue efforts to deliver Nacimiento Project Water to the water users in the Paso Robles Groundwater Basin	• Continue efforts to deliver Nacimiento Project Water to the water users in the Paso Robles Groundwater Basin • Explore opportunities for unassigned Nacimiento Project Water

5.1 – Agricultural Water Management Practices	• Continuation of the UC Extension Study on vineyard irrigation practices • Paso Robles Wine Country Alliance (PRWCA) represents member vineyard during development of GMP, including serving on the Steering Committee for Plan implementation	• Continuation of the UC Extension Study on vineyard irrigation practices • Continue to encourage implementation of best management practices amount vineyard owners • Ensure new wineries use best management practices consist with BMP's identified in RCS
5.2 – Urban Water Management Practices	• Urban water purveyors continue to implement water conservation BMPs	• Continue to implement water conservation and demand management programs
5.3 – Rural Residential Water Management Practices	• Rural residential stakeholders participate in development of Groundwater Management Plan	• Revise Growth Management Ordinance to limit yearly non-agricultural development in rural areas of the Basin • County will develop a landscape ordinance to limit the amount of turf and other high-water use features on parcels.